DAIKIN

SiBE12-908

Preliminary

Service Manual

Inverter Multi System with Humidifying
G-Series

[Applied Models]
● Inverter Multi : Heat Pump

Inverter Multi System with Humidifying G-Series

●Heat Pump

Indoor Unit

CTXU25G2V1B
CTXU35G2V1B
CTXU42G2V1B
CTXU50G2V1B

Outdoor Unit

2MXU40GV1B
2MXU50GV1B

Part 4
Function and Control

1. Main Functions

1.1 Frequency Principle

Main Control Parameters

The compressor is frequency-controlled during normal operation. The target frequency is set by the following 2 parameters coming from the operating indoor unit:

- The load condition of the operating indoor unit
- The difference between the room temperature and the set temperature

Additional Control Parameters

The target frequency is adapted by additional parameters in the following cases:

- Frequency restrictions
- Initial settings
- Forced cooling operation

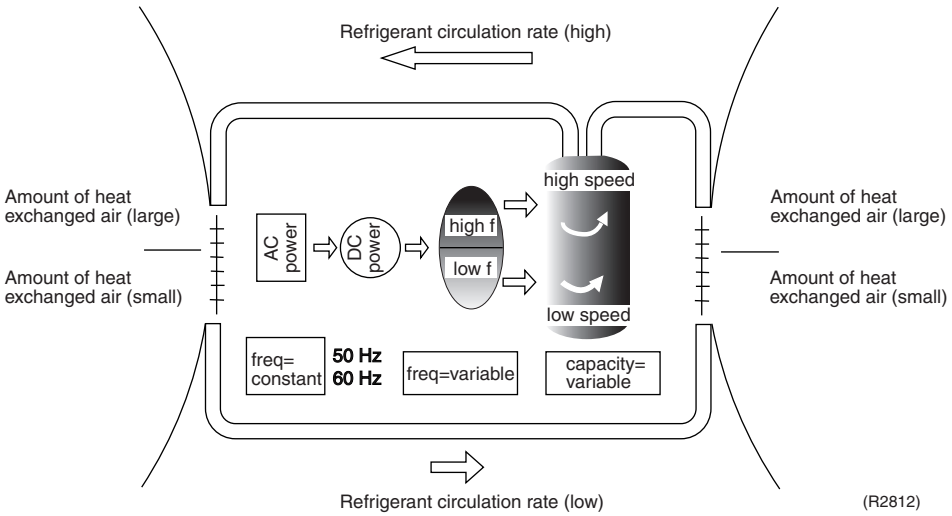
Inverter Principle

To regulate the capacity, a frequency control is needed. The inverter makes it possible to vary the rotation speed of the compressor. The following table explains the conversion principle:

Phase	Description
1	The supplied AC power source is converted into the DC power source for the present.
2	The DC power source is reconverted into the three phase AC power source with variable frequency. ■ When the frequency increases, the rotation speed of the compressor increases resulting in an increased refrigerant circulation. This leads to a higher amount of the heat exchange per unit. ■ When the frequency decreases, the rotation speed of the compressor decreases resulting in a decreased refrigerant circulation. This leads to a lower amount of the heat exchange per unit.

Drawing of Inverter

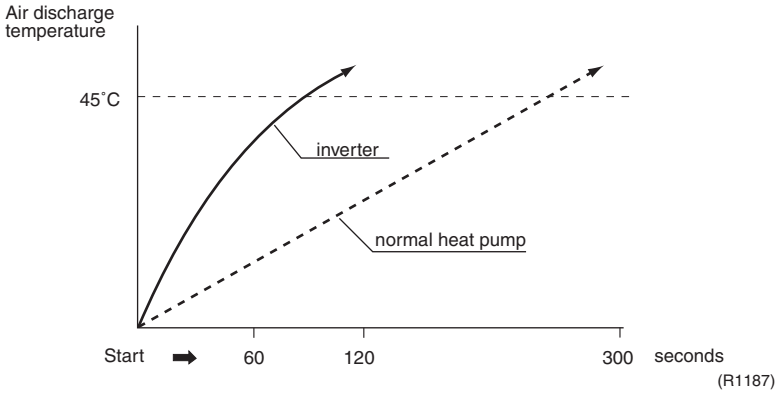
The following drawing shows a schematic view of the inverter principle:



Inverter Features

The inverter provides the following features:

- The regulating capacity can be changed according to the changes in the outdoor air temperature and cooling / heating load.
- Quick heating and quick cooling
  The compressor rotational speed is increased when starting the heating (or cooling). This enables a quick set temperature.



- Even during extreme cold weather, the high capacity is achieved. It is maintained even when the outdoor air temperature is 2°C.
- Comfortable air conditioning
  A detailed adjustment is integrated to ensure a fixed room temperature. It is possible to air condition with a small room temperature variation.
- Energy saving heating and cooling
  Once the set temperature is reached, the energy saving operation enables to maintain the room temperature at low power.

Frequency Limits

The following table shows the functions that define the minimum and maximum frequency:

Frequency limits	Limited during the activation of following functions
Low	■ Four way valve operation compensation. Refer to page 31.
High	■ Discharge pipe temperature control. Refer to page 33. ■ Input current control. Refer to page 33. ■ Compressor protection function. Refer to page 32. ■ Heating peak-cut control. Refer to page 34. ■ Freeze-up protection control. Refer to page 34. ■ Defrost control. Refer to page 36.

Forced Cooling Operation

For more information, refer to “Forced operation mode” on page 42.

1.2 Thermostat Control

Thermostat control is based on the difference between the room temperature and the set point.

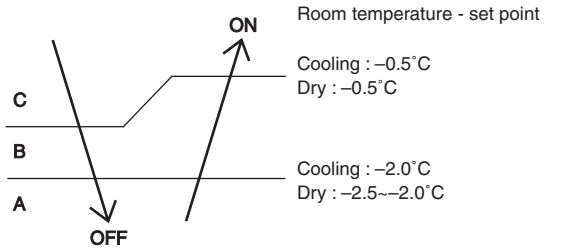
Thermostat OFF Condition

- The temperature difference is in the zone A.

Thermostat ON Condition

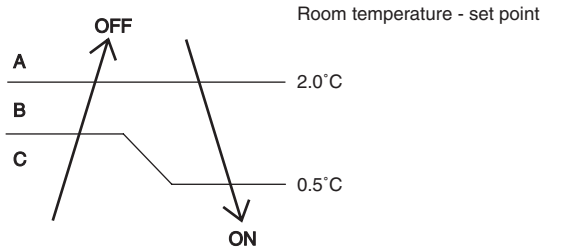
- The temperature difference is above the zone C after being in the zone A.
- The system resumes from defrost control in any zones except A.
- The operation turns on in any zones except A.
- The monitoring time has passed while the temperature difference is in the zone B. (Cooling / Dry : 10 minutes, Heating : 10 seconds)

Cooling / Dry



(R4668)

Heating



(R9424)

1.3 Automatic Operation

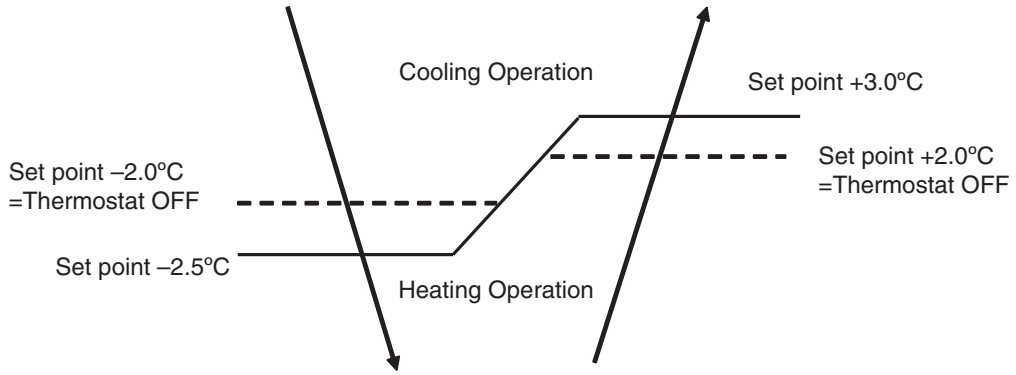
Automatic Cooling / Heating Function

When the AUTO mode is selected with the remote controller, the microcomputer automatically determines the operation mode from cooling and heating according to the room temperature and setting temperature at the time of the operation startup, and automatically operates in that mode.

The unit automatically switches the operation mode to cooling or heating to maintain the room temperature at the main unit setting temperature.

Detailed Explanation of the Function

1. Remote controller setting temperature is set as automatic cooling / heating setting temperature (18 to 30°C).
2. Main unit setting temperature equals remote controller setting temperature.
3. Mode switching point are as follows.
   ① Heating → Cooling switching point:
   Room temperature ≥ Main unit setting temperature +3.0 deg.
   ② Cooling → Heating switching point:
   Room temperature < Main unit setting temperature –2.5 deg.
   ③ Thermostat ON / OFF point is the same as the ON / OFF point of cooling or heating operation.
4. During initial operation
   Room temperature ≥ Remote controller setting temperature: Cooling operation
   Room temperature < Remote controller setting temperature: Heating operation



(R9417)

Ex: When the set point is 25°C

Cooling Operation → 23°C: Thermostat OFF → 22°C: Switch to Heating Operation
Heating Operation → 27°C: Thermostat OFF → 28°C: Switch to Cooling Operation

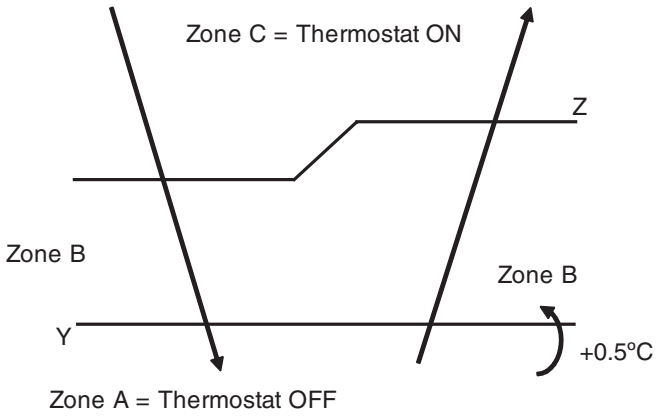
1.4 Programme Dry Function

Programme dry function removes humidity while preventing the room temperature from lowering.
Since the microcomputer controls both the temperature and airflow volume, the temperature adjustment and fan adjustment buttons are inoperable in this mode.

In Case of Inverter Units

The microcomputer automatically sets the temperature and fan settings. The difference between the room temperature at startup and the temperature set by the microcomputer is divided into two zones. Then, the unit operates in the dry mode with an appropriate capacity for each zone to maintain the temperature and humidity at a comfortable level.

Room temperature at startup	Set temperature X	Thermostat OFF point Y	Thermostat ON point Z
24°C or more	Room temperature at startup	X – 2.5°C	X – 0.5°C or Y + 0.5°C (zone B) continues for 10 min.
23.5°C ~ 18°C		X – 2.0°C	X – 0.5°C or Y + 0.5°C (zone B) continues for 10 min.
17.5°C ~	18°C	X – 2.0°C	X – 0.5°C = 17.5°C or Y + 0.5°C (zone B) continues for 10 min.



(R6841)

1.5 Airflow Direction Control

Power-Airflow Dual Flaps

The large flaps send a large volume of air downwards to the floor. The flap provides an optimum control area in cooling, heating, and dry mode.

Heating Mode
During heating mode, the large flap enables direct warm air straight downwards. The flap presses the warm air above the floor to reach the entire room.

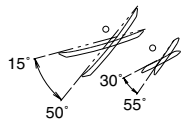
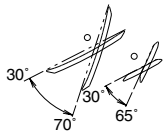
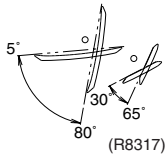
Cooling / Dry Mode
During cooling or dry mode, the flap retracts into the indoor unit. Then, cool air can be blown far and pervaded all over the room.

Wide-Angle Louvres

The louvres, made of elastic synthetic resin, provide a wide range of airflow that guarantees a comfortable air distribution.

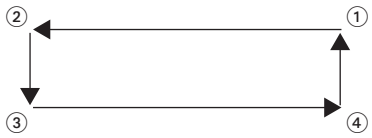
Auto-Swing

The following table explains the auto swing process for heating, cooling, dry, and fan :

Vertical Swing (up and down)			Horizontal Swing (right and left: automatic)
Cooling / Dry	Heating	Fan	
 (R8315)	 (R8316)	 (R8317)	 (R8318)

3-D Airflow

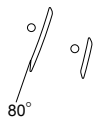
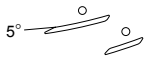
- Alternative repetition of vertical and horizontal swing motions enables uniform air-conditioning of the entire room. This function is effective for starting the air conditioner.
- When the horizontal swing and vertical swing are both set to auto mode, the airflow become 3-D airflow and the horizontal swing and vertical swing motions are alternated. The order of swing motion is such that it turns counterclockwise, starting from the right upper point as viewed to the front side of the indoor unit.



(R1024)

COMFORT AIRFLOW

The vertical swing flap is controlled not to blow the air directly on the person in the room.

Heating	Cooling
 (R8413)	 (R4302)

1.6 Fan Speed Control for Indoor Units

Control Mode

The airflow rate can be automatically controlled depending on the difference between the set temperature and the room temperature. This is done through phase control and Hall IC control.

For more information about Hall IC, refer to the troubleshooting for fan motor on page 116.

Phase Steps

Phase control and fan speed control contains 9 steps: LLL, LL, SL, L, ML, M, MH, H and HH. In automatic fan speed operation, the step “SL” is not available.

Step	Cooling	Heating
LLL	 (R6833)	 (R6834)
LL		
L		
ML		
M		
MH		
H		
HH (POWERFUL)		

= The airflow rate is automatically controlled within this range when the FAN setting button is set to automatic.

Note:

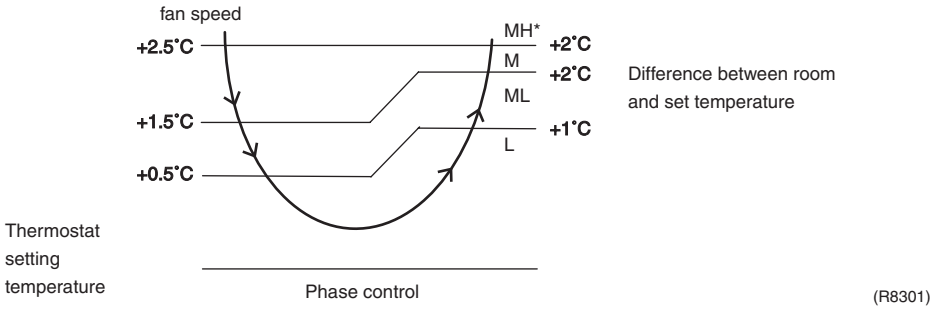
1. During POWERFUL operation, fan operates H tap + 50 rpm.
2. Fan stops during defrost operation.
3. In time of thermostat OFF, the fan rotates at the following speed.
   Cooling: The fan keeps rotating at the set tap.
   Heating: The fan stops.
   Dry: The fan will stop after keeps rotating for a few minutes at LL tap.

Automatic Airflow Control for Heating

On heating mode, the indoor fan speed will be regulated according to the indoor heat exchanger temperature and the difference between the room temperature and the required set point.

Automatic Airflow Control for Cooling

The following drawing explains the principle of fan speed control for cooling:



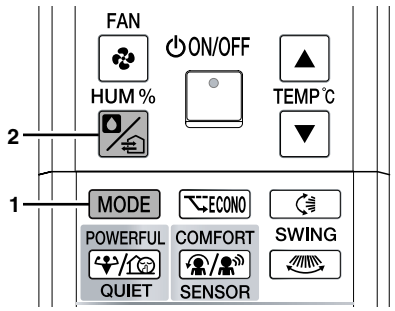
Note: *In automatic fan speed operation, upper limit is at M tap in 30 minutes from the operation start.

COMFORT AIRFLOW Mode

- The airflow rate is controlled automatically within the following steps.
  Cooling: L tap – MH tap (same as AUTOMATIC)
  Heating: ML tap – MH tap
- The latest command has the priority between POWERFUL and COMFORT AIRFLOW.

1.7 HUMID HEAT Operation

Operation



(R9409)

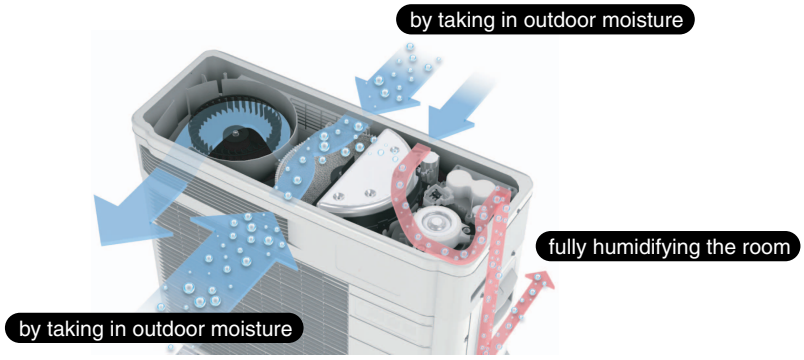
1. Select HEAT mode.
2. Set humidity.

∗ Refer to the operation manual for details.

Features

■ **A world first new humidifying method has adopted**

What is new in this method is to intake vapor in the outdoor air with the hygroscopic element mounted in outdoor unit, and send indoors. This has enabled powerful and speedy humidification apart from other company's methods which just absorb moisture in the indoor air.



(R9410)

■ **The room is uniformly humidified.**

- Humidifier + heating operation by air conditioner
  Moisture gathers around the ceiling, as it is lighter than the air even if the humidifier is operated. The air on the floor is kept dry.

When using humidifier, moisture gathers around the ceiling.

(R3325)

- HUMID HEAT operation by URURU
  This air conditioner enables uniformly humidifying the room by circulating vapor with warm air.

The room is uniformly humidified.

(R3326)

- **Powerful humidifying ability**
  The humidifying capacity is 450 ml/h and equivalent to that of a normal humidifier.
  The value is measured at 7°C DB / 6°C WB of outdoor air and with 4.0 m of humidifying hose length.
- **No need for water supply nor cleaning**
  Water supply and cleaning are unnecessary as it does not have water tank, unlike humidifiers, and there is no proliferations of bacteria.
- **Humidity control**
  The target of the humidity level is 40 to 50%RH.
  You can select from Low, STD (standard), Hi (high), and CONT (continuous). The target humidity (%) cannot be set.

Note

- When the outdoor temperature and humidity are low, the humidifying capacity is decreased. In addition, the moisture in the room may not attain sufficient humidity when the ventilation volume is high, the preset temperature is high, or the preset humidity is HIGH.
- After the “humid heating” operation starts, the relative humidity in the room lowers temporarily. This phenomenon is caused by the increase of the saturation water vapor. Therefore, the humidity raises gradually after the temperature reaches the preset temperature.
- In the humidifying operation, the operation sound increases by about 2 dB in the indoor unit and 3 dB in the outdoor unit.
- This system does not suppose the storage of musical instruments or the like.

Conditions for Humidifying Operation

While heating mode, humidifying operation can be available when the following conditions 1~5 are met at the same time.

1. Indoor heat exchanger temperature is 12°C or more.
2. Outdoor temperature is from –10°C to 24°C (meanwhile, in test operation, up to 34°C is possible). Humidifying operation does not work under –10°C.
3. Approx. 1 minute has already passed after heating operation startup. (See Note.)
4. Heating operation does not work to its full capacity. (Meanwhile, the “continuous” humidification is selected, humidifying operation has the priority.)
5. Room humidity is under 70%RH.

Note

- Exclude the case when it is recovered from thermostat-off or when the defrosting operation finished.

How to Check the Motion of Humidifying Operation

You can check whether the humidifying unit is in good working order. If you set HUMID HEAT test operation (refer to the installation manual for details), you can check even beyond the range of the conditions for humidifying operation.

1. Hygroscopic fan ..... Air is exhaled from the front exhaust outlet of outdoor unit.
2. Humidifying fan/heater/damper ... Warm air is blown from the duct of outdoor unit.
3. Humidification rotor ..... The rotor is rotating with top panel off.

As for the performance, estimate from psychrometric chart with the measured temperature and humidity of the outdoor air and of the humidified air (in front of the indoor outlet) using thermal hygrometer.

Airflow rate (m^3/min)
0.38

Humidity Fluctuation by Temperature Settings

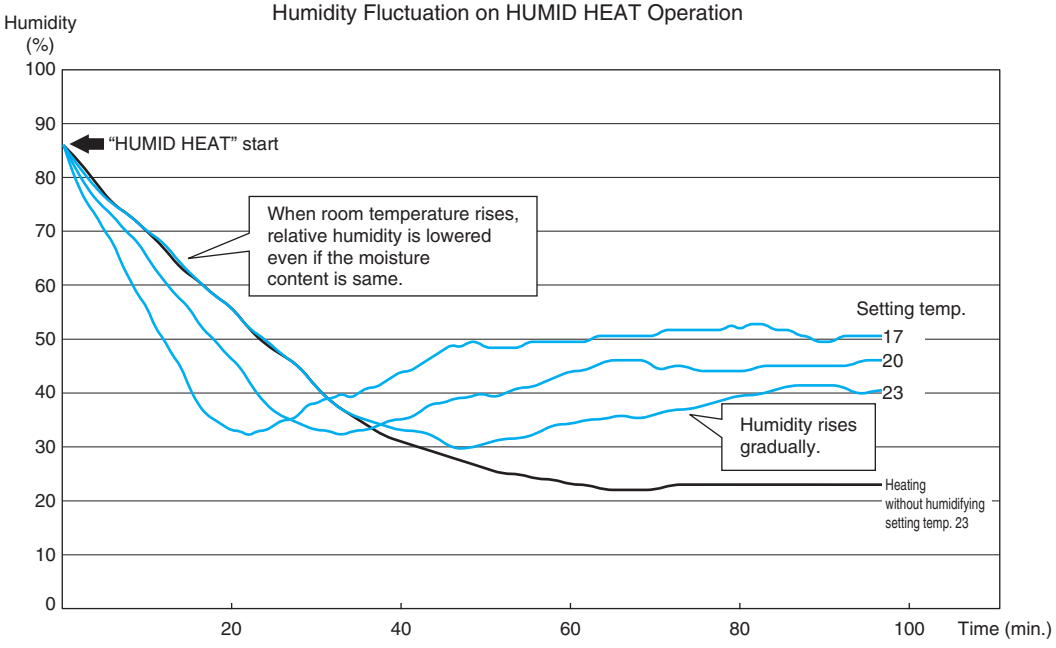
At HUMID HEAT operation, as room temperature rises, relative humidity is temporarily lowered. This is because as room temperature rises, relative humidity is lowered even if the moisture content is the same.

e.g.) The rise in the room temperature from 15°C to 25°C will result in the fall in humidity from 40%RH to about 22%RH.

As humidifying operation starts concurrently with heating, humidity rises gradually as shown in the figure below.

Some room conditions (floor space, ventilation frequency, number of residents, etc.) and temperature settings (mostly higher settings) may result in unsatisfactory humidity settings.

Humidity Fluctuation on HUMID HEAT Operation

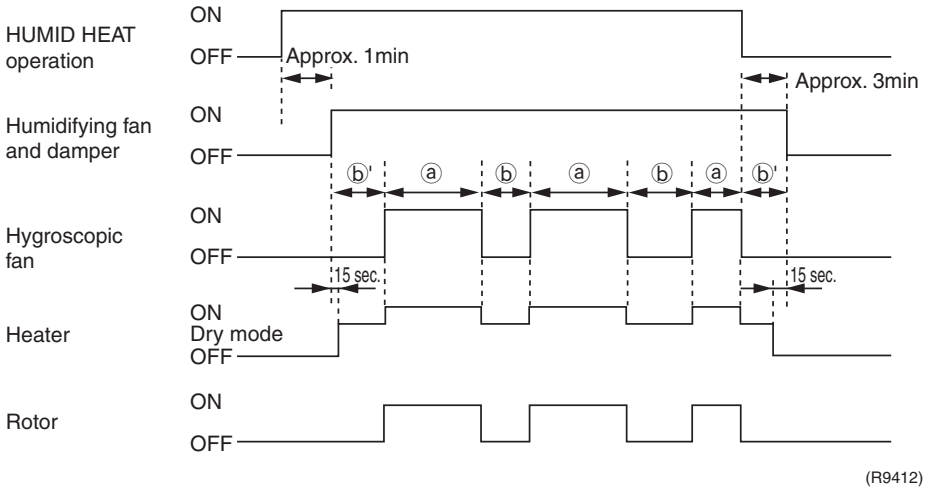


Measurement Conditions
Outdoor temp.: 7
HUMID HEAT operation setting:
Temp.; each setting as below, Humidity; "CONT" (Continuous)
Airflow rate setting: H tap
Area of the room: 26.4 m^2
Humidifying hose length: 4.0 m
Ventilation: 0.75 times/hour
0.5 times of natural ventilation
0.25 times of humidity absorption by a carpet, a curtain, etc.

(R9411)

Time chart for humidifying operation control

Approx. 1min. after HUMID HEAT operation start up, it repeats humidifying and drying alternately (to protect condensation for inside the hose).



ⓐ. Humidifying time	Approx. 70min.	Decide time according to the outdoor temperature and hose length set by remote controller.
ⓑ. Drying time	Approx. 2~10min.	Decide time according to the hose length set by remote controller.
ⓑ'. Drying time	Approx. 2~10min.	

■ **Time chart for HUMID HEAT operation on trial mode**

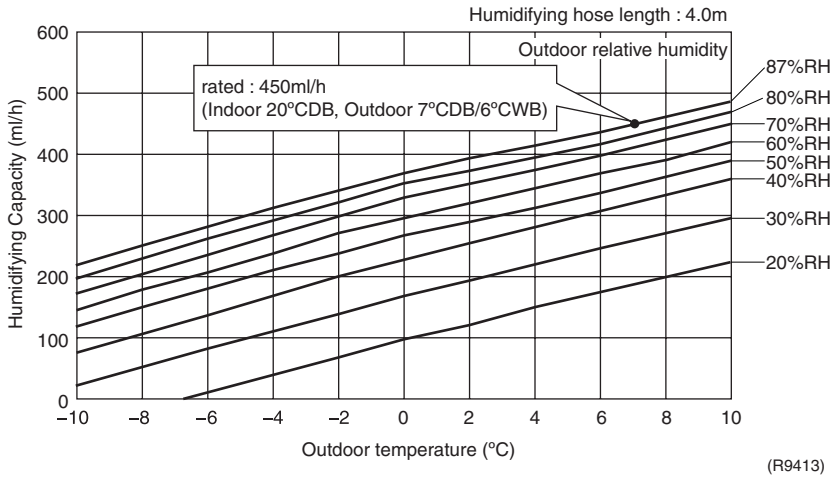
HUMID HEAT operation on trial mode works in the same sequence as HUMID HEAT operation, but about 30 min. later it automatically stops.

■ **Remark**

When a room is spacious such as loft style or partitioned by accordion style curtain, the ventilation volume is large and may not sometimes reach the set humidity.

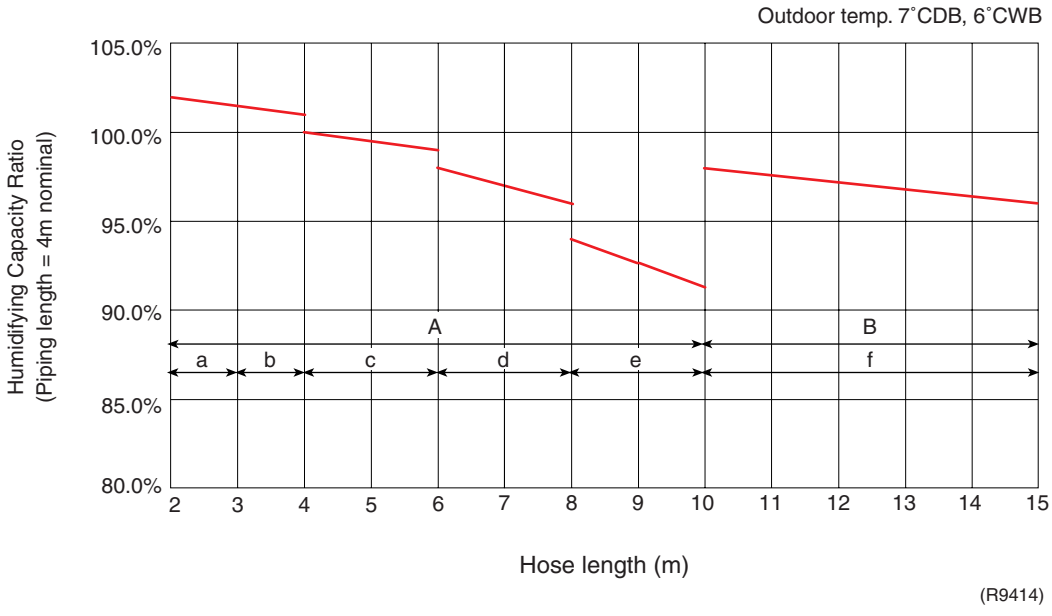
Humidification performance by outdoor temperature

The humidifying of this system is different from that of the normal humidifier. Therefore, the humidifying performance varies with the outdoor temperature or installation condition. Sufficient humidifying capacity may not be attained depending on the weather condition in operation.
When the outdoor temperature lowers by 5°C, the humidifying capacity is decreased by about 15%.
When the outdoor humidity lowers by 20%, the humidifying capacity is decreased by about 20%.



Performance compensation by hose length

The max. piping length is 15 m, but the longer the length of the humidifying hose becomes, the less the humidifying performance becomes.

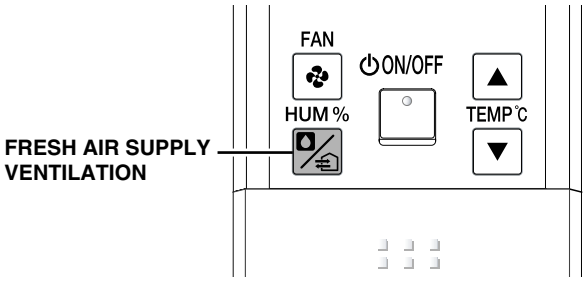


Applicable hose (Hose diameter)
A : KPMH996A10S (I.D.25mm)
B : KPMH996A15S (I.D.30mm)

Hose length setting
a : ~3.0m, b : 3.1~4.0m, c : 4.1~6.0m, d : 6.1~8.0m,
e : 8.1~10.0m, f : 10.1m~

1.8 FRESH AIR SUPPLY VENTILATION

Operation

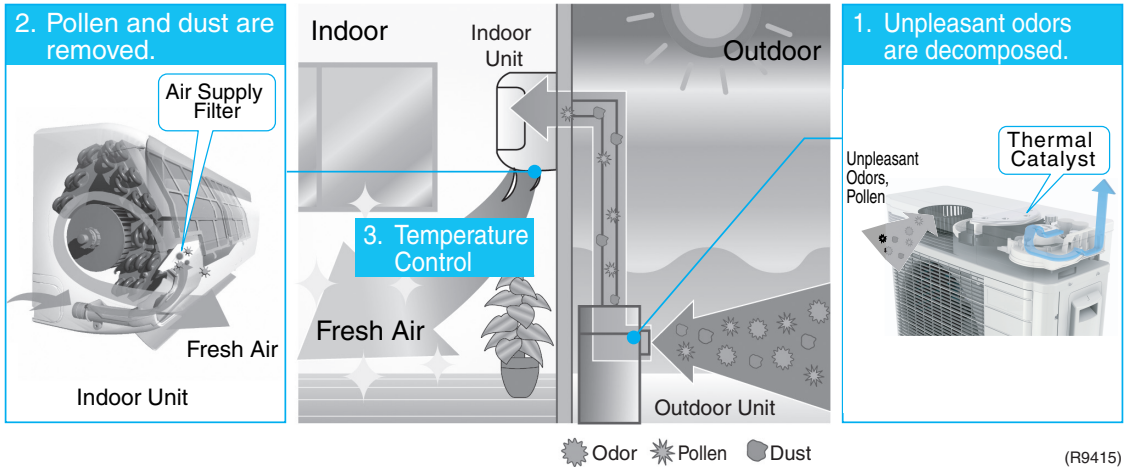


(R9425)

* Refer to the operation manual for details.

Features

The air supply ventilation system using only fresh air.
Any contaminated outdoor air is purified in two stages of indoor unit and outdoor unit. Fresh air from which bacteria were removed is supplied into the room.



(R9415)

1. **Purifying air in the outdoor unit**
   Thermal catalyst containing in the humidifying rotor analyzes unpleasant odor and also removes exhaust gases (NOx, SOx).
   Manganese catalyst used to treat the automotive exhaust gas is adopted for the thermal catalyst.

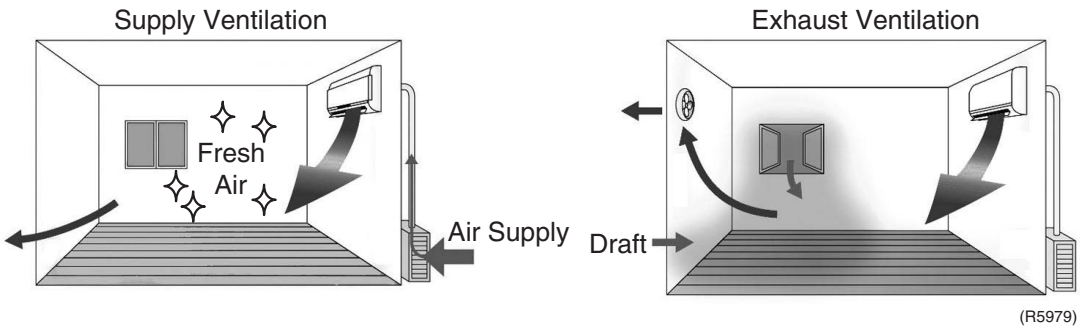
2. **Purifying air in the indoor unit**
   The air supply filter is placed at the humidifying hose outlet of the indoor unit side.
   The air supply filter removes about 97% pollen and dust.

3. **Controlling temperature**
   The fresh air passed through the air supply filter is cooled (or heated) in the indoor unit and supplied into the room.
   You can keep comfortable temperature and also replace air because the ventilation is performed while temperature is controlled.

Pollen, exhaust gas and odor that could not be removed by the thermal catalyst and air supply filter will be decomposed by photocatalyst.

■ Ventilation System

The ventilation type is mainly divided into two. The convenient system is supply ventilation.



- Quiet because the ventilation fan is located in the outdoor unit
- Energy saving system due to low heat loss
- The room temperature changes little because no wind enters

- Operation noise is heard because the ventilation fan is located in the room.
- Electricity charges are high because heat loss is high.
- Draft enters easily to prevent comfortable temperature from being kept.

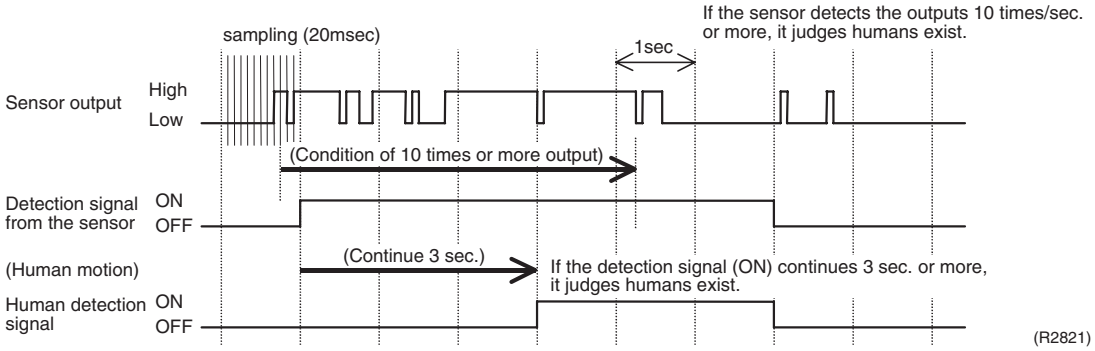
1.9 2-AREA INTELLIGENT EYE

The following functions can be performed by a human motion sensor (INTELLIGENT EYE).

1. Reduces the capacity when there is no human in the room in order to save electricity. (energy saving operation)
2. Divides the room into plural areas and detects existence of humans in each area. Shifts the airflow direction to the area having no human automatically to avoid direct airflow on humans.

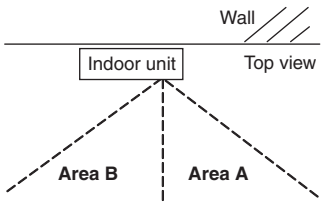
Processing

1. Detection method by INTELLIGENT EYE



- This sensor detects human motion by receiving infrared rays and displays the pulse wave output.
- A microcomputer in an indoor unit carries out a sampling every 20 msec. and if it detects 10 cycles of the wave in one second in total (corresponding to 20msec.× 10 = 200msec.), and when the ON signal continues 3 sec., it judges human is in the room as the motion signal is ON
- INTELLIGENT EYE sensor is divided into 2 areas and detects humans in each area.

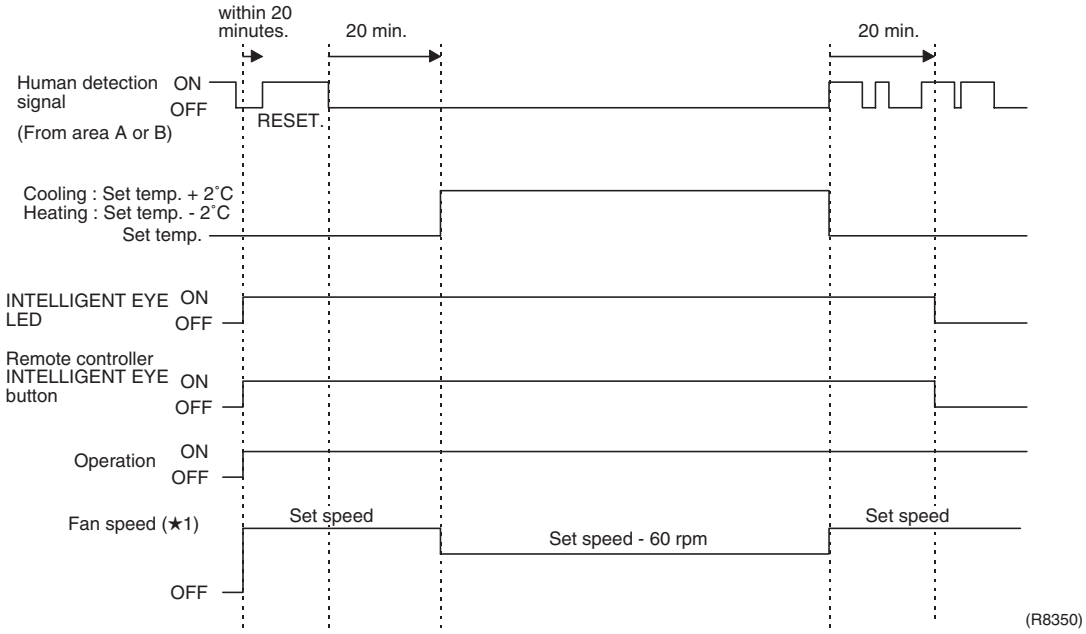
■ **Image of 2-AREA INTELLIGENT EYE**



· A microcomputer judges human existence in area A and B by the sensor signal from each

(R3854)

2. The motions in energy saving operation (for example: in cooling)

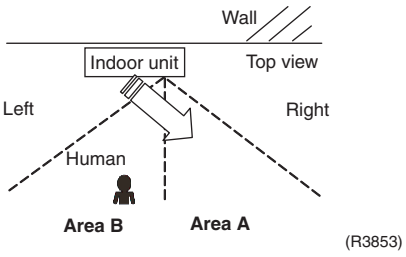


- When a microcomputer doesn't have a signal from the sensor in 20 minutes, it judges that nobody is in the room and operates the unit in temperature shifted 2°C from the set temperature. (Cooling/Dry : 2°C higher, Heating : 2°C lower and AUTO : according to the operation mode at that time.)

★1 In case of FAN mode, the fan speed reduces by 60 rpm.

3. Airflow direction in 2-AREA INTELLIGENT EYE operation

- Detection method: The opposite area of detected area is set as the target direction.



1. Detection signal ON in both area A and B: Shift the airflow direction to area B (left side)
2. Detection signal ON in area A: Shift the airflow direction to area B (left side)
3. Detection signal ON in area B: Shift the airflow direction to area A (right side)
4. Detection signal OFF in both area A and B: No change

* When the detection signal OFF in both area A and B, the unit starts energy saving operation.

Others

- The dry operation can not command the setting temperature with a remote controller, but internally the set temperature is shifted by 1°C.

1.10 Inverter POWERFUL Operation

Outline

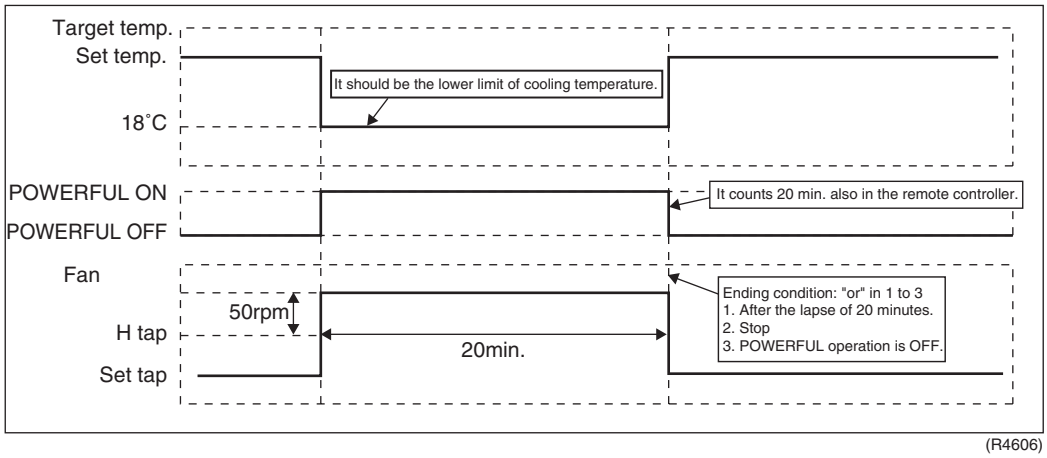
In order to exploit the cooling and heating capacity to full extent, operate the air conditioner by increasing the indoor fan rotating speed and the compressor frequency.

Details of the Control

When POWERFUL button is pushed in each operation mode, the fan speed / setting temperature will be converted to the following states in a period of 20 minutes.

Operation mode	Fan speed	Remote controller set temperature
COOL	H tap + 50 rpm	18°C
DRY	Dry rotating speed + 50 rpm	Normally targeted temperature in dry operation; Approx. –2°C
HEAT	H tap + 50 rpm	30°C
FAN	H tap + 50 rpm	—
AUTO	Same as cooling / heating in POWERFUL operation	The target is kept unchanged

Ex.) : POWERFUL operation in cooling mode.



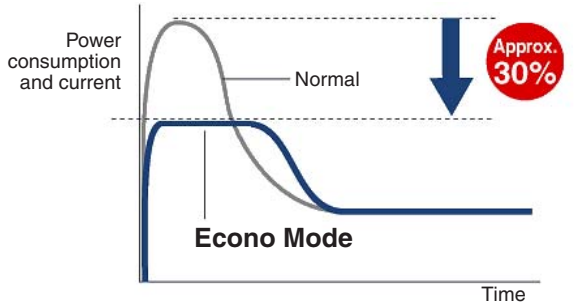
(R4606)

1.11 ECONO Mode

Outline

The "ECONO mode" reduces the maximum operating current and power consumption by approx. 30% during start up etc..
This mode is particularly convenient for energy-saving-oriented users. It is also a major bonus for those whose breaker capacities do not allow the use of multiple electrical devices and air conditioners.
It is easily activated from the wireless remote controller by pushing the ECONO button.

- When this function is ON, the maximum capacity is also down. (Approx. 20%)
- This function can only be set when the unit is running. Pressing the operation stop button causes the settings to be canceled.
- This function and POWERFUL operation cannot be used at the same time. The latest command has the priority.



(R4300)

Details

- ECONO mode can be activated while the unit is running. The remote controller can send the ECONO command when the unit is in COOL, HEAT, DRY, or AUTO operation.
- When the ECONO command is valid, the input current is under reducing control.
(Refer to "Input current control" on page 33.)

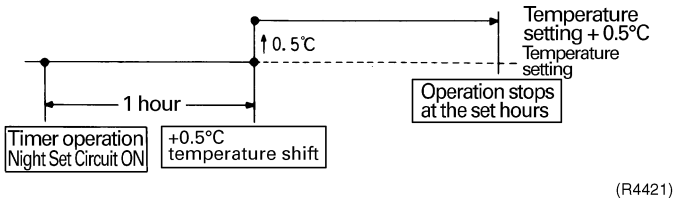
1.12 NIGHT SET Mode

When the OFF timer is set, the NIGHT SET circuit automatically activates.
The NIGHT SET circuit maintains the airflow setting made by users.

The NIGHT SET Circuit

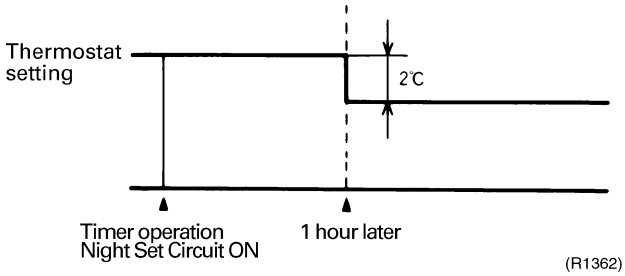
The NIGHT SET circuit continues heating or cooling the room at the set temperature for the first one hour, then automatically raises the temperature setting slightly in the case of cooling, or lowers it slightly in the case of heating, for economical operations. This prevents excessive heating in winter and excessive cooling in summer to ensure comfortable sleeping conditions, and also conserves electricity.

Cooling Operation



(R4421)

Heating Operation



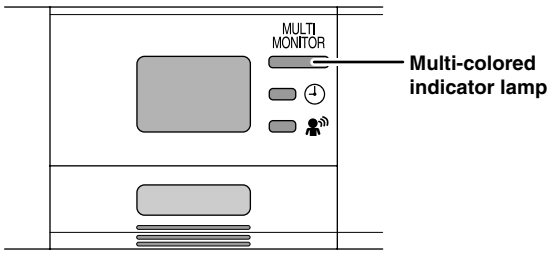
(R1362)

1.13 Other Functions

1.13.1 Multi-Colored Indicator Lamp

Features

Current operation mode is displayed in color of the lamp of the indoor unit which changes in 6 colors. Operating status can be monitored even in automatic operation in accordance with the content of actual operation.



(R9426)

- The lamp color changes according to the operation.
  - Heating.....Red
  - HUMID HEAT.....Orange
  - Cooling.....Blue
  - DRY .....Green
  - FAN.....White
- The lamp color also changes according to the optional function.
  - FRESH AIR SUPPLY VENTILATION.....White
    (Only for the first 2 seconds during operation of the air conditioner.)
  - Standby state (ex. mode conflict).....Yellow

1.13.2 WEEKLY TIMER Operation

Up to 4 timer settings can be saved for each day of the week (up to 28 settings in total). Those 3 items of “ON / OFF”, “temperature” and “time” can be set.

Refer to “WEEKLY TIMER Operation” on page 86 for detail.

1.13.3 Hot Start Function

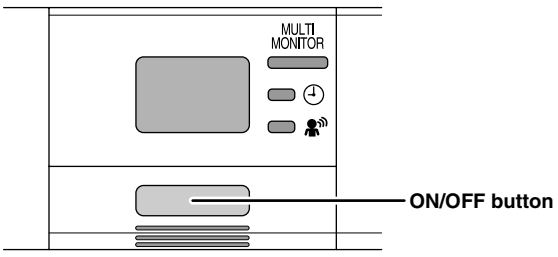
In order to prevent the cold air blast that normally comes when heating is started, the temperature of the heat exchanger of the indoor unit is detected, and either the airflow is stopped or is made very weak thereby carrying out comfortable heating of the room.
*The cold air blast is also prevented using a similar control when the defrosting operation is started or when the thermostat gets turned ON.

1.13.4 Signal Receiving Sign

When the indoor unit receives a signal from the remote controller, the unit emits a signal receiving sound.

1.13.5 ON/OFF Button on Indoor Unit

An ON/OFF button is provided on the front panel of the unit. Use this button when the remote controller is missing or if its battery has run out.
Every press of the button switches from ON to OFF or from OFF to ON.



(R9408)

- Push this button once to start operation. Push once again to stop it.
- This button is useful when the remote controller is missing.
- The operation mode refers to the following table.

	Mode	Temperature setting	Airflow rate
Heat Pump	AUTO	25℃	AUTO

- In the case of multi system operation, there are times when the unit does not activate with this button.

<Forced operation mode>

Forced operation mode will be set by pressing the ON/OFF button for between 5 to 9 sec. while the unit is not operating.

See page 42 for the detail of "Forced Operation Mode".

Note: When the ON/OFF button is pressed for 10 sec. or more, the operation will be stopped.

1.13.6 Titanium Apatite Photocatalytic Air-Purifying Filter

This filter combines the Air Purifying Filter and Titanium Apatite Photocatalytic Deodorizing Filter in a single highly effective unit. The filter traps microscopic particles, decompose odours and even deactivates bacteria and viruses. It lasts for 3 years without replacement if washed about once every 6 months.

