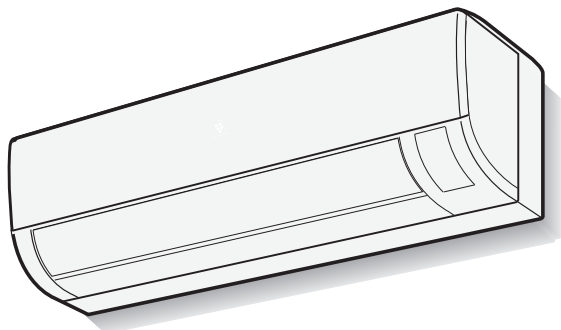


# SERVICE MANUAL



## SPLIT TYPE AIR TO AIR HEAT PUMP

MODEL **12PR-N**  
**09PR-N**

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

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#### Parts List

Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

# CHAPTER 1. SPECIFICATION

## [1] SPECIFICATION

### 1. 12PR-N

ITEMS			MODEL	INDOOR UNIT	OUTDOOR UNIT
				12PR-N	
Rated cooling capacity (Min– Max.)		kW	3.50 (1.40 - 4.00)		
Rated heating capacity (Min–Max.)		kW	4.20 (1.40 - 6.00)		
Moisture removal (at cooling)		Liters/h	1.2		
Electrical data					
Phase			1		
Rated frequency		Hz	50		
Rated voltage		V	220-240		
Rated current ☆ (Min - Max.)	Cool	A	4.7 (2.0 - 6.3 )		
	Heat	A	4.6( 1.7 - 8.2 )		
Rated input ☆ (Min - Max.)	Cool	W	980 (350- 1300)		
	Heat	W	970 (290 - 1700)		
Power factor ☆	Cool	%	91		
	Heat	%	92		
Maximum operating current		A	9.1		
Compressor	Type		Hermetically sealed rotary type		
	Model		5RS102XBE01		
	Oil charge		RB68A 320cc		
Refrigerant system	Evaporator		Louver Fin and Grooved tube type		
	Condenser		Corrugate Fin and Grooved tube type		
	Control		Expansion valve		
	Refrigerant (R410A)		1140g		
	De-Ice system		Micro computer controlled reversed systems		
Noise level (at cooling)	High	dB(A)	43	48	
	Low	dB(A)	–	–	
	Soft	dB(A)	27	–	
Fan system					
Drive			Direct drive		
Air flow quantity (at cooling)	High	m3/min.	9.8	32.5	
	Low	m3/min.	7.5	–	
	Soft	m3/min.	5.2	–	
Fan			Cross flow fan	Propeller fan	
Connections					
Refrigerant coupling			Flare type		
Refrigerant tube size Gas, Liquid			3/8", 1/4"		
Drain piping mm			O.D φ16		
Others					
Safety device			Compressor: Thermistor		
			Fan motors: Inherent thermistor		
			Fuse, Micro computer control		
Air filters			Polypropylene net (Washable)		
Net dimensions	Width	mm	770	780	
	Height	mm	260	540	
	Depth	mm	248	265	
Net weight		kg	9	34	

NOTE: The conditions of star"☆" marked item are based on 'EN14511'.

