HITACHI

PM | NO. 0305E

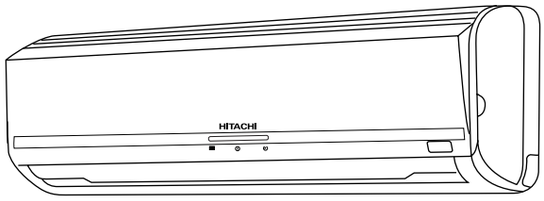
RAS-70YH5 / RAC-70YH5

SERVICE MANUAL

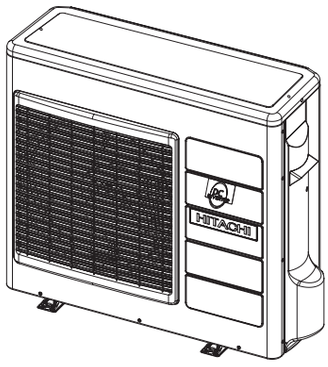
TECHNICAL INFORMATION

REFER TO THE FOUNDATION MANUAL

FOR SERVICE PERSONNEL ONLY



RAS-70YH5



RAC-70YH5

CONTENTS

SPECIFICATIONS

TYPE			DC INVERTER (WALL TYPE)	
			INDOOR UNIT	OUTDOOR UNIT
MODEL			RAS-70YH5	RAC-70YH5
POWER SOURCE			1 PHASE, 50 Hz, 240V	
COOLING	TOTAL INPUT	(W)	2,670	
	TOTAL AMPERES	(A)	11.2	
	CAPACITY	(kW)	7.10	
		(B.T.U./h)	24,240	
HEATING	TOTAL INPUT	(W)	2,800	
	TOTAL AMPERES	(A)	11.80	
	CAPACITY	(kW)	8.30	
		(B.T.U./h)	28,330	
DIMENSIONS (mm)		W	1030	850
		H	295	800
		D	191	298
NET WEIGHT		(kg)	12	52

※ After installation

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

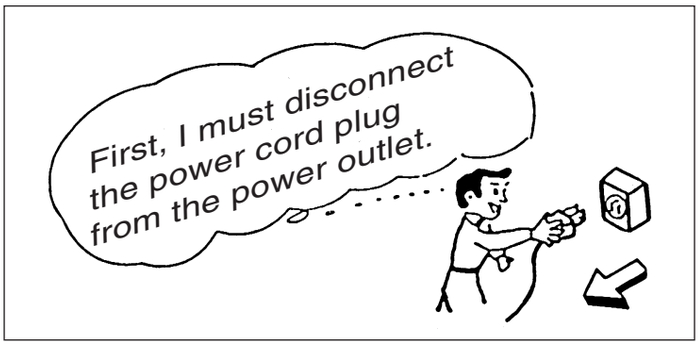
ROOM AIR CONDITIONER

INDOOR UNIT + OUTDOOR UNIT

DECEMBER 2005 Refrigeration & Air-Conditioning Division

SAFETY DURING REPAIR WORK

1. In order to disassemble and repair the unit in question, be sure to disconnect the power cord plug from the power outlet before starting the work.



2. If it is necessary to replace any parts, they should be replaced with respective genuine parts for the unit, and the replacement must be effected in correct manner according to the instructions in the Service Manual of the unit.

> If the contacts of electrical parts are defective, replace the electrical parts without trying to repair them.

3. After completion of repairs, the initial state should be restored.
4. Lead wires should be connected and laid as in the initial state.
5. Modification of the unit by user himself should absolutely be prohibited.
6. Tools and measuring instruments for use in repairs or inspection should be accurately calibrated in advance.
7. In installing the unit having been repaired, be careful to prevent the occurence of any accident such as electrical shock, leak of current, or bodily injury due to the drop of any part.
8. To check the insulation of the unit, measure the insulation resistance between the power cord plug and grounding terminal of the unit. The insulation resistance should be 1MΩ or more as measured by a 500V DC megger.
9. The initial location of installation such as window, floor or the other should be checked for being and safe enough to support the repaired unit again.
   If it is found not so strong and safe, the unit should be installed at the initial location reinforced or at a new location.
10. Any inflammable thing should never be placed about the location of installation.
11. Check the grounding to see whether it is proper or not, and if it is found improper, connect the grounding terminal to the earth.

WORKING STANDARDS FOR PREVENTING BREAKAGE OF SEMICONDUCTORS

1. Scope
   The standards provide for items to be generally observed in carrying and handling semiconductors in relative manufacturers during maintenance and handling thereof. (They apply the same to handling of abnormal goods such as rejected goods being returned).

2. Object parts

   (1) Micro computer
   (2) Integrated circuits (IC)
   (3) Field-effect transistors (FET)
   (4) P.C. boards or the like on which the parts mentioned in (1) and (2) of this paragraph are equipped.

3. Items to be observed in handling

   (1) Use a conductive container for carrying and storing of parts. (Even rejected goods should be handled in the same way).

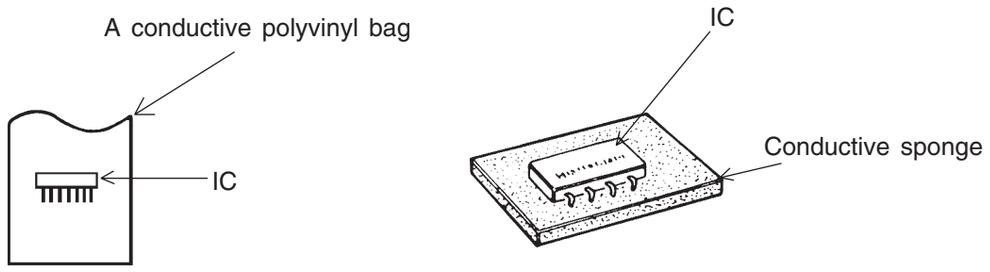


Fig. 1. Conductive Container

   (2) When any part is handled uncovered (in counting, packing and the like), the handling person must always use himself as a body earth. (Make yourself a body earth by passing one M ohm earth resistance through a ring or bracelet).

   (3) Be careful not to touch the parts with your clothing when you hold a part even if a body earth is being taken.

   (4) Be sure to place a part on a metal plate with grounding.

   (5) Be careful not to fail to turn off power when you repair the printed circuit board. At the same time, try to repair the printed circuit board on a grounded metal plate.

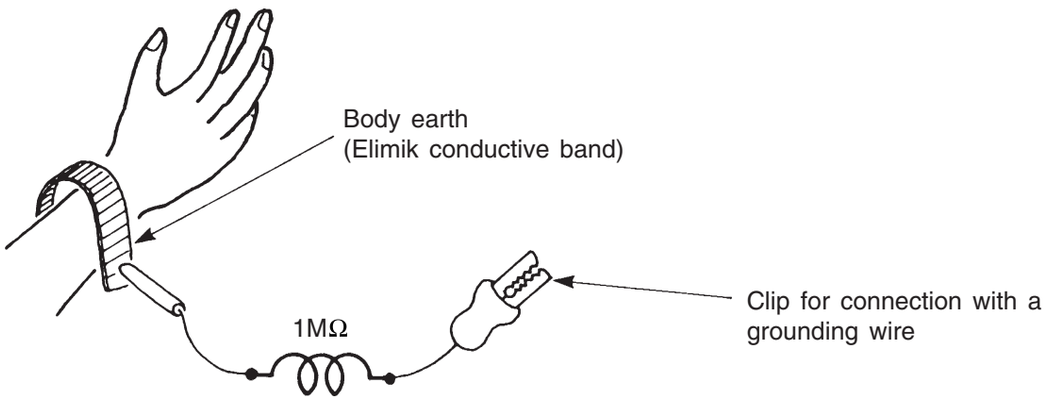


Fig. 2. Body Earth

(6) Use a three wire type soldering iron including a grounding wire.

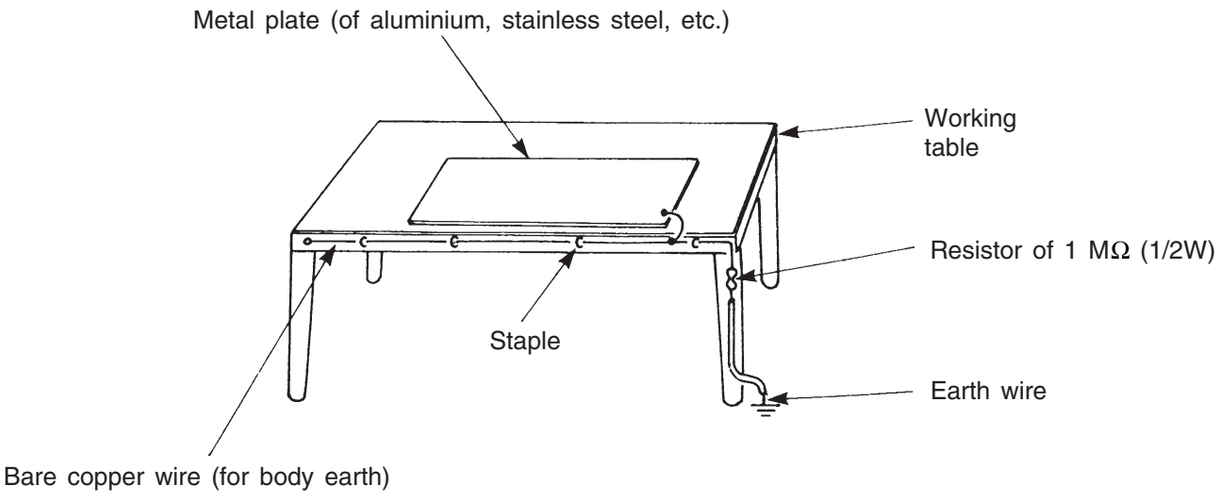


Fig. 3. Grounding of the working table

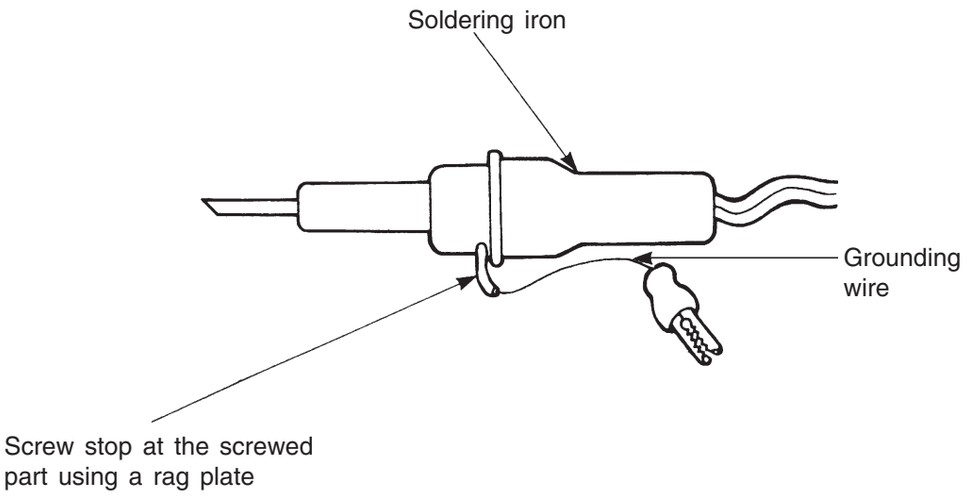


Fig. 4. Grounding a soldering iron

Use a high insulation mode (100V, 10MΩ or higher) when ordinary iron is to be used.

(7) In checking circuits for maintenance, inspection or some others, be careful not to have the test probes of the measuring instrument shortcircuit a load circuit or the like.

⚠ CAUTION

1. In quiet or stopping operation, slight flowing noise of refrigerant in the refrigerating cycle is heard occasionally, but this noise is not abnormal for the operation.

2. When it thunders near by, it is recommend to stop the operation and to disconnect the power cord plug from the power outlet for safety.

3. In the event of power failure, the air conditioner will restart automatically in the previously selected mode once the power is restored. In the event of power failure during TIMER operation, the timer will be reset and the unit will begin or stop operating under a new timer setting.

4. If the room air conditioner is stopped by adjusting thermostat, or missoperation, and re-start in a moment, there is occasion that the cooling and heating operation does not start for 3 minutes, it is not abnormal and this is the result of the operation of IC delay circuit. This IC delay circuit ensures that there is no danger of blowing fuse or damaging parts even if operation is restarted accidentally.

5. This room air conditioner should not be used at the cooling operation when the outside temperature is below 10°C (50°F).

6. This room air conditioner (the reverse cycle) should not be used when the outside temperature is below –15°C (5°F).
   If the reverse cycle is used under this condition, the outside heat exchanger is frosted and efficiency falls.

7. When the outside heat exchanger is frosted, the frost is melted by operating the hot gas system, it is not trouble that at this time fan stops and the vapour may rise from the outside heat exchanger.

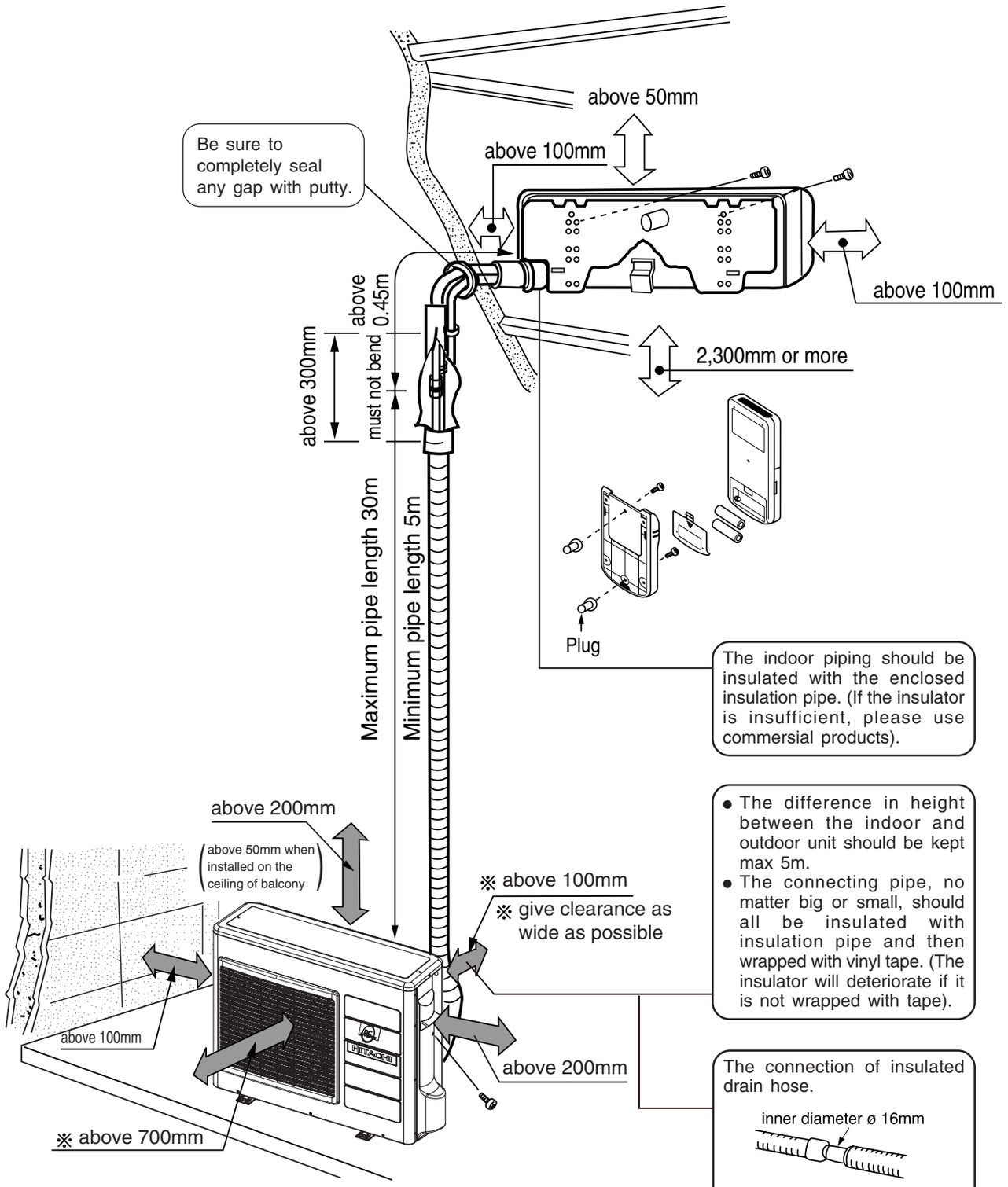
SPECIFICATIONS

MODEL		RAS-70YH5	RAC-70YH5
FAN MOTOR		PWM DC35V	40 W
FAN MOTOR CAPACITOR		NO	NO
FAN MOTOR PROTECTOR		NO	NO
COMPRESSOR		–	JU1015D3
COMPRESSOR MOTOR CAPACITOR		NO	NO
OVERLOAD PROTECTOR		NO	YES (INTERNAL)
OVERHEAT PROTECTOR		NO	YES
FUSE (for MICROPROCESSOR)		3.15A	3.0A
POWER RELAY		NO	G4A
POWER SWITCH		NO	NO
TEMPORARY SWITCH		YES	NO
SERVICE SWITCH		NO	YES
TRANSFORMER		NO	NO
VARISTOR		416NR-12D	450NR
NOISE SUPPRESSOR		NO	YES
THERMOSTAT		YES(IC)	YES(IC)
REMOTE CONTROL SWITCH (LIQUID CRYSTAL)		YES	NO
REFRIGERANT CHARGING VOLUME (Refrigerant R410A)	UNIT	----------	1800g
	PIPES (MAX. 30m)	WITHOUT REFRIGERANT BECAUSE COUPLING IS FLARE TYPE.	

Chargeless upto 20m, above 20m upto max 30m, charge refrigerant R410A 10 g/m.

Figure showing the installation of Indoor and Outdoor unit

CAUTION	The installation height of indoor unit must be 2.3m or more in a non public area.



SAFETY PRECAUTION

- Please read the “Safety Precaution” carefully before operating the unit to ensure correct usage of the unit.
- Pay special attention to signs of “ ⚠ **Warning**” and “ ⚠ **Caution**”. The “Warning” section contains matters which, if not observed strictly, may cause death or serious injury. The “Caution” section contains matters which may result in serious consequences if not observed properly. Please observe all instructions strictly to ensure safety.
- The sign indicate the following meanings.

Make sure to connect earth line.	The sign in the figure indicates prohibition.
Indicates the instructions that must be followed.	

- Please keep this manual after reading.

PRECAUTIONS DURING INSTALLATION

WARNING

- Do not reconstruct the unit.
  Water leakage, fault, short circuit or fire may occur if you reconstruct the unit by yourself.

- Please ask your sales agent or qualified technician for the installation of your unit. Water leakage, short circuit or fire may occur if you install the unit by yourself.
- Please use earth line.
  Do not place the earth line near water or gas pipes, lightning-conductor, or the earth line of telephone. Improper installation of earth line may cause electric shock.

CAUTION

- A circuit breaker should be installed depending on the mounting site of the unit. Without a circuit breaker, the danger of electric shock exists.
- Do not install near location where there is flammable gas. The outdoor unit may catch fire if flammable gas leaks around it.

- Please ensure smooth flow of water when installing the drain hose.

PRECAUTIONS DURING SHIFTING OR MAINTENANCE

WARNING

- Should abnormal situation arises (like burning smell), please stop operating the unit and turn off the circuit breaker. Contact your agent. Fault, short circuit or fire may occur if you continue to operate the unit under abnormal situation.

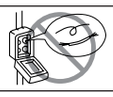
- Please contact your agent for maintenance. Improper self maintenance may cause electric shock and fire.
- Please contact your agent if you need to remove and reinstall the unit. Electric shock or fire may occur if you remove and reinstall the unit yourself improperly.

PRECAUTIONS DURING OPERATION

WARNING

- Avoid an extended period of direct air flow for your health.

- Do not put objects like thin rods into the panel of blower and suction side because the high-speed fan inside may cause danger.
- Do not use any conductor as fuse wire, this could cause fatal accident.

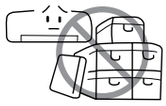


- During thunder storm, disconnect and turn off the circuit breaker.

PRECAUTIONS DURING OPERATION

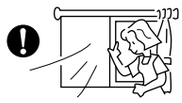
CAUTION

- The product shall be operated under the manufacturer specification and not for any other intended use.



- Do not attempt to operate the unit with wet hands, this could cause fatal accident.

- When operating the unit with burning equipments, regularly ventilate the room to avoid oxygen insufficiency.

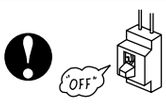


- Do not direct the cool air coming out from the air-conditioner panel to face household heating apparatus as this may affect the working of apparatus such as the electric kettle, oven etc.

- Please ensure that outdoor mounting frame is always stable, firm and without defect. If not, the outdoor unit may collapse and cause danger.

- Do not splash or direct water to the body of the unit when cleaning it as this may cause short circuit.

- Do not use any aerosol or hair sprays near the indoor unit. This chemical can adhere on heat exchanger fin and blocked the evaporation water flow to drain pan. The water will drop on tangential fan and cause water splashing out from indoor unit.

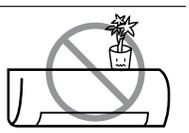


- Please switch off the unit and turn off the circuit breaker during cleaning, the high-speed fan inside the unit may cause danger.

- Turn off the circuit breaker if the unit is not to be operated for a long period.

- Do not climb on the outdoor unit or put objects on it.

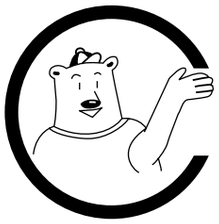
- Do not put water container (like vase) on the indoor unit to avoid water dripping into the unit. Dripping water will damage the insulator inside the unit and causes short-circuit.



- Do not place plants directly under the air flow as it is bad for the plants.

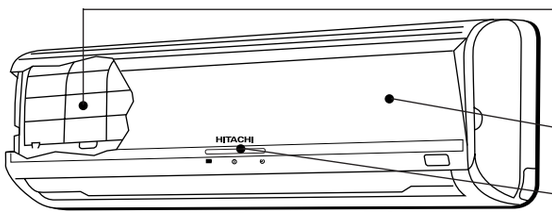
- When operating the unit with the door and windows opened, (the room humidity is always above 80%) and with the air deflector facing down or moving automatically for a long period of time, water will condense on the air deflector and drips down occasionally. This will wet your furniture. Therefore, do not operate under such condition for a long time.
- If the amount of heat in the room is above the cooling or heating capability of the unit (for example: more people entering the room, using heating equipments and etc.), the preset room temperature cannot be achieved.

- This is not intended for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use the appliance safely.
- Young children should be supervised to ensure that they do not play with the appliance.



NAMES AND FUNCTIONS OF EACH PART

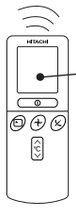
INDOOR UNIT



AIR FILTER
To prevent dust from coming into the indoor unit.
(Refer page 19)

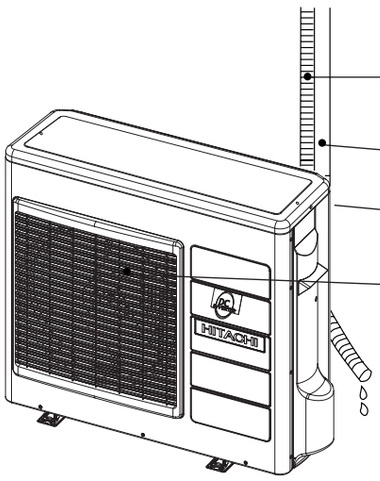
FRONT PANEL (AIR INLET).

INDOOR UNIT INDICATORS
Light indicator showing the operating condition.
(Refer page 5)



REMOTE CONTROL
Send out operation signal to the indoor unit. So as to operate the whole unit.
(Refer page 6)

OUTDOOR UNIT



DRAIN PIPE
Condensed water drain to outside.

CONNECTING CORD

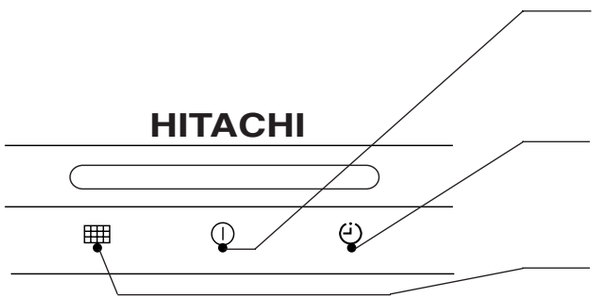
AIR INLET (BACK, LEFT SIDE)

AIR OUTLET

MODEL NAME AND DIMENSIONS

MODEL	WIDTH (mm)	HEIGHT (mm)	DEPTH (mm)
RAS-70YH5	1030	295	191
RAC-70YH5	850	800	298

INDOOR UNIT INDICATORS



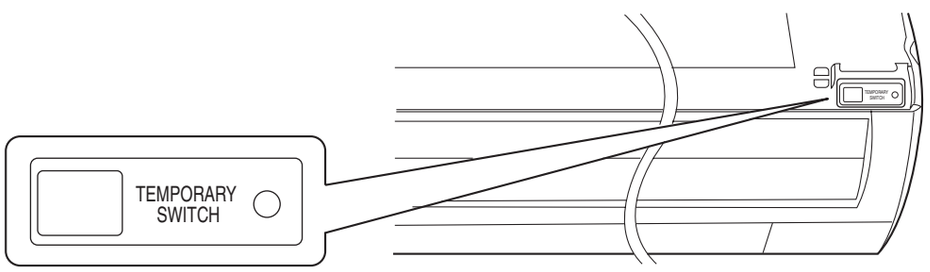
OPERATION LAMP
This lamp lights during operation.

TIMER LAMP
This lamp lights when the timer is working.

FILTER LAMP
When the device is operated for a total of about 200 hours, the FILTER lamp lights to indicate that it is time to clean the filter. The lamp goes out when the POWER SWITCH set to OFF and ON again.

OPERATION INDICATOR

- This figure shows the opening condition of front panel. Refer to page 18 in relation to how to open or close the front panel.



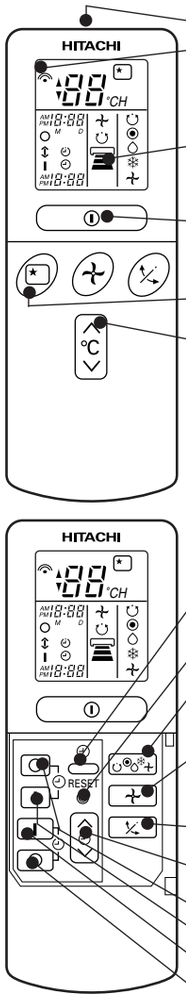
TEMPORARY SWITCH

- Use this switch to start and stop when the remote controller does not work.
- By pressing the temporary switch, the operation is done in automatic mode.

NAMES AND FUNCTIONS OF REMOTE CONTROL UNIT

REMOTE CONTROLLER

- This controls the operation of the indoor unit. The range of control is about 7 meters. If indoor lighting is controlled electronically, the range of control may be shorter.
  This unit can be fixed on a wall using the fixture provided. Before fixing it, make sure the indoor unit can be controlled from the remote controller.
- Handle the remote controller with care. Dropping it or getting it wet may compromise its signal transmission capability.
- After new batteries are inserted into the remote controller, the unit will initially require approximately 10 seconds to respond to commands and operate.



- **Signal emitting window/transmission sign**
  Point this window toward the indoor unit when controlling it.
  The transmission sign blinks when a signal is sent.
- **Display**
  This indicates the room temperature selected, current time, timer status, function and intensity of circulation selected.
- **START/STOP button**
  Press this button to start operation. Press it again to stop operation.
- **SLEEP button**
  Use this button to set the sleep timer.
- **TEMPERATURE buttons**
  Use these buttons to raise or lower the temperature setting. (Keep pressed, and the value will change more quickly.)
- **TIME button**
  Use this button to set and check the time and date.
- **RESET buttons**
- **FUNCTION selector**
  Use this button to select the operating mode. Every time you press it, the mode will change from ↻ (AUTO) to ◉ (HEAT) to ◇ (DEHUMIDIFY) to ❄ (COOL) and to ✢ (FAN) cyclically.
- **FAN SPEED selector**
  This determines the fan speed. Every time you press this button, the intensity of circulation will change from ↻ (AUTO) to ≡ (HI) to ≡ (MED) to ≡ (LOW) (This button allows selecting the optimal or preferred fan speed for each operation mode).
- **AUTO SWING button**
  Controls the angle of the horizontal air deflector.
- **TIMER control**
  Use this button to set the timer.
- **OFF-TIMER button** Select the turn OFF time.
- **ON-TIMER button** Select the turn ON time.
- **RESERVE button** Time setting reservation.
- **CANCEL button** Cancel time reservation.

↻	AUTO
◉	HEAT
◇	DEHUMIDIFY
❄	COOL
✢	FAN
≡	FAN SPEED LOW MED HI
★	SLEEPING
○	STOP (CANCEL)
I	START (RESERVE)
⏻	START/STOP
🕘	TIME
🕘	TIMER SET
🕘	TIMER SELECTOR ON TIMER OFF TIMER
⤡	AUTO SWING

Precautions for Use

- Do not put the remote controller in the following places.
  - Under direct sunlight.
  - In the vicinity of a heater.
- Handle the remote controller carefully. Do not drop it on the floor, and protect it from water.
- Once the outdoor unit stops, it will not restart for about 3 minutes (unless you turn the power switch off and on or unplug the power cord and plug it in again).
  This is to protect the device and does not indicate a failure.
- If you press the FUNCTION selector button during operation, the device may stop for about 3 minutes for protection.

VARIOUS FUNCTIONS

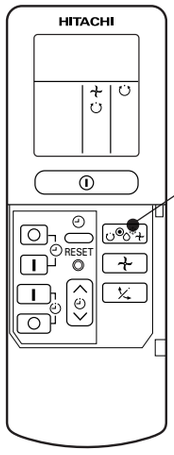
■ Auto Restart Control

- If there is a power failure, operation will be automatically restarted when the power is resumed with previous operation mode and airflow direction.
  (As the operation is not stopped by remote controller.)
- If you intend not to continue the operation when the power is resumed, switch off the power supply.
  When you switch on the circuit breaker, the operation will be automatically restarted with previous operation mode and airflow direction.

Note: 1. If you do not require Auto Restart Control, please consult your sales agent or OFF by remote control.
2. Auto Restart Control is not available when Timer or Sleep Timer mode is set.

AUTOMATIC OPERATION

The device will automatically determine the mode of operation, HEAT, COOL or DEHUMIDIFY depending on the current room temperature. The selected mode of operation will change when the room temperature varies. However the mode of operation will not change when indoor unit connected to multi type outdoor unit.

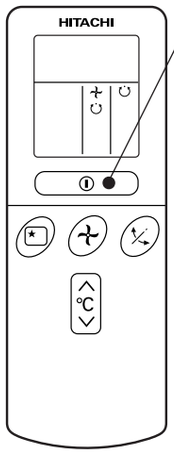


1 Press the FUNCTION selector so that the display indicates the ↻ (AUTO) mode of operation.

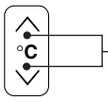
- When AUTO has been selected, the device will automatically determine the mode of operation, HEAT, COOL or DEHUMIDIFY depending on the current room temperature. However the mode of operation will not change when indoor unit connected to multi type outdoor unit.
- If the mode automatically selected by the unit is not satisfactory, manually change the mode setting (heat, dehumidify, cool or fan).

START / STOP Press the ⏻ (START/STOP) button.
Operation starts with a beep.
Press the button again to stop operation.

■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.



You can raise or lower the temperature setting as necessary by maximum of 3°C.



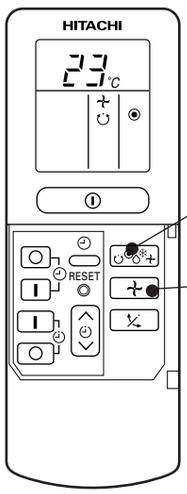
Press the temperature button and the temperature setting will change by 1°C each time.

- The preset temperature and the actual room temperature may vary somewhat depending on conditions.
- The display does not indicate the preset temperature in the AUTO mode. If you change the setting, the indoor unit will produce a beep.

Press the ✣ (FAN SPEED) button, AUTO and LOW is available.

HEATING OPERATION

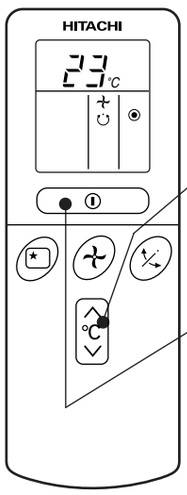
- Use the device for heating when the outdoor temperature is under 21°C.
  When it is too warm (over 21°C), the heating function may not work in order to protect the device.
- In order to keep reliability of the device, please use this device above -15°C of the outdoor temperature.



1 Press the FUNCTION selector so that the display indicates ◉ (HEAT).

2 Set the desired FAN SPEED with the ✣ (FAN SPEED) button (the display indicates the setting).

- ↻ (AUTO): The fan speed is HI at first and varies to MED or LOW automatically when the preset temperature has been reached.
- (HI) : Economical as the room will become warm quickly. But you may feel a chill at the beginning.
- (MED) : Fan speed slow.
- (LOW) : Fan speed slower.



3 Set the desired room temperature with the TEMPERATURE buttons (the display indicates the setting).

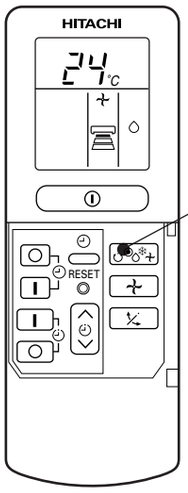
The temperature setting and the actual room temperature may vary somewhat depending on conditions.

START / STOP Press the ⏻ (START/STOP) button. Heating operation starts with a beep. Press the button again to stop operation.

■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

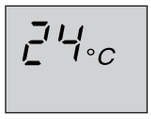
DEHUMIDIFYING OPERATION

Use the device for dehumidifying when the room temperature is over 16°C.
When it is under 15°C, the dehumidifying function will not work.



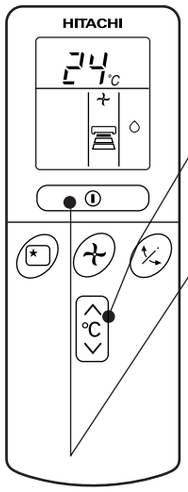
1 Press the FUNCTION selector so that the display indicates ♢ (DEHUMIDIFY).
The FAN SPEED is set at LOW automatically.
The FAN SPEED button does not work.

2 Set the desired room temperature with the TEMPERATURE button (the display indicates the setting).



The range of 20-26˚C is recommended as the room temperature for dehumidifying.

START / STOP Press the ⏻ (START/STOP) button. Dehumidifying operation starts with a beep. Press the button again to stop operation.



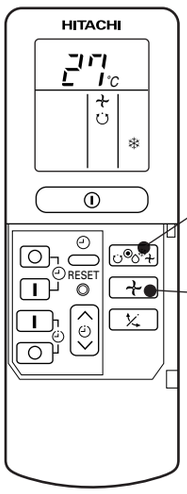
■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

■ Dehumidifying Function

When the room temperature is higher than the temperature setting: The device will dehumidify the room, reducing the room temperature to the preset level.
When the room temperature is lower than the temperature setting: Dehumidifying will be performed at the temperature setting slightly lower than the current room temperature, regardless of the temperature setting. The function will stop (the indoor unit will stop emitting air) as soon as the room temperature becomes lower than the setting temperature.

COOLING OPERATION

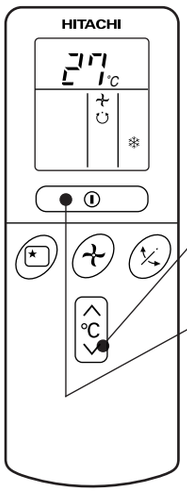
Use the device for cooling when the outdoor temperature is 22-42°C.
If in doors humidity is very high (80%), some dew may form on the air outlet grille of the indoor unit.



1 Press the FUNCTION selector so that the display indicates ❄ (COOL).

2 Set the desired FAN SPEED with the (FAN SPEED) button (the display indicates the setting).

- (AUTO): The FAN SPEED is HI at first and varies to MED or LOW automatically when the preset temperature has been reached.
- (HI) : Economical as the room will become cool quickly.
- (MED) : Fan speed slow.
- (LOW) : Fan speed slower.



3 Set the desired room temperature with the TEMPERATURE button (the display indicates the setting).

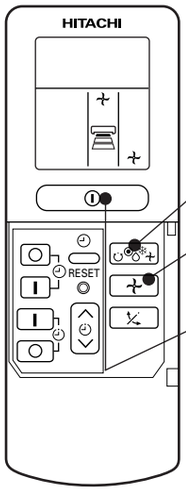
The temperature setting and the actual room temperature may vary some how depending on conditions.

START / STOP Press the ⏻ (START/STOP) button. Cooling operation starts with a beep. Press the button again to stop operation. The cooling function does not start if the temperature setting is higher than the current room temperature (even though the ⏻ (OPERATION) lamp lights). The cooling function will start as soon as you set the temperature below the current room temperature.

■ As the settings are stored in memory in the remote controller, you only have to press the ⏻ (START/STOP) button next time.

FAN OPERATION

You can use the device simply as an air circulator. Use this function to dry the interior of the indoor unit at the end of summer.



1 Press the FUNCTION selector so that the display indicates ✣ (FAN).

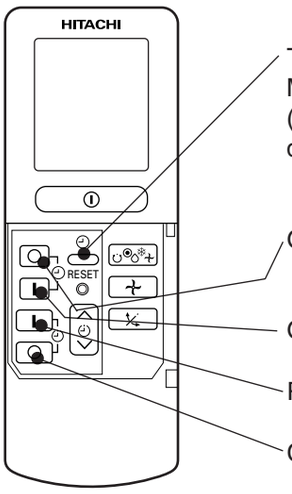
2 Press the ✣ (FAN SPEED) button.

START / STOP Press the ⏻ (START/STOP) button. Fan operation starts with a beep. Press the button again to stop operation.

FAN SPEED (AUTO) ····· When the AUTO fan speed mode is set in the cooling/heating operation:

For the heating operation	● The fan speed will automatically change according to the temperature of discharged air. ● When the difference of room temperature and setting temperature is large, fan starts to run at HI speed. ● When the room temperature reaches setting temperature, fan speed changes to LOW automatically.
For the cooling operation	● When the difference of room temperature and setting temperature is large, fan starts to run at HI speed. ● After room temperature reaches the preset temperature, the cooling operation, which changes the fan speed and room temperature to obtain optimum conditions for natural healthful cooling will be performed.

HOW TO SET THE TIMER



TIME, DAY, MONTH (current time, day, month)

OFF TIMER

ON TIMER

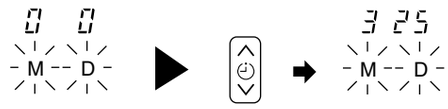
RESERVE

CANCEL

Time, Day, Month

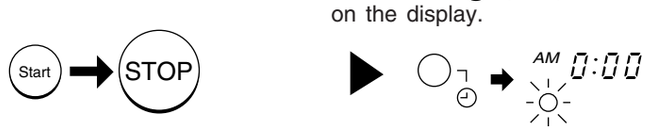
After you change the batteries;

1 Set the current month and day with the TIMER control button.



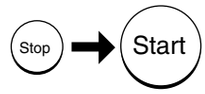
OFF-Timer

1 Press the (OFF-TIMER) button. The (OFF) mark blinks on the display.



You can set the device to turn off at the present time.

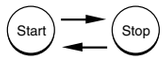
ON-Timer



1 Press the (ON-TIMER) button the (ON) mark blinks on the display.

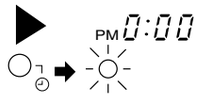
- The device will turn on at the designated times.

ON/OFF-Timer

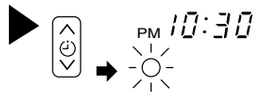


- The device will turn on (off) and off (on) at the designated times.
- The switching occurs first at the preset time that comes earlier.
- The arrow mark appearing on the display indicates the sequence of switching operations.

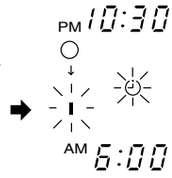
1 Press the (ON-OFF) button so that the (OFF) mark blinks.



2 Set the turn-off time with the TIMER control button.
Press the (RESERVE) button.



3 Press the (ON-TIMER) button so that the (OFF) mark lights and the (ON) mark blinks.



How to Cancel Reservation

Point the signal window of the remote controller toward the indoor unit, and press the (CANCEL) button.
The (RESERVED) sign goes out with a beep and the (TIMER) lamp turns off on the indoor unit.

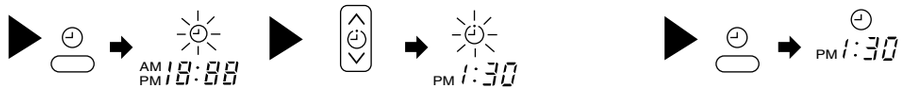
NOTE

You can set only one of the OFF-timer, ON-timer and ON/OFF-timer.

2 Press the ◴ (TIME) button.

3 Set the current time with the TIMER control button.

4 Press the ◴ (TIME) button again.
The time indication starts lighting instead of flashing.

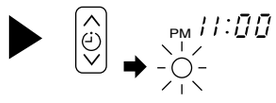


Example: The current time is 1:30 p.m.

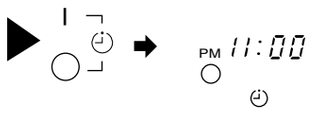
- The time indication will disappear automatically in 10 second.
- To check the current time setting, press the ◴ (TIME) button twice.

The setting of the current time is now complete.

2 Set the turn-off time with the TIMER control button.



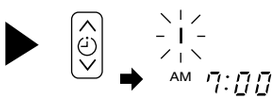
3 Point the signal window of the remote controller toward the indoor unit, and press the ❙ (RESERVE) button.
The ◯ (OFF) mark starts lighting instead of flashing and the sign ◴ (RESERVED) lights. A beep occurs and the ◴ (TIMER) lamp lights on the indoor unit.



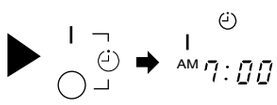
Example: The device will turn off at 11:00p.m.

The setting of turn-off time is now complete.

2 Set the turn-on time with the TIMER control button.

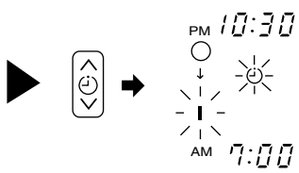


3 Point the signal window of the remote controller toward the indoor unit, and press the ❙ (RESERVE) button.
The ❙ (ON) mark starts lighting instead of flashing and the ◴ (RESERVED) sign lights. A beep occurs and the ◴ (TIMER) lamp lights on the indoor unit.

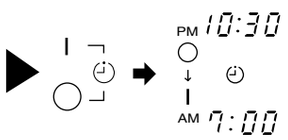


Example:
The device will turn on at 7:00 a.m.
The setting of the turn-on time is now complete.

4 Set the turn-on time with the TIMER control button.



5 Point the signal window of the remote controller toward the indoor unit, and press the ❙ (RESERVE) button.
The ❙ (ON) mark starts lighting instead of flashing and the ◴ (RESERVED) sign lights. A beep occurs and the ◴ (TIMER) lamp lights on the indoor unit.

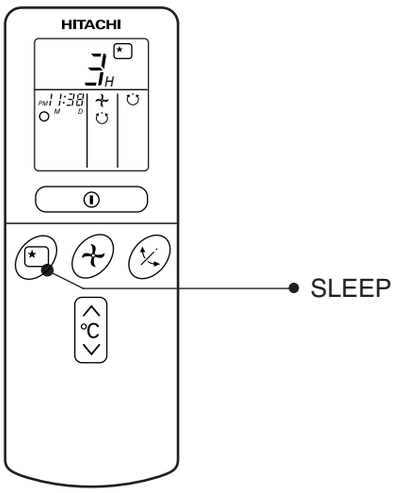


Example:
The device will turn off at 10:30 p.m. and it will be turned on at 7:00 a.m.
The settings of the turn-on/off times are now complete.

- The timer may be used in three ways: off-timer, on-timer, and ON/OFF (OFF/ON)-timer. Set the current time at first because it serves as a reference.
- As the time settings are stored in memory in the remote controller, you only have to press the ❙ (RESERVE) button in order to use the same settings next time.