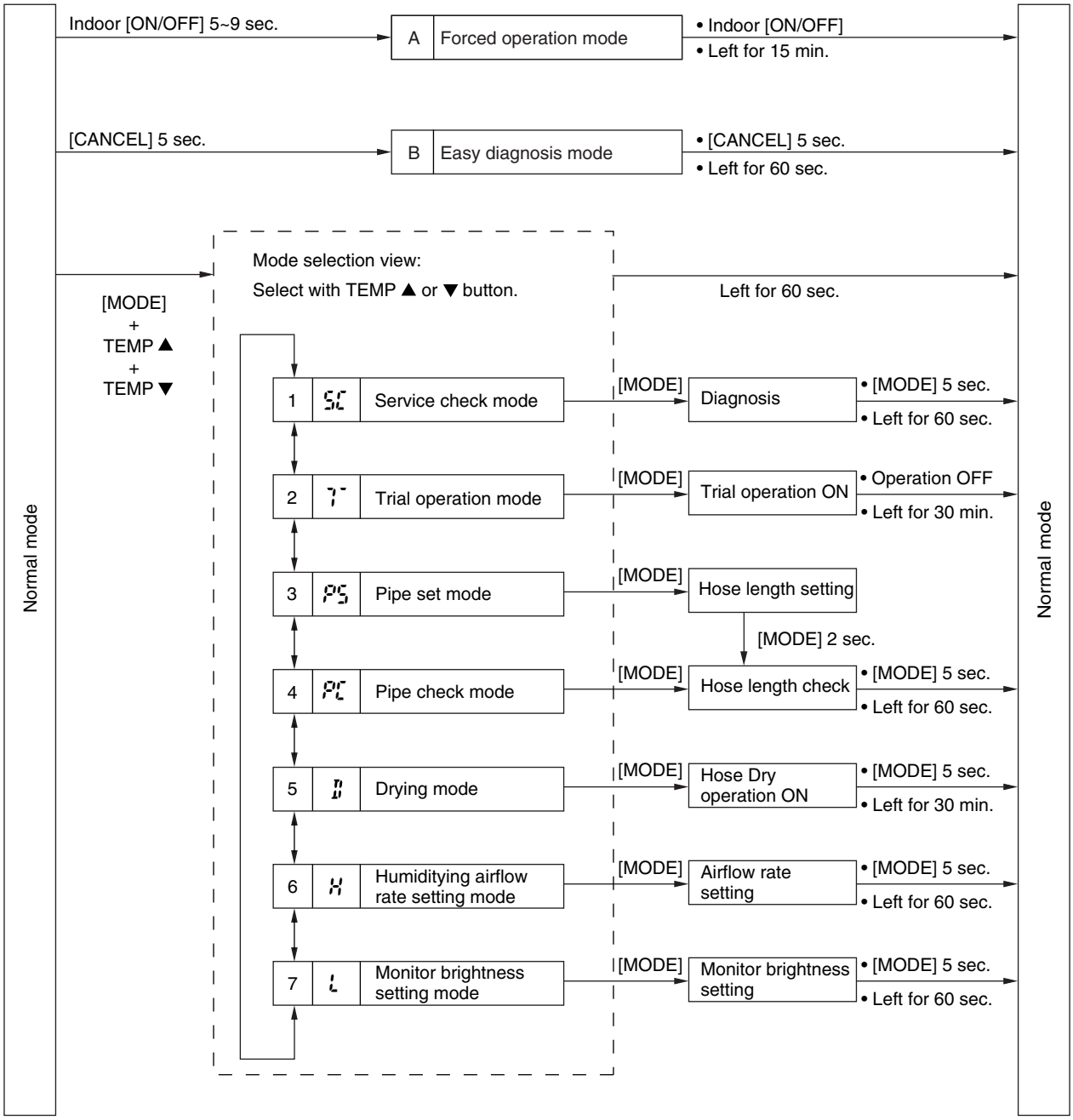
1.13.7 Air Filter (Prefilter)

The air filter net is impregnated with a safe, odorless mold preventative to make the filter virtually immune to mold.

1.13.8 Auto-restart Function

Even if a power failure (including one for just a moment) occurs during the operation, the operation restarts in the condition before power failure automatically when power is restored. (Note) It takes 3 minutes to restart the operation because the 3-minute standby function is activated.

1.14 Table for Special Modes



(R9416)

A. Forced operation mode:
The buzzer beeps, and the timer and multi-colored indicator lamp illuminate.
Refer to page 42 for detail.

B. Easy diagnosis mode:
You can identify the error code in a quite simple way but some of the error codes do not appear on the LCD.
Refer to the Check Method 1 on page 97 for detail.

1. Service check mode:
You can identify the error code for diagnosis.
Refer to the Check Method 2 on page 98 for detail.

2. Trial operation mode:
- You can select a mode for trial operation on the remote controller.
- The operation continues for approx. 30 minutes.

Refer to the installation manual on page 57 for detail.

3. Pipe set mode:
You can set the humidifying hose length and then check the preset value.
Refer to the installation manual on page 56 for detail.

4. Pipe check mode:
You can check the preset value of the humidifying hose length.
Refer to the installation manual on page 56 for detail.

5. Drying mode:
- Hose Dry operation is a forced drying operation for humidifying hose.
- The operation continues for approx. 30 minutes.
- Cooling, heating, or dry operation is not available during Hose Dry operation.

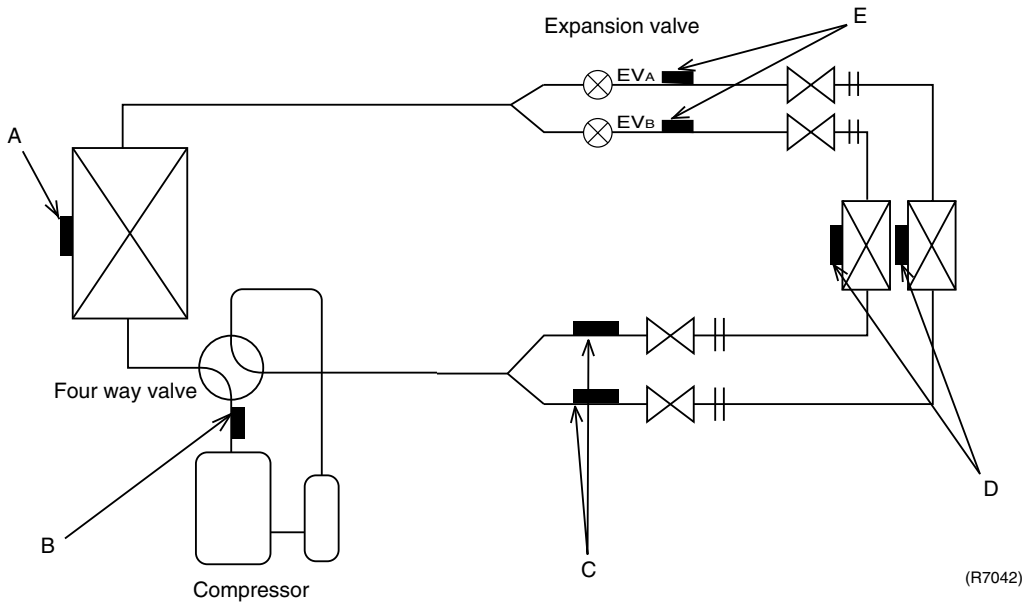
Refer to the installation manual on page 57 for detail.

6. Humidifying airflow rate setting mode:
Humidifying airflow rate setting mode allows to fine-tune the speed of the humidifying fan around ±10% relative to Automatic. Set high to increase the airflow rate, or set to low to decrease.

7. Monitor brightness setting mode:
The brightness of the multi-colored indicator lamp can be adjusted H (high), L (low), or OFF.

2. Function of Thermistor

2.1 Heat Pump Model



A Outdoor Heat Exchanger Thermistor

1. The outdoor heat exchanger thermistor is used for controlling target discharge temperature.
   The system sets a target discharge temperature according to the outdoor and indoor heat exchanger temperature, and controls the electronic expansion valve opening so that the target discharge temperature can be obtained.
2. The outdoor heat exchanger thermistor is used for detecting disconnection of the discharge thermistor when cooling.
   When the discharge pipe temperature becomes lower than the outdoor heat exchanger temperature, the discharge pipe thermistor is judged as disconnected.
3. The outdoor heat exchanger thermistor is used for high pressure protection during cooling operation.

B Discharge Pipe Thermistor

1. The discharge pipe thermistor is used for controlling temperature of the discharge pipe.
   If the temperature of discharge pipe (used in place of the inner temperature of the compressor) rises abnormally, the operating frequency drops or the operation halts.
2. The discharge pipe thermistor is used for detecting disconnection of the discharge thermistor.

C Gas Pipe Thermistor

1. In cooling, the gas pipe thermistors are used for gas pipe isothermal control.
   The system controls electronic expansion valve opening so that gas pipe temperature in each room becomes equal.

D Indoor Heat Exchanger Thermistor

1. The indoor heat exchanger thermistors are used for controlling target discharge temperature.
   The system sets a target discharge pipe temperature according to the outdoor and indoor heat exchanger temperature, and controls the electronic expansion valve opening so that the target discharge temperature can be obtained.
2. The indoor heat exchanger thermistor is used to prevent freezing.
   During the cooling operation, if the temperature drops abnormally, the operating frequency becomes lower, then the operation halts.
3. The indoor heat exchanger thermistor is used for anti-icing control.
   During the cooling operation, if the heat exchanger temperature in the room where operation is halted becomes -1°C, or if the room temperature - heat exchanger temperature in the room where operation is halted becomes ≥10°C, it is assumed as icing.
4. The indoor heat exchanger thermistor is used to heating peak-cut control.
   During heating operation, if the temperature rises abnormally, the operating frequency becomes lower, then the operation halts.
5. During heating: the indoor heat exchanger thermistors are used for detecting disconnection of the discharge pipe thermistor.
   When the discharge pipe temperature become lower than an indoor heat exchanger temperature, a disconnected discharge pipe thermistor can be detected.
   The indoor heat exchanger thermistors are also used for preventing abnormal high pressure.
6. When only one indoor unit is operating, the indoor heat exchanger thermistor is used for sub-cooling control.
   The actual sub-cooling is calculated from the liquid pipe temperature and the heat exchanger temperature. The system controls the electronic expansion valve opening to reach the target sub-cooling.

E Liquid Pipe Thermistor

1. When only one indoor unit is heating, the indoor liquid pipe thermistor is used for a sub-cooling control.
   The system calculates the actual sub-cooling with the liquid pipe temperature and the maximum heat exchanger temperature between rooms, and controls the opening of the electronic expansion valve to reach the target sub-cooling.
2. When all indoor units are heating, the liquid pipe thermistor is used for liquid pipes isothermal control.
   The system controls electronic expansion valves to make liquid pipe temperatures the average of present temperature of each room.

3. Control Specification

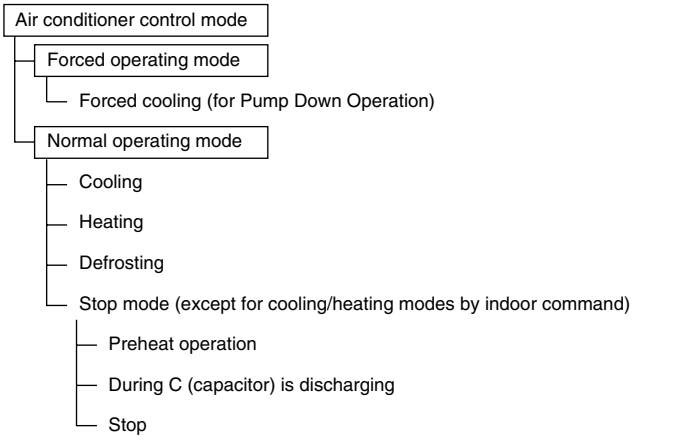
3.1 Mode Hierarchy

Outline

There are two modes; the mode selected in user's place (normal air conditioning mode) and forced operation mode for installation and providing service.

Detail

1. For heat pump model
   There are following modes; stop, cooling (includes drying), heating (include defrosting)



Note: Unless specified otherwise, an indoor dry operation command must be regarded as cooling operation.

Decision of the operation mode

In this multi system, when both 2 indoor units are operating, one of them may enter the standby mode by the following conditions.

- The units in the 2 rooms are different in operation mode
- The indoor units in both 2 rooms are set to HUMID HEAT operation or FRESH AIR SUPPLY VENTILATION

Refer to the following pages for detail.
"Note for multi" on page 91.
"HUMID HEAT operation" on page 77.
"FRESH AIR SUPPLY VENTILATION" on page 79.

3.2 Automatic switching for HUMID HEAT operation room

Outline

When the indoor units in both 2 rooms are set to HUMID HEAT operation, priority will be given to the indoor unit starting operation first basically.
However, priority will be given to the indoor unit starting operation subsequently under certain conditions.

Detail

1. When the indoor units in both 2 rooms are set to HUMID HEAT operation, priority will be given to the indoor unit starting operation first (Unit 1), and the indoor unit will go into humidifying operation while the indoor unit starting operation subsequently (Unit 2) will go into standby mode.

2. When the humidity of the Unit 1 reaches a target level, the unit which performs HUMID HEAT operation switches from Unit 1 to Unit 2 automatically.

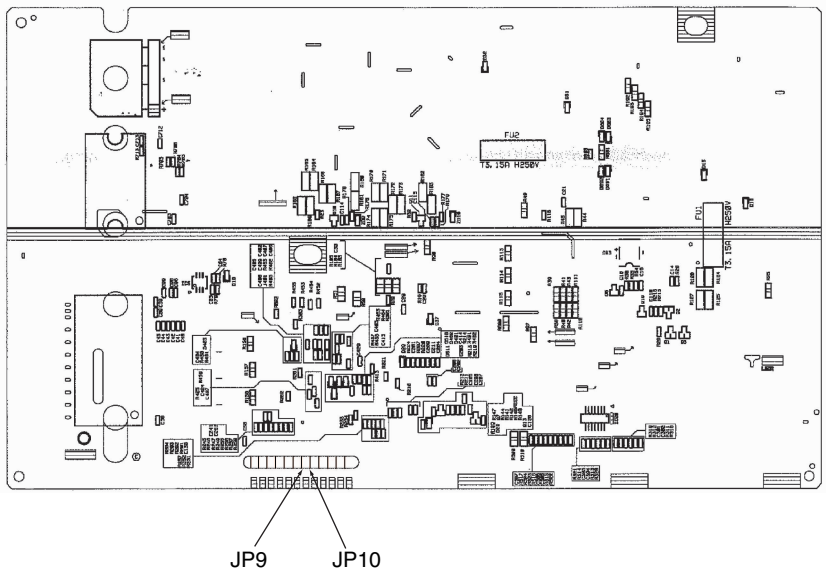
3. When the temperature decreases in the room of the Unit 1, the Unit 2 will go into standby mode, then, the Unit 1 will start HUMID HEAT operation again.

Carry out priority room setting to prevent the room of HUMID HEAT operation from switching automatically.

How to carry out priority room setting

Cut the jumper of the outdoor unit PCB.

Cut the JP9 → Room-A will be set as the priority room.
Cut the JP10 → Room-B will be set as the priority room.



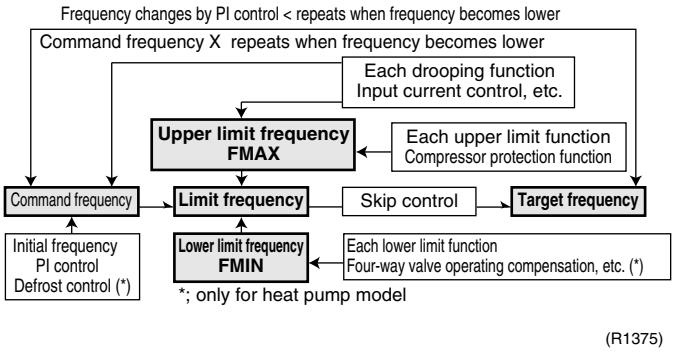
(R9428)

3.3 Frequency Control

Outline

Frequency that corresponds to each room's capacity will be determined according to the difference in the temperature of each room and the temperature that is set by the remote controller.
The function is explained as follows.

1. How to determine frequency.
2. Frequency command from an indoor unit. (The difference between a room temperature and the temperature set by the remote controller.)
3. Frequency command from an indoor unit. (The ranked capacity of the operating room).
4. Frequency initial setting.
5. PI control.



(R1375)

Detail

How to Determine Frequency

The compressor frequency will finally be determined by taking the following steps.

For Heat Pump Model

1. Determine command frequency

- Command frequency will be determined in the following order of priority.

1.1 Limiting frequency by drooping function

- Input current, discharge pipes, low Hz high pressure limit, peak cutting, freeze prevention, dew prevention, fin thermistor temperature.

1.2 Limiting defrost control time
1.3 Forced cooling
1.4 Indoor frequency command

2. Determine upper limit frequency

- Set a minimum value as an upper limit frequency among the frequency upper limits of the following functions:
  Compressor protection, input current, discharge pipes, Low Hz high pressure, peak cutting, freeze prevention, defrost.

3. Determine lower limit frequency

- Set a maximum value as an lower limit frequency among the frequency lower limits of the following functions:
  Four way valve operating compensation, draft prevention, pressure difference upkeep.

4. Determine prohibited frequency

- There is a certain prohibited frequency such as a power supply frequency.

Indoor Frequency Command (ΔD signal)

The difference between a room temperature and the temperature set by the remote controller will be taken as the "ΔD signal" and is used for frequency command.

Temperature difference	ΔD signal	Temperature difference	ΔD signal	Temperature difference	ΔD signal	Temperature difference	ΔD signal
0	∗Th OFF	2.0	4	4.0	8	6.0	C
0.5	1	2.5	5	4.5	9	6.5	D
1.0	2	3.0	6	5.0	A	7.0	E
1.5	3	3.5	7	5.5	B	7.5	F

∗Th OFF = Thermostat OFF

Indoor Unit Capacity (S value)

The capacity of the indoor unit is a "S" value and is used for frequency command.

ex.)

Capacity	S value
2.5 kW	25
3.5 kW	35

Frequency Initial Setting

< Outline >

When starting the compressor, or when conditions are varied due to the change of the operating room, the frequency must be initialized according to the total of a maximum ΔD value of each room and a total value of Q (ΣQ) of the operating room (the room in which the thermostat is set to ON).

Q value: Indoor unit output determined from indoor unit volume, airflow rate and other factors.

PI Control (Determine Frequency Up/Down by ΔD Signal)

1. **P control**
   Calculate a total of the ΔD value in each sampling time (20 seconds), and adjust the frequency according to its difference from the frequency previously calculated.

2. **I control**
   If the operating frequency is not change more than a certain fixed time, adjust the frequency up and down according to the ΣΔD value, obtaining the fixed ΣΔD value.
   When the ΣΔD value is small...lower the frequency.
   When the ΣΔD value is large...increase the frequency.

3. **Limit of frequency variation width**
   When the difference between input current and input current drooping value is less than 1 A, the frequency increase width must be limited.

4. **Frequency management when other controls are functioning**

- When each frequency is drooping;
  Frequency management is carried out only when the frequency droops.
- For limiting lower limit
  Frequency management is carried out only when the frequency rises.

5. **Upper and lower limit of frequency by PI control**
   The frequency upper and lower limits are set depending on the total of S values of operating room. When low noise commands come from the indoor unit more than one room or when outdoor unit low noise or quiet commands come from all the rooms, the upper limit frequency must be lowered than the usual setting.

3.4 Controls at Mode Changing / Start-up

3.4.1 Preheating Operation

Outline

Operate the inverter in the open phase operation with the conditions including the preheating command from the indoor, the outdoor air temperature and discharge pipe temperature.

Detail

Preheating ON Condition

- When outdoor air temperature is below 10.5°C and discharge pipe temperature is below 10.5°C, inverter in open phase operation starts. (The power consumption of compressor during preheating operation is 35 W.)

OFF Condition

- When outdoor air temperature is higher than 12°C or discharge pipe temperature is higher than 12°C, inverter in open phase operation stops.

3.4.2 Four Way Valve Switching

Outline

During the heating operation current must be conducted and during cooling and defrosting current must not be conducted. In order to eliminate the switching sound (as the four way valve coil switches from ON to OFF) when the heating is stopped, the delay switch of the four way valve must be carried out after the operation stopped.

Detail

The OFF delay of four way valve
Energize the coil for 150 sec after unit operation is stopped.

3.4.3 Four Way Valve Operation Compensation

Outline

At the beginning of the operation as the four way valve is switched, acquire the differential pressure required for activating the four way valve by having output the operating frequency, which is more than a certain fixed frequency, for a certain fixed time.

Detail

Staring Conditions

1. When starting compressor for heating.
2. When the operating mode changes from the previous time.
3. When starting compressor for starting defrosting or resetting.
4. When starting compressor for the first time after the reset with the power is ON.
5. When starting compressor after operation stop by the cooling / heating mode change-over malfunction.

Set the lower limit frequency to 𝔸 Hz for 60 seconds with any conditions with 1 through 5 above.

		40 class	50 class
𝔸	Cooling	56Hz	40Hz
	Heating	68Hz	54Hz

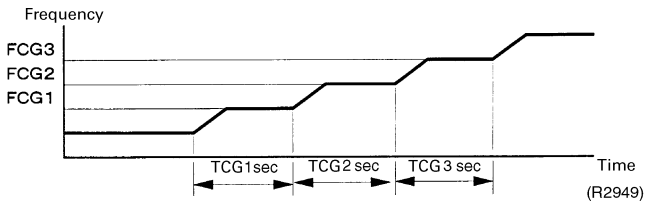
3.4.4 3-Minute Standby

Prohibit to turn ON the compressor for 3 minutes after turning it off.
(Except when defrosting.)

3.4.5 Compressor Protection Function

When turning the compressor from OFF to ON, the upper limit of frequency must be set as follows. (The function must not be used when defrosting.)

	40 class	50 class
FCG 1	62	55
FCG 2	72	70
FCG 3	90	85
TCG 1	140	150
TCG 2	180	180
TCG 3	300	300



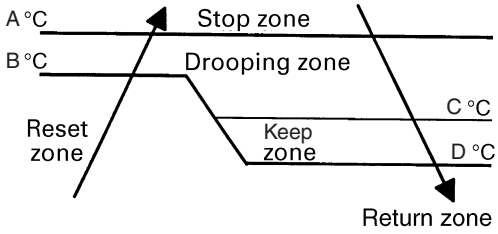
3.5 Discharge Pipe Temperature Control

Outline

The discharge pipe temperature is used as the compressor's internal temperature. If the discharge pipe temperature rises above a certain level, the operating frequency upper limit is set to keep this temperature from going up further.

Detail

Divide the Zone



(R2836)

A	110
B	103
C	102
D	101

Management within the Zones

Zone	Control contents
Stop zone	When the temperature reaches the stop zone, stop the compressor and correct abnormality.
Drooping zone	Start the timer, and the frequency will be drooping.
Keep zone	Keep the upper limit of frequency.
Return / Reset zone	Cancel the upper limit of frequency.

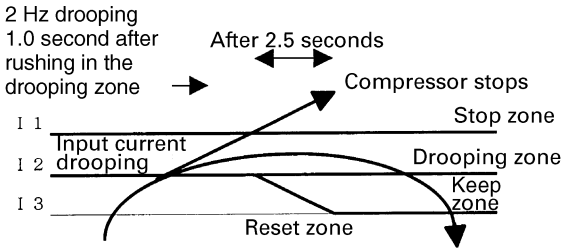
3.6 Input Current Control

Outline

Detect an input current by the CT during the compressor is running, and set the frequency upper limit from such input current.
In case of heat pump model, this control is the upper limit control function of the frequency which takes priority of the lower limit of four way valve activating compensation.

Detail

The frequency control will be made within the following zones.



(R1378)

When a “stop current” continues for 2.5 seconds after rushing on the stop zone, the compressor operation stops.
If a “drooping current” is continues for 1.0 second after rushing on the drooping zone, the frequency will be 2 Hz drooping.
Repeating the above drooping continues until the current rushes on the drooping zone without change.
In the keep zone, the frequency limit will remain.
In the return / reset zone, the frequency limit will be cancelled.

Limitation of current drooping and stop value according to the outdoor air temperature

1. In case the operation mode is cooling
- The current droops when outdoor air temperature becomes higher than a certain level (model by model).

2. In case the operation mode is heating (only for heat pump model)
- The current droops when outdoor air temperature becomes higher than a certain level (model by model).

3.7 Freeze-up Protection Control

Outline

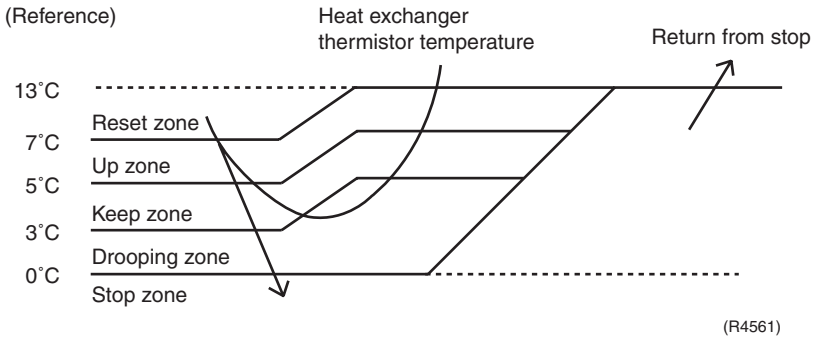
During cooling operation, the signals being sent from the indoor unit allow the operating frequency limitation and then prevent freezing of the indoor heat exchanger. (The signal from the indoor unit must be divided into the zones as the followings.

Detail

Conditions for Start Controlling

Judge the controlling start with the indoor heat exchanger temperature after 2 sec from operation start and after 30 sec from changing number of operation room.

Control in Each Zone



3.8 Heating Peak-cut Control

Outline

During heating operation, the signals being sent from the indoor unit allow the operating frequency limitation and prevent abnormal high pressure. (The signal from the indoor unit must be divided as follows.)

Detail

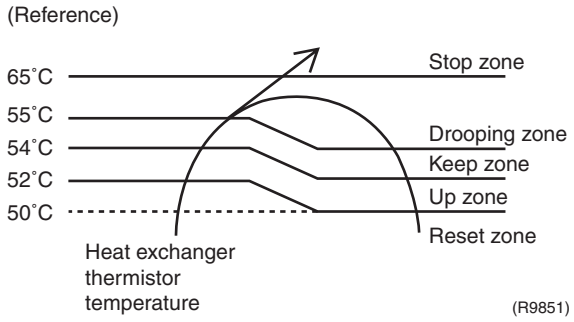
Conditions for Start Controlling

Judge the controlling start with the indoor heat exchanger temperature after 2 min from operation start and △ sec from changing number of operation room.

Control in Each Zone

The maximum value of heat exchange intermediate temperature of each indoor unit controls the following (excluding stopped rooms).

	△
When increase	30
When decrease	2



3.9 Fan Control

Outline

Fan control is carried out according to the following conditions.

1. Fan ON control for electric component cooling fan
2. Fan control when defrosting
3. Fan OFF delay when stopped
4. ON/OFF control when cooling operation
5. Fan control when the number of heating rooms decreases
6. Fan control when forced operation
7. Fan control in indoor / outdoor unit quiet operation
8. Fan control during heating operation
9. Fan control in the POWERFUL mode
10. Fan control for pressure difference upkeep

Detail

Fan OFF Control when Stopped

■ Fan OFF delay for 60 seconds must be made when the compressor is stopped.

Tap Control in Indoor / Outdoor Unit Quiet Operation

1. When Cooling Operation
   When the outdoor air temperature is higher than 37°C, the fan tap must be set to H.
   When the outdoor air temperature is 18 ~ 37°C, the fan tap must be set to M.
   When the outdoor air temperature is lower than 18°C, the fan tap must be set to L.
2. When Heating Operation
   When the outdoor air temperature is lower than 4°C, the fan tap must be set to H.
   When the outdoor air temperature is 4 ~ 12°C, the fan tap must be set to M.
   When the outdoor air temperature is higher than 12°C, the fan tap must be set to L.

3.10 Liquid Compression Protection Function 2

Outline

In order to obtain the dependability of the compressor, the compressor must be stopped according to the conditions of the temperature of the outdoor air and outdoor heat exchanger.

Detail

■ Operation stops depending on the outdoor air temperature.

Compressor operation turns OFF under the conditions that the system is in cooling operation and outdoor air temperature is below 10°C.

3.11 Defrost Control

Outline

Defrosting is carried out by the cooling cycle (reverse cycle). The defrosting time or outdoor heat exchanger temperature must be more than its fixed value when finishing.

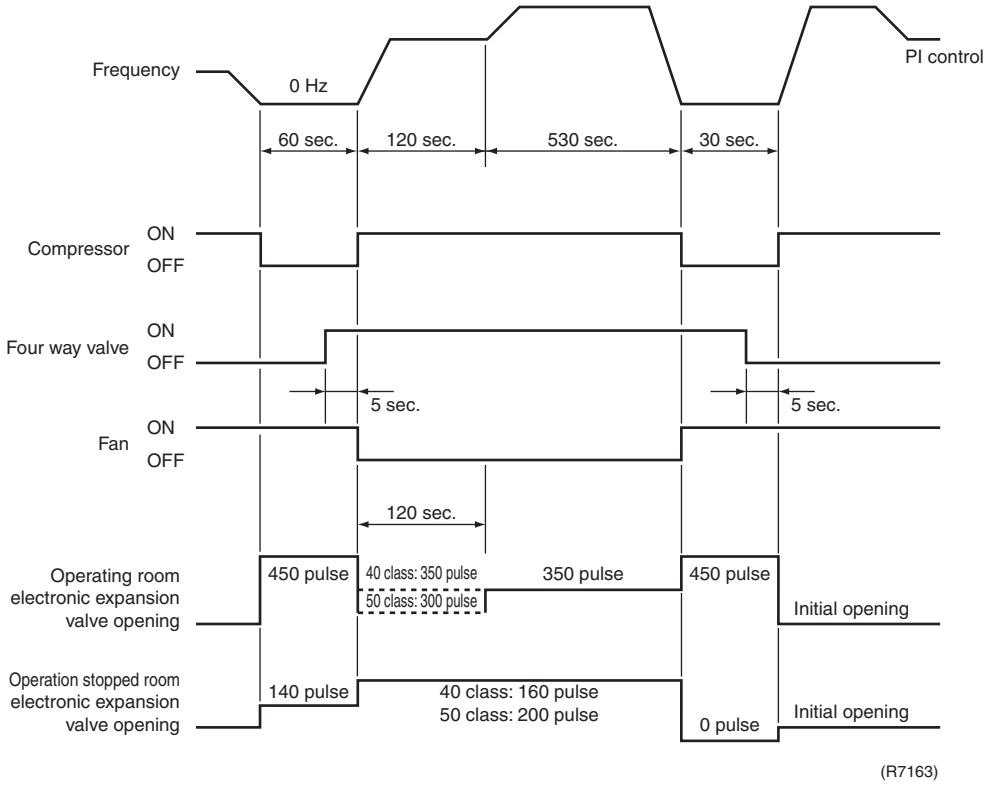
Detail

Conditions for Starting Defrost

The starting conditions must be made with the outdoor air temperature and heat exchanger temperature. Under the conditions that the system is in heating operation, 6 minutes after the compressor is started and more than 30 minutes of accumulated fine pass since the start of the operation or ending the defrosting.

Conditions for Canceling Defrost

The judgment must be made with heat exchanger temperature. (40 class : 4°C~12°C, 50 class : 4°C~15°C)



3.12 Electronic Expansion Valve Control

Outline

The following items are included in the electronic expansion valve control.

Electronic expansion valve is fully closed

1. Electronic expansion valve is fully closed when turning on the power.
2. Pressure equalizing control

Room Distribution Control

1. Gas pipe isothermal control
   Liquid pipe temperature control (with all ports connected and all rooms being air-conditioned)
2. SC control

Open Control

1. Electronic expansion valve control when starting operation
2. Control when frequency changed
3. Control for defrosting
4. Oil recover control
5. Control when a discharge pipe temperature is abnormally high
6. Control when the discharge pipe thermistor is disconnected
7. Control for indoor unit freeze-up protection

Feedback Control

1. Discharge pipe temperature control

Detail

The followings are the examples of control which function in each mode by the electronic expansion valve control.

Operation pattern	○ : function × : not function	Gas pipe isothermal control	SC control	Control when frequency changed	Control for abnormally high discharge pipe temperature	Oil recovery control	Indoor freeze prevention control	Liquid pipe temperature control	Dew buildup prevention control for indoor rotor
When power is turned ON	Fully closed when power is turned ON	×	×	×	×	×	×	×	×
Cooling, 1 room operation	Open control when starting	×	×	×	○	×	○	×	○
	(Control of target discharge pipe temperature)	×	×	○	○	○	○	×	○
Cooling, 2 rooms operation	Control when the operating room is changed	×	×	×	○	×	○	×	○
	(Control of target discharge pipe temperature)	○	×	○	○	×	○	×	○
Stop	Pressure equalizing control	×	×	×	×	×	×	×	×
Heating, 1 room operation	Open control when starting	×	×	×	○	×	×	×	×
	(Control of target discharge pipe temperature)	×	○	○	○	×	×	×	×
Heating, 2 rooms operation	Control when the operating room is changed	×	×	×	○	×	×	×	×
	(Control of target discharge pipe temperature)	×	×	○	○	×	×	○	×
	(Defrost control FD=1)	×	×	×	×	×	×	×	×
Stop	Pressure equalizing control	×	×	×	×	×	×	×	×
Heating, 1 room operation	Open control when starting	×	×	×	○	×	×	×	×
Control of discharge pipe thermistor disconnection	Continue	×	○	○	×	×	×	○	×
Stop	Pressure equalizing control	×	×	×	×	×	×	×	×

(R9427)

3.12.1 Fully Closing with Power On

Initialize the electronic expansion valve when turning on the power, set the opening position and develop pressure equalizing.

3.12.2 Pressure Equalization Control

When the compressor is stopped, open and close the electronic expansion valve and develop pressure equalization.

3.12.3 Opening Limit

Outline

Limit a maximum and minimum opening of the electronic expansion valve in the operating room.

Detail

- A maximum electronic expansion valve opening in the operating room : 450 pulses
- A minimum electronic expansion valve opening in the operating room : 60 pulses

The electronic expansion valve is fully closed in the room where cooling is stopped and is opened with fixed opening during defrosting.

3.12.4 Gas Pipe Isothermal Control During Cooling

When the units are operating in multiple rooms, detect the gas piping temperature and correct the electronic expansion valve opening so that the temperature of the gas pipe in each room becomes identical.

- When the gas pipe temperature > the average gas pipe temperature → open the electronic expansion valve in that room
- When the gas pipe temperature < the average gas pipe temperature → close the electronic expansion valve in that room

3.12.5 SC Control

Outline

Detect the temperature of liquid pipe and heat exchanger of the rooms and compensate the electronic expansion valve opening so that the SC of each room becomes the target SC.

- When the actual SC is > target SC, open the electronic expansion valve of the room.
- When the actual SC is < target SC, close the electronic expansion valve of the room.

Detail

Start Functioning Conditions

After finishing the open control (630 seconds after the beginning of the operation), control all the electronic expansion valve in the operating room.

Determine Electronic Expansion Valve Opening

Adjust the electronic expansion valve so that the temperature difference between the maximum heat exchanger temperature of connected room and the temperature of liquid pipe thermistor becomes constant.

3.12.6 Starting Operation / Changing Operating Room Control

Control the electronic expansion valve opening when the system is starting or the operating room is changed, and prevent the system to be super heated or moistened.

3.12.7 Disconnection of the Discharge Pipe Thermistor

Outline

Detect a disconnected discharge pipe thermistor by comparing the discharge pipe temperature with the condensation temperature. If any is disconnected, open the electronic expansion valve according to the outdoor air temperature and the operating frequency, and operate for a specified time, and then stop.

After 3 minutes of waiting, restart the unit and check if any is disconnected. If any is disconnected stop the system after operating for a specified time. If the disconnection is detected 4 times in succession, then the system will be down.

Detail

Detect Disconnection

If a 780-second timer for open control becomes over, the following adjustment must be made.

1. When the operation mode is cooling
   When the discharge pipe temperature is lower than the outdoor heat exchanger temperature, the discharge pipe thermistor disconnection must be ascertained.
2. When the operation mode is heating (only for heat pump model)
   When the discharge pipe temperature is lower than the max temperature of operating room heat exchanger, the discharge pipe thermistor disconnection must be ascertained.

When the condition of the above 1 or 2 is decided, the system will stop after operating for continuous 9 minutes.

Adjustment when the thermistor is disconnected

When compressor stop repeats specified time, the system should be down.

3.12.8 Control when frequency is changed

When the target discharge pipe temperature control is active, if the target frequency is changed for a specified value in a certain time period, cancel the target discharge pipe temperature control and change the target opening of the electronic expansion valve according to the shift.

3.12.9 High Temperature of the Discharge Pipe

When the compressor is operating, if the discharge pipe temperature exceeds a certain value, open the electronic expansion valve and remove the refrigerant to the low pressure side and lower discharge temperature.

3.12.10 Oil Recovery Function

Outline

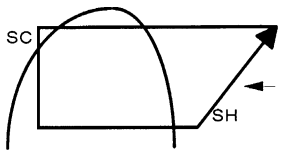
The electronic expansion valve opening in the cooling stopped room must be set as to open for a certain time at a specified interval so that the oil in the cooling stopped room may not be accumulated.

Detail

During cooling operation, every 1 hour continuous operation, the electronic expansion valves in the operation stopped room must be opened by 80 pulses for specified time.

3.12.11 Target Discharge Pipe Temperature Control

Obtain the target discharge pipe temperature from the indoor and outdoor heat exchange temperature, and adjust the electronic expansion valve opening so that the actual discharge pipe temperature become close to that temperature. (Indirect SH control using the discharge pipe temperature)



Set the target discharge pipe temperature as to become an aiming SH.
Regard that the inclination cannot be changed due to the operating condition.

(R1389)

Determine a correction value of the electronic expansion valve compensation and drive it according to the deflection of the target discharge temperature and actual discharge temperature, and the discharge temperature variation by the 20 sec.

3.13 Malfunctions

3.13.1 Sensor Malfunction Detection

Sensor malfunction may occur either in the thermistor or current transformer (CT) system.

Relating to Thermistor Malfunction

1. Outdoor heat exchanger thermistor
2. Discharge pipe thermistor
3. Fin thermistor
4. Gas pipe thermistor
5. Outdoor air thermistor
6. Liquid pipe thermistor

Relating to CT Malfunction

When the output frequency is more than 52 Hz and the input current is less than 1.25A, carry out abnormal adjustment.

3.13.2 Detection of Overload and Overcurrent

Outline

In order to protect the inverter, detect an excessive output current, and for protecting compressor, monitor the OL operation.

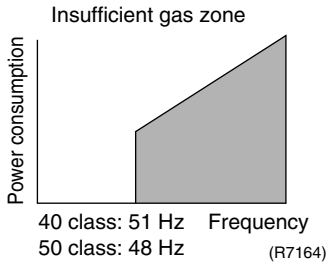
Detail

- **If the OL (compressor head) temperature exceeds 120~130°C (depending on the model), the compressor gets interrupted.**
- **If the inverter current exceeds 22 A, the compressor gets interrupted too.**

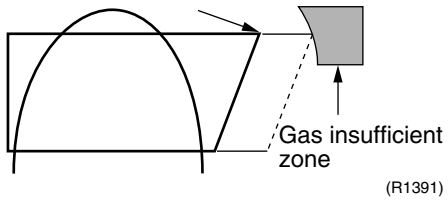
3.13.3 Insufficient Gas Control

Outline

If a power consumption is below the specified value in which the frequency is higher than the specified frequency, it must be regarded as gas insufficient.
In addition to such conventional function, if the discharge temperature is higher than the target discharge pipe temperature, and the electronic expansion valve is fully open (450 pulses) more than the specified time, it is considered as an insufficient gas.



With the conventional function, a power consumption is weak comparing with that in the normal operation when gas is insufficient, and gas insufficiency is detected by checking a power consumption.



When operating with insufficient gas, although the rise of discharge pipe temperature is great and the electronic expansion valve is open, it is presumed as an insufficient gas if the discharge pipe temperature is higher than the target discharge pipe temperature.

Refer to “Insufficient Gas” on page 147 for detail.

Detail

Judgment by Input Current

When an output frequency is exceeds 51 Hz (40 class) or 48 Hz (50 class) and the input current is less than specified value, the adjustment is made for insufficient gas.

Judgment by Discharge Pipe Temperature

When discharge pipe temperature is higher than 101°C, the electronic expansion value opening is 450 plus (max.) and the adjustment is made for insufficient gas.

3.13.4 Preventing Indoor Freezing

During cooling, if the heat exchanger temperature in the operation stopped room becomes below the specified temperature for the specified time, open the electronic expansion valve in the operation stopped room as specified, and carry out the fully closed operation. After this, if freezing abnormality occurs more than specified time, the system shall be down as the system abnormality.

3.14 Forced Operation Mode

Outline

Forced operating mode includes only forced cooling.

Detail

Forced Cooling

Item	Forced Cooling
Forced operation allowing conditions	1) The indoor unit is not abnormal, but the indoor unit which is not in the freezing prohibiting zone is present in more than 1 room.
	2) The outdoor unit is not abnormal and not in the 3-minute standby mode.
	The forced operation is allowed when the above “and” conditions are met.
Starting/adjustment	When the indoor unit on/off button is pressed for continuous 5 second as the above conditions are met.
1) Determine operating room	All rooms must operate.
2) Command frequency	70Hz (40 class), 47Hz (50 class)
3) Electronic expansion valve opening	It depends on the capacity of the operating indoor unit.
4) Outdoor unit adjustment	Compressor is in operation.
5) Indoor unit adjustment	The command of forced cooling operation is transmitted to all indoor units.
End	1) When the indoor units on/off button (of the unit which sent the command) is pressed again.
	2) The operation is to end automatically after 15 min.
Others	The protect functions are prior to all others in the forced operation.

3.15 Additional Function

3.15.1 POWERFUL Operation Mode

Compressor operating frequency and outdoor unit airflow rate are increased.

3.15.2 Voltage Detection Function

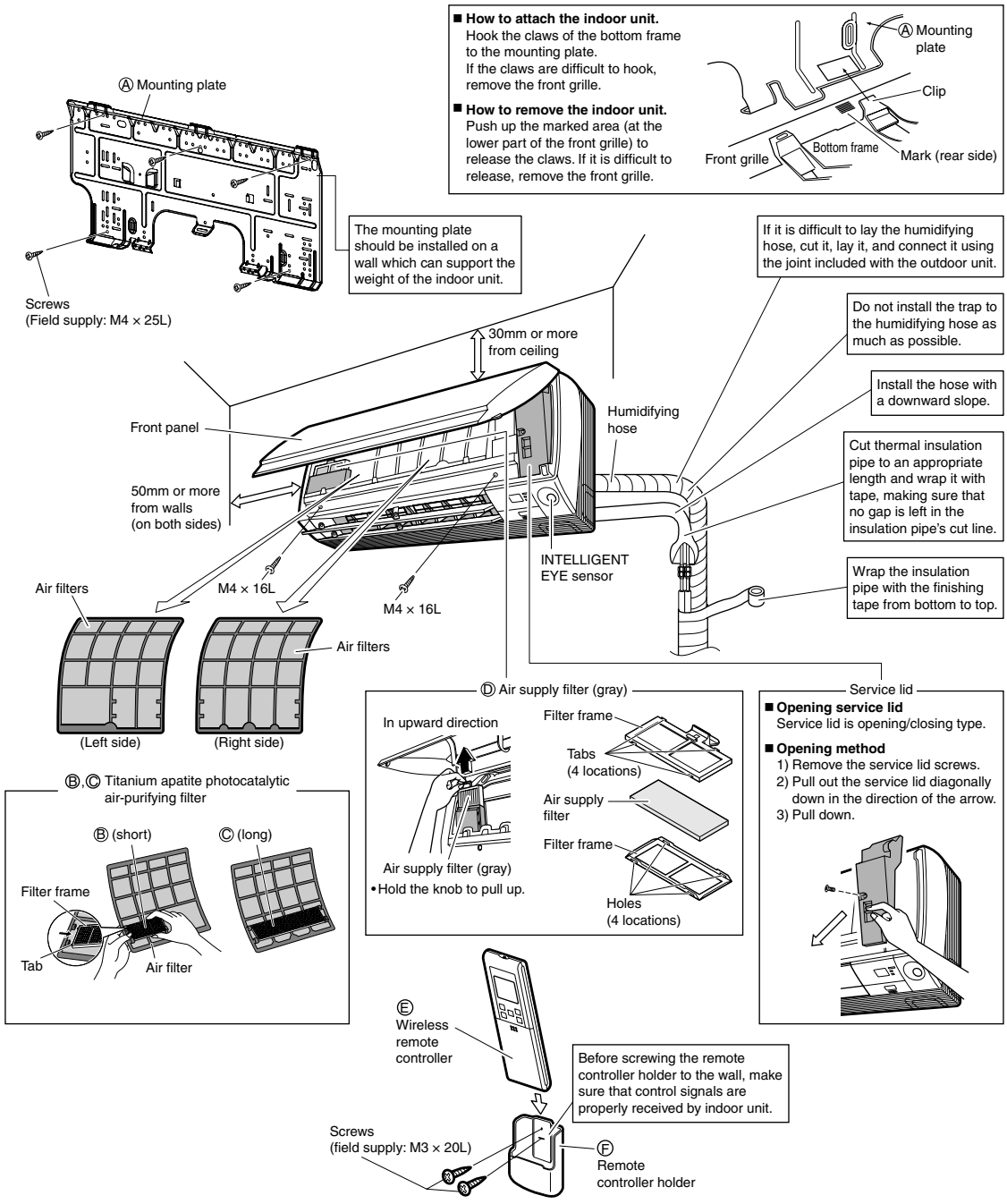
Power supply voltage is detected each time equipment operation starts.

Part 5
Installation / Operation Manual

1. Installation Manual

1.1 Indoor Units

Indoor Unit Installation Drawings



INTELLIGENT EYE sensor

⚠ CAUTION

1) Do not hit or violently push the INTELLIGENT EYE sensor. This can lead to damage and malfunction.
2) Do not place large objects near the sensor. Also keep heating units or humidifiers outside the sensor's detection area.

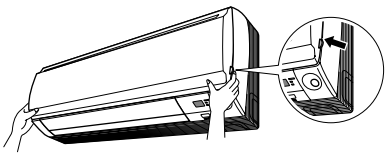
3

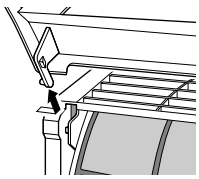
Preparation before Installation

1. Removing and installing front panel.

• Removal method

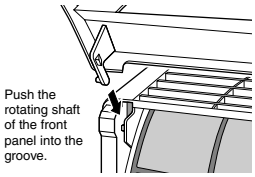
Hook fingers on the tabs on the left and right of the main body, and open until the panel stops. Slide the front panel sideways to disengage the rotating shaft. Then pull the front panel toward you to remove it.





• Installation method

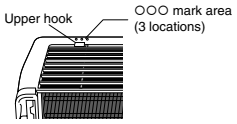
Align the tabs of the front panel with the grooves, and push all the way in. Then close slowly. Push the center of the lower surface of the panel firmly to engage the tabs.

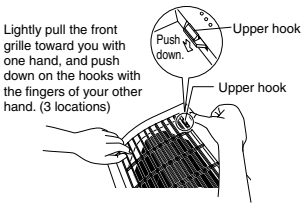


2. Removing and installing front grille.

• Removal method

1) Remove front panel to remove the air filter.
2) Remove 2 screws from the front grille.
3) In front of the ○○○ mark of the front grille, there are 3 upper hooks. Lightly pull the front grille toward you with one hand, and push down on the hooks with the fingers of your other hand.





When there is no work space because the unit is close to ceiling

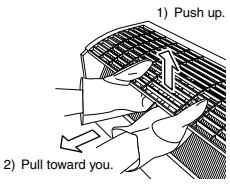
⚠ CAUTION

Be sure to wear protection gloves.

Place both hands under the center of the front grille, and while pushing up, pull it toward you.

• Installation method

1) Install the front grille and firmly engage the upper hooks (3 locations).
2) Install 2screws of the front grille.
3) Install the air filter and then mount the front panel.

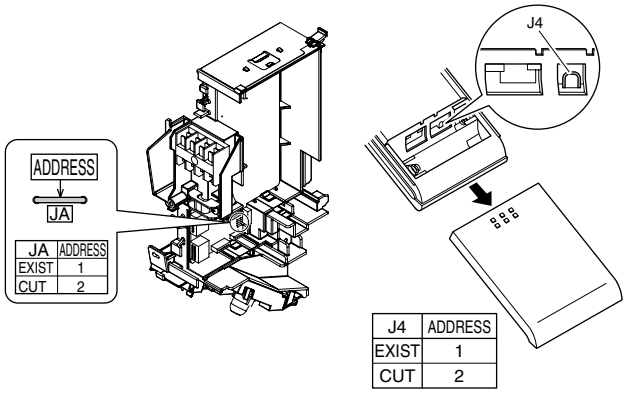


Preparation before Installation

3. How to set the different addresses.

When 2 indoor units are installed in 1 room, the 2 wireless remote controllers can be set for different addresses.

1) Remove the metal plate electrical wiring cover.
   (Refer to the **Removal/attachment methods of metal plate electrical wiring covers**.)
2) Cut the address jumper (JA) on the printed circuit board.
3) Cut the address jumper (J4) in the remote controller.

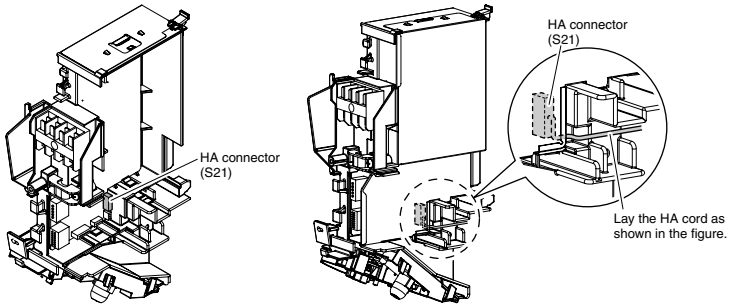


JA	ADDRESS
EXIST	1
CUT	2

J4	ADDRESS
EXIST	1
CUT	2

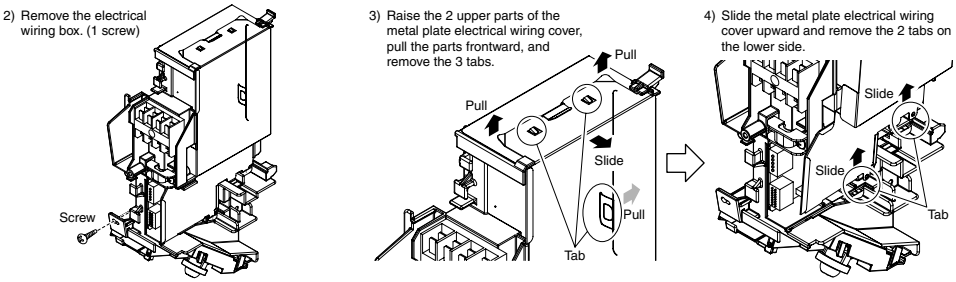
4. When connecting to an HA system. (Wired remote controller, central remote controller etc.)

1) Remove the metal plate electrical wiring cover.
   (Refer to the **Removal/attachment methods of metal plate electrical wiring covers**.)
2) Attach the connection cord to the S21 connector and pull the harness out through the notched part in the figure.
3) Replace the electrical wiring cover as it was, and pull the harness around, as shown in the figure.



• Removal methods of metal plate electrical wiring covers

1) Remove the front grille.
2) Remove the electrical wiring box. (1 screw)
3) Raise the 2 upper parts of the metal plate electrical wiring cover, pull the parts frontward, and remove the 3 tabs.
4) Slide the metal plate electrical wiring cover upward and remove the 2 tabs on the lower side.



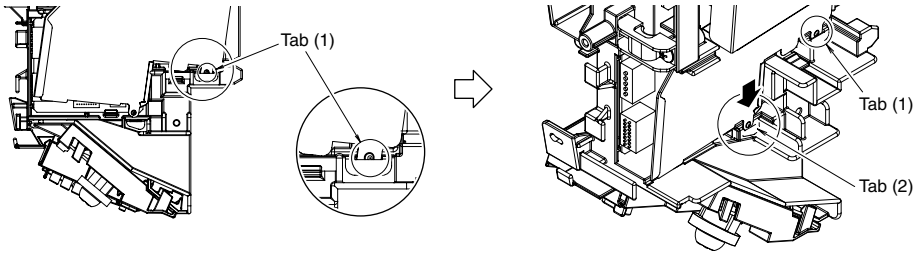
5

• Attachment methods of metal plate electrical wiring covers

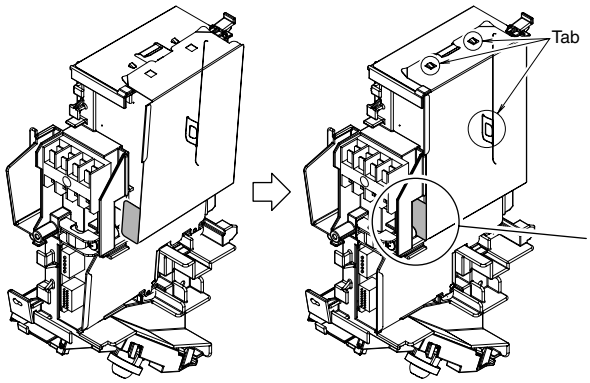
Attach the metal plate electrical wiring covers as shown below.

1) Lean the metal plate electrical wiring cover as shown in the figure and attach tab (1) on the lower side to the electrical wiring box.

2) Attach tab (2) on the lower side of the metal plate electrical wiring cover.



3) Push in the upper part of the metal plate electrical wiring cover and attach the 3 tabs.



⚠ CAUTION

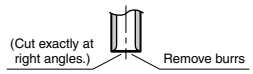
Make sure that the shaded part ( ) will not go inside the electrical wiring box.

Refrigerant Piping Work

With a multi indoor unit , install as described in the installation manual supplied with the multi outdoor unit.

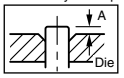
1. Flaring the pipe end.

1) Cut the pipe end with a pipe cutter.
2) Remove burrs with the cut surface facing downward so that the chips do not enter the pipe.
3) Put the flare nut on the pipe.
4) Flare the pipe.
5) Check that the flaring is properly made.



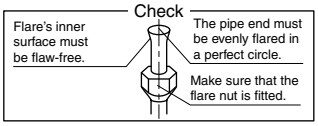
Flaring

Set exactly at the position shown below.



	Flare tool for R410A	Conventional flare tool	
	Clutch-type	Clutch-type (Rigid-type)	Wing-nut type (Imperial-type)
A	0-0.5mm	1.0-1.5mm	1.5-2.0mm

Check



⚠ WARNING

1) Do not use mineral oil on flared part.
2) Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.
3) Never use piping which has been used for previous installations. Only use parts which are delivered with the unit.
4) Do not install a drier to this R410A unit in order to guarantee its lifetime.
5) The drying material may dissolve and damage the system.
6) Incomplete flaring may cause refrigerant gas leakage.

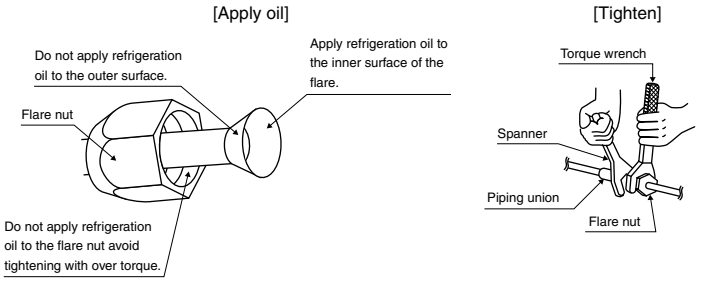
Refrigerant Piping Work

2. Refrigerant piping.

⚠ CAUTION

1) Use the flare nut fixed to the main unit. (To prevent cracking of the flare nut by aged deterioration.)
2) To prevent gas leakage, apply refrigeration oil only to the inner surface of the flare. (Use refrigeration oil for R410A.)
3) Use torque wrenches when tightening the flare nuts to prevent damage to the flare nuts and gas leakage.

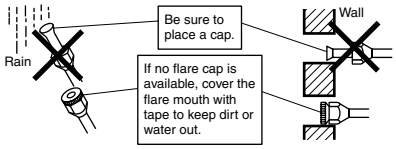
Align the centres of both flares and tighten the flare nuts 3 or 4 turns by hand. Then tighten them fully with the torque wrenches.



Flare nut tightening torque		
Gas side		Liquid side
25/35/42 class	50 class	
3/8 inch	1/2 inch	1/4 inch
32.7-39.9N • m (330-407kgf • cm)	49.5-60.3N • m (505-615kgf • cm)	14.2-17.2N • m (144-175kgf • cm)

2-1. Caution on piping handling.

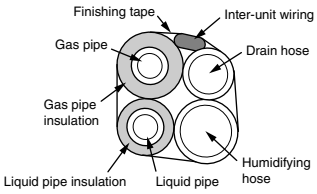
1) Protect the open end of the pipe against dust and moisture.
2) All pipe bends should be as gentle as possible. Use a pipe bender for bending.



2-2. Selection of copper and heat insulation materials.

- When using commercial copper pipes and fittings, observe the following:

1) Insulation material: Polyethylene foam
Heat transfer rate: 0.041 to 0.052W/mK (0.035 to 0.045kcal/(mh•˚C))
Refrigerant gas pipe's surface temperature reaches 110˚C max.
Choose heat insulation materials that will withstand this temperature.



2) Be sure to insulate both the gas and liquid piping and to provide insulation dimensions as below.

Gas side		Liquid side	Gas pipe thermal insulation		Liquid pipe thermal insulation
25/35/42 class	50 class		25/35/42 class	50 class	
O.D. 9.5mm	O.D. 12.7mm	O.D. 6.4mm	I.D. 12-15mm	I.D. 14-16mm	I.D. 8-10mm
Minimum bend radius			Thickness 10mm Min.		
30mm or more	40mm or more	30mm or more			
Thickness 0.8mm (C1220T-O)					

3) Use separate thermal insulation pipes for gas and liquid refrigerant pipes.

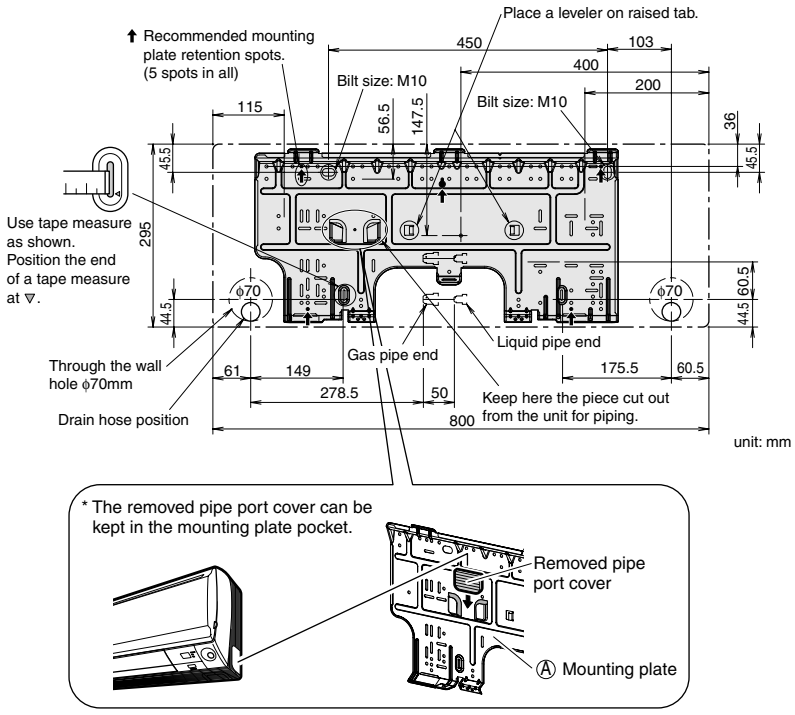
7

Indoor Unit Installation

1. Installing the mounting plate.

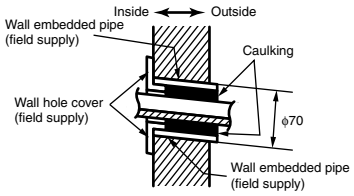
- The mounting plate should be installed on a wall which can support the weight of the indoor unit.
  1) Temporarily secure the mounting plate to the wall, make sure that the panel is completely level, and mark the boring points on the wall.
  2) Secure the mounting plate to the wall with screws.

Recommended mounting plate retention spots and dimensions



2. Boring a wall hole and installing wall embedded pipe.

- For walls containing metal frame or metal board, be sure to use a wall embedded pipe and wall cover in the feed-through hole to prevent possible heat, electrical shock, or fire.
- Be sure to caulk the gaps around the pipes with caulking material to prevent water leakage.
  1) Bore a feed-through hole of 70mm in the wall so it has a down slope toward the outside.
  2) Insert a wall pipe into the hole.
  3) Insert a wall cover into wall pipe.
  4) After completing refrigerant piping, wiring, and drain piping, caulk pipe hole gap with putty.

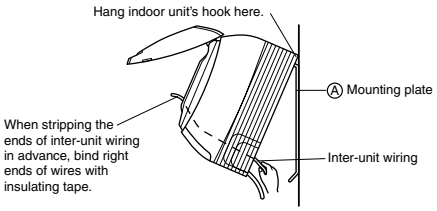


8

Indoor Unit Installation

3. Inter-unit wiring.

1) Open the front panel, then remove the service lid.
2) Pass the inter-unit wiring from the outdoor unit through the feed-through wall hole and then through the back of the indoor unit. Pull them through the front side. Bend the ends of tie wires upward for easier work in advance. (If the inter-unit wiring ends are to be stripped first, bundle wire ends with adhesive tape.)
3) Press the bottom frame of the indoor unit with both hands to set it on the mounting plate hooks. Make sure the wires do not catch on the edge of the indoor unit.



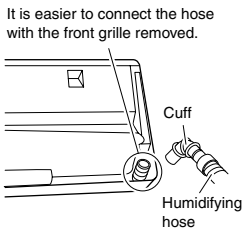
4. Humidifying hose installation work.

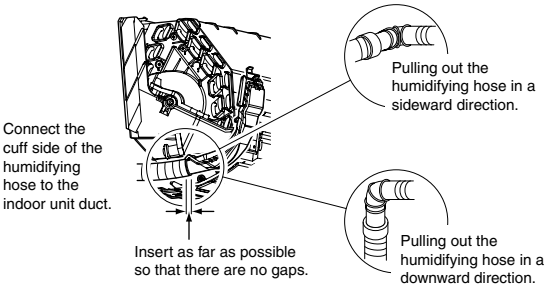
⚠ CAUTION

- Be sure to use humidifying hose sold as optional accessory. (KPMH996A10S (10m set), KPMH996A15S (15m set))
  1) The length of the humidifying hose needs to be set to ensure humidifying capacity. Cut off any excess hose. Use the remote controller to set the hose length. (Refer to page 13.)
- Attach a cover to the end of each humidifying hose so that no moisture or foreign substance will go into the hose when leaving the hose without being connected to the outdoor and indoor units.
- When laying the humidifying hose inside the wall, block the ends of the humidifying hose with tape or the like to prevent water or anything else from entering it until it is connected to the indoor unit and outdoor unit ducts.
- Do not bend the humidifying hose more than 90˚.
- Use caution not to deform the cuff while installing the humidifying hose.

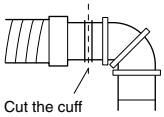
4-1. Connecting to the indoor unit.

- Connect the cuff side of the humidifying hose to the indoor unit duct.
- Use the humidifying hose of suitable length as shown below.
  10m set: the 8m hose
  15m set: the 2m hose
- When connecting the humidifying hoses of the indoor and outdoor units, refer to the installation manual provided to the outdoor unit.

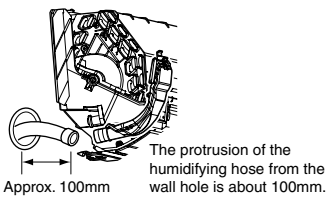




• Left-back piping



(If it is too long, cut the humidifying hose and bond the separately sold cuff with adhesive for vinyl to adjust the length.)

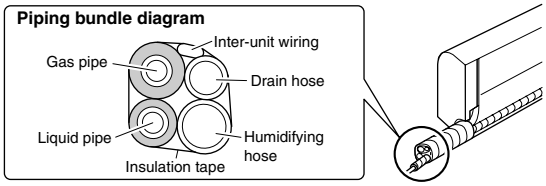


9

5. Laying piping, hoses, and wiring.

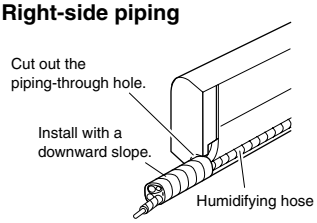
- Connect the humidifying hose to the indoor unit duct. See **4. Humidifying hose installation work** for details.
- Lay the piping, drain hose and humidifying hose according to the orientation of the piping coming out of the unit, as shown below.
- Make sure the drain hose is sloped downward.
- Wrap the piping, drain hose and humidifying hose together using insulation tape.

Piping bundle diagram

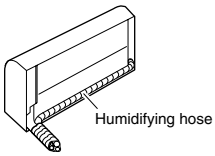


5-1. Right-side, right-back, or right-bottom piping.

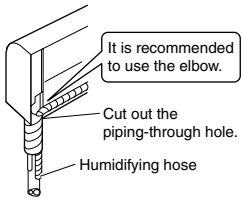
• Right-side piping



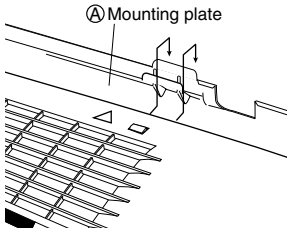
• Right-back piping



• Right-bottom piping



1) Wrap the pipes, hoses and inter-unit wiring using insulation tape as shown in the piping bundle diagram.
2) Put all the pipes through the through-hole in the wall and hook the indoor unit onto the Ⓐ mounting plate.
3) Connect the pipes.



5-2. Left-side, left-back, or left-bottom piping.

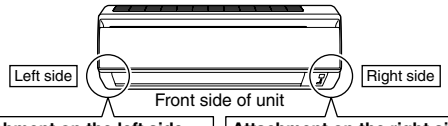
How to replace the drain plug and drain hose.

• Replacing onto the left side

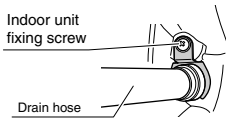
1) Remove the insulation fixing screws on the right to remove the drain hose.
2) Remove the drain plug on the left side and attach it to the right side.
3) Insert the drain hose and tighten with the screws which were removed at STEP 1).

Drain hose attachment position

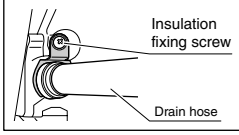
* The drain hose is on the back of the unit.



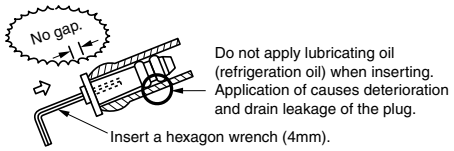
Attachment on the left side



Attachment on the right side (factory default)

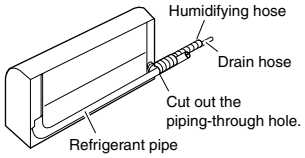


How to set drain plug

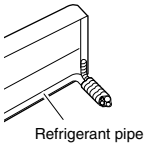


Indoor Unit Installation

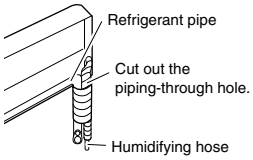
• Left-side piping



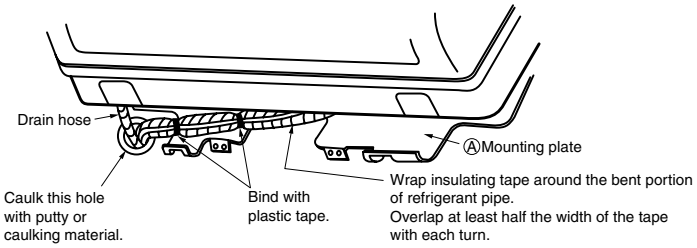
• Left-back piping



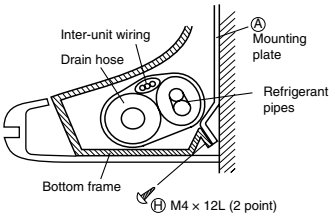
• Left-bottom piping



1) Replace the drain plug and drain hose. **(How to replace the drain plug and drain hose.)**
2) Pull in the refrigerant piping and lay it so that it matches the liquid and gas piping marked on the Ⓐ mounting plate.
3) Hook the indoor unit onto the Ⓐ mounting plate.
4) Connect the pipes. If it is difficult to do, remove the front grille first.
5) Wrap the insulation on the piping with insulation tape. If you are not replacing the drain hose, store it in the location shown as right figure.



6) While exercising care so that the inter-unit wiring do not catch indoor unit, press the bottom edge of indoor unit with both hands until it is firmly caught by the mounting plate hooks. Secure indoor unit to the mounting plate with screws (M4 × 12L).

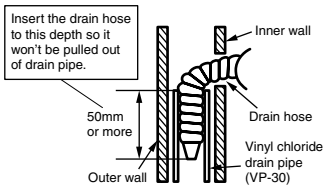


5-3. Wall embedded piping.

Follow the instructions given under

Left-side, left-back, or left-bottom piping .

1) Insert the drain hose to this depth so it won't be pulled out of the drain pipe.

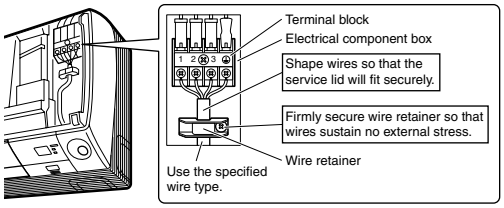


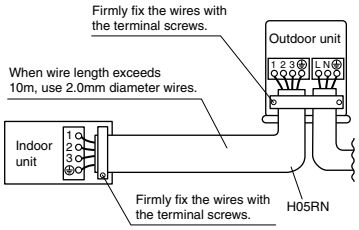
11

6. Wiring.

With a multi indoor unit , install as described in the installation manual supplied with the multi outdoor unit.

1) Strip wire ends (15mm).
2) Match wire colours with terminal numbers on indoor and outdoor unit's terminal blocks and firmly screw wires to the corresponding terminals.
3) Connect the earth wires to the corresponding terminals.
4) Pull wires to make sure that they are securely latched up, then retain wires with wire retainer.
5) In case of connecting to an adapter system. Run the remote controller cable and attach the S21.
6) Shape the wires so that the service lid fits securely, then close service lid.



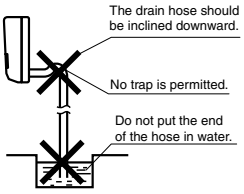


⚠ WARNING

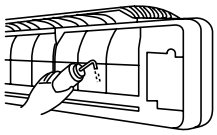
1) Do not use tapped wires, strand wires, extensioncords, or starburst connections, as they may cause overheating, electrical shock, or fire.
2) Do not use locally purchased electrical parts inside the product. (Do not branch the power for the drain pump, etc., from the terminal block.) Doing so may cause electric shock or fire.

7. Drain piping.

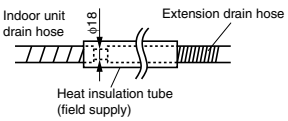
1) Connect the drain hose, as described right.



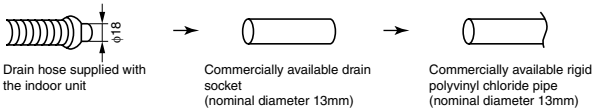
2) Remove the air filters and pour some water into the drain pan to check the water flows smoothly.



3) When drain hose requires extension, obtain an extension hose commercially available.
Be sure to thermally insulate the indoor section of the extension hose.



4) When connecting a rigid polyvinyl chloride pipe (nominal diameter 13mm) directly to the drain hose attached to the indoor unit as with embedded piping work, use any commercially available drain socket (nominal diameter 13mm) as a joint.

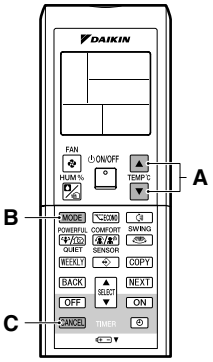


Setting the Humidifying Hose Length

⚠ CAUTION

If the humidifying hose length is not set or it is set incorrectly, the humidifying capacity may diminish or strange sound may occur from humidifying hose.

1. Setting the humidifying hose length.



A: TEMP button
B: MODE selector button
C: CANCEL button

Set the humidifying hose length to ensure humidifying capacity. Use the remote controller to set the humidifying hose length. When doing this, power on the unit as communication is established between the unit and the remote controller.
Be sure to direct the remote controller toward the indoor unit while setting the humidifying hose length.
(The humidifying hose length includes the rear of the indoor unit.)

- Set the humidifying hose length according the following procedure after check the installed hose length.

Pipe set mode (Hose length setting)

1) Press “MODE” button and “TEMP” button (2 locations) at the same time.
(To cancel, do not operate the button for 60 seconds. The display will return to normal.)

2) Press “TEMP ▲▼” button and select “PS” (Pipe set mode).

3) Press “MODE” button to activate the Pipe set mode.
(When the unit receive signal, the sound emitted. Be sure to check the sound. If the sound is not heard, press “MODE” button again.)

4) Pressing “TEMP ▲▼” button changes the humidifying hose length.
You may set the hose length to 6 levels:
“~ 3.0”, “~ 4.0”, “~ 6.0”, “~ 8.0”, “~ 10.0”, “~ 10.0”.

5) Hold “MODE” button for more than 2 seconds.
The display changes to “PC” (Pipe check mode).

Pipe check mode (Hose length check)

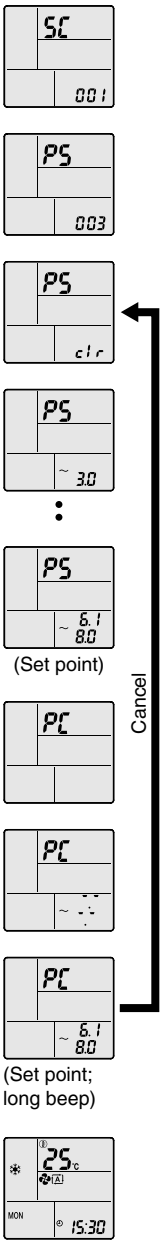
6) Press “MODE” button again to activate the pipe check mode.

7) Press “TEMP ▲▼” button and select the hose length.
Beep sound indicate that the setting of the remote controller accords or disaccord with the unit.
- accord: a long beep
- disaccord: a short beep

If you set the wrong humidifying hose length, press “CANCEL” button.
The display returns to step 4). Reset the hose length.

8) Hold “MODE” button for more than 5 seconds.
The humidifying hose length setting is complete and the display returns to normal.

LCD



2. When the unit cannot be powered on.

When setting the humidifying hose length without powering on the unit, the indoor unit does not receive the information at step 3) and 5) shown above. However, the remote controller stores the humidifying hose length information.
(When the customer uses the unit, the humidifying hose length information is send to the indoor unit to be set.)

Trial Operation and Testing

1. Trial operation and testing.

1-1 Measure the supply voltage and make sure that it falls in the specified range.

1-2 Trial operation should be carried out in either cooling or heating mode.

- In cooling mode, select the lowest programmable temperature; in heating mode, select the highest programmable temperature.
  1) Trial operation may be disabled in either mode depending on the room temperature. Use the remote controller for trial operation as described below.
  2) After trial operation is complete, set the temperature to a normal level (26˚C to 28˚C in cooling mode, 20˚C to 24˚C in heating mode).
  3) For protection, the system disables restart operation for 3 minutes after it is turned off.

1-3 To perform a test run for HUMID HEAT operation, activate test run mode from the remote controller following the instructions below and select the HUMID HEAT operation.

1-4 Carry out the test operation in accordance with the operation manual to ensure that all functions and parts, such as louver movement, are working properly.
- The air conditioner requires a small amount of power in its standby mode. If the system is not to be used for some time after installation, shut off the circuit breaker to eliminate unnecessary power consumption.
- If the circuit breaker trips to shut off the power to the air conditioner, the system will restore the original operation mode when the circuit breaker is opened again.

Trial operation from remote controller

1) Press “ON/OFF” button to turn on the system.
2) Press “TEMP” button (2 locations) and “MODE” button at the same time.
3) Press “TEMP ▲▼” button and select “ 7 ” (TEST mode).
4) Press “MODE” button.
5) Trial run mode terminates in approx. 30 minutes and switches into normal mode. To quit a trial operation, press “ON/OFF” button.

2. Test items.

Test items	Symptom (diagnostic display on RC)	Check
Indoor and outdoor units are installed properly on solid bases.	Fall, vibration, noise	
No refrigerant gas leaks.	Incomplete cooling/heating function	
Refrigerant gas and liquid pipes and indoor drain hose extension are thermally insulated.	Water leakage	
Draining line is properly installed.	Water leakage	
System is properly earthed.	Electrical leakage	
The specified wires are used for inter-unit wiring connections.	Inoperative or burn damage	
Indoor or outdoor unit’s air intake or exhaust has clear path of air. Stop valves are opened.	Incomplete cooling/heating function	
Indoor unit properly receives remote controller commands.	Inoperative	
No strange noise from the humidifying hose.	Bubble sound*	

* When the bubble sound is heard, water may be in the humidifying hose. Do the HOSE DRY operation.

HOSE DRY operation for humidifying hose

1) Press “TEMP” button (2 locations) and “MODE” button at the same time.
2) Press “TEMP ▲▼” button and select “ J ” (DRYING mode).
3) Press “MODE” button to start the HOSE DRY operation. HOSE DRY operation will work about 30 minutes. (To cancel the HOSE DRY operation, hold “MODE” button for more than 5 seconds.)
4) Activate test run for HUMID HEAT operation again, check that the bubble sound is not heard from the humidifying hose.

3P232706-1B

1.2 Outdoor Units

Outdoor Unit Installation Drawings

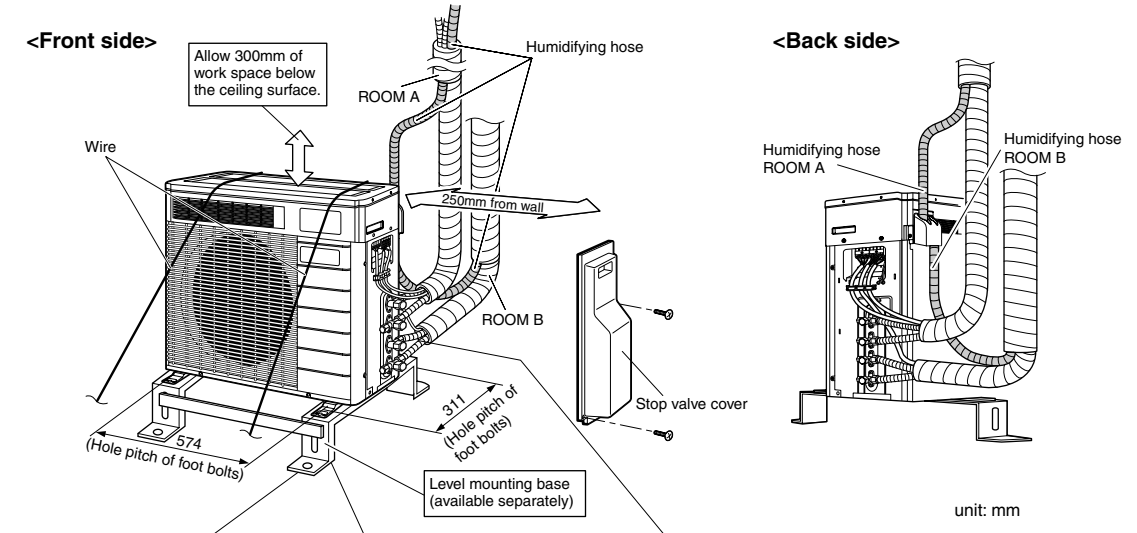
1. Precautions for humidifying hose installation work.

- Moisture on the outdoor unit is brought to the indoor unit together with air around the outdoor unit during humidifying operation. Install the outdoor unit in a clean and calm location.
- Be sure to use the humidifying hose sold as an optional accessory. (KPMH996A10S (10m set), KPMH996A15S (15m set))

⚠ CAUTION

Do not connect the embedded branch piping and the outdoor unit when only carrying out piping work without connecting the indoor unit in order to add another indoor unit later.
Make sure no dirt or moisture gets into either side of the embedded branch piping.
See "**Precautions for Laying Refrigerant Piping**" on page 9 for details.

■ Installation of humidifying hoses, respectively, in upward direction in ROOM A and in downward direction in ROOM B.

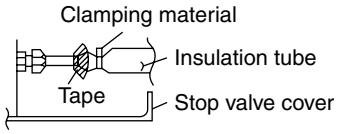


unit: mm

If there is the danger of the unit falling or overturning, fix the unit with foundation bolts, or with wire or other means.

If the location does not have good drainage, place the unit on a level mounting base (or a plastic pedestal). Install the outdoor unit in a level position. Failure to do so may result in water leakage or accumulation.

Also insulate the connection on the outdoor unit.



Use tape or insulating material on all connections to prevent air from getting in between the copper piping and the insulation tube.
Be sure to do this if the outdoor unit is installed above.

3

Installation

- Install the unit horizontally.
- The unit may be installed directly on a concrete verandah or a solid place if drainage is good.
- If the vibration may possibly be transmitted to the building, use a vibration-proof rubber (field supply).

1. Connections (connection port).

Install the indoor unit according to the table below, which shows the relationship between the class of indoor unit and the corresponding port.
The total indoor unit class that can be connected to this unit:

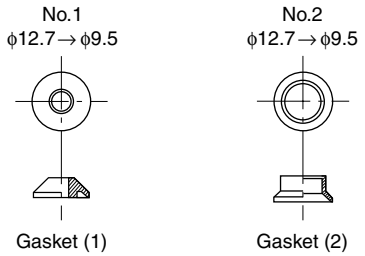
2MXU40G* — Up to 6.0kW
2MXU50G* — Up to 8.5kW

Port	2MXU40G*	2MXU50G*
A	25 , 35	25 , 35 , 42
B	25 , 35	(25),(35),(42), 50

( ) : Use a reducer to connect pipes.

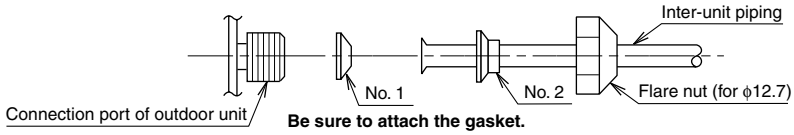
Refer to "**How to Use Reducers**" for information on reducer numbers and their shapes.

How to Use Reducers



Use the reducers supplied with the unit as described below.

- Connecting a pipe of ϕ9.5 to a gas pipe connection port for ϕ12.7:

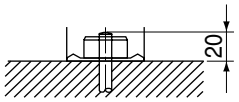


- When using the reducer packing shown above, be careful not to overtighten the nut, or the smaller pipe may be damaged (about 2/3 - 1 the normal torque).
- Apply a coat of refrigeration oil to the threaded connection port of the outdoor unit where the flare nut comes in.
- Use an appropriate wrench to avoid damaging the connection thread by over-tightening the flare nut.

Flare nut tightening torque	
Flare nut for ϕ12.7	49.5–60.3N·m (505–615kgf·cm)

Precautions on Installation

- Check the strength and level of the installation ground so that the unit will not cause any operating vibration or noise after installed.
- In accordance with the foundation drawing in fix the unit securely by means of the foundation bolts. (Prepare four sets of M8 or M10 foundation bolts, nuts and washers each which are available on the market.)
- It is best to screw in the foundation bolts until their length are 20mm from the foundation surface.

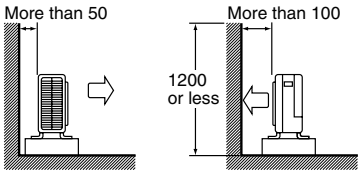


4

Outdoor Unit Installation Guideline

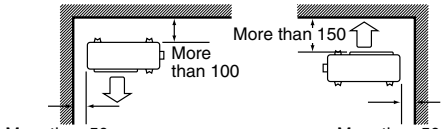
- Where a wall or other obstacle is in the path of outdoor unit's intake or exhaust airflow, follow the installation guidelines below.
- For any of the below installation patterns, the wall height on the exhaust side should be 1200mm or less.

Wall facing one side



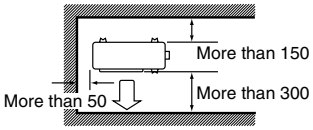
Side view

Walls facing two sides



Top view

Walls facing three sides



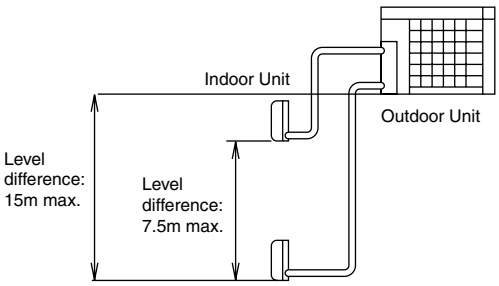
Top view

unit: mm

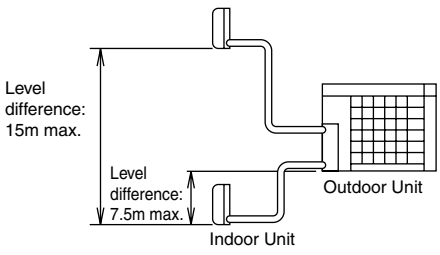
Selecting a Location for Installation of the Indoor Units

- The maximum allowable length of refrigerant piping, and the maximum allowable height difference between the outdoor and indoor units, are listed below.
  (The shorter the refrigerant piping, the better the performance. Connect so that the piping is as short as possible. **Shortest allowable length per room is 3m.**)

Piping to each indoor unit	ROOM A, B: 15m max.
Total length of piping between all units	30m max.



If the outdoor unit is positioned higher than the indoor units.



If the outdoor unit is positioned otherwise. (If lower than one or more indoor units.)

5

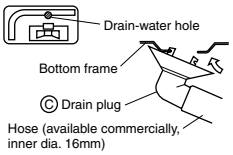
Refrigerant Piping Work

1. Installing outdoor unit.

1) When installing the outdoor unit, refer to "**Precautions for Selecting the Location**" on page 2 and the "**Outdoor Unit Installation Drawings**" on page 3.
2) If drain work is necessary, follow the procedures below.

2. Drain work.

1) Use Ⓒ drain plug for drainage.
2) If the drain port is covered by a mounting base or floor surface, place additional foot bases of at least 30mm in height under the outdoor unit's feet.
3) In cold areas, do not use a drain hose with the outdoor unit. (Otherwise, drain water may freeze, impairing heating performance.)



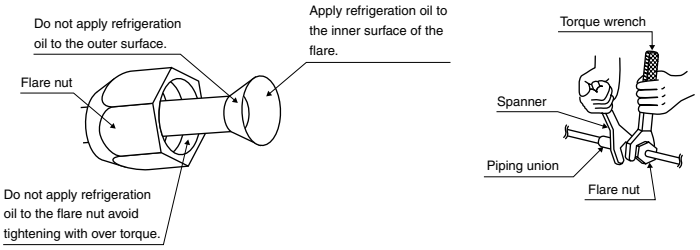
3. Refrigerant piping.

⚠ CAUTION

1) Use the flare nut fixed to the main unit. (To prevent cracking of the flare nut by aged deterioration.)
2) To prevent gas leakage, apply refrigeration oil only to the inner surface of the flare. (Use refrigeration oil for R410A.)
3) Use torque wrenches when tightening the flare nuts to prevent damage to the flare nuts and gas leakage.

Align the centres of both flares and tighten the flare nuts 3 or 4 turns by hand. Then tighten them fully with the torque wrenches.

[Apply oil] [Tighten]



Flare nut tightening torque	
Flare nut for ϕ6.4	14.2-17.2N • m (144-175kgf • cm)
Flare nut for ϕ9.5	32.7-39.9N • m (333-407kgf • cm)
Flare nut for ϕ12.7	49.5-60.3N • m (505-615kgf • cm)

Valve cap tightening torque		
Gas side		Liquid side
3/8 inch	1/2 inch	1/4 inch
21.6-27.4N • m (220-280kgf • cm)	48.1-59.7N • m (490-610kgf • cm)	21.6-27.4N • m (220-280kgf • cm)

Service port cap tightening torque	10.8-14.7N • m (110-150kgf • cm)

Refrigerant Piping Work

4. Purging air and checking gas leakage.

⚠ WARNING

1) Do not mix any substance other than the specified refrigerant (R410A) into the refrigeration cycle.
2) When refrigerant gas leaks occur, ventilate the room as soon and as much as possible.
3) R410A, as well as other refrigerants, should always be recovered and never be released directly into the environment.
4) Be sure to check for gas leaks.

- Be sure to perform vacuum pumping for all the rooms at the same time.
- Be sure to use the special tools for the R410A (gauge manifold, charge hose, vacuum pump, vacuum pump adapter, etc.).
- Use a hexagonal wrench (4mm) to operate the stop valve rod.
- All refrigerant pipe joints should be tightened with a torque wrench at the specified tightening torque.

1) Connect the charge hose protrusions (the side for pushing the pin) for low pressure and high pressure on the gauge manifold to the gas stop valve service port for rooms **A and B**.

⇩

2) Fully open gauge manifold's low-pressure valve (Lo) and high-pressure valve (Hi).

⇩

3) Apply vacuum pumping for 20 minutes or longer. Check that the compound pressure gauge reads –0.1MPa (–76cmHg).

⇩

4) After checking the vacuum, close the low pressure and high pressure valves on the gauge manifold and stop the vacuum pump. (Leave as is for 4-5 minutes and make sure the coupling meter needle does not go back.) If it does go back, this may indicate the presence of moisture or leaking from connecting parts.
After inspecting all the connection and loosening then retightening the nuts, repeat steps 2) → 3) → 4).

⇩

5) Remove the valve caps on the liquid and gas stop valves at the pipes for rooms A and B.

⇩

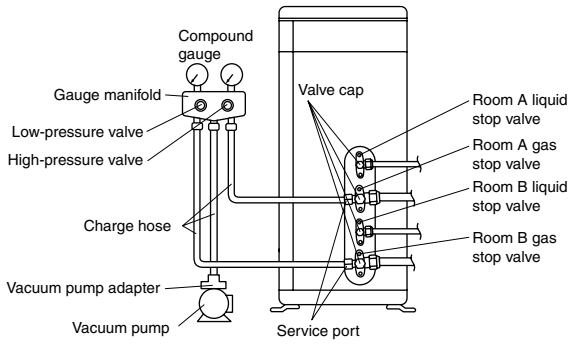
6) Open the valve rods on the liquid stop valves for rooms A and B by turning them 90˚ counterclockwise using a hex wrench. Close them 5 seconds later and check for gas leaks.
After checking for gas leaks, check the areas around flares on the indoor unit, and the areas around flares and valve rods on the outdoor unit by applying soapy water.
Wipe down thoroughly after the check is complete.

⇩

7) Remove the charge hose from the gas stop valve service ports at the pipes for rooms A and B and completely open the liquid and gas stop valves at the pipes for rooms A and B.
(Stop the valve rods as far as they go and do not attempt to turn them any further.)

⇩

8) Use a torque wrench to tighten the valve caps and service port caps on the liquid and gas stop valves at the pipes for rooms A and B to the designated torque.



7

5. Refilling the refrigerant.

Check the type of refrigerant to be used on the machine nameplate.

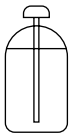
Precautions when adding R410A

Fill from the liquid pipe in liquid form.

It is a mixed refrigerant, so adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

1) Before filling, check whether the cylinder has a siphon attached or not. (It should have something like “liquid filling siphon attached” displayed on it.)

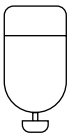
Filling a cylinder with an attached siphon



Stand the cylinder upright when filling.

There is a siphon pipe inside, so the cylinder need not be upside-down to fill with liquid.

Filling other cylinders



Turn the cylinder upside-down when filling.

2) Be sure to use the R410A tools to ensure pressure and to prevent foreign objects entering.

6. Charging with refrigerant.

- If the total length of piping for all rooms exceeds 20m, additionally charge with **(R410A) 20g** of refrigerant for each additional meter of piping.

Important information regarding the refrigerant used

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol.

Do not vent gases into the atmosphere.

Refrigerant type: **R410A**

GWP(1) value: **1975**

(1) GWP = global warming potential

Please fill in with indelible ink,

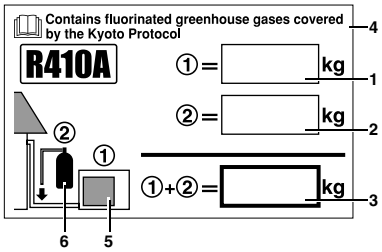
■ ① the factory refrigerant charge of the product,

■ ② the additional refrigerant amount charged in the field and

■ ①+② the total refrigerant charge

on the refrigerant charge label supplied with the product.

The filled out label must be adhered in the proximity of the product charging port (e.g. onto the inside of the stop valve cover).



1 factory refrigerant charge of the product: see unit name plate

2 additional refrigerant amount charged in the field

3 total refrigerant charge

4 Contains fluorinated greenhouse gases covered by the Kyoto Protocol

5 outdoor unit

6 refrigerant cylinder and manifold for charging

NOTE:

National implementation of EU regulation on certain fluorinated greenhouse gases may require to provide the appropriate official national language on the unit. Therefor an additional multilingual fluorinated greenhouse gases label is supplied with the unit.

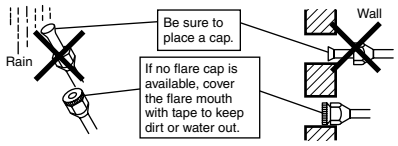
Sticking instructions are illustrated on the backside of that label.

⚠ CAUTION

1) Even though the stop valve is fully closed, the refrigerant may slowly leak out; do not leave the flare nut removed for a long period of time.
2) Do not overfill with refrigerant. This will break the compressor.

Refrigerant Piping Work

Precautions for Laying Refrigerant Piping



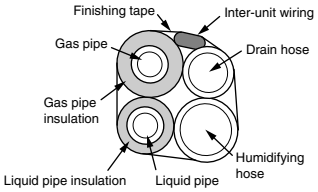
• Cautions on pipe handling

1) Protect the open end of the pipe against dust and moisture.
2) All pipe bends should be as gentle as possible. Use a pipe bender for bending.

• Selection of copper and heat insulation materials

When using commercial copper pipes and fittings, observe the following:

1) Insulation material: Polyethylene foam
   Heat transfer rate: 0.041 to 0.052W/mK (0.035 to 0.045kcal/mh˚C)
   Refrigerant gas pipe's surface temperature reaches 110˚C max.
   Choose heat insulation materials that will withstand this temperature.
2) Be sure to insulate both the gas and liquid piping and to provide insulation dimensions as below.

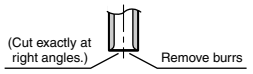


Gas side		Liquid side	Gas pipe thermal insulation		Liquid pipe thermal insulation
40 or 50class	50 class		40 class	50 class	
O.D. 9.5mm	O.D. 12.7mm	O.D. 6.4mm	I.D. 12-15mm		I.D. 8-10mm
Minimum bend radius			Thickness 13mm Min.		Thickness 10mm Min.
30mm or more	40mm or more	30mm or more			
Thickness 0.8mm (C1220T-O)					

3) Use separate thermal insulation pipes for gas and liquid refrigerant pipes.

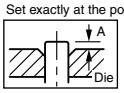
• Flaring the pipe end

1) Cut the pipe end with a pipe cutter.
2) Remove burrs with the cut surface facing downward so that the chips do not enter the pipe.
3) Put the flare nut on the pipe.
4) Flare the pipe.
5) Check that the flaring is properly made.

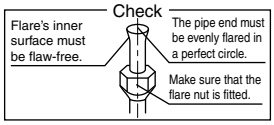


Flaring

Set exactly at the position shown below.



	Flare tool for R410A	Conventional flare tool	
	Clutch-type	Clutch-type (Rigid-type)	Wing-nut type (Imperial-type)
A	0-0.5mm	1.0-1.5mm	1.5-2.0mm



⚠ WARNING

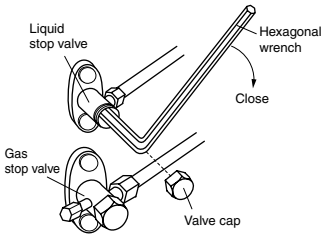
1) Do not use mineral oil on flared part.
2) Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.
3) Never use piping which has been used for previous installations. Only use parts which are delivered with the unit.
4) Do never install a drier to this R410A unit in order to guarantee its lifetime.
5) The drying material may dissolve and damage the system.
6) Incomplete flaring may cause refrigerant gas leakage.

9

Pump Down Operation

In order to protect the environment, be sure to pump down when relocating or disposing of the unit.

1) Remove the valve caps on the liquid and the gas stop valves at the pipes for rooms A and B.
2) Run the unit on forced cooling. (Refer to the below.)
3) After 5 to 10 minutes, close the liquid stop valves at the pipes for rooms A and B using a hex wrench.
4) After 2 to 3 minutes, stop the FORCED COOLING operation as quickly as possible after the gas stop valves at the pipes for rooms A and B have been shut off.
5) Turn the power breaker off.



⚠ CAUTION

Run the air conditioner to cool both rooms A and B when performing a pump down.

1. FORCED COOLING operation.

1-1. Using the indoor unit "ON/OFF" button.

1) Press the "ON/OFF" button on the indoor unit in either room A or B for 5 seconds continuously. The units in both rooms will start.
2) FORCED COOLING operation will end after around 15 minutes and the unit will stop automatically. Press the "ON/OFF" button on the indoor unit to FORCED COOLING operation to stop.
3) **Use this method to FORCED COOLING operation when the outside temperature is 10˚C or lower.**

1-2. Using the wireless remote controller.

1) Select cooling operation and press the "ON/OFF" button. (The unit will start.)
2) Press the "TEMP ▲▼" button (2 locations), and the "MODE" button at the same time.
3) Press the "MODE" button twice. (7 will be displayed and the unit will go into test-run mode.)
4) Test-run mode will end after around 30 minutes and the unit will stop automatically. Press the "ON/OFF" button to force the test-run to stop.

⚠ CAUTION

If the outside temperature is 10˚C or lower, the safety device might start, preventing operation. In this situation, warm the outside temperature thermistor on the outdoor unit to 10˚C or warmer. Operation will start.

Connecting the Humidifying Hose

Either one of the following sets (optional accessories) is required when connecting humidifying hoses. Prepare the 10 or 15m set according to the conditions of the site.

<Optional accessories>

KPMH996A10S (10m set)

Ⓐ Joint (ϕ25)	Ⓑ Binding band	Humidifying hose		Ⓔ Installation manual
		Ⓒ 8m (With cuff) (I.D. 25mm O.D. 35mm)	Ⓓ 2m (With cuff) (I.D. 25mm O.D. 35mm)	
1	2	1	1	1

KPMH996A15S (15m set)

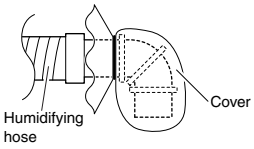
Ⓕ Joint (ϕ30)	Ⓖ Reducing joint (ϕ30→ϕ25)	Ⓑ Binding band	Humidifying hose			Ⓔ Installation manual
			Ⓗ 7.5m (I.D. 30mm O.D. 46mm)	Ⓙ 3.5m (I.D. 30mm O.D. 46mm)	Ⓓ 2m (With cuff) (I.D. 25mm O.D. 35mm)	
1	2	6	1	1	2	1

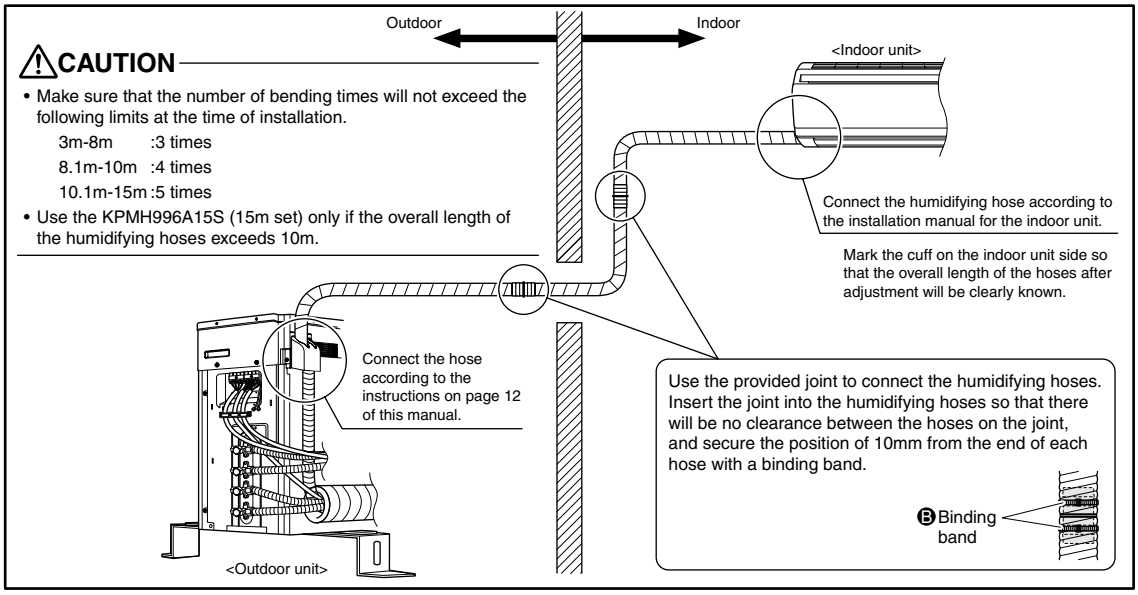
Connecting the Humidifying Hose

1. Connecting to indoor unit.

Keep the following items in mind in order to prevent the degrading of humidification performance when connecting the humidifying hose to the indoor unit.

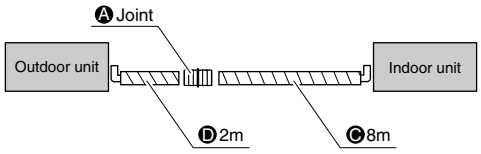
1) Cut the excessive portions of the humidifying hoses.
   * Determine the overall length of the humidifying hoses according to the installation manual for the indoor unit.
2) Be sure to avoid traps as much as possible when installing the humidifying hoses.
3) Be careful not to crush the humidifying hoses in the case of bending the hoses at the time of installation. Furthermore, make sure that the maximum bending radius will not exceed 90˚.
4) Check that the overall length of the humidifying hoses is definitely 3m or more.
5) Attach a cover to the end of each humidifying hose so that no moisture or foreign substance will go into the hose when leaving the hose without being connected to the outdoor and indoor units.





■ Connecting KPMH996A10S (10m set)

1) Be sure to connect the Ⓒ 8m hose to the indoor unit and the Ⓓ 2m hose to the outdoor unit, respectively, and join the 2 hoses with the Ⓐ joint.