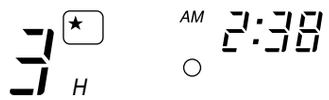
HOW TO SET THE SLEEP TIMER

Set the current time at first if it is not set before (see the pages for setting the current time). Press the ⊡ (SLEEP) button, and the display changes as shown below.



Mode	Indication
Sleep timer	→ 1 hour → 2 hours → 3 hours → 7 hours → Sleep timer off →

Sleep Timer: The device will continue working for the designated number of hours and then turn off.
Point the signal window of the remote controller toward the indoor unit, and press the SLEEP button.
The timer information will be displayed on the remote controller. The TIMER lamp lights with a beep from the indoor unit. When the sleep timer has been set, the display indicates the turn-off time.



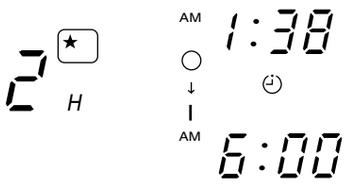
Example: If you set 3 hours sleep time at 11:38 p.m., the turn-off time is 2:38 a.m.

Sleep timer → Start

The device will be turned off by the sleep timer and turned on by on-timer.

1 Set the ON-timer.

2 Press the ⊡ (SLEEP) button and set the sleep timer.



For heating:

In this case, the device will turn off in 2 hours (at 1:38 a.m.) and turn on early so that the preset temperature will be almost reached at 6:00 next morning.

How to Cancel Reservation

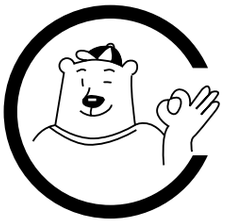
Point the signal window of the remote controller toward the indoor unit, and press the ○ (CANCEL) button.
The ◴ (RESERVED) sign goes out with a beep and the ◴ (TIMER) lamp turns off on the indoor unit.

Explanation of the sleep timer

The device will control the FAN SPEED and room temperature automatically so as to be quiet and good for people's health.
You can set the sleep timer to turn off after 1, 2, 3 or 7 hours.

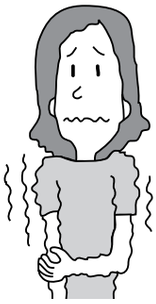
NOTE

- If date or current time is not set, sleep timer can not be set.
- If you set the sleep timer after the off-, on/off- or off/on-timer has been set, the sleep timer becomes effective instead of the off-, on/off- or off/on-timer set.
- You can not set other timer during sleep timer operation.



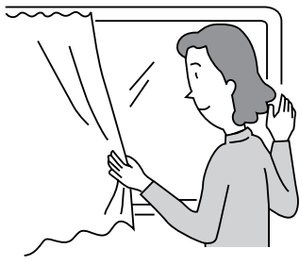
THE IDEAL WAYS OF OPERATION

Suitable Room Temperature



⚠ Warning
Freezing temperature is bad for health and a waste of electric power.

Install curtain or blinds



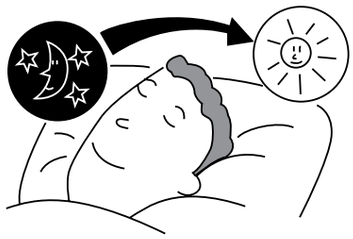
It is possible to reduce heat entering the room through windows.

Ventilation

⚠ Caution
Do not close the room for a long period of time. Occasionally open the door and windows to allow the entrance of fresh air.

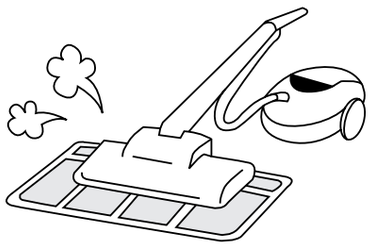
Effective Usage Of Timer

At night, please use the “sleep timer operation mode”, together with your wake up time in the morning. This will enable you to enjoy a comfortable room temperature. Please use the timer effectively.



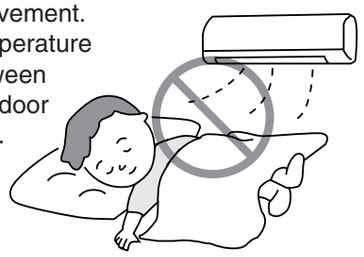
Do Not Forget To Clean The Air Filter

Dusty air filter will reduce the air volume and the cooling efficiency. To prevent from wasting electric energy, please clean the filter every 2 weeks.



Please Adjust Suitable Temperature For Baby And Children

Please pay attention to the room temperature and air flow direction when operating the unit for baby, children and old folks who have difficulty in movement.
(The ideal temperature difference between outdoor and indoor is about ±5°C).

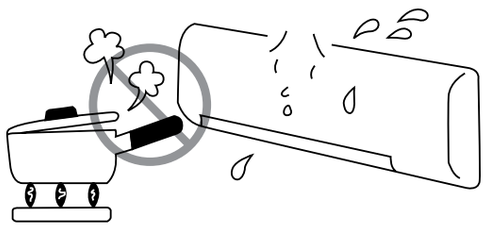


FOR USER'S INFORMATION

The Air Conditioner And The Heat Source In The Room

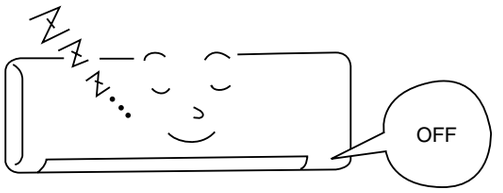
⚠ Caution

If the amount of heat in the room is above the cooling capability of the air conditioner (for example: more people entering the room, using heating equipments and etc.), the preset room temperature cannot be achieved.



Not Operating For A Long Time

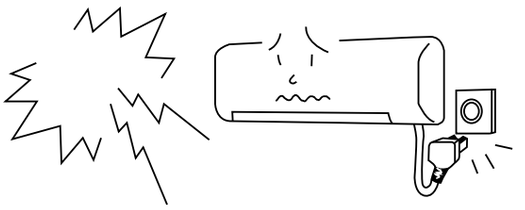
When the indoor unit is not to be used for a long period of time, please switch off the power from the mains. If the power from mains remains "ON", the indoor unit still consumes about 8W in the operation control circuit even if it is in "OFF" mode.



When Lightning Occurs

⚠ Warning

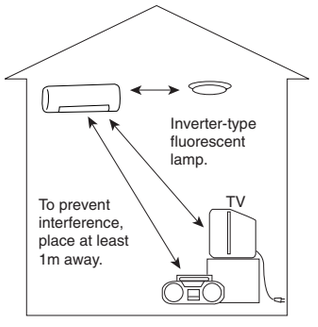
To protect the whole unit during lightning, please stop operating the unit and remove the plug from the socket.



Interference From Electrical Products

⚠ Caution

To avoid noise interference, please place the indoor unit and its remote controller at least 1m away from electrical products.



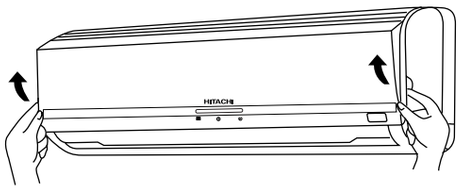
ATTACHING THE AIR CLEANSING FILTERS

⚠ CAUTION

Cleaning and maintenance must be carried out only by qualified service personal. Before cleaning, stop operation and switch off the power supply.

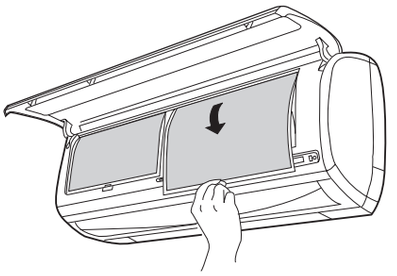
1 **Open the front panel.**

- Pull up the front panel by holding it at both sides with both hands.



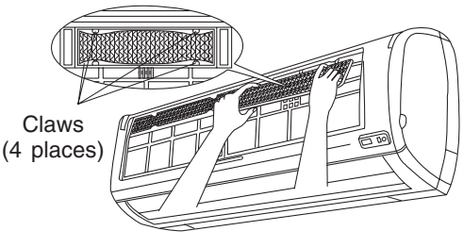
2 **Remove the filter.**

- Push upward to release the claws and pull out the filter.



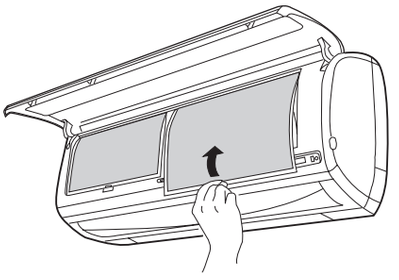
3 **Attaching the air cleansing filters to the filter.**

- Attach the air cleansing filters to the frame by gently compress its both sides and release after insertion into filter frame.



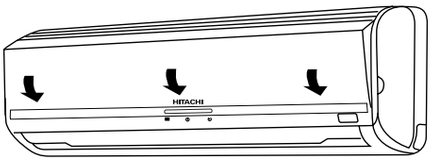
⚠ CAUTION

Do not bend the air cleansing filter as it may cause damage to the structure.



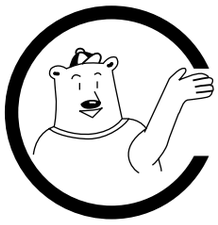
4 **Attach the filters.**

- Attach the filters by ensuring that the surface written “FRONT” is facing front.
- After attaching the filters, push the front panel at three arrow portion as shown in figure and close it.



NOTE

- In case of removing the air cleansing filters, please follow the above procedures.
- The cooling capacity is slightly weakened and the cooling speed becomes slower when the air cleansing filters are used. So, set the fan speed to "HIGH" when using it in this condition.
- Air cleansing filters are not washable and can be use in 1 year time. Type number for this air cleansing filter is <SPX-CFH7>. Please use this number for ordering when you want to renew it.
- Do not operate the air conditioner without filter. Dust may enter the air conditioner and fault may occur.



MAINTENANCE

⚠ CAUTION

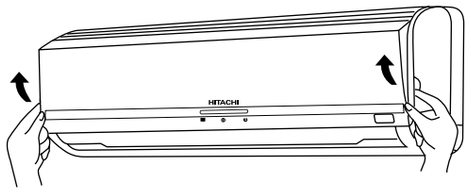
Cleaning and maintenance must be carried out only by qualified service personal. Before cleaning, stop operation and switch off the power supply.

1. AIR FILTER

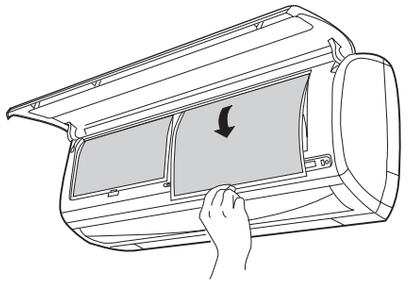
Clean the air filter, as it removes dust inside the room. In case the air filter is full of dust, the air flow will decrease and the cooling capacity will be reduced. Further, noise may occur. Be sure to clean the filter following the procedure below.

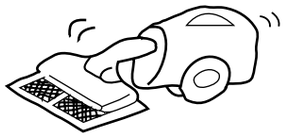
PROCEDURE

1 Open the front panel and remove the filter
- Gently lift and remove the air cleansing filter from the air filter frame.

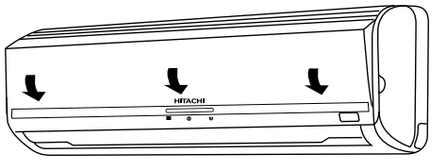


2 Vacuum dust from the air filter and air cleansing filter using vacuum cleaner. If there is too much dust, air filter only rinse under running tap water and gently brush it with soft bristle brush. Allow filters to dry in shade.





3
- Re-insert the air cleansing filter to the filter frame. Set the filter with “FRONT” mark facing front, and slot them into the original state.
- After attaching the filters, push the front panel at three arrow portions as shown in figure and close it.



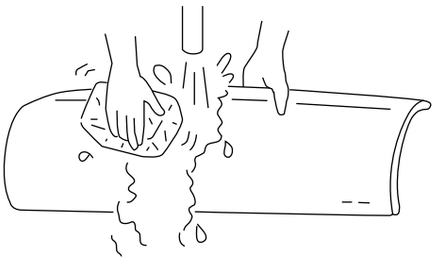
NOTE:
- Air cleansing filter should be cleaned every month or sooner if noticeable loading occurs. When used overtime, it may loose its deodorizing function. For maximum performance, it is recommended to replace it every 1 year depending on application requirements.

⚠ CAUTION

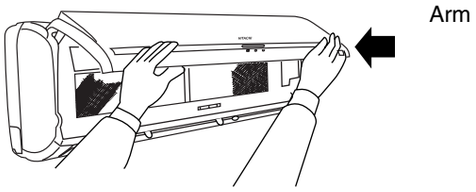
- Do not wash with hot water at more than 40°C. The filter may shrink.
- When washing it, shake off moisture completely and dry it in the shade; do not expose it directly to the sun. The filter may shrink.
- Do not use detergent on the air cleansing filter as some detergent may deteriorate the filter electrostatic performance.

2. CLEANING OF FRONT PANEL

- Wipe it with a soft dry cloth.
- When it is excessively dirty, wipe with a soft cloth soaked in lukewarm water or neutral detergent. Then wipe thoroughly with a soft dry cloth.
- Wipe the remote controller thoroughly with a soft dry cloth.

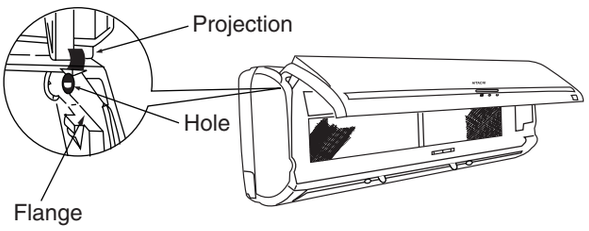


Removing the Front Panel



- When the front panel is fully opened with both hands, push the right arm to the inside to release it, and while closing the front panel slightly, pull it out forward.

Attaching the Front Panel



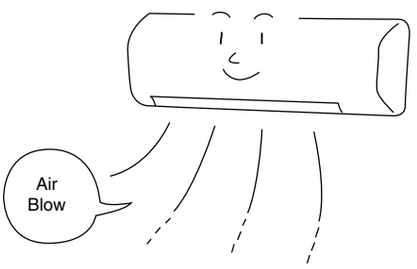
- Move the projections of the left and right arms into the **Flanges** in the unit and securely insert them into the holes.

⚠ CAUTION

- Never use hot water (above 40°C), benzine, gasoline, acid, thinner or a brush, because they will damage the plastic surface and the coating.

3. MAINTENANCE AT BEGINNING OF LONG OFF PERIOD

- Running the unit setting the operation mode to ✣ (FAN) and the fan speed to HI for about half a day on a fine day, and dry the whole of the unit.
- Disconnect the power plug.



⚠ CAUTION

- Please use earth line.
  Do not place the earth line near water or gas pipes, lightning-conductor, or the earth line of telephone. Improper installation of earth line may cause electric shock.

- A circuit breaker should be installed depending on the mounting site of the unit. Without a circuit breaker, the danger of electric shock exists.

IMPORTANT

The wires in this mains lead are coloured in accordance with the following code:

Green-and-yellow	: Earth
Blue	: Neutral
Brown	: Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol ⏚ or coloured green or green-and-yellow.
The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

NOTE

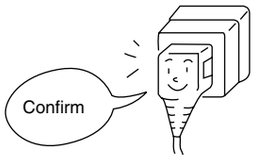
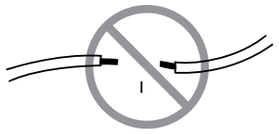
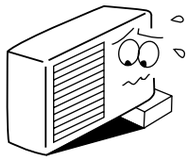
If the supply cord is damaged, it must be replaced by the special cord obtainable at authorized service/ parts centers.

⚠ CAUTION

Cleaning and maintenance must be carried out only by qualified service personal. Before cleaning, stop operation and switch off the power supply.

REGULAR INSPECTION

PLEASE CHECK THE FOLLOWING POINTS EITHER EVERY HALF YEARLY OR YEARLY. CONTACT YOUR SALES AGENT SHOULD YOU NEED ANY HELP.

1		Is the plug of power line firmly plugged into the socket? (Please ensure no loose contact between them).
2		Is the earth line disconnected or broken?
3		Is the mounting frame seriously affected by rust and is the outdoor unit tilted or unstable?

AFTER SALE SERVICE AND WARRANTY

WHEN ASKING FOR SERVICE, CHECK THE FOLLOWING POINTS.

CONDITION	CHECK THE FOLLOWING POINTS
When it does not operate	● Is the fuse all right? ● Is the voltage extremely high or low? ● Is the circuit breaker “ON”?
When it does not cool well	● Is the air filter blocked with dust? ● Does sunlight fall directly on the outdoor unit? ● Is the air flow of the outdoor unit obstructed? ● Are the doors or windows opened, or is there any source of heat in the room? ● Is the set temperature suitable?

Notes

- In quiet operation or stopping the operation, the following phenomena may occassionally occur, but they are not abnormal for the operation.
  (1) Slight flowing noise of refrigerant in the refrigerating cycle.
  (2) Slight rubbing noise from the fan casing which is cooled and then gradually warmed as operation stops.
- The odor will possibly be emitted from the room air conditioner because the various odor, emitted by smoke, foodstuffs, cosmetics and so on, sticks to it. So please clean the air filter and the evaporator regularly to reduce the odor.

- Please contact your sales agent immediately if the air conditioner still fails to operate normally after the above inspections. Inform your agent of the model of your unit, production number, date of installation. Please also inform him regarding the fault.

- Power supply shall be connected at the rated voltage, otherwise the unit will be broken or could not reach the specified capacity.

NOTE:

If the supply cord is damaged, it must be replaced by the special cord obtainable at authorized service parts centers.

This product conforms with the protection requirements of council directives 89/336/EEC relating to electromagnetic compatibility and 73/23/EEC relating to electrical equipment designed for use within certain voltage limits.

Please note:
On switching on the equipment, particularly when the room light is dimmed, a slight brightness fluctuation may occur. This is of no consequence.
The conditions of the local Power Supply Companies are to be observed.

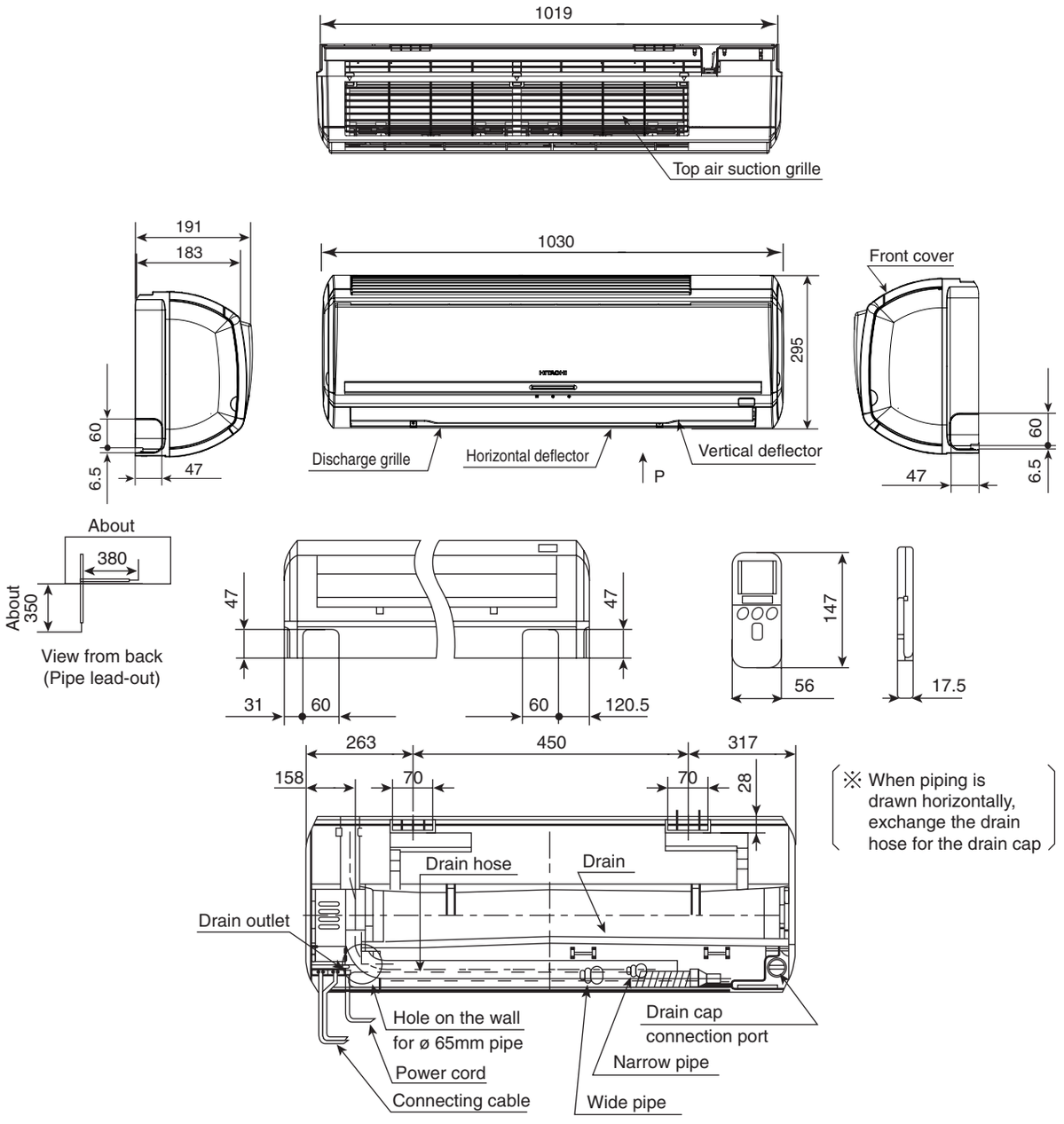
Note

- Avoid to use the room air conditioner for cooling operation when the outside temperature is below 21°C (70°F).
  The recommended maximum and minimum operating temperatures of the hot and cold sides should be as below:

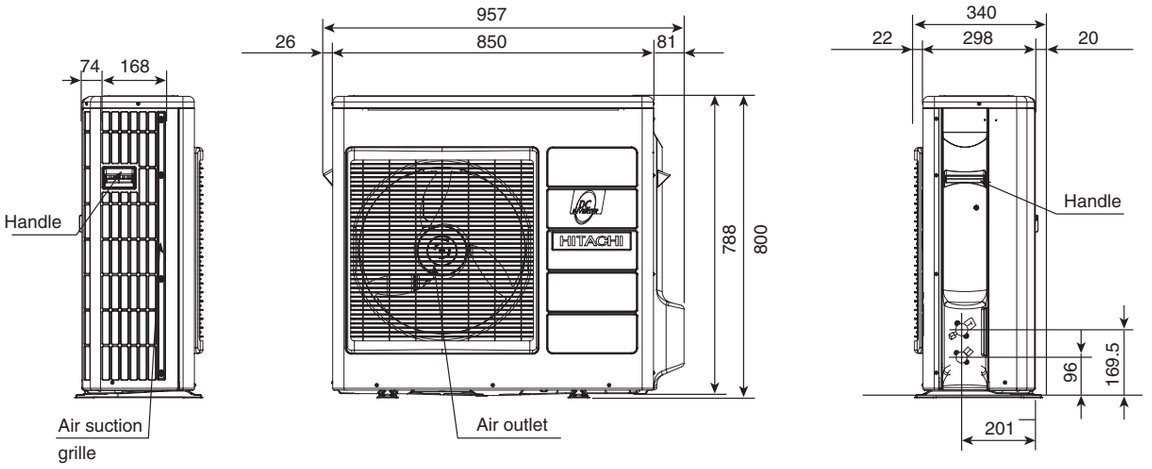
		Minimum	Maximum
Indoor	Dry bulb °C	21	32
	Wet bulb °C	15	23
Outdoor	Dry bulb °C	21	43
	Wet bulb °C	15	26

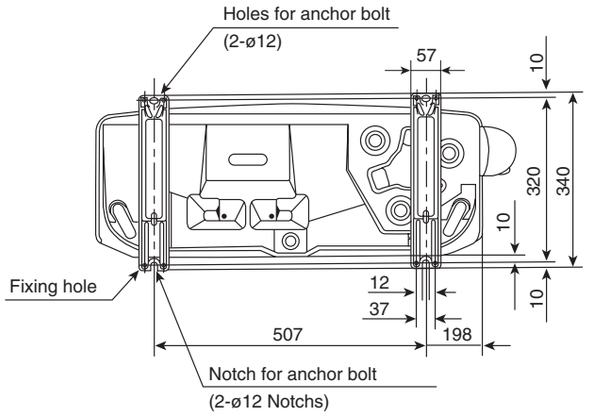
MEMO

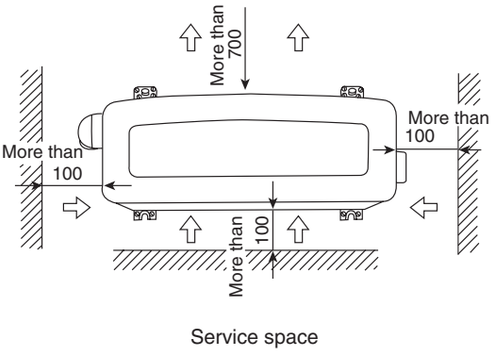
CONSTRUCTION AND DIMENSIONAL DIAGRAM



CONSTRUCTION AND DIMENSIONAL DIAGRAM FOR OUTDOOR







Service space

MAIN PARTS COMPONENT

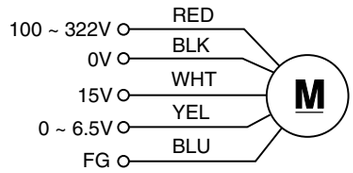
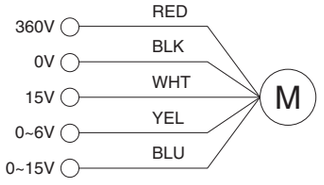
THERMOSTAT (Room Temperature Thermistor)

Thermostat Specifications

MODEL			RAS-70YH5	
THERMOSTAT MODEL			IC	
OPERATION MODE			COOL	HEAT
TEMPERATURE °C (°F)	INDICATION 16	ON	15.6 (60.1)	20.0 (68.0)
		OFF	15.3 (59.5)	20.7 (69.3)
	INDICATION 24	ON	23.6 (74.5)	28.0 (82.4)
		OFF	23.3 (73.9)	28.7 83.7)
	INDICATION 32	ON	31.6 (88.9)	36.0 (96.8)
		OFF	31.3 (88.3)	36.7 (98.1)

FAN MOTOR

Fan Motor Specifications

MODEL	RAS-70YH5	RAC-70YH5
POWER SOURCE	DC: 100 ~ 322V	DC350V
OUTPUT	30W	100W
CONNECTION	 (Control circuit built in)	

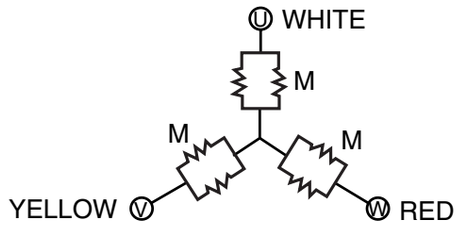
BLU : BLUE YEL : YELLOW BRN : BROWN WHT : WHITE

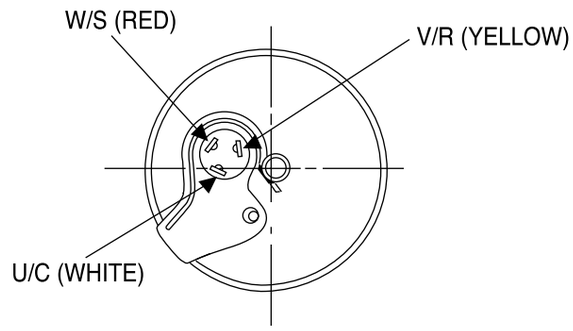
GRY : GRAY ORN : ORANGE GRN : GREEN RED : RED

BLK : BLACK PNK : PINK VIO : VIOLET

COMPRESSOR MOTOR

Compressor Motor Specifications

MODEL		RAC-70YH5
COMPRESSOR MODEL		JU1015D3
PHASE		SINGLE
RATED VOLTAGE		AC 220 ~ 240 V
RATED FREQUENCY		50 Hz
POLE NUMBER		4
CONNECTION		
RESISTANCE VALUE (Ω)	20°C (68°F)	2M = 1.05
	75°C (167°F)	2M = 1.268



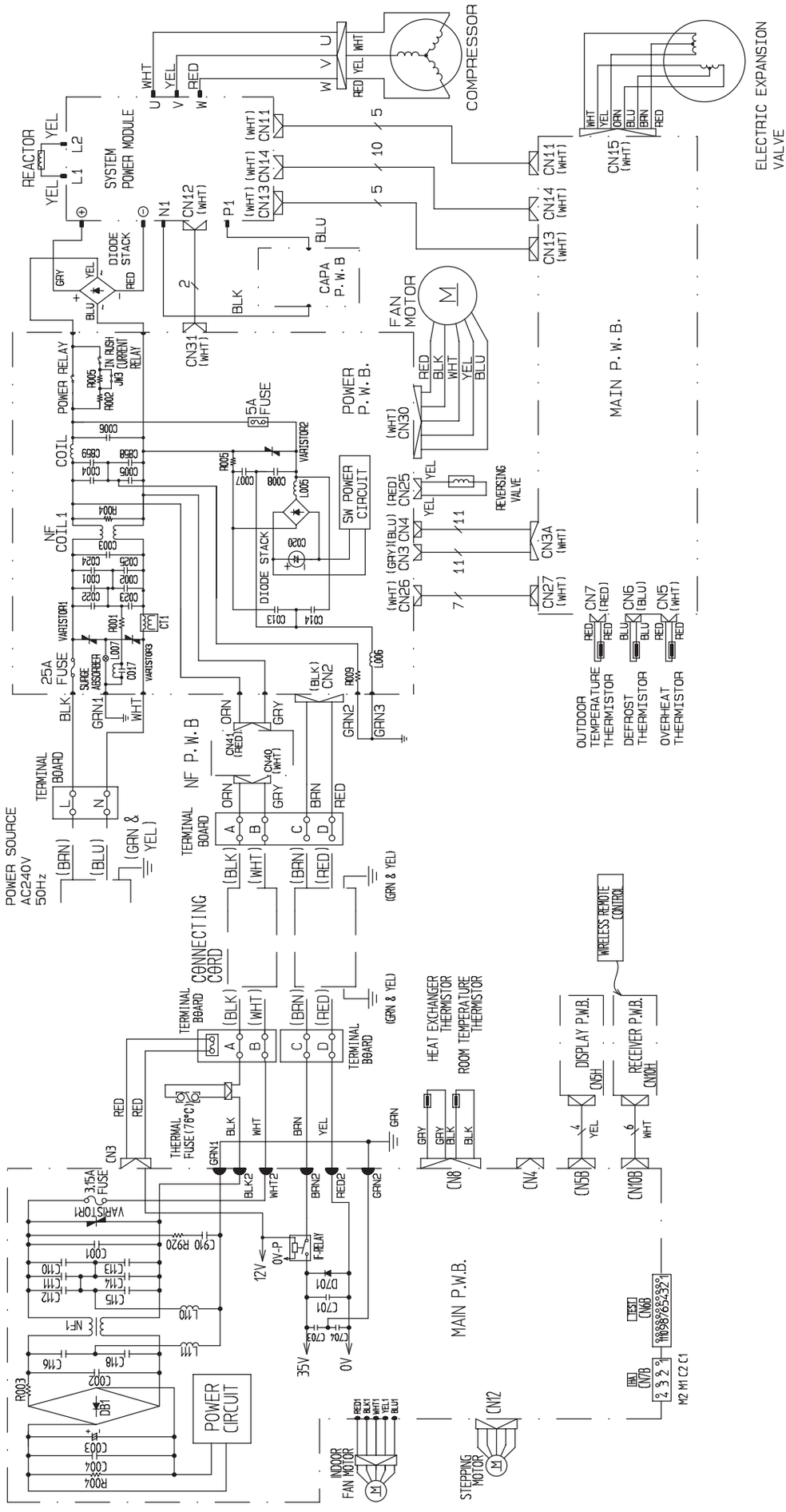
⚠ CAUTION

When the Air Conditioner has been operated for a long time with the capillary tubes clogged or crushed or with too little coolant, check the color of the refrigerant oil inside the compressor. If the color has been changed conspicuously, replace the compressor.

WIRING DIAGRAM

MODEL RAS-70YH5 / RAC-70YH5

OUTDOOR UNIT

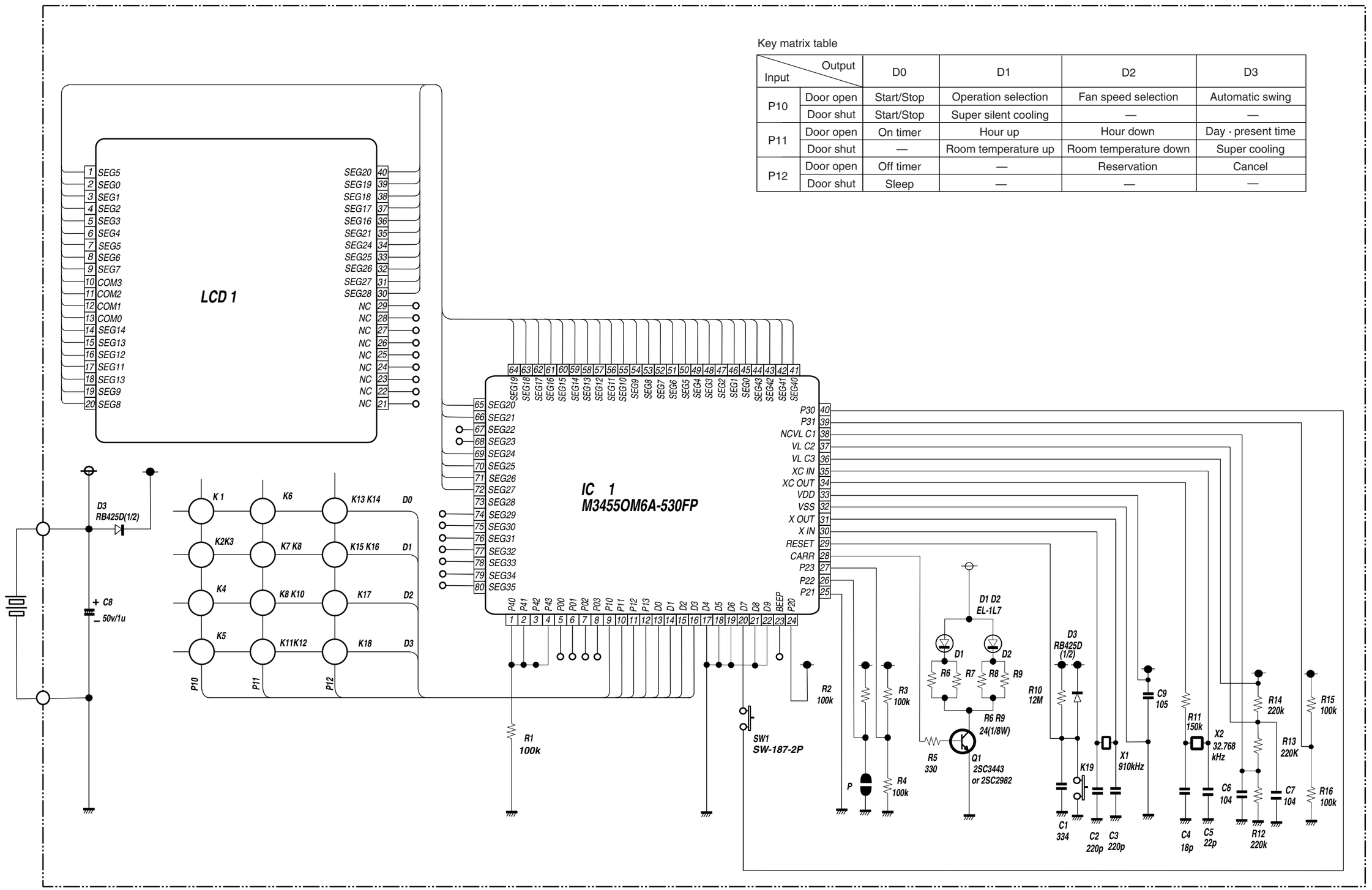


CIRCUIT DIAGRAM

Remote Control

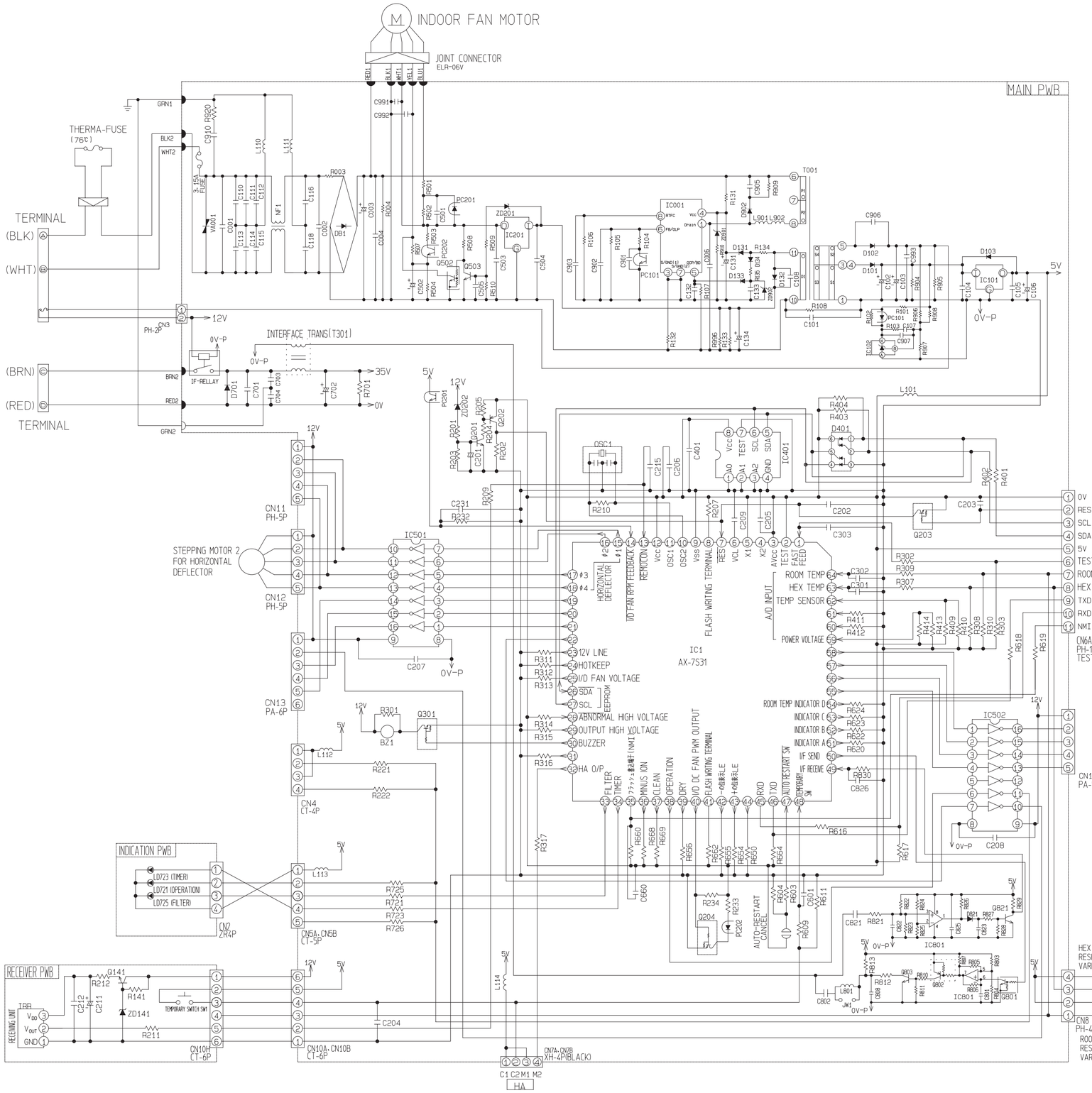
Key matrix table

Input \ Output		D0	D1	D2	D3
P10	Door open	Start/Stop	Operation selection	Fan speed selection	Automatic swing
	Door shut	Start/Stop	Super silent cooling	—	—
P11	Door open	On timer	Hour up	Hour down	Day · present time
	Door shut	—	Room temperature up	Room temperature down	Super cooling
P12	Door open	Off timer	—	Reservation	Cancel
	Door shut	Sleep	—	—	—



CIRCUIT DIAGRAM

MODEL RAS-70YH5



MOUNTING FACE
A: COMPONENT SIDE
B: SOLDER SIDE

MOUNTING TYPE
A : AXIAL
R : RADIAL
P : RADIAL (7.5mm PITCH)
H : HAND INSERT
C : CHIP SURFACE
: OTHER SURFACE MOUNTING

RESISTOR

SYMBOL	(Ω)	TOL	POWER (W)	MOUNTING TYPE	MOUNTING FACE	REMARK
R003	2.2	5%	5	H	A	
R004	1M	5%	1/4	A	A	RCR
R101	620	5%	1/10	C	B	
R102	1K	5%	1/10	C	B	
R103	15K	5%	1/10	C	B	
R104	2.2K	5%	1/10	C	B	
R105	33K	5%	1/10	C	A	
R106	150K	1%	1/10	C	A	
R107	330	5%	1/4	C	B	
R108					A	
R131	1.2M	5%	1	H	A	RCR
R132	0.62	5%	2	P	A	
R133	1M	5%	1/2	C	B	
R134	22	5%	1/2	A	A	
R135	750	5%	1/2	C	A	
R141	1K	5%	1/6	A		
R201	5.1K	5%	1/16	C	A	
R202	5.1K	5%	1/16	C	A	
R203	2K	5%	1/16	C	A	
R204	10K	5%	1/16	C	A	
R205	2.7K	5%	1/16	C	A	
R207	10K	5%	1/16	C	A	
R209	1K	5%	1/16	C	A	
R210	1M	5%	1/16	C	B	
R211	1K	5%	1/6	A		
R212	47	5%	1/6	A		
R221	390	5%	1/4	C	A	
R222	390	5%	1/4	C	A	
R232	1K	5%	1/10	C	B	
R233	390	5%	1/8	C	A	
R234	1K	5%	1/16	C		
R301	3.3K	5%	1/10	C	B	
R302	1K	5%	1/16	C	A	
R303	10K	5%	1/16	C	A	
R307	1K	5%	1/16	C	A	
R308	12.7K	1%	1/16	C	A	
R309	1K	5%	1/16	C	A	
R310	12.7K	1%	1/16	C	A	
R311	10K	5%	1/16	C	A	
R312	10K	5%	1/16	C	A	
R313	10K	5%	1/16	C	A	
R314	10K	5%	1/16	C	A	
R315	10K	5%	1/16	C	A	
R316	10K	5%	1/16	C	A	
R317	1K	5%	1/16	C	A	
R401	390	5%	1/16	C	A	
R402	390	5%	1/16	C	A	
R403	5.1K	5%	1/16	C	A	
R404	5.1K	5%	1/16	C	A	
R409	5.1K	5%	1/16	C	A	
R410	5.1K	5%	1/16	C	A	
R411	10K	5%	1/16	C	A	
R412	10K	5%	1/16	C	A	
R413	5.1K	5%	1/16	C	A	
R414	5.1K	5%	1/16	C	A	
R501	4.3K	5%	1/4	C	B	
R502	4.3K	5%	1/10	C	B	
R503	4.7K	5%	1/8	C	B	
R504	3.3K	5%	1/10	C	B	
R507	7.5K	5%	1/2	C	B	
R508	10K	5%	1/10	C	B	
R509	100	5%	1/10	C	A	
R510	15K	5%	1/10	C	B	
R603	1K	5%	1/16	C	A	
R604	20K	5%	1/16	C	A	
R609	1K	5%	1/16	C	A	
R611	10K	5%	1/16	C	A	
R616	1K	5%	1/10	C	A	
R617	10K	5%	1/10	C	A	
R618	1K	5%	1/10	C	A	
R619	10K	5%	1/10	C	A	
R620	10K	5%	1/16	C	A	
R622	10K	5%	1/16	C	A	
R623	10K	5%	1/16	C	A	
R624	10K	5%	1/16	C	A	
R650	10K	5%	1/16	C	A	
R654	10K	5%	1/16	C	A	
R655	10K	5%	1/16	C	A	
R656	10K	5%	1/16	C	A	
R660	1K	5%	1/16	C	A	
R662	10K	5%	1/16	C	A	
R664	10K	5%	1/16	C	A	
R668	10K	5%	1/16	C	A	
R669	10K	5%	1/16	C	A	
R701	20K	5%	1/6	A	A	
R721	300	5%	1/10	C	A	
R723	240	5%	1/10	C	A	
R725	240	5%	1/10	C	A	
R726	240	5%	1/10	C	A	
R803	120K	5%	1/16	C	A	
R804	120K	5%	1/16	C	A	
R805	120K	5%	1/16	C	A	
R806	120K	5%	1/16	C	A	
R807	4.3K	5%	1/16	C	A	
R810	680	5%	1/10	C	A	
R811	2K	5%	1/16	C	A	
R812	39	5%	1/4	C	A	
R813	39	5%	1/4	C	A	
R821	470	5%	1/16	C	A	
R822	10K	1%	1/16	C	A	
R823	10K	1%	1/16	C	A	
R824	8.25K	1%	1/16	C	A	
R825	10K	1%	1/16	C	A	
R826	1K	5%	1/16	C	A	
R827	3K	5%	1/16	C	A	
R828	10K	5%	1/16	C	A	
R829	5.1K	5%	1/16	C	A	
R830	1K	5%	1/16	C	A	
R904	1M	5%	1/2	C	B	
R905	1M	5%	1/2	C	B	
R906	12K	1%	1/10	C	B	
R907	2K	1%	1/10	C	B	
R908	12K	1%	1/10	C	B	
R909	220K	5%	2	P	A	
R910	270K	5%	1/2	C	A	
R996	10	5%	1/2	A	A	CFS
					B	