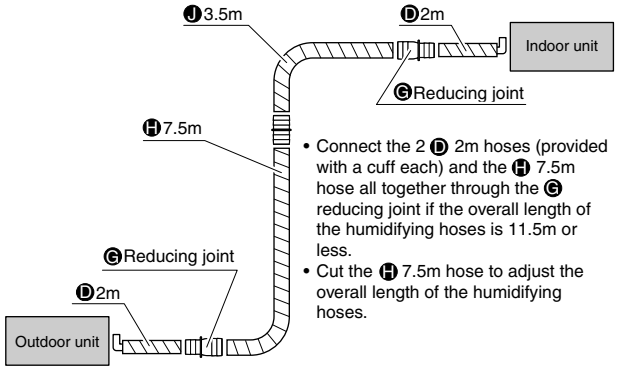


• Cut the Ⓒ 8m hose to adjust the overall length of the humidifying hoses.

■ Connecting KPMH996A15S (15m set)

• Use the KPMH996A15S (15m set) only if the overall length of the humidifying hoses exceeds 10m.

1) Be sure to connect one of the Ⓓ 2m hoses (provided with a cuff each) to the indoor unit and the other one to the outdoor unit. Connect the Ⓗ 7.5m hose and Ⓙ 3.5m hose midway to adjust the overall length.

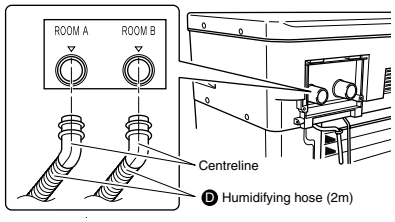


• Connect the 2 Ⓓ 2m hoses (provided with a cuff each) and the Ⓗ 7.5m hose all together through the Ⓖ reducing joint if the overall length of the humidifying hoses is 11.5m or less.
• Cut the Ⓗ 7.5m hose to adjust the overall length of the humidifying hoses.

2. Connecting to outdoor unit.

There are 2 ways to connect humidifying hoses to the outdoor unit.

<Back side>



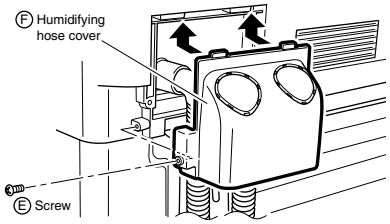
Connecting through the path under the humidifying hoses cover

1) Connect the D humidifying hose (2m) to the humidifying duct on the back of the outdoor unit. In that case, make sure that the centreline on the cuff of the hose coincides with ▽ mark above the connecting port.

   * The F humidifying hose cover cannot be mounted unless ▽ mark coincides with the centreline.

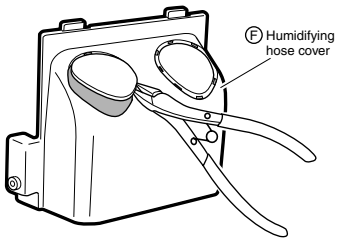
2) Mount the F humidifying hose cover.
   Insert the 4 tabs of the cover as shown in the figure.

3) Tighten the E screw and secure the F humidifying hose cover and outdoor unit.

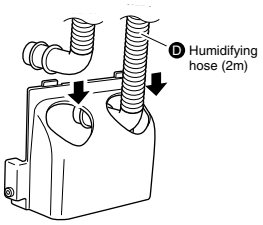


Connecting through the path above the humidifying hose cover

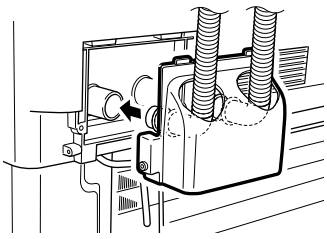
1) Cut out the knockout hole on the F humidifying hose cover.



2) Insert the D humidifying hose (2m) into the knockout hole.

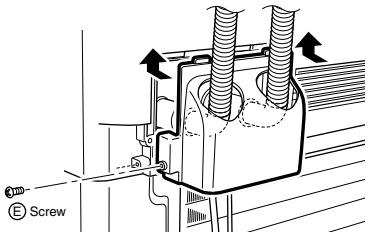


3) Insert the D humidifying hose into the humidifying duct on the back of the outdoor unit.



4) Mount the F humidifying hose cover.
   Insert the 4 tabs of the cover as shown in the figure.

5) Tighten the E screw and secure the F humidifying hose cover and outdoor unit.



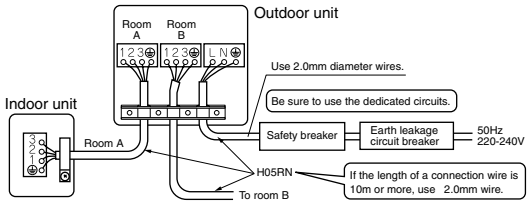
Wiring

⚠ WARNING

1) Do not use tapped wires, stranded wires (**CAUTION** 1)), extension cords, or starburst connections, as they may cause overheating, electrical shock, or fire.
2) Do not use locally purchased electrical parts inside the product. (Do not branch the power for the drain pump, etc., from the terminal block.) Doing so may cause electric shock or fire.
3) Be sure to install an earth leakage breaker. (One that can handle higher harmonics.)
(This unit uses an inverter, which means that it must be used an earth leakage breaker capable handling harmonics in order to prevent malfunctioning of the earth leakage breaker itself.)
4) Use an all-pole disconnection type breaker with at least 3mm between the contact point gaps.

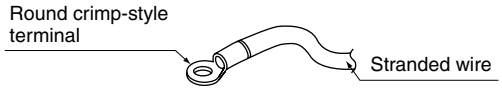
- Do not turn ON the safety breaker until all work is completed.

1) Strip the insulation from the wire (20mm).
2) Connect the connection wires between the indoor and outdoor units **so that the terminal numbers match**. Tighten the terminal screws securely. We recommend a flathead screwdriver be used to tighten the screws. The screws are packed with the terminal board.

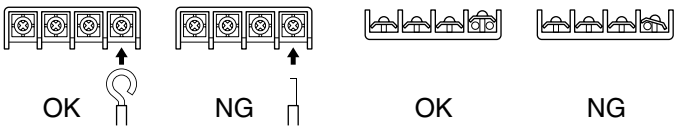


⚠ CAUTION

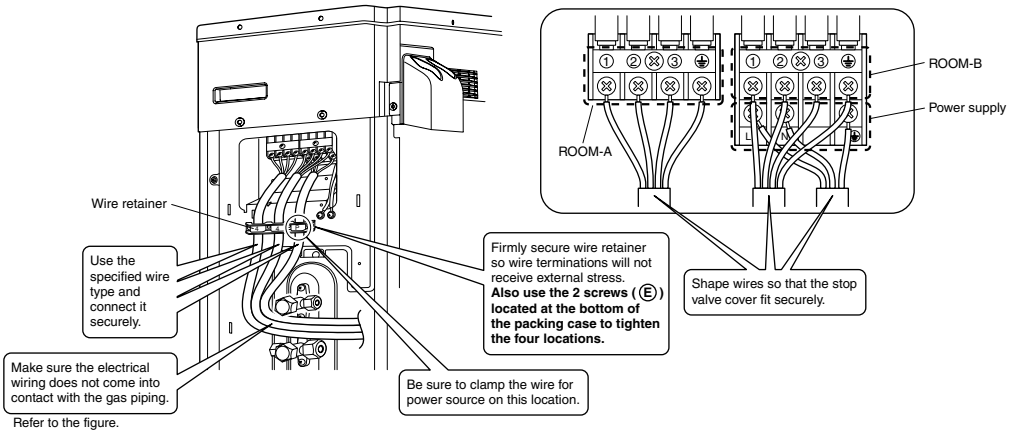
1) In case using stranded wires is unavoidable for some reason, make sure to install the round crimp-style terminals on the tip. Place the round crimp-style terminals on the wires up to the covered part and secure in place.



2) When connecting the connection wires to the terminal board using a single core wire, be sure to perform curling.
Problems with the work may cause heat and fires.

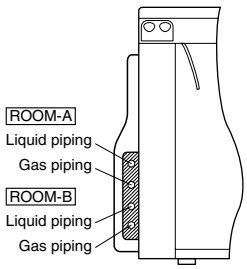


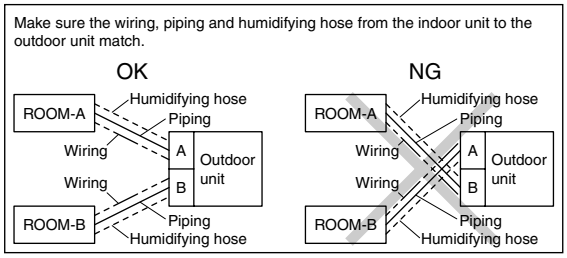
3) Pull the wire and make sure that it does not disconnect. Then fix the wire in place with a wire retainer.



Make sure connecting the piping and connecting wiring fit into ▨.

(Incorrect handling will make it hard to attach the stop valve cover, causing deformation.)





Test Run and Final Check

- Before starting the test run, measure the voltage at the primary side of the safety breaker.
- Check that all liquid and gas stop valves are fully open.
- Check that piping and wiring all match.

1. Test run and final check.

1) To test cooling, set for the lowest temperature. To test heating, set for the highest temperature. (Depending on the room temperature, only heating or cooling (but not both) may be possible.)
2) After the unit is stopped, it will not start again (heating or cooling) for approximately 3 minutes.
3) During the test run, first check the operation of each unit individually. Then also check the simultaneous operation of all indoor units.
   Check both heating and cooling operation.
4) After running the unit for approximately 20 minutes, measure the temperatures at the indoor unit inlet and outlet. If the measurements are above the values shown in the table below, then they are normal.

	Cooling	Heating
Temperature difference between inlet and outlet	Approx. 8˚C	Approx. 15˚C

(When running in one room)

5) During cooling operation, frost may form on the gas stop valve or other parts. This is normal.
6) Operate the indoor units in accordance with the included operation manual. Check that they operate normally.

2. Items to check.

Check item	Consequences of trouble	Check
Are the indoor units installed securely?	Falling, vibration, noise	
Has an inspection been made to check for gas leakage?	No cooling, no heating	
Has complete thermal insulation been done (gas pipes, liquid pipes, indoor portions of the drain hose extension)?	Water leakage	
Is the drainage secure?	Water leakage	
Are the ground wire connections secure?	Danger in the event of a ground fault	
Are the electric wires connected correctly?	No cooling, no heating	
Is the wiring in accordance with the specifications?	Operation failure, burning	
Are the inlets/outlets of the indoor and outdoor units free of any obstructions? Are the stop valves open?	No cooling, no heating	
Do the marks match (room A, room B) on the wiring and piping for each indoor unit?	No cooling, no heating	
Has the overall length of the humidifying hoses been set correctly? (Note 1)	No humidification or loud operating sound	
Are the connections of the humidifying hoses correct? (Note 2)	No humidification or unusual sound in the other room	

Note 1: Set the overall length of the humidifying hoses correctly according to the operation manual after the humidifying hoses are installed.

Note 2: Check that the connections of the humidifying hoses are correct.

Ventilation in room A (tap H)
↓
Go to room B and check that there is no air distribution sound from the indoor unit.
↓
If air distribution sound is heard in room B, interchange the humidifying hoses on the outdoor unit for rooms A and B.

■ **ATTENTION**

1) Have the customer actually operate the unit while looking at the manual included with the indoor unit. Instruct the customer how to operate the unit correctly (particularly cleaning of the air filters, operation procedures, and temperature adjustment).
2) Even when the air conditioner is not operating, it consumes some electric power. If the customer is not going to use the unit soon after it is installed, turn OFF the breaker to avoid wasting electricity.
3) If additional refrigerant has been charged because of long piping, list the amount added on the nameplate on the reverse side of the stop valve cover.

3P234246-1

2. System Configuration

After the installation and test operation of the room air conditioner have been completed, it should be operated and handled as described below. Every user would like to know the correct method of operation of the room air conditioner, to check if it is capable of cooling (or heating) well, and to know a clever method of using it.
In order to meet this expectation of the users, giving sufficient explanations taking enough time can be said to reduce about 80% of the requests for servicing. However good the installation work is and however good the functions are, the customer may blame either the room air conditioner or its installation work because of improper handling. The installation work and handing over of the unit can only be considered to have been completed when its handling has been explained to the user without using technical terms but giving full knowledge of the equipment.

3. Operation Manual

3.1 Names of Parts

Name of Parts

■ Indoor Unit

1. **Air filter**
2. **Titanium apatite photocatalytic air-purifying filter:**
   - These filters are attached to the inside of the air filters.
3. **Air inlet**
4. **Front panel**
5. **Panel tab**
6. **Room temperature and humidity sensors:**
   - It senses the air temperature and humidity around the unit.
7. **INTELLIGENT EYE sensor:** (page 15.)
8. **Control panel**
9. **Air outlet**
10. **Flaps (horizontal blades):** (page 10.)
11. **Louvers (vertical blades):**
    - The louvers are inside of the air outlet. (page 10.)
12. **Air supply filter (gray):** (page 29.)
13. **Indoor Unit ON/OFF switch:** (page 8.)
    - Push this switch once to start operation. Push once again to stop it.
    - The operation mode refers to the following table.

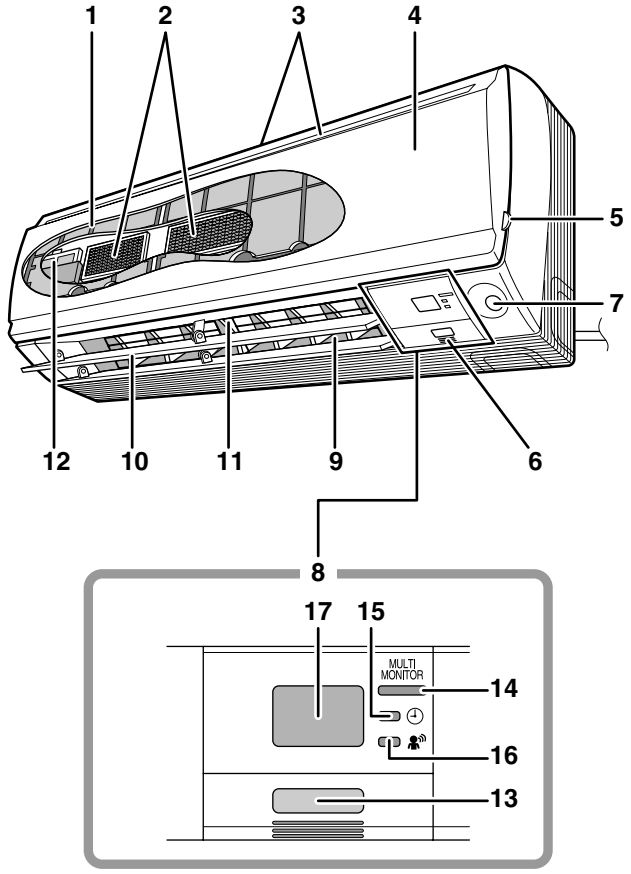
Mode	Temperature setting	Airflow rate
AUTO	25˚C	AUTO

    - This switch is useful when the remote controller is missing.
14. **Multi-monitor lamp:** (page 8.)
    - The lamp color changes according to the operation.
      - AUTO ..... Blue/Red
      - DRY ..... Green
      - COOL ..... Blue
      - HEAT ..... Red
      - FAN ..... White
15. **TIMER lamp (yellow):** (page 19.)
16. **INTELLIGENT EYE lamp (green):** (page 15.)
17. **Signal receiver:**
    - It receives signals from the remote controller.
    - When the unit receives a signal, you will hear a short beep.
      - Operation start ..... beep-beep
      - Settings changed ..... beep
      - Operation stop ..... beeeeep

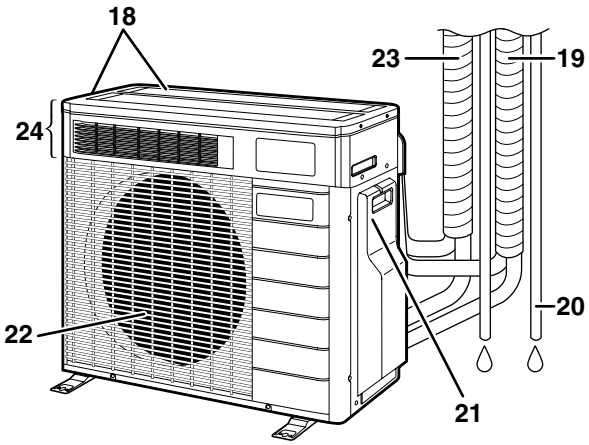
■ Outdoor Unit

18. **Air inlet:** (Back and side)
19. **Refrigerant piping, humidifying hose and inter-unit cables**
20. **Drain hoses**
21. **Earth terminals:**
    - It is inside of this cover.
22. **Air outlet**
23. **Humidifying hoses**
24. **Humidity unit**

Indoor Unit

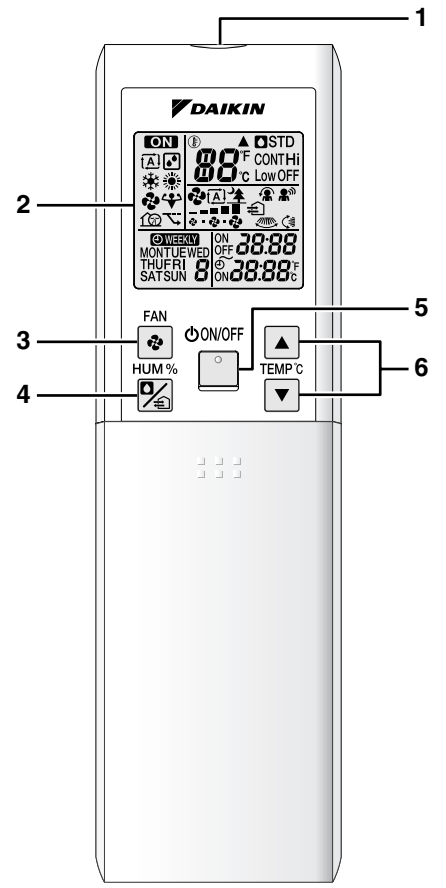


Outdoor Unit

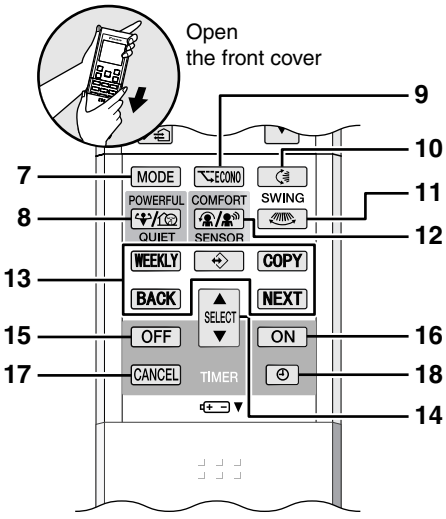


4

Remote Controller



<ARC452A5>

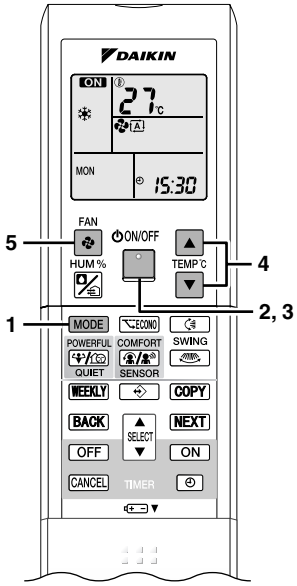


■ Remote Controller

1. **Signal transmitter:**
   - It sends signals to the indoor unit.
2. **Display (LCD):**
   - It displays the current settings. (In this illustration, each section is shown with its displays ON for the purpose of explanation.)
3. **FAN setting button:**
   - It selects the airflow rate setting.
4. **HUMIDIFY/VENTILATE button:**
   - HUMID HEAT operation and FRESH AIR SUPPLY VENTILATION (page 12.)
5. **ON/OFF button:**
   - Press this button once to start operation. Press once again to stop it.
6. **TEMPERATURE adjustment buttons:**
   - It changes the temperature setting.
7. **MODE selector button:**
   - It selects the operation mode. (AUTO/DRY/COOL/HEAT/FAN) (page 8.)
8. **POWERFUL/QUIET button:**
   - POWERFUL and OUTDOOR UNIT QUIET operation (page 17.)
9. **ECONO button:**
   - ECONO operation (page 18.)
10. **SWING button:**
    - Flaps (horizontal blades) (page 10.)
11. **SWING button:**
    - Louvers (vertical blades) (page 10.)
12. **COMFORT/SENSOR button:**
    - COMFORT AIRFLOW and INTELLIGENT EYE operation (page 15.)
13. **WEEKLY: WEEKLY button**
    : PROGRAM button
    COPY: COPY button
    BACK: BACK button
    NEXT: NEXT button:
    - WEEKLY TIMER operation (page 21.)
14. **SELECT button:**
    - It changes the ON/OFF TIMER and WEEKLY TIMER settings. (page 19, 20, 22.)
15. **OFF TIMER button:** (page 19.)
16. **ON TIMER button:** (page 20.)
17. **TIMER CANCEL button:**
    - It cancels the timer setting. (page 19, 20.)
    - It cannot be used for the WEEKLY TIMER operation.
18. **CLOCK button:**

3.2 AUTO · DRY · COOL · HEAT · FAN Operation

AUTO · DRY · COOL · HEAT · FAN Operation

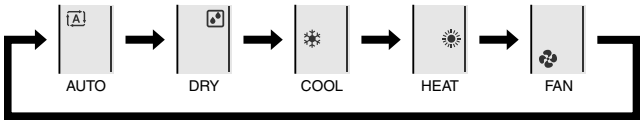


The air conditioner operates with the operation mode of your choice.
From the next time on, the air conditioner will operate with the same operation mode.

■ To start operation

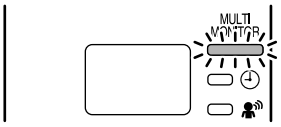
1. Press “MODE selector” button and select a operation mode.

• Each pressing of the button advances the mode setting in sequence.



2. Press “ON/OFF” button.

• “ ON ” is displayed on the LCD.
• The OPERATION lamp lights up.



Operation mode	Multi-monitor lamp
AUTO	Blue/Red
DRY	Green
COOL	Blue
HEAT	Red
FAN	White
HUMID HEAT	Orange/Yellow (page 12.)
FRESH AIR SUPPLY VENTILATION	Lit white for 2 seconds. After that, return to the color of selected operation mode or change to yellow in a standby state. (page 14.)

■ To stop operation

3. Press “ON/OFF” button again.

• “ ON ” disappear from the LCD.
• Then OPERATION lamp goes off.

■ To change the temperature setting

4. Press “TEMPERATURE adjustment” button.

• The displayed items on the LCD will change whenever either one of the buttons is pressed.

DRY or FAN mode	COOL mode	HEAT mode	AUTO mode
The temperature setting is not variable.	18 – 32˚C	10 – 30˚C	18 – 30˚C
	Press “▲” button to raise the temperature and press “▼” button to lower the temperature.		

8

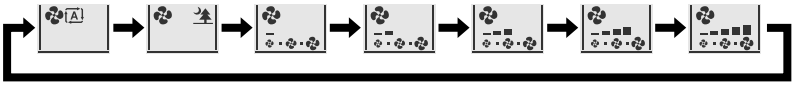
■ To change the airflow rate setting

5. Press “FAN setting” button.

DRY mode	AUTO or COOL or HEAT or FAN mode
The airflow rate setting is not variable.	Five levels of airflow rate setting from “ ” to “ ” plus “ ” and “ ” are available. 

- Indoor unit quiet operation

  When the airflow is set to “ ”, the noise from the indoor unit will become quieter.
  Use this when making the noise quieter.
- Each pressing of the button advances the airflow rate setting in sequence.



NOTE

■ **Notes on HEAT operation**
- Since this air conditioner heats the room by taking heat from outdoor air to indoors, the heating capacity becomes smaller in lower outdoor temperatures. If the heating effect is insufficient, it is recommended to use another heating appliance in combination with the air conditioner.
- The heat pump system heats the room by circulating hot air around all parts of the room. After the start of heating operation, it takes some time before the room gets warmer.
- In heating operation, frost may occur on the outdoor unit and lower the heating capacity. In that case, the system switches into defrosting operation to take away the frost.
- During defrosting operation, hot air does not flow out of indoor unit.
- A pinging sound may be heard during defrosting operation, which, however does not mean that the air conditioner has failures.

■ **Note on COOL operation**
- This air conditioner cools the room by blowing the hot air in the room outside, so if the outside temperature is high, the performance of the air conditioner drops.

■ **Note on DRY operation**
- The computer chip works to rid the room of humidity while maintaining the temperature as much as possible. It automatically controls temperature and airflow rate, so manual adjustment of these functions is unavailable.

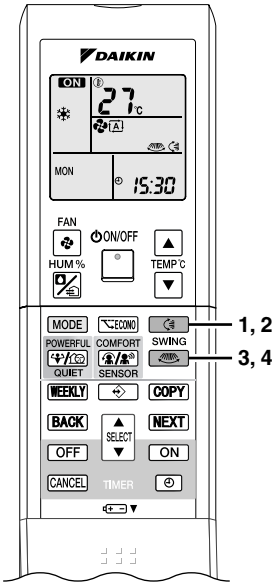
■ **Notes on AUTO operation**
- In AUTO operation, the system selects a temperature setting and an appropriate operation mode (COOL or HEAT) based on the room temperature at the start of the operation.
- The system automatically reselects setting at a regular interval to bring the room temperature to user-setting level.
- If you do not like AUTO operation, manually change the set temperature.

■ **Note on FAN operation**
- This mode is valid for fan only.

■ **Note on airflow rate setting**
- At smaller airflow rates, the cooling (heating) effect is also smaller.

3.3 Adjusting the Airflow Direction

Adjusting the Airflow Direction



You can adjust the airflow direction to increase your comfort.

Adjusting the upper and lower airflow direction

■ To adjust the flaps (horizontal blades)

1. Press "SWING" button.

- "" is displayed on the LCD and the flaps will begin to swing.

2. When the flaps have reached the desired position, press "SWING" button once more.

- The flaps will stop moving.
- "" disappears from the LCD.

Adjusting the right and left airflow direction

■ To adjust the louvers (vertical blades)

3. Press "SWING" button.

- "" is displayed on the LCD.

4. When the louvers have reached the desired position, press the "SWING" button once more.

- The louvers will stop moving.
- "" disappears from the LCD.

10

Adjusting the 3-D airflow direction

■ To start 3-D airflow

1. 3. Press the "SWING" button and the "SWING" button: the "" and "" display will light up and the flap and louvers will move in turn.

■ To cancel 3-D airflow

2. 4. Press either the "SWING" button or the "SWING" button.

■ COMFORT AIRFLOW operation

• Check COMFORT AIRFLOW operation in the section of "COMFORT AIRFLOW Operation" and "INTELLIGENT EYE Operation". (page 15.)

NOTE

■ **Notes on flaps and louvers angles**

• When "**SWING**" button is selected, the flaps swinging range depends on the operation mode. (See the figure.)

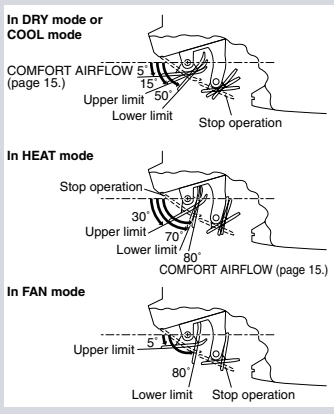
3-Dimensional (3-D) airflow

• Using 3-dimensional airflow circulates cold air, which tends to collected at the bottom of the room, and hot air, which tends to collect near the ceiling, throughout the room, preventing areas of cold and hot developing.

■ **ATTENTION**

• Always use a remote controller to adjust the angles of the flaps and louvers. If you attempt to move it forcibly with hand when it is swinging, the mechanism may be broken.

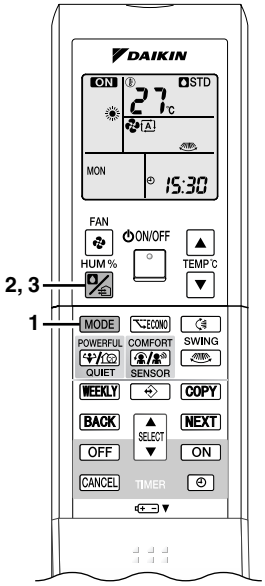
• Always use a remote controller to adjust the louvers angles. In side the air outlet, a fan is rotating at a high speed.



11

3.4 HUMID HEAT Operation

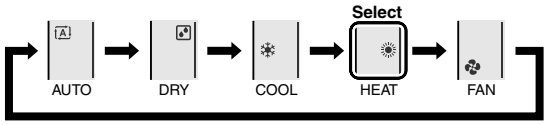
HUMID HEAT Operation



This function enables the humidification of a room where the air conditioner is in HEAT operation, thus providing appropriate humidity to the room if the function is used in wintertime during which the air is dry.
When the humidity of the room is high, the user will feel warm enough even if the set temperature is dropped.

■ To start HUMID HEAT operation

1. Press "MODE selector" button, and select a Heat mode.



- "☀" is displayed on the LCD.
- The multi-monitor lamp will be red.

2. Press "HUMIDIFY/VENTILATE" button, and select a Humidity settings.

- The multi-monitor lamp will be orange.
- Each press of the button advances the humidity settings in sequence.

Remote controller LCD	Humidity settings	Multi-monitor lamp
CONT	Continuous	Orange/*1Yellow
Hi	High	
STD	Standard	
Low	Low	
OFF	HUMID HEAT operation → OFF Refer to FRESH AIR SUPPLY VENTILATION (page 14.)	Red/*1Yellow
OFF	FRESH AIR SUPPLY VENTILATION → OFF	Red

*1 When the unit cannot operate HUMID HEAT operation or FRESH AIR SUPPLY VENTILATION and go into a standby state, the multi-monitor lamp will be yellow. (page 13.)

■ To cancel HUMID HEAT operation

3. Press "HUMIDIFY/VENTILATE" button, and select a OFF.

- The multi-monitor lamp will be red. (*Return to HEAT operation.)

NOTE

■ Notes on HUMID HEAT operation

- The HUMID HEAT operation function is selectable only when the air conditioner is in HEAT operation.
- The operation sound of the air conditioner will rise by slightly while the air conditioner is in humidifying or ventilating operation.
- While the indoor unit in one room out of two is in HUMID HEAT operation, the indoor unit in the other room will go into humidification stand-by mode regardless of the selection of the HUMID HEAT operation function for the other room.
  When the indoor unit in HUMID HEAT operation attains the target humidity, the indoor unit in humidification stand-by mode in the other room will start HUMID HEAT operation.
- The ability of the unit to humidify drops when the outdoor temperature and humidity are low, or when the set airflow rate is low.
- The operation noise is higher than in normal HEAT.
- The outdoor noise or odor may be captured because the outdoor air is heated with the heater and resultant moisture is taken into the room for humidification.
- The top of the outdoor unit may get warm during operation, but this is not a malfunction.
- The operation noise may change depending on the outdoor temperature and humidity. (Water supply is not necessary because moisture from the outdoor air is taken into the room.)

NOTE

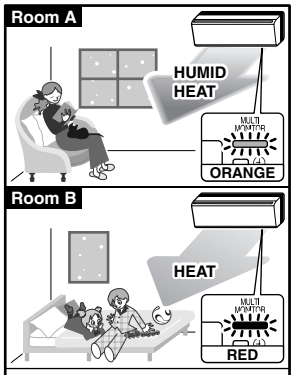
■ **Notes on "HUMID HEAT operation" at multi system**

- When the indoor units in both 2 rooms are set to HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION, the indoor unit in either 1 of the room operate HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION.
  (The indoor units in both 2 rooms do not simultaneously go into HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION.)
  Priority is given to the indoor unit in either one of the rooms already in operation. When the humidity of the room to which priority is given reaches a target level, the humidification of the room will stop and the humidification of the other room will start automatically. (page 26.)

■ **Refer to the following application examples**

Example 1 : The indoor units in both 2 rooms are in HUMID HEAT operation.

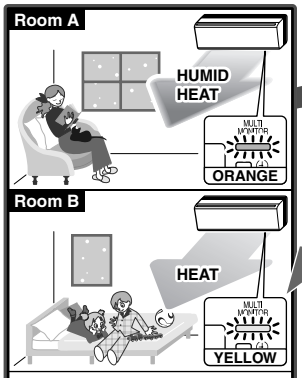
Initial state of operation



- The unit in Room B in HEAT operation will be changed into HUMID HEAT operation while the unit in Room A is in HUMID HEAT operation.
  The result is shown in the illustration on the right.

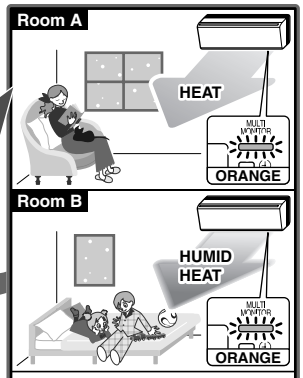
- **While the unit in Room A is in "CONT" HUMID HEAT operation, the unit in Room B will not go into HUMID HEAT operation automatically as right example. (The multi-monitor lamp is yellow in a standby state.)**

First selected priority



- The unit in first selected priority operation in Room A will take precedence, and the unit in Room B will go into a standby state. (Yellow) When the humidity of Room A satisfies the preset condition, HUMID HEAT operation in Room A will be switched to the unit in Room B automatically.
  The result is shown in the illustration on the right.

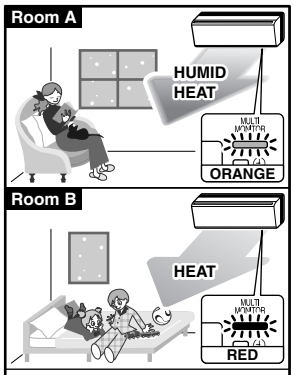
Automatic switchover between 2 rooms



- The humidification of Room A is finished, and the unit in a standby state in Room B will go into HUMID HEAT operation. When the humidity of Room A drops, the unit in Room A will be switched HUMID HEAT operation and the unit in Room B will be switched HEAT operation automatically. (Because the unit in Room A is first selected priority.)
  The result is shown in the illustration on the left.

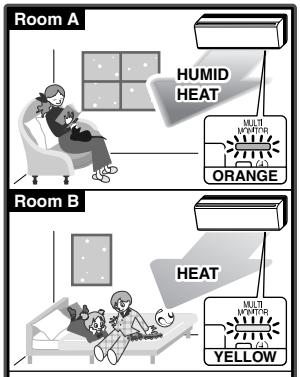
Example 2 : The indoor units in the rooms are in HUMID HEAT operation and FRESH AIR SUPPLY VENTILATION, respectively.

Initial state of operation

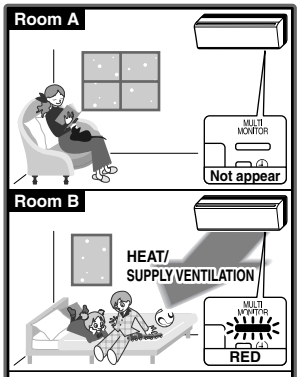


- The unit in Room B in HEAT operation will be added ventilation while the unit in Room A is in HUMID HEAT operation.
  The result is shown in the illustration on the right.

First selected priority



- The unit in first selected priority operation in Room A will take precedence.
  The unit in Room B keeps HEAT operation and will go into a standby state for ventilation. (Yellow)
  In case you will start ventilation the unit in Room B, the HUMID HEAT operation of Room A have to be stopped.
  The result is shown in the illustration on the right.

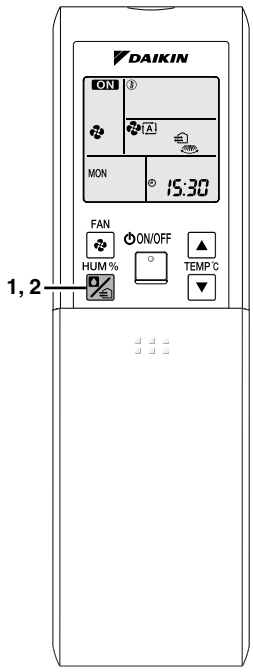


- The unit in Room B is in HEAT operation besides ventilation.

13

3.5 FRESH AIR SUPPLY VENTILATION

FRESH AIR SUPPLY VENTILATION



This function takes in outdoor air to refresh indoor air.

■ To start FRESH AIR SUPPLY VENTILATION

1. Press "HUMIDIFY/VENTILATE" button, and select a FRESH AIR SUPPLY VENTILATION mode.

Mode	Cyclic of humidity settings	Multi-monitor lamp
HEAT	CONT → Hi → STD → Low → OFF (Select) → OFF	Lit white for 2 seconds. After that, return to the color of selected operation mode or change to yellow in a standby state.
AUTO COOL DRY FAN	→ OFF	

• "⇦" is displayed on the LCD.

■ To cancel FRESH AIR SUPPLY VENTILATION

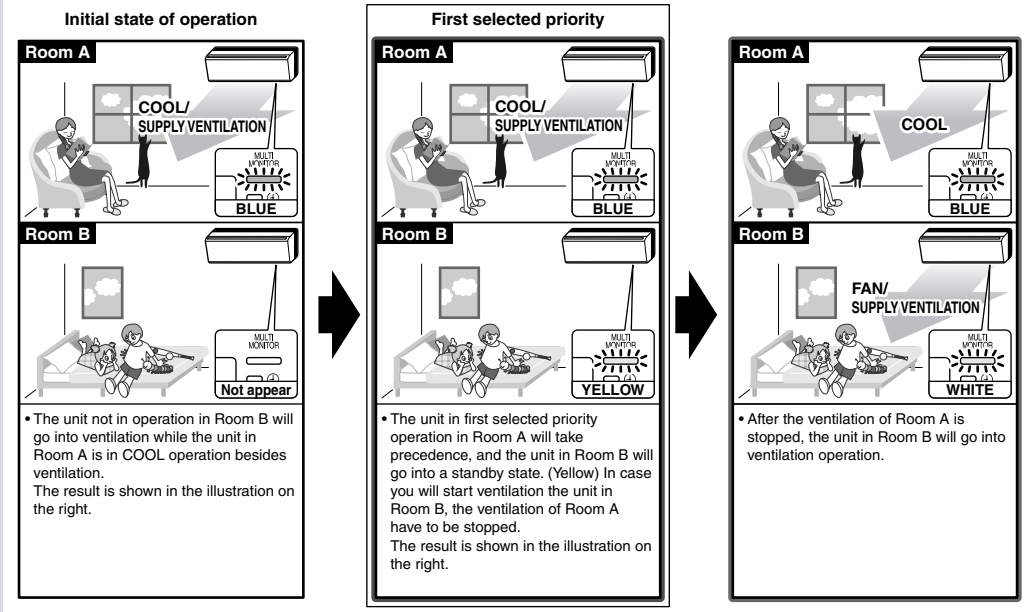
2. Press "HUMIDIFY/VENTILATE" button, and select a OFF.

• "⇦" disappears from the LCD.

NOTE

■ **Notes on FRESH AIR SUPPLY VENTILATION**

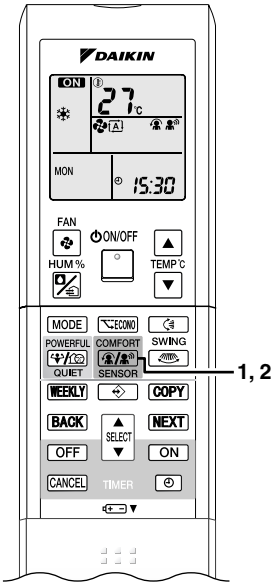
An example of FRESH AIR SUPPLY VENTILATION (page 26.)



- Fresh air is taken from outdoor through the outdoor unit.
- The outdoor noise and odor may be captured because the outdoor air is taken into the room. The operation noise is slightly louder.
- When the outdoor temperature is higher than room temperature, the airflow rate of FRESH AIR SUPPLY VENTILATION will be low.

3.6 COMFORT AIRFLOW and INTELLIGENT EYE Operation

COMFORT AIRFLOW and INTELLIGENT EYE Operation

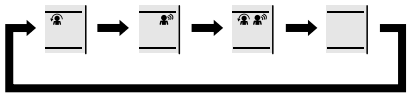


The INTELLIGENT EYE incorporates infrared sensors to detect the presence of people in the conditioned room.
When these sensors detect people, the louvers will adjust the airflow direction to an area where people are not present. When there are no people in the sensing areas, the air conditioner will go into energy-saving mode.

■ To start operation

1. Press "COMFORT/SENSOR" button and select an operation mode.

- Choose the desired operation mode out of the following sequence.
- Each time the "COMFORT/SENSOR" button is pressed a different setting option is displayed on the LCD.



- When the flaps (horizontal blades) are swinging, the operating as above will stop the movement of them.

■ To cancel operation

2. Press "COMFORT/SENSOR" button.

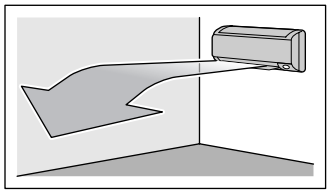
- Press the button to select "Blank".

Display	Operation mode	Explanation
	COMFORT AIRFLOW	The flaps will adjust the airflow direction upward while cooling, and adjust the airflow direction downward while heating. (page 16.)
	INTELLIGENT EYE	The sensors will detect the movement of people in the sensing areas and the louvers will adjust the airflow direction to an area where people are not present. When there are no people in the sensing areas, the air conditioner will go into energy-saving mode. (page 16.)
	COMFORT AIRFLOW and INTELLIGENT EYE	The air conditioner will be in COMFORT AIRFLOW operation combined with INTELLIGENT EYE operation. (page 16.)
Blank	No function	–

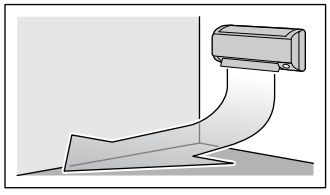
NOTE

■ Notes on "COMFORT AIRFLOW operation"

- The flap position will change, preventing air from blowing directly on the occupants of the room.
- POWERFUL operation and COMFORT AIRFLOW operation cannot be used at the same time.
- The volume of air will be set to AUTO. If the upward and downward airflow direction is selected, the COMFORT AIRFLOW function will be canceled.
- Priority is given to the function of whichever button is pressed last.
- The COMFORT AIRFLOW function makes the following airflow direction adjustments. The flaps will move upward while cooling so that the airflow will be directed upward. The flaps will move downward while heating so that the airflow will be directed downward.
- COMFORT AIRFLOW operation cannot be selected while FAN operation.



Cooling operation



Heating operation

15

COMFORT AIRFLOW and INTELLIGENT EYE Operation

"INTELLIGENT EYE" is useful for Energy Saving

■ **Energy saving operation**

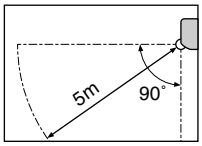
- Change the temperature –2˚C in heating / +2˚C in cooling / +2˚C in dry mode from set temperature.
- Decrease the airflow rate slightly in FAN mode only. If no presence detected in the room during 20 minutes.

NOTE

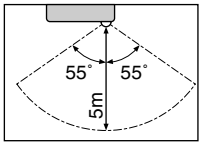
■ **Notes on "INTELLIGENT EYE operation"**

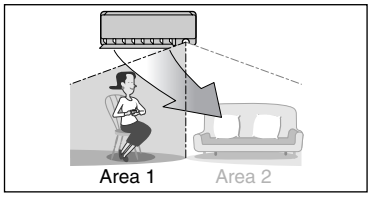
- The INTELLIGENT EYE sensor according to the following situations.

Vertical angle 90˚
(Side View)

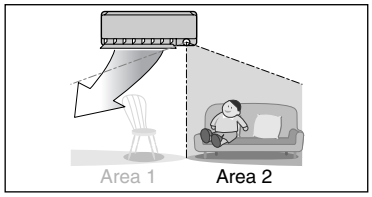


Horizontal angle 110˚
(Top View)

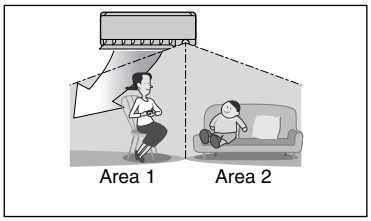




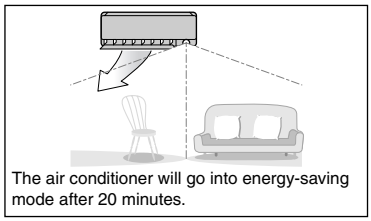
A person is detected in area 1.



A person is detected in area 2.



People are detected in both areas.
(Use the INTELLIGENT EYE operation in combination with the COMFORT AIRFLOW operation.)



No people are detected in the areas.
*The wind direction may differ from the illustrated direction depending on the actions and movements of the people in the areas.

- While the air conditioner is in INTELLIGENT EYE operation, the louvers will adjust the airflow direction. If there are people in the sensing areas of the INTELLIGENT EYE, the louvers are controlled and airflow direction will be leftward or rightward so that the airflow will not be directed to the people.
  If no people are detected in either area 1 or 2 in 20 minutes, the air conditioner will go into energy-saving mode with the set temperature shifted by 2˚C.
  The INTELLIGENT EYE sensor may not detect the people depending on the clothes they are wearing if there are no movements of them in the areas.
- The airflow direction will be leftward if there are people in both areas 1 and 2 or if there is a person right in front of the sensor.
- Because of the position of the sensor, people might be exposed to the airflow of the indoor unit if they are close to the border between areas 1 and 2.
  If there are people close to the border between areas or in both areas, it is recommended to use the COMFORT AIRFLOW and INTELLIGENT EYE functions simultaneously.
  When both of them are in use, flaps and louvers are controlled and the indoor unit will not direct the airflow towards the people.
- Sensor detection sensitivity changes according to indoor unit location, the speed of passersby, temperature range, etc.
- The sensor also mistakenly detects pets, sunlight, fluttering curtains and light reflected off of mirrors as passersby.
- NIGHT SET MODE (page 19.) will not go on during use of INTELLIGENT EYE operation.

NOTE

■ **To combine "COMFORT AIRFLOW operation" and "INTELLIGENT EYE operation"**

- The air conditioner can go into operation with the COMFORT AIRFLOW and INTELLIGENT EYE functions combined.
  The flaps adjust the airflow direction upward (while in cooling operation) and downward (while in heating operation), during which the sensor of the INTELLIGENT EYE is working to detect the movement of people. When the sensor detects people, the louvers will direct the airflow in such way that it will not be blown directly on them. If there are no people, the air conditioner will go into energy-saving operation after 20 minutes.

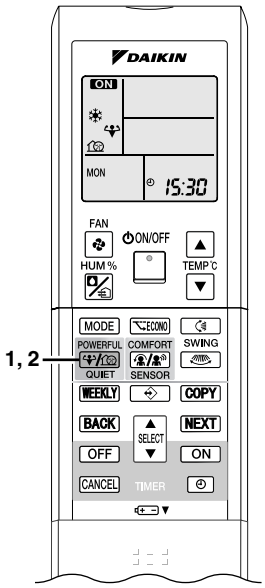
⚠ CAUTION

- Do not place large objects near the sensor.
  Also keep heating units or humidifiers outside the sensor's detection area. This sensor can detect undesirable objects.
- Do not hit or violently push the INTELLIGENT EYE sensor. This can lead to damage and malfunction.

16

3.7 POWERFUL and OUTDOOR UNIT QUIET Operation

POWERFUL and OUTDOOR UNIT QUIET Operation



POWERFUL operation quickly maximizes the cooling (heating) effect in any operation mode. You can get the maximum capacity.
OUTDOOR UNIT QUIET operation lowers the noise level of the outdoor unit by changing the frequency and fan speed on the outdoor unit. This function is convenient during night.

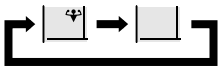
■ To start operation

1. Press "POWERFUL and QUIET" button, and select an operation mode.

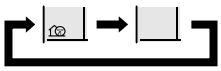
- Choose the desired operation mode out of the following sequence.
- Each time the "POWERFUL/QUIET" button is pressed a different setting option is displayed on the LCD.
- Selectable functions vary with each operation mode and the ON/OFF state.
- "" and "" are displayed on the LCD.

While in operation in AUTO, COOL, HEAT, or HUMID HEATING mode.

While in operation in DRY or FAN mode.



While not in operation in AUTO, COOL, HEAT, or HUMID HEATING mode.



- POWERFUL operation starts in 5 seconds and ends in 20 minutes. Then the system automatically operates again with the previous settings which were used before POWERFUL operation.
- When using POWERFUL operation, there are some functions which are not available.

■ To cancel operation

2. Press "POWERFUL and QUIET" button.

- Press the button to select "Blank".
- "" and "" are disappears from the LCD.

NOTE

■ Note on POWERFUL operation

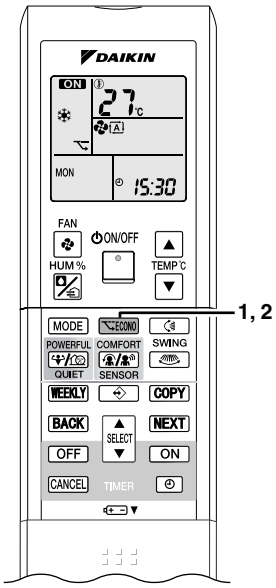
- POWERFUL operation cannot be used together with ECONO, QUIET, or COMFORT operation. Priority is given to the function of whichever button is pressed last.
- POWERFUL operation can only be set when the unit is running.
  Pressing the operation stop button causes the settings to be canceled, and the " " disappears from the LCD.
- POWERFUL operation will not increase the capacity of the air conditioner if the air conditioner is already in operation with its maximum capacity demonstrated.
- **In COOL and HEAT mode:** To maximize the cooling (heating) effect, the capacity of outdoor unit must be increased and the airflow rate be fixed to the maximum setting. The temperature and airflow settings are not variable.
- **In DRY mode:** The temperature setting is lowered by 2.5°C and the airflow rate is slightly increased.
- **In AUTO mode:** The temperature can be changed only in powerful auto operation.
- **In FAN mode:** The airflow rate is fixed to the maximum setting.
- **In HUMID HEAT mode:** The operation mode changes to HEAT mode.

■ Note on OUTDOOR UNIT QUIET operation

- This function is available in COOL, HEAT, and AUTO modes. (This is not available in FAN and DRY mode.)
- POWERFUL operation and OUTDOOR UNIT QUIET operation cannot be used at the same time. Priority is given to the function of whichever button is pressed last.
- OUTDOOR UNIT QUIET operation will drop neither the frequency nor fan speed if the frequency and fan speed have been already dropped low enough.

3.8 ECONO Operation

ECONO Operation



ECONO operation is a function which enables efficient operation by limiting the maximum power consumption value.
This function is useful for cases in which attention should be paid to ensure a circuit breaker will not trip when the product runs alongside other appliances.