ZENNER DIODE

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
ZD141	HZ56B1LTA	A		
ZD202	RL27.5B	C	A	
ZD201	RD15UUN3	C	A	
ZD901	JUMPER	C	A	
ZD902	UDZS3.6B	C	A	

CAPACITOR

SYMBOL	(μF)	(V)	KIND	MOUNTING TYPE	MOUNTING FACE	REMARK
C001	0.68	AC250	F	H	A	
C002	0.01	AC250	C	P	A	耐電圧
C003	100	450	D	H	A	KMH
C004	0.01	1000V	C	H	A	
C006	2200	2000	C	P	A	
C101	2200p	AC250	C	R	A	
C102	470	25	D	R	A	LXZ
C103	1800	25	D	H	A	LXZ
C104	0.1	25	C	C	B	
C105	0.1	25	C	C	B	
C106	220	10	D	R	A	YXA
C107	0.1	25	C	C	B	
C108					A	
C110	0.01	AC250	C	P	A	STD PART
C111						
C112	0.01	AC250	C	P	A	STD PART
C113	0.01	AC250	C	P	A	STD PART
C114						
C115	0.01	AC250	C	P	A	STD PART
C116	1000p	AC250	C	P	A	STD PART
C118	1000p	AC250	C	P	A	STD PART
C131	10	50	D	R	A	PF
C132	470p	50	C	C	B	
C133	22p	50	C	C	A	
C134	68	50	D	R	A	LXZ
C201	10	16	D	R	A	
C202	0.1	25	C	C	B	
C203	0.1	25	C	C	A	
C204	0.1	25	C	C	A	
C205	0.1	25	C	C	B	
C206	0.1	25	C	C	B	
C207	0.1	25	C	C	A	
C208	0.1	25	C	C	A	
C209	0.1	25	C	C	B	
C211	47	16	D	R		
C212						
C215	1000p	50	C	C	B	B
C231	1000p	50	C	C	B	
C301	0.1	25	C	C	B	
C302	0.1	25	C	C	B	
C303	0.1	25	C	C	B	
C401	0.1	25	C	C	A	
C501	1000p	50	C	C	B	
C502	10	16	D	R	A	KL
C503	0.1	25	C	C	B	
C504	0.1	50	C	C	B	
C505	1000p	50	C	C	B	
C601	0.1	25	C	C	B	
C660	0.1	25	C	C	B	
C701	0.15μ	50	F	R	A	
C702	68#	50	D	R	A	UJ
C703	0.01	AC250	C	P	A	STD PART
C704	0.01	AC250	C	P	A	STD PART
C801	150P	50	C	C	A	CH
C802	0.22μ	50	F	R	A	
C808	0.1μ	25	C	C	A	F
C821	0.01μ	50	F	R	A	
C822	1000p	50	C	C	A	B
C823	0.047μ	25	C	C	A	B
C825	0.1μ	25	C	C	A	F
C826	0.01	50	C	C	B	
C901			C	C	B	
C902	0.47μ	10	C	C	B	
C903	0.01	50	C	C	A	
C905	0.01	1000	C	P	A	
C906	2200p	1000	C	P	A	
C907			C	C	B	
C910	470p	AC250	C	P	A	
C991	0.1	50	C	C	A	
C992	0.1	50	C	C	A	
C993	0.1	50	C	C	B	

COIL

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
L101	EXCELSA35	A	A	
L110	EXCELSA35	A	A	
L111	JUMPER	A	A	
L112	EXCELSA35	A	A	
L113	EXCELSA35	A	A	
L114	EXCELSA35	A	A	
L801	LB2518 101M	C	A	
L901	HF70BTL3.5X6R	A	A	
L902	HF70BTL3.5X6R	A	A	
NF1	RHK801 M-0016.7	H	A	
T001	200V-TRANS	H	A	
T301	RHK3636	H	A	

TRANSISTOR

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
Q141	KTC3199-Y	R		
Q201	2SC2462LC	C	A	
Q202	2SA1213SC	C	A	
Q203	DTC114EKA	C	A	
Q204	DTC114EUA	C		
Q301	DTC114EUA	C	A	
Q502	KRC402E	C	A	
Q503	2SC2412K-R	C	B	
Q801	RN1102	C	A	
Q802	RN2102	C	A	
Q803	2SC3441E	C	A	
Q821	2SC4738GRY	C	A	

LED

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
LD721	SEL2715K - YELLOW	H		
LD723	SEL6916A - ORANGE	H		
LD725	SEL6414E - GREEN	H		
LD221	E1S19-0P0A7 VIOLET	H		

DIODE

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
D101	RK16	A	A	
D102	FMB-G16L	H	A	
D103	1SS355	C	A	
D131	U1GU44	C	B	
D132	U1GU44	C	B	
D133	1SS355	C	A	
D134	U1GU44	C	B	
D401	HN1D03FU	C	A	
D701	DSM3	C	A	
DB21	1SS355	C	A	
D902	EG01C	A	A	
DB1	D3SBA60	H	A	

IC

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
IC1	HD64336B4H	C	A	
IC001	STR-V852	H	A	
IC101	KIA7805API	H	A	
IC102	KIA431A	R	A	
IC201	KIA7815API	H	A	
IC401	BR24L04F-W	C	A	
IC501	KID65003AF	C	A	
IC502	KID65003AF	C	A	
IC801	NJM2903M	C	A	
IRR	RPM6938-V4	H		

フォトカプラ

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
PC101	PS2701-1	C	B	
PC201	PS2701-1	C	B	
PC202	PS2701-1	C	B	

BUZZER

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
BZ1	PKM13EPY	H	A	

FUSE

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
3AFUSE	250V/3.15A(BET3.15)	H	A	
HF	TP00351-51	R	A	
HF	TP00351-51	R	A	

JUMPER

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
JW1		A	A	

SWITCH

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
SW1	EVQPAC05R	H		

SURGE ARRESTER

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
VA001	416NR-12D	P	A	

OCCILATOR

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
OSC1	EFOMC1005	R	A	

CONNECTOR

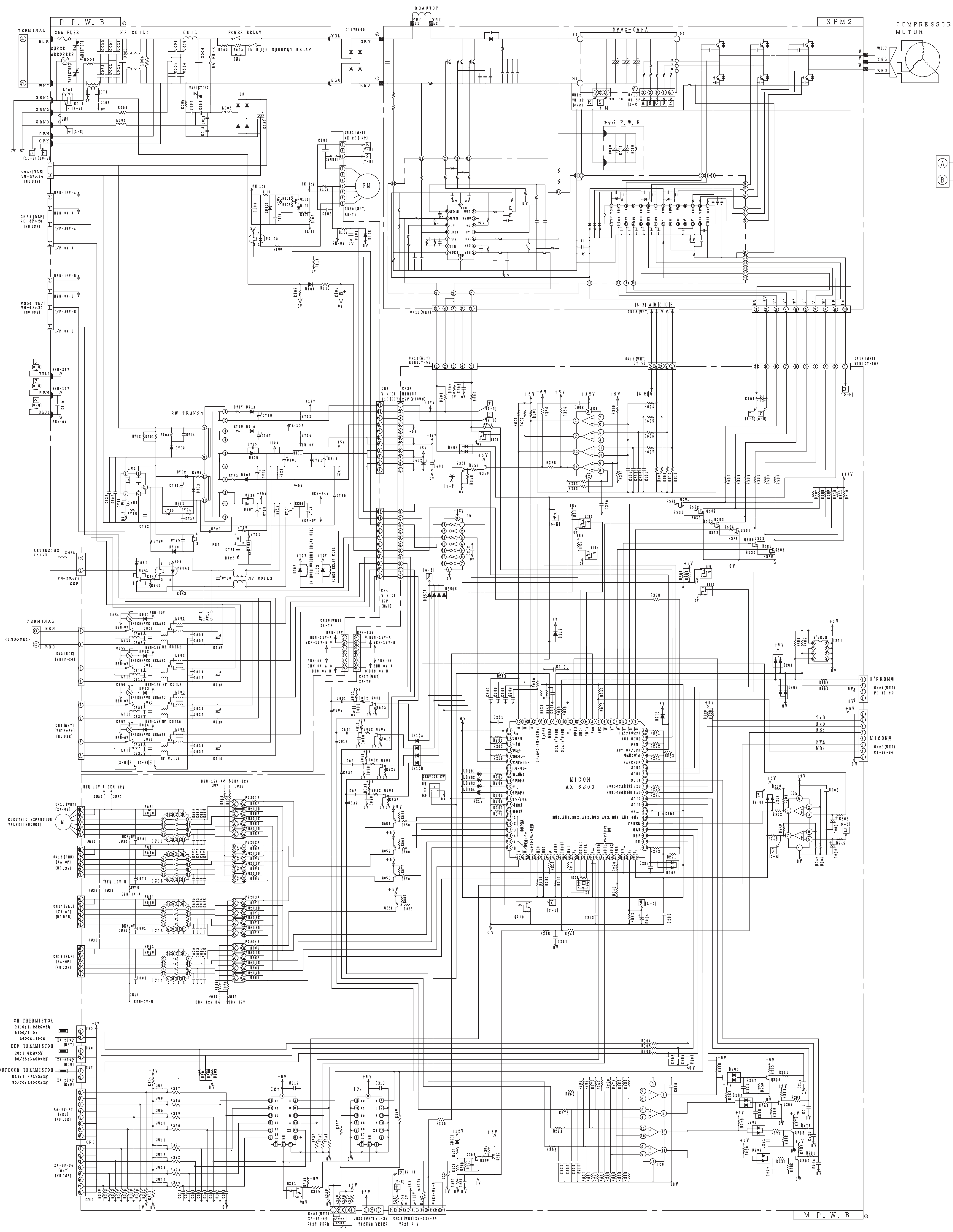
SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
CN3	B2B-PH-K-S	H	A	
CN4	CT-4P-V	H	A	
CN5A		H	A	
CN5B	CT-5P-V	H	A	
CN6A		H	A	
CN6B	B11B-PH-K-S	H	A	
CN7A		H	A	
CN7B	B11B-PH-K-S	H	A	BLK
CN8	B4B-PH-K-S	H	A	
CN10A		H	A	
CN10B	CT-6P-V	H	A	
CN11	B5B-PH-K-K	H	A	BLK
CN12	B5B-PH-K-S	H	A	
CN13	B6B-PA-K-S	H	A	
CN14	B5B-PA-K-S	H	A	
JOIN CONN	ELR-06V(RNB1281)	H	A	
CN5H	SJN-6P	H		
CN10H	CT-6P-V	H		
BLU1	BOARD-IN TYPE	H	A	
YEL1	BOARD-IN TYPE	H	A	
BLK1	BOARD-IN TYPE	H	A	
BLK2	BOARD-IN TYPE	H	A	
RED1	BOARD-IN TYPE	H	A	
RED2	BOARD-IN TYPE	H	A	
WHT1	BOARD-IN TYPE	H	A	
WHT2	BOARD-IN TYPE	H	A	
BRN2	BOARD-IN TYPE	H	A	
GRN1	BOARD-IN TYPE	H	A	
GRN2	BOARD-IN TYPE	H	A	

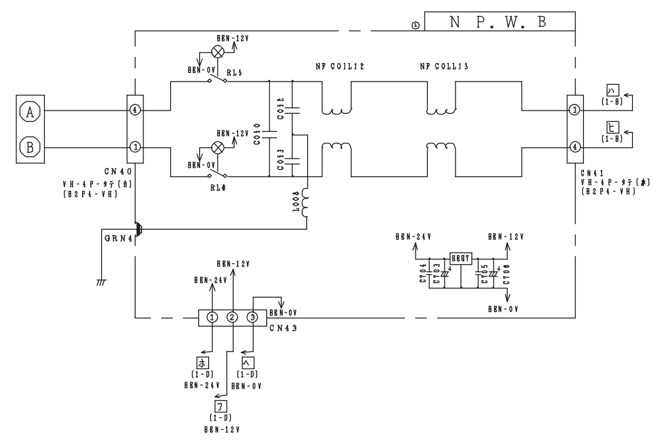
RELAY

SYMBOL	MODEL TYPE	MOUNTING TYPE	MOUNTING FACE	REMARK
IF-RELLAY	FTR-F3-RY	H	A	

CIRCUIT DIAGRAM

MODEL RAC-70YH5





PCB SET
N : M.P.W.B
P : P.P.W.B
S : SW.P.W.B
C : キャパ.P.W.B
N : NF.P.W.B

Surface
A : Parts side
B : Solder side

Mounting form
A : Axial insertion
R : Radial insertion
P : Radial insertion (7.5mm pitch)
H : Hand insertion
C : Chip surface mounting
S : In addition surface mounting

Resistor

symbol	resistance (Ω)	tolerance	power rating (W)	mounting form	surface	remark	pcb set
R001	JUMPER			A			P
R002	100	5%	10	H			P
R003							P
R004	470k	5%	1/2	A		BCR	P
R005	2.2	5%	5	H			P
R009	JUMPER			A			P
R010	470k	5%	1/2	A		BCR	C
R101	3.6k	1%	1/6	A			P
R102	3k	1%	1/6	A			P
R103	30k	5%	1/6	A			P
R104	3.9k	5%	1/6	A			P
R105	7.5k	5%	1/6	A			P
R106	2.4k	5%	1/6	A			P
R107	6.2	1%	2	P			P
R108	1k	1%	1/6	A			P
R109	510	5%	1/6	A			P
R110	1.69k	1%	1/6	A			P
R114	1k	5%	1/6	A			P
R115	JUMPER			A			P
R201	10k	5%	1/16	C	A	1608	M
R202	10k	5%	1/16	C	A	1608	M
R203	2k	5%	1/16	C	A	1608	M
R204	2k	5%	1/16	C	A	1608	M
R205	2k	5%	1/16	C	A	1608	M
R206	10k	5%	1/16	C	A	1608	M
R207	10k	5%	1/16	C	A	1608	M
R212	2k	5%	1/16	C	A	1608	M
R215	10k	5%	1/16	C	A	1608	M
R216	10k	5%	1/16	C	A	1608	M
R217	10k	5%	1/16	C	A	1608	M
R219	10k	5%	1/16	C	A	1608	M
R220	1M	5%	1/16	C	A	1608	M
R221	10k	1%	1/16	C	A	1608	M
R222	510	5%	1/16	C	A	1608	M
R223	100	5%	1/16	C	A	1608	M
R224	100	5%	1/16	C	A	1608	M
R225	100	5%	1/16	C	A	1608	M
R228	100	5%	1/16	C	A	1608	M
R229	10k	5%	1/16	C	A	1608	M
R230	10k	5%	1/16	C	A	1608	M
R231	10k	5%	1/16	C	A	1608	M
R232	10k	5%	1/16	C	A	1608	M
R233	10k	5%	1/16	C	A	1608	M
R234	10k	5%	1/16	C	A	1608	M
R237	5.1k	5%	1/16	C	A	1608	M
R238	100	5%	1/16	C	A	1608	M
R239	100	5%	1/16	C	A	1608	M
R240	1k	5%	1/16	C	A	1608	M
R243	100	5%	1/16	C	A	1608	M
R244	2k	5%	1/16	C	A	1608	M
R245	5.1k	5%	1/16	C	A	1608	M
R246	10k	5%	1/16	C	A	1608	M
R247	1.43k	1%	1/16	C	A	1608	M
R248	1k	5%	1/16	C	A	1608	M
R249	20k	1%	1/16	C	A	1608	M
R250	10k	5%	1/16	C	A	1608	M
R251	10k	5%	1/16	C	A	1608	M
R253	3.32k	1%	1/16	C	A	1608	M
R254	100	5%	1/16	C	A	1608	M
R255	2k	5%	1/16	C	A	1608	M
R256	10k	5%	1/16	C	A	1608	M
R257	3k	5%	1/16	C	A	1608	M
R258	1k	5%	1/16	C	A	1608	M
R259	8.25k	1%	1/16	C	A	1608	M
R260	10k	1%	1/16	C	A	1608	M
R261	10k	1%	1/16	C	A	1608	M
R262	10k	1%	1/16	C	A	1608	M
R263	470	5%	1/16	C	A	1608	M
R264	100	5%	1/16	C	A	1608	M
R265	2k	5%	1/16	C	A	1608	M
R266							M
R267							M
R268							M
R269							M
R270							M
R271							M
R272							M
R273							M
R274	100	5%	1/16	C	A	1608	M
R275	2k	5%	1/16	C	A	1608	M
R276							M
R277							M
R278							M
R279							M
R280							M
R281							M
R282							M
R283							M
R284	100	5%	1/16	C	B	1608	M
R285	2k	5%	1/16	C	B	1608	M
R286							M
R287							M
R288							M
R289							M
R290							M
R291							M
R292							M
R293							M
R294	18k	5%	1/16	C	A	1608	M
R295	910	1%	1/16	C	A	1608	M
R296							M
R301	3.74k	1%	1/16	C	A	1608	M
R302	3.01k	1%	1/16	C	A	1608	M
R303	3.01k	1%	1/16	C	A	1608	M
R304	100	5%	1/16	C	A	1608	M
R305	100	5%	1/16	C	A	1608	M
R306	100	5%	1/16	C	A	1608	M
R307							M
R308							M
R309							M
R310							M
R311							M
R312							M
R313							M
R314							M
R315							M
R316							M
R317							M
R318							M
R319							M
R320							M
R321							M
R322							M
R323							M
R324							M
R326	1k	5%	1/16	C	A	1608	M
R327							M
R328	2.7k	5%	1/16	C	A	1608	M
R329	470	5%	1/16	C	A	1608	M
R330	1.6k	5%	1/16	C	A	1608	M
R331	4.3k	5%	1/16	C	A	1608	M
R332	10k	5%	1/16	C	A	1608	M
R333	10k	5%	1/16	C	A	1608	M
R334	10k	5%	1/16	C	A	1608	M
R335							M
R336							M
R338	0	5%	1/16	C	A	1608	M
R340	100	5%	1/16	C	A	1608	M
R341	100	5%	1/16	C	A	1608	M
R342	100	5%	1/16	C	A	1608	M
R343	10k	5%	1/16	C	A	1608	M
R344	100	5%	1/16	C	A	1608	M
R345	5.1k	5%	1/16	C	A	1608	M
R350	120k	1%	1/16	C	A	1608	M
R351	120k	1%	1/16	C	A	1608	M
R352	120k	1%	1/16	C	A	1608	M
R353	120k	1%	1/16	C	A	1608	M
R354	4.3k	2%	1/16	C	A	1608	M
R355	4.3k	5%	1/16	C	A	1608	M
R356	10k	5%	1/16	C	A	1608	M
R357	2k	5%	1/16	C	A	1608	M
R358	3k	5%	1/16	C	A	1608	M
R360							M
R361	6.98k	1%	1/16	C	A	1608	M
R362	2k	5%	1/16	C	A	1608	M

Resistor

symbol	resistance (Ω)	tolerance	power rating (W)	mounting form	surface	remark	pcb set
R363	1k	5%	1/16	C	A	1608	M
R364	1k	1%	1/16	C	A	1608	M
R365	10k	5%	1/16	C	A	1608	M
R366	4.7k	5%	1/16	C	A	1608	M
R367	3k	5%	1/16	C	A	1608	M
R368	1.6k	5%	1/16	C	A	1608	M
R369	27k	5%	1/16	C	A	1608	M
R370	5.1k	5%	1/16	C	A	1608	M
R371	10k	5%	1/16	C	A	1608	M
R401	5.1k	5%	1/16	C	A	1608	M
R402	5.1k	5%	1/16	C	A	1608	M
R403	390	5%	1/16	C	A	1608	M
R404	390	5%	1/16	C	A	1608	M
R501	1k	5%	1/16	C	A	1608	M
R502	1k	5%	1/16	C	A	1608	M
R503	1k	5%	1/16	C	A	1608	M
R504	1k	5%	1/16	C	A	1608	M
R505	1k	5%	1/16	C	A	1608	M
R506	1k	5%	1/16	C	A	1608	M
R507	5.1k	5%	1/8	C	A	3216	M
R508	5.1k	5%	1/8	C	A	3216	M
R509	5.1k	5%	1/8	C	A	3216	M
R510	5.1k	5%	1/8	C	A	3216	M
R511	5.1k	5%	1/8	C	A	3216	M
R512	5.1k	5%	1/8	C	A	3216	M
R521	10k	5%	1/16	C	A	1608	M
R522	10k	5%	1/16	C	A	1608	M
R523	10k	5%	1/16	C	A	1608	M
R524	10k	5%	1/16	C	A	1608	M
R525	10k	5%	1/16	C	A	1608	M
R526	10k	5%	1/16	C	A	1608	M
R531	5.1k	5%	1/16	C	A	1608	M
R532	5.1k	5%	1/16	C	A	1608	M
R533	5.1k	5%	1/16	C	A	1608	M
R534	5.1k	5%	1/16	C	A	1608	M
R535	5.1k	5%	1/16	C	A	1608	M
R536	5.1k	5%	1/16	C	A	1608	M
R601	2k	5%	1/16	C	A	1608	M
R602	2k	5%	1/16	C	A	1608	M
R603	2k	5%	1/16	C	A	1608	M
R604	100	5%	1/16	C	A	1608	M
R605	100	5%	1/16	C	A	1608	M
R606	100	5%	1/16	C	A	1608	M
R607	100	5%	1/16	C	A	1608	M
R608	4.02k	1%	1/16	C	A	1608	M
R609	4.02k	1%	1/16	C	A	1608	M
R610	4.02k	1%	1/16	C	A	1608	M
R611	4.02k	1%	1/16	C	A	1608	M
R701	1M	5%	1/2	A		BCR	P
R702	1M	5%	1/2	A		BCR	P
R703	100k	5%	2	P		MOS	P
R708	10	5%	1/4	A			P
R710	1.8k	5%	1/4	A			P
R711	75	5%	1/6	A			P
R712	3.3k	5%	1/4	A			P
R713	8.2k	5%	1	P		MOS	P
R714	3.3k	5%	1/4	A			P
R715	680	5%	1/4	A			P
R716	0.56	5%	1	P		MOSX	P
R717	JUMPER			A			P
R718	8.2	5%	1/4	A			P
R721	10k	5%	1/6	A			P
R722	2.7k	5%	1/4	A			P
R723	33	5%	1/6	A			P
R724	2.7k	5%	1/4	A			P
R725		JUMPER		A			P
R726	3.3k	5%	1/4	A			P
R801	39	5%	1/4	C	A	3225	M
R802	39	5%	1/4	C	A	3225	M
R803	3k	5%	1/16	C	A	1608	M
R804	3k	5%	1/16	C	A	1608	M
R811							M
R812							M
R813							M
R814							M
R821							M
R822							M
R823							M
R824							M
R831							M
R832							M
R833							M
R834							M
R841	10k	5%	1/6	A			P
R842	7.5k	5%	1/2	A			P
R843	620	5%	1/6	A			P
R850	200	5%	1/10	C	A	2125	M
R851	200	5%	1/10	C	A	2125	M
R852	510	5%	1/16	C	A	1608	M
R853	510	5%	1/16	C	A	1608	M
R854	510	5%	1/16	C	A	1608	M
R855	510	5%	1/16	C	A	1608	M
R856	1k	5%	1/10	C	A	2125	M
R857	10k	5%	1/16	C	A	1608	M
R858	3k	5%	1/16	C	A	1608	M
R860							M
R861							M
R862							M
R863							M
R864							M
R865							M
R866							M
R867	10k	5%	1/16	C	A	1608	M
R868	3k	5%	1/16	C	A	1608	M
R870							M
R871							M
R872							M
R873							M
R874							M
R875							M
R876							M
R877	10k	5%	1/16	C	A	1608	M
R878	3k	5%	1/16	C	A	1608	M
R880							M
R881							M
R882							M
R883							M
R884							M
R885							M
R886							M
R887	10k	5%	1/16	C	B	1608	M
R888	3k	5%	1/16	C	B	1608	M

Capacitor

symbol	capacitance (μF)	withstand voltage (V)	type	mounting form	surface	remark	temperature characteristics	pcb set
C001	0.01	AC250	C	P		規格品	F	P
C002	0.01	AC250	C	P		規格品	F	P
C003	0.68	630	F	H		ECQU		P
C004	0.001	AC250	C	P		規格品	F	P
C005	0.01	AC250	C	P		規格品	F	P
C006	3.3	AC300	F	H		VEA		P
C007	0.01	AC250	C	P		規格品	F	P
C008	0.01	AC250	C	P		規格品	F	P
C010	400	450	D	H				C
C011	400	450	D	H				C
C013	0.01	AC250	C	P		規格品	F	P
C014	0.01	AC250	C	P		規格品	F	P
C017	0.0022	AC250	C	P		規格品	F	P
C020	270	450	D	H		SME		P
C022	0.01	AC250	C	P		規格品	F	P
C023	0.01	AC250	C	P		規格品	F	P
C024	0.01	AC250	C	P		規格品	F	P
C025	0.01	AC250	C	P		規格品	F	P
C050	0.47	AC275	F	H		規格品		N
~~C051~~	~~0.47~~	~~AC250~~	~~C~~	~~R~~		~~規格品~~		~~N~~
C052	0.01	AC250	C	P		規格品	F	N
C053	0.01	AC250	C	P		規格品	F	N
~~C054~~	~~0.01~~	~~AC250~~	~~C~~	~~P~~		~~規格品~~	~~F~~	~~N~~
~~C055~~	~~0.01~~	~~AC250~~	~~C~~	~~P~~		~~規格品~~	~~F~~	~~N~~
~~C056~~	~~0.01~~	~~AC250~~	~~C~~	~~P~~		~~規格品~~	~~F~~	~~N~~
~~C057~~	~~0.01~~	~~AC250~~	~~C~~	~~P~~		~~規格品~~	~~F~~	~~N~~
C101	0.082	630	F	H		QXJ		P
C102								P
C103	0.1	50	C	R			F	P
C104	1000p	50	C	R				P
C105	100	16	D	R				P
C106								P
C109	0.1	50	C	R			F	P
C201	0.1	25	C	C	A	1608	F	M
C202	2200p	25	C	C	A	1608	B	M
C203	2200p	25	C	C	A	1608	B	M
C205	0.1	50	D	C	A	WX		M
C206	0.1	25	C	C	A	1608	F	M
C207	0.047	50	C	C	A	1608	F	M
C208	0.1	25	C	C	A	1608	F	M
C209	0.1	25	C	C	A	1608	F	M
C210	0.047	50	C	C	A	1608	F	M
C211	0.1	25	C	C	A	1608	F	M
C212	0.1	25	C	C	A	1608	F	M
C213	0.047	50	C	C	A	1608	F	M
C214	0.068	16	C	C	A	1608	B	M
C215	0.1	25	C	C	A	1608	F	M
C216	4700p	50	C	C	A	1608	B	M
C217								M
C218								M
C219								M
C220								M
C221								M
C222								M
C223	0.1	25	C	C	A	1608	F	M
C224	10	16	D	C	A	WX		M
C225								M
C226								M
C227								M
C280	2.2	50	D	C	A	WX		M
C281	0.01	50	C	C	A	1608	B	M
C282	22	6.3	D	C	A	WX		M
C283	0.1	25	C	C	A	1608	F	M
C284	0.1	25	C	C	A	1608	F	M
C301	0.1	25	C	C	A	1608	F	M
C302	0.1	25	C	C	A	1608	F	M
C303	0.1	25	C	C	A	1608	F	M
C304								M
C305								M
C306								M
C307								M
C308								M
C309								M
C310								M
C311								M
C312								M
C313								M
C350	150p	50	C	C	A	1608	CH	M
C351	0.047	50	C	C	A	1608	F	M
C402	100	16	D	C	A	UR		M
C403	100	25	D	C	A			M
C404	33	25	D	C	A	WX		M
C601	680p	50	C	C	A	2125	CH	M
C602	680p	50	C	C	A	2125	CH	M
C603	680p	50	C	C	A	2125	CH	M
C604	680p	50	C	C	A	2125	CH	M
C605	1000p	50	C	C	A	1608	B	M
C606	1000p	50	C	C	A	1608	B	M
C607	1000p	50	C	C	A	1608	B	M
C608	0.1	25	C	C	A	1608	F	M
C701	330	50	D	H		LXV		P
C702	0.1	50	C	R			F	P
C703	330	50	D	H		LXV		N
C704	0.1	50	C	R			F	N
C705	0.1	50	C	R			F	N
C706	330	25	D	H		PF		N
C707	330	25	D	H		PF		P
C708	330	25	D	H		PF		P
C709	180	16	D	R		PF		P
C710	330	50	D	H		LXV		P
C714	0.01	1k	C	P			E	P
C716	330	16	D	R		PF		P
C718	220	25	D	R		PF		P
C719	0.1	50	C	R			F	P
C721	0.1	50	C	R			F	P
C722								P
C723	470p	2k	C	P			B	P
C724	0.1	50	C	R			F	P
C725								P
C731	330	25	D	R		PF		P
C732	470p	50	C	R				P
C733	1000p	50	C	R				P
C734	1000p	AC250	C	P			E	P
C735	1000p	50	C	R				P
C736	68	50	D	R		PF		P
C737	68	50	D	R		PF		P
C738								P
C739								P
C740								P
C780	470p	AC250	C	P			B	P
C801	0.15	50	F	C	A	6041		M
C802	0.022	16	F	C	A	3216		M
C803	0.15	50	F	R				P
C804	0.01	AC250	C	P		規格品	F	P

Capacitor

symbol	capacitance (μF)	withstand voltage (V)	type	mounting form	surface	remark	temperature characteristics	pcb set
C805	0.01	AC250	C	P		規格品	F	P
C806	0.01	AC250	C	P			F	P
C807	0.01	AC250	C	P			F	P
C808	0.1	25	C	C	A	1608	F	M
C811								M
C812								M
C813								P
C814								P
C815								P
C816								P
C817								P
C818								M
C820	470p	AC250	C	P			B	P
C821								M
C822								M
C823								P
C824								P
C825								P
C826								P
C827								P
C828								M
C831								M
C832								M
C833								P
C834								P
C835								P
C836								P
C837								P
C838								M
C854	100	25	D	R				P
C855								P
C856								P
C857								P
C858	0.001	AC250	C	P		規格品	F	P
C859	0.01	AC250	C	P		規格品	F	P
C861	0.1	25	C	C	A	1608	F	M
C862	0.01	50	C	C	A	1608	B	M
C863	0.01	50	C	C	A	1608	B	M
C864	0.01	50	C	C	A	1608	B	M
C865	0.01	50	C	C	A	1608	B	M
C871								M
C872								M
C873								M
C874								M
C875								M
C881								M
C882								M
C883								M
C884								M
C885								M
C891								M
C892								M
C893								M
C894								M
C895								M

Diode

symbol	product name	mounting form	surface	remark	pcb set
D101	1GH46	A			P
D102	1S2076A	A			P
D103	1S2076A	A			P
D104	1SS120	A			P
D105	1SS120	A			P
D201	DAN202K	C	A		M
D202	DAP202K	C	A		M
D203	DAP202K	C	A		M
D204	DAN202K	C	A		M
D205	DAN202K	C	A		M
D206	DAN202K	C	A		M
D207					M
D208					M
D209					M
D210A	1SS355	C	A		M
D210B					M
D212	1SS355	C	A		M
D213	1SS355	C	A		M
D350A	1SS355	C	A		M
D350B					M
D702	1GH46	A			P
D703	1SS120	A			P
D705	RN2Z	H			P
D706	AK06	A			P
D707	RN3Z	H			P
D708	JUMPER	A			P
D709	RD1P	A			P
D710	1GH46	A			P
D713	1GH46	A			P
D715	1SS120	A			P
D716	1S2473	A			P
D811	1SS120	A			P
D812					P
D813					P
D814					P
D841	1SS120	A			P

IC

symbol	product name	mounting form	surface	remark	pcb set
MICON	AX-6S00	Q	A		M
EEPROM	S24C04BFJ-TB	S	A		M
IC1	STR-F6523	H			P
IC4	NJM2901M-TE1	S	A		M
IC5	NJM2904M-TE3	S	A		M
IC6	NJM2901M-TE1	S	A		M
IC7					M
IC8					M
IC9	ULN2003ANS	S	A		M
IC11	M54532FP	S	A		M
IC12					M
IC13					M
IC14					M
REG1	MC7805CT	H			P
REG2	SE012N	H			P
REG6	TA7824S ~~MC7812CT~~	H			P
REG7	MC7812CT	H			N

Surge arrester

symbol	product name	mounting form	surface	remark	pcb set
VARISTOR1	450NR-12D	P			P
VARISTOR2	450NR-12D	P			P
VARISTOR3	450NR-12D	P			P
SURGE ABSORBER	DSA-102MA-05F25	H			P

Diode stack

symbol	product name	mounting form	surface	remark	pcb set
DS	D15XB60	H			P

Transistor

symbol	product name	mounting form	surface	remark	pcb set
Q101	2SA673	R			P
Q201	RN1402	C	A		M
Q202	RN1402	C	A		M
Q203	RN1402	C	A		M
Q204	RN1402	C	B		M
Q205	2SC2462LC	C	A		M
Q206	2SC2462LC	C	A		M
Q207					M
Q208					M
Q209					M
Q210					M
Q211	RN1402	C	A		M
Q212	2SA1121SC	C	A		M
Q213					M
Q350	2SA1121SC	C	A		M
Q351	2SC2462LC	C	A		M
Q501	2SC2462LC	C	A		M
Q502	2SC2462LC	C	A		M
Q503	2SC2462LC	C	A		M
Q504	2SC2462LC	C	A		M
Q505	2SC2462LC	C	A		M
Q506	2SC2462LC	C	A		M
Q801	2SC2618RC	C	A		M
Q802					M
Q803					M
Q804					M
Q841	2SC1214CT	R			P
Q851	2SA1121SC	C	A		M
Q852					M
Q853					M
Q854					M

Photocoupler

symbol	product name	mounting form	surface	remark	pcb set
PQ7	PS2561-1(K,L-rank)	H			P
PQ102	PS2561-1(K,L-rank)	H			P
PQ201A~D	PS2701-1(P-rank)	S	A		M
PQ202A~D					M
PQ203A~D					M
PQ204A~D					M
PQ841	PC817X(C,D-rank)	H			P

Fuse

symbol	product name	mounting form	surface	remark	pcb set
2A FUSE	RRPN2438	H			P
5A FUSE	RRPN2586	H			P
25A FUSE	RRPN1221	H			P

Oscillator

symbol	product name	mounting form	surface	remark	pcb set
X1	CSTCV16.0MXJ03	C	A		M

M.P.W.B Jumper wire

symbol	product name	mounting form	surface	remark	pcb set
JW7					M
JW8					M
JW9					M
JW10					M
JW11					M
JW12					M
JW13					M
JW14					M
					M
JW29					M
JW30	JUMPER	C	A	1608	M
JW31					M
JW32	JUMPER	C	A	1608	M
JW33					M
JW34					M
JW35					M
JW36	JUMPER	C	A	1608	M
JW37					M
JW38					M
JW39					M
JW40					M
JW41					M
JW42					M
JW43					M

SW.P.W.B Jumper wire

symbol	product name	mounting form	surface	remark	pcb set

P.P.W.B Jumper wire

symbol	product name	mounting form	surface	remark	pcb set
J1~J28	JUMPER	A			P
JW3	JUMPER	A			P
JW5					P
JW15	JUMPER	A			P
JW16	JUMPER	A			P

Trans

symbol	product name	mounting form	surface	remark	pcb set
SW TRANS1	RRMF3520	H			P
L801	RRMF3636	H			P
L802					P
L803					P
L804					P

NF coil

symbol	product name	mounting form	surface	remark	pcb set
NF COIL1	RRMH3681	H			P
NF COIL2	RRMH3573	H			P
NF COIL3	RRMH3573	H			P
NF COIL4					P
NF COIL6					P
NF COIL8					P
NF COIL12	RRMH3801	H			N
NF COIL13	HF2223VD-622Y1R0-01H	H			N
COIL	RRMH3442	H			P

Inductor

symbol	product name	mounting form	surface	remark	pcb set
L005	RRMH3728	H			P
L006	EXCELSA35V	A			P
L007	FBA06WA450	A			P
L008	JUMPER	A			N
~~L009~~					~~N~~
~~L010~~					~~N~~
L811	HF70BTL3.5X6R	A			P
L812					P
L813					P
L814					P
FB1	BL01RN1	A			P
CT1	S19-J200CT	H			P

Zener diode

symbol	product name	mounting form	surface	remark	pcb set
ZD101					P
ZD201	RLZ6.8A	C	A		M

Led

symbol	product name	mounting form	surface	remark	pcb set
LD301	LT1D67A	C	A	RED	M
LD302	LT1D67A	C	A	RED	M
LD303	LT1D67A	C	A	RED	M
LD304	LT1K67A	C	A	GREEN	M

Connector

symbol	product name	mounting form	surface	remark	pcb set
CN1					P
CN2	B4P7-VH-BK	H		BLACK	P
CN3A	MINICT-22P	C	A	2ROWS	M
CN3	MINICT-11P	H		GRAY	P
CN4	MINICT-11P	H		BLUE	P
CN5	BM02B-XASS-TF	C	A	WHITE	M
CN6	BM02B-XASS-TF	C	A	BLUE	M
CN7	BM02B-XASS-TF	C	A	RED	M
CN8					M
CN9					M
CN11	MINICT-5P	C	A	WHITE	M
CN13	CT-5P	C	A	WHITE	M
CN14	MINICT-10P	C	A	WHITE	M
CN15	BM06B-XASS-TF	C	A	WHITE	M
CN16					M
CN17					M
CN18					M
CN19	B12B-ZR-SM3-TF	C	A	WHITE	M
CN20					M
CN21	B4B-ZR-SM3-TF	C	A	WHITE	M
CN23	CT-8P	C	A	WHITE	M
CN24	B4B-PH-SM3-TB	C	A	WHITE	M
CN25	B2P3-VH-R	H		RED	P
CN26	B07B-XASK-1	H		WHITE	P
CN27	BM07B-XASS-TF	C	A	WHITE	M
CN30	B5(7-2,3)B-XH-A	H		WHITE	P
CN31	B2P3-VH			WHITE	P
CN32					P
CN34					P
CN36					P
CN40	B2P4-VH	H	A	WHITE	N
CN41	B2P4-VH	H	A	RED	N
CN43	BM03B-XASS-TF	H	A	WHITE	N

Relay

symbol	product name	mounting form	surface	remark	pcb set
INTERFACE RELAY1	G5NB-1A	H			P
INTERFACE RELAY2					P
INTERFACE RELAY3					P
INTERFACE RELAY4					P
RELAY5	FTR-F3AA012E	H			N
RELAY6	FTR-F3AA012E	H			N
CURRENT RELAY	FTR-F3	H			P
POWER RELAY	G4A-1A-PE	H			P

Switch

symbol	product name	mounting form	surface	remark	pcb set
SERVICE SW	SKQNALE010	C	A		M

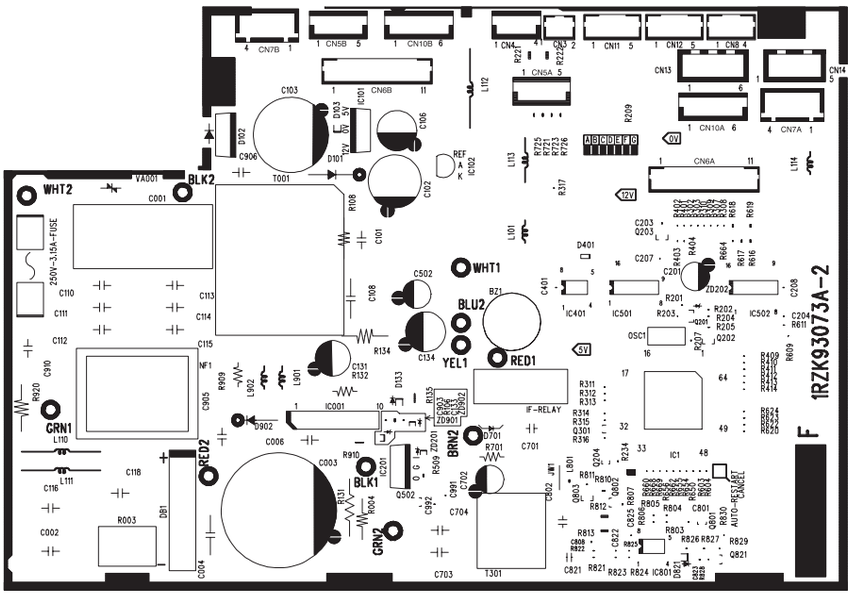
PRINTED WIRING BOARD LOCATION DIAGRAM

MODEL RAS-70YH5

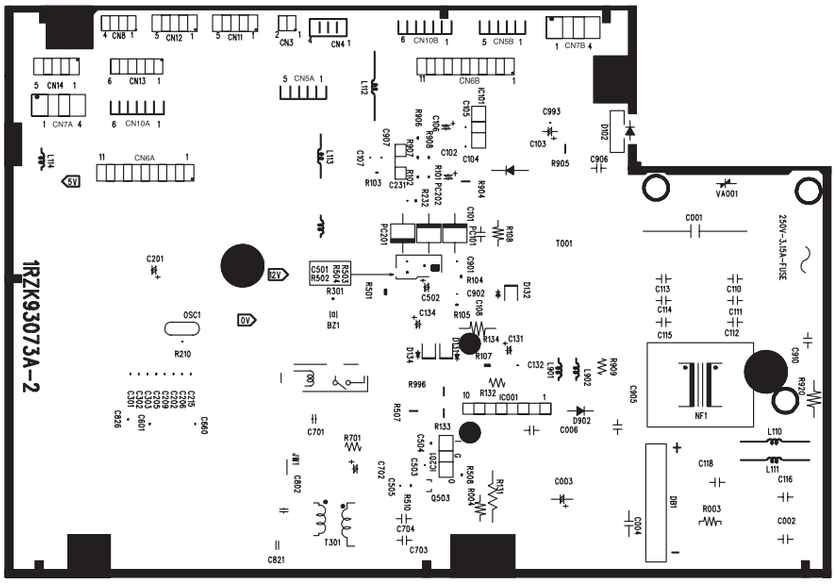
MAIN P.W.B.