■ To start ECONO operation

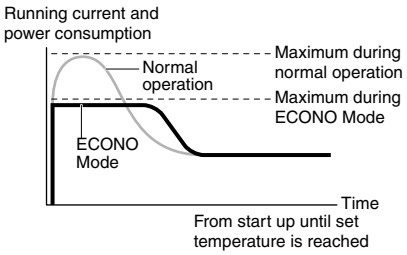
1. Press "ECONO" button.

- "⌥" is displayed on the LCD.

■ To cancel ECONO operation

2. Press "ECONO" button again.

- "⌥" disappears from the LCD.



- This diagram is a representation for illustrative purposes only.
- The maximum running current and power consumption of the air conditioner in ECONO mode vary with the connecting outdoor unit.

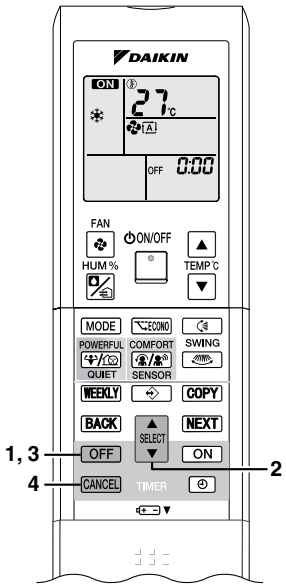
NOTE

- ECONO operation can only be set when the unit is running. Pressing the OFF button causes the setting to be canceled, and the "⌥" disappears from the LCD.
- ECONO operation is a function which enables efficient operation by limiting the power consumption of the outdoor unit (operating frequency).
- ECONO operation functions in AUTO, COOL, DRY and HEAT modes.
- In case ECONO operation is selected in QUIET operation, QUIET operation will be canceled.
- POWERFUL and ECONO operation cannot be used at the same time.
  Priority is given to the function of whichever button is pressed last.
- Power consumption may not drop even if ECONO operation is used of the level of power consumption is already low.

18

3.9 TIMER Operation

TIMER Operation



Timer functions are useful for automatically switching the air conditioner on or off at night or in the morning. You can also use OFF TIMER and ON TIMER in combination.

■ To use OFF TIMER operation

• Check that the clock is correct.
If not, set the clock to the present time. (page 7.)

1. Press “OFF TIMER” button.

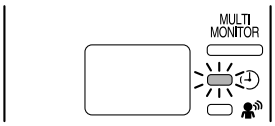
• “0:00” is displayed.
• “OFF” blinks.
• “⏲” and day of the week disappears from LCD.

2. Press “SELECT” button until the time setting reaches the point you like.

• Every pressing of either button increases or decreases the time setting by 10 minutes. Holding down either button changes the setting rapidly.

3. Press “OFF TIMER” button again.

• “OFF” and setting time are displayed on the LCD.
• The TIMER lamp lights up.



■ To cancel the OFF TIMER operation

4. Press “CANCEL” button.

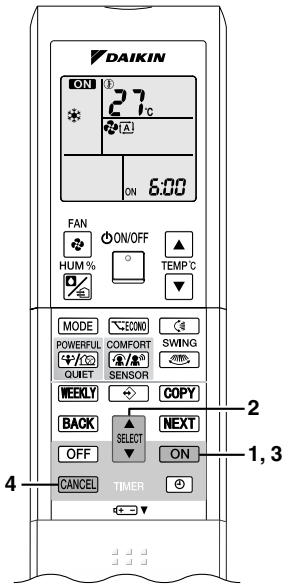
• “OFF” and setting time disappears from LCD.
• “⏲” and day of the week are displayed on the LCD.
• The TIMER lamp goes off.

NOTE

• When TIMER is set, the present time is not displayed.
• Once you set ON, OFF TIMER, the time setting is kept in the memory. (The memory is canceled when remote controller batteries are replaced.)
• When operating the unit via the ON/OFF TIMER, the actual length of operation may vary from the time entered by the user. (Maximum approx. 10 minutes)

■ **NIGHT SET MODE**
When the OFF TIMER is set, the air conditioner automatically adjusts the temperature setting (0.5˚C up in COOL, 2.0˚C down in HEAT) to prevent excessive cooling (heating) for your pleasant sleep.

TIMER Operation



■ To use ON TIMER operation

• Check that the clock is correct.
If not, set the clock to the present time. (page 7.)

1. Press “ON TIMER” button.

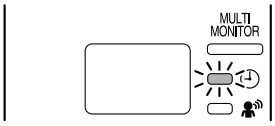
• “ 6:00 ” is displayed.
• “ ON ” blinks.
• “ ⏲ ” and day of the week disappears from LCD.

2. Press “SELECT” button until the time setting reaches the point you like.

• Every pressing of either button increases or decreases the time setting by 10 minutes. Holding down either button changes the setting rapidly.

3. Press “ON TIMER” button again.

• “ ON ” and setting time are displayed on the LCD.
• The TIMER lamp lights up.



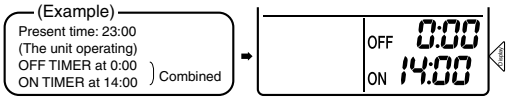
■ To cancel ON TIMER operation

4. Press “CANCEL” button.

• “ ON ” and setting time disappears from LCD.
• “ ⏲ ” and day of the week are displayed on the LCD.
• The TIMER lamp goes off.

■ To combine ON TIMER and OFF TIMER

• A sample setting for combining the two timers is shown below.



ATTENTION

■ In the following cases, set the timer again

• After a breaker has turned OFF.
• After a power failure.
• After replacing batteries in the remote controller.

20

3.10 WEEKLY TIMER Operation

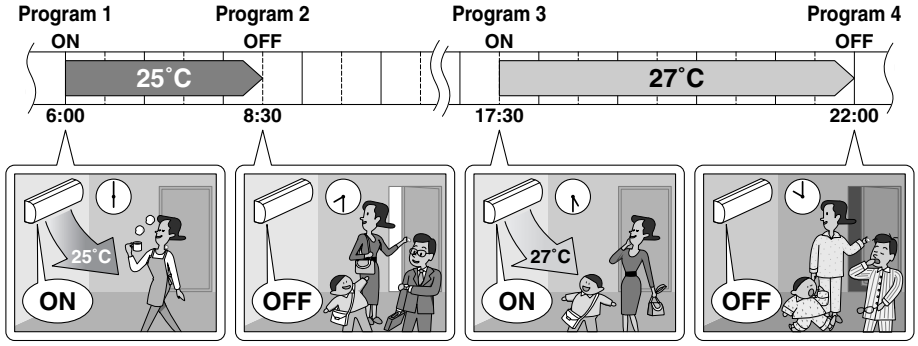
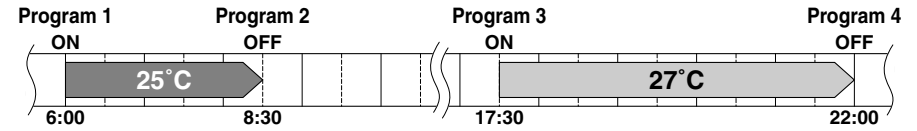
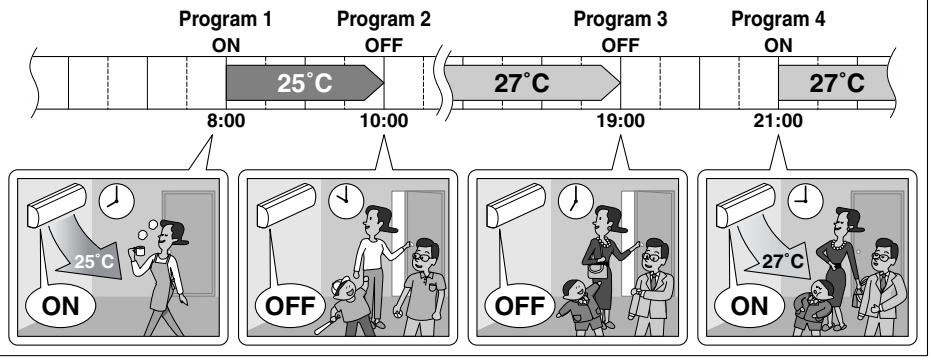
WEEKLY TIMER Operation

Up to 4 timer settings can be saved for each day of the week. It is convenient if the WEEKLY TIMER is set according to the family's life style.

■ Using in these cases of WEEKLY TIMER

An example of WEEKLY TIMER settings is shown below.

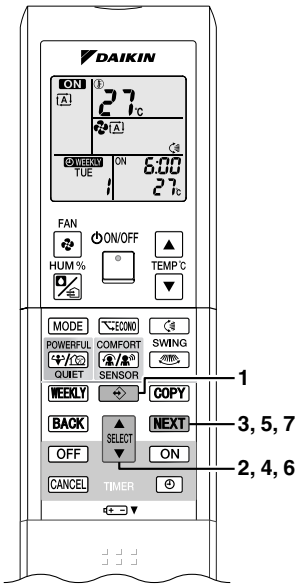
Example: The same timer settings are made for the week from Monday through Friday while different timer settings are made for the weekend.

<table>
<tr><td>[Monday]</td><td>Make timer settings up to programs 1-4. (page 22.)
 
</td></tr>
<tr><td>[Tuesday] to [Friday]</td><td>Use the copy mode to make settings for Tuesday to Friday, because these settings are the same as those for Monday. (page 24.)
 
</td></tr>
<tr><td>[Saturday]</td><td>No timer settings</td></tr>
<tr><td>[Sunday]</td><td>Make timer settings up to programs 1-4. (page 22.)
 
</td></tr>
</table>

- Up to 4 reservations per day and 28 reservations per week can be set in the WEEKLY TIMER. The effective use of the copy mode ensures ease of making reservations.
- The use of ON-ON-ON-ON settings, for example, makes it possible to schedule operating mode and set temperature changes. Furthermore, by using OFF-OFF-OFF-OFF settings, only the turn-OFF time of each day can be set. This will turn OFF the air conditioner automatically if the user forgets to turn it OFF.

21

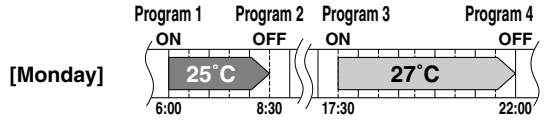
WEEKLY TIMER Operation



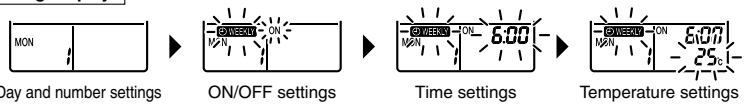
■ To use WEEKLY TIMER operation

Setting mode

• Make sure the day of the week and time are set. If not, set the day of the week and time. (page 7.)



Setting Displays



1. Press “PROGRAM” button.

• The day of the week and the reservation number of the current day will be displayed.
• Programs 1-4 settings can be made per day.

2. Press “SELECT” button to select the desired day of the week and reservation number.

• Pressing the “SELECT” button changes the reservation number and the day of the week.

3. Press “NEXT” button.

• The day of the week and reservation number will be set.
• “WEEKLY” and “ON” blink.

4. Press “SELECT” button to select the desired mode.

• Pressing the “SELECT” button changes “ON” or “OFF” setting in sequence.

• In case the reservation has already been set, selecting “blank” deletes the reservation.
• Go to STEP **9** if “blank” is selected.

5. Press “NEXT” button.

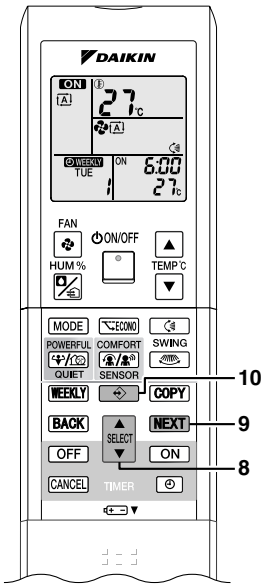
• The ON/OFF TIMER mode will be set.
• “WEEKLY” and the time blink.

6. Press “SELECT” button to select the desired time.

• The time can be set between 0:00 and 23:50 in 10 minute intervals.
• To return to the ON/OFF TIMER mode setting, press “BACK” button.
• Go to STEP **9** when setting the OFF TIMER.

7. Press “NEXT” button.

• The time will be set.
• “WEEKLY” and the temperature blink.



8. Press “SELECT” button to select the desired temperature.

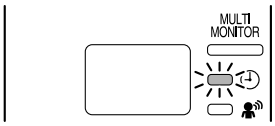
- The temperature can be set between 10˚C and 32˚C.
  Cooling: The unit operates at 18˚C even if it is set at 10 to 17˚C.
  Heating: The unit operates at 30˚C even if it is set at 31 to 32˚C.
- To return to the time setting, press “BACK” button.
- The set temperature is only displayed when setting the ON TIMER.

9. Press “NEXT” button.

- The temperature will be set and go to the next reservation setting.
- To continue further settings, repeat the procedure from STEP **4**.

10. Press “PROGRAM” button to complete the setting.

- Be sure to direct the remote controller toward the indoor unit and check for a receiving tone and flashing the operation lamp.
- “WEEKLY” is displayed on the LCD and WEEKLY TIMER operation is activated.
- The TIMER lamp lights up.



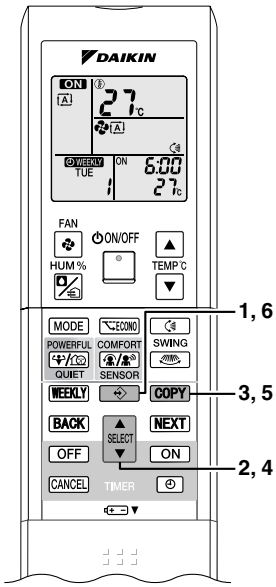
- A reservation made once can be easily copied and the same settings used for another day of the week.
  Refer to **Copy mode**. (page 24.)

NOTE

■ **Notes on WEEKLY TIMER operation**

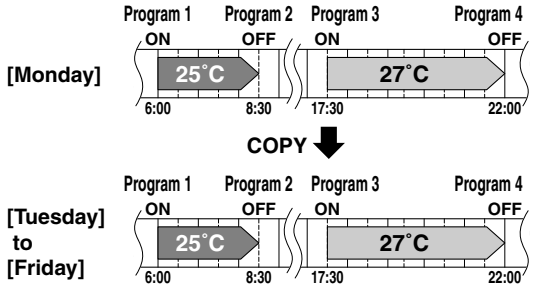
- Do not forget to set the time on the remote controller first.
- The day of the week, ON/OFF TIMER mode, time and set temperature (only for ON TIMER mode) can be set with WEEKLY TIMER. Other settings for ON TIMER are based on the settings just before the operation.
- Both WEEKLY TIMER and ON/OFF TIMER operation cannot be used at the same time. The ON/OFF TIMER operation has priority if it is set while WEEKLY TIMER is still active. WEEKLY TIMER is activated after the reserved ON/OFF TIMER operation is completed.
- Only the time and set temperature set with the weekly timer are sent with the “PROGRAM” button.
  Set the weekly timer only after setting the operation mode, the fan strength, and the fan direction ahead of time.
- Shutting the breaker off, power failure, and other similar events will render operation of the indoor unit’s internal clock inaccurate. Reset the clock. (page 7.)
- The “BACK” button can be used only for the ON/OFF TIMER mode and time settings.
  It cannot be used to go back to the reservation number.

WEEKLY TIMER Operation

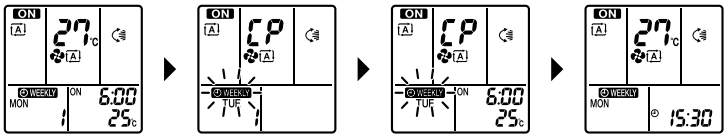


Copy mode

- A reservation made once can be copied another day of the week. The whole reservation of the selected day of the week will be copied.



Setting Displays



1. Press "PROGRAM" button.

2. Press "SELECT" button to confirm the day of the week to be copied.

3. Press "COPY" button.

- This activates copy mode.
- The whole reservation of the selected day of the week will be copied.

4. Press "SELECT" button to select the destination day of the week.

5. Press "COPY" button.

- The reservation will be copied to the selected day of the week.
- To continue copying the settings to other days of the week, repeat STEP **4** and STEP **5**.

6. Press "PROGRAM" button to complete the setting.

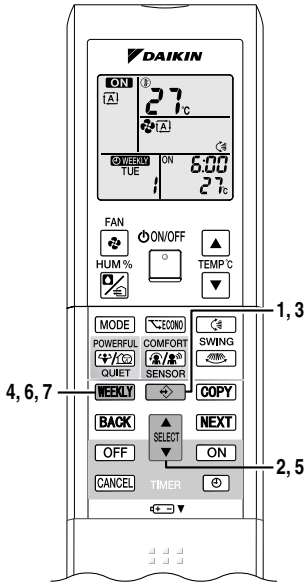
- Exit copy mode.
- "WEEKLY" is displayed on the LCD and WEEKLY TIMER operation is activated.

NOTE

■ COPY MODE

- The entire reservation of the source day of the week is copied in the copy mode. Detailed settings can be made after the copy is completed.

24



■ Confirming a reservation

• The reservation can be confirmed.

Setting Displays

Normal display Confirmation display

1. Press “PROGRAM” button.

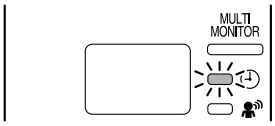
• The day of the week and the reservation number of the current day will be displayed.

2. Press “SELECT” button to select the day of the week and the reservation number to be confirmed.

• Pressing the “SELECT” button displays the reservation details.

3. Press “PROGRAM” button.

• Exit confirming mode.
• “WEEKLY” is displayed on the LCD and WEEKLY TIMER operation is activated.
• The TIMER lamp lights up.



■ To deactivate WEEKLY TIMER operation

4. Press “WEEKLY” button while “WEEKLY” is displayed on the LCD.

• The “WEEKLY” will disappear from the LCD.
• The TIMER lamp goes off.
• To reactivate the WEEKLY TIMER operation, press the “WEEKLY” button again.
• If a reservation deactivated with “WEEKLY” button is activated once again, the last reservation mode will be used.

■ To delete reservations

The individual reservation

• Refer to **Setting mode**. (page 22.)
When selecting desired mode at STEP **4** in setting mode, select “blank”. The reservation will be deleted.

The reservations for each day of the week

• This function can be used for deleting reservations for each day of the week.
• It can be used while confirming or setting reservations.

5. Press “SELECT” button to select the day of the week to be deleted.

6. Hold the “WEEKLY” button for 5 seconds.

• The reservation of the selected day of the week will be deleted.

All reservations

7. Hold the “WEEKLY” button for 5 seconds.

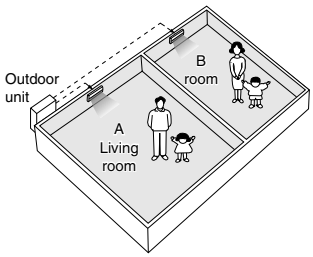
• Be sure to direct the remote controller toward the indoor unit and check for a receiving tone.
• This operation is not effective while WEEKLY TIMER is being set.
• All reservations will be deleted.

3.11 Note for Multi System

Note for Multi System

⟨⟨ What is a "Multi System"? ⟩⟩

This system has one outdoor unit connected to multiple indoor units.



■ Selecting the operation mode

1. With the Priority Room Setting present but inactive or not present.

When more than one indoor unit is operating, priority is given to the first unit that was turned on. In this case, set the units that are turned on later to the same operation mode (*1) as the first unit. Otherwise, they will enter the Standby Mode, and the operation lamp will flash; this does not indicate malfunction.

(*1)

- COOL, DRY and FAN mode may be used at the same time.
- AUTO mode automatically selects COOL mode or HEAT mode based on the room temperature. Therefore, AUTO mode is available when selecting the same operation mode as that of the room with the first unit to be turned on.

⟨CAUTION⟩

Normally, the operation mode in the room where the unit is first run is given priority, but the following situations are exceptions, so please keep this in mind.

If the operation mode of the first room is **FAN Mode**, then using **HEAT Mode** in any room after this will give priority to **HEAT**. In this situation, the air conditioner running in FAN Mode will go on standby, and the operation lamp will flash.

■ HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION

- When the indoor units in both 2 rooms are set to HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION, the indoor unit in either 1 of the room operate HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION. (The indoor units in both 2 rooms do not simultaneously go into HUMID HEAT operation/FRESH AIR SUPPLY VENTILATION.) Priority is given to the indoor unit in either one of the rooms with the mode selected earlier. The indoor unit in the other room with mode selected later will change its state according to the operation mode with humidifying operation/ventilation settings. Refer to the following examples 1 through 4. Neither one of the indoor units cannot go into humidifying operation/ventilation while the indoor units are in a standby state. (Refer to the information on selecting operation mode.)

1. When the indoor units in both 2 rooms are set to HUMID HEAT operation.

1) Priority will be given to the indoor unit in the first selected room, and the indoor unit will go into humidifying operation while the indoor unit in the second selected room will go into a humidifying operation standby state. The multi-monitor indicator will be lit yellow in approx. 20 seconds.

2) When the humidity of the first selected room reaches a target level, the indoor unit will go into a humidifying operation standby state. Then the indoor unit in the other room will go into HUMID HEAT operation automatically.

3) When the humidity of the first selected room drops, the indoor unit of the room will return to HUMID HEAT operation. At that time, the indoor unit in the second selected room will go into a humidifying operation standby state.
   - When the indoor unit in the first selected room is in "CONT" humidifying the indoor unit of the second selected room will not switch automatically.

2. When the indoor unit in the first selected room is in HUMID HEAT operation and the indoor unit in the second selected room is in FRESH AIR SUPPLY VENTILATION.

1) When the HUMID HEAT operation of the indoor unit in the first selected room stops, the ventilation of the second selected room will start.
   - Even though the humidity of first selected room reaches a target level, the ventilation of the second selected room will not start unless the HUMID HEAT operation of the indoor unit in the first selected room stops.

3. When the indoor unit in the first selected room is in FRESH AIR SUPPLY VENTILATION and the indoor unit in the second selected room is in HUMID HEAT operation.

1) When the ventilation of the first selected room stops, the humidifying operation of the second selected room will start.
   - The humidifying operation of the second selected room will not start unless the ventilation of the first selected room stops.

4. When the indoor units in both 2 rooms are set to FRESH AIR SUPPLY VENTILATION.

1) Priority will be given to the indoor unit in the first selected room, and the indoor unit in the second selected room will be in a ventilation standby state. At that time, no automatic switching explained in **1** will be possible. The ventilation of the second selected room will start after the ventilation of the first selected room stops.

3P232703-1

Part 6
Service Diagnosis

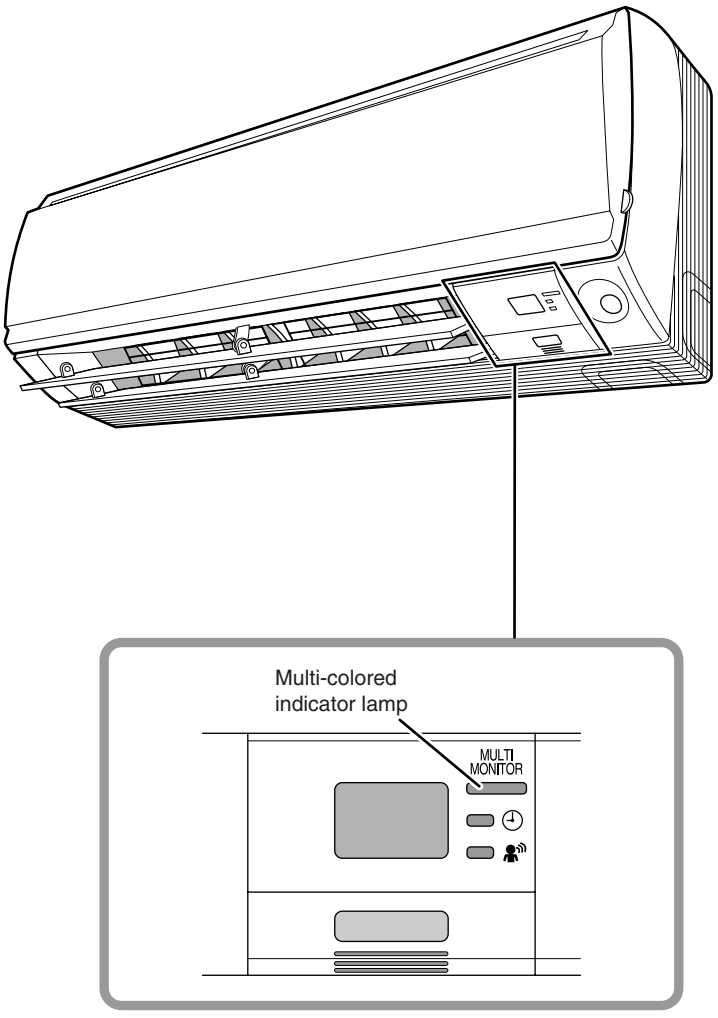
1. Service Check Function

1.1 Failure Diagnosis with Multi-Colored Indicator Lamp

The multi-colored indicator lamp on the display of the indoor unit flashes when any of the following failure is detected.

1. When a protection device of the indoor or outdoor unit is activated or when the thermistor malfunctions and the machine does not work.
2. When a signal transmission error occurs between the indoor and outdoor units.

For detailed troubleshooting, refer to the following pages “Troubleshooting” (P.100~).



(R9419)

1.2 Failure Diagnosis by LED Indication

The following failure diagnosis can be done by LED indication on the outdoor unit PCB.

1. The outdoor unit has 2 green LED(LED A, LED5) on the PCB.
   The flashing green LED indicates "in order" condition.
   The turned ON or OFF LED indicates the failure related to the microcomputer.

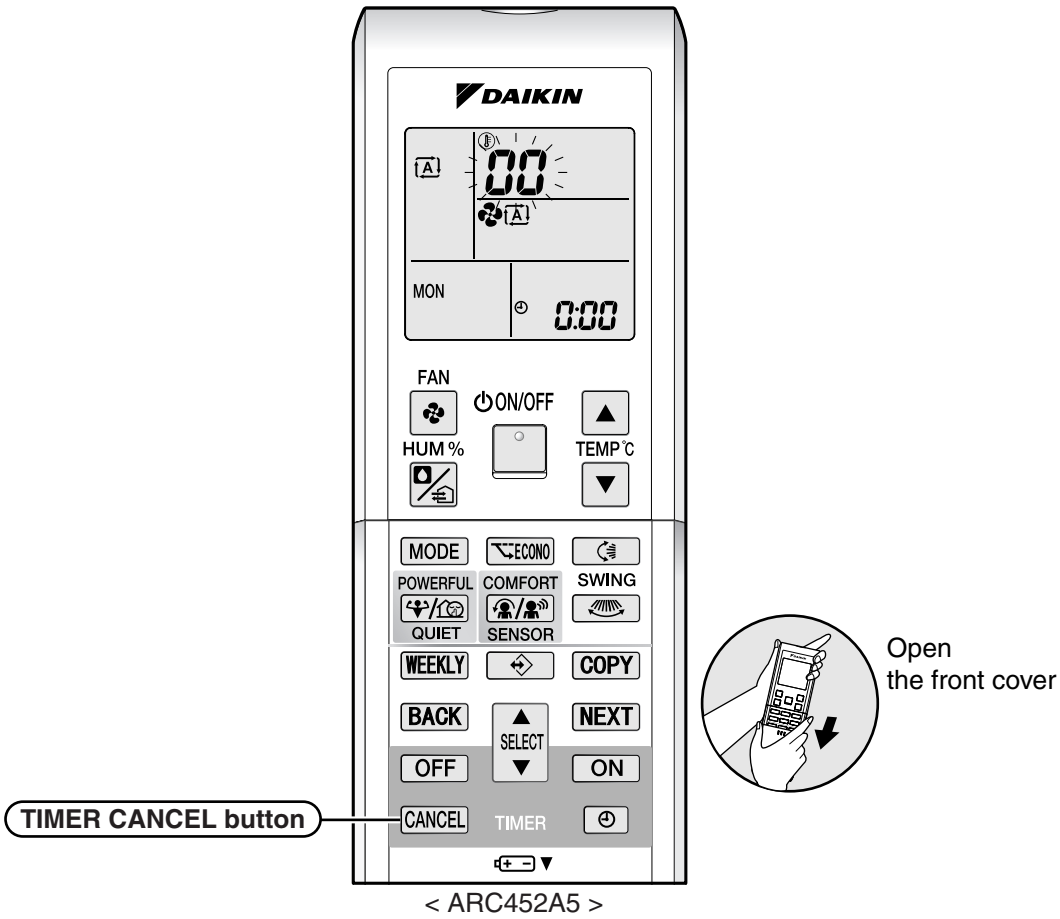
- PCB is set upside down (with backside up) to improve its quality.
- LED can be visually inspected through a inspection slit.

1.3 Failure Diagnosis by Remote Controller

The temperature display sections on the remote controller indicate corresponding codes.

Check Method 1

1. When the timer cancel button is held down for 5 seconds, a "00" indication flashes on the temperature display section.



< ARC452A5 >

(R9418)

2. Press the timer cancel button repeatedly until a continuous beep is produced.

■ The code indication changes in the sequence shown below, and notifies with a long beep.

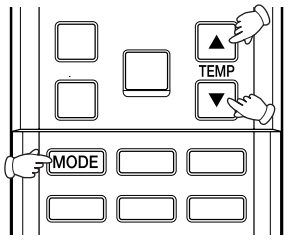
No.	Code	No.	Code	No.	Code
1	00	13	C7	25	U8
2	U4	14	A3	26	UR
3	L5	15	H8	27	P4
4	E6	16	H9	28	L3
5	H6	17	C9	29	L4
6	H0	18	C4	30	H7
7	A6	19	C5	31	U2
8	E7	20	J3	32	EA
9	U0	21	J6	33	AH
10	F3	22	E5	34	FA
11	A5	23	A1	35	H1
12	F6	24	E1	36	P9

Note:

1. A short beep and two consecutive beeps indicate non-corresponding codes.
2. To cancel the code display, hold the timer cancel button down for 5 seconds. The code display also cancels itself if the button is not pressed for 1 minute.

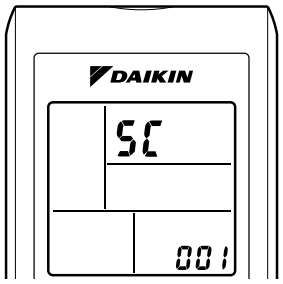
Check Method 2

1. Press the 3 buttons (TEMP▲, TEMP▼, MODE) simultaneously.



(R8381)

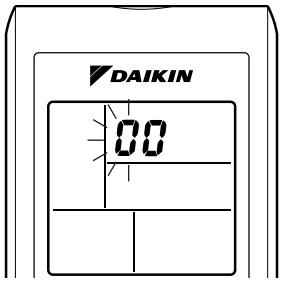
"SC" is displayed on the LCD.



(R9420)

2. Select "SC" with TEMP▲ or ▼ button.

3. Press the MODE button to enter the service check mode.
   The figure of the ten's place blinks.
   ★Try again from the start when the figure does not blink.

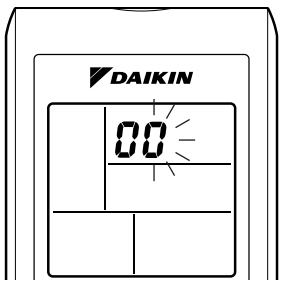


(R9430)

4. Press TEMP▲ or ▼ button and change the figure until you hear the sound of "beep" or "pi pi".

5. Diagnose by the sound.
   ★"pi" : The figure of the ten's place does not accord with the error code.
   ★"pi pi" : The figure of the ten's place accords with the error code but the one's not.
   ★"beep" : The both figures of the ten's and one's place accord with the error code.
   (→See 7.)

6. Press the MODE button.
   The figure of the one's place blinks.



(R9429)

7. Press TEMP▲ or ▼ button and change the figure until you hear the sound of “beep”.

8. Diagnose by the sound.
   ★“pi” : The figure of the ten’s place does not accord with the error code.
   ★“pi pi” : The figure of the ten’s place accords with the error code but the one’s not.
   ★“beep” : The both figures of the ten’s and one’s place accord with the error code.
   (→See 7.)

9. Determine the error code.
   The digits indicated when you hear the “beep” sound are error code.
   (Error codes and description → Refer to page 100.)

10. Press the MODE button for 5 seconds to exit from the service check mode.
    (When the remote controller is left untouched for 60 seconds, it returns to the normal mode.)

2. Troubleshooting

2.1 Error Code Indication by Remote Controller

* Various cases may be possible.

Code	Unit	Description	Reference page
Basic Failure Diagnosis		Air conditioner does not run.	102
		Air conditioner runs but does not get cooling (heating).	105
		When operation starts, safety breaker works.	107
		Air conditioner makes big noise and vibration.	109
		Air does not humidified enough.	110
A1	Indoor	Indoor unit PCB abnormality	113
A5		Freeze-up protection or high pressure control	114
A6		Fan motor or related abnormality	116
C4		Indoor heat exchanger thermistor abnormality	118
C9		Room temperature thermistor abnormality	118
CC		Humidity sensor abnormality	119
E1	Outdoor	Outdoor unit PCB abnormality	125
E5		OL activation (compressor overload)	126
E6		Compressor lock	127
E7		DC fan lock	128
E8		Input overcurrent detection	129
F3		Discharge pipe temperature control	131
F6		High pressure control in cooling	132
H0		Compressor sensor system abnormality	134
H1	Humidifying unit	Damper abnormality	135
H6	Outdoor	Position sensor abnormality	136
H8		DC voltage / DC current sensor abnormality	138
H9		Outdoor air thermistor abnormality	139
J3		Discharge pipe thermistor abnormality	139
J6		Outdoor heat exchanger thermistor abnormality	139
J8		Liquid pipe thermistor abnormality	139
J9		Gas pipe thermistor abnormality	139
L3		Abnormal temperature in electrical box	141
L4		Temperature rise in radiation fin	143
L5		Output overcurrent	145
P4		Radiation fin thermistor abnormality	139
P9	Humidifying unit	Fan motor system abnormality / fan lock	155
PA		Heater wire abnormality	156
PH		Humidification fan outlet thermistor abnormality / abnormal heater temperature	158
U0	System	Insufficient gas	147
U2		Over voltage protection (OVP) / low voltage protection (LVP)	149
U4		Signal transmission error (indoor unit - outdoor unit)	120
	Outdoor	Outdoor unit PCB abnormality or communication circuit abnormality	150
U7	System	Signal transmission error on outdoor unit PCB	153
UA		Incompatible power supply between indoor unit and outdoor unit	122
	Indoor	Incomplete setting for hose length	123

Code	Unit	Description	Reference page
U8, UH	System	Freeze-up protection in other rooms / Unspecified voltage (between indoor and outdoor units)	124
–		Lights-out of microcomputer status lamp	160

2.2 Air conditioner does not run.

Method of Malfunction Detection

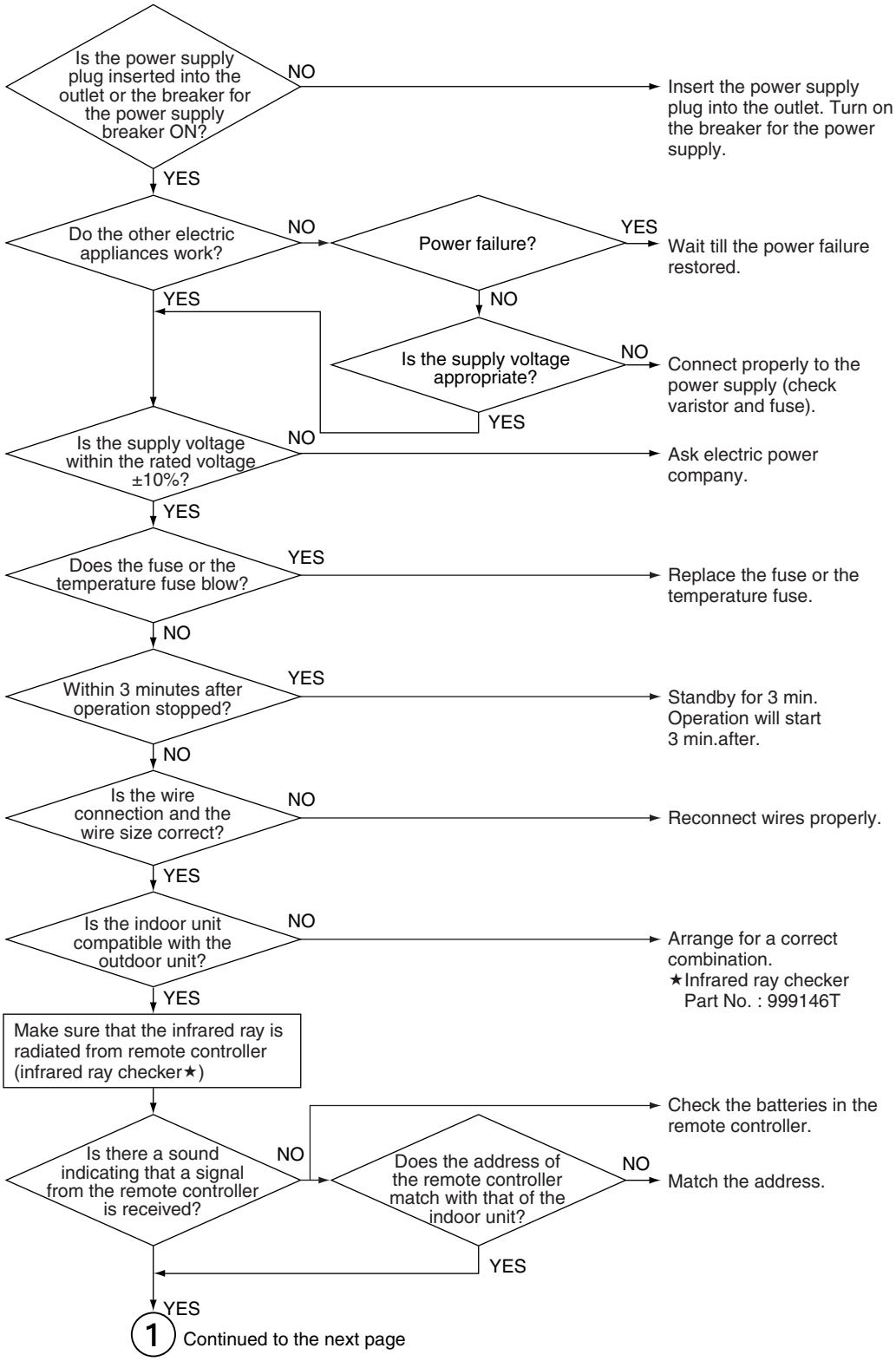
Malfunction Decision Conditions

Supposed Causes

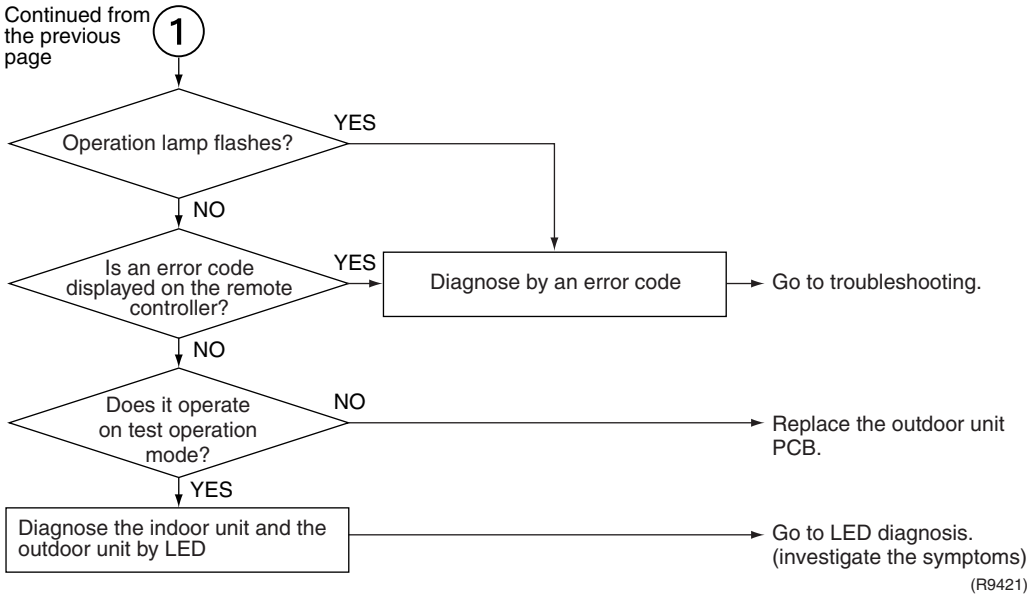
- Power supply is OFF
- Improper power supply voltage
- Improper connection of wire
- Incorrect combination of indoor unit and outdoor unit
- Battery shortage of remote controller
- Invalid address setting
- Protection device works
  (dirty air filter, insufficient gas, over filling, mixed air, etc.)
- Transmission error between indoor unit and outdoor unit
  (Defective PCB on outdoor unit)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9681)


Continued from the previous page
1
Operation lamp flashes?
YES
NO
Is an error code displayed on the remote controller?
YES
Diagnose by an error code
Go to troubleshooting.
NO
Does it operate on test operation mode?
NO
Replace the outdoor unit PCB.
YES
Diagnose the indoor unit and the outdoor unit by LED
Go to LED diagnosis. (investigate the symptoms)
(R9421)

2.3 Air conditioner runs but does not get cooling (heating).

Method of Malfunction Detection

Malfunction Decision Conditions

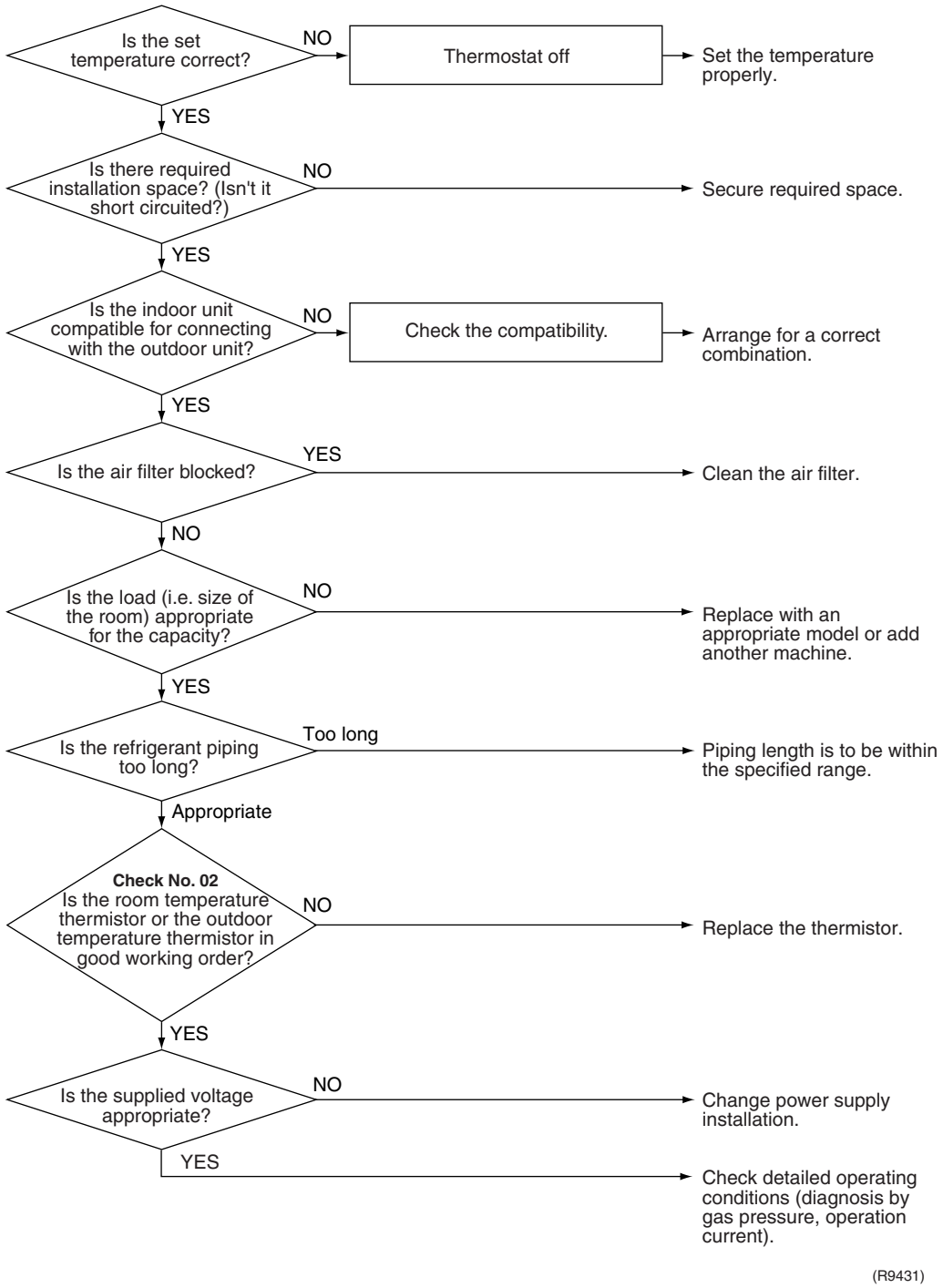
Supposed Causes

- Incorrect temperature setting
- Incorrect combination of indoor unit and outdoor unit
- Blocked air filter
- Insufficient power
- Refrigerant piping is too long
- Improper setting of piping length
- Defective field piping (squeezed, etc.)

Troubleshooting

Check No.02
Refer to P.162

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9431)

Warning: When an air conditioner does not cool or heat the room, refrigerant leak is considered to be one of the reasons.
Make sure that there is no gas leakage or breaks due to over tightened flare part. (Though the refrigerant used in an air conditioner is itself harmless, but it can generate toxic gases when it leaks into room and contacts flames, such as fan and other heaters, stoves, and ranges. In case of leakage, ventilate the room immediately.)