Marking on P.W.B

COMPONENT SIDE

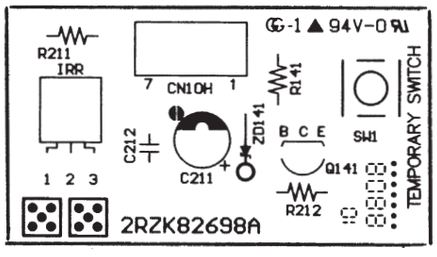


SOLDERING SIDE



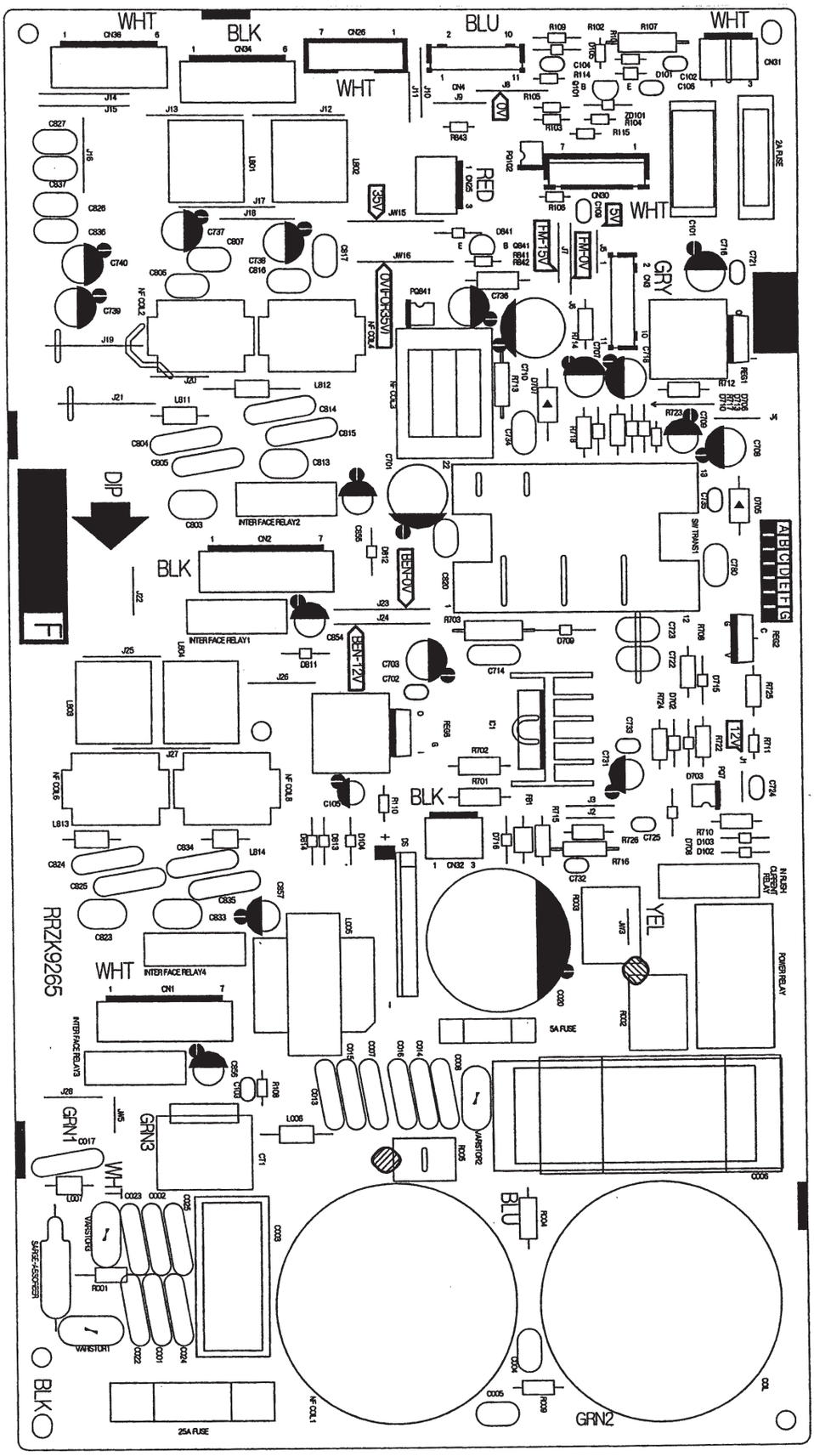
RECEIVING P.W.B.

Marking on P.W.B

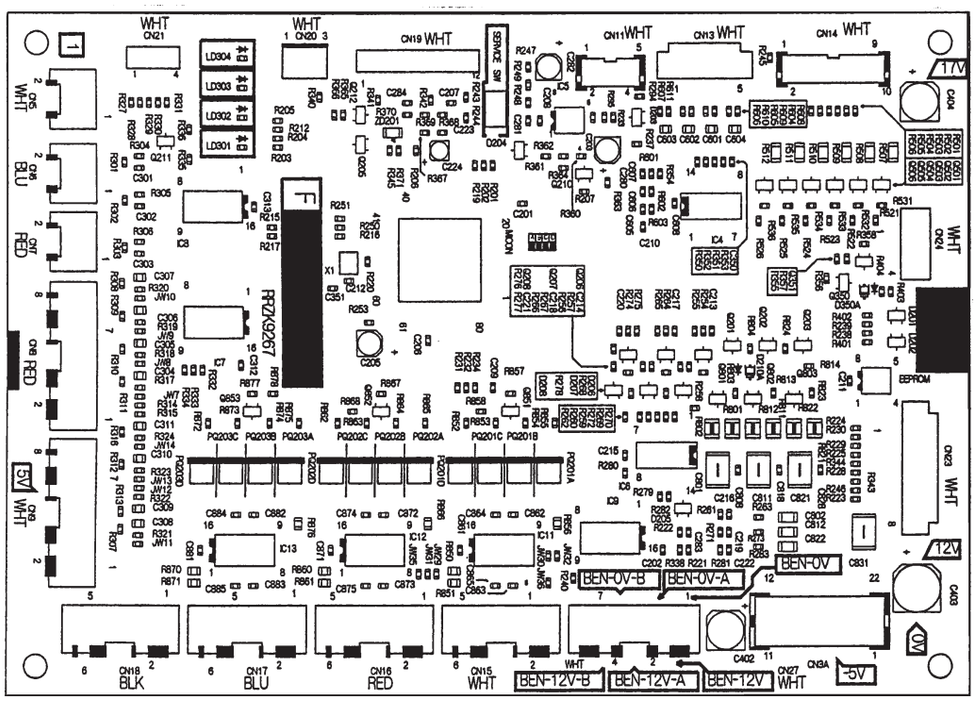


MODEL RAC-70YH5

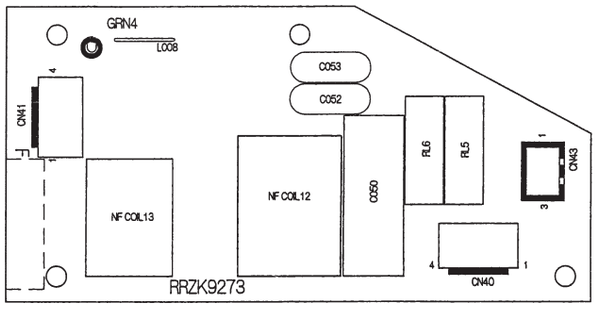
MAIN P.W.B.



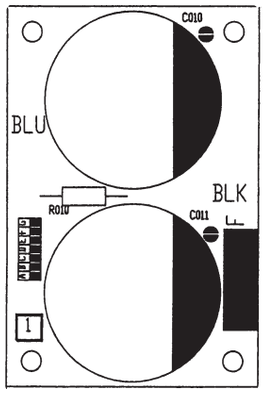
MAIN P.W.B.



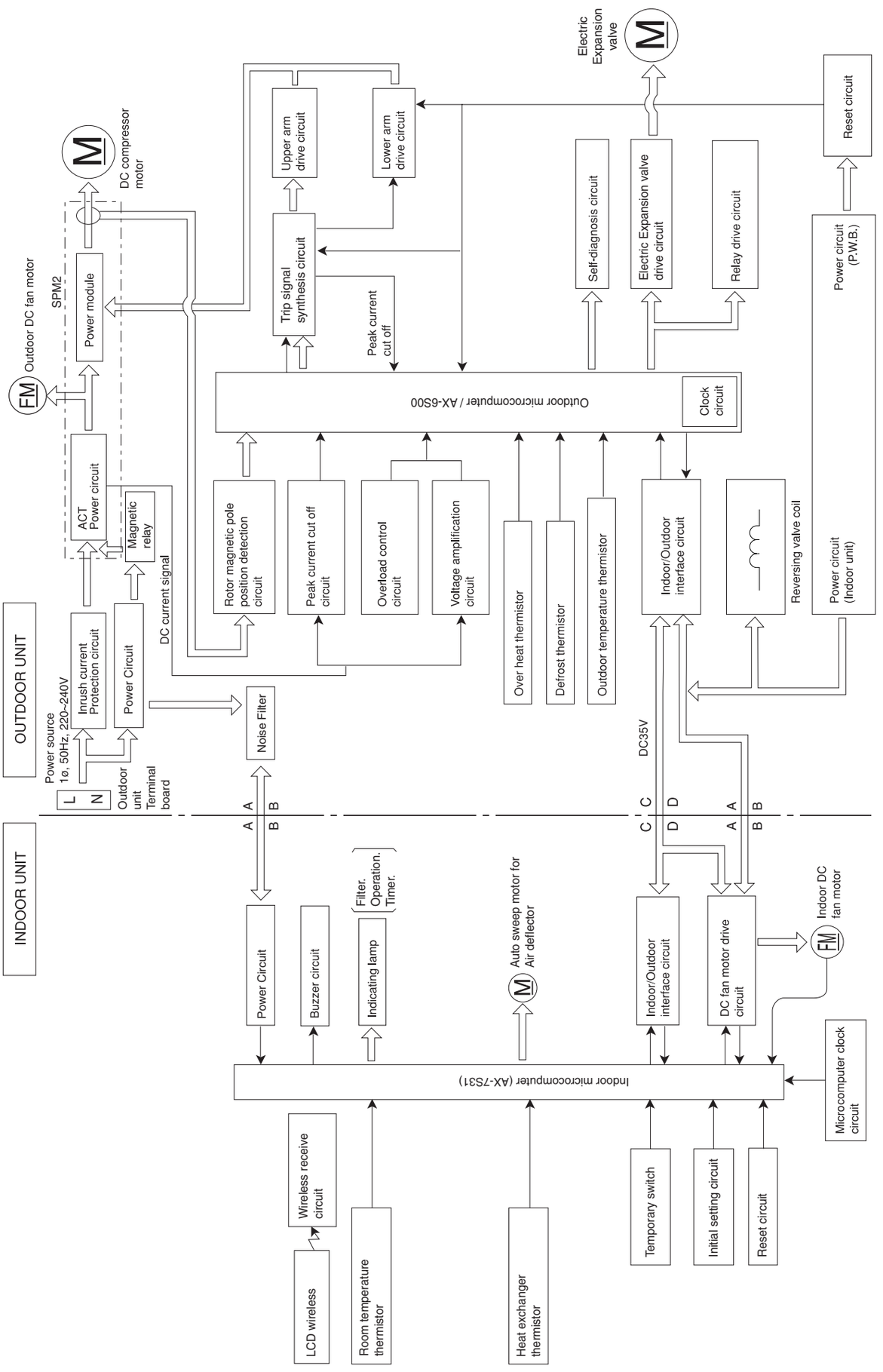
NF P.W.B.



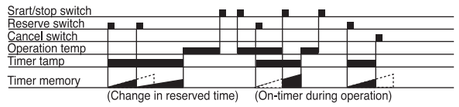
CAPA P.W.B.



BLOCK DIAGRAM
MODEL RAS-70YH5/RAC-70YH5



BASIC MODE

<table>
<tr><th colspan="2">Operation mode</th><th>Fan</th><th>Cooling</th><th>Dehumidifying (dehumidifying operation by the function select button only, not including that engaged by the dehumidify button)</th><th>Heating</th><th>Auto</th></tr>
<tr><td colspan="2">Basic operation of start/stop switch</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="3">Timer functions</td><td>Off-timer</td><td colspan="5"> 
</td></tr>
<tr><td>On-timer</td><td colspan="5"> 
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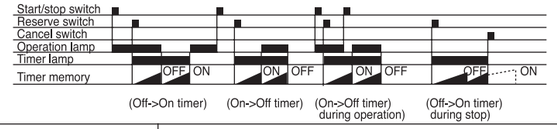
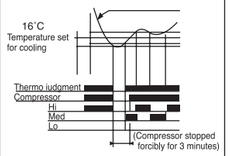
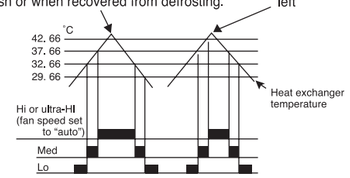
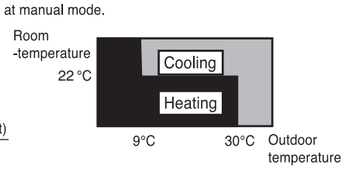
<tr><td>Off -> On
On -> Off timer</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="4">Fan speed mode (indoor fan)</td><td>Auto</td><td></td><td>Changes from “Hi” to “Med” or “Lo” depending on room temperature.
 

1. Runs at “Hi” until first thermo off after operation is started.
2. Runs at “Lo” when thermo is off.</td><td>Changes between “Lo” and “Med” depending on the room temperature.
<table><tr><th>Temperature division</th><th>Fan speed</th></tr><tr><td>Division 1</td><td>Lo</td></tr><tr><td>Division 2</td><td>Lo</td></tr><tr><td>Division 3</td><td>Med</td></tr><tr><td>Division 4</td><td>Med</td></tr></table>1. The indoor fan also stops when the compressor is in stop status.</td><td>Set to “ultra-Lo”, “Lo”, “Med”, “Hi”, “ultra-Hi” or “stop” depending on the room temperature, time and heat exchange temperature. Set to “stop” if the room temperature is 18˚C in the “ultra-Lo” mode other than during preheating (cooling is recovered at 18.33˚C).
When the compressor is running at maximum speed during hot dash or when recovered from defrosting.
In modes other than left
 
</td><td rowspan="4">Operating mode is judged by room temperature and outdoor temperature.
(1) Judging by outdoor temperature
・ Operating mode is judged by outdoor temperature. Only when the mode is not restricted by this judgment, the judgment by room temperature in the next paragraph will be performed.
(a) Outdoor temperature ≧ 30°C : Restricted to cooling
(b) Outdoor temperature ≦ 9°C : Restricted to heating
(2) Judging by room temperature
Operating mode at start up is judged (initial judgment)
(a) Conditions for judgment (any of the followings)
・ When auto operation is started after 1 hour has elapsed since the operation was stopped.
・ When auto operation is started after the previous manual mode operation.
・ When the operating mode is switched to auto while operating at manual mode.
(b) Judging method
・ Room temperature ≧ 23°C ±3°C : Cooling
・ Room temperature < 23°C ±3°C : Heating
※ ±3°C is the fine adjustment value from the remote controller.
 

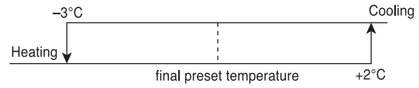
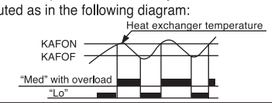
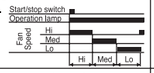
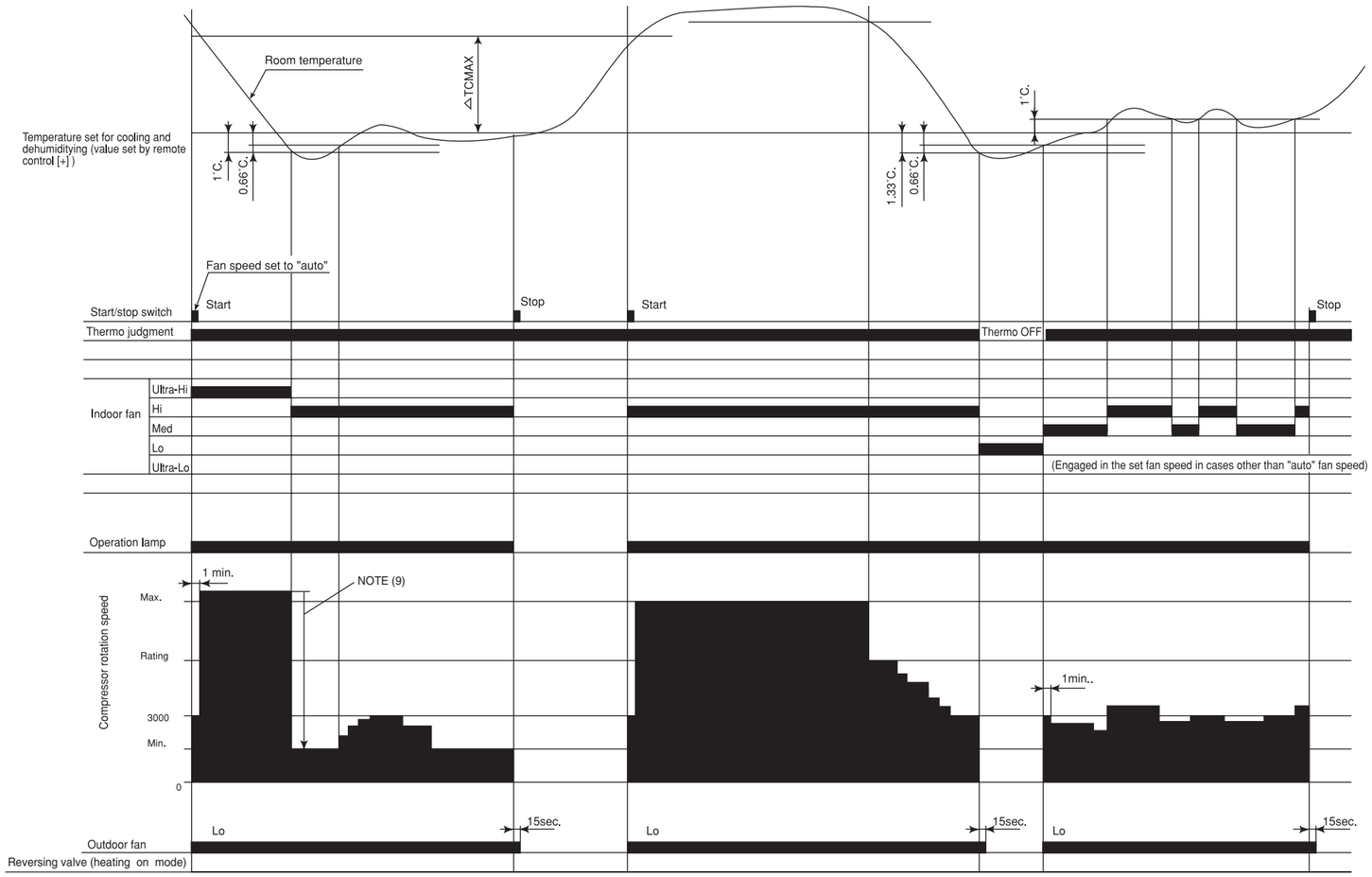
Judging operating mode change during operation (Continuous judgment)
(a) Conditions for judgment (any of the followings)
・ The mode is reviewed at every interval time.
・ When auto operation is started again before 1 hour has elapsed since the operation was stopped.
(b) Judging method
・ Judge by setting the hysteresis on the final preset temperature. The final preset temperature is the actually targeted preset temperature which is the sum of the basic preset temperature and each type of shift value (e.g. ±3°C by remote controller, preset temperature correction value, powerful shift value, etc.).
[Currently cooling]
・ Room temperature ≦ Final preset temperature –3°C Change to heating
・ Room temperature > Final preset temperature –3°C Continue cooling
[Currently heating]
・ Room temperature ≧ Final preset temperature +2°C Change to cooling
・ Room temperature < Final preset temperature +2°C Continue heating
 
</td></tr>
<tr><td>Hi</td><td>Operates at “Hi” regardless of the room temperature.</td><td>Set to “ultra-Hi” when the compressor runs at maximum speed, and to “Hi” in other modes.</td><td>Set to “Hi” in modes other than when the compressor stops.</td><td>Set to “ultra-Lo”, “Lo”, “Med”, “Hi”, “ultra-Hi” or “stop” depending on the room temperature, and time. Set to “stop” if the room temperature is 18˚C in the “ultra-Lo” mode other than during preheating (cooling is recovered at 18.33˚C).
Set to “ultra-Hi” when the compressor is running at maximum speed during hot dash or when recovered from defrosting.</td></tr>
<tr><td>Med</td><td>Operates at “Med” regardless of the room temperature.</td><td>Same as at left.</td><td>Set to “Med” in modes other than when the compressor stops.</td><td>Set to “ultra-Lo”, “Lo”, “Med” or “stop” depending on the room temperature and time. Set to “stop” if the room temperature is 18˚C in the “ultra-Lo” mode other than during preseating (cooling is recovered at 18.33˚C).</td></tr>
<tr><td>Lo</td><td>Operates at “Lo” regardless of the room temperature.</td><td>Same as at left.</td><td>Set to “Lo” in modes other than when the compressor stops.</td><td>Set to “ultra-Lo”, “Lo”, or “stop” depending on the room temperature and time. Set to “stop” if the room temperature is 18˚C in the “ultra-Lo” mode other than during preseating (cooling is recovered at 18.33˚C). The fan speed is controlled by the heat exchanger temperature; the overload control is executed as in the following diagram:
 
</td></tr>
<tr><td colspan="2">Basic operation of temperature controller</td><td>Performs only fan operation at the set speed regardless of the room temperature.
 
</td><td>See page 49.</td><td>See page 53.</td><td>See page 55.</td></tr>
<tr><td colspan="2">Sleep operation (with sleep button ON)</td><td>・ Enters sleep operation after set as on the left.
・ Action during sleep operation Lo (sleep) operation</td><td>・ Same as at left
・ See page 51.</td><td>・ Same as at left
・ See page 53.</td><td>・ Same as at left
・ See page 57.</td><td>・ Same as at left.
・ Performs the sleep operation of each operation mode.</td></tr>
</table>

Table 1 Mode data file

	RAS-70YH5
LABEL NAME	**VALUE**
WMAX	5800 min^{-1}
WMAX2	5800 min^{-1}
WSTD	5000 min^{-1}
WBEMAX	4000 min^{-1}
CMAX	5800 min^{-1}
CMAX2	5800 min^{-1}
CSTD	5300 min^{-1}
CKYMAX	4000 min^{-1}
CJKMAX	4000 min^{-1}
CBEMAX	3000 min^{-1}
WMIN	1200 min^{-1}
CMIN	1200 min^{-1}
STARTMC	60 Seconds
DWNRATEW	100%
DWNRATEC	100%
SHIFTW	2.00°C
SHIFTC	1.00°C
CLMXTP	30.00°C
YNEOF	25.00°C
TEION	2.00°C
TEIOF	9.00°C
SFTDSW	0.66°C
DFTIM1	50 Minutes
DFTIM2	50 Minutes

Basic Cooling Operation



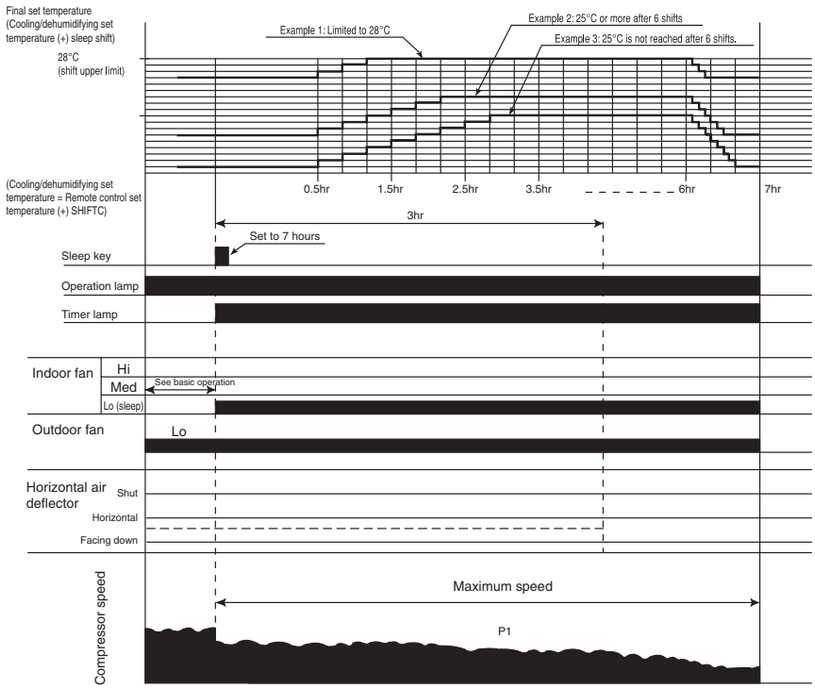
Notes:

(1) Condition for entering into Cool Dashed mode. When fan set to “Hi” or “Auto mode” and temperature difference between indoor temperature and set temperature has a corresponding compressor rpm (calculated value in Table 2) larger than WMAX.
(2) Cool Dashed will release when i) a maximum 25 minutes is lapsed and ii) room temperature is lower than set temperature –3°C (thermo off) and iii) when room temperature has achieved setting temperature –1°C then maximum Cool Dashed time will be revised to 20 minutes. And iv) indoor fan is set to Lo and Med fan mode and v) change operation mode.
(3) During Cool Dashed operation, thermo off temperature is set temperature (with shift value) –3°C. After thermo off, operation continue in Fuzzy control mode.
(4) Compressor minimum “ON” time and “OFF” time is 3 minutes.
(5) During normal cooling mode, compressor maximum rpm CMAX will maintain for 60 minutes if indoor temperature is lower than CLMXTP. No time constrain if indoor temperature is higher than CLMXTP.
(6) When fan is set to “Hi”, compressor rpm will be limited to CKYMAX.
(7) When fan is set to “Med”, compressor rpm will be limited to CJKMAX.
(8) When fan is set to “Lo”, compressor rpm will be limited to CBEMAX.
(9) During Cool Dashed, when room temperature reaches set temperature –1°C compressor rpm is actual rpm x DWNRATEC.

Table 2 ΔTCMAX

Temperature difference	Calculated compressor rpm
1.66	2265 min^{-1}
2	2435 min^{-1}
2.33	2600 min^{-1}
2.66	2765 min^{-1}
3	2935 min^{-1}
3.33	3100 min^{-1}
3.66	3265 min^{-1}
4	3435 min^{-1}
4.33	3600 min^{-1}
4.66	3765 min^{-1}
5	3935 min^{-1}
5.33	4100 min^{-1}
5.66	4265 min^{-1}
6	4435 min^{-1}
6.33	4600 min^{-1}
6.66	4765 min^{-1}
7	4935 min^{-1}
7.33	5100 min^{-1}
7.66	5265 min^{-1}
8	5435 min^{-1}
8.33	5600 min^{-1}
8.66	5765 min^{-1}
9	5935 min^{-1}
9.33	6100 min^{-1}
9.66	6265 min^{-1}
10	6435 min^{-1}
10.33	6600 min^{-1}
10.66	6765 min^{-1}
11	6935 min^{-1}

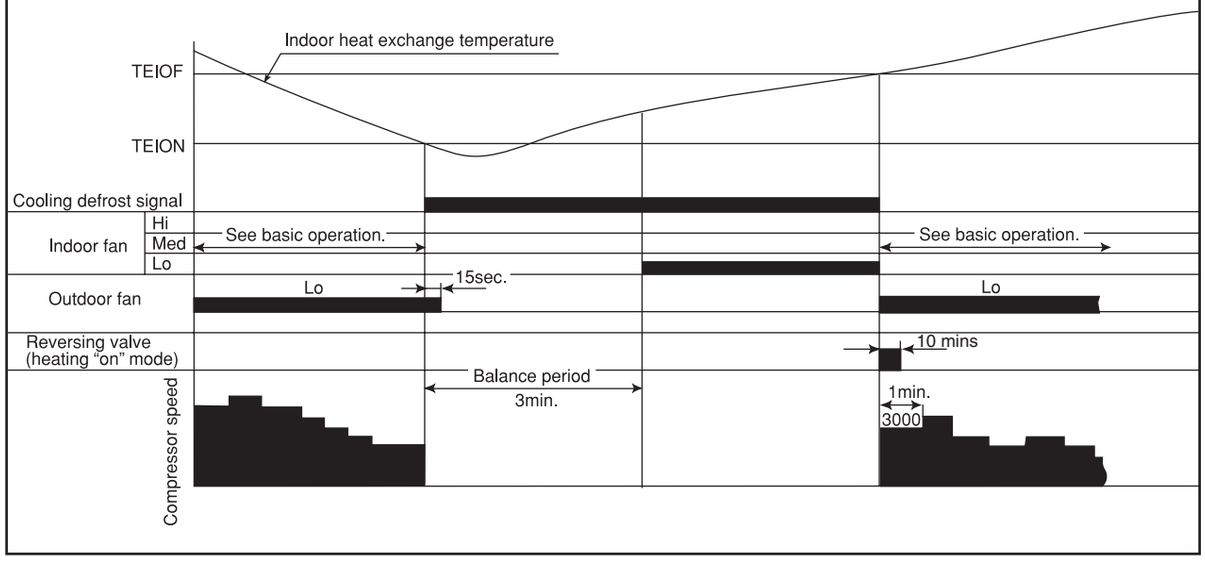
Cooling Sleep Operation



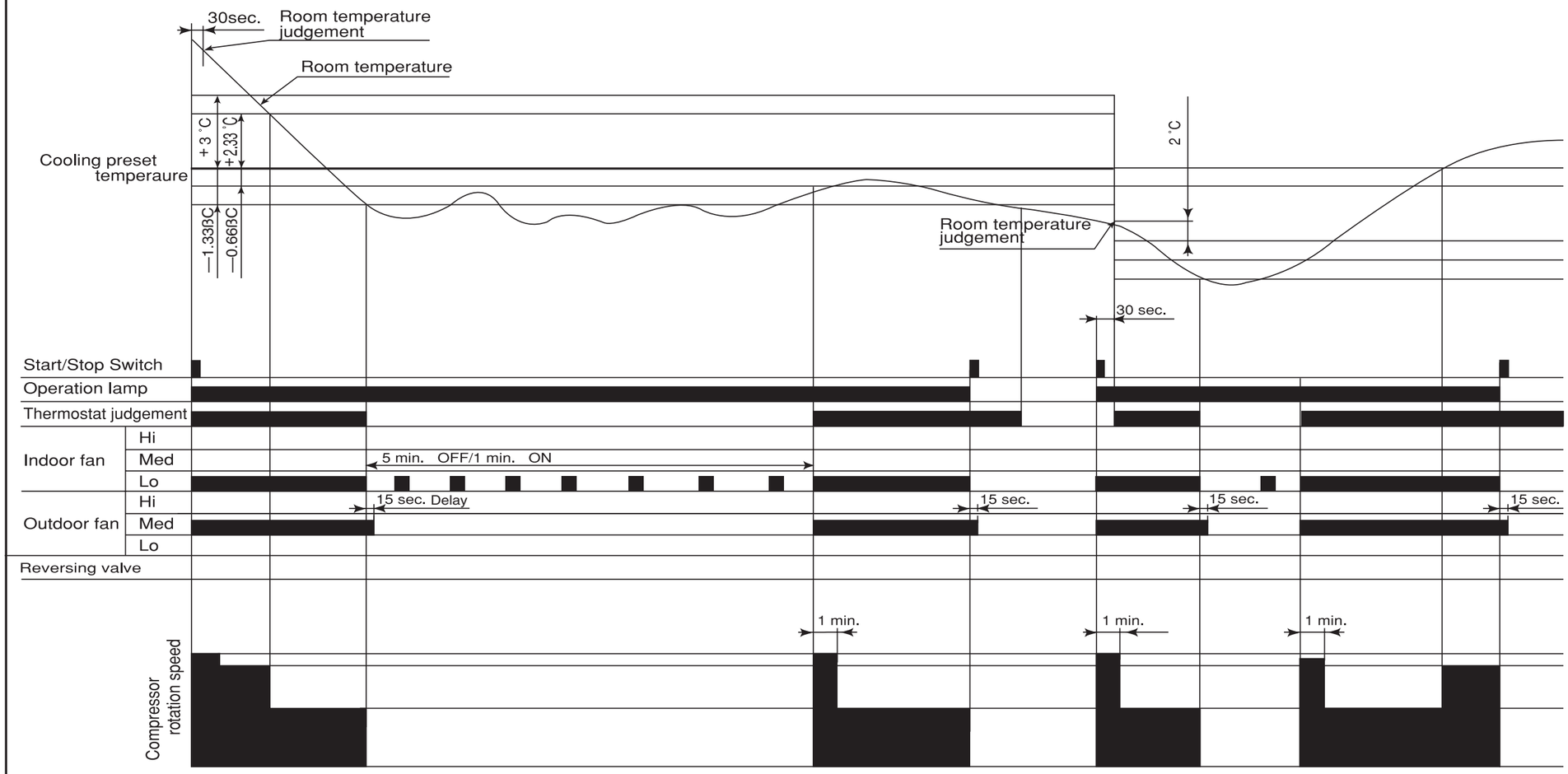
Notes:

(1) The sleep operation starts when the sleep key is pressed.
(2) When the sleep key is set, the maximum compressor speed is limited, and the indoor fan is set to “sleep Lo”.
(3) 30 minutes after the sleep key is set, the sleep shift of temperature starts, and upper shift is made at least 6 times. If 25˚C is not reached after 6 shifts, shifts repeat unit 25˚C is reached.
(4) The sleep shift upper value of set temperature is 28˚C.
(5) After 6 hours, a shift down to the initial set temperature is made at a rate of 0.33˚C/5 min.
(6) If the operation mode is changed during sleep operation, the set temperature is cleared, and shift starts from the point when switching is made.
(7) The indoor fan speed does not change even when the fan speed mode is changed.
(8) When operation is stopped during sleep operation, the set temperature when stopped, as well as the time, continue to be counted.
(9) If the set lime is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.
(10) If sleep operation is canceled by the cancel key or sleep key, all data is cleared.

Cooling Defrost



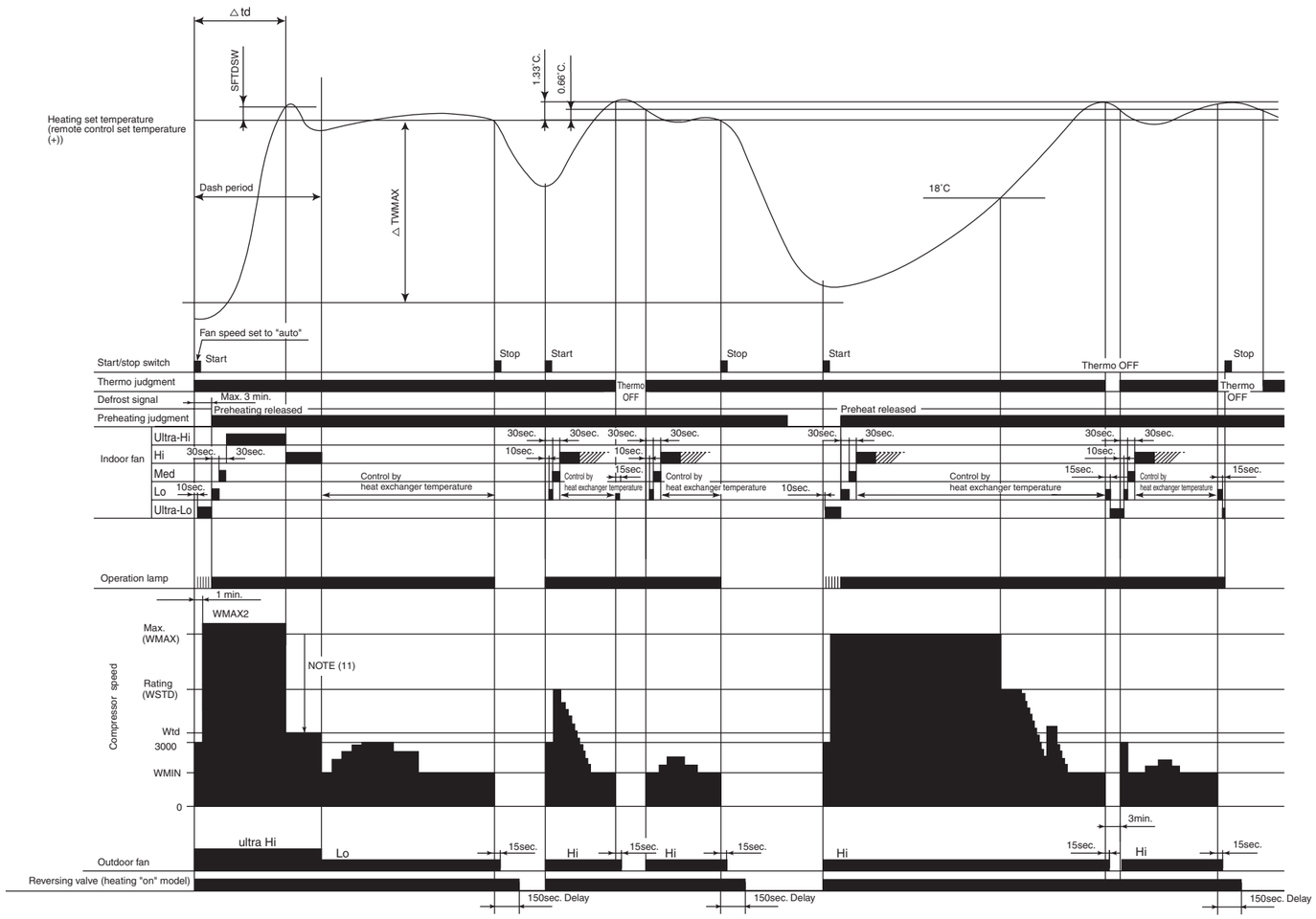
Dehumidifying



Notes:

(1) If the room temperature is (cooling preset temperature) - (1.33°C) or less after 30 seconds from starting the operation, the operation is done assuming as the preset temperature = (room temperature at the time) - (2°C).
(2) The indoor fan is operated in the “Lo” mode. During thermo OFF indoor fan will be OFF for 5 minutes and ON for 1 minute.
(3) When the operation is started by the themostat turning ON, the start of the indoor fan is delayed 32 seconds after the start of compressor operation.
(4) The compressor is operated forcedly for 3 minutes after operation is started.
(5) The minimum ON time and OFF time of the compressor are 3 minutes.

Basic Heating Operation



Notes:

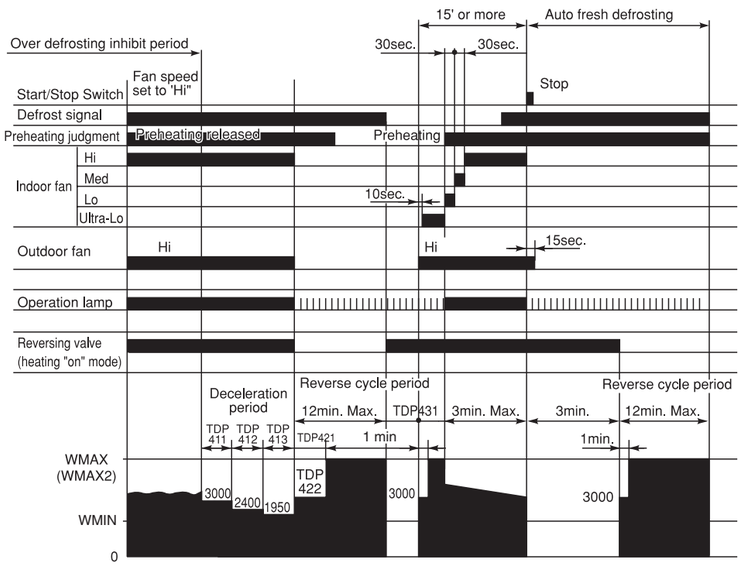
(1) Condition for entering into Hot Dashed mode. When fan set to “Hi” or “Auto mode” and i) Indoor temperature is lower than 18°C, and ii) outdoor temperature is lower than 10°C, and iii) Temperature difference between indoor temperature and set temperature has a corresponding compressor rpm (calculated value in Table 3) larger than WMAX.
(2) Hot Dashed will release when i) Room temperature has achieved the set temperature + SFTDSW. ii) Thermo off.
(3) During Hot Dashed operation, thermo off temperature is set temperature (with shift value) +3°C. After thermo off, operation continue in Fuzzy control mode.
(4) Compressor minimum “ON” time and “OFF” time is 3 minutes.
(5) During normal heating mode, compressor maximum rpm WMAX will maintain for 120 minutes if indoor temperature is higher than 18°C. No time limit constrain if indoor temperature is lower than 18°C and outdoor temperature is lower than 2°C.
(6) During Hotkeep or Defrost mode, indoor operation lamp will blink at interval of 3 seconds “ON” and 0.5 second “OFF”.
(7) When heating mode starts, it will enter into Hotkeep mode if indoor heat exchanger temperature is lower than YNEOF + 0.33°C.
(8) When fan is set to “Med” or “Lo”, compressor rpm will be limited to WBEMAX.
(9) In “Ultra-Lo” fan mode, if indoor temperature is lower than 18°C, indoor fan will stop. If indoor temperature is higher than 18°C + 0.33°C, fan will continue in “Ultra-Lo” mode. During Hotkeep or Defrost mode, fan will continue in “Ultra-Lo” mode.
(10) During Hot Dashed or outdoor temperature is lower than –5°C, compressor rpm is WMAX2.
(11) During Hot Dashed, when room temperature reaches set temperature + SFTDSW compressor rpm is actual rpm x DWNRATEW.

Table 3 ΔTWMAX

Temperature difference	Calculated compressor rpm
1.66	1965 min^{-1}
2	2135 min^{-1}
2.33	2300 min^{-1}
2.66	2465 min^{-1}
3	2635 min^{-1}
3.33	2800 min^{-1}
3.66	2965 min^{-1}
4	3135 min^{-1}
4.33	3300 min^{-1}
4.66	3465 min^{-1}
5	3635 min^{-1}
5.33	3800 min^{-1}
5.66	3965 min^{-1}
6	4135 min^{-1}
6.33	4300 min^{-1}
6.66	4465 min^{-1}
7	4635 min^{-1}
7.33	4800 min^{-1}
7.66	4965 min^{-1}
8	5135 min^{-1}
8.33	5300 min^{-1}
8.66	5465 min^{-1}
9	5635 min^{-1}
9.33	5800 min^{-1}
9.66	5965 min^{-1}
10	6135 min^{-1}
10.33	6300 min^{-1}
10.66	6465 min^{-1}
11	6635 min^{-1}

Notes:
1. See the data in Table 1 on page 47 for each constant in capital letters in the diagrams.

Reversing Valve Defrosting



Notes:

(1) The defrosting inhibit period is set as shown in the diagram below. When defrosting has finished once, the inhibit period is newly set, based on the outdoor temperature when the compressor was started. During this period, the defrost signal is not accepted.

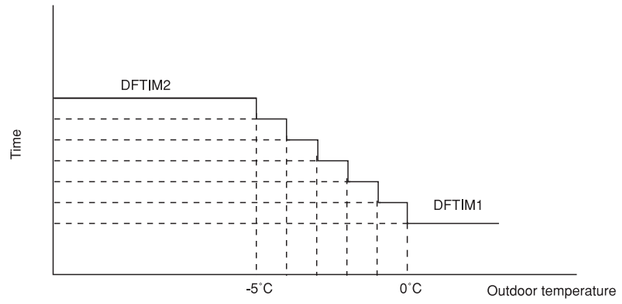
(2) If the difference between the room and outdoor temperature is large when defrosting is finished, the maximum compressor speed (WMAX) or (WMAX2) can be continued for 120 minutes maximum.

(3) The defrosting period is 12 minutes maximum.

(4) When operation is stopped during defrosting, it is switched to auto refresh defrosting.

(5) Auto refresh defrosting cannot be engaged within 15 minutes after operation is started or defrosting is finished.

Setting Defrosting Inhibit Period



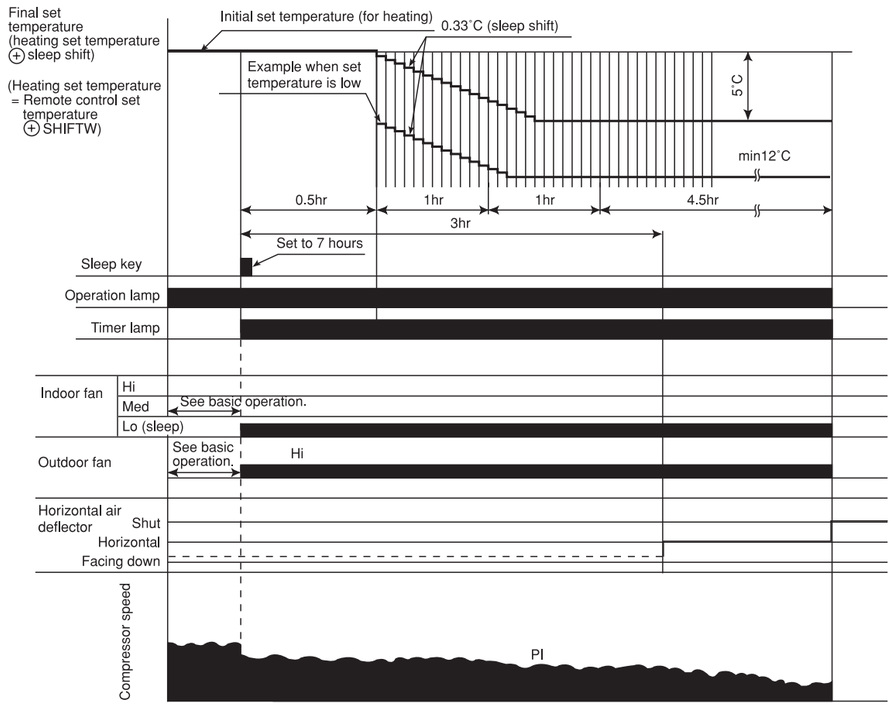
Notes:

(1) The time is set according to the outdoor temperature when it is between 0˚C and -5˚C.

(2) DFTIM is used when the outdoor temperature ≧ 0˚C.

(3) DFTIM2 is used when the outdoor temperature ≦ -5˚C.

Heating Sleep Operation



Notes:

(1) The sleep operation starts when the sleep key is pressed.

(2) When the sleep key is set, the maximum compressor speed is limited to WSTD+2000/2, and the indoor fan is set to “sleep Lo”.

(3) 30 minutes after the sleep key is set, the sleep shift of set temperature starts.

(4) The maximum sleep shift of set temperature is 5°C, and the minimum is 12°C.

(5) If the operation mode is changed during sleep operation, the changed operation mode is set and sleep control starts.

(6) The indoor fan speed does not change even when the fan speed mode is changed. (Lo)

(7) When defrosting is to be set during sleep operation, defrosting is engaged and sleep operation is restored after defrosting.

(8) When operation is stopped during sleep operation, the set temperature when stopped, as well as the time, continue to be counted.

(9) If the set time is changed during sleep operation, all data including set temperature, time, etc. is cleared and restarted.

(10) If sleep operation is canceled by the cancel key or sleep key, all data is cleared.

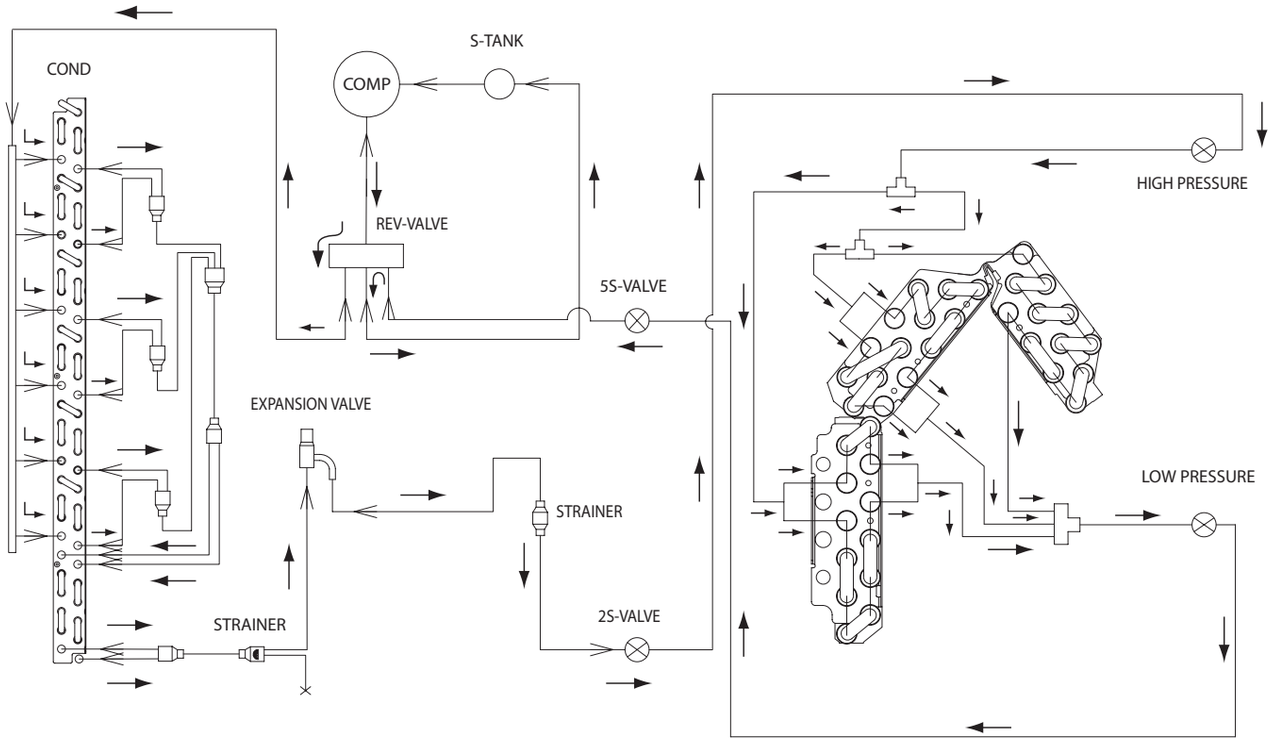
REFRIGERATING CYCLE DIAGRAM

MODEL RAS-70YH5 / RAC-70YH5

COOLING, DEHUMIDIFYING, DEFROSTING

OUTDOOR UNIT

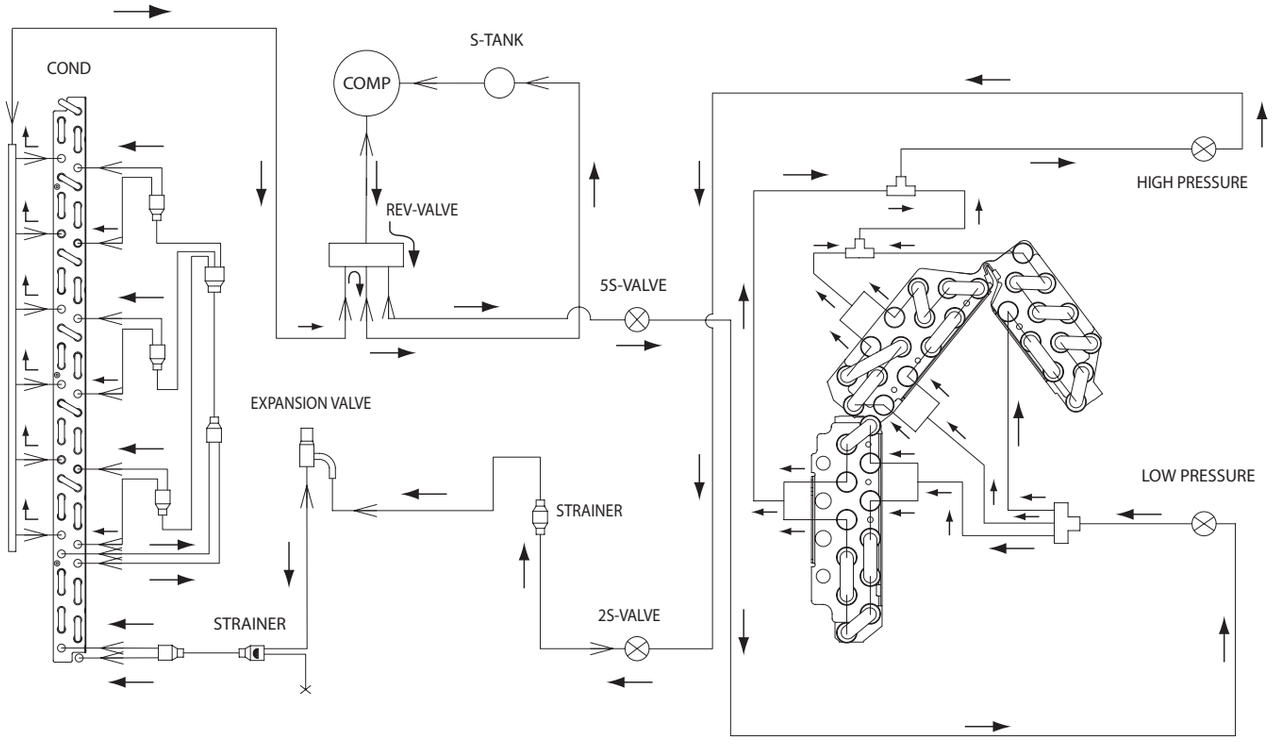
INDOOR UNIT



HEATING

OUTDOOR UNIT

INDOOR UNIT



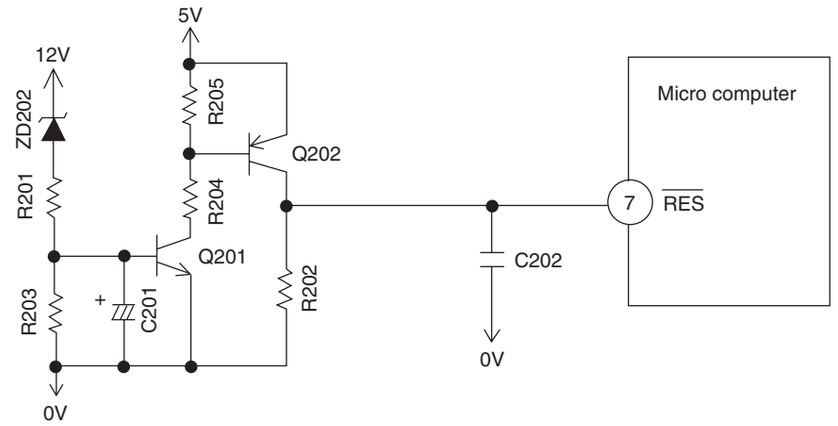
AUTO SWING FUNCTION

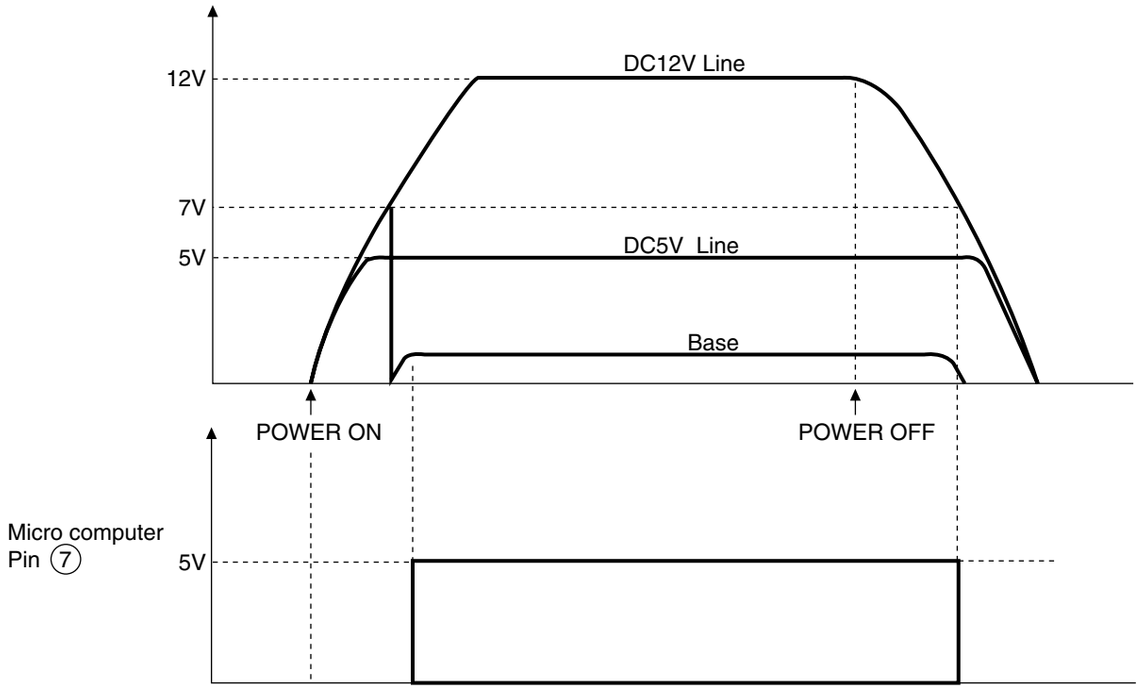
INPUT SIGNAL	PRESENT CONDITION			OPERATING SPECIFICATION	REFERENCE
	OPERATION	OPERATION MODE	AIR DEFLECTOR		
KEY INPUT	STOP	EACH MODE	STOP	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING ONE SWING	STOP AT THE MOMENT.	
	DURING OPERATION	AUTO COOL COOL FAN AUTO DRY DRY	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
		AUTO HEAT HEAT CIRCULATOR	STOP	START SWINGING ① DOWNWARD ② UPWARD ③ DOWNWARD	
			DURING SWINGING	STOP AT THE MOMENT.	
THERMO. ON (INTERNAL FAN ON)	DURING OPERATION	AUTO DRY DRY AUTO HEAT HEAT CIRCULATOR	TEMPORARY STOP	START SWING AGAIN.	
THERMO. ON (INTERNAL FAN OFF)			DURING SWINGING	STOP SWINGING TEMPORARILY. (SWING MODE IS CLEARED IF SWING COMMAND IS TRANSMITTED DURING TEMPORARY STOP.)	
MAIN SWITCH ON	STOP	COOL FAN DRY	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD ② UPWARD	
		HEAT CIRCULATOR	STOP DURING ONE SWING	INITIALIZE ① DOWNWARD	
MAIN SWITCH OFF	DURING OPERATION	EACH MODE	STOP DURING SWINGING	ONE SWING (CLOSING AIR DEFLECTOR) ① DOWNWARD ② UPWARD	INITIALIZE AT NEXT OPERATION.
			DURING INITIALIZING		
CHANGE OF OPERATION	DURING OPERATION	EACH MODE	STOP	INITIALIZING CONDITION OF EACH MODE.	
			DURING SWINGING	STOP SWINGING AND MODE BECOMES INITIALIZING CONDITION.	

DESCRIPTION OF MAIN CIRCUIT OPERATION

RAS-70YH5

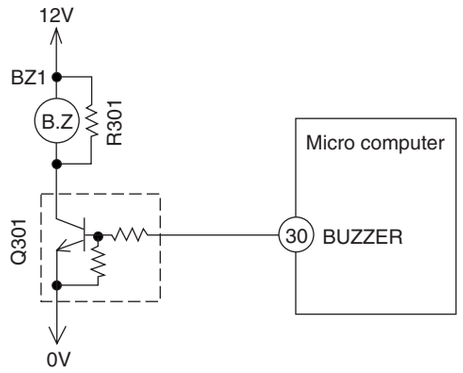
1. Reset Circuit





- The reset circuit is used to reset the program to its initial settings when the power is turned on or when the power is recovered after a power failure.
- The micro computer is reset when the reset input is “Hi”, and operation is possible when the reset input is “Lo”.
- The waveforms at each point when the power is turned on and off are shown in the diagrams.
- When the power is turned on, the voltages of the DC 12V line and DC 5V lines are increased. When the voltage of DC 12V lines reaches about 7V, ZD202 is turned ON, the potential of Q201’s base rises and Q202 is turned ON. Since Q202’s collector is set to “LO” at this time, Q202 is turned OFF and the reset input of the micro computer is set to “Lo”. The DC 5V line voltage has already become 5V at this time and the micro computer starts operation.
- When the power is turned OFF, the voltage of the DC 12V line decreases. When it becomes about 7V, ZD202 is turned OFF, then Q201 is turned OFF, Q202 is turned ON the reset input of the micro computer is set to “Hi’ and the micro computer is set to the reset mode.

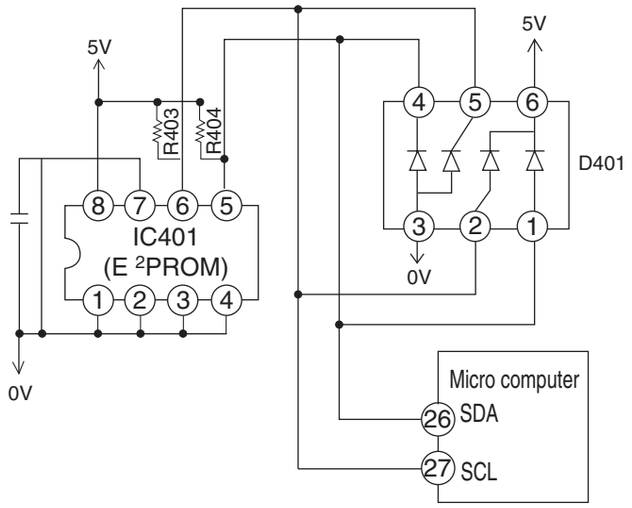
2. Buzzer Circuit



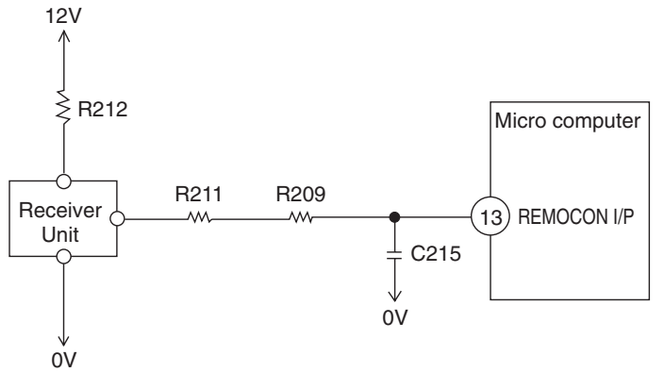
When the buzzer is to be activated, buzzer output pin ㉚ of the micro computer alternates between ON and OFF repeatedly at 4kHz and Q302 is turned ON/OFF accordingly. A 4kHz voltage is applied to the buzzer and the diaphragm of the buzzer vibrates to output 4kHz sound.

3. Initial setting (IC301)

The pre-heating operation start value, ratings of the compressor, maximum rotation speed, etc. are preset in the micro computer.



4. Receive circuit



Infrared signals from the wireless remote controller are received by the light receiving unit and output after being amplified and shaped.

5. Auto Sweep Motor Circuit

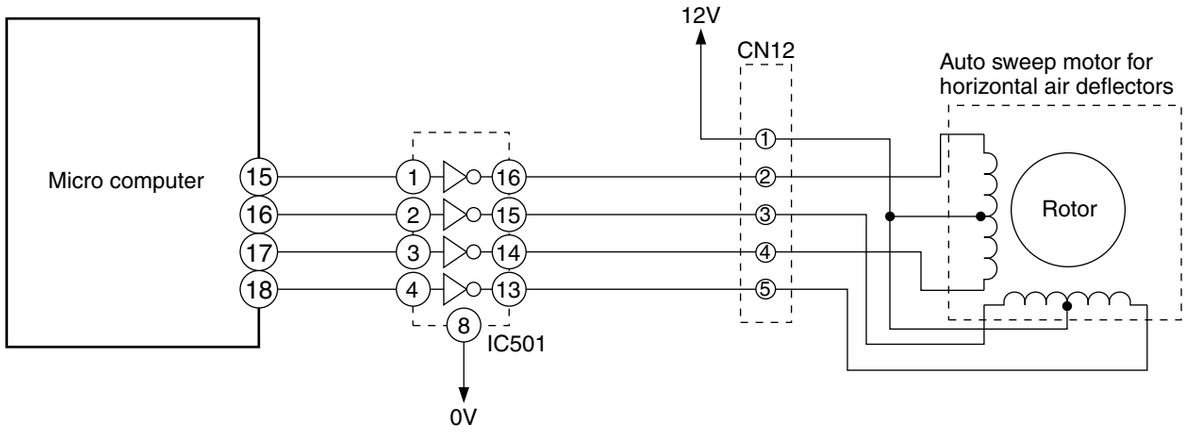


Fig. 5-1 Auto Sweep Motor Circuit (Horizontal air deflectors)

- Fig. 5-1 shows the Auto sweep motor drive circuit; the signals shown in Fig. 5-2 are output from pins ⑮–⑱ of the micro computer.

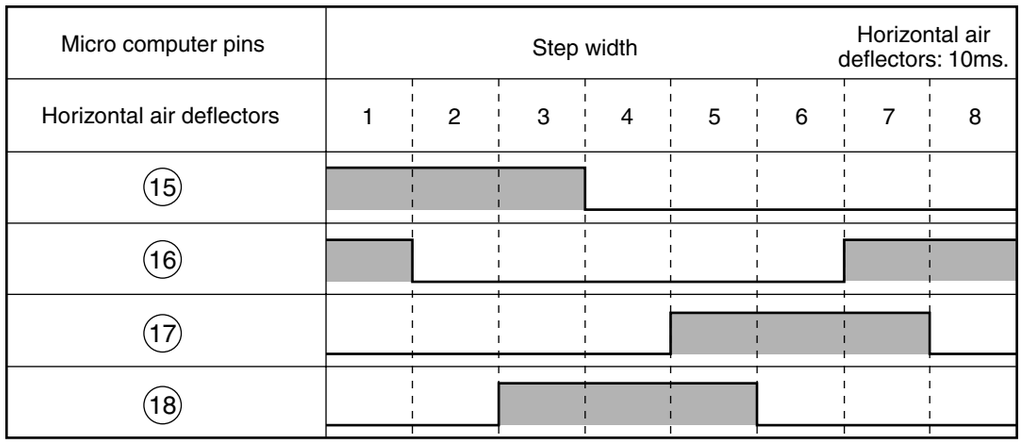


Fig. 5-2 Micro computer Output Signals

- As the micro computer's outputs change as shown in Fig. 5-2, the core of the auto sweep motor is excited to turn the rotor. Table 5-1 shows the rotation angle of horizontal air deflectors.

Table 5-1 Auto sweep Motor Rotation

	Rotation angle per step (°)	Time per step (ms)
Horizontal air deflectors	0.0879	10

6. Room Temperature Thermistor Circuit

- Fig. 6-1 shows the room temperature thermistor circuit.

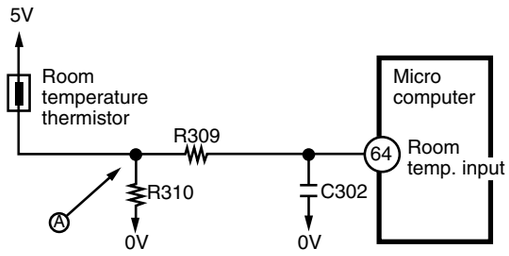


Fig. 6-1

- The voltage at Ⓐ depends on the room temperature as shown in Fig. 6-2.

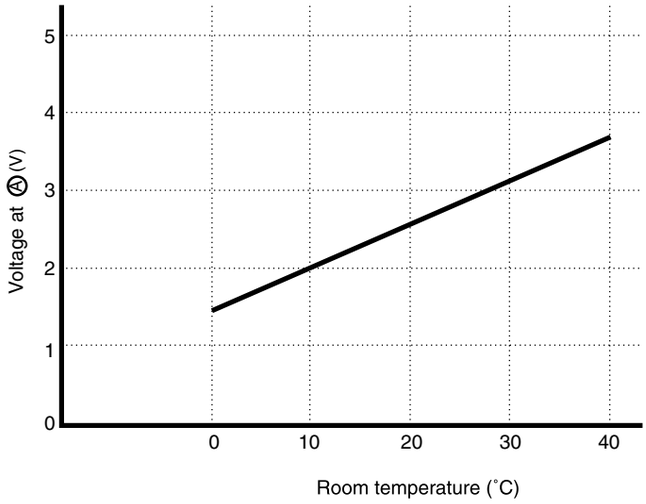


Fig. 6-2

7. Heat exchanger temperature thermistor circuit

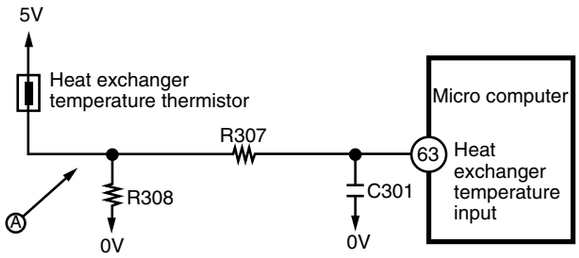


Fig. 7-1

- The circuit detects the indoor heat exchanger temperature and controls the following.

  (1) Low-temperature defrosting during cooling and dehumidifying operation.

  The voltage at Ⓐ depends on the heat exchanger temperature as shown in Fig. 7-2.

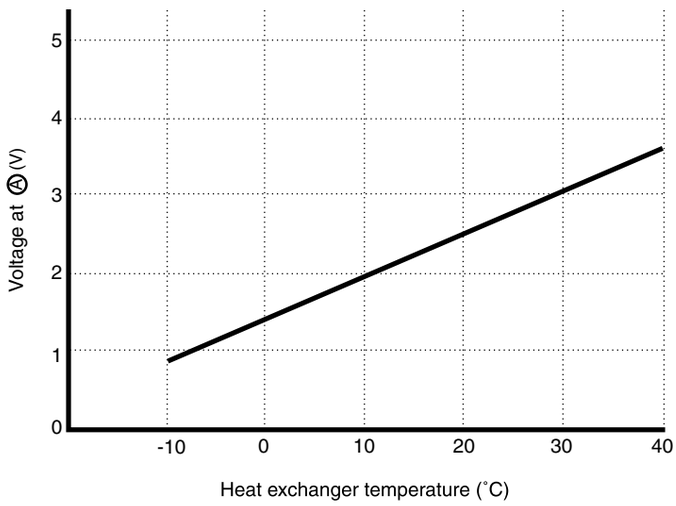


Fig. 7-2

8. Temporary Switch

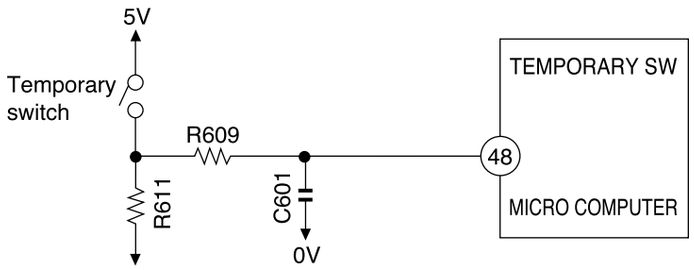


Fig. 8-1

- The temporary switch is used to operate the air conditioner temporarily when the wireless remote control is lost or faulty.
- The air conditioner operates in the previous mode at the previously set temperature. However, when the power switch is set to OFF, it starts automatic operation.

9. Indoor Fan Motor Feedback Circuit

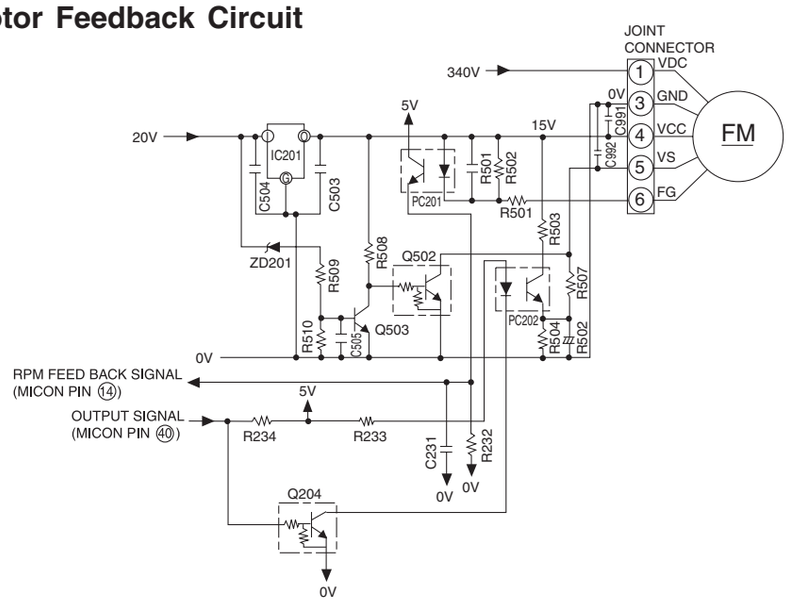


Fig. 9-1

- <Exp. of circuit wave>

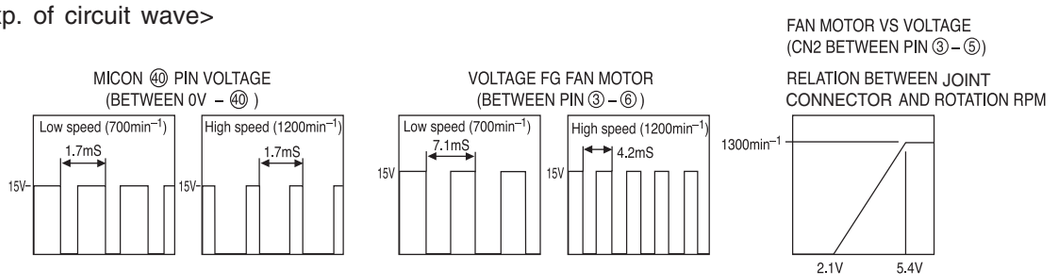


Fig. 9-2

- Fan motor will receive signal thru Joint Connector with VDC (Motor Drive Voltage), VCC (Motor Controller Power Supply), VSC (RPM Instruction) motor WCC return the FG sinal under frequency RPM.
- The circuit produces fan motor drive from 340V DC supplied from the indoor unit and controls the fan motor speed.

⚠ CAUTION 1

Indoor fan motor circuit will be connected with primary power source line and please take care of the electrical shock.

⚠ CAUTION 2

Please do not disconnect the fan motor connector during running due to the high voltage supply, it will cause the damage at fan motor and PWB.

RAC-70YH5
1. Power Circuit

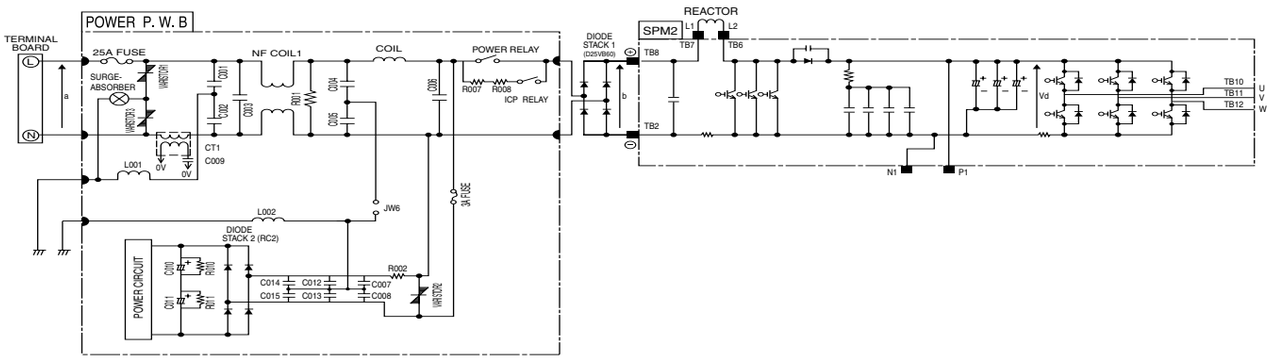


Fig. 1-1

- This circuit full-wave rectifies 220-240V AC applied between terminals L and N, and boosts it to a required voltage with the active module, to create a DC voltage.

The voltage becomes 260-360V when the compressor is operated

(1) Active module

The active filter, consisting of a reactor and switching element, eliminates higher harmonic components contained in the current generated when the compressor is operated, and improves the power-factor.

(2) Diode stacks

These rectify the 220-240V AC from terminals L and N to a DC power supply.

< Reference >

- In case of malfunction or defective connection: Immediately after the compressor starts, it may stop due to “abnormally low speed” active error, etc.

  The compressor may continue to operate normally, but the power-factor will decrease, the operation current will increase, and the overcurrent breaker of the household power board will probably activate.
- In case of active module faulty or defective connection:

  Although the compressor continues to operate normally, the power-factor will decrease, the operation current will increase, and the overcurrent breaker of the household power board will probably activate.

< Reference >

- If diode stack 1 is faulty, the compressor may stop due to “lp”, “anbormally low speed”, etc. immediately after it starts, or it may not operate at all because no DC voltage is generated between the positive ⊕ and negative ⊖ terminals.

  If diode stack 1 is faulty, be aware that the 25A fuse might also have blown.
- If diode stack 2 is faulty, DC voltage may not be generated and the compressor may not operate at all. Also, be aware that the 5A fuse might have blown.

(3) Smoothing capacitor (C501, C502, C503)

This smoothes (averages) the voltage rectified by the diode stacks.

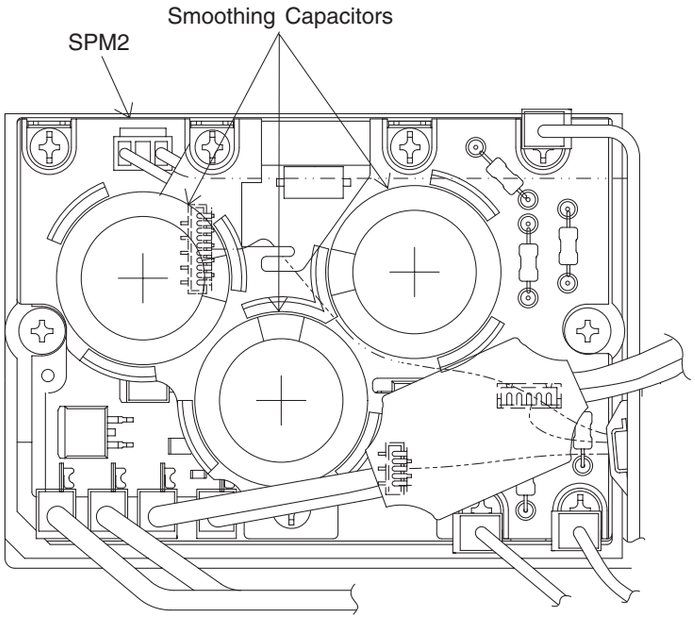


Fig. 1-2

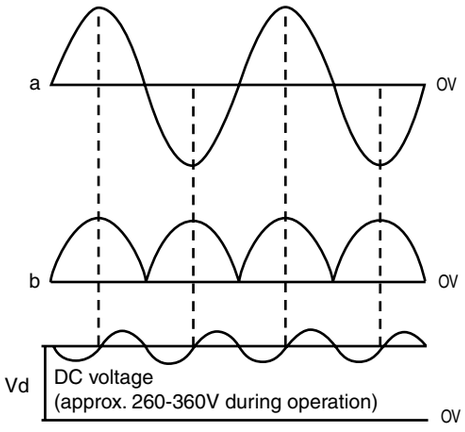


Fig. 1-3

- Be careful to avoid an electric shock as a high voltage is generated. Also take care not to cause a short-circuit through incorrect connection of test equipment terminals. The circuit board could be damaged.

(4) Smoothing capacitor (C020)
This smoothes (averages) the voltage rectified by the diode stack2. A DC voltage is generated in the same way as in Fig. 1-3.
Voltage between + side of C020 is about 330V.

(5) C001 to C003, C012 to C015, C007, C008, NF COIL1, COIL, C22 ~ C25 absorb electrical noise generated during operation of compressor, and also absorb external noise entering from power line to protect electronic parts.

(6) Surge absorber, Varistor 1, 2, 3,
absorbs external power surge.

(7) Inrush protective resistor (R002, R003)
This works to protect from overcurrent when power is turned on.

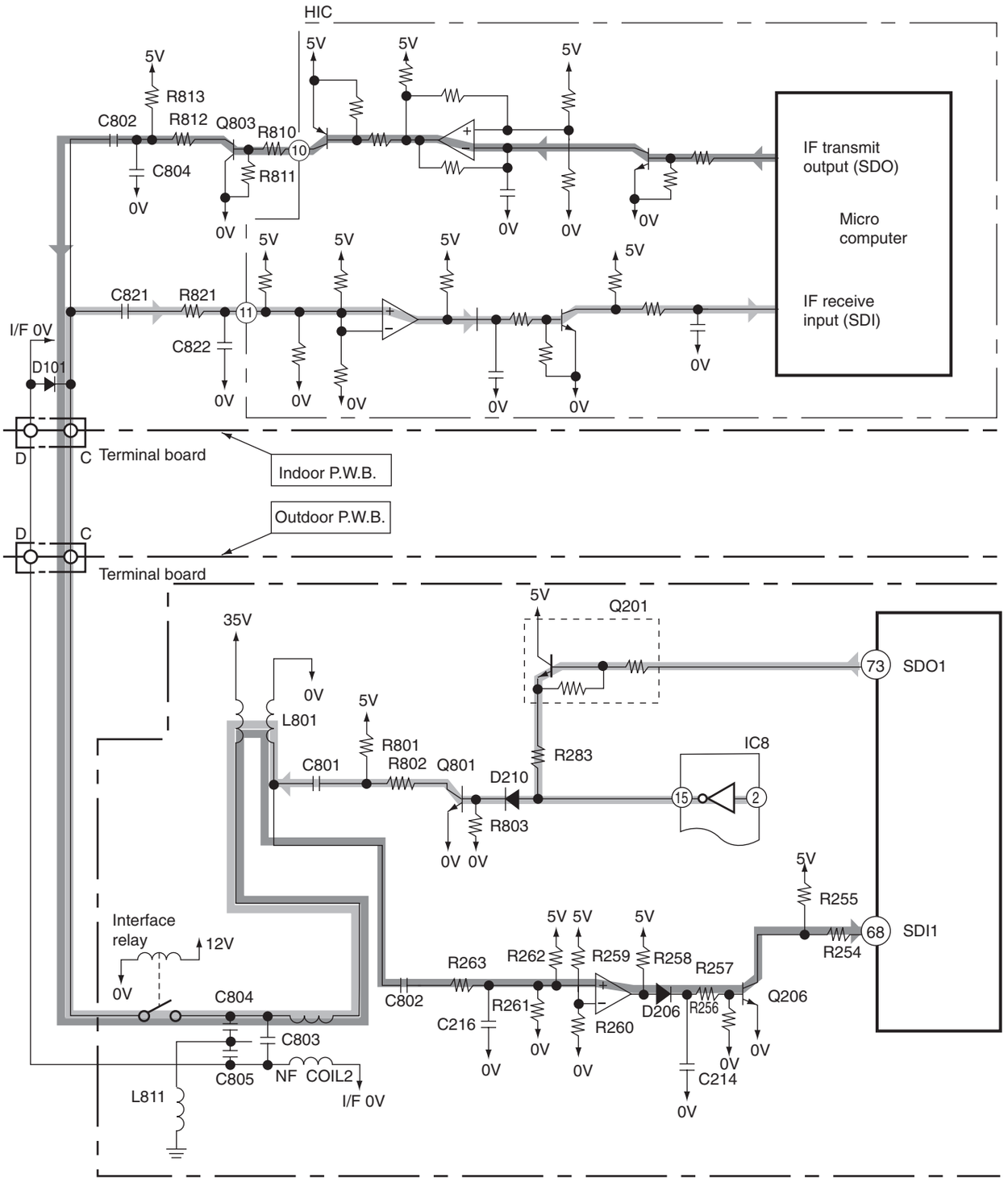
< Reference >

- When inrush protective resistor is defective, diode stack may malfunction. As a result, DC voltage is not generated and no operation can be done.

2. Indoor/Outdoor Interface Circuit

- The interface circuit superimposes an interface signal on the DC 35V line supplied from the outdoor unit to perform communications between indoor and outdoor units. This circuit consists of a transmiting circuit which superimposes an interface signal transmit from the microcomputer on the DC 35V line and a transmiting circuit which detects the interface signal on the DC 35V line and outputs it to the microcomputer.
- Communications are performed by mutually transmiting and receiving the 4-frame outdoor request signal one frame of which consists of a leader of approx. 100 ms., start bit, 8-bit data and stop bit and the command signal with the same format transmit from the indoor unit.
- From outdoor microcomputer to indoor microcomputer.
  The request signal output from microcomputer pin ⑦③ , ⑦④ , ⑨ is input to the transmitting circuit. The transmitting circuit modulates this signal by approx. 38kHz high-frequency. This high-frequency signal is amplified by a transistor, superimposed on the DC 35V line via C801 (or C811, C821) and L801 (or L802, L803), and supplied to the indoor unit.
  To prevent erroneous reception, the outdoor microcomputer is designed so that it cannot receive a signal while is is outputting a request signal.
  The receiving circuit in the indoor unit consists of a comparator and transistor. The interface signal from the outdoor unit on the DC 35V line is supplied to C821, where DC components are eliminated, and is then shaped by the comparator. The shaped signal is detected by diode, amplified by amp, and supplied to receiving input of the indoor microcomputer.
  Fig. 2-2 shows the voltages at each component when data is transferred from the outdoor microcomputer to the indoor microcomputer.
- Indoor microcomputer to outdoor microcomputer.
  The communications from the indoor microcomputer to the outdoor micro computer are the same. Fig. 2-3 shows the voltages and waveforms at each circuit.

- Fig. 2-1 shows the interface circuit used for the indoor and outdoor microcomputers to communicate with each other.



(Communications from indoor micro computer to outdoor micro computer)

(Communications from outdoor micro computer to indoor micro computer)

Fig. 2-1 Indoor / Outdoor interface Circuit

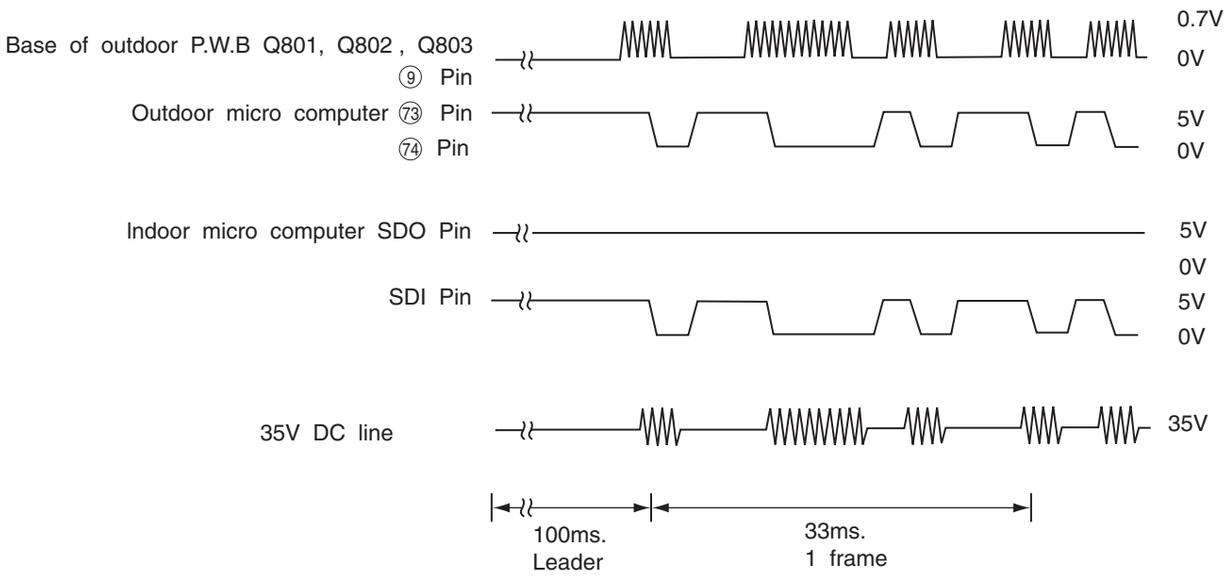


Fig. 2-2 Voltages Waveforms of indoor / Outdoor Micro computers (Outdoor to Indoor Communications)

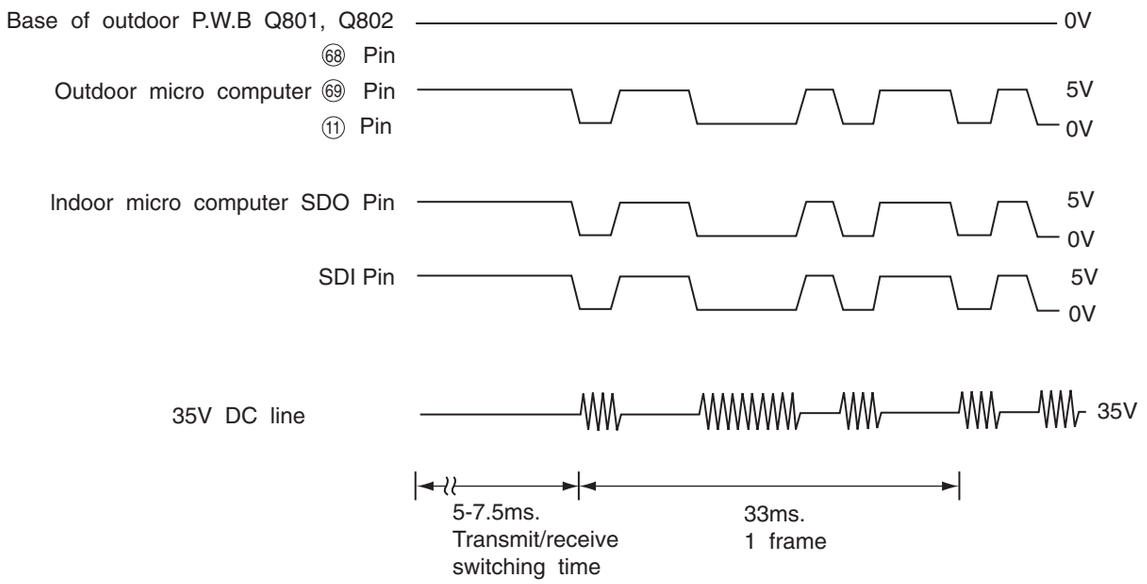


Fig. 2-3 Voltages Waveforms of indoor / Outdoor Micro computers (Indoor to Outdoor Communications)

3. Power Module Circuit

- Fig. 3-1 shows the system power module and its peripheral circuit. (Current ACT module and power module are combined into one unit.) The three transistors on the positive ⊕ side are called the upper arm, and the three transistors on the negative ⊖ side, the lower arm.