2.4 When operation starts, safety breaker works.

Method of Malfunction Detection

Malfunction Decision Conditions

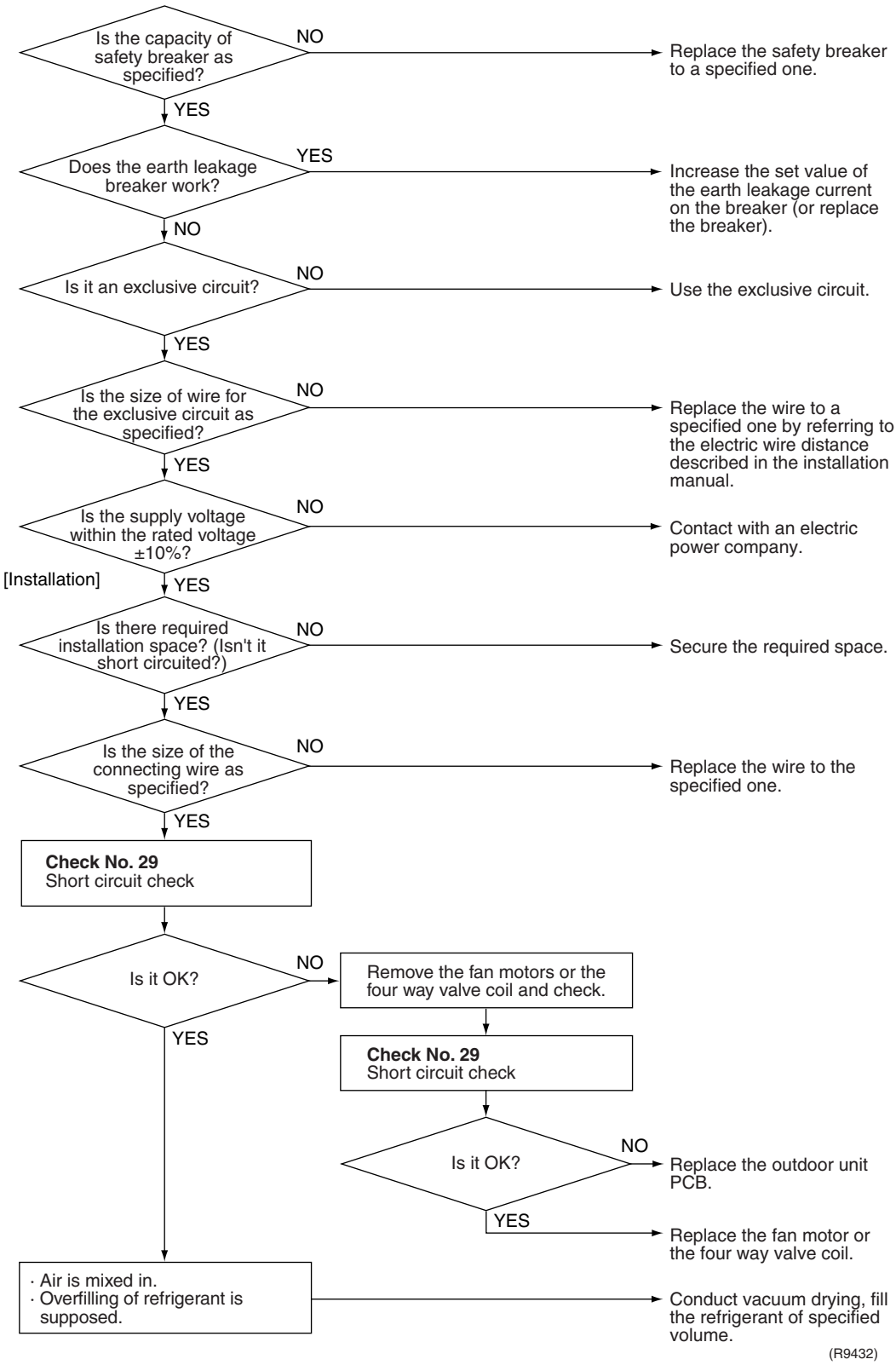
Supposed Causes

- Insufficient capacity of safety breaker
- Earth leakage breaker is too sensitive
- Not exclusive circuit
- The supply voltage is not within rated voltage ±10%.
- The size of connecting wire is thin (indoor power supply unit)
- Air is mixed (over filling)
- Damaged outdoor unit PCB (short circuit)

Troubleshooting

Check No.29
Refer to P.171

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9432)

2.5 Air conditioner makes big noise and vibration.

Method of Malfunction Detection

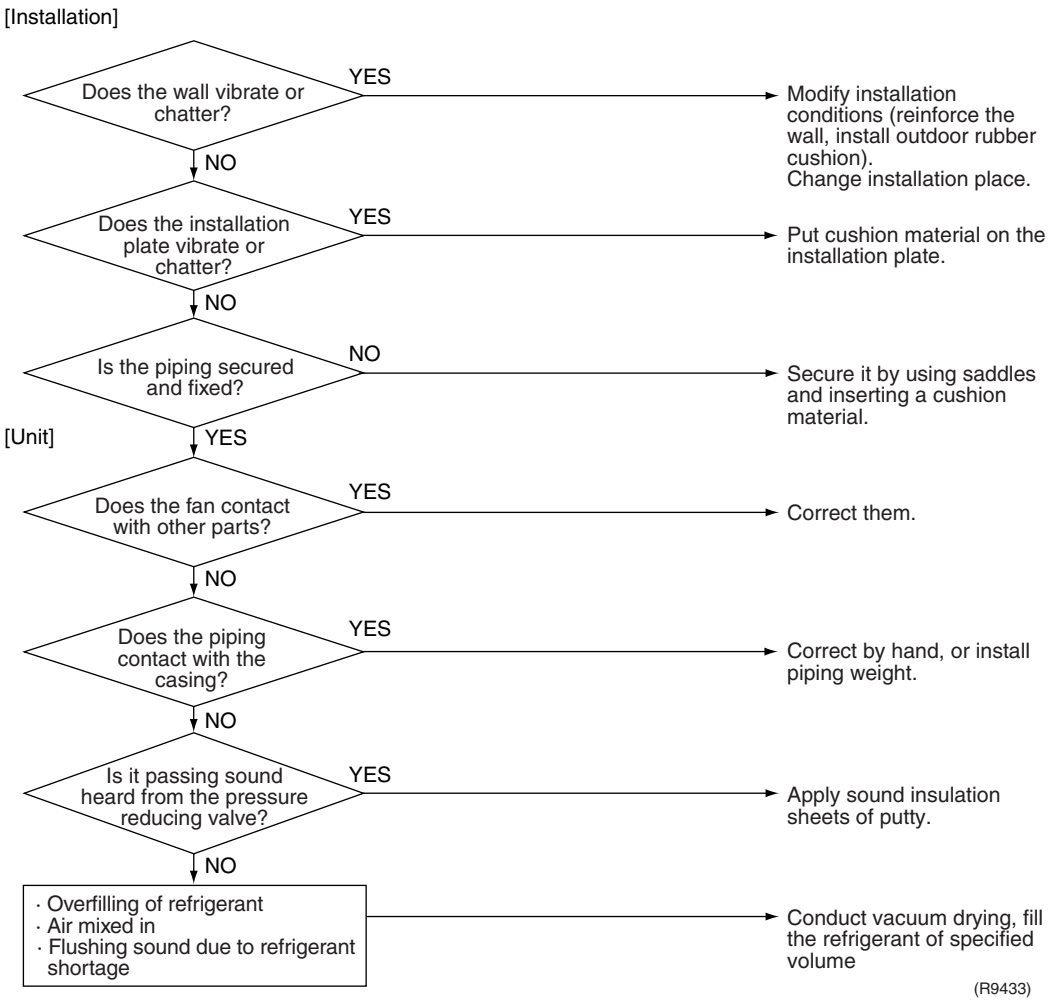
Malfunction Decision Conditions

Supposed Causes

- Piping length is too short
- Mounting wall is too thin
- Insufficient vibration prevention measures
- Deformation of the unit
- Improper quantity of refrigerant

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



2.6 Air does not humidified enough.

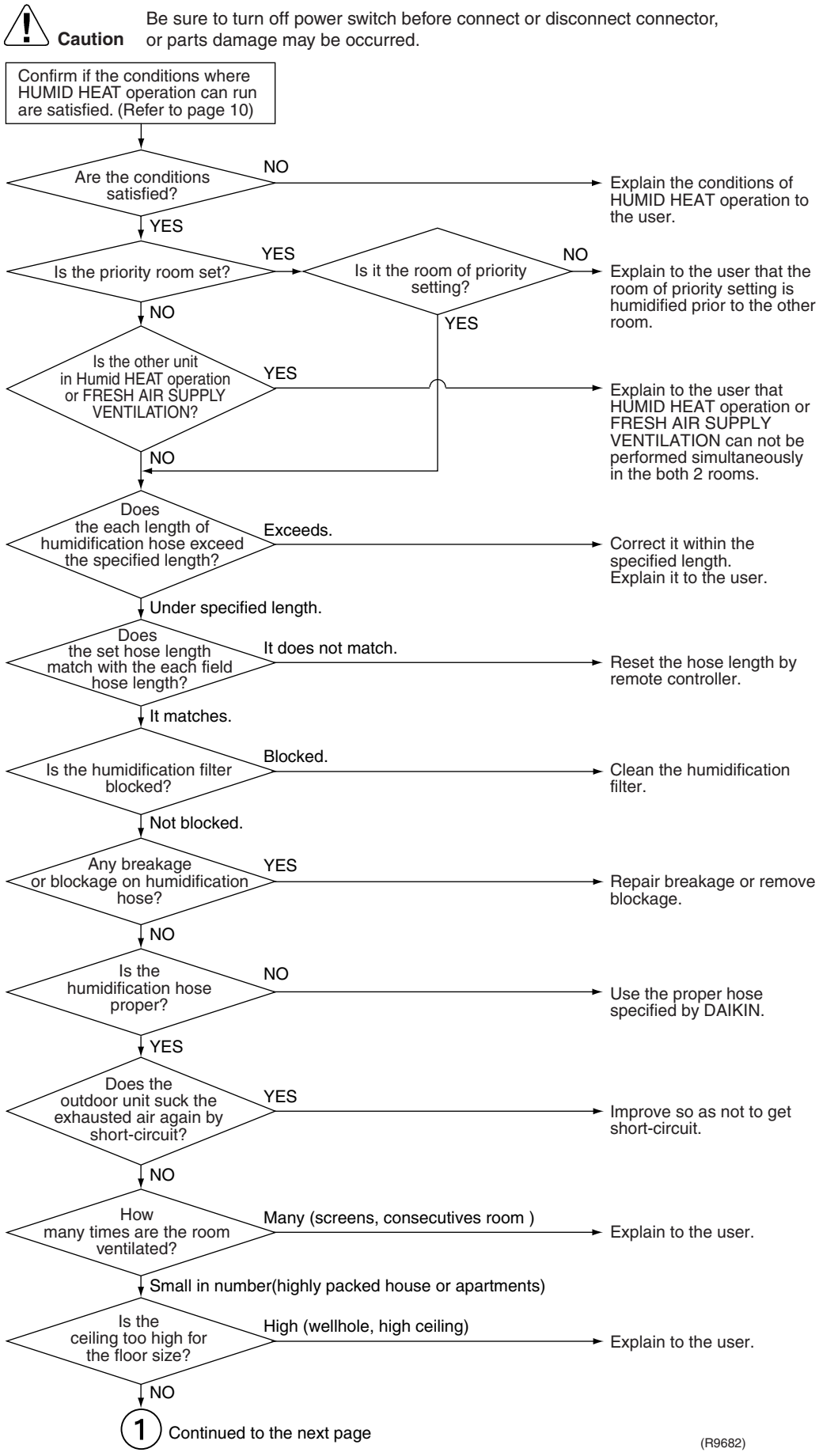
Method of Malfunction Detection

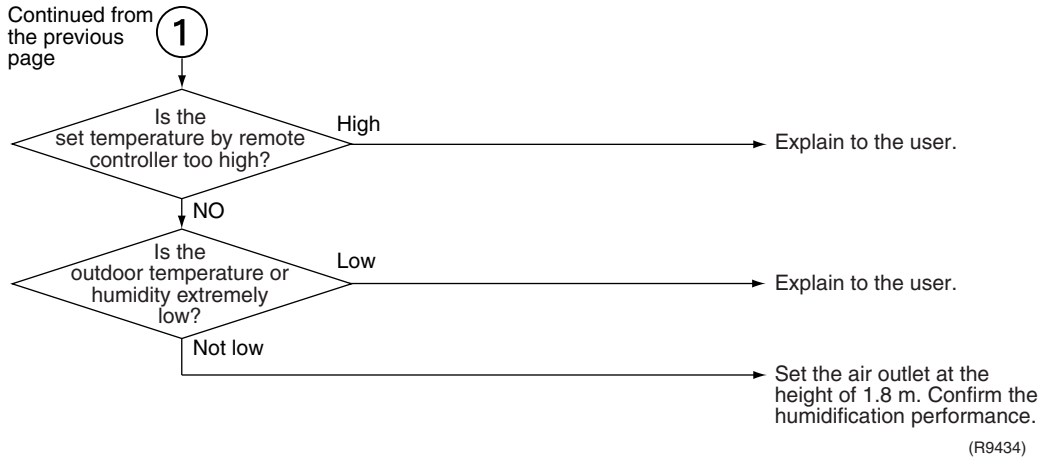
Malfunction Decision Conditions

Supposed Causes

- Hose length is not set
- Incorrect hose length setting
- Short circuited at outdoor unit
- Blocked humidification filter
- Insufficient heat insulation of duct
- Indoor ventilation is made too often
- Ceiling is very high.

Troubleshooting





Note: Refer to P. 28 for the priority room setting.

2.7 Indoor Unit PCB Abnormality

Remote Controller Display

A1

Method of Malfunction Detection

Evaluation of zero-cross detection of power supply by indoor unit.

Malfunction Decision Conditions

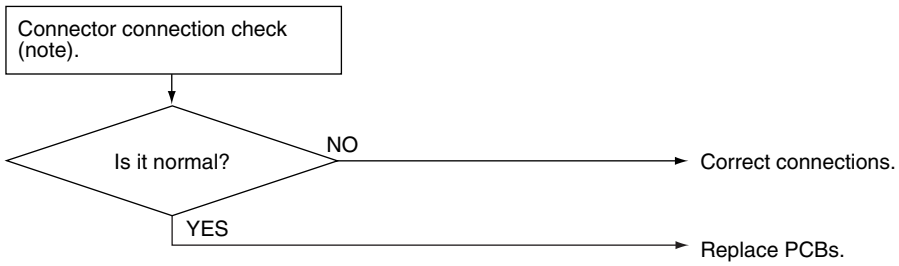
When there is no zero-cross detection in approximately 10 continuous seconds.

Supposed Causes

- Faulty indoor unit PCB
- Faulty connector connection

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R7130)

Note: Connector Nos. vary depending on models.

Model Type	Connector No.
Wall Mounted Type	Terminal strip~Control PCB

2.8 Freeze-up Protection Control or High Pressure Control

Remote Controller Display

Method of Malfunction Detection

- High pressure control
  During heating operations, the temperature detected by the indoor heat exchanger thermistor is used for the high pressure control (stop, outdoor fan stop, etc.)
- Freeze-up protection control (operation halt) is activated during cooling operation according to the temperature detected by the indoor unit heat exchanger thermistor.

Malfunction Decision Conditions

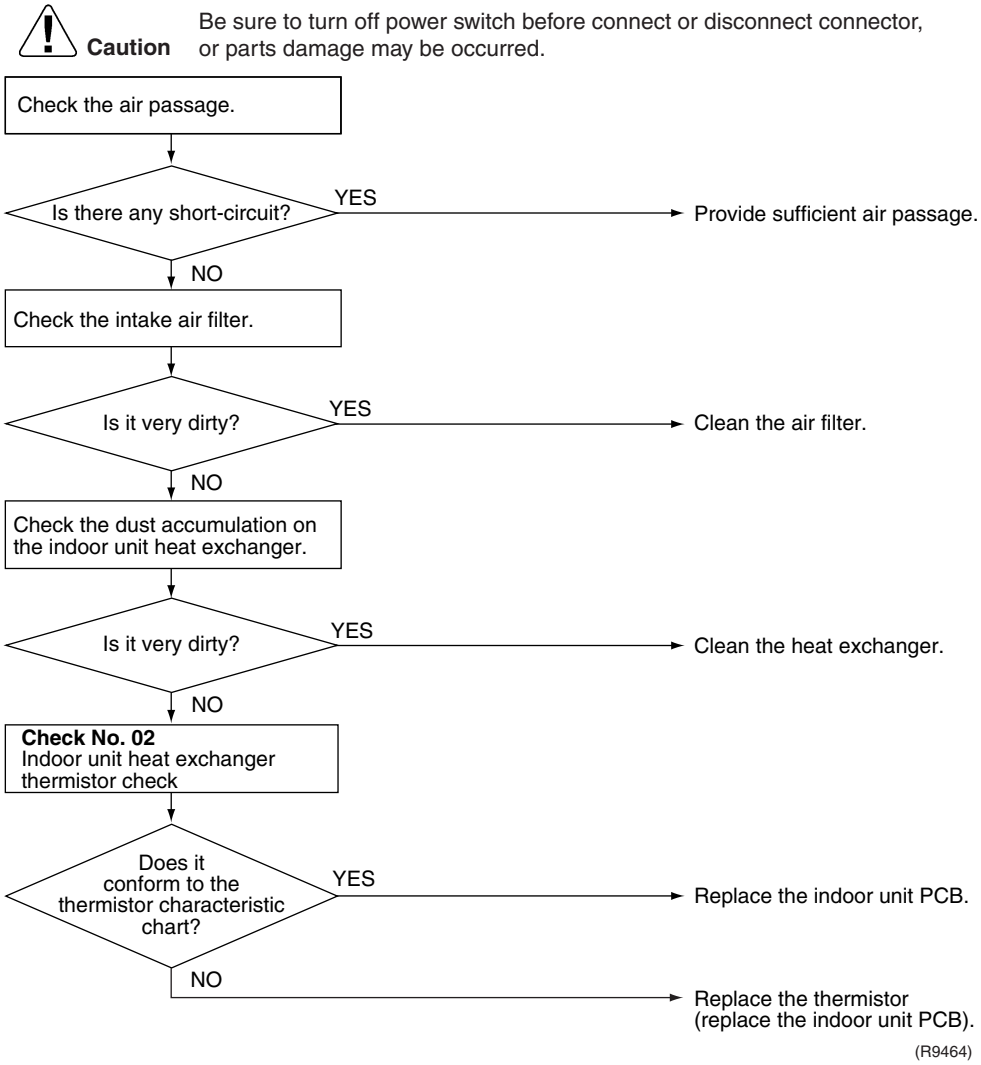
- High pressure control
  During heating operations, the temperature detected by the indoor heat exchanger thermistor is above 65°C
- Freeze-up protection
  When the indoor unit heat exchanger temperature is below 0°C during cooling operation.

Supposed Causes

- Operation halt due to clogged air filter of the indoor unit.
- Operation halt due to dust accumulation on the indoor unit heat exchanger.
- Operation halt due to short-circuit.
- Detection error due to faulty indoor unit heat exchanger thermistor.
- Detection error due to faulty indoor unit PCB.

Troubleshooting

Check No.02
Refer to P.162



2.9 Fan Motor (DC Motor) or Related Abnormality

Remote Controller Display

Method of Malfunction Detection

The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor operation.

Malfunction Decision Conditions

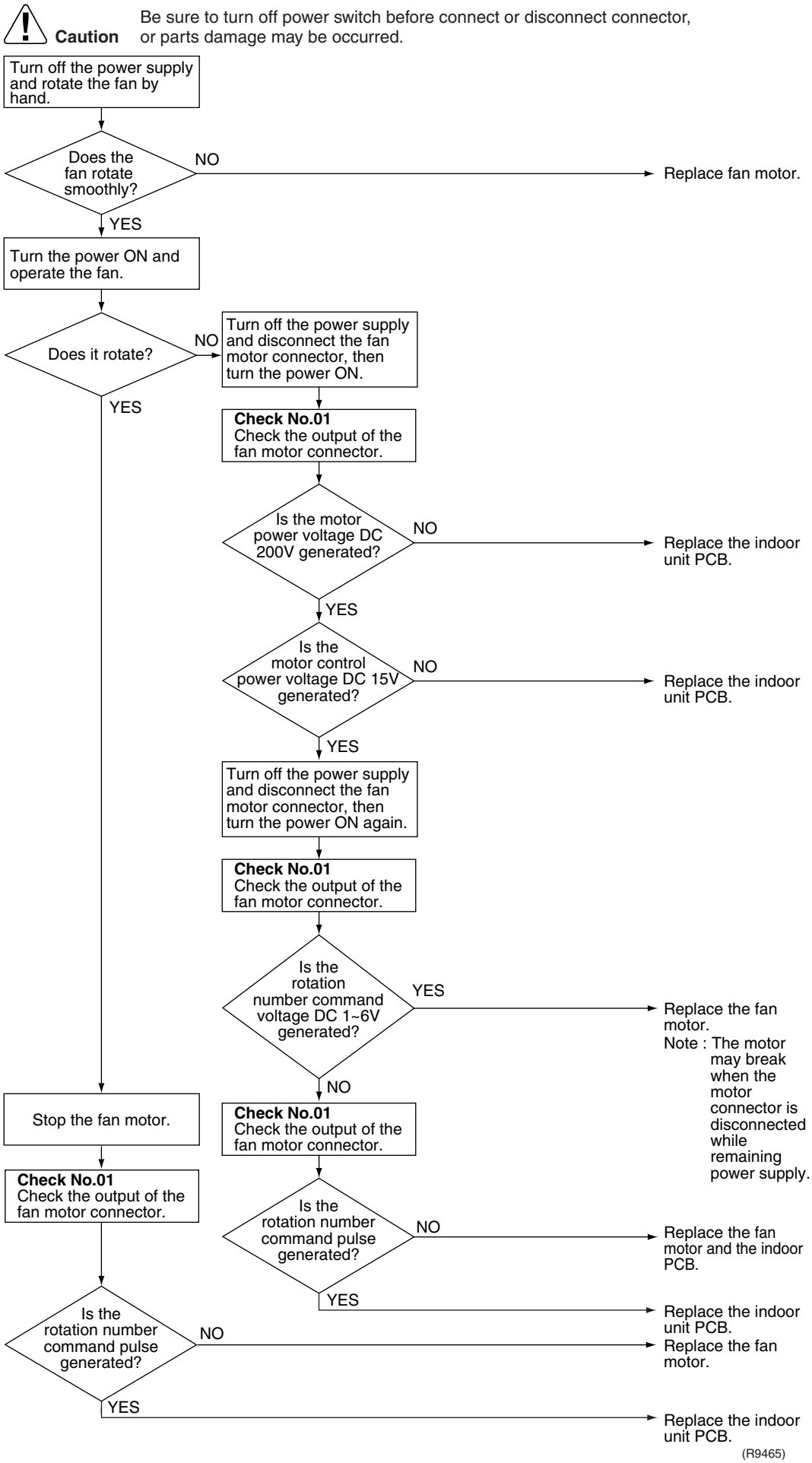
When the detected rotation speed does not reach the demanded rotation speed of the target tap, and is less than 50% of the maximum fan motor rotation speed.

Supposed Causes

- Operation halt due to short circuit inside the fan motor winding.
- Operation halt due to breaking of wire inside the fan motor.
- Operation halt due to breaking of the fan motor lead wires.
- Operation halt due to faulty capacitor of the fan motor.
- Detection error due to faulty indoor unit PCB.

Troubleshooting

Check No.01
Refer to P.161



2.10 Thermistor or Related Abnormality (Indoor Unit)

Remote Controller Display

C4, C9

Method of Malfunction Detection

The temperatures detected by the thermistors are used to determine thermistor errors.

Malfunction Decision Conditions

When the thermistor input is more than 4.96 V or less than 0.04 V during compressor operation*.
* (reference)
When above about 212°C (less than 120 ohms) or below about -50°C (more than 1,860 kohms).

Note: The values vary slightly in some models.

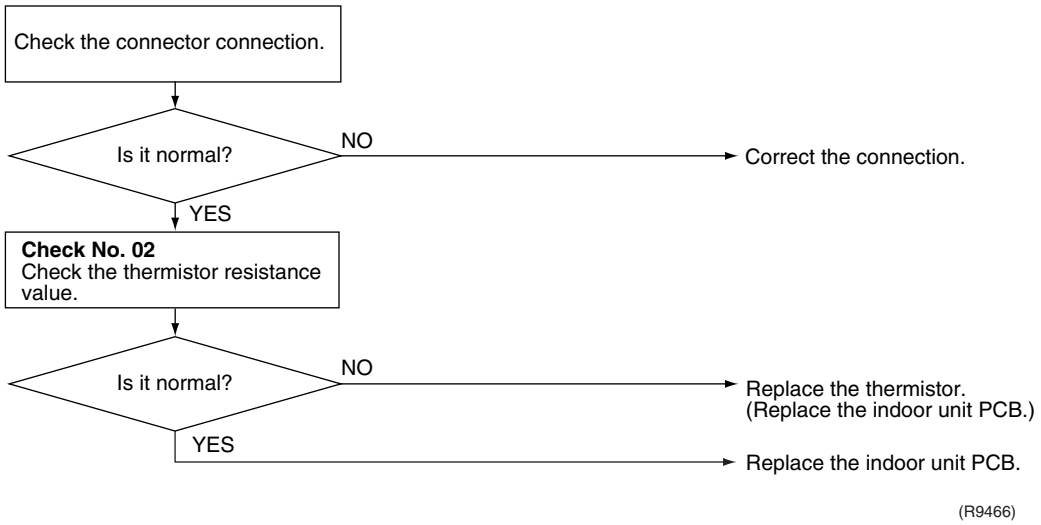
Supposed Causes

- Faulty connector connection
- Faulty thermistor
- Faulty PCB

Troubleshooting

Check No.02
Refer to P.162

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



C4 : Heat exchanger thermistor
C9 : Room temperature thermistor

2.11 Humidity Sensor Abnormality

Remote Controller Display

CC

Method of Malfunction Detection

Sensor abnormality is detected by input value.

Malfunction Decision Conditions

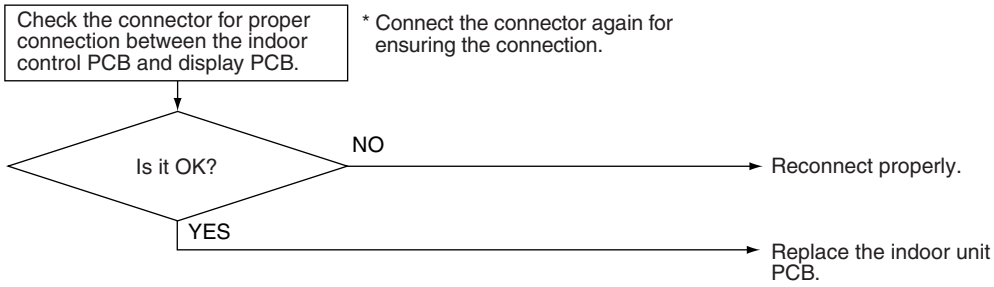
When the input from a temperature sensor is 4.96 V or more or 0.04 V or less*

Supposed Causes

- Improper connector connection
- Defective indoor control PCB
- Defective humidity sensor PCB

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



CC : Humidity sensor

(R9422)

2.12 Signal Transmission Error (Indoor Unit - Outdoor Unit)

Remote Controller Display

U4

Outdoor Unit LED Display

A ☼ 5 ☼

Method of Malfunction Detection

The data sent from the outdoor unit is checked for problem.

Malfunction Decision Conditions

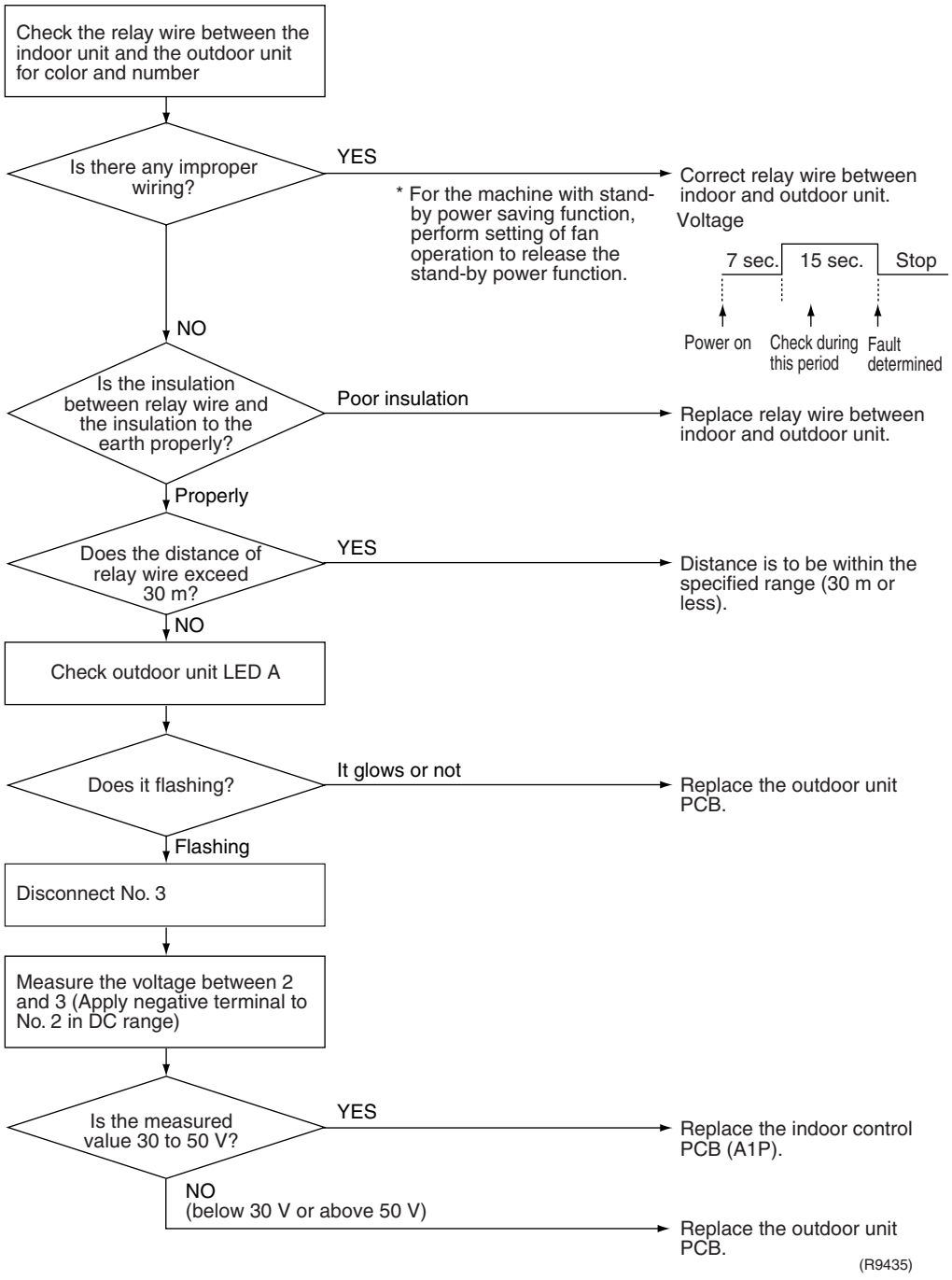
When the data sent from the outdoor unit can not be received without error, or when the disable status of signal transmission continues for 15 sec..

Supposed Causes

- Defective outdoor unit PCB
- Defective indoor unit PCB
- Signal transmission error between indoor and outdoor unit due to improper wiring
- Signal transmission error between indoor and outdoor unit due to breakage of relay wire (transmission wire)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



2.13 Incompatible Power Supply between Indoor Unit and Outdoor Unit

Remote Controller Display

Method of Malfunction Detection

Check the incompatible power supply between indoor unit and outdoor unit by using signal transmission.

Method of Malfunction Detection

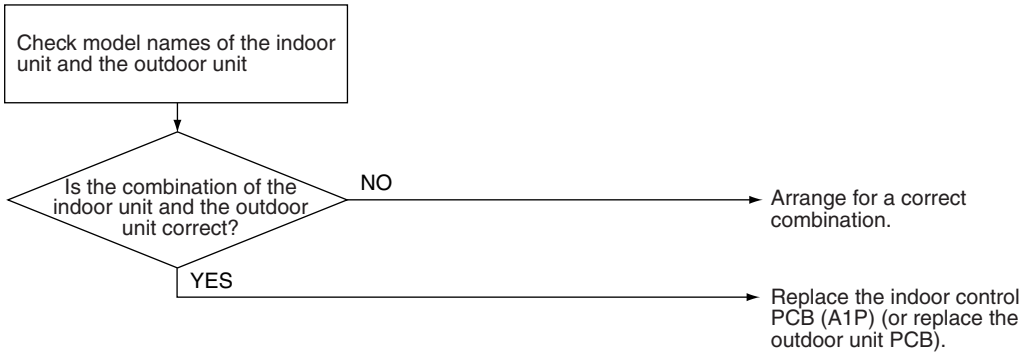
In case that the indoor intake model is connected to outdoor intake model.

Supposed Causes

- Connected to wrong model
- Mounted improper indoor unit PCB
- Defective indoor unit PCB
- Mounted improper outdoor unit PCB or defective PCB

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9436)

2.14 Incomplete Setting for Hose Length

Remote Controller Display

UA

Method of Malfunction Detection

This fault occurs when the humidification hose length is not stored in the EEPROMs of the indoor unit and the outdoor unit.
(Hose length is not stored at initial power on.)

Malfunction Decision Conditions

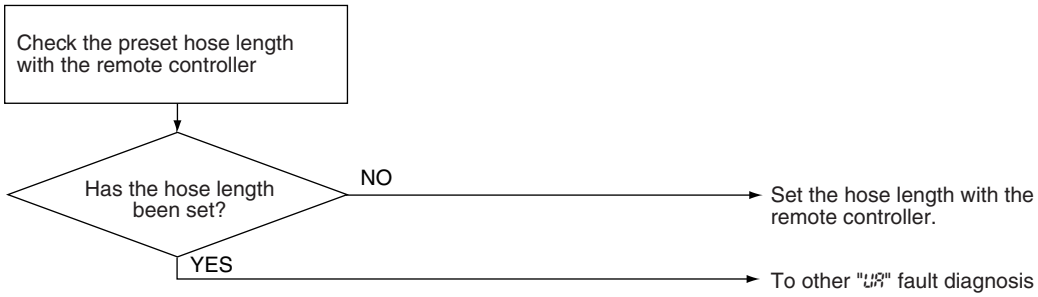
- When the humidification hose length is not stored in EEPROMs of the indoor unit and the outdoor unit.

Supposed Causes

Hose length is not set.
Hose length is erased by replacement of the indoor unit PCB or the outdoor unit PCB. (When both the indoor unit and the outdoor unit PCBs are replaced simultaneously, the set value is erased.)

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9423)

How to check the preset hose length

1) Press 3 buttons (TEMP ▲, ▼, MODE) simultaneously.
SC is displayed. (A)


A

2) Press TEMP ▲ or ▼ button and select PC. (B)


B

3) Press MODE button to enter the pipe check mode. (C)


C

4) Press TEMP ▲ or ▼ button to change the display of the hose length. (D)


D
(Set point; long beep)

5) Long beep sound means that the display shows the preset hose length.
If you hear the long beep when the display is (E), the hose length is not set.


E

2.15 Freeze-up Protection in Other Rooms / Unspecified Voltage (between Indoor and Outdoor Units)

Remote Controller Display

U9, UH

Method of Malfunction Detection

A wrong connection is detected by checking the combination of indoor and outdoor units on the microcomputer.

Malfunction Decision Conditions

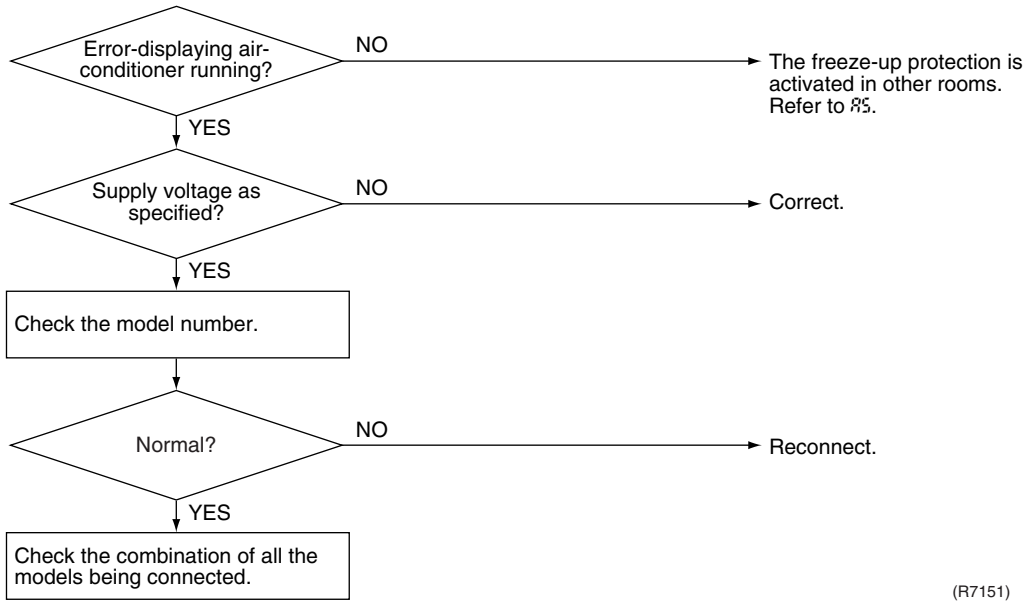
- Operation halt due to the freeze-up protection in other rooms
- Operation halt due to unspecified voltage between indoor and outdoor units

Supposed Causes

- Operation halt due to the freeze-up protection in other rooms
- Wrong connections at the indoor unit
- PCB wrongly connected

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



2.16 Outdoor Unit PCB Abnormality

Remote Controller Display

E 1

Outdoor Unit LED Display

A ☼ 5 ☼
A ● 5 ☼ (zero-cross abnormality)

Method of Malfunction Detection

- Detect within the programme of the microcomputer that the programme is in good running order.
- Detect input of zero-cross signal.

Malfunction Decision Conditions

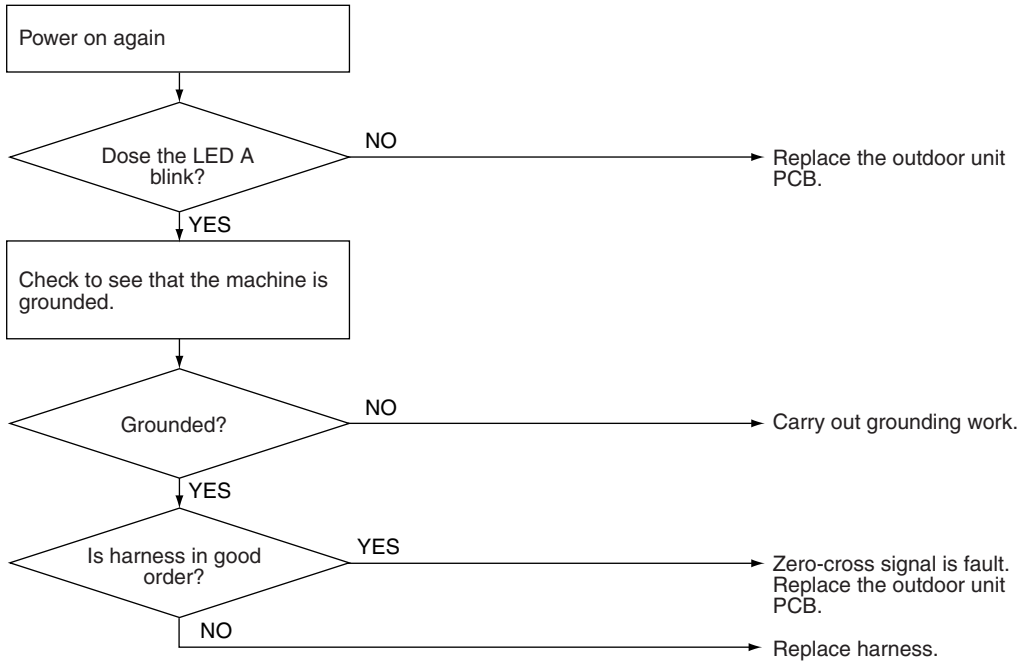
- When the programme of the microcomputer is in bad running order.
- Zero-cross signal can not be detected.

Supposed Causes

- Out of control of microcomputer caused by external factors
  - Noise
  - Momentary fall of voltage
  - Momentary power loss
- Defective outdoor unit PCB
- Breakage of harness between PCBs

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9437)

2.17 OL Activation (Compressor Overload)

Remote Controller Display

E5

Method of Malfunction Detection

A compressor overload is detected through compressor OL.

Malfunction Decision Conditions

- If the compressor OL is activated twice, the system will be shut down.
- The error counter will reset itself if this or any other error does not occur during the following 60-minute compressor running time (total time).

* The operating temperature condition is not specified.

Supposed Causes

- Refrigerant shortage
- Four way valve malfunctioning
- Outdoor unit PCB defective
- Water mixed in the local piping
- Electronic expansion valve defective
- Stop valve defective

Troubleshooting

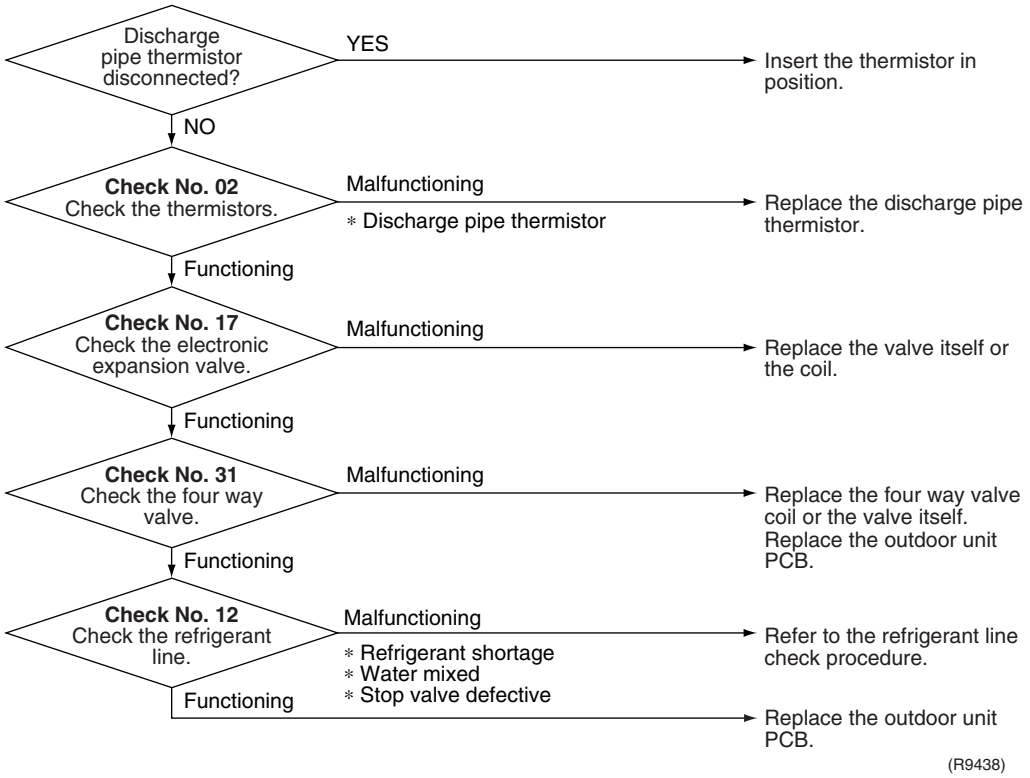
Check No.02
Refer to P.162

Check No.12
Refer to P.165

Check No.17
Refer to P.169

Check No.31
Refer to P.172

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9438)

2.18 Compressor Lock

Remote Controller Display

E6

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

Judging from current waveform generated when high-frequency voltage is applied to the compressor.

Malfunction Decision Conditions

- The machine is shut down when the fault count reaches 16.
- Clear condition: Continuous operation for 11 min. (without fault)

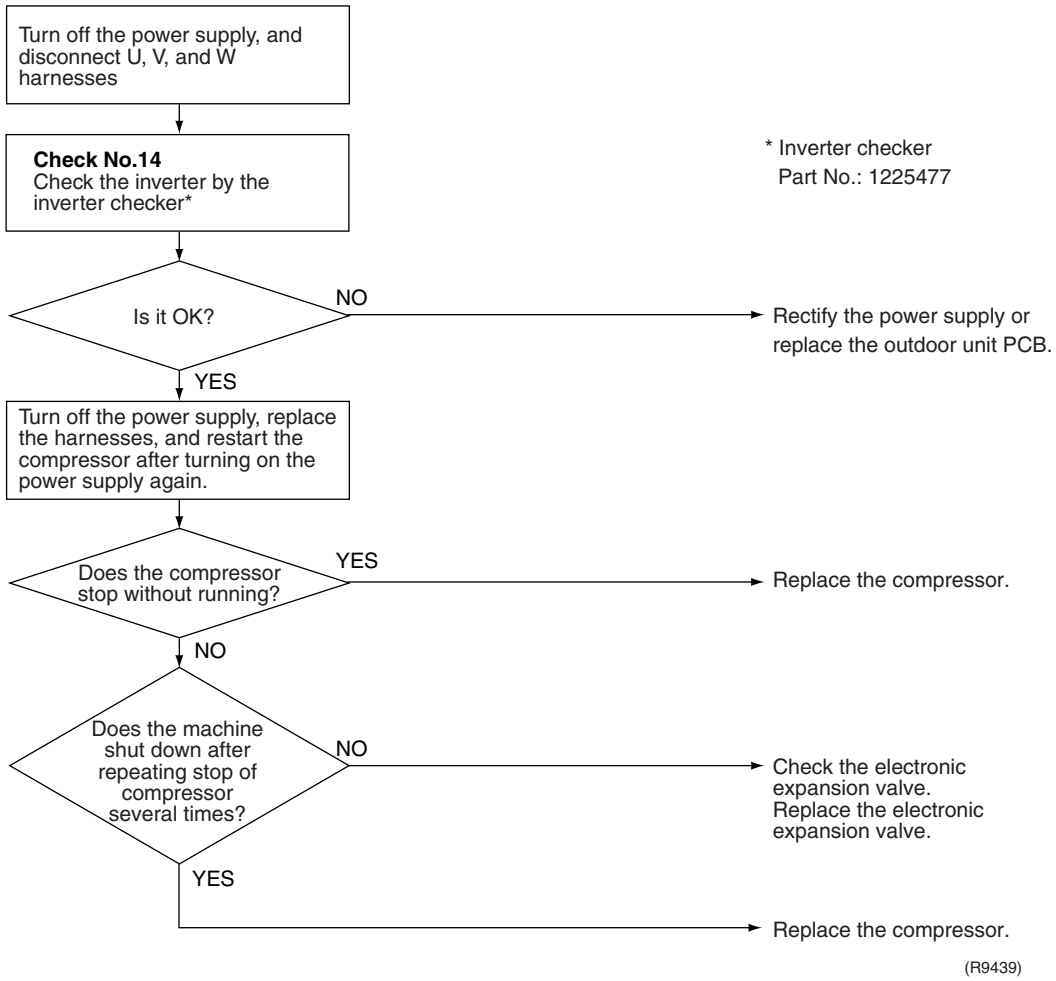
Supposed Causes

- Compressor lock
- Disconnection of compressor harness

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Check No.14
Refer to P.166



(R9439)

2.19 DC Fan Lock

Remote Controller Display

E7

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

Identify the fan motor system fault based on fan speed detected by Hall IC during high pressure fan motor running.

Malfunction Decision Conditions

- When the fan motor is running, the fan does not rotate for 60 sec. or more.
- Shut down when the error repeats 16 times
- Clear condition: The fan continuously rotates for 11 min.(without fault)

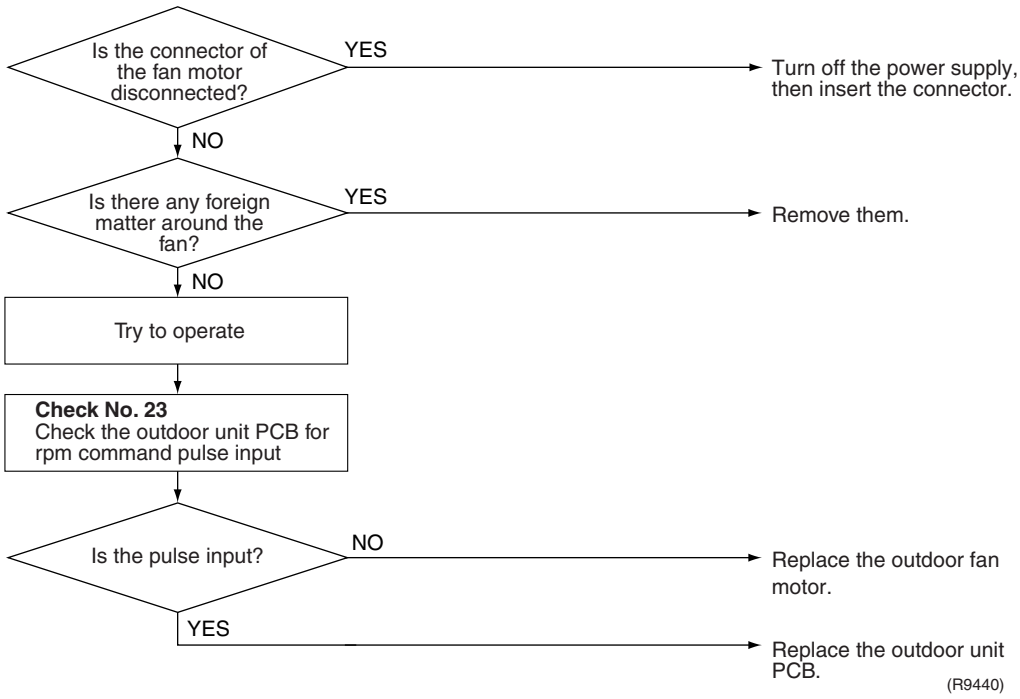
Supposed Causes

- Failure in fan motor
- Disconnection or improper connection of harness/connector between fan motor and PCB
- The fan does not rotate because it gets caught in foreign matter

Troubleshooting

Check No.23
Refer to P.170

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



2.20 Input Overcurrent Detection

Remote Controller Display

E8

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

Detect an input overcurrent by checking the inverter power consumption or the input current detected by CT with the compressor running.

Malfunction Decision Conditions

- When △ or more of CT input continues for 2.5 sec.
- The compressor stops if the error occurs, and restarts automatically after 3 minutes standby.

	△
40 class	11.0 A
50 class	12.5 A

Supposed Causes

- Overcurrent due to defective compressor
- Overcurrent due to defective power transistor
- Overcurrent due to defective electrolytic capacitor of inverter main circuit
- Overcurrent due to defective outdoor unit PCB
- Detection error due to defective outdoor unit PCB
- Overcurrent due to short circuit

Troubleshooting

Check No.03
Refer to P.163

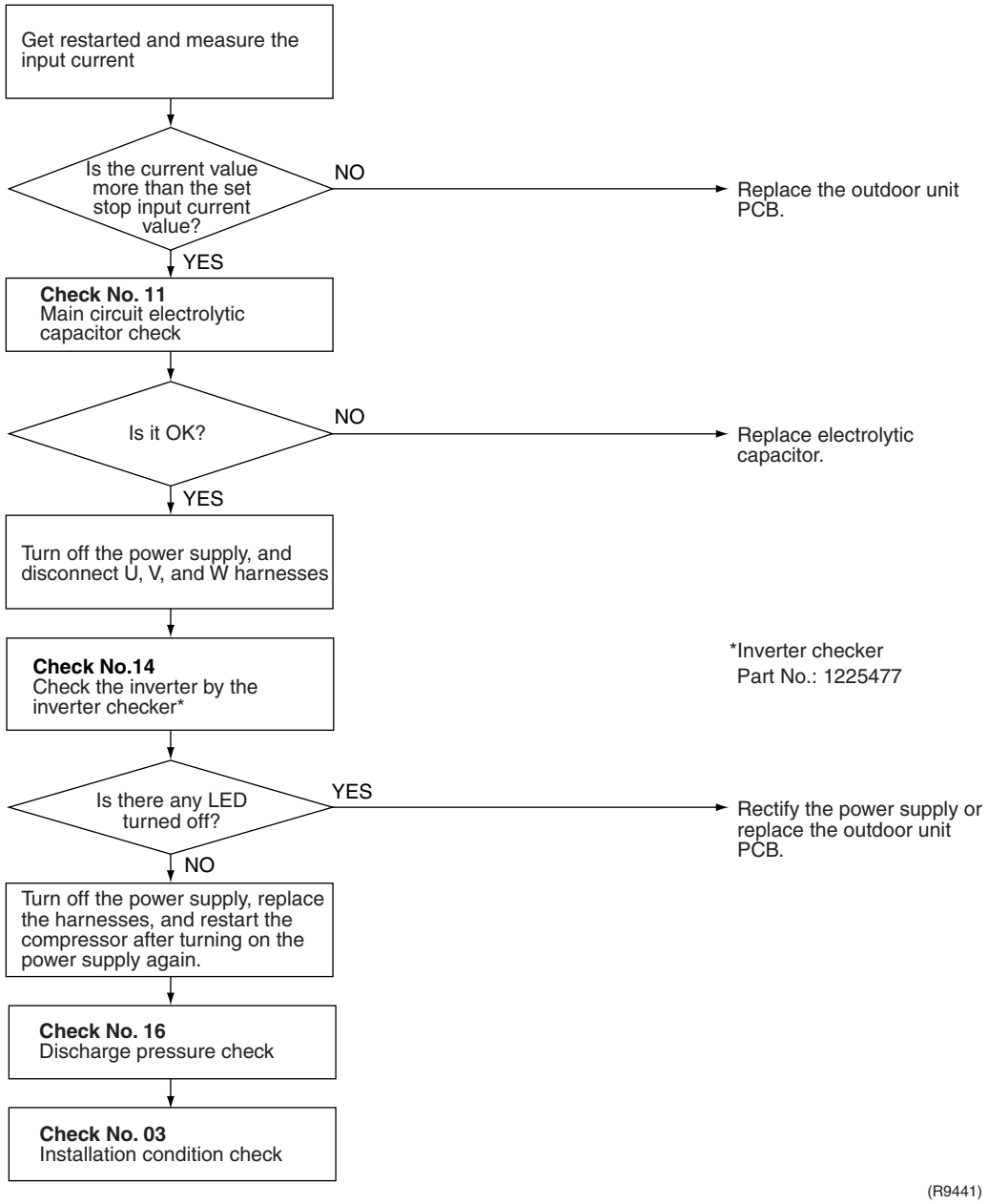
Check No.11
Refer to P.164

Check No.14
Refer to P.166

Check No.16
Refer to P.168

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

*Input over current may be caused by improper wiring inside the machine. If the machine stops due to input over current after connecting or disconnecting wires to replace part, check wiring for proper connection.



(R9441)

2.21 Discharge Pipe Temperature Control

Remote Controller Display

F3

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

Discharge pipe temperature control (stop, frequency attenuation, etc.) is executed based on the temperature detected by the discharge pipe thermistor.

Malfunction Decision Conditions

If the temperature being detected by the discharge pipe thermistor rises, the compressor will stop. The temperature at which the compressor halts varies according to the frequency.
(1) 110°C when the frequency is above 30Hz on ascending or above 25Hz on descending.
(2) 108°C when the frequency is below 30Hz on ascending or below 25Hz on descending.

- The error is cleared when the temperature has dropped below 95°C.
- If the compressor stops 6 times successively due to abnormal discharge pipe temperature, the system will be shut down.
- The error counter will reset itself if this or any other error does not occur during the following 60-minute compressor running time (total time).