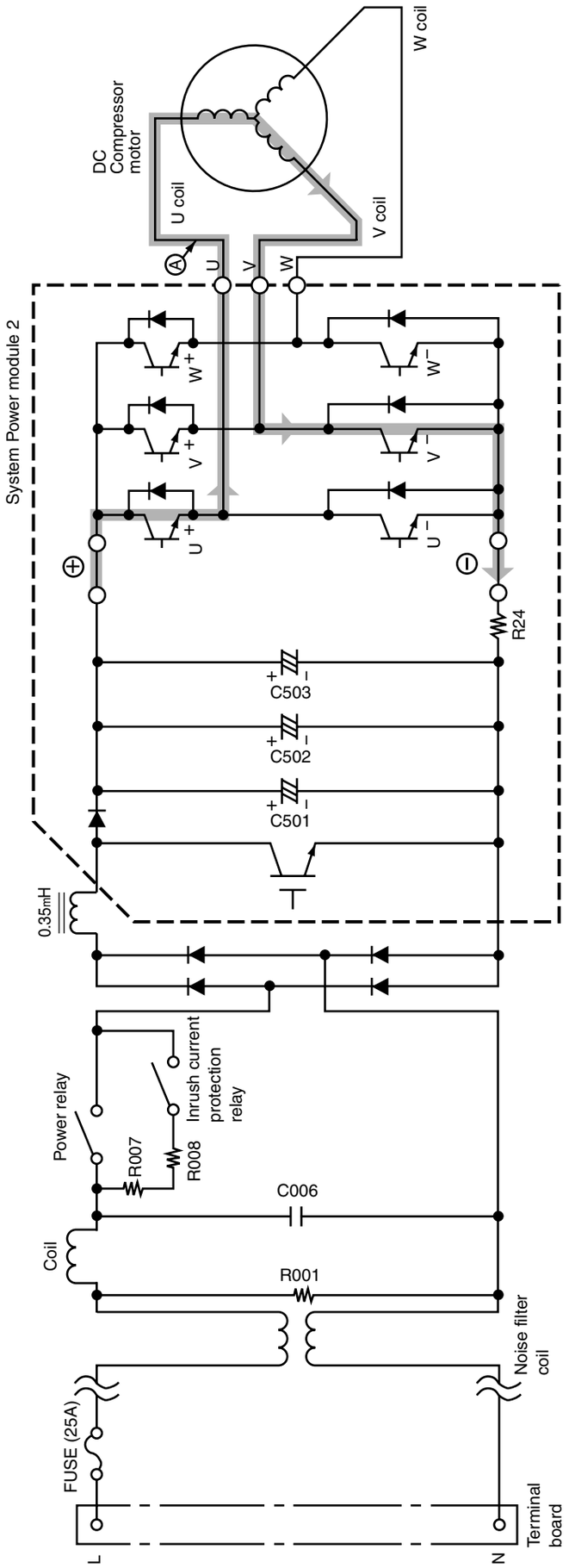


Fig. 3-1 Power module circuit (U^+ is ON, V^- is ON)

- DC 320-360V is input to power module and power module switches power supply current according to rotation position of magnet rotor. The switching order is as shown in Fig. 3-2.

[※ At point E: U^+ is ON, V^- is ON (circuit in Fig. 3-1)
※ At point F: U^+ is chopped (OFF), V^- is ON (circuit in Fig. 3-4)]

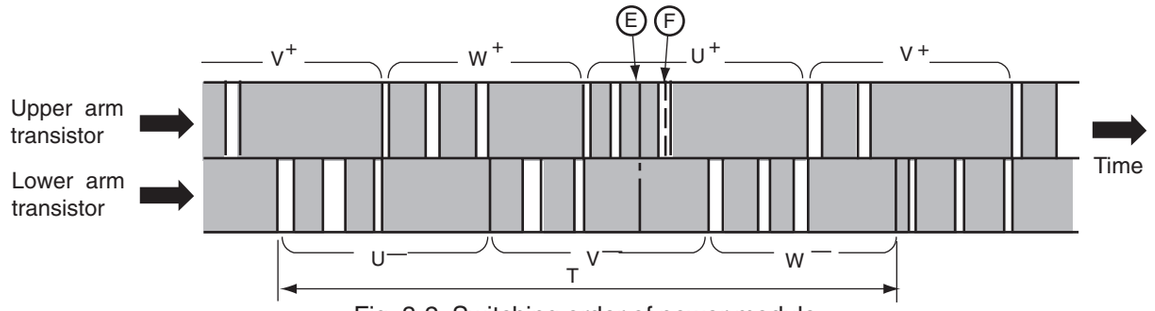


Fig. 3-2 Switching order of power module

- Upper arm transistor is controlled to ON/OFF by 3.2kHz chopper signal. Rotation speed of the compress is proportional to duty ratio (ON time/ ON time + OFF time) of this chopper signal.
- Time T in Fig. 3-2 shows the switching period, and relation with rotation speed (N) of the compressor is shown by formula below;

$$N = 60/2 \times 1/T$$

- Fig. 3-3 shows voltage / current waveform at each point shown in Figs. 3-1 and 3-4. First half of upper arm is chopper, second half is ON, and first half of lower arm is chopper, second half is ON.

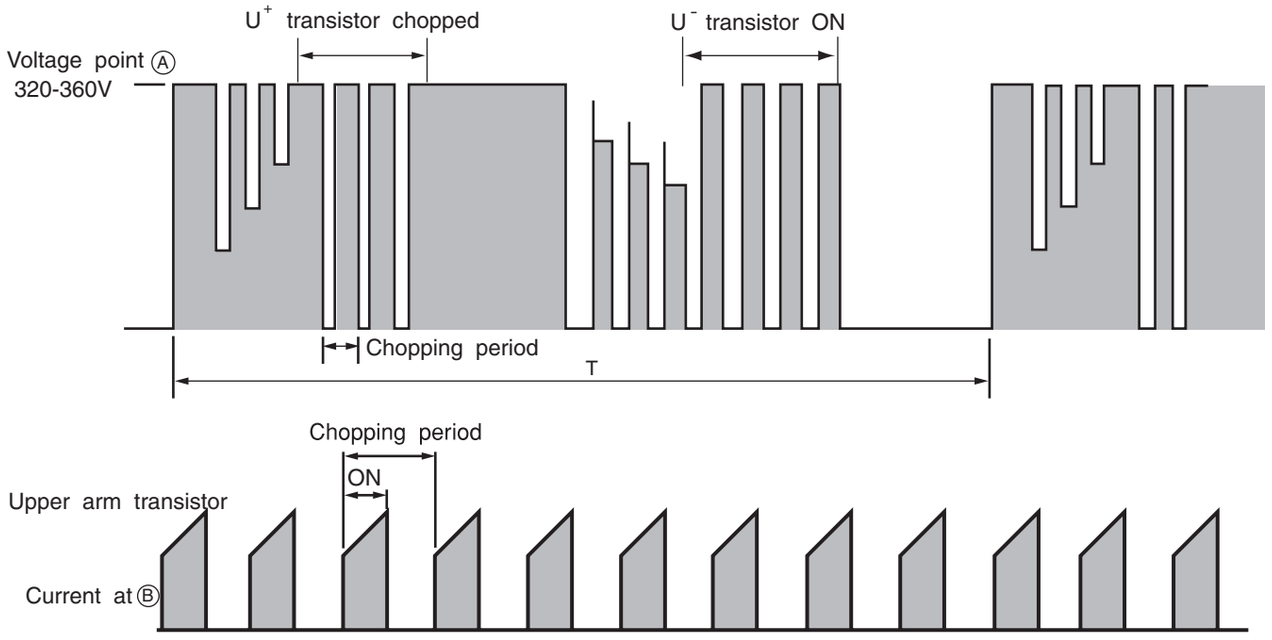


Fig. 3-3 Voltage waveform at each point

- When power is supplied $U^+ \rightarrow U^-$, because of that U^+ is chopped, current flows as shown below; Ⓑ
  (1) When U^+ transistor is ON: U^+ transistor → U coil → V coil → V^- transistor → DC current detection resistor → Point Ⓑ (Fig. 3-1)
  (2) When U^+ transistor is OFF: (by inductance of motor coil) U coil → V coil → V^- transistor → Return diode → Point Ⓐ (Fig. 3-4)

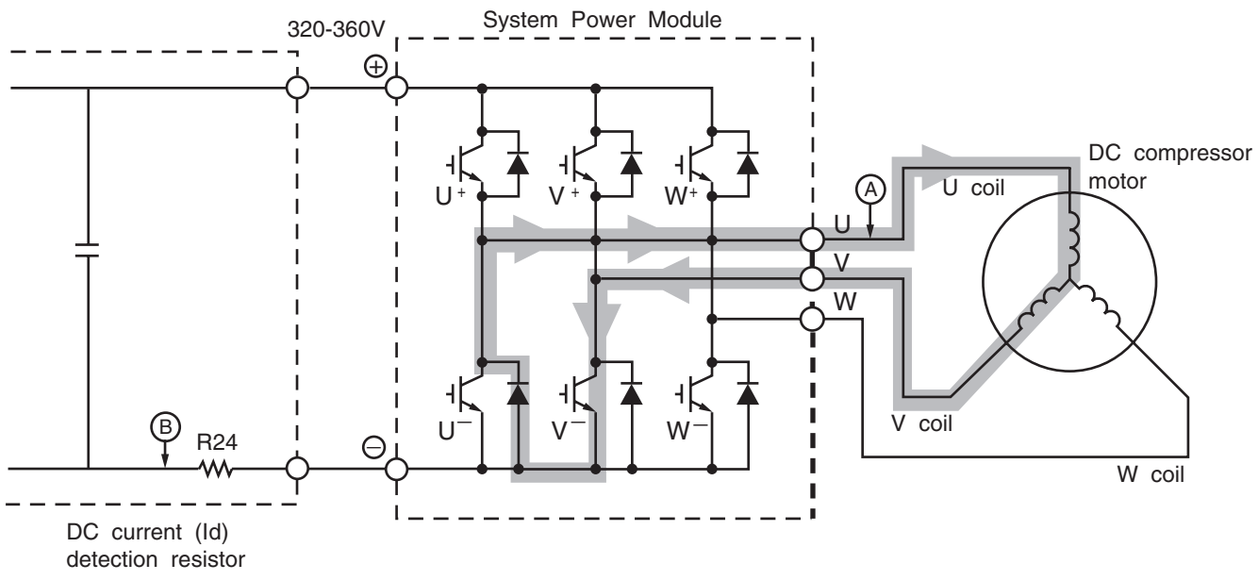


Fig. 3-4 System Power module circuit (U^+ is OFF, V^- is ON)

- Since current flows at point Ⓑ only when U+ transistor and V^- transistor is ON, the current waveform at point Ⓑ becomes intermittent waveform as shown in Fig. 3-3. Since current at point Ⓑ is approximately proportional to the input current of the air conditioner, input current is controlled by using DC current (Id) detection resistor.

<Reference>

If power module is detective, self diagnosis lamps on the control P.W.B. may indicate as shown below:

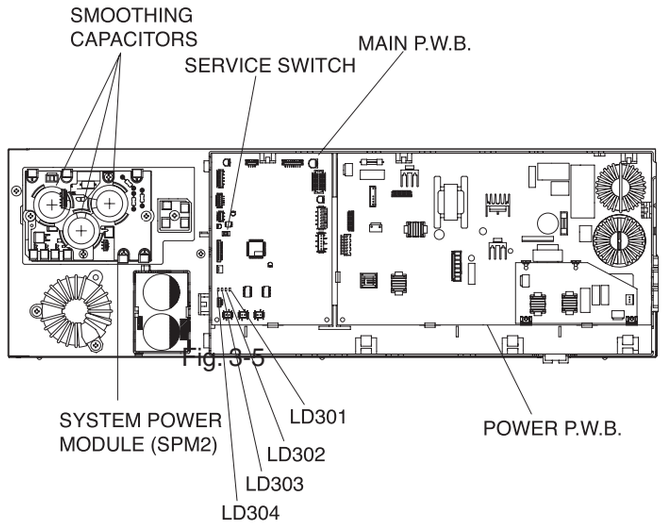


Fig. 3-5

Table 3-1

Self-diagnosis	Self-diagnosis lamp and mode	
Ip (peak current cut)	LD301	Blinks 2 times
Abnormal low speed rotation	LD301	Blinks 3 times
Switching incomplete	LD301	Blinks 4 times

※ From results of power module simple inspection (inspection mode when operated with compressor lead disconnected), LD310 blinks four times about 2 seconds later: Unit has not entered the normal operation.

4. Power Supply Circuit

- Fig. 4-1 shows the power circuit.

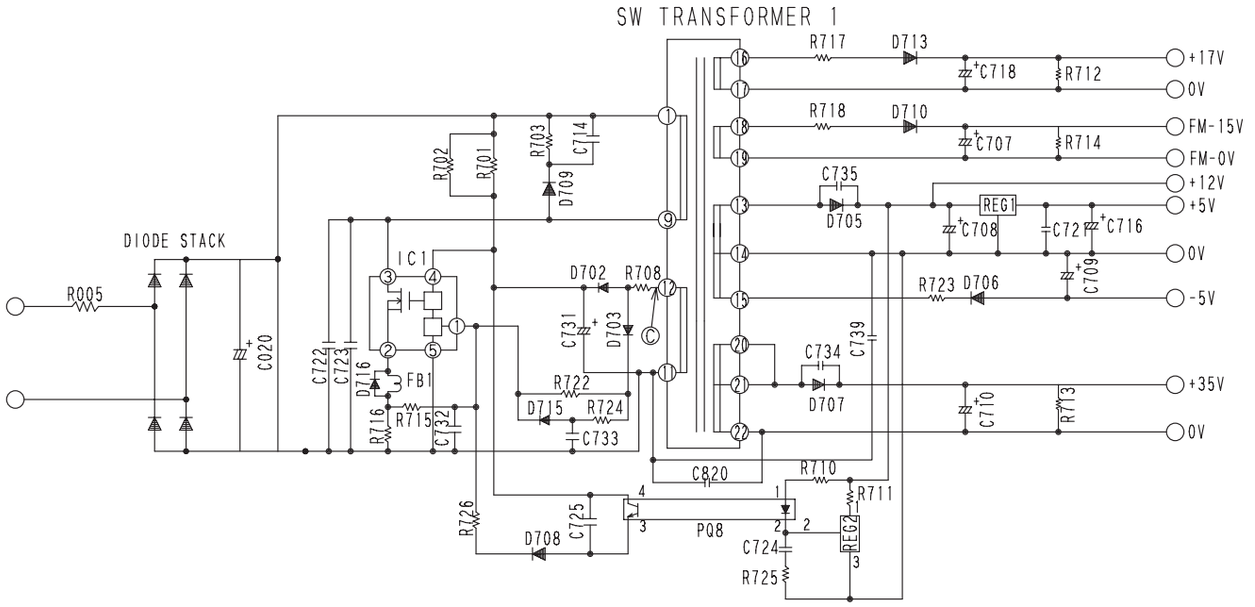


Fig. 4-1 Power circuit for P.W.B.

- There are two switching power supply in Power PWB.
- Switching power supply 1 is generating the secondary power for control circuits and DC35V indoor unit.
- Switching power supply performs voltage conversion effectively by switching transistor IC1 to convert DC330V to high frequency of approximately 20kHz to 200kHz.
- Transistor IC1 operates as follows:

(1) Shifting from OFF to ON

- DC about 330V is applied from smoothing capacitors C020 ⊕ and ⊖ in the control power circuit. With this power, current flows to pin ④ of IC1 via R701 and IC1 starts to turn ON. Since voltage in the direction of arrow generates at point ⓒ at the same time, current passing through R708 and D702 is positive-fed back to IC1.

(2) During ON

- The drain current at IC1 increases linearly. During this period, the gate voltage and current become constant because of the saturation characteristics of the transformer.

(3) Shifting from ON to OFF

- This circuit applies a negative feedback signal from the 12V output. When the voltage across C708 reaches the specified value, REG2 turns on and current flows to PQ8 ①-②. This turns the secondary circuits on, sets IC1 pin ① to “Hi”, and turns IC1 off.

(4) During OFF

- While IC1 is on, the following energy charges the primary windings of the transformer:

  Energy=$LI^2/2$. Here, L : Primary inductance

  I : Current when IC1 is off

  This energy discharges to the secondary windings during power off. That is, C707-C710, C718 is charged according to the turn ratio of each winding.
- At the start, an overcurrent flows to IC1 because of the charged current at C707-C710, C718.
- The drain current at IC1 generates a voltage across R716. If it exceeds the IC1 base voltage, it sets the IC gate voltage to “HI”.
- R716 limits the gate voltage to prevent excessive collector current from flowing to IC1.
- This SW power circuit uses a frequency as low as 20kHz, especially at a low load (when both the indoor and outdoor units stop): This reduces power loss in standby status.

<Reference>

If the power circuit for P.W.B. seems to be faulty:

(1) Make sure that 5V, 12V, 15V, 17V and -5V on the control P.W.B. power voltage are the specified values.

(2) When only the 5V output is low:
REG 1 (regulator) faulty, 5V-0V shorted, output is too high, or REG 1 is abnormal.

(3) When 12V and 5V are abnormal:
The following defects can be considered:
① Fan, operation, power, rush prevention relay (shorting in relay, etc.)
② REG 1 (regulator is abnormal), etc.
Shorting on primary circuits.
When shorting occurs in the secondary circuits, there is no abnormality in the primary circuits because of overcurrent protection.
The voltage rises when an opening occurs in the primary circuits, or the feedback system is abnormal.

(4) When 15V and 17V power supply are abnormal:
D710, D713 or Drive circuit is abnormal.

(5) When all voltage are abnormal:
IC1, R716, may possibly be defective. Also D cable may possibly be reverse connected.
If IC1 is abnormal, be aware that other components, such as the power module, REG (regulator), etc. are possibly defective.

[When the switching power supply seems to be abnormal, the voltage between IC1 pin ④ (to be measured at the leads of R701 and R702) and IC1 pin ⑤ (to be measured at R216 lead) may be between 11 and 16V. This is because the protection circuit of IC is operating.]

6. Rotor magnetic pole position detection circuit

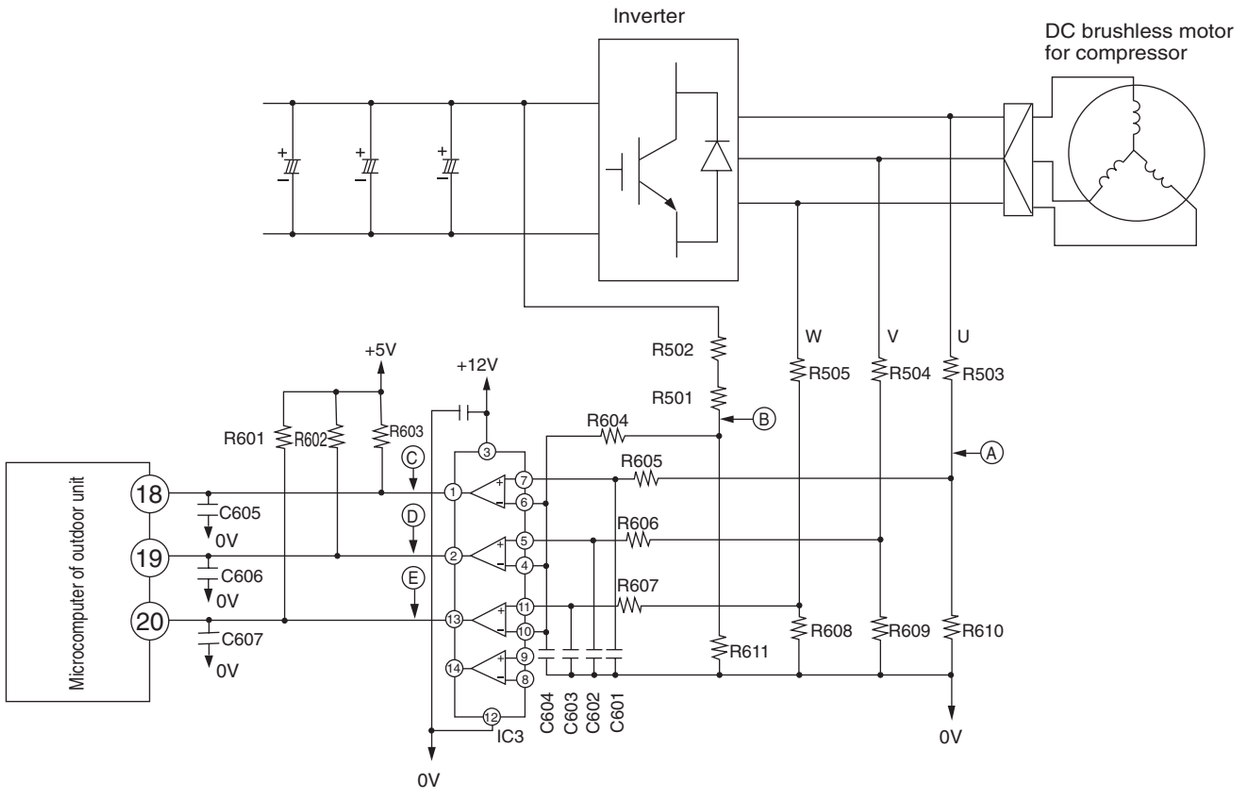


Fig. 6-1 Rotor magnetic pole position detection circuit

When the DC brushless motor is rotated, it also operates as power generator, generating reverse electromotive force according to number of rotations. This reverse electromotive force is voltage-divided by R503 – R505 and R608 – R610, and appears as point Ⓐ voltage. IC3 compares and digitalizes point Ⓐ voltage with point Ⓑ voltage (in which DC voltage (Vd) is voltage-divided by R501, R502 and R611), and inputs this to microcomputer as position detection signals for points Ⓒ, Ⓓ and Ⓔ. Microcomputer switches inverter using optimum timing based on position detection signals, in order to control the rotation of the brushless motor.

7. Peripheral circuit of microcomputer

- Fig. 7-1 shows the microcomputer and its peripheral circuits.
  Table 7-1, the basic operations of each circuit block, and Fig. 7-2, the system configuration.

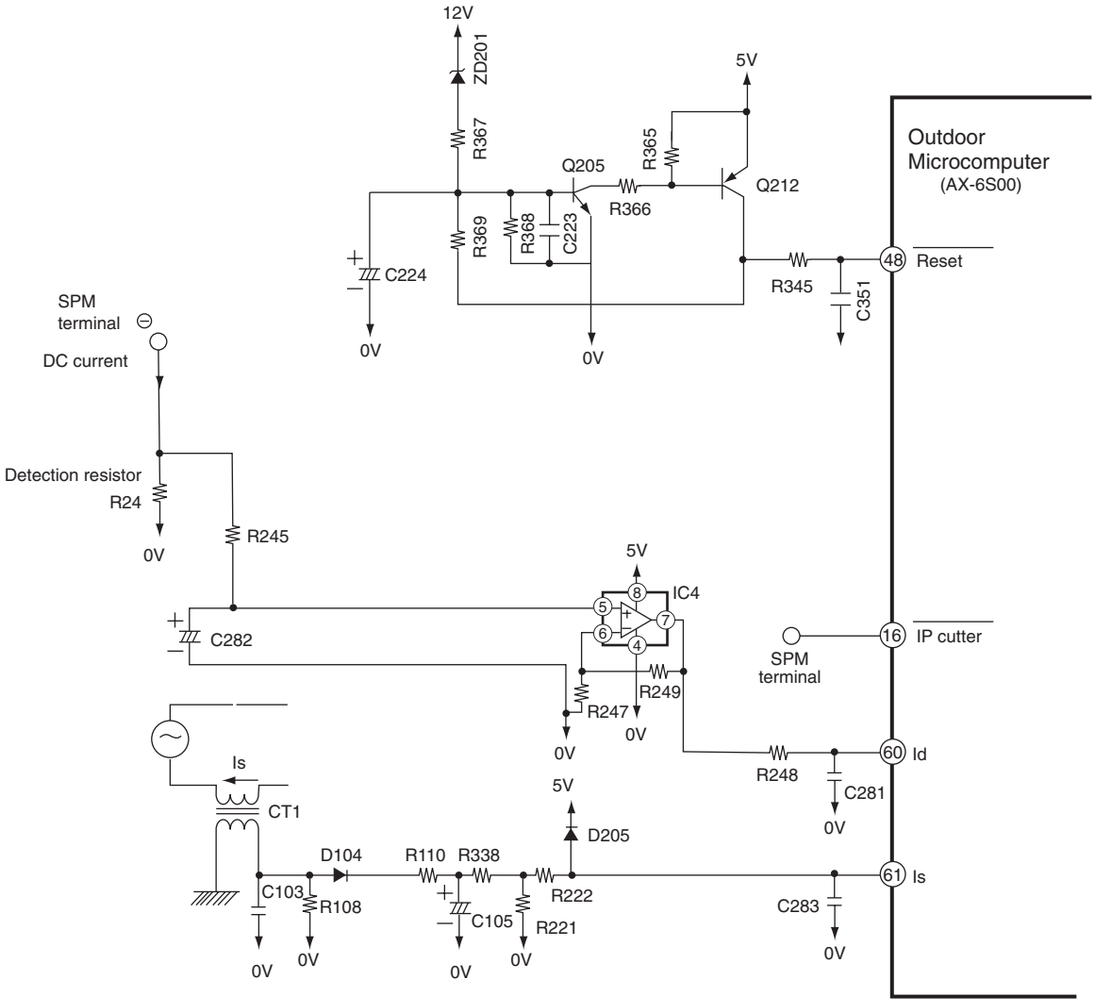


Fig. 7-1 Peripheral circuit of microcomputer (AX-6500)

Table 7-1

Circuit block	Basic operation
Peak current cutoff circuit	This circuit detects DC current flowing power module: When over-current (instantaneous value) flows, it stops upper and lower arm drive circuit and also produces Ip signal to stop microcomputer.
Overload external judgment circuit	This circuit detects DC current flowing to power module and produces signal to notify microcomputer of overload status.
Voltage amplifier circuit	This circuit voltage-amplifies DC current level detected by detection resistor and sends it to microcomputer. In addition, setting of internal/external overload judgment is performed.
Reset circuit	This circuit produces reset voltage.

8. Overload control circuit (OVL control circuit)

- Overload control is to decrease the speed of the compressor and reduce the load when the load on the air conditioner increases to an overload state, in order to protect the compressor, electronic components and power breaker.
- Overloads are judged by comparing the DC current level and set value.
- Fig. 8-1 shows the overload control system configuration and Fig. 8-2 is a characteristic diagram of overload judgement values. There are two judgement methods-external judgement which compares the externally set value with the DC current value regardless of the rotation speed and internal judgement which compares the set value that varies according to the rotation speed programmed in the microcomputer software with the DC current value.

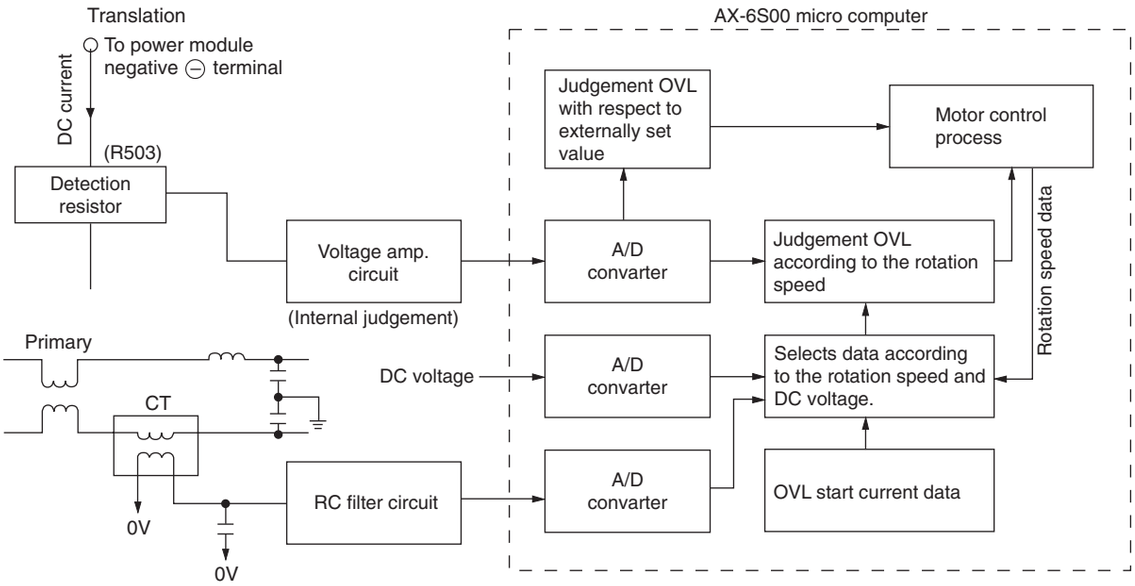


Fig. 8-1 Overload Control System Configuration

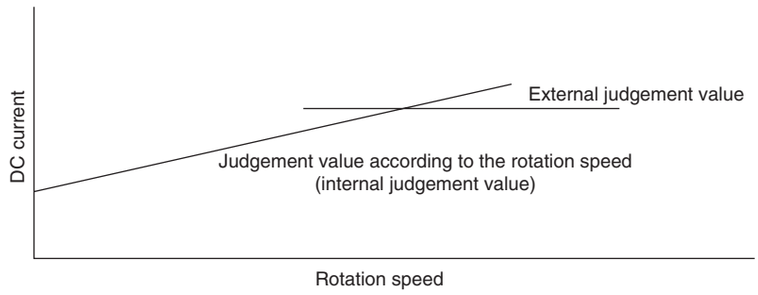


Fig. 8-2

9. Reset Circuit

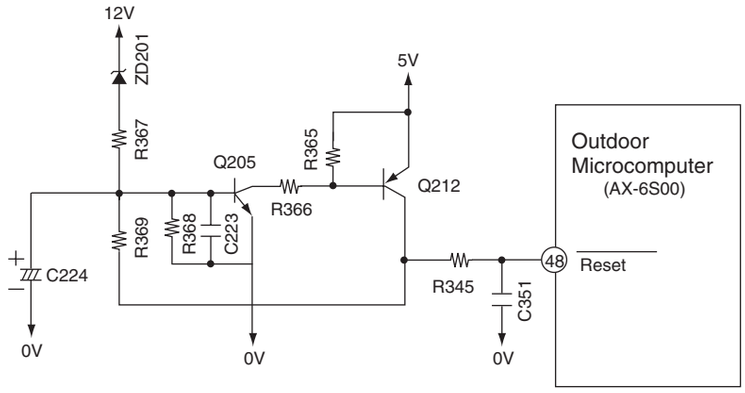


Fig. 9-1

- Reset circuit performs initial setting of the microcomputer program when power is turned on.
- Microcomputer resets program with reset voltage set to Lo, to enable operation at Hi level.
- Fig. 9-1 shows the reset circuit, and Fig. 9-2 shows waveform at each point when power is turned on/off.
- After power is turned on, 12V line and 5V line voltages rise: When 12V line voltage reaches 7.2V (Zener voltage of ZD201), ZD201 turns ON and Q211 and Q205 turn on, and reset voltage becomes Hi. Reset voltage is not set to Hi until VDD of microcomputer rises to 5V, enabling operation, due to ZD201.
- After power turns off, when 12V line voltage drops, ZD201 also turns OFF.

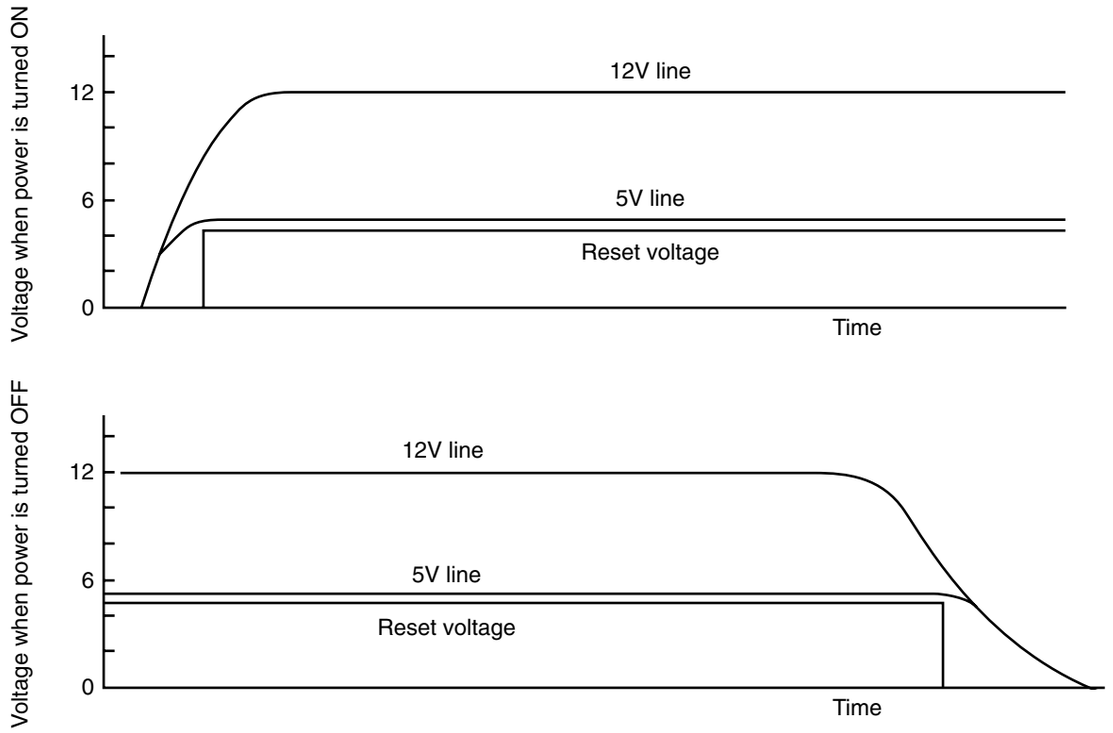


Fig. 9-2

10. Temperature Detection Circuit

- The outdoor units (this model) provides with the outdoor temperature thermistor, DEF (defrost) thermistor, OH (overheat) thermistor and electric expansion valve thermistor so that they detect the temperatures of the unit and control the system.
- The circuit of the thermistors is shown as Fig. 10-1 for model RAS-70YHA, and their roles and temperature measuring points are shown as Table 10-1.

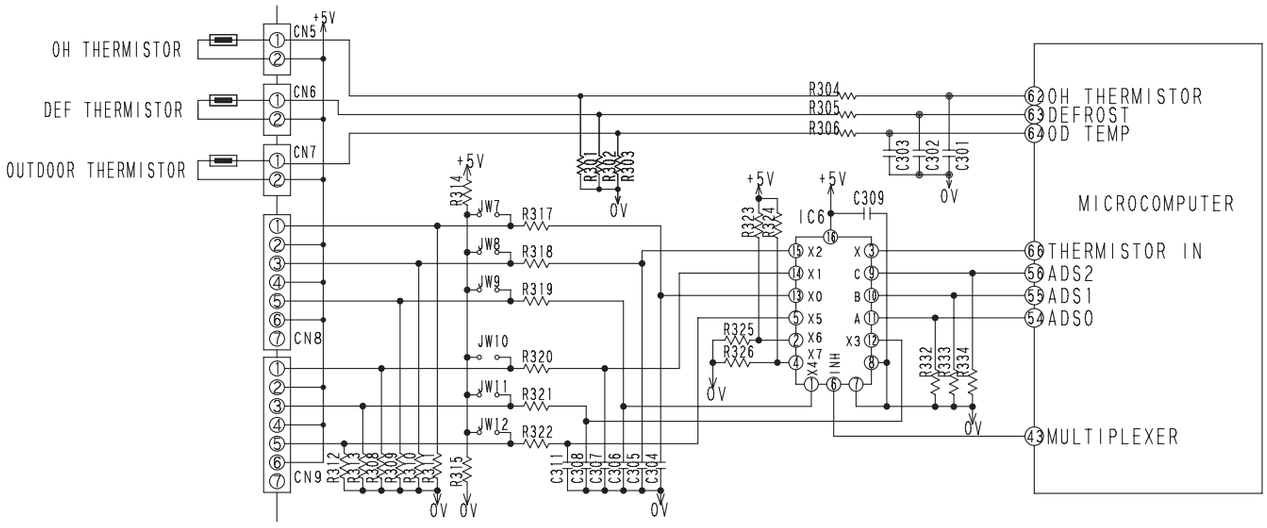


Fig. 10-1 Temperature Detection Circuit

Table 10-1 Name and Role of each thermistor

Name	Connector No	Measuring Point	Role
OH thermistor	CN5	Compressor head	If the temperature of the compressor rises abnormally (118˚C), the compressor will be stopped. The temperature is used to decide the operation of the valve.
DEF thermistor	CN6	Heat exchanger	The thermistors decide the defrost operation during heating combined the data of the outside temperature and its data.
Outdoor temperature thermistor	CN7	Outside temperature	Outdoor temperature is used to decide the various operations of the air conditioner.
Electric expansion valve thermistor (NARROW PIPE)	CN8	Indoor unit (NARROW PIPE)	The thermistors detect the temperatures of the piping to the indoor units. The temperatures are used to decide how much the expansion valve is opened.
Electric expansion valve thermistor (WIDE PIPE)	CN9	Indoor unit (WIDE PIPE)	

- Table 10-2 shows the correspondence between the thermistor's resistance and the temperature. They should be used as reference values. The value, which you measure, may be slightly difference from that in the table. It depends on the instrument.
- When you measure the resistance, pull out the connector after turning off the power supply. Pulling out the connector while the power supply is turned on will cause troubles.

Table 10-2 Correspondence between each thermistor's resistance and temperature (reference value)

Electric expansion valve thermistor DEF thermistor	Temperature	Resistance	Microcomputer pin potential
	-15˚C	12.6kΩ	1.0V
	0˚C	6.1kΩ	1.7V
	25˚C	2.2kΩ	3.0V
	50˚C	860Ω	3.9V
	75˚C	400Ω	4.4V
Outdoor temperature thermistor	Temperature	Resistance	Potential
	-15˚C	12.6kΩ	1.0V
	0˚C	6.1kΩ	1.7V
	15˚C	3.2kΩ	2.4V
	30˚C	2kΩ	3.1V
OH thermistor	Temperature	Resistance	Potential
	25˚C	33.9kΩ	0.5V
	50˚C	10.8kΩ	1.3V
	75˚C	4.1kΩ	2.4V
	100˚C	1.7kΩ	3.4V
	105˚C	1.5kΩ	3.6V
	118˚C	1kΩ	3.9V

- When the connectors of the thermistors are disconnected or the thermistors is open or short, LD301 (red) lights and LD302 (red) blinks so that they indicate troubled parts. Combinations of LD301 and LD302 are set up for indicating troubled thermistors. The correspondences between the number of blink time and troubled parts are shown as Table 10-3. Look in the table (LD301 and LD302 blink) for troubled parts, and if the disconnections of them are checked out, they are replaced.

- If you can see two or more troubled thermistors, a small number of blink takes precedence of others.

- The electric expansions valve thermistor is put togrther with 3 pieces, when replacing the thermistor, replace one set of 3 pieces as taking care of positioning. If you don't do so, the unit may not operate normally and its cooling performance may drop.

- Be ware that only an open-circuit for OH thermistor has to be checked in 5 minutes after the compressor starts.

- If the unit operates abnormally after replacing the thermistor, replace the control P.W.B. because it malfunctions.

11. Electric expansion valve

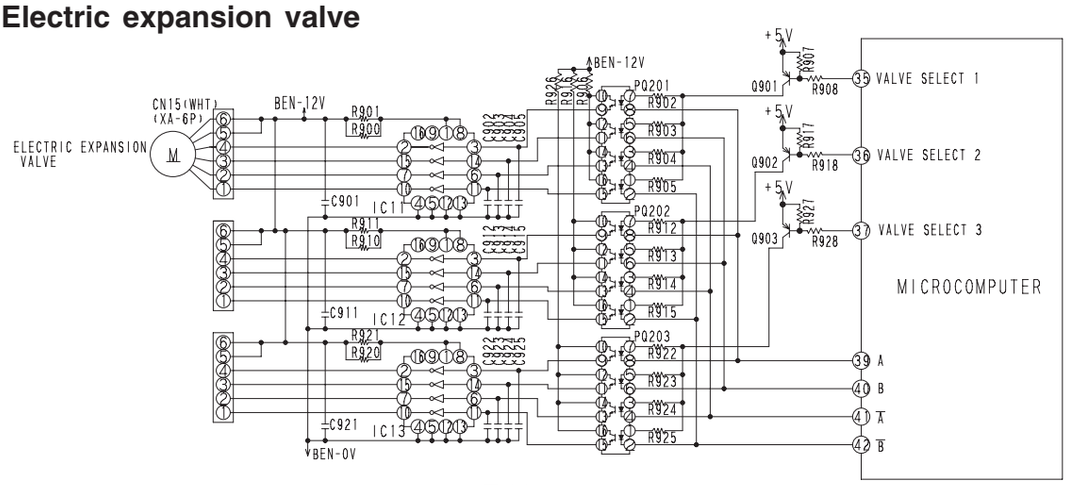


Table 11-1

- The electric expansion valve is driven by DC 12V. Power is supplied to 1 or 2 phases of 4-phase winding to switch magnetic pole of winding in order to control opening degree.
- Relationship between power switching direction of phase and open/close direction is shown below.

  When power is supplied, voltages at pins 4 to 1 of CN15 are about 0.9V; they are about 12V when no power is supplied. When power is reset, initialization is performed for 10 or 20 seconds.

  During initialization, measure all voltages at pins 4 to 1 of CN15 using mutimeter. If there is any pin with voltage that has not changed from around 0.9V or 12V, expansion valve or microcomputer is defective.
- Fig. 11-2 shows logic waveform when expansion valve is operating.

Table 11-2

Pin phase No.	Lear wire	Drive status							
		1	2	3	4	5	6	7	8
④	White	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
③	Yellow	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
②	Orange	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
①	Blue	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Operation mode
1→2→3→4→5→6→7→8 VALVE CLOSE
8→7→6→5→4→3→2→1 VALVE OPEN

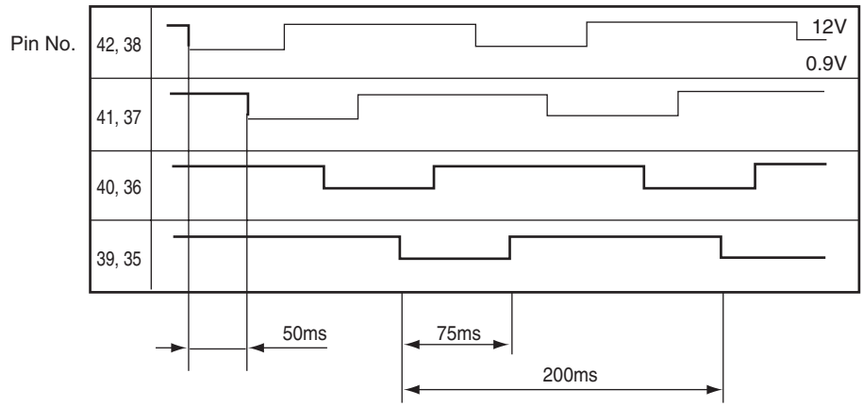


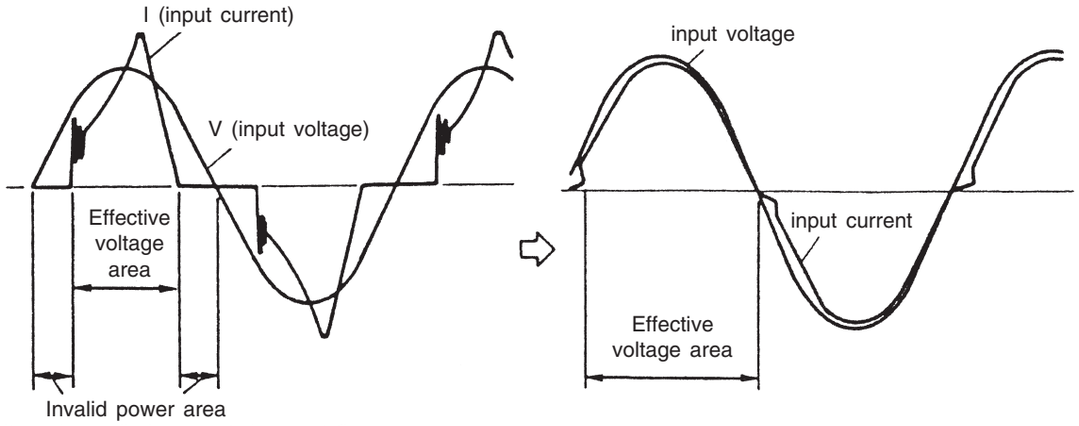
Fig. 11-2

With expansion valve control, opening degree is adjusted to stabilize target temperature, by detecting temperature of compressor head.

The period of control is about once per 20 seconds, and output a few pulses.

12. Power Factor Control Circuit

Power factor is controlled by almost 100%. (Effective use of power)
With IC in ACT module, control is performed so that input current waveform will be similar to waveform of input voltage.



*Assuming the same current capacity (20A), power can be used about 10% effective, comparing with curent use (power factor of 90%), and maximum capacity is thereby improved.

SERVICE CALL Q & A

COOLING MODE

Q1 The compressor has stopped suddenly during cooling operation.

A1 Check if the indoor heat exchanger is frosted. Wait for 3-4 minutes until it is defrosted.

If the air conditioner operates in cooling mode when it is cold, the evaporator may get frosted.

DEHUMIDIFYING MODE

Q2 Sound of running water is heard from indoor unit during dehumidifying.

A2 Normal sound when refrigerant flows in pipe.

Q3 Compressor occasionally does not operate during dehumidifying.

A3 Compressor may not operate when room temperature is 10°C or less. It also stops when the humidity is preset humidity or less.

HEATING MODE

Q4 The circulation stops occasionally during Heating mode.

A4 It occurs during defrosting. Wait for 5-10 minutes until the condenser is defrosted.

Q5 When the fan speed is set at HIGH or MED, the flow is actually Weak.

A5 At the beginning of heating, the fan speed remains LOW for 30 seconds. If HIGH is selected, it switches to LOW and again to MED after additional 30 seconds.

Q6 Heating operation stops while the temperature is preset at "30".

A6 If temperature is high in the outdoor, heating operation may stop to protect internal devices.

AUTO FRESH DEFROSTING

Q7 After the ON/OFF button is pressed to stop heating, the outdoor unit is still working with the OPERATION lamp lighting.

A7 Auto Fresh Defrosting is carried out : the system checks the outdoor heat exchanger and defrosts it as necessary before stopping operation.

AUTO OPERATION

Q8 Fan speed does not change when fan speed selector is changed during auto operation.

A8 At this point fan speed is automatic.

NICE TEMPERATURE RESERVATION

Q9 When on-timer has been programmed, operation starts before the preset time has been reached.

A9 This is because “Nice temperature reservation” function is operating. This function starts operation earlier so the preset temperature is reached at the preset time. Operation may start maximum 60 minutes before the preset time.

Q10 Does “Nice temperature reservation” function operate during dehumidifying?

A10 It does not work. It works only during cooling and heating.

Q11 Even if the same time is preset, the operation start time varies.

A11 This is because “Nice temperature reservation” function is operating. The start time varies according to the load of room. Since load varies greatly during heating, the operation start time is corrected, so it will vary each day.

INFRARED REMOTE CONTROL

Q12 Timer cannot be set.

A12 Has the clock been set? Timer cannot be set unless the clock has been set.

Q13 The current time display disappears soon.

A13 The current time disappears in approx. 10 seconds. The time set display has priority.

When the current time is set the display flashes for approx 3 minutes.

Q14 The timer has been programmed, but the preset time disappears.

A14 Is the current time past the preset time? When the preset time reaches the current time, it disappears.

OTHERS

Q15 The indoor fan varies among high air flow, low air flow and breeze in the auto fan speed mode. (Heating operation)

A15 This is because the cool wind prevention function is operating, and does not indicate a fault.

The heat exchanger temperature is sensed in the auto speed mode. When the temperature is low, the fan speed varies among high air flow, low air flow and breeze.

Q16 Loud noise from the outdoor unit is heard when operation is started.

A16 When operation is started, the compressor rotation speed goes to maximum to increase the heating or cooling capability, so noise becomes slightly louder. This does not indicate a fault.

Q17 Noise from the outdoor unit occasionally changes.

A17 The compressor rotation speed changes according to the difference between the thermostat set temperature and room temperature. This does not indicate a fault.

Q18 There is a difference between the set temperature and room temperature.

A18 There may be a difference between the set temperature and room temperature because of construction of room, air current, etc. Set the temperature at a comfortable for the space.

Q19 Air does not flow immediately after operation is started.

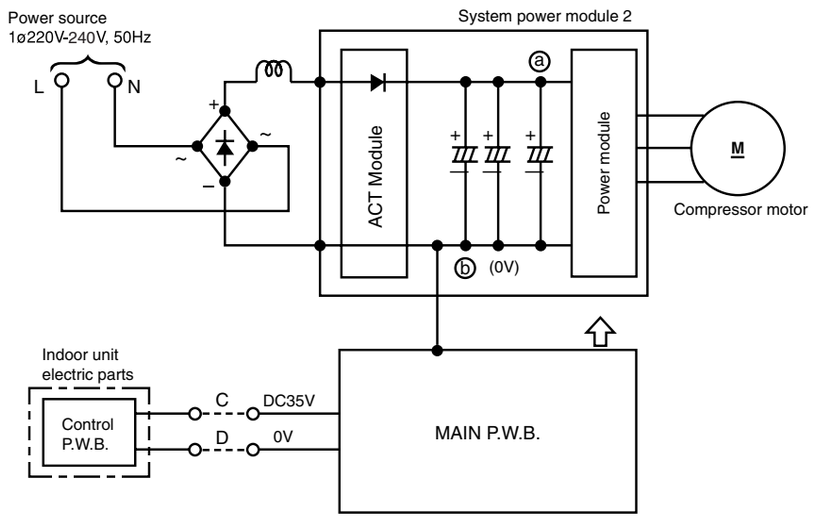
A19 Preliminary operation is performed for one minute when the power switch on and heating or dehumidifying is set. The operation lamp blinks during this time for heating. This does not indicate a fault.

TROUBLE SHOOTING

PRECAUTIONS FOR CHECKING

DANGER

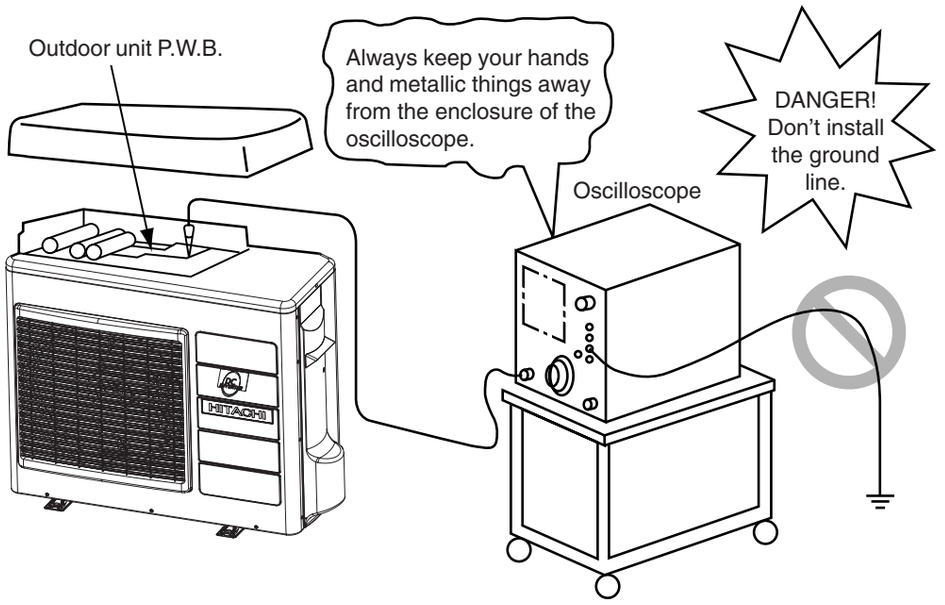
1. Remember that the 0V line is biased to 155-170V in reference to the ground level.
2. Also note that it takes about 10 minutes until the voltage fall after the power switch is turned off.



Across ⓐ – ⓑ (0V line)..... approx 260-360V
Across ⓐ – ground..... approx 155-170V
Across ⓑ (0V line)– ground..... approx 155-170V

DANGER

When using an oscilloscope, never ground it. Don't forget that high voltages as noted above may apply to the oscilloscope.



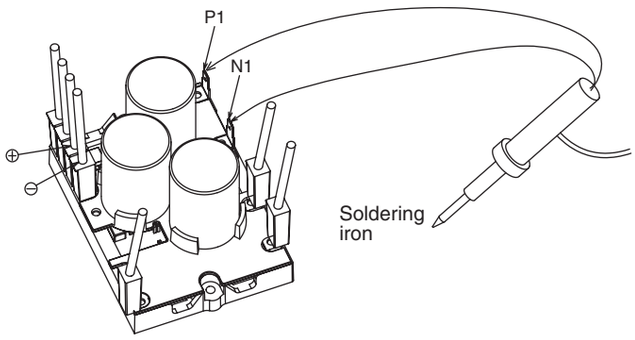
DISCHARGE PROCEDURE AND POWER SHUT OFF METHOD FOR POWER CIRCUIT

WARNING

Caution

- Voltage of about 300-330V is charged between both ends of smoothing capacitors
- During continuity check for each part of circuit in indoor unit electrical parts, disconnect red/gray lead wire connected from diode stack to system power module (SPM2) to prevent secondary trouble. (Be sure to discharge smoothing capacitor)

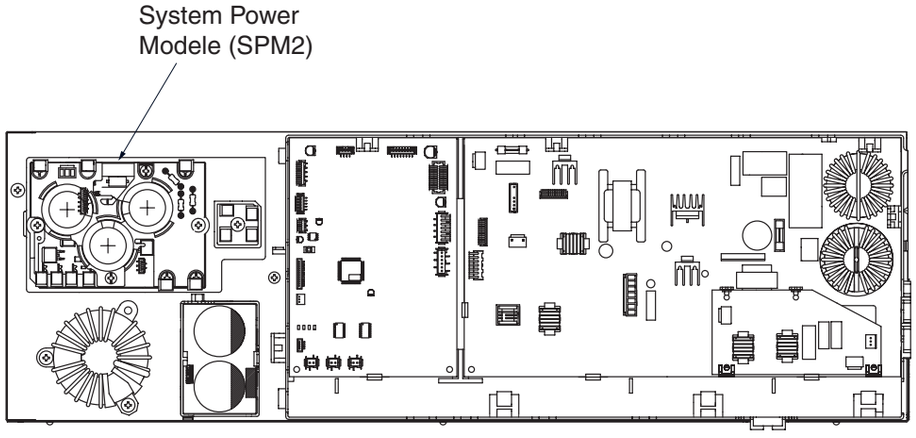
1. Turn OFF the Power supply to the outdoor unit.
2. After power is turned off, wait for 10 minutes or more. Then, remove electrical parts cover and apply soldering iron of 30 to 75W for 15 seconds or more to P2 and N1 terminals on system power module, in order to discharge voltage in smoothing capacitor.
3. Remove receptable of red/gray lead wire connected to system power module from diode stack before performing operation chech of each circuit.



System power module

Do not use a soldering iron with transformer: If one is used, thermal fuse inside transformer will be blown

As shown above, apply soldering iron to metal parts (receptable) inside the sleeve corresponding to P1 and N1 terminals of system power module: Do this with smoothing capacitors kept connected. By removing red/gray lead wire from diode stack, power supply can be shut off. (corresponding to ⊕ and ⊖ terminals of system power module)



CHECKING THE INDOOR/OUTDOOR UNIT ELECTRICAL PARTS AND REFRIGERATING CYCLE

Timer lamp

Does the timer lamp on the indoor unit blink?

→ See Troubleshooting when the timer lamp blinks .

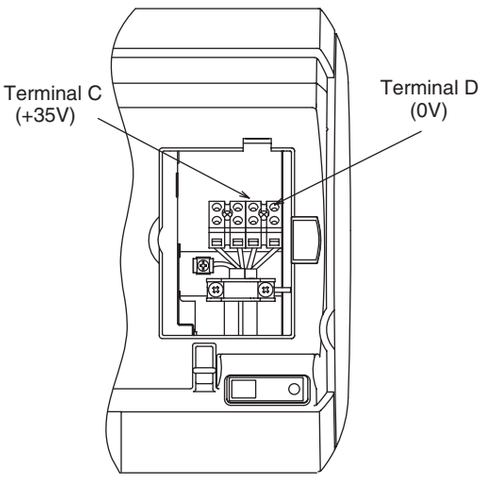
No

Set to room temperature 16°C in the cooling mode or to 32°C in the heating mode, and press the start/stop button

Does the operation lamp on the indoor unit start to light or blink?

No →

Remove the terminal cover and check the voltage between terminal (C) and terminal (D)



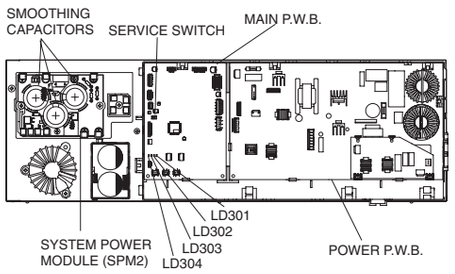
Yes

Is the compressor in the outdoor unit operating?

Yes

No

Remove the outdoor unit cover and electrical parts cover, and check self-diagnosis lamp LD301



Does LD301 blink one time ?
* Repeats 0.25-second on and 2-second off.

Blinking other than one time

One-time blinking

Press the service switch for 1 sec. Does the compressor operate? (After checking, be sure to press the service switch to stop the operation).

Yes

No

See Out door unit self-diagnosis lamp lighting mode .

Is approx. DC 33 to 37V being generated? Is the polarity correct?

No

Yes

Check to see whether the F-cable is connected incorrectly or disconnected

Normal

Check the refrigerating cycle.

Check the outdoor electrical parts.

Check the indoor electrical parts.

TROUBLESHOOTING WHEN TIMER LAMP BLINKS.

Perform troubleshooting according to the number of times the indoor timer lamp and outdoor LD301 blink.

SELF-DIAGNOSIS LIGHTING MODE

No.	Blinking of Timer lamp	Reason for indication	Possible cause
1	 1 time	Reversing valve defective When the indoor heat exchanger temperature is too low in the heating mode or it is too high in the cooling mode.	(1) Reversing valve defective (2) Heat exchanger thermistor disconnected (only in the heating mode) (Note) The malfunction mode is entered the 3rd time this abnormal indication appears (read every 3 minutes).
2	 2 times	Outdoor unit forced operation When the outdoor unit is in forced operation or balancing operation after forced operation	Electrical parts in the outdoor unit
3	 3 times	Indoor/outdoor interface defective When the interface signal from the outdoor unit is interrupted.	(1) Indoor interface circuit (2) Outdoor interface circuit
4	 4 times	Outdoor electrical assembly defective.	Please check at the outdoor electrical led lamp blinking (LD301) and refer to self diagnosis lighting mode for outdoor unit.
5	 9 times	Room thermistor or heat exchanger thermistor is faulty When room thermistor or heat exchanger thermistor is opened circuit or short circuit.	(1) Room thermistor (2) Heat exchanger thermistor
6	 10 times	Over-current detection at the DC fan motor when over-current is detected at the DC fan motor of the indoor unit.	(1) Indoor fan locked (2) Indoor fan motor (3) Indoor control P.W.B.
※1 7	 13 times	IC401 data reading error When data read from IC401 is incorrect.	IC401 abnormal

(▮ – – Lights for 0.35 sec. at interval of 0.35 sec..)

<Cautions>

(1) If the interface circuit is faulty when power is supplied, the self-diagnosis display will not be displayed.

(2) If the indoor unit does not operate at all, check to see if the F-cable is connected or disconnected.

(3) To check operation again when the timer lamp is blinking, you can use the remote control for operation (except for mode mark ※1).

SELF-DIAGNOSIS LIGHTING MODE

DANGER (DC360V)

- SWITCH OFF MAIN POWER SUPPLY TO THE OUTDOOR UNIT AT LEAST 10 MINUTES BEFORE START THE SERVICING WORK.
- MAKE SURE THE DC VOLTAGE LEVEL AT MEASURING POSITION (P1) AND (N1) IS LESS THAN 10V.
- DO NOT TOUCH THE SCREWS OF THE SYSTEM POWER MODULE WHEN THE UNIT IS TURNED ON. HIGH VOLTAGE STILL REMAIN EVEN AFTER THE UNIT IS TURNED OFF.
- DO NOT TOUCH ANY OTHER PARTS EXCEPT THE SERVICE SWITCH WHEN SERVICE OPERATION IS CONDUCTED.

SELF-DIAGNOSIS LIGHTING MODE ■ LIT ▨ BLINKING □ OFF

LD301 RED	LD302 RED	LD303 RED	LD304 GRN	SELF-DIAGNOSIS NAME	DETAILS	MAIN CHECK POINT
				[1] DURING OPERATION		
□	□	■	□	NORMAL OPERATION	COMPRESSOR OPERATION	NOT MALFUNCTION
▨	□	■	□	OVERLOAD (1)	(1) (2) SET VALUE (3) ROTATION SPEED TIME	THIS SHOWS AN OVERLOAD, NOT MALFUNCTION.
□	■	■	□	OVERLOAD (2)		
■	■	■	□	OVERLOAD (3)	UNDER OVERLOAD CONDITION, THE ROTATION SPEED IS CONTROLLED AUTOMATICALLY IN ORDER TO PROTECT THE COMPRESSOR.	

※ EXAMPLE OF BLINKING (5 TIMES) ▨▨▨▨▨ 2SEC ▨ (▨•• LIGHTS FOR 0.25 SEC. AT INTERVAL OF 0.25 SEC.)

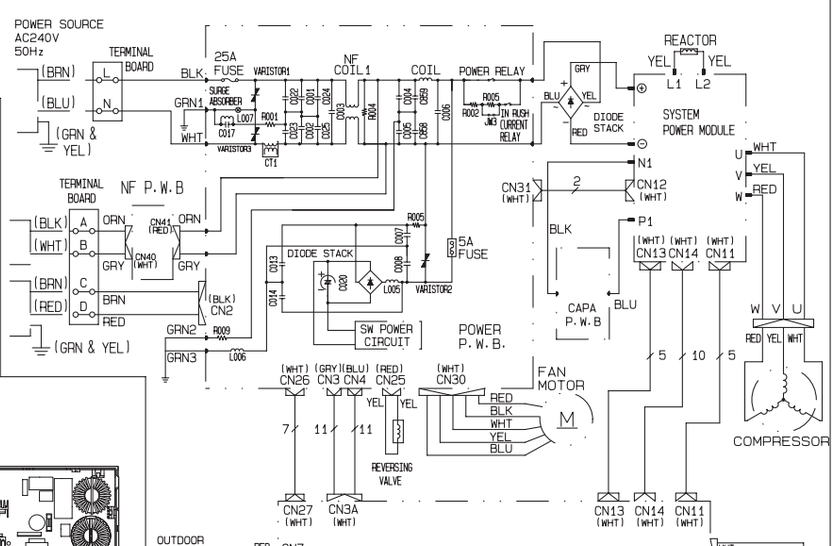
CORRESPONDENCE TABLE FOR ABNORMAL THERMISTOR

BLINKING TIME	ABNORMAL THERMISTOR
1 TIME	OVERHEAT THERMISTOR
2 TIMES	DEFROST THERMISTOR
3 TIMES	OUTDOOR TEMPERATURE THERMISTOR

LD301	LD302	LD303	LD304	[2] DURING STOP		
□	□	□	□	NORMAL STOP	INDOOR THERMOSTAT OFF. MAIN OPERATION OFF.	NOT MALFUNCTION.
▨	□	□	□	RESET STOP 1 TIME	WHEN STOPPED WITH POWER RESET. (NORMAL WHEN POWER HAS BEEN TURNED ON).	① P.W.B.s (POWER CIRCUIT,HIC, ETC.)
▨	□	□	□	PEAK CURRENT CUT 2 TIMES	OVER CURRENT IS DETECTED.	① COMPRESSOR ② P.W.B.s
▨	▨	□	□			① SYSTEM POWER MODULE ② P.W.B.s
▨	□	□	□	ABNORMAL LOW SPEED ROTATION 3 TIMES	POSITION DETECTION SIGNAL IS NOT INPUT DURING OPERATION.	① SYSTEM POWER MODULE ② COMPRESSOR ③ P.W.B.s
▨	□	□	□	SWITCHING FAILURE 4 TIMES	FAIL TO SWITCH FROM INITIAL LOW FREQUENCY SYNC. TO POSITION DETECTION SYNC. .	① SYSTEM POWER MODULE ② COMPRESSOR ③ P.W.B.s
▨	□	□	□	OVERLOAD LOWER LIMIT CUT 5 TIMES	OVERLOAD CONDITION STILL PERSISTING EVEN WHEN ROTATION SPEED IS BELOW THE LOWER RPM LIMIT.	① OUTDOOR UNIT IS EXPOSED TO DIRECT SUNLIGHT OR ITS AIRFLOW BLOCKED. ② FAN MOTOR ③ FAN MOTOR CIRCUIT ④ THE VOLTAGE IS EXTREMELY LOW.
▨	□	□	□	OH THERMISTOR TEMP. RISE 6 TIMES	OH THERMISTOR IS OPERATING.	① LEAK OF REFRIGERANT ② COMPRESSOR ③ OH THERMISTOR CIRCUIT ④ FAN MOTOR ⑤ FAN MOTOR CIRCUIT
▨	□	□	□	ACCELERATION DEFECTIVE 8 TIMES	NO ACCELERATION ABOVE THE LOWER LIMIT OF THE ROTATION SPEED.	① LEAK OF REFRIGERANT ② COMPRESSOR
▨	□	□	□	POWER SUPPLY VOLTAGE ERROR 10 TIMES	POWER SUPPLY VOLTAGE IS INCORRECT.	① POWER SUPPLY VOLTAGE ② RECEPTACLE OF WIRE AT SYSTEM POWER MODULE IS NOT PROPERLY INSERTED
▨	□	□	□	FAN LOCK ERROR 12 TIMES	OUTDOOR FAN RPM IS NOT ROTATE AS INTENDED RPM.	① FAN MOTOR ② FAN MOTOR CIRCUIT
▨	□	□	□	EEPROM READING ERROR 13 TIMES	MICROCOMPUTER CANNOT READ THE DATA IN EEPROM.	① MAIN P.W.B.
▨	□	□	□	ACTIVE CONVERTER DEFECTIVE 14 TIMES	OVER VOLTAGE IS DETECTED BY SYSTEM POWER MODULE.	① SYSTEM POWER MODULE
■ LIT	▨	□	□	ABNORMAL THERMISTOR 1~3 TIMES	THERMISTOR IS OPENED OR SHORTED. REFER TO TABLE "CORRESPONDENCE TABLE FOR ABNORMAL THEMISTOR"	① THERMISTOR ② CONNECTION OF THERMISTOR IS FAULTY ③ THERMISTOR CIRCUIT
□	□	□	▨	COMMUNICATION ERROR BETWEEN INDOOR AND OUTDOOR UNIT 1 TIMES	WHEN INDOOR UNIT IS NOT CONNECTED, IT BLINKS SIMILARLY. NOT MULFUNTION.	① CABLE IS WRONG CONNECTED ② CABLE IS OPEN ③ INTERFACE CIRCUIT BETWEEN INDOOR AND OUTDOOR UNIT.

WIRING DIAGRAM

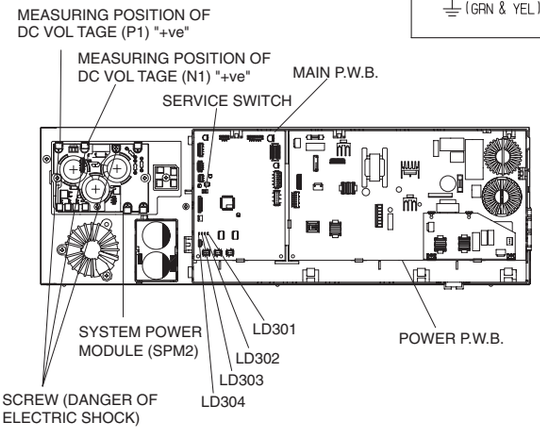
BLK : BLACK GRY : GRAY
BLU : BLUE RED : RED
BRN : BROWN WHT : WHITE
GRN : GREEN YEL : YELLOW
ORN : ORANGE



SERVICE OPERATION

COLLECT REFRIGERANT FROM INDOOR UNIT AND STORE AT OUTDOOR UNIT.

1. SWITCH OFF THE MAIN POWER SUPPLY AND THEN SWITCH IT ON AGAIN. WAIT FOR 1 MINUTE.
2. PRESS AND HOLD THE SERVICE SWITCH FOR 1 SECOND TO START OUTDOOR UNIT IN COOLING OPERATION. IN ORDER TO PREVENT PARTS FROM DAMAGE, DO NOT OPERATE THE OUTDOOR UNIT FOR MORE THAN 5 MINUTES.
3. PRESS AND HOLD THE SERVICE SWITCH FOR 1 SECOND TO STOP THE SERVICE OPERATION.
4. REPEAT STEP 1 TO 3 IF SERVICE OPERATION NEED TO BE REPEATED.

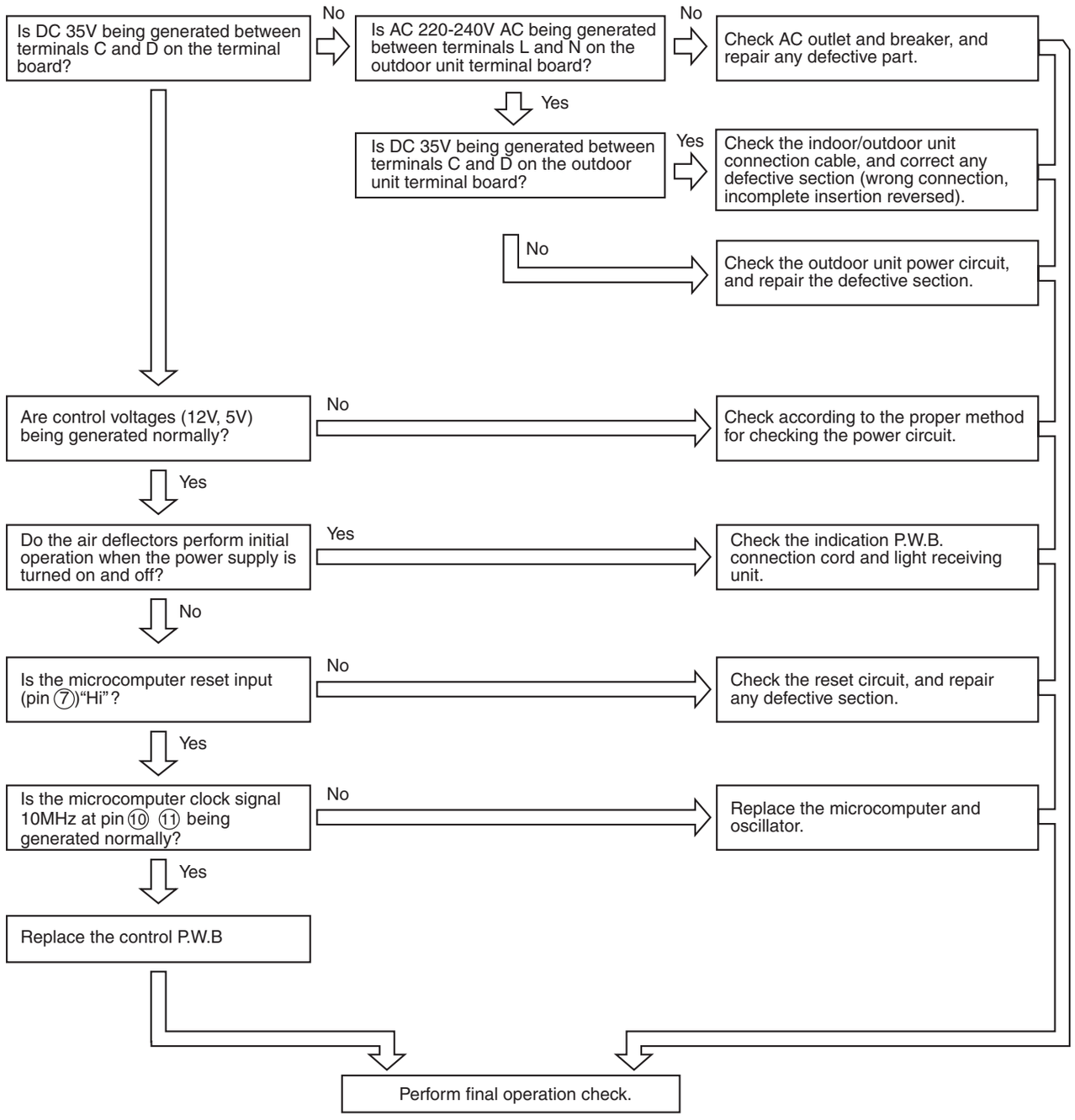


USE 30A TIME DELAY FUSE

1HRA81284A

CHECKING INDOOR UNIT ELECTRICAL PARTS

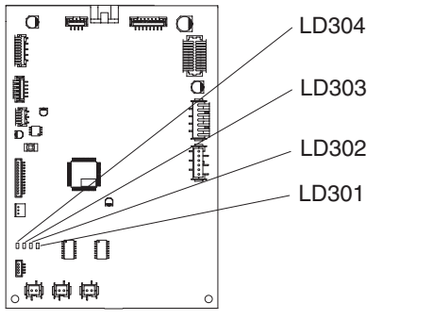
1. Power does not come on (no operation)



2. Outdoor unit does not operate (but receives remote infrared signal)

Set to room temperature 16°C in the cooling mode or to 32°C in the heating mode, and press the start/stop button.

Remove the outdoor unit cover and electrical parts cover, and check self-diagnosis lamp LD301.



Does LD301 blink one time?
*Repeats 0.25-second on and 2-second off.

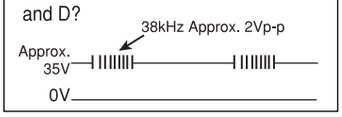
Yes → Check the room temperature thermistor; if it is defective, replace it.
<Normal values>
10°C → approx. 20kΩ
25°C → approx. 10kΩ
30°C → approx. 8kΩ

Check the heat exchanger thermistor; if it is defective, replace it.
<Normal values>
10°C → approx. 20kΩ
25°C → approx. 10kΩ
30°C → approx. 8kΩ

No

Does outdoor electrical part LD301 blink nine times?

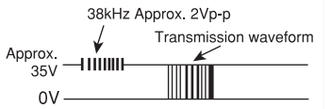
Yes → Is the indoor/outdoor unit communication signal superimposed on 35V DC of connection wires C and D?



No → Check outdoor electrical parts, and repair any defective parts (around the outdoor interface transmitting circuit).

Yes

Is the indoor transmitting signal being generated at Q801's collector?



No → Check the indoor interface transmitting circuit. Replace IC801.

Yes → Check outdoor electrical parts, and repair any defective parts (around the outdoor interface transmitting circuit).

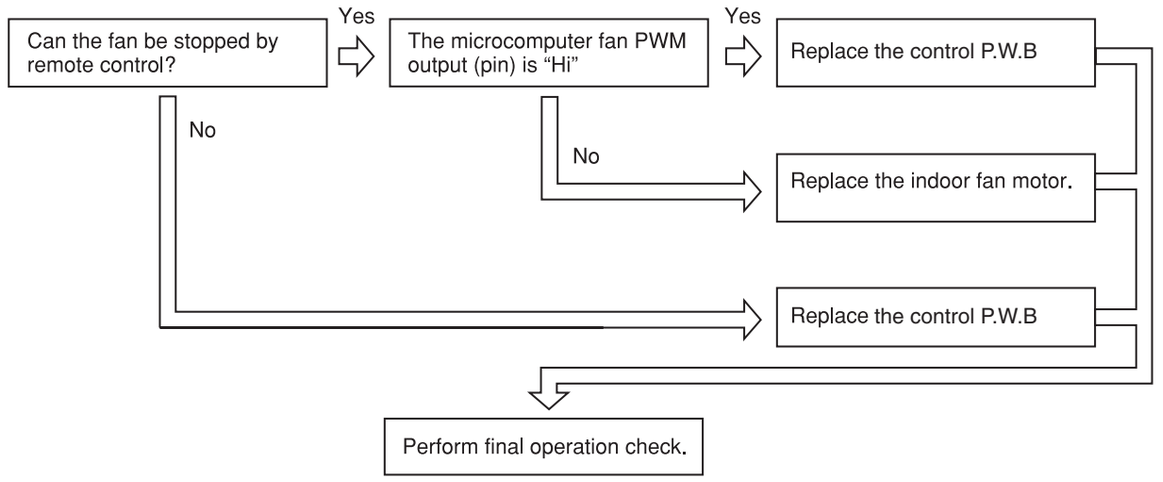
No

Does LD303 switch off several second after it lights?

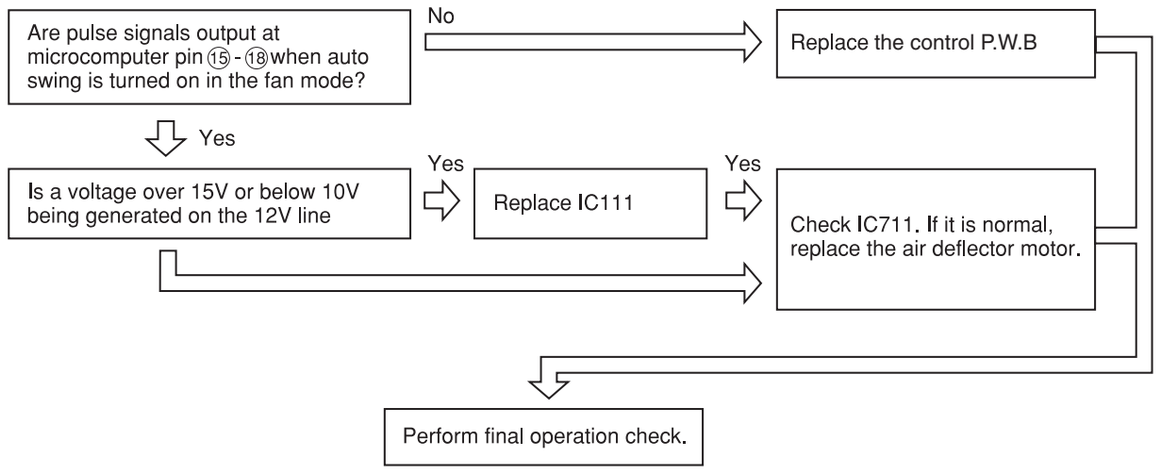
Yes → Check outdoor electrical parts, and repair any defective parts.

Perform final operation check.

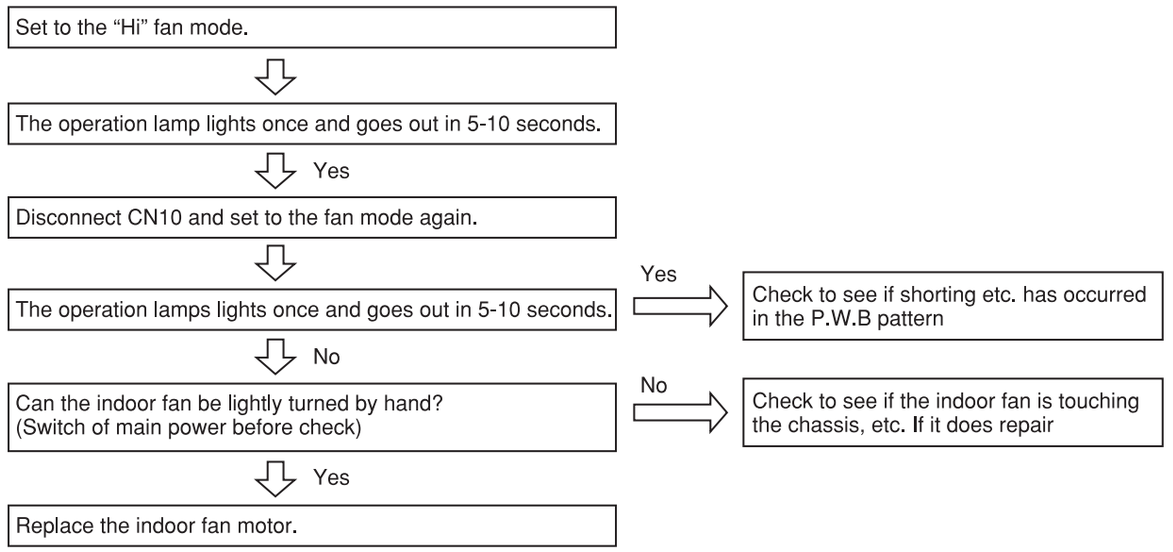
3. Only indoor fan does not operate (other is normal)



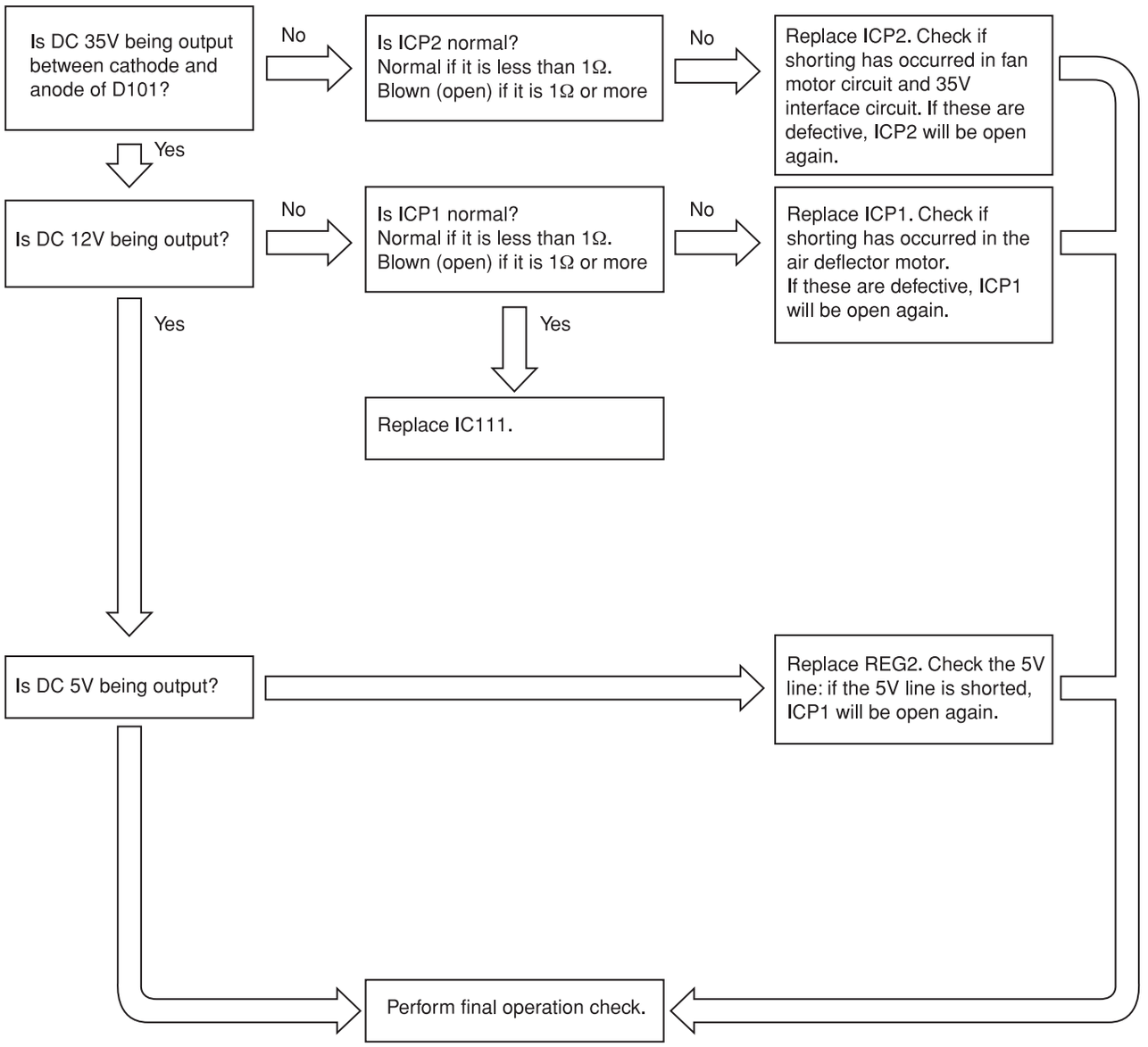
4. Air deflector does not move (others are normal)



5. All systems stop from several seconds to several minutes after operation is started (all indicators are also off)



6. Check the main P.W.B (power circuit)



CHECKING THE REMOTE CONTROLLER

Is battery polarity correct?

No

Install the battery in the correct polarity.

Yes

Is the battery check sign + − flashing?

Yes

Replace the battery.

No

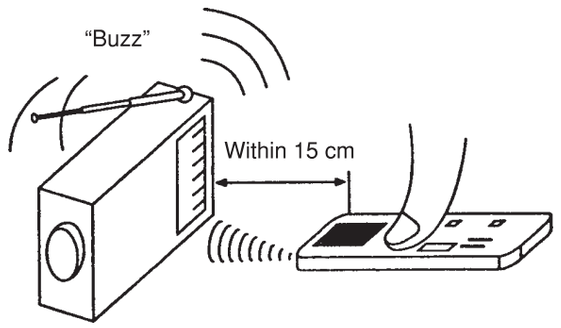
Turn on an AM radio, bring the remote control switch within 15 cm of the radio, and press the ON/OFF button.

Does the radio buzz noisily?

No

Check the LED (D1) with a multimeter.

Yes



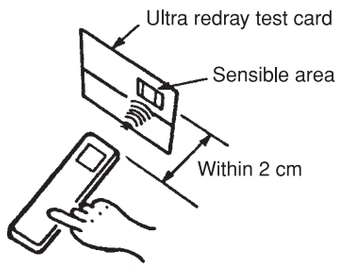
[AM radio]

Check the indoor unit signal receiving P. W. B..
If it is good, check the main P. W. B..

Check functions again.
If it does not work, replace the remote controller.