Supposed Causes

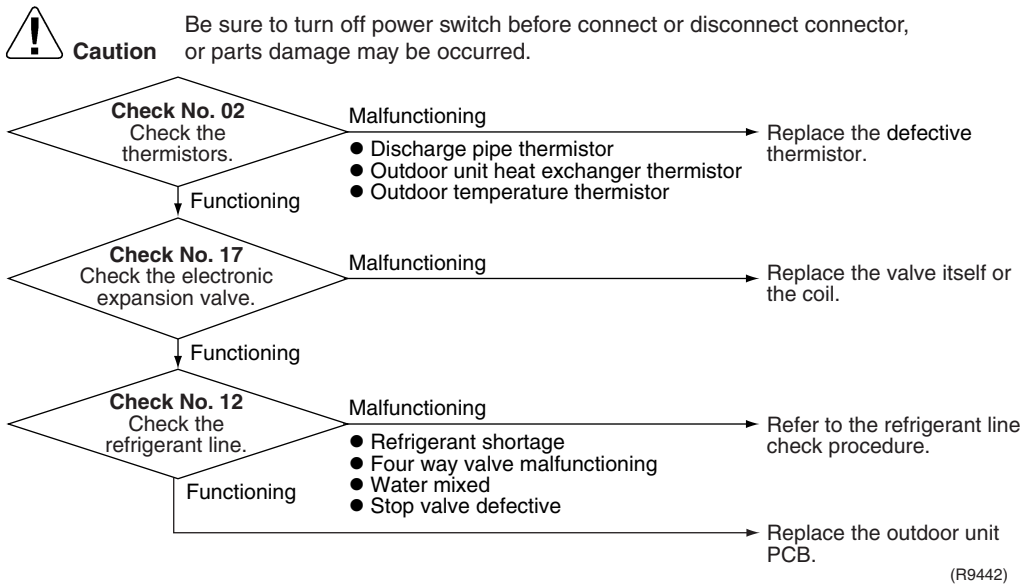
- Insufficient gas
- Faulty operation of four way valve
- Defective discharge pipe thermistor
  (Defective heat exchanger thermistor or outdoor air thermistor)
- Defective outdoor unit PCB
- Water mixed in the field piping
- Defective electronic expansion valve
- Defective stop valve

Troubleshooting

Check No.02
Refer to P.162

Check No.12
Refer to P.165

Check No.17
Refer to P.169



2.22 High Pressure Control in Cooling

Remote Controller Display

F6

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

During cooling, high pressure control (stop, frequency attenuation, etc.) is executed according to the temperature detected by the heat exchanger thermistor.

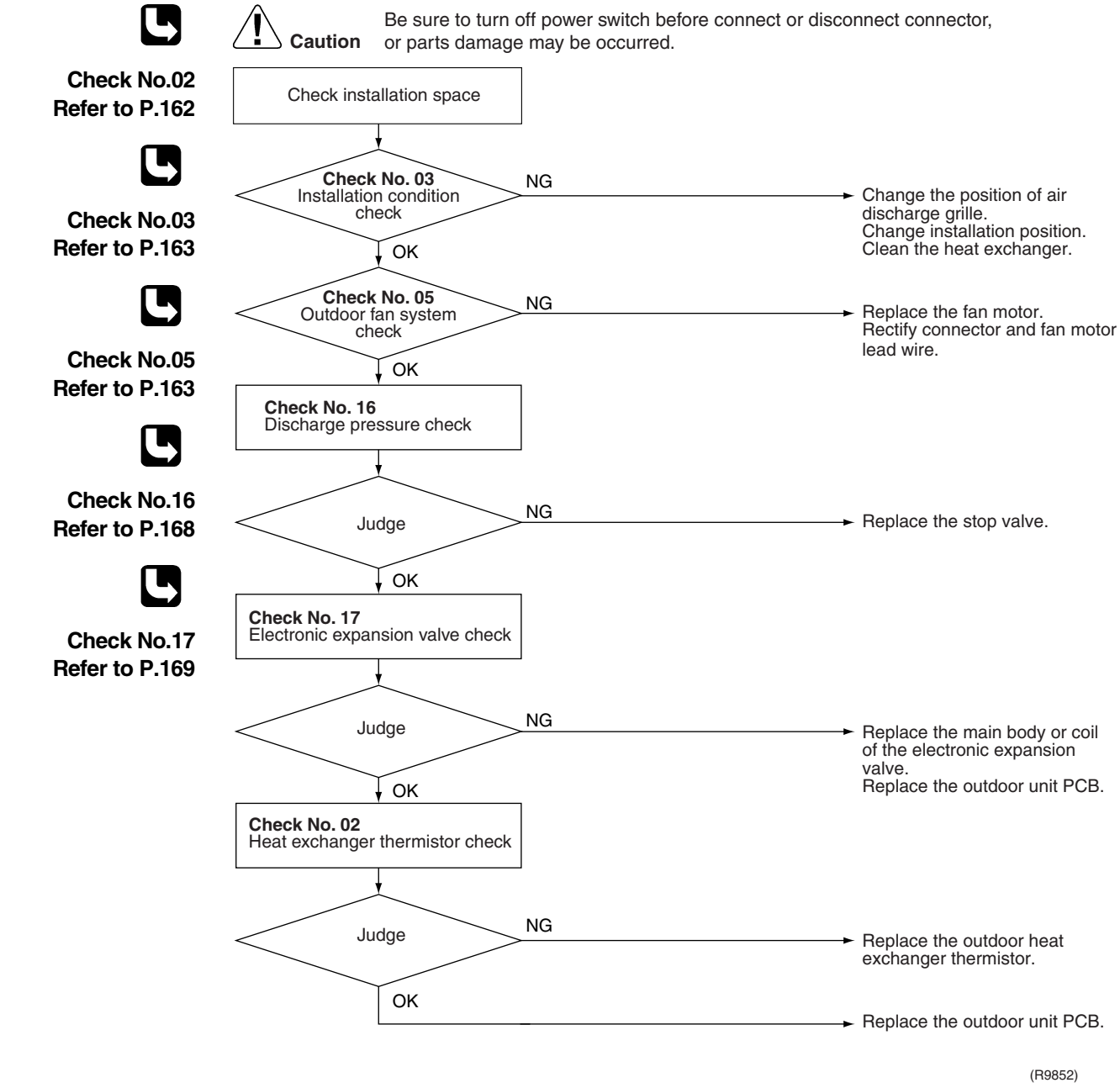
Malfunction Decision Conditions

- Activated when the temperature being sensed by the heat exchanger thermistor rises above 65°C.
- Deactivated when the temperature drops below 53°C.

Supposed Causes

- Insufficient installation space
- Defective outdoor fan
- Defective electronic expansion valve
- Defective heat exchanger thermistor
- Defective outdoor unit PCB
- Defective stop valve

Troubleshooting



(R9852)

2.23 Compressor Sensor System Abnormality

Remote Controller Display	H0
Outdoor Unit LED Display	A◑ 5◑ (-)
Method of Malfunction Detection	Fault condition is identified by DC current which is detected before compressor startup.
Malfunction Decision Conditions	■ When the DC voltage is 50 V or less.
Supposed Causes	■ Defective PCB ■ Harness disconnection / defective connection

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Replace the outdoor unit PCB.

2.24 Damper Abnormality

Remote Controller Display

H1

Outdoor Unit LED Display

A◑ 5◑

Method of Malfunction Detection

Detected by the limit switch (LS) in the humidification unit.

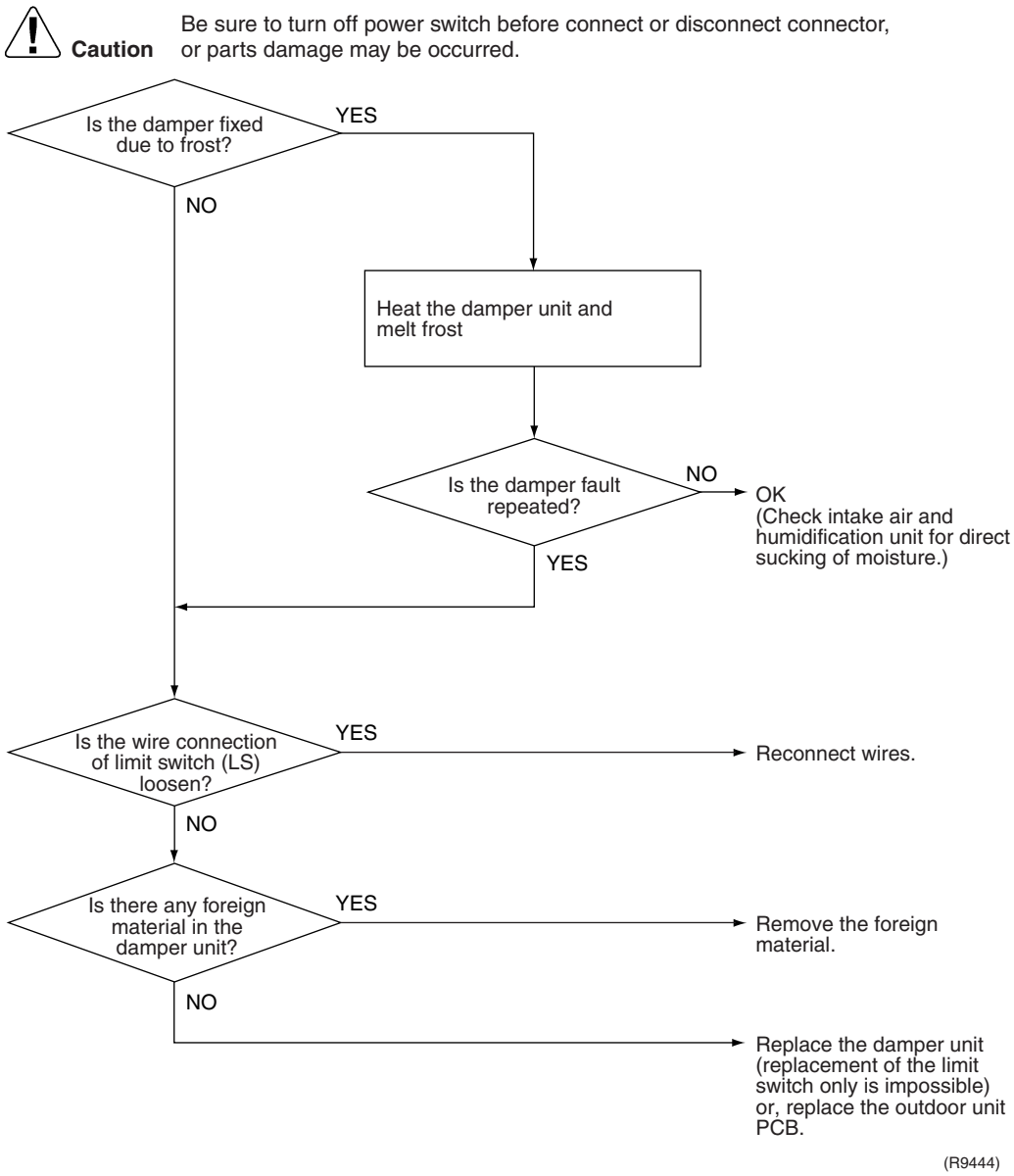
Malfunction Decision Conditions

- Limit switch does not turn on or off when the operation of humidification unit starts or finishes. For example, when turning on the power supply, when humidification operation (including air intake) starts.

Supposed Causes

- Faulty damper operation due to frost
- Faulty damper operation due to foreign material
- Limit switch fault (including improper connection)
- Defective motor for damper

Troubleshooting

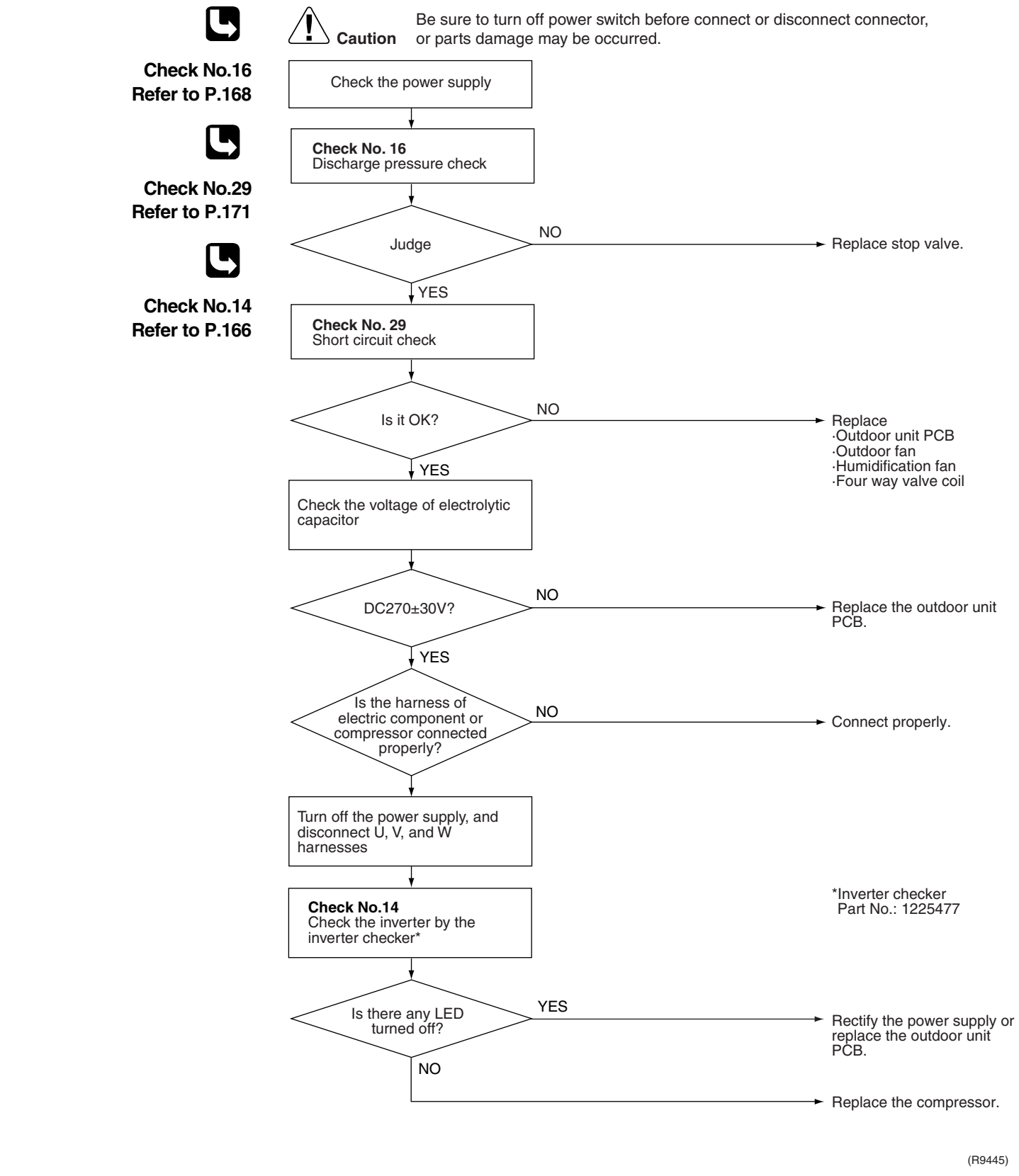


(R9444)

2.25 Position Sensor Abnormality

Remote Controller Display	H6
Outdoor Unit LED Display	A☼ 5☼ (-)
Method of Malfunction Detection	Startup failure of the compressor is identified by rpm information of the compressor and by electric component position detector.
Malfunction Decision Conditions	■ When the compressor does not run for 15 sec. after receiving operation start command ■ The machine shuts down if the fault occurs 16 times ■ Clear condition: The compressor continuously runs for 10 min. without fault
Supposed Causes	■ Detection error due to disconnection of compressor harness ■ Startup failure due to defective compressor ■ Startup failure due to defective outdoor unit PCB ■ Startup failure due to closed stop valve ■ Input voltage fault

Troubleshooting



(R9445)

2.26 DC Voltage / DC Current Sensor Abnormality

Remote Controller Display

H8

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

DC voltage or DC current sensor system abnormality is identified based on the compressor operation frequency and the input current detected by the product of DC current and DC voltage.

Malfunction Decision Conditions

When the compressor operation frequency is more than 56 Hz (40 class) or 40 Hz (50 class), and when the input current is less than 0.25 A
(Input current is below 0.5 A)

- The machine shuts down when the fault occurs 4 times.
- Fault counter will be reset to zero if the machine will not stop during accumulated compressor operation time of 60 min. after restored from fault conditions.

Supposed Causes

- Defective outdoor unit PCB
- Defective current transformer

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Replace the outdoor unit PCB.

2.27 Thermistor or Related Abnormality (Outdoor Unit)

Remote Controller Display

P4, J3, J6, J8, J9, H9

Outdoor Unit LED Display

A 5 -

Method of Malfunction Detection

This fault is identified based on the thermistor input voltage to the microcomputer.
A thermistor fault is identified based on the temperature detected by each thermistor.

Malfunction Decision Conditions

When power is supplied and the thermistor input is 4.98 V or more
or when the thermistor input is 0.02 V or less for 5 sec. continuously

For J3,
“Discharge pipe thermistor < heat exchanger thermistor” is taken into consideration to identify the fault.
For J8 or J9, although the system of the corresponding room will be shut down, the outdoor unit can operate.

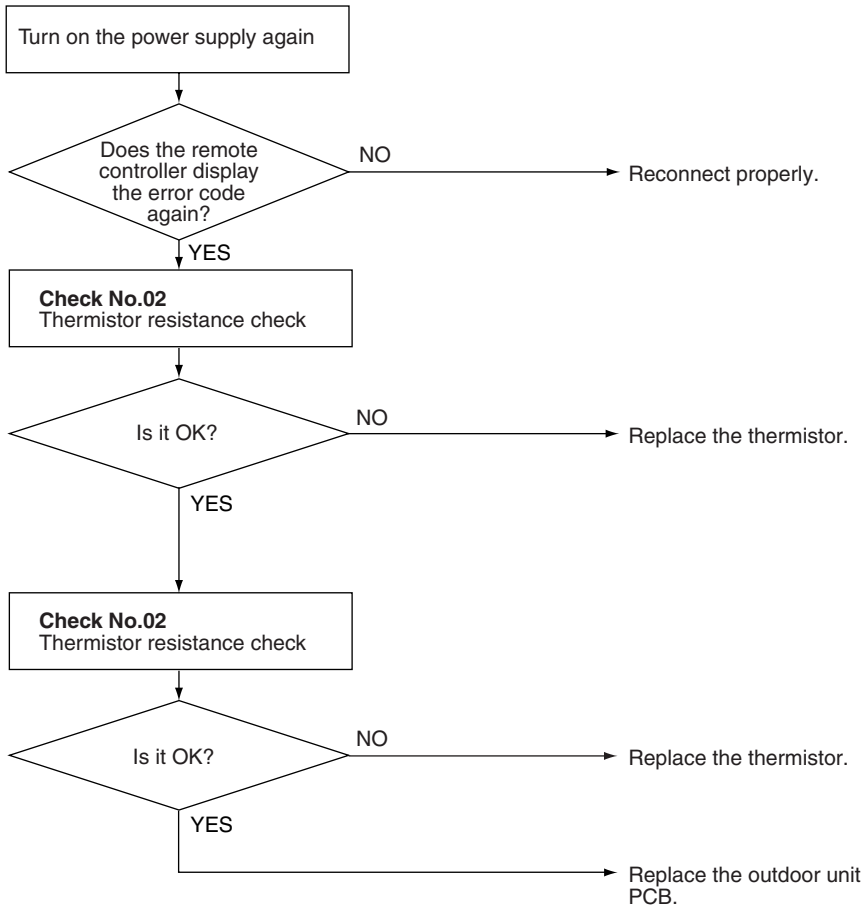
Supposed Causes

- Improper connection of connector
- Defective thermistor
- Defective indoor unit PCB
- For J3, defective heat exchanger thermistor
  (Cooling: outdoor heat exchanger thermistor, heating: indoor heat exchanger thermistor)

Troubleshooting

Check No.02
Refer to P.162

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9446)

P4 : Radiation fin thermistor
J3 : Discharge pipe thermistor
J6 : Outdoor heat exchanger thermistor
J8 : Liquid pipe thermistor
J9 : Gas pipe thermistor
H9 : Outdoor air thermistor

2.28 Abnormal Temperature in Electrical Box

Remote Controller Display	L3
Outdoor Unit LED Display	A☼● 5 -
Method of Malfunction Detection	Temperature rise in the electrical box is identified based on the temperature of the radiation fin detected by the fin thermistor with the compressor off.
Malfunction Decision Conditions	■ With the compressor off, the radiation fin temperature is above 80°C. ■ The error is cleared when the temperature drops below 70°C.
Supposed Causes	■ Fin temperature rise due to defective outdoor fan ■ Fin temperature rise due to short circuit ■ Detection error due to defective fin thermistor ■ Detection error due to improper connection of connector ■ Detection error due to defective outdoor unit PCB

Troubleshooting

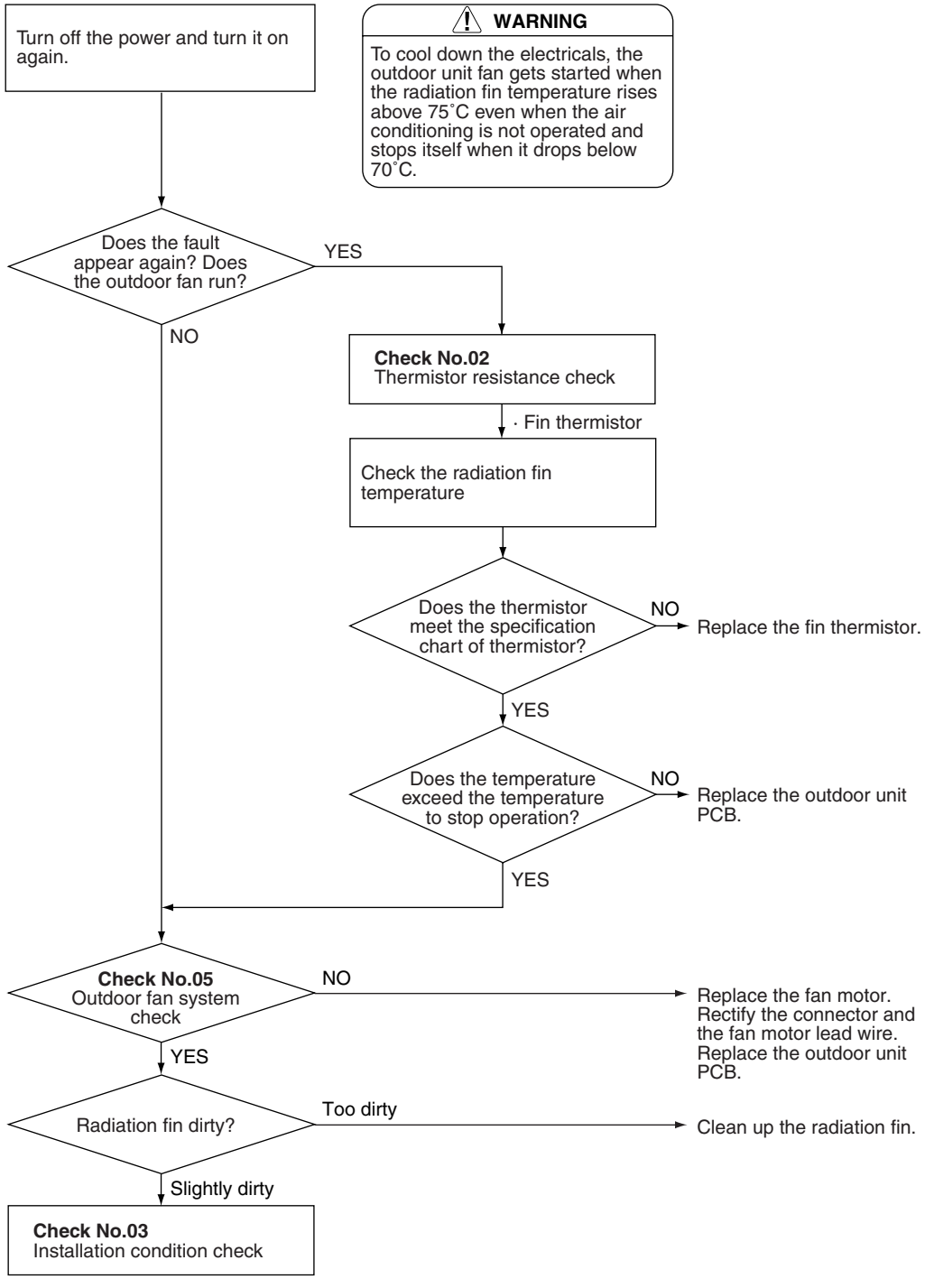
Check No.02
Refer to P.162

Check No.03
Refer to P.163

Check No.05
Refer to P.163

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

(Note on resetting power supply)
To reset the machine, power off status need to continue at least 30 sec.



(R9447)

2.29 Temperature Rise in Radiation Fin

Remote Controller Display

L4

Outdoor Unit LED Display

A☼ 5☼

Method of Malfunction Detection

Temperature rise in the radiation fin is identified based on the temperature of the radiation fin detected by the fin thermistor with the compressor on.

Malfunction Decision Conditions

- The compressor stops when the radiation fin temperature is 86 °C or more. (Fault condition is cleared when the radiation fin temperature is below 72 °C.)
- Shut down when the error repeats 255 times
- Clear condition : Continuous operation for 60 minutes

Supposed Causes

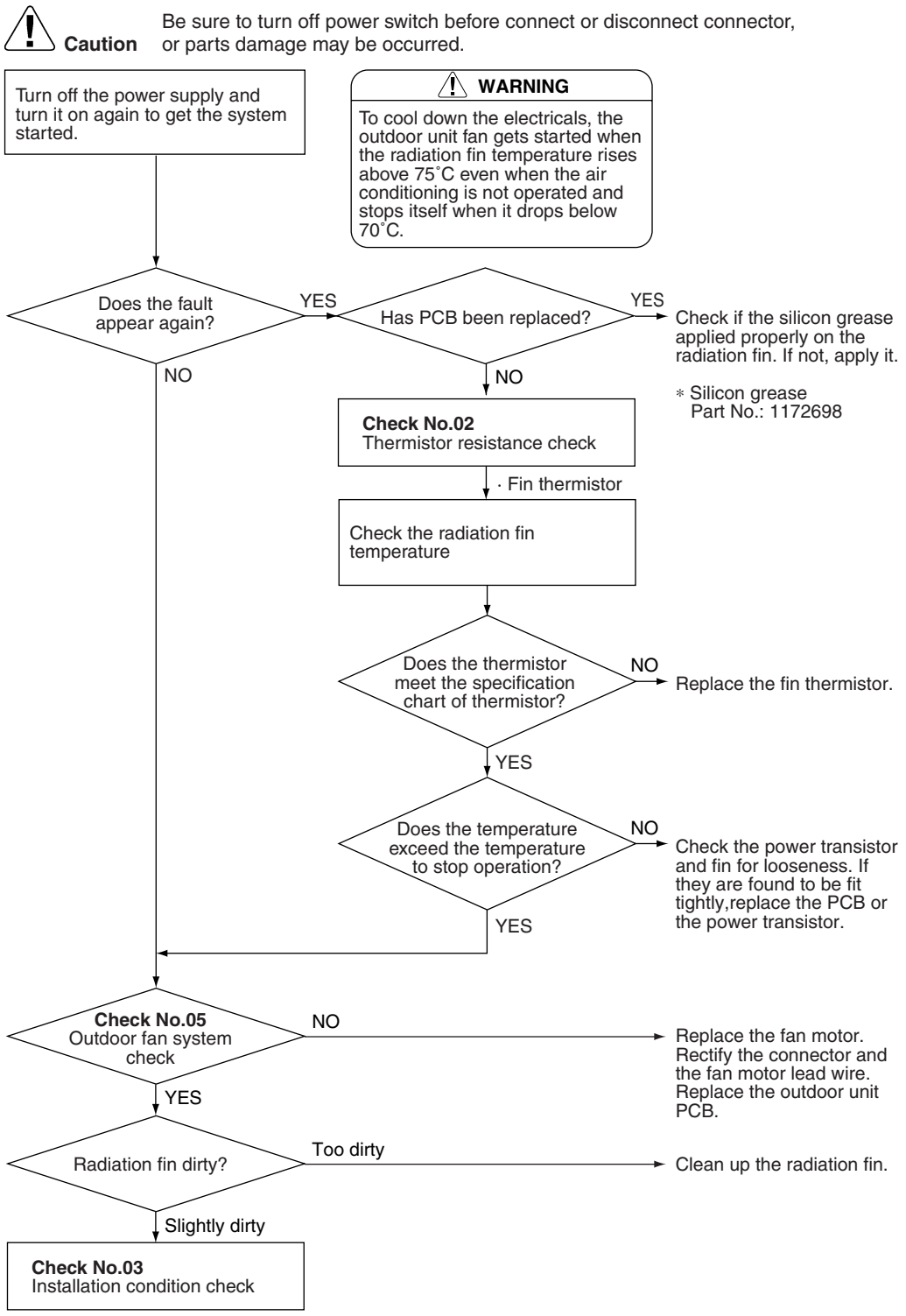
- Fin temperature rise due to defective outdoor fan
- Fin temperature rise due to short circuit
- Detection error due to defective fin thermistor
- Detection error due to improper connection of connector
- Detection error due to defective outdoor unit PCB
- Silicon grease is not applied properly on the heat radiation fin after replacing outdoor unit PCB

Troubleshooting

Check No.02
Refer to P.162

Check No.03
Refer to P.163

Check No.05
Refer to P.163



(R9448)

Note: Refer to “1.3 Application of Silicon grease to a power transistor and a diode bridge” on P. xxx.

2.30 Output Overcurrent

Remote Controller Display

L5

Outdoor Unit LED Display

A☼ 5☼

Method of Malfunction Detection

An output overcurrent is detected by checking the current that flows in the inverter DC section.

Malfunction Decision Conditions

- A position signal error occurs while the compressor is running.
- A speed error occurs while the compressor is running.
- The machine shuts down when the signal of output overcurrent is sent 8 times from the output overcurrent detection circuit to the microcomputer.
- Clear condition: The machine continuously runs for about 11 min. (without fault)

Supposed Causes

- Overcurrent due to defective power transistor
- Overcurrent due to wrong internal wiring
- Overcurrent due to abnormal supply voltage
- Overcurrent due to defective PCB
- Detection error due to defective PCB
- Overcurrent due to closed stop valve
- Overcurrent due to defective compressor
- Overcurrent due to poor installation condition

Troubleshooting

Check No.03
Refer to P.163

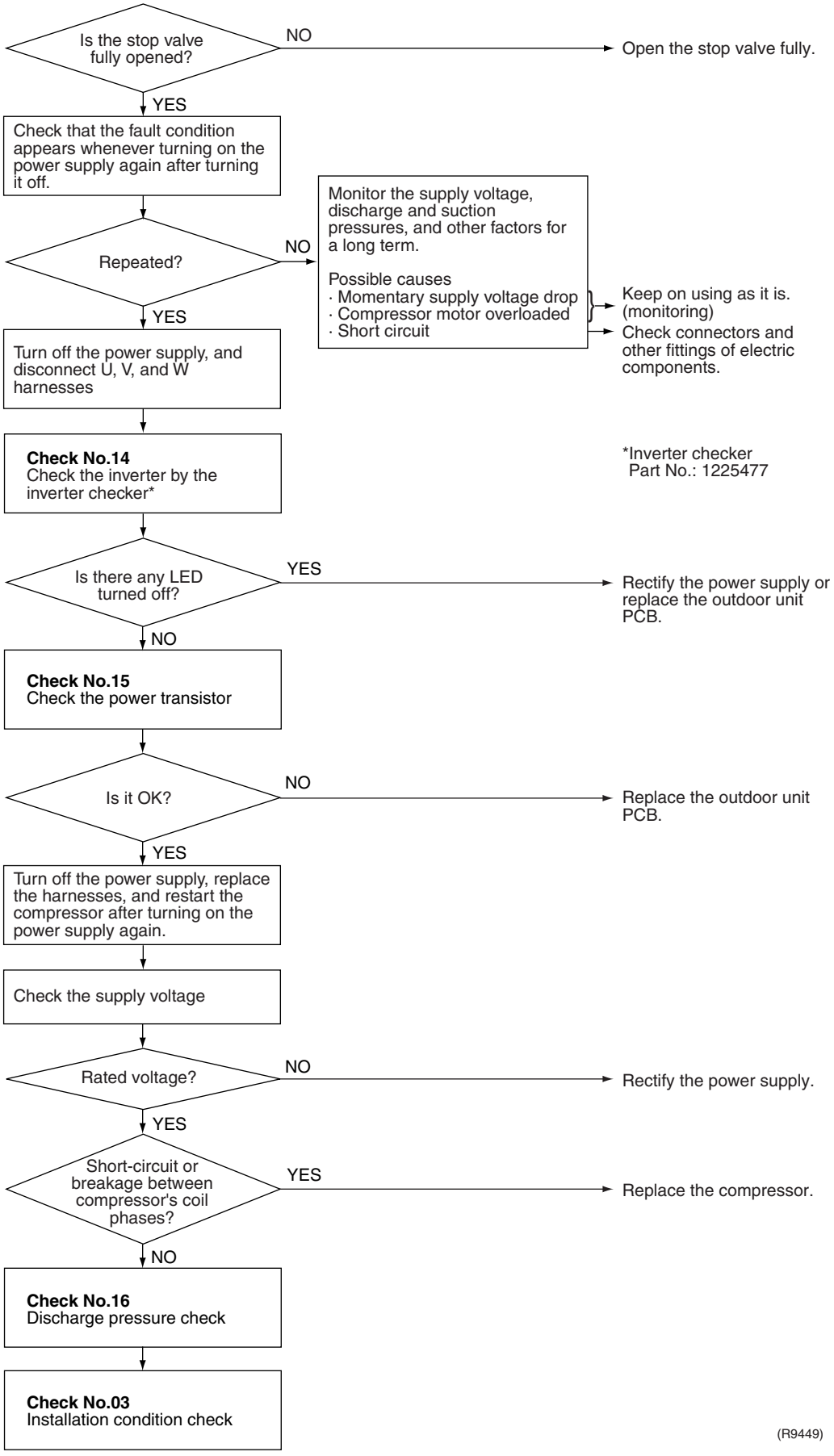
Check No.14
Refer to P.166

Check No.15
Refer to P.167

Check No.16
Refer to P.168

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

*Output overcurrent may caused by improper wiring inside the machine. If the machine stops due to output overcurrent after connecting or disconnecting wires to replace part, check wiring for proper connection.



(R9449)

2.31 Insufficient Gas

Remote Controller Display

U0

Outdoor Unit LED Display

A☼ 5☼ (-)

Method of Malfunction Detection

Gas shortage detection I:
Gas shortage is detected by checking the input current value and the compressor running frequency. If the gas is short, the input current is smaller than the normal value.

Gas shortage detection II:
Gas shortage is detected by checking the discharge temperature and the opening of the electronic expansion valve. If the gas is short, the discharge temperature tends to rise.

Malfunction Decision Conditions

Gas shortage detection I:
40 class
The following conditions continue for 7 minutes.
- Input current × input voltage ≤ 2111 / 256 × output frequency - 361 (W)
- Output frequency > 51 (Hz)

50 class
The following conditions continue for 7 minutes.
- Input current × input voltage ≤ 4628 / 256 × output frequency - 608 (W)
- Output frequency > 48 (Hz)

Gas shortage detection II:
The following conditions continue for 80 seconds.
- Target opening of the electronic expansion valve ≥ 450 (pulse)
- Discharge temperature > 128 / 128 × target discharge temperature +20 (°C)

If a gas shortage error takes place 4 times straight, the system will be shut down. The error counter will reset itself if this or any other error does not occur during the following 60-minute compressor running time (total time).

Supposed Causes

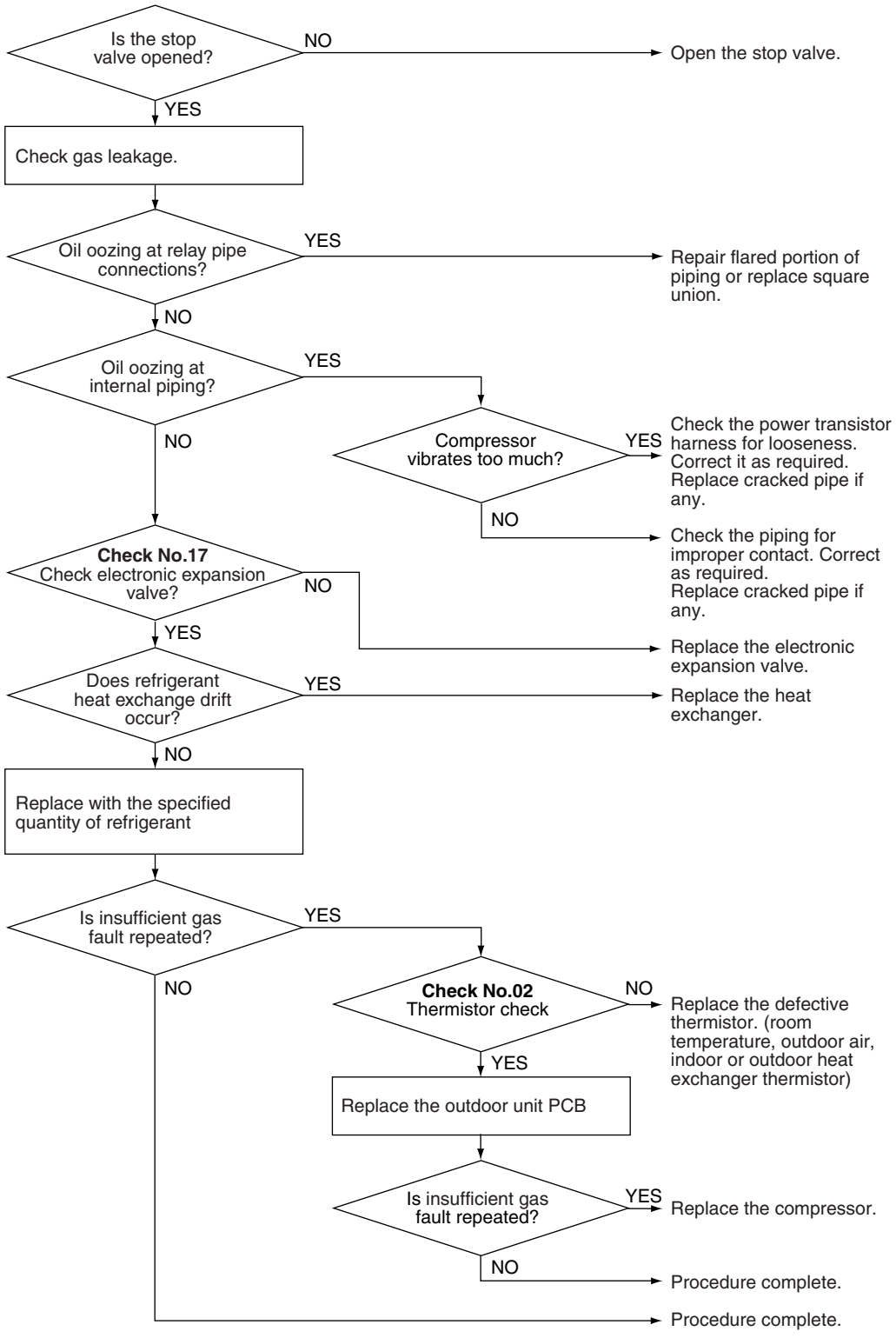
- Refrigerant shortage (refrigerant leakage)
- Refrigerant heat exchanger drift
- Poor compression performance of compressor
- Closed stop valve
- Defective electronic expansion valve

Troubleshooting

Check No.02
Refer to P.162

Check No.17
Refer to P.169

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9450)

2.32 Over Voltage Protection / Low Voltage Protection

Remote Controller Display

U2

Outdoor Unit LED Display

A◑ 5◑ (-)

Method of Malfunction Detection

Detect an abnormal increase or drop of voltage by the detection circuit or DC voltage detection circuit.

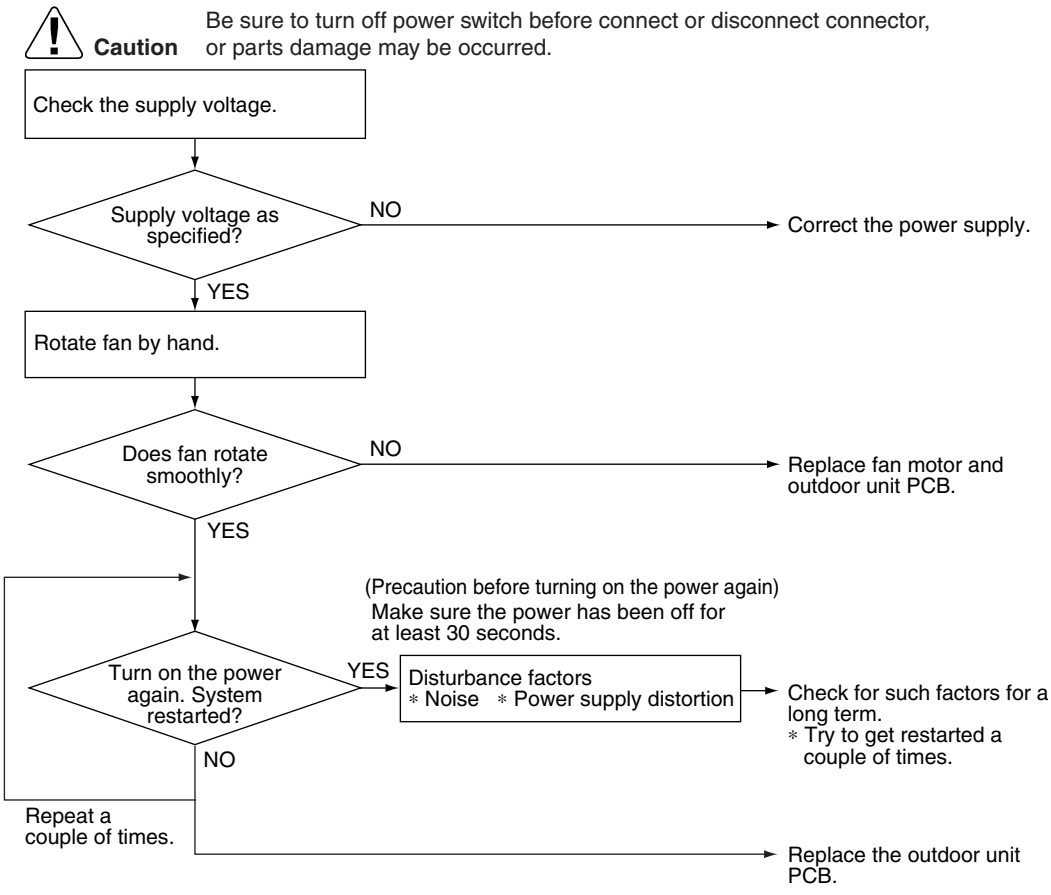
Malfunction Decision Conditions

- When an overcurrent signal is sent to the microcomputer from the overcurrent detection circuit, or the voltage detected by DC voltage detection circuit is less than 150 V and that voltage continues for about 0.1 sec.
- The machine shuts down if the fault conditions occurs 255 times
- Fault counter is reset when the machine continuously runs for 60 min. without fault.

Supposed Causes

- Abnormal supply voltage, momentary power failure
- Defective overcurrent detector or defective DC voltage detection circuit
- Failure in PAM controlled parts
- Short circuit inside the fan motor winding.

Troubleshooting



(R9451)

2.33 Outdoor Unit PCB Abnormality or Communication Circuit Abnormality

Remote Controller Display

U4

Outdoor Unit LED Display

A☼ 5 -

Method of Malfunction Detection

Detect within the programme of the microcomputer that the programme is in good running order.

Malfunction Decision Conditions

1. When the programme of the microcomputer is in bad running order.
2. When indoor-outdoor unit signal transmission can not be performed for more than 15 sec.
3. When zero-cross signal can not be detected for more than 10 sec.

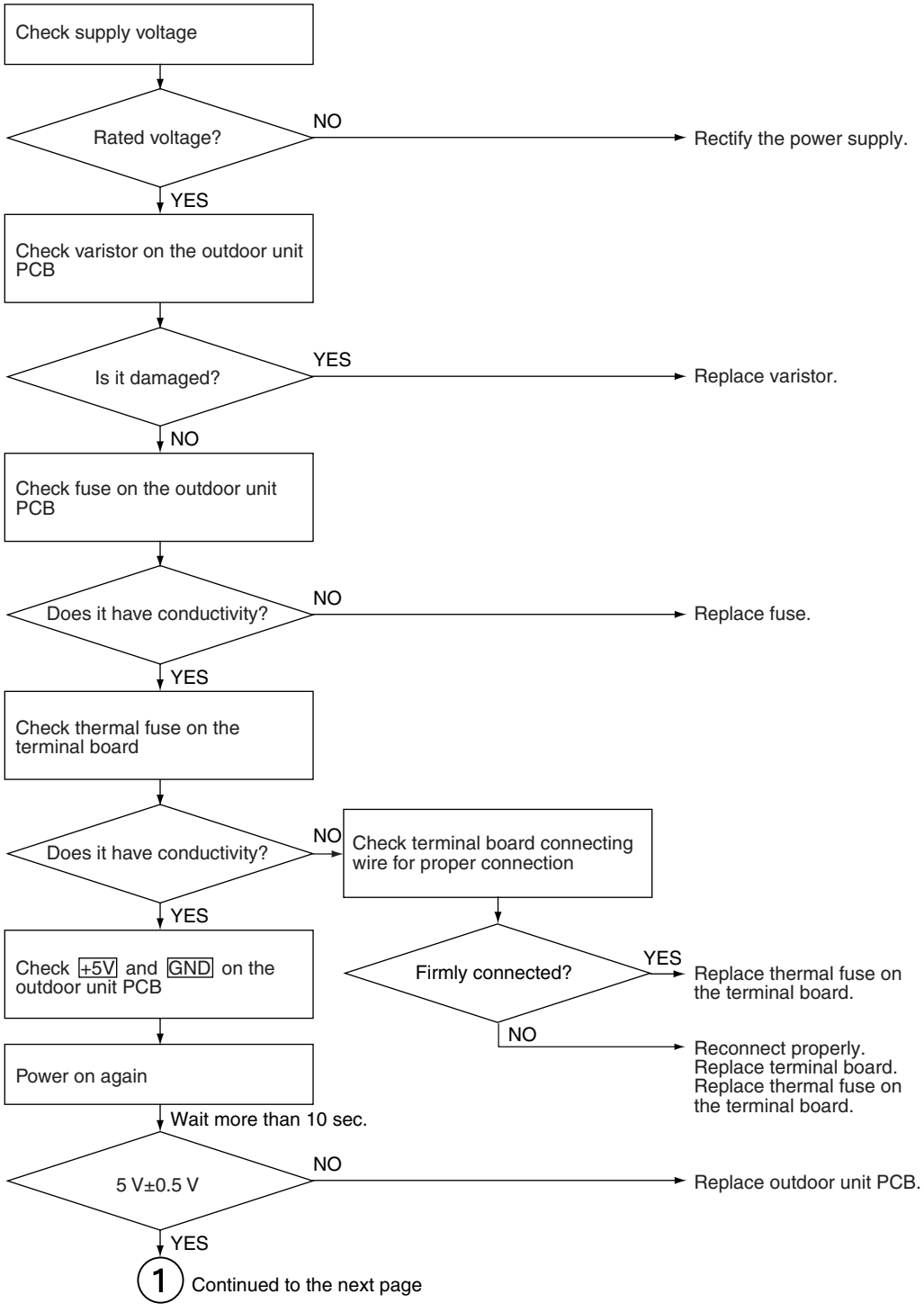
Supposed Causes

- Display disabled due to power supply fault
- Communication circuit fault in outdoor unit PCB
- Out of control of microcomputer caused by external factors
  - Noise
  - Momentary voltage drop
  - Momentary power loss
- Defective outdoor unit PCB
- Defective thermal fuse in outdoor terminal board

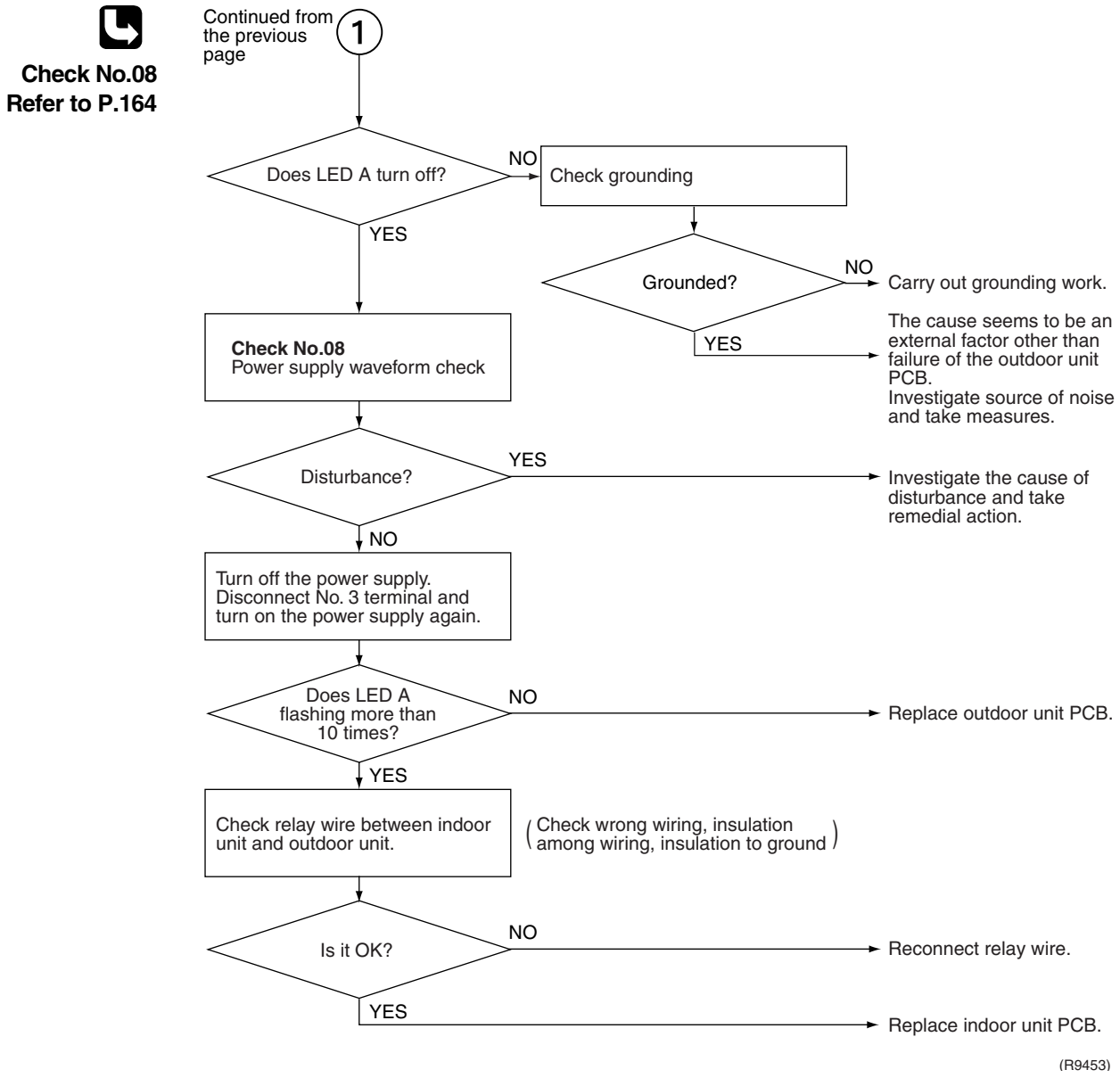
Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

Check indoor unit also, because a comunication circuit fault may be caused by the problem related to the indoor unit.