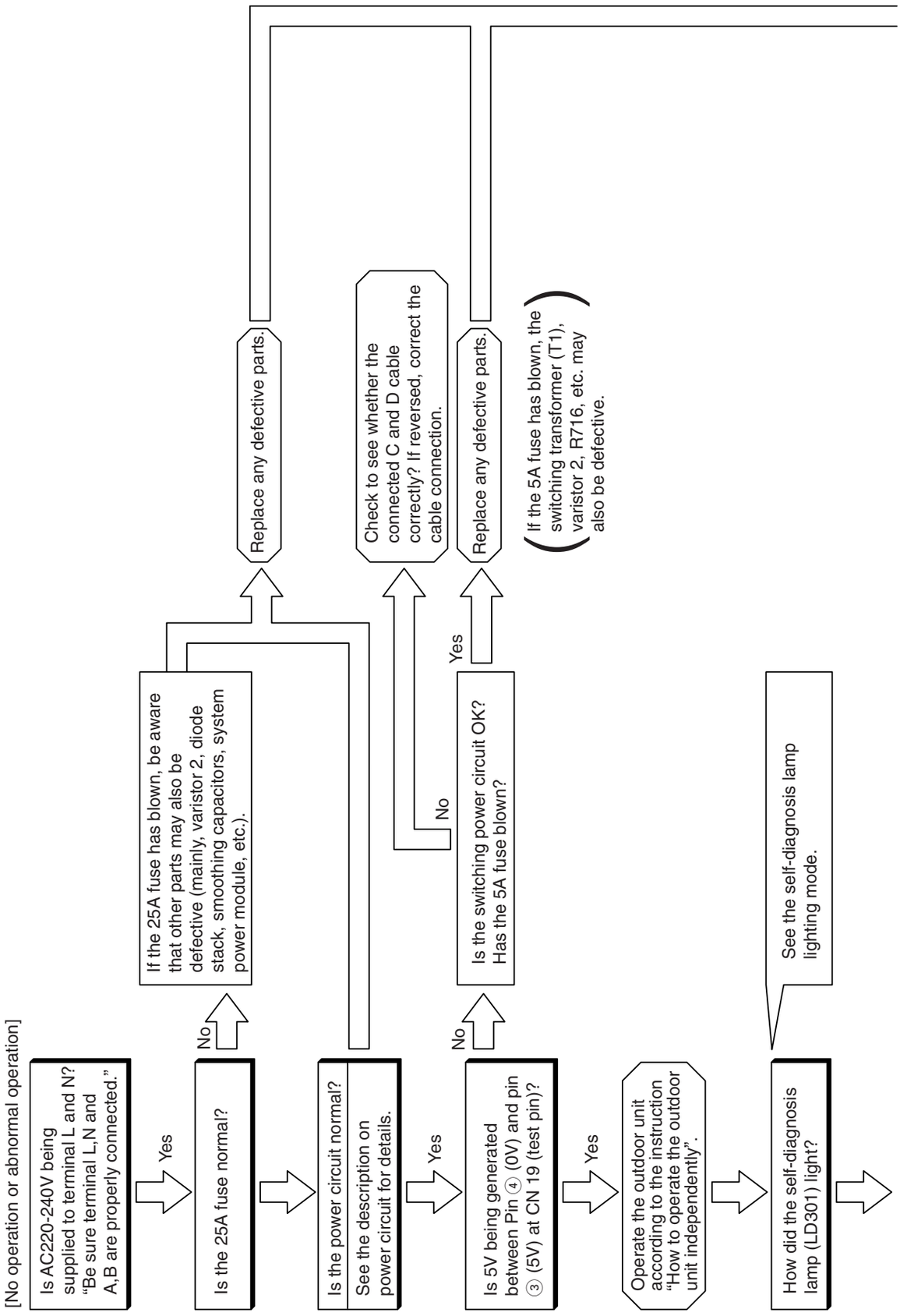
You can check the remote control switch by other methods as explained below.

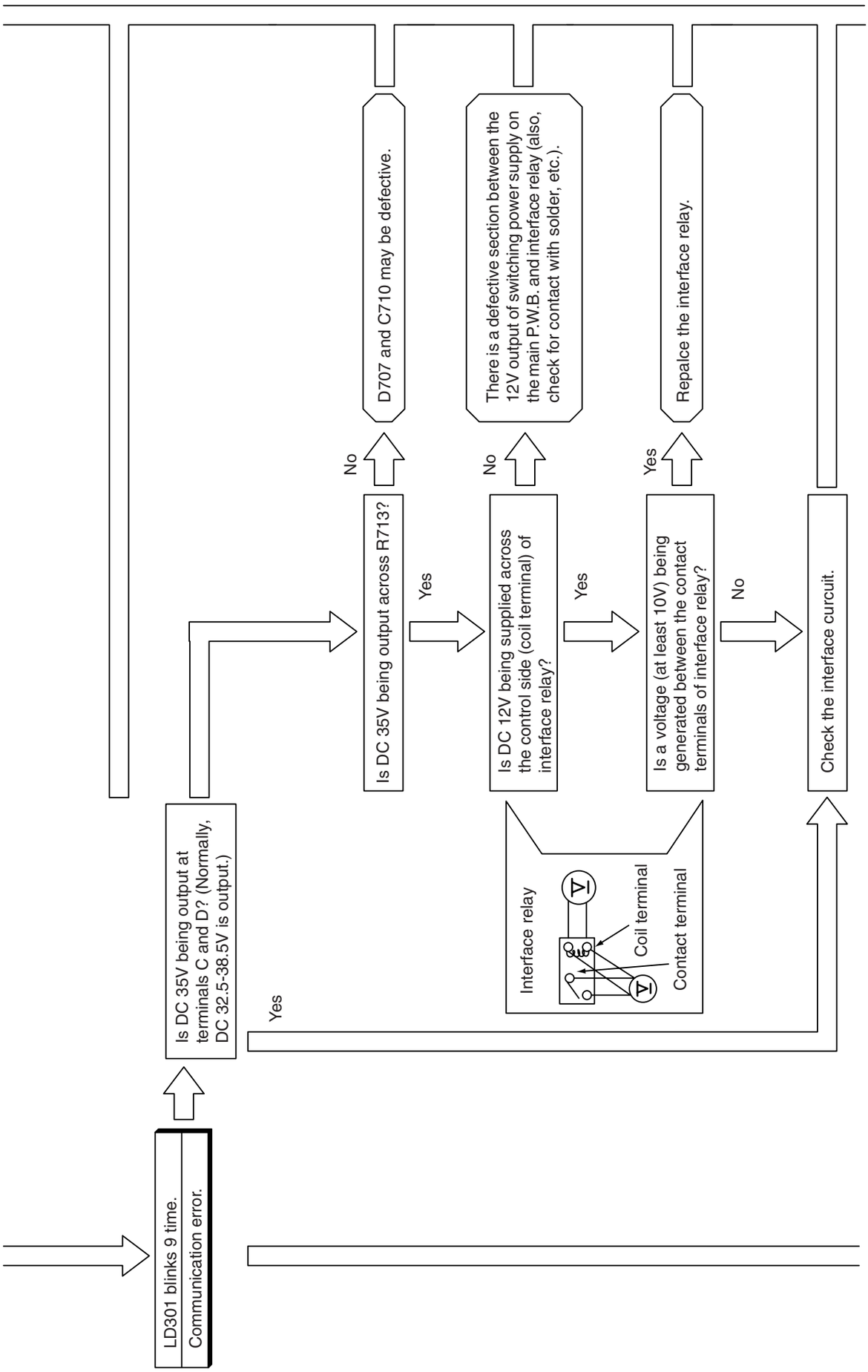
Using the test card

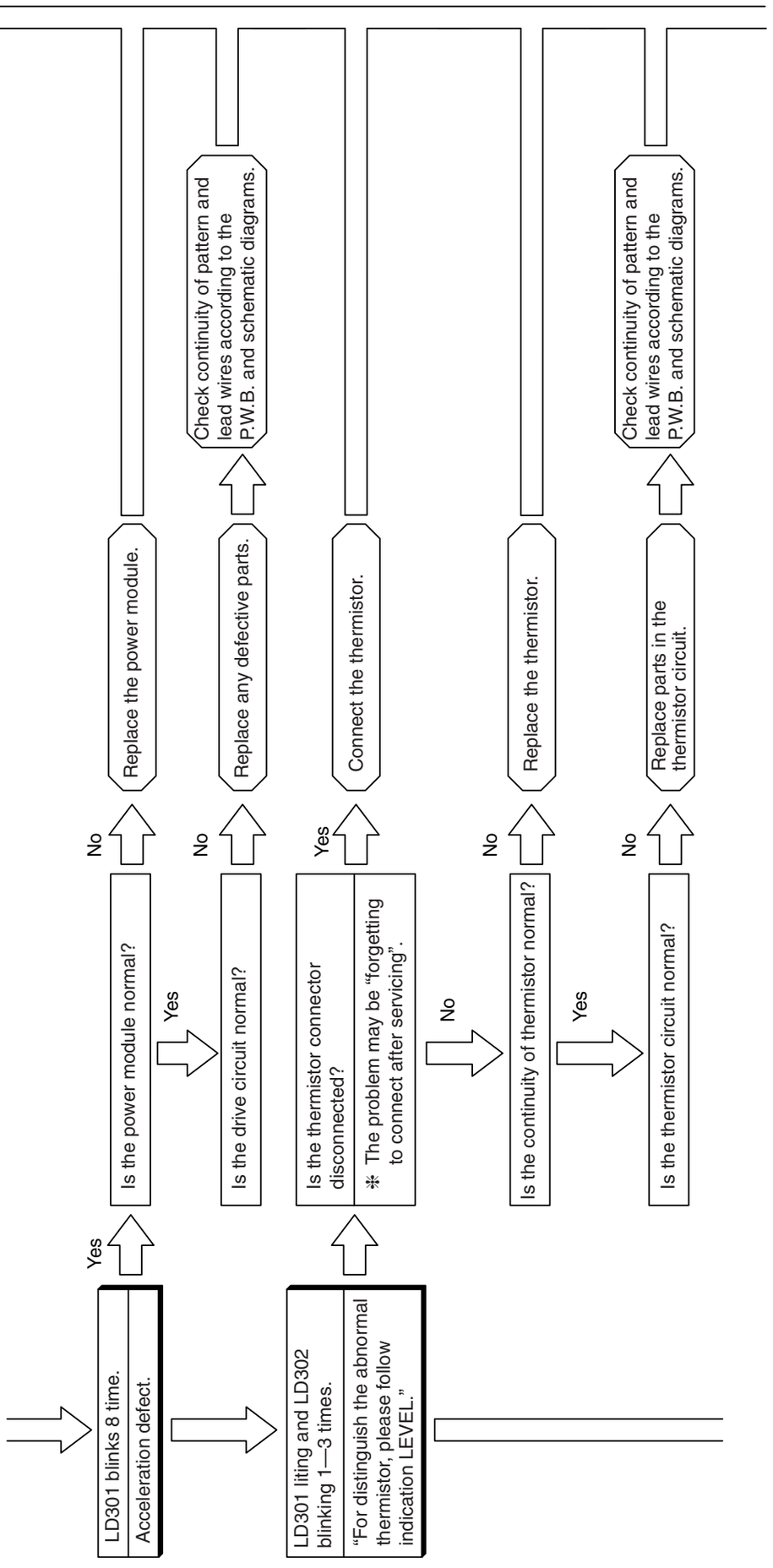


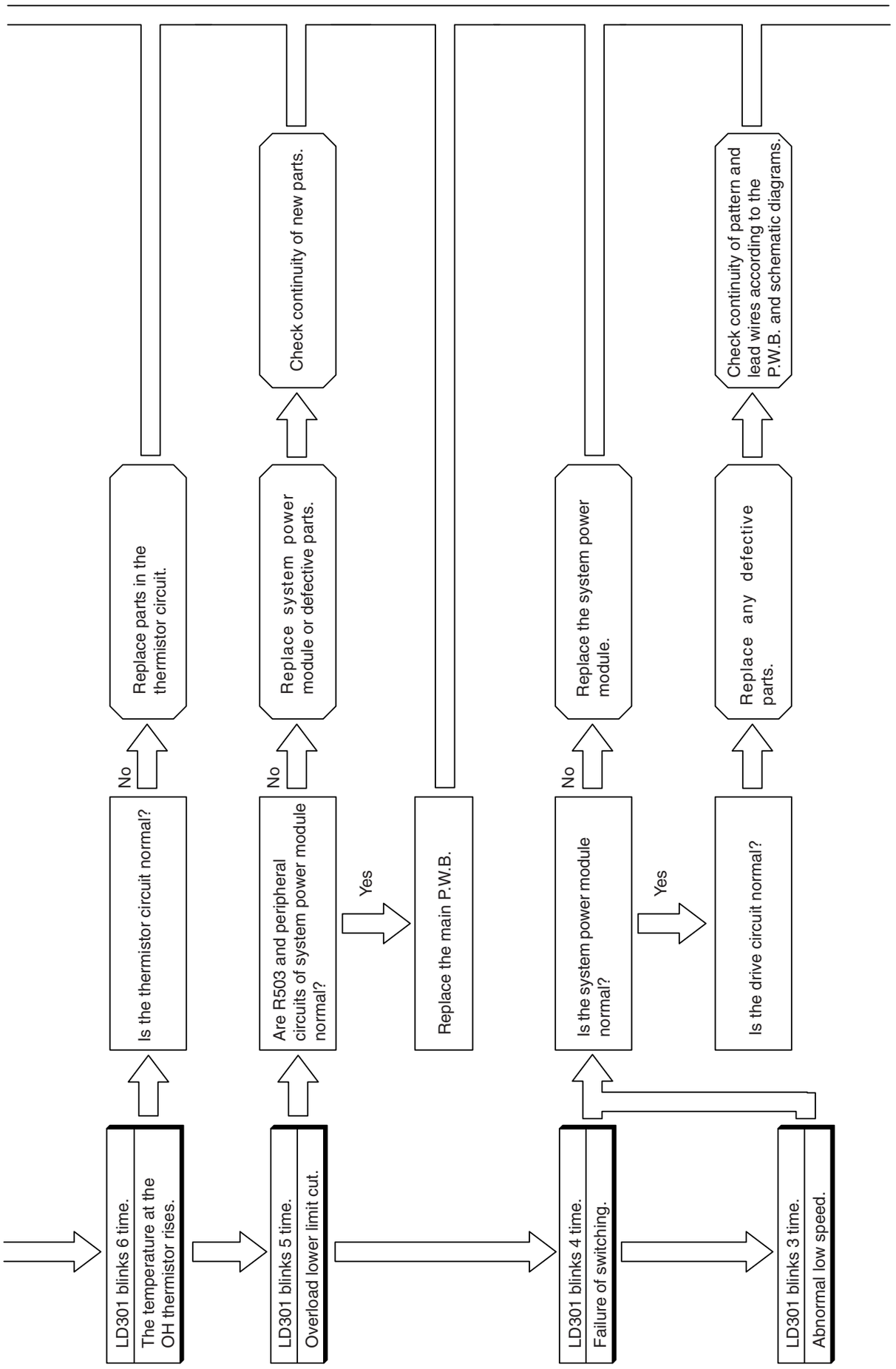
The sensible area should flash in orange when you operate the remote control unit if it is good.

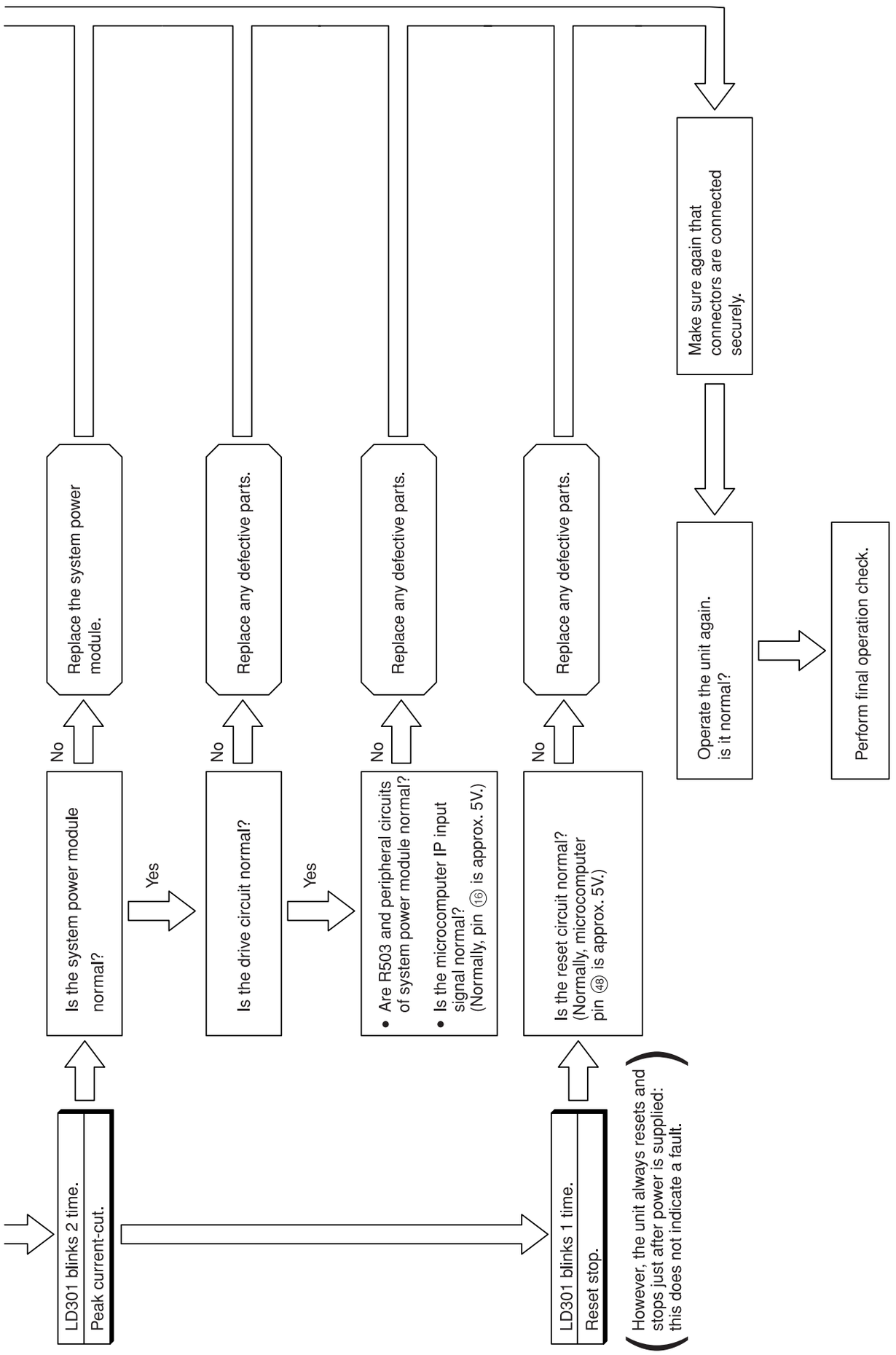
CHECKING THE OUTDOOR UNIT ELECTRICAL PARTS





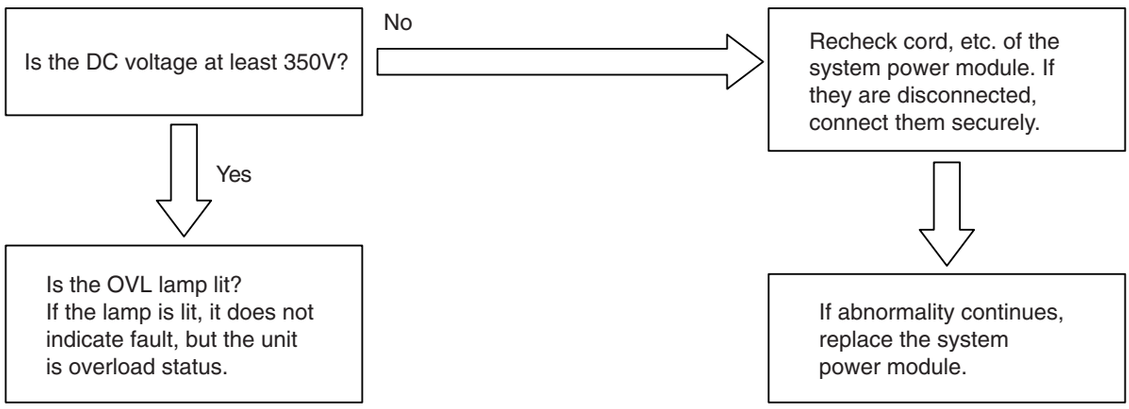






POWER CIRCUIT

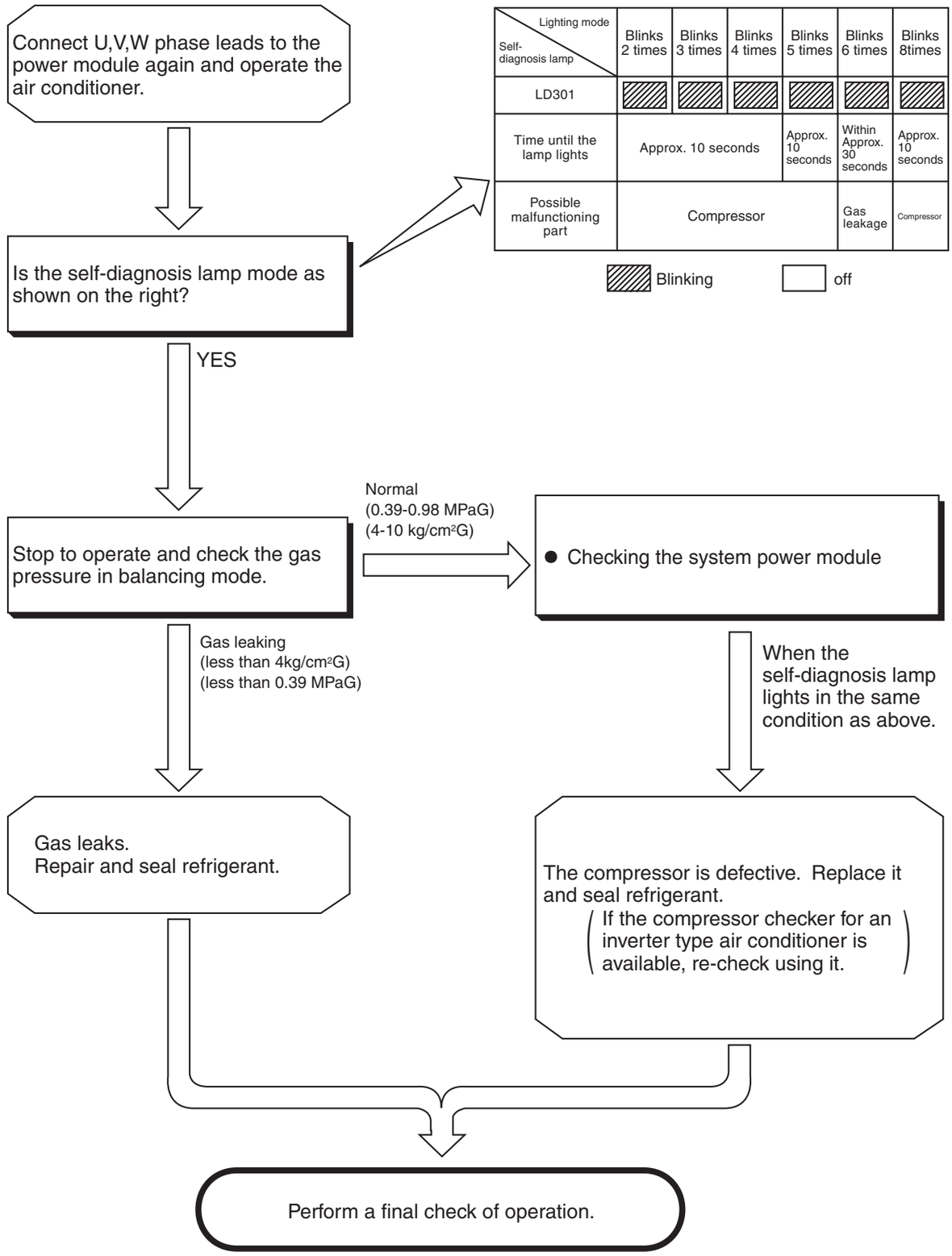
Phenomenon 1 <Rotation speed does not increase>



Overvoltage defect: system power module faulty (15-times blinking)

CHECKING THE REFRIGERATING CYCLE (JUDGING BETWEEN GAS LEAKAGE AND COMPRESSOR DEFECTIVE)

1. Troubleshooting procedure (No operation, No heating, No cooling)

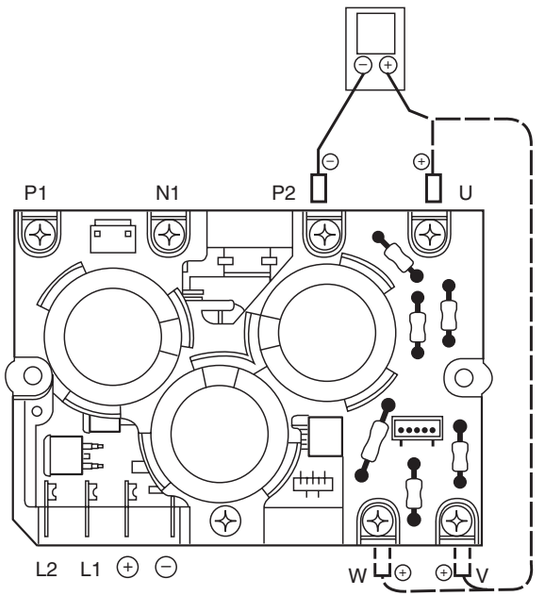


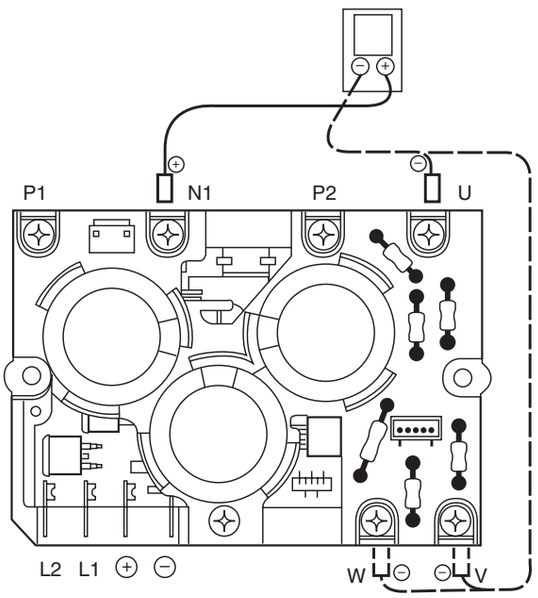
HOW TO CHECK SYSTEM POWER MODULE

Checking system power module using tester
Set tester to resistance range (X 100)
If indicator does not swing in the following conductivity check, the system power module is normal.
(In case of digital tester, since built-in battery is set in reverse direction, ⊕ and ⊖ terminals are reversed.)

⚠ CAUTION

If inner circuit of system power module is disconnected (open), the indicator of tester will not swing and this may assumed as normal. In this case, if indicator swings when ⊕ and ⊖ terminals are connected in reverse of diagram below, it is normal. Furthermore, compare how indicator swings at U, V and W phases. If indicator swings the same way at each point, it is normal.





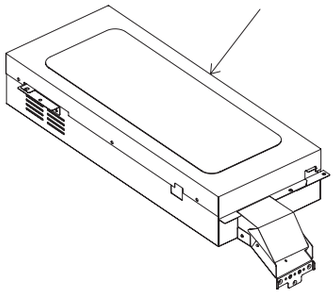
HOW TO OPERATE USING THE SERVICE SWITCH THE OUTDOOR UNIT

1. Turn off the power supply to outdoor unit and then turn on again.
2. Remove the electrical box cover.

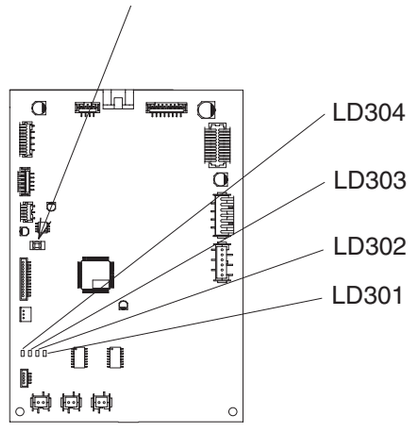
LD303 (red) will light and the unit will operate in the forced cooling mode at this time.

Never operate the unit for more than 5 minutes.

Electrical Box Cover



Service switch
(forced-cooling mode is set by pressing for 1 second or more, and stopped by pressing again.)



(Cautions)
(1) If interface signal (DC 35V) terminals C and D are not connected when the outdoor unit is in forced cool mode, the outdoor unit defect indicator (LD301) will blink 9 times during operation to indicate communication error.
(2) If checking is done with the compressor connector disconnected, the unit will continue normal operation when the electrical parts are normal, or it will repeat operating for approx. one minute and stop due to overload power limit cut, or it will operate in the overload status.

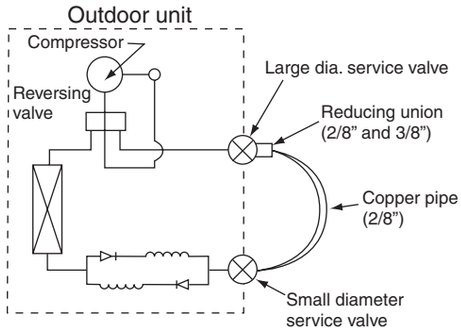
Be sure to push the service switch again to stop the forced cool operation.

HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

1. Connect the large dia. pipe side and small dia. pipe side service valves using a pipe.

Connect the small diameter service value and the large diameter service valve using the reducing union and copper pipe as shown on the right.

Charge refrigerant of 300g after vacuuming (※ 1)



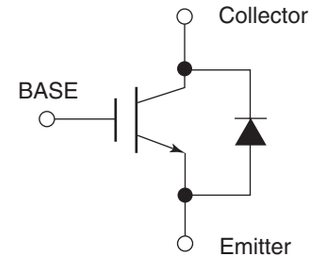
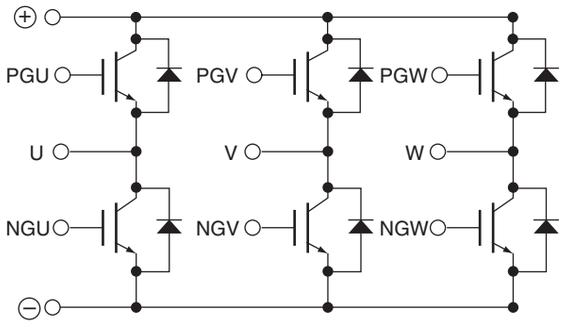
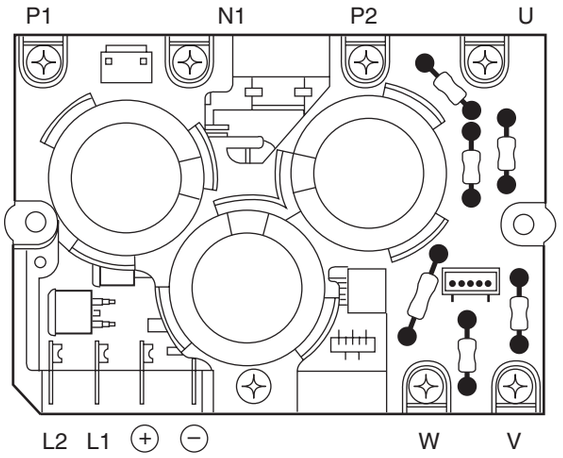
Parts to be prepared

(1) Reducing union
2/8" (6.35mm)
1/2" (12.7mm)
(2) Copper pipe (2/8" and 1/2")
(3) Shorting leads
2 leads approx. 10 cm long with alligator clip or IC clip

Do not operate for more than 5 minutes

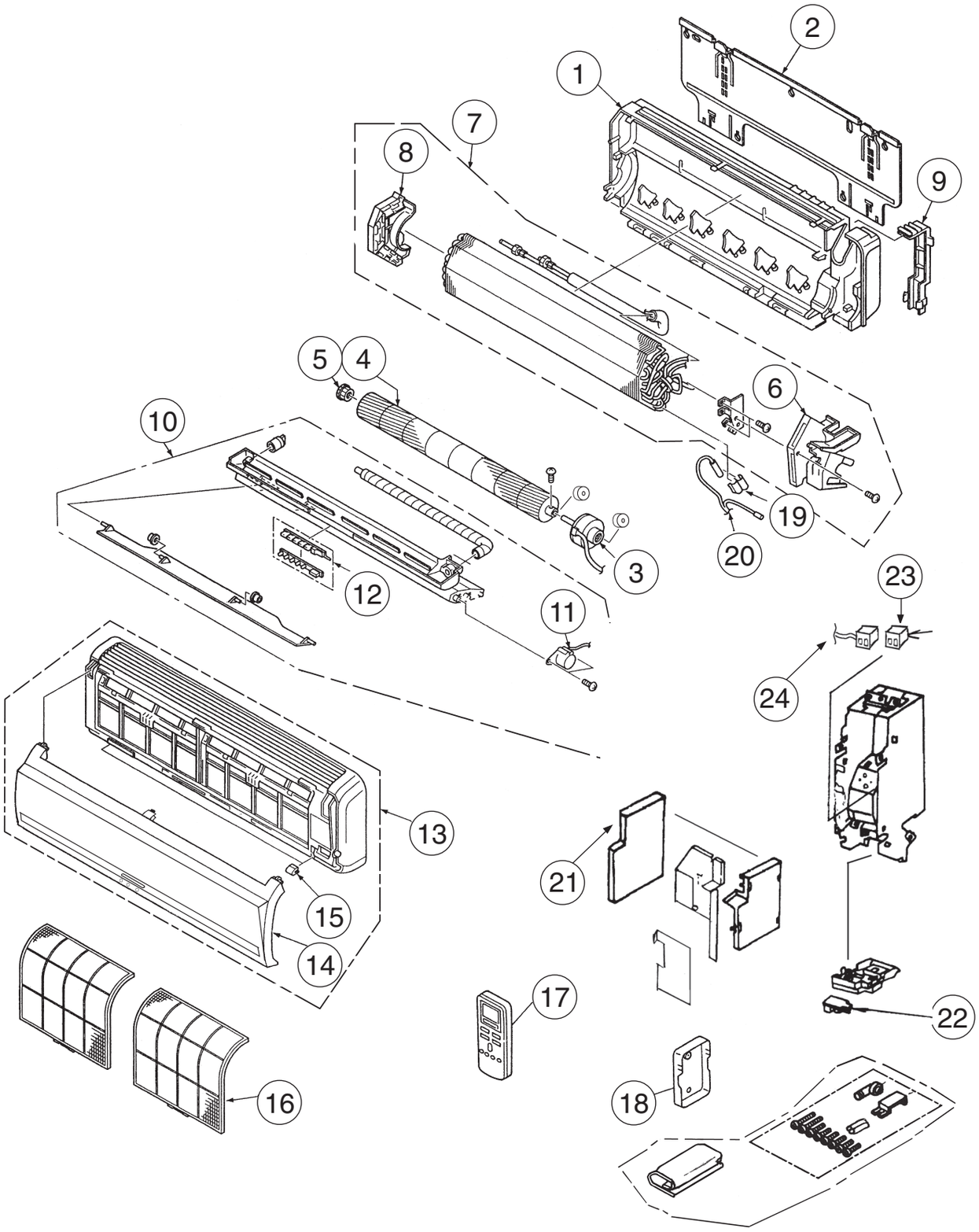
The operation method is the same as "How to operate using the connector to servicing the outdoor unit".
※ 1 The charging amount of 300g is equivalent to the load in normal operation.

SYSTEM POWER MODULE DIAGNOSIS

Circuit diagram of the device (excepting the reflux diode)	
Circuit diagram of the module	
Terminals symbol mark of the module ※ See next page for measuring value using tester	

PARTS LIST AND DIAGRAM

INDOOR UNIT
MODEL : RAS-70YH5

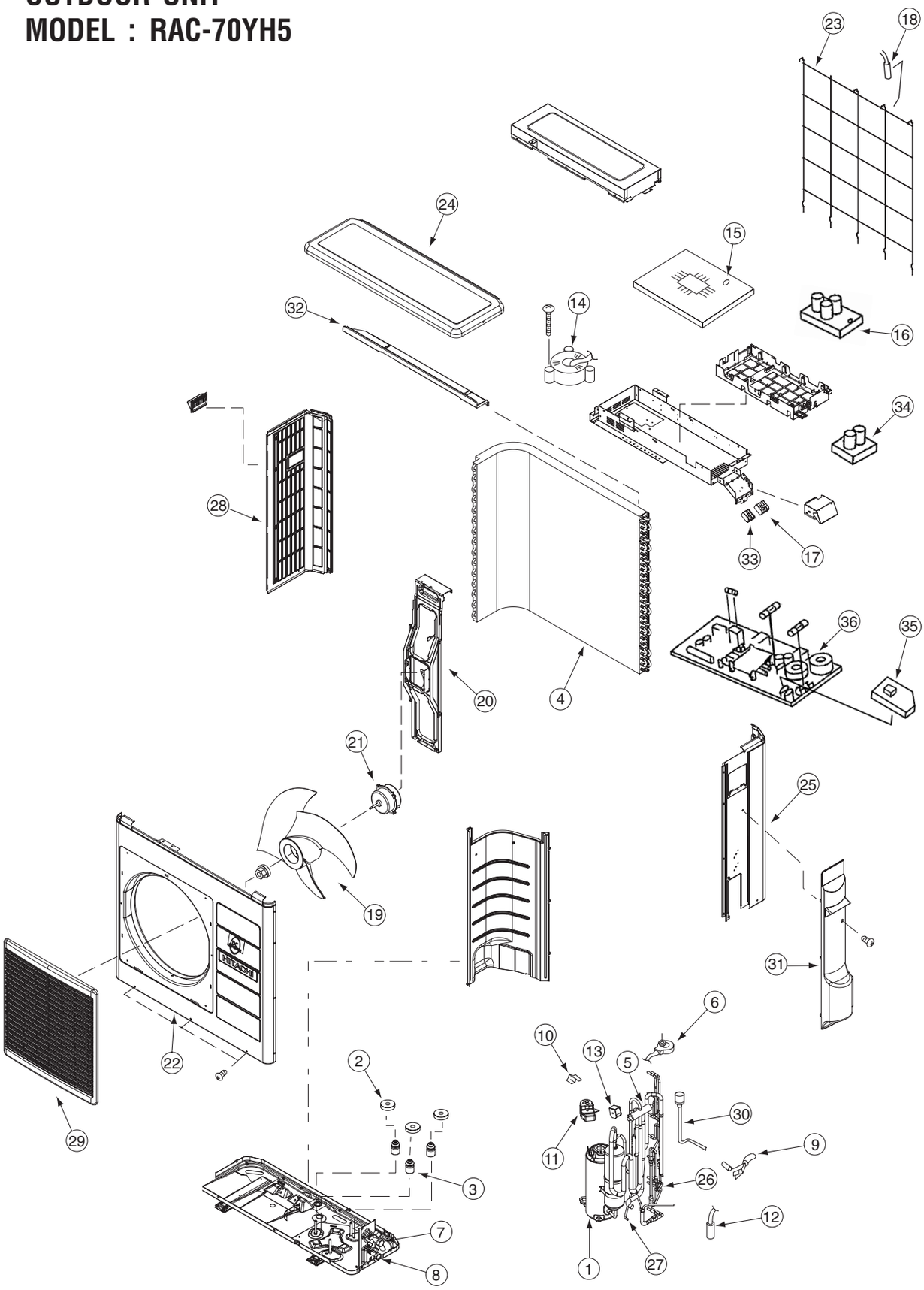


MODEL RAS-70YH5

NO.	PART N0. RAS-70YH5	Q'TY / UNIT	PARTS NAME
1	PMRAS-70YHA 001	1	CABINET
2	PMRAS-40CNH2 023	1	MOUNTING PLATE
3	PMRAS-70YHA 004	1	FAN MOTOR
4	PMRAS-70YHA 010	1	TANGENTIAL FAN
5	PMRAS-25CNH2 005	1	P-BEARING ASSY
6	PMRAS-51CHA1 004	1	FAN MOTOR BASE
7	PMRAS-70YHA 002	1	CYCLE ASSY
8	PMRAS-51CHA1 020	1	FAN COVER
9	PMRAS-18CP5 003	1	PIPE SUPPORT
10	PMRAS-70YHA 003	1	DRAIN PAN ASSY
11	PMRAS-18CP6 002	1	AUTO SWEEP MOTOR
12	PMRAS-70YHA 007	1	P.W.B (LED)
13	PMRAS-60YH5 001	1	FRONT COVER ASSEMBLY
14	PMRAS-60YH5 002	1	FRONT PANEL
15	PMRAS-10C7M 008	3	CAP
16	PMRAS-51CHA1 010	2	AIR FILTER
17	PMRAS-51CHA1 011	1	REMOTE CONTROL ASSEMBLY
18	PMRAS-10C3M 003	1	REMOTE CONTROL SUPPORT
19	PMRAS-10C8M 003	1	THERMISTOR SUPPORT
20	PMRAS-70YHA 012	1	THERMISTOR
21	PMRAS-70YHA 009	1	P.W.B (MAIN)
22	PMRAS-70YHA 008	1	P.W.B (RECEIVER)
23	PMRAS-10C6M 002	1	TERMINAL BOARD (2P)
24	PMRAS-70YHA 011	1	TERMINAL BOARD (2P) WITH PUSE

PARTS LIST AND DIAGRAM

OUTDOOR UNIT
MODEL : RAC-70YH5



MODEL RAC-70YH5

NO.	PART N0. RAC-70YH5	Q'TY / UNIT	PARTS NAME
1	PMRAC-80YHA 902	1	COMPRESSOR
2	KPNT1 001	6	PUSH NUT
3	RAC-2226HV 805	3	COMPRESSOR RUBBER
4	PMRAC-70YHA 903	1	CONDENSER
5	PMRAM-22NHZ4 901	1	REVERSING VALVE
6	PMRAC-25NH4 903	1	ELECTRICAL EXPANSION COIL
7	PMRAC-80YHA 905	1	VALVE (5S)
8	PMRAC-50NH4 903	1	VALVE (2S)
9	PMRAC-80YHA 914	1	THERMISTOR (OH)
10	PMRAC-25NH4 909	1	OVERHEAT THERMISTOR SUPPORT
11	PMRAC-25NH4 910	1	OVERLOAD RELAY COVER
12	PMRAC-70YHA 913	1	THERMISTOR (DEFROST)
13	PMRAC-80YHA 907	1	COIL (REVERSING VALVE)
14	PMRAC-18SH4 901	1	REACTOR
15	PMRAC-70YHA 914	1	P.W.B (MAIN)
16	PMRAC-80YHA 910	1	SYSTEM POWER MODULE
17	PMRAS-25NH4 913	1	TERMINAL BOARD (4P)
18	PMRAM-65QH4 910	1	THERMISTOR (OUTSIDE TEMPERATURE)
19	PMRAC-70YHA 907	1	PROPELLER FAN
20	PMRAC-70YHA 912	1	SUPPORT (FAN MOTOR)
21	PMRAC-70YHA 904	1	FAN MOTOR
22	PMRAC-70YHA 901	1	CABINET
23	PMRAC-70YHA 906	1	NET
24	PMRAC-24CP5 905	1	TOP COVER
25	PMRAC-70YHA 909	1	SIDE PLATE-R
26	PMRAC-70YHA 911	1	STRAINER (COND)
27	PMRAC-70YHA 910	1	STRAINER (PIPE)
28	PMRAC-70YHA 908	1	SIDE PLATE-L
29	PMRAC-70YHA 905	1	GRILL
30	PMRAC-25NH4 916	1	EXPANSION VALVE
31	PMRAC-70YHA 915	1	SV-COVER
32	PMRAC-70YHA 916	1	NET COVER
33	PMRAC-63CA1 902	1	TERMINAL BOARD (2P)
34	PMRAC-80YHA 912	1	CAPACITOR BOARD
35	PMRAC-70YHA 918	1	NOISE FILTER BOARD
36	PMRAC-70YHA 917	1	POWER BOARD



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