(R9452)

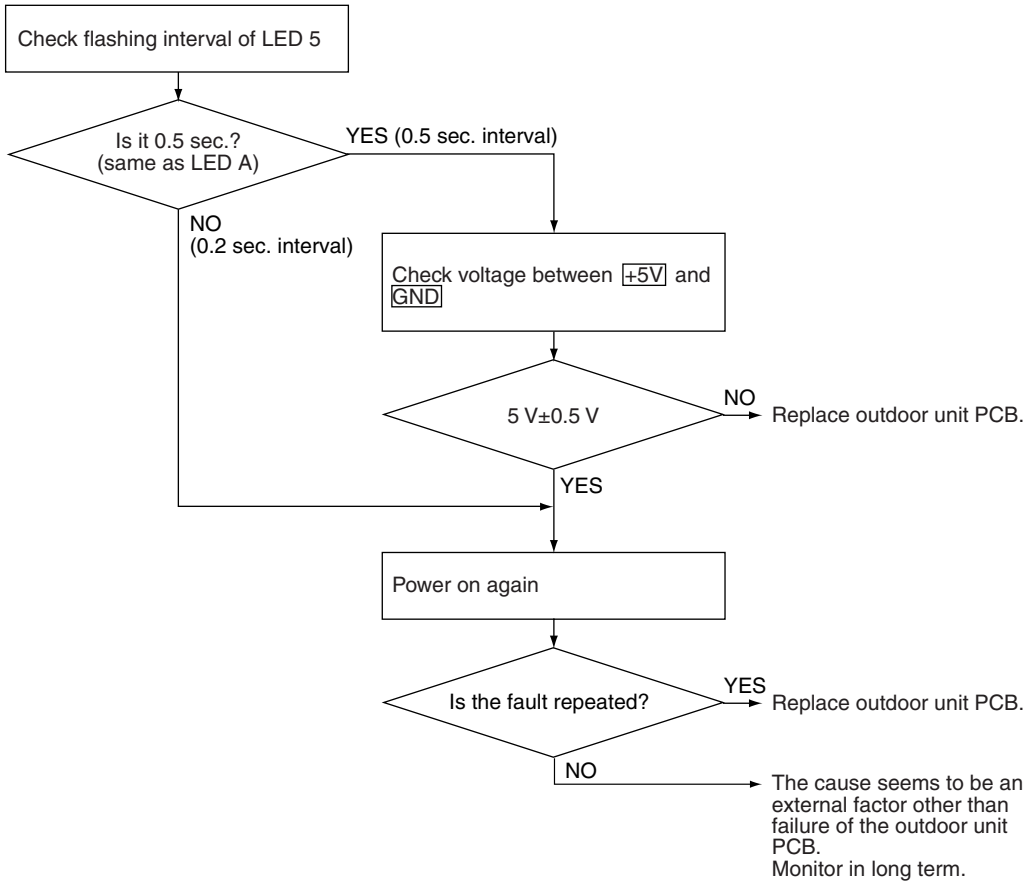

Check No.08
Refer to P.164
Continued from the previous page
1
Does LED A turn off?
NO
Check grounding
YES
Grounded?
NO
Carry out grounding work.
YES
The cause seems to be an external factor other than failure of the outdoor unit PCB.
Investigate source of noise and take measures.
Check No.08
Power supply waveform check
Disturbance?
YES
Investigate the cause of disturbance and take remedial action.
NO
Turn off the power supply.
Disconnect No. 3 terminal and turn on the power supply again.
Does LED A flashing more than 10 times?
NO
Replace outdoor unit PCB.
YES
Check relay wire between indoor unit and outdoor unit.
(Check wrong wiring, insulation among wiring, insulation to ground)
Is it OK?
NO
Reconnect relay wire.
YES
Replace indoor unit PCB.
(R9453)

2.34 Signal Transmission Error on Outdoor Unit PCB

Remote Controller Display	U7
Outdoor Unit LED Display	A☼ 5☼ (-)
Method of Malfunction Detection	Communication error between microcomputer mounted on the main body and inverter.
Malfunction Decision Conditions	■ When the data sent from the microcomputer of the inverter can not be received successively for 9 sec., the machine shuts down. ■ Fault counter is reset when the data from the microcomputer of the inverter can be successfully received.
Supposed Causes	■ Defective outdoor unit PCB ■ Disconnection or breakage of harness between PCBs

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9454)

2.35 Fan Motor System Abnormality / Fan Lock

Remote Controller Display

P9

Outdoor Unit LED Display

A◑ 5◑

Method of Malfunction Detection

During humidification fan motor running, fan motor system abnormality is identified based on the fan speed (rpm) detected by Hall IC.

Malfunction Decision Conditions

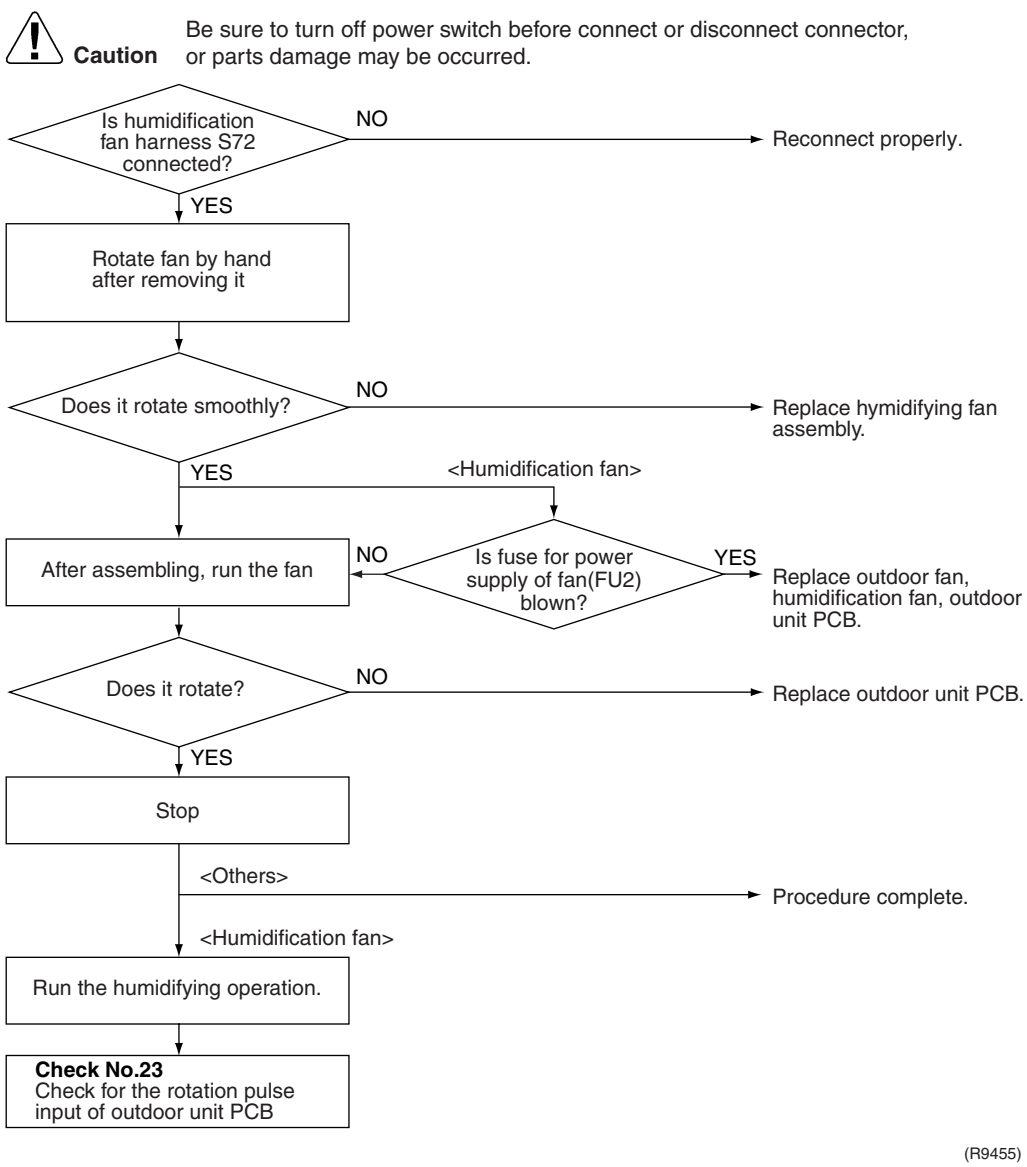
<Humidification fan>
When fan speed does not reach 100 rpm within 12 sec. after fan motor start up.

Supposed Causes

<Humidification fan>
- Defective motor (Hall IC) for humidification fan
- Breakage of relay harness or loose connector
- Detection fault of fan speed due to defective outdoor unit PCB

Troubleshooting

Check No.23
Refer to P.170



(R9455)

2.36 Heater Wire Abnormality

Remote Controller Display

P8

Outdoor Unit LED Display

A 5

Method of Malfunction Detection

A fault is identified when the outlet temperature of humidification fan does not reach a certain temperature within a given time after the heater turned on.

Malfunction Decision Conditions

When the temperature detected by the thermistor is lower than the outdoor temperature (at heater turned off) + 5°C, and this condition continues for 30 min.

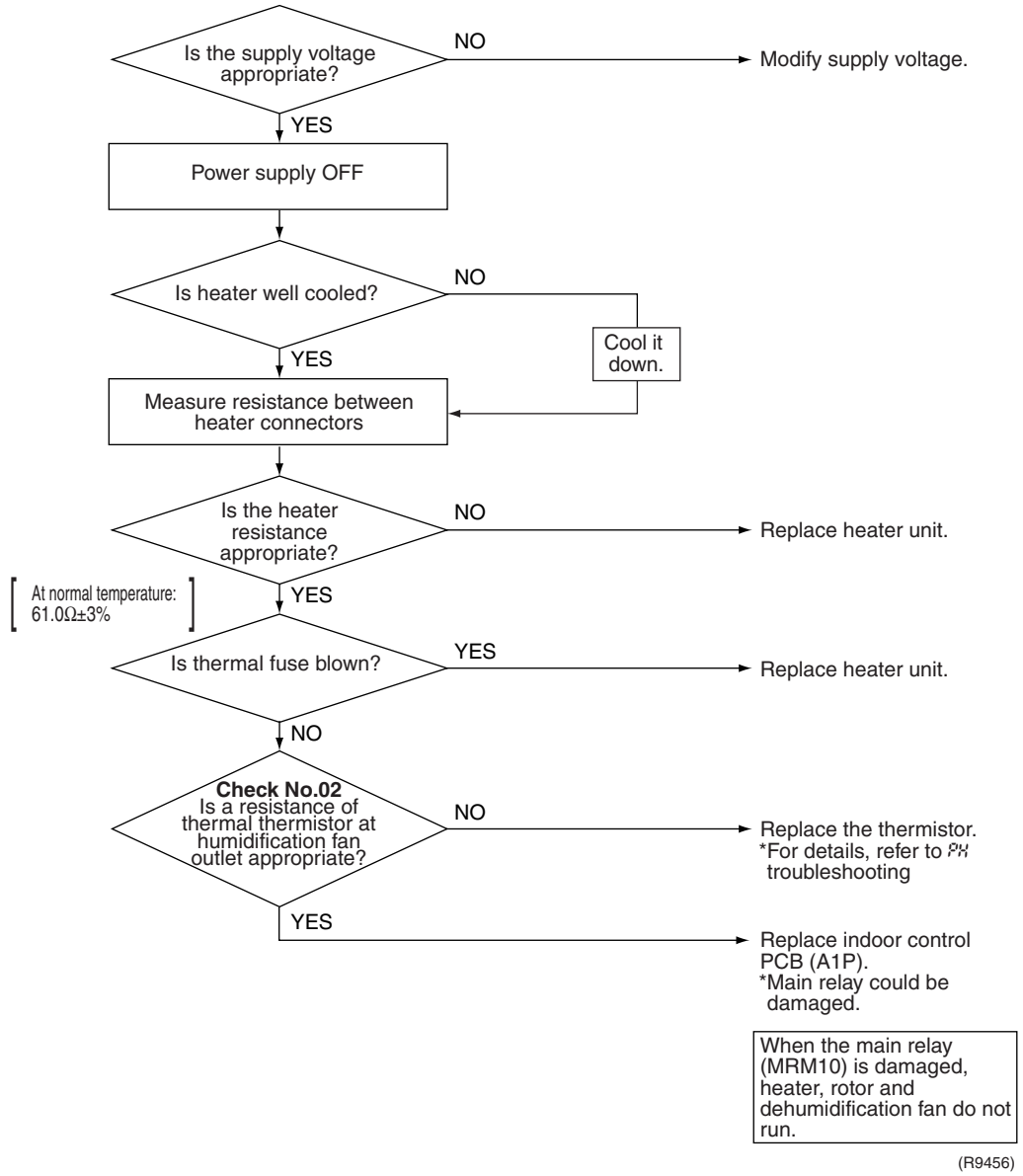
Supposed Causes

- Breakage of heater filament
- Breakage of heater harness
- Abnormal temperature detected by outdoor temperature thermistor
- Abnormal temperature detected by humidification fan outlet thermistor
- Damaged main relay
- Blown thermal fuse
- Damaged heater control part
- Extremely low voltage

Troubleshooting

Check No.02
Refer to P.162

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



(R9456)

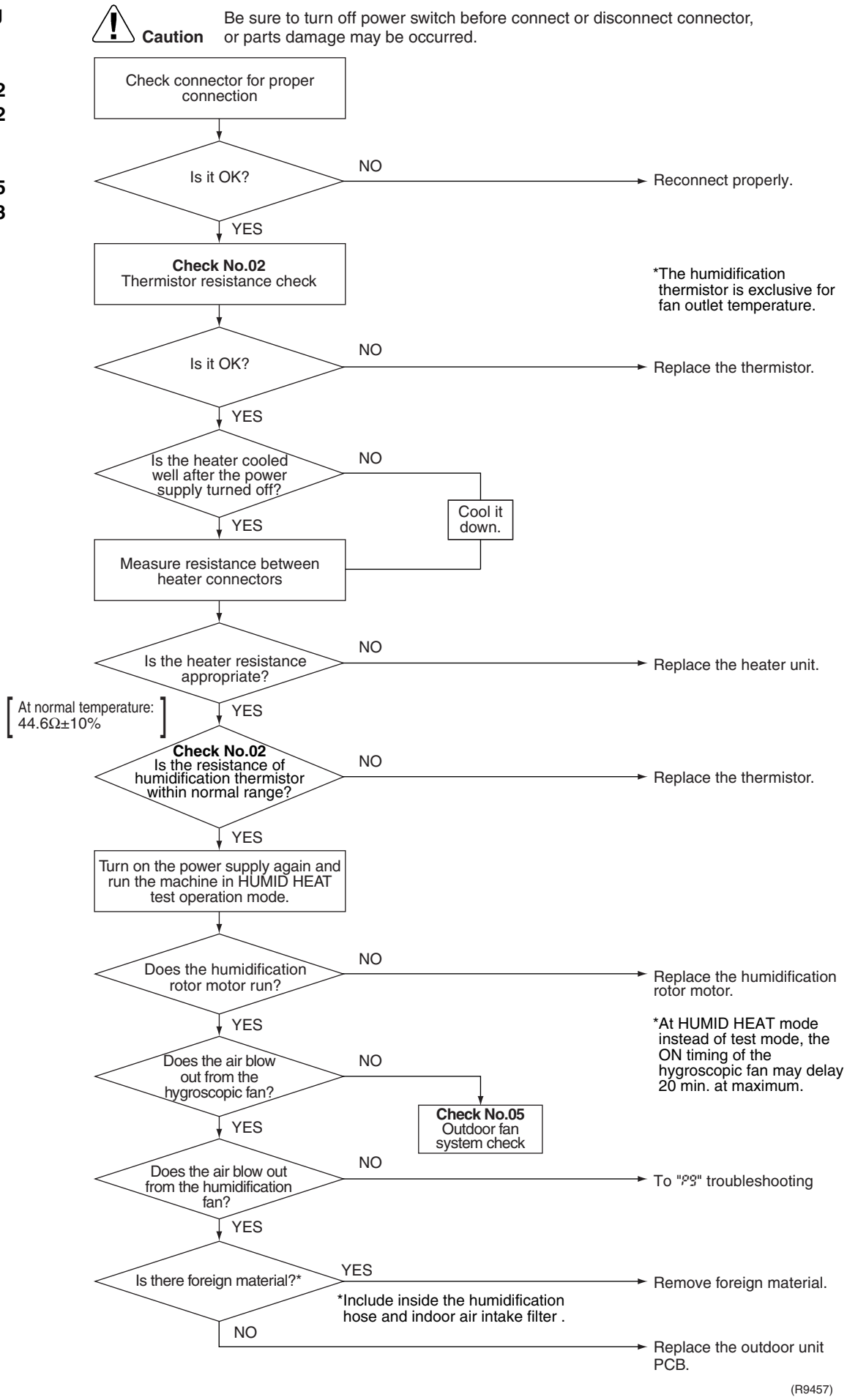
2.37 Humidification Fan Outlet Thermistor Abnormality / Heater Temperature Abnormality

Remote Controller Display	PH
Outdoor Unit LED Display	A☼ 5☼
Method of Malfunction Detection	Detect short circuit and wire breakage of humidification thermistor. When humidification fan outlet temperature becomes high, this condition is identified as an abnormal heater temperature fault.
Malfunction Decision Conditions	When power is supplied and the thermistor input is 4.92 V or more, or 0.06 V or less. If the humidification fan outlet temperature is more than 90°C, this condition is identified as abnormal heater temperature fault.
Supposed Causes	■ Short circuit and wire breakage of humidification thermistor ■ Disconnected connector ■ Heater has a high power ■ Thermistor temperature detection error ■ Defective rotor motor ■ Defective hygroscopic fan motor ■ Defective heater control part ■ Defective humidification fan

Troubleshooting

Check No.02
Refer to P.162

Check No.05
Refer to P.163



(R9457)

2.38 Lights-out of Microcomputer Status Lamp

Remote Controller Display

—

Outdoor Unit LED Display

A● 5● (-)

Method of Malfunction Detection

When a microcomputer fault is detected, LED A or LED 5 turns off.

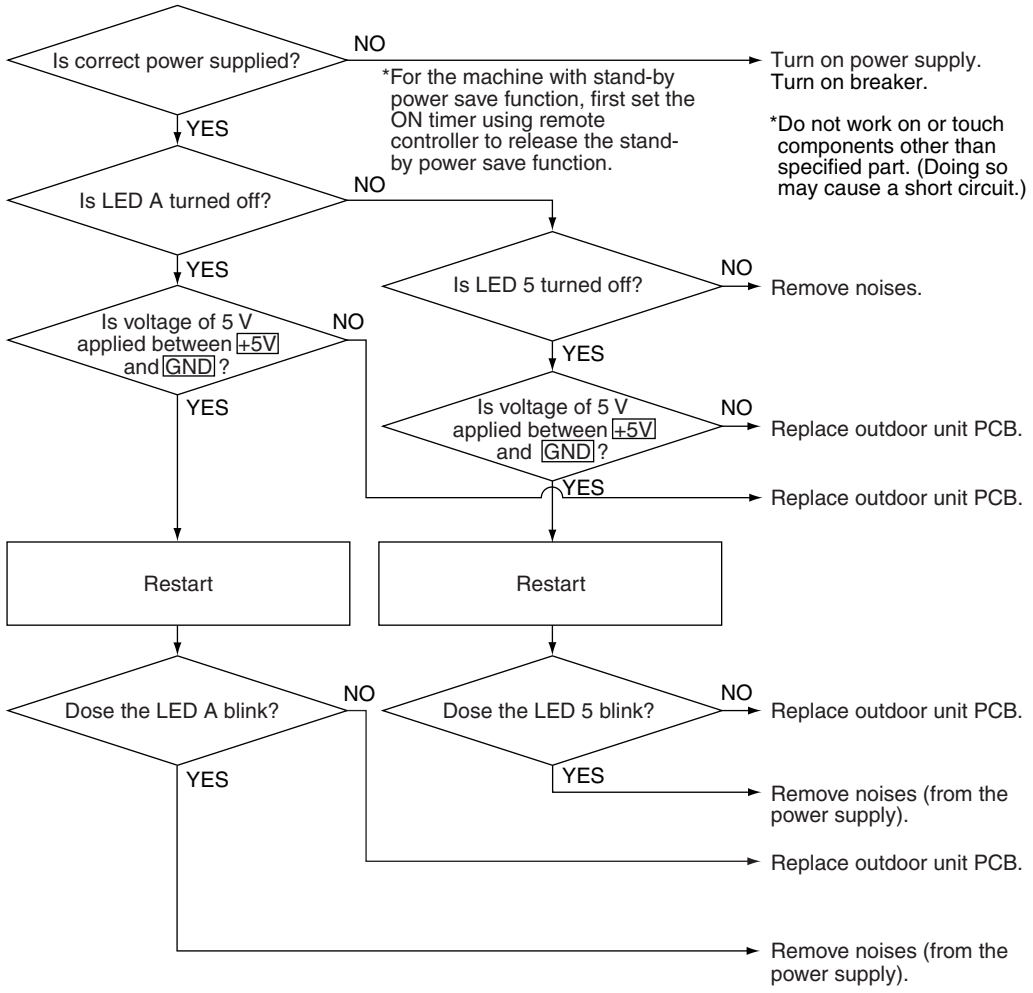
Malfunction Decision Conditions

Supposed Causes

- Outdoor unit PCB is not power supplied
- Power supply failure due to noise

Troubleshooting

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.



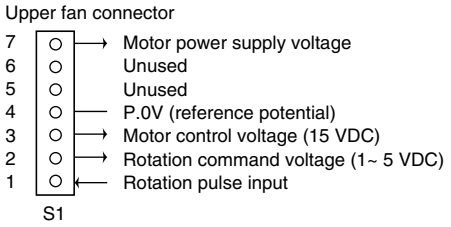
(R9458)

3. Check

3.1 Fan Motor Connector Output Check

Check No.01

1. Check connector connection.
2. Check motor power supply voltage output (pins 4-7).
3. Check motor control voltage (pins 4-3).
4. Check rotation command voltage output (pins 4-2).
5. Check rotation pulse input (pins 4-1).



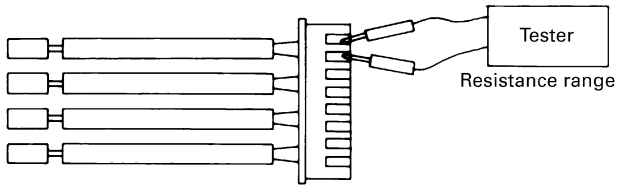
(R6940)

3.2 Thermistor Resistance Check

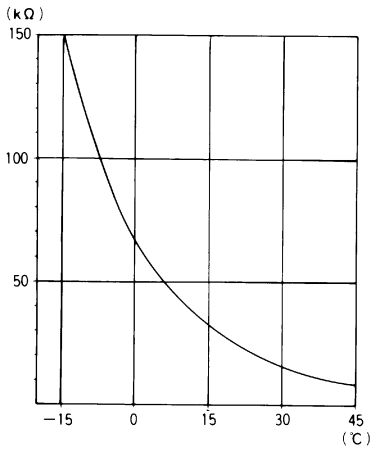
Check No.02

Remove the connectors of the thermistors on the PCB, and measure the resistance of each thermistor using tester.
The relationship between normal temperature and resistance is shown in the graph and the table below.

Thermistor Temperature (°C)	R25°C=20kΩ B=3950
–20	211.0 (kΩ)
–15	150
–10	116.5
–5	88
0	67.2
5	51.9
10	40
15	31.8
20	25
25	20
30	16
35	13
40	10.6
45	8.7
50	7.2

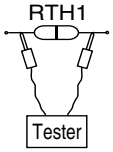


（R25＝20kΩ、B＝3950）



(R1437)

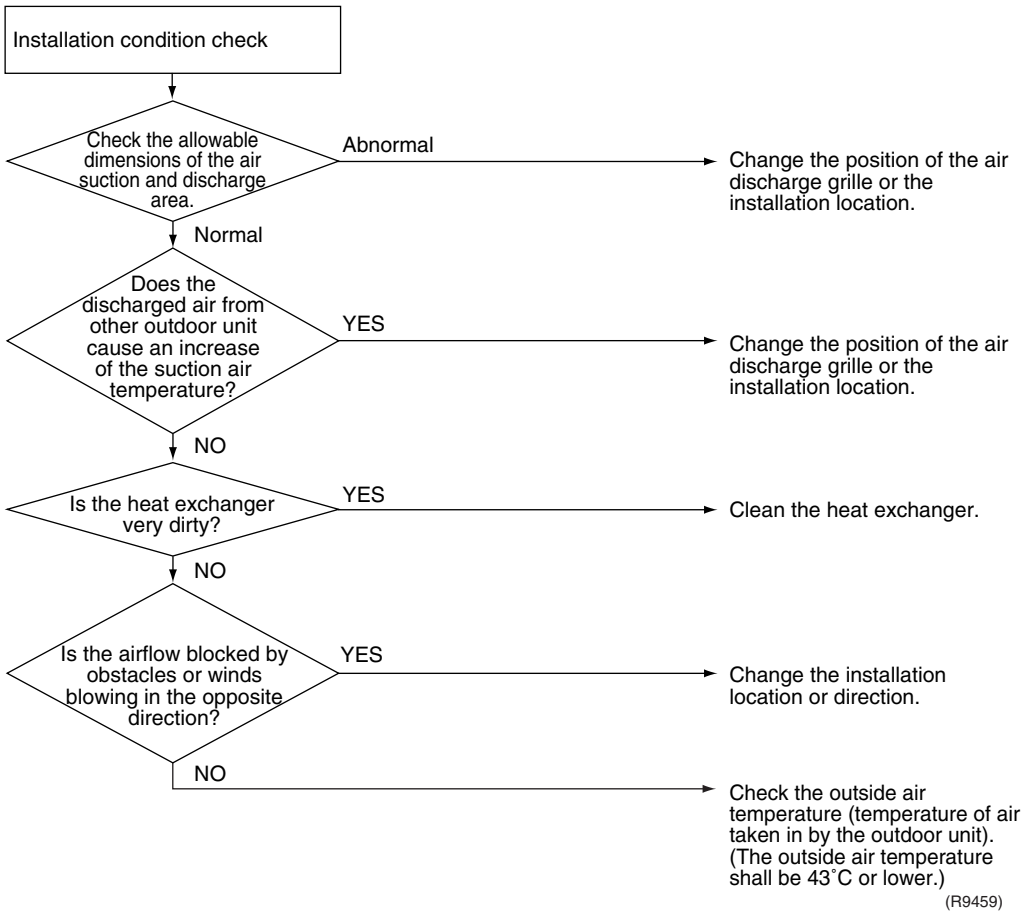
■ For the models in which the thermistor is directly mounted on the PCB.



(R3460)

3.3 Installation Condition Check

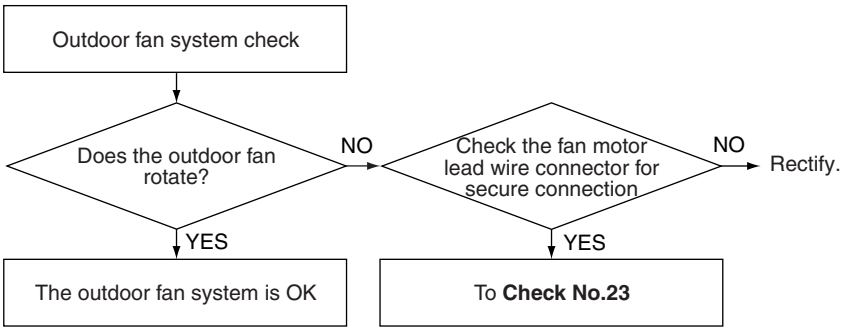
Check No.03



3.4 Outdoor Fan System Check (DC Motor)

Check No.05

Check No.23
Refer to P.170



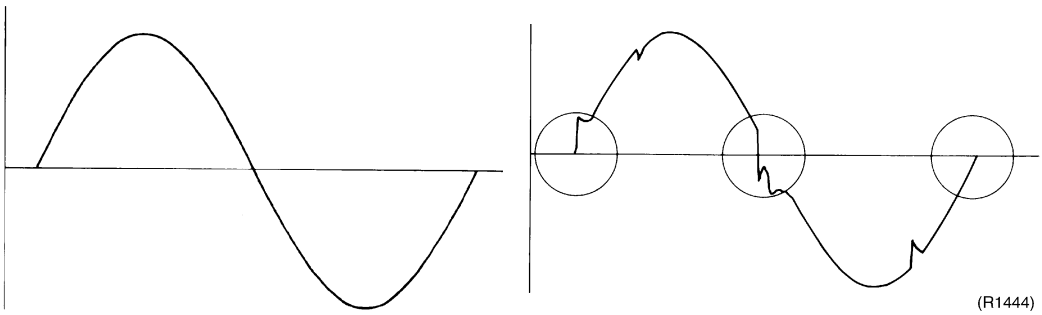
3.5 Power Supply Waveform Check

Check No.08

Check the voltage waveform between power supply terminals on the terminal board for disturbance using oscillo-tester.

- Check to see if the power supply waveform is a sine wave (Fig.1).
- Check to see if there is waveform disturbance near the zero cross (sections circled in Fig.2)

[Fig.1] [Fig.2]

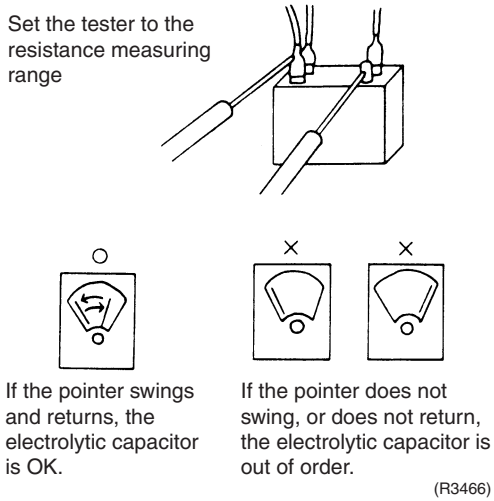


(R1736) (R1444)

3.6 Main Circuit Electrolytic Capacitor Check

Check No.11

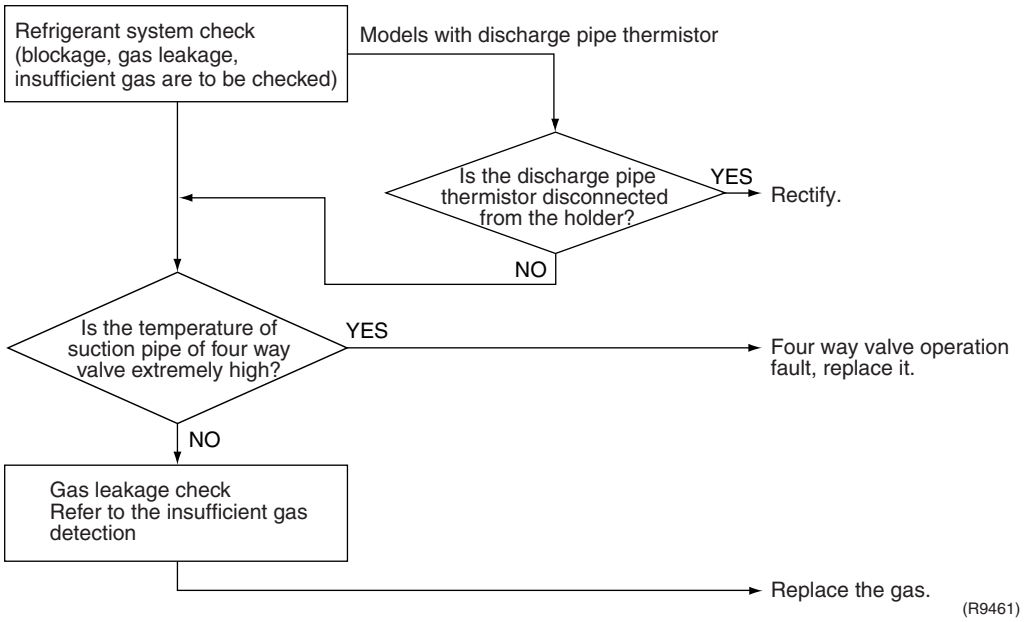
- Do not touch the live parts within 10 min. after the breaker is turned off.
- Even after that, when you touch the parts, check that there is no DC voltage with a tester.
- Check the conductivity with a tester. It is OK if the tester shows good conductivity when pins are replaced.



(R3466)

3.7 Refrigerant System Check

Check No.12



3.8 “Inverter Checker” Check

Check No.14

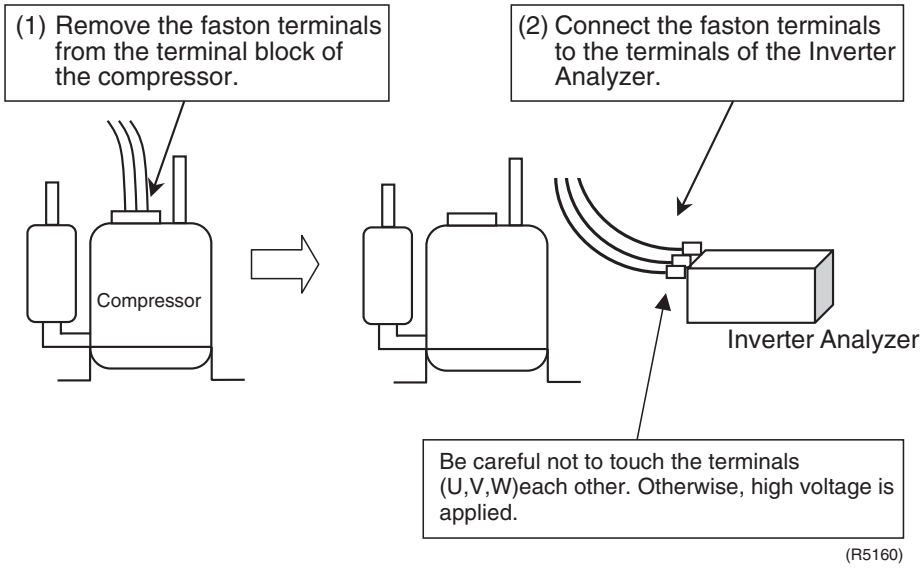
1. Characteristics

If abnormal stop occurs due to compressor startup failure or overcurrent output when using inverter unit, it is difficult to judge it results from the compressor failure or other failure (control PCB, power transistor, etc.). The inverter analyzer makes it possible to judge the cause of trouble easily and securely. (Connect this analyzer as a quasi compressor instead of compressor and check the output of inverter)

2. Operation Method

1) Be sure to turn the power off.
2) Install the Inverter Analyzer instead of a compressor.

Note: Make sure the charged voltage of the built-in smoothing electrolytic capacitor drops to 10 VDC or below before carrying out the service work.



Reference

If the connector terminal of compressor is not a faston terminal (difficult to remove the wire on the terminal), it is possible to connect a wire available on site to the unit from output side of PCB. (Do not connect it to the compressor at the same time, otherwise it may result in incorrect detection.)

■ How to activate inverter test mode

1) Turn the power on.
2) Press the 3 buttons (TEMP▲, TEMP▼, MODE) on the remote controller simultaneously.
3) Press TEMP▲ or ▼ button and select ｱﾅ.
4) Press the MODE button to enter the trial operation mode.
5) Press the MODE button and select FAN mode.
6) Press the ON/OFF button to start inverter test.

3. Diagnose method (Diagnose can be made according to 6 LEDs lighting status as follows:)

(1) When all LEDs are lit uniformly, → Compressor malfunction (to be replaced)

(2) When some of LEDs are not lit (LEDs are not lit or go off, etc.):
Check the individual power transistor. (Refer to check No.15)

* When the power transistor and control PCB are integrated :
→ Replace the control PCB.
* When the power transistor can be checked individually :
↓ Check the resistance value. (Refer to check No.15)

If NG : → The power transistor may have a failure. (Replace the power transistor).

If the power transistor is normal, check if there is any solder cracking on the filter PCB.

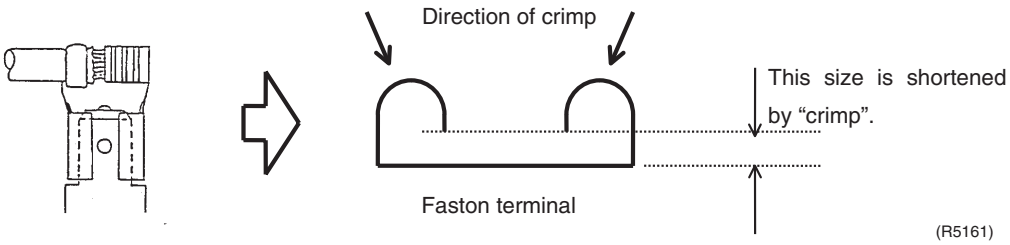
* If any solder cracking is found: → Replace the filter PCB (or repair the soldered section).
* If the filter PCB is normal: → Replace the control PCB.

Caution

① When the output frequency is low, the LED flashes slowly. As the frequency increases, the LED flashes quickly. (It looks like the LED is lit)

② If the operation is carried out with no load (the condition of the compressor is disconnected), some of units may stop operation with “CT system error” (due to no electric current) or “startup failure” (because the compressor does not turn). In this case, check if the LED is flashing during “operation” to “malfunction stop”. (Refer to the service manual of each air conditioner for checking whether the alarm LEDs for CT system, startup failure, etc. are provided or not.)

③ On completion of diagnose by this checker, be sure to re-crimp the faston terminal for resetting the system.
(Otherwise, the terminal may be burned due to loosening.)



3.9 Power Transistor Check

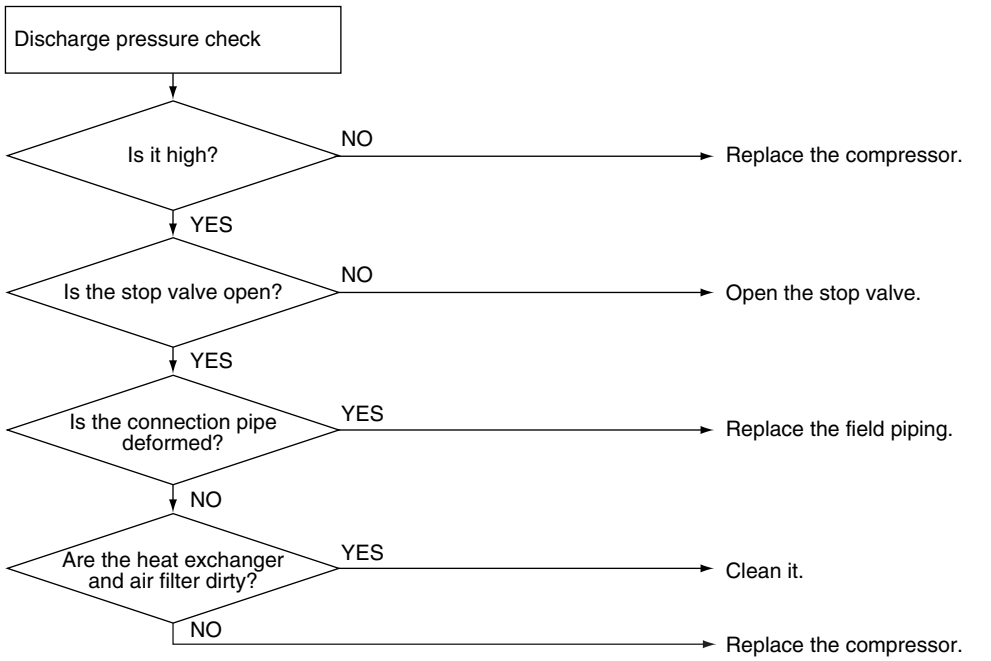
Check No.15

- Do not touch the live parts within 10 min. after the breaker is turned off.
- Even after that, when you touch the parts, check to see that supply voltage of the power transistor is less than 50 V with a tester.
- Measure resistance at connector terminal on PCB or at the relay connector.

(–) terminal of a tester	Power transistor (+)	UVW	Power transistor (–)	UVW
(+) terminal of a tester	UVW	Power transistor (+)	UVW	Power transistor (–)
Resistance in OK	several kΩ~several MΩ			
Resistance in NG	0 or ∞			

3.10 Discharge Pressure Check

Check No.16



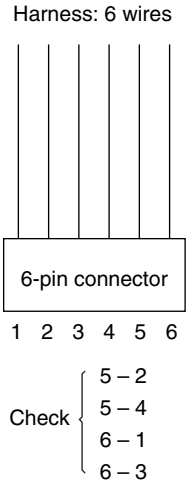
(R9683)

3.11 Electronic Expansion Valve Check

Check No.17

Check the electronic expansion valve (EV) as follows:

1. Check if the EV connector properly inserted into the control PCB. Collate the number of EV main body with that of the connector.
2. Check to see that clatter (latching sound) is heard from all of the EVs when turning on the power supply again after turning it off.
3. If there are EVs which do not sound clatter, disconnect the connectors of these EVs and check them for conductivity.



(R6028)

4. If there is no clatter (latching sound) on all of the EVs in step 2, the outdoor PCB is defective.
5. For EVs for which conductivity is established in step 3, connect the coil which sounded clatter to the EV main body which did not sound, and make sure the latching sound be heard again.
   If latching sound is heard, outdoor unit PCB is defective.
   If there is no latching sound, the EV main body is defective.

Note Latching sound varies by each valve.

3.12 Rotating Pulse Input on Outdoor Unit PCB Check

Check No.23

< For propeller fan motor or humidification fan>

Make sure voltage of 270 ± 30 V is applied.

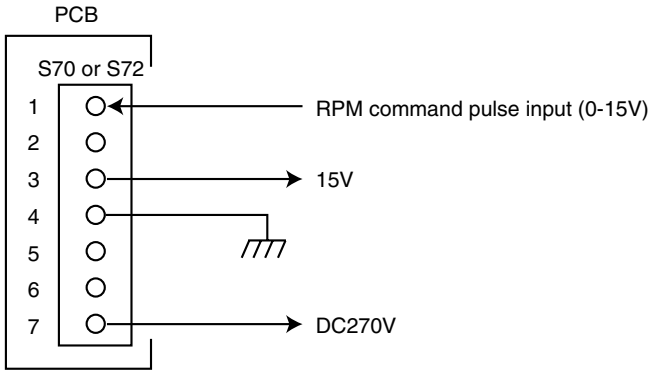
1. Set power ON and operation OFF. Remove connector S70 or S72.
2. Check that the voltage between No. 4 pin and No.7 pin is 270 VDC.
3. Check that the control voltage between No. 3 pin and No. 4 pin is 15 VDC.
4. Check that the RPM command voltage between No. 2 pin and No. 4 pin is 5 VDC.
5. Set power OFF and operation OFF. Connect connector S70 or S72.
6. Check whether two pulses (0 - 15 V) are input at No. 1 pin and No. 4 pin when the fan motor is rotated 1 turn by hand.

Fuses are commonly used as follows. Refer to the corresponding circuit diagram.

FU1	SW power supply Four way valve Hygroscopic fan
FU2	Outdoor fan Humidification fan

When FU2 is melted, check outdoor fan for proper function.

If NG in step 2 → Defective PCB → Replace the PCB.
If NG in step 4 → Defective Hall IC → Replace the DC fan motor.
If OK in both steps 2 and 4 → Replace the PCB.



(R3477)

■ Propeller fan motor: S70, Humidification fan motor: S72

<For Hygroscopic fan>

Check that the connectors HK1, HK2, HK3 for proper connection.

1. Check that the supply voltage between HK1 and HK3 is 5VDC.
   *Check when the machine is not in suspend mode.

2. If NG in step 1 → Defective PCB → Replace the PCB.

FU1	SW power supply Four way valve Hygroscopic fan
FU2	Outdoor fan Humidification fan

Therefore, when the FU2 is melted, check rotor motor for proper function.

3.13 Main Circuit Short Check

Check No.29

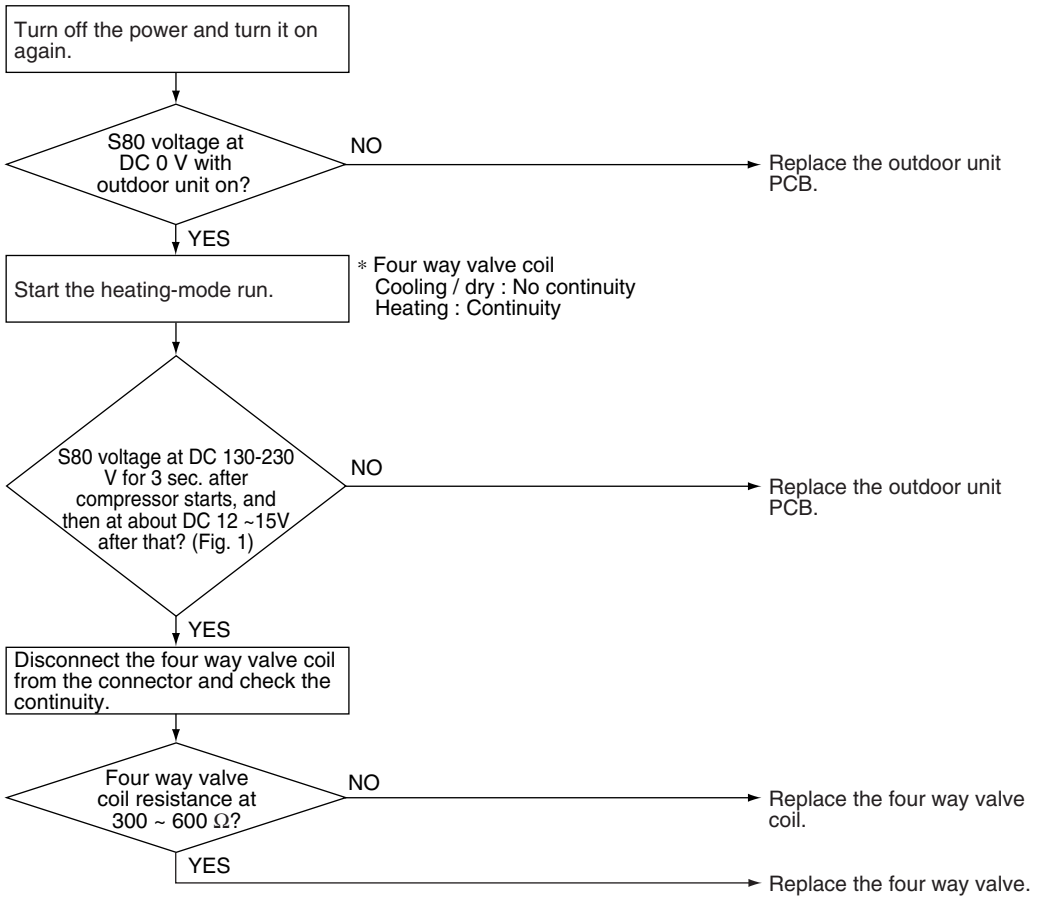
- Measure the resistance between pins at both ends of DB1.
- If the resistance is ∞ or less than 1 kΩ, the main circuit short.

(–) terminal of the tester (in case of digital, (+) terminal)	(~)	(+)	(~)	(–)
(+) terminal of the tester (in case of digital, (–) terminal)	(+)	(~)	(–)	(~)
Resistance in OK	several kΩ ~several MΩ	∞	∞	several kΩ ~several MΩ
Resistance in NG	0 or ∞	0	0	0 or ∞

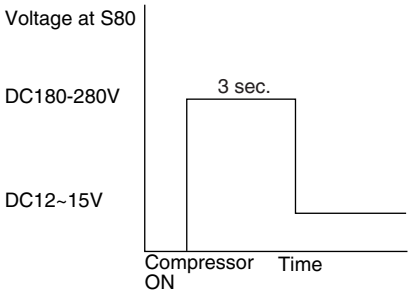
3.14 Four-way Valve Performance Check

Check No.31

< Caution on resetting the power supply >
* Be sure to wait for 30 sec. or more after turning off the power supply.



(Fig. 1)



(R9462)

Warning

- Daikin Industries, Ltd.'s products are manufactured for export to numerous countries throughout the world. Daikin Industries, Ltd. does not have control over which products are exported to and used in a particular country. Prior to purchase, please therefore confirm with your local authorised importer, distributor and/or retailer whether this product conforms to the applicable standards, and is suitable for use, in the region where the product will be used. This statement does not purport to exclude, restrict or modify the application of any local legislation.
- Ask a qualified installer or contractor to install this product. Do not try to install the product yourself. Improper installation can result in water or refrigerant leakage, electrical shock, fire or explosion.
- Use only those parts and accessories supplied or specified by Daikin. Ask a qualified installer or contractor to install those parts and accessories. Use of unauthorised parts and accessories or improper installation of parts and accessories can result in water or refrigerant leakage, electrical shock, fire or explosion.
- Read the User's Manual carefully before using this product. The User's Manual provides important safety instructions and warnings. Be sure to follow these instructions and warnings.

If you have any enquiries, please contact your local importer, distributor and/or retailer.

Cautions on product corrosion

1. Air conditioners should not be installed in areas where corrosive gases, such as acid gas or alkaline gas, are produced.
2. If the outdoor unit is to be installed close to the sea shore, direct exposure to the sea breeze should be avoided. If you need to install the outdoor unit close to the sea shore, contact your local distributor.

JMI-0107

JQA-1452

About ISO 9001

ISO 9001 is a plant certification system defined by the International Organization for Standardization (ISO) relating to quality assurance. ISO 9001 certification covers quality assurance aspects related to the "design, development, manufacture, installation, and supplementary service" of products manufactured at the plant.

EC99J2044

About ISO 14001

ISO 14001 is the standard defined by the International Organization for Standardization (ISO) relating to environmental management systems. Our group has been acknowledged by an internationally accredited compliance organisation as having an appropriate programme of environmental protection procedures and activities to meet the requirements of ISO 14001.

Dealer

DAIKIN INDUSTRIES, LTD.
Head Office:
Umeda Center Bldg., 2-4-12, Nakazaki-Nishi,
Kita-ku, Osaka, 530-8323 Japan
Tokyo Office:
JR Shinagawa East Bldg., 2-18-1, Konan,
Minato-ku, Tokyo, 108-0075 Japan
http://www.daikin.com/global_ac/

• Specifications, designs and other content appearing in this brochure are current as of January 2009 but subject to change without notice.

SiBE12-908
Printed in Japan 01/2009 B AK