## 2. 09PR-N

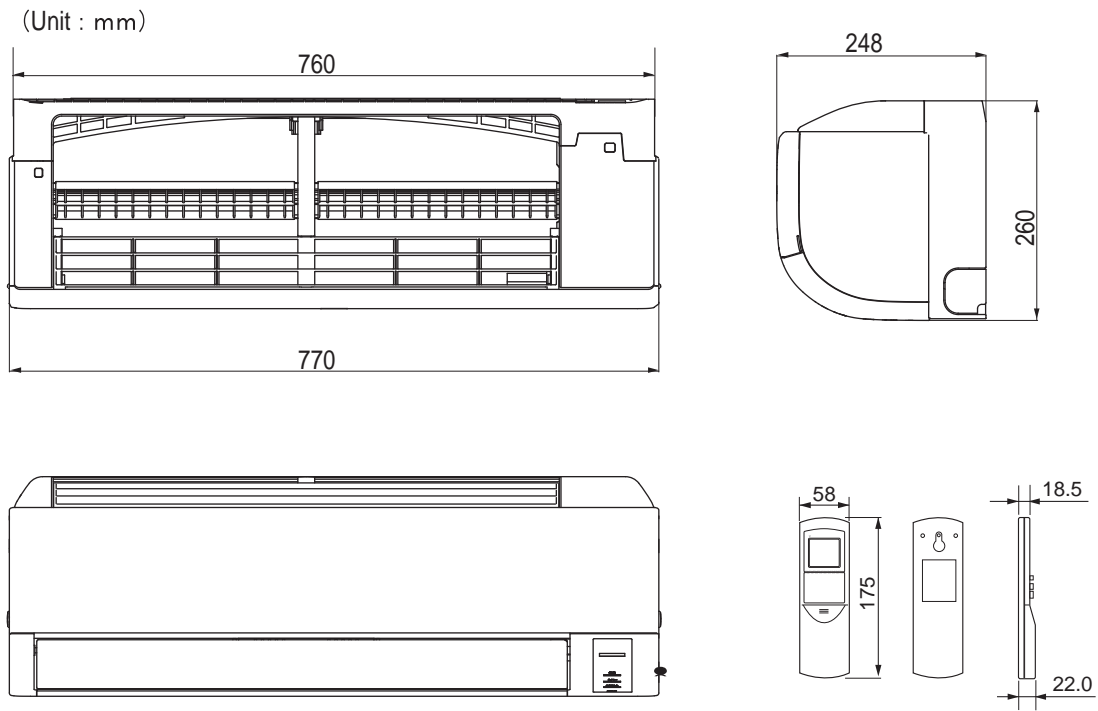
ITEMS			MODEL	INDOOR UNIT	OUTDOOR UNIT
			09PR-N		
Rated cooling capacity (Min– Max.)			kW	2.50(1.40 - 3.00)	
Rated heating capacity (Min–Max.)			kW	3.20 (1.40 - 5.00)	
Moisture removal (at cooling)			Liters/h	0.8	
Electrical data					
Phase				1	
Rated frequency			Hz	50	
Rated voltage			V	220-240	
Rated current ☆ (Min - Max.)	Cool		A	2.9 (2.0 - 3.9 )	
	Heat		A	3.4( 1.7 - 6.3 )	
Rated input ☆ (Min - Max.)	Cool		W	570 (350- 800)	
	Heat		W	700 (290 - 1300)	
Power factor ☆	Cool		%	85	
	Heat		%	90	
Maximum operating current			A	8.1	
Compressor	Type		Hermetically sealed rotary type		
	Model		5RS102XBE01		
	Oil charge		RB68A 320cc		
Refrigerant system	Evaporator		Louver Fin and Grooved tube type		
	Condenser		Corrugate Fin and Grooved tube type		
	Control		Expansion valve		
	Refrigerant (R410A)		1140g		
	De-ice system		Micro computer controled reversed systems		
Noise level (at cooling)	High	dB(A)	42	45	
	Low	dB(A)	–	–	
	Soft	dB(A)	26	–	
Fan system					
Drive			Direct drive		
Air flow quantity (at cooling)	High	m3/min.	9.4	28.3	
	Low	m3/min.	7.0	–	
	Soft	m3/min.	4.7	–	
Fan			Cross flow fan		Propeller fan
Connections					
Refrigerant coupling			Flare type		
Refrigerant tube size Gas, Liquid			3/8", 1/4"		
Drain piping mm			O.D φ16		
Others					
Safety device			Compressor: Thermistor		
			Fan motors: Inherent thermistor		
			Fuse, Micro computer control		
Air filters			Polypropylene net (Washable)		
Net dimensions	Width	mm	770	780	
	Height	mm	260	540	
	Depth	mm	248	265	
Net weight		kg	9	34	

NOTE: The conditions of star"☆" marked item are based on 'EN14511'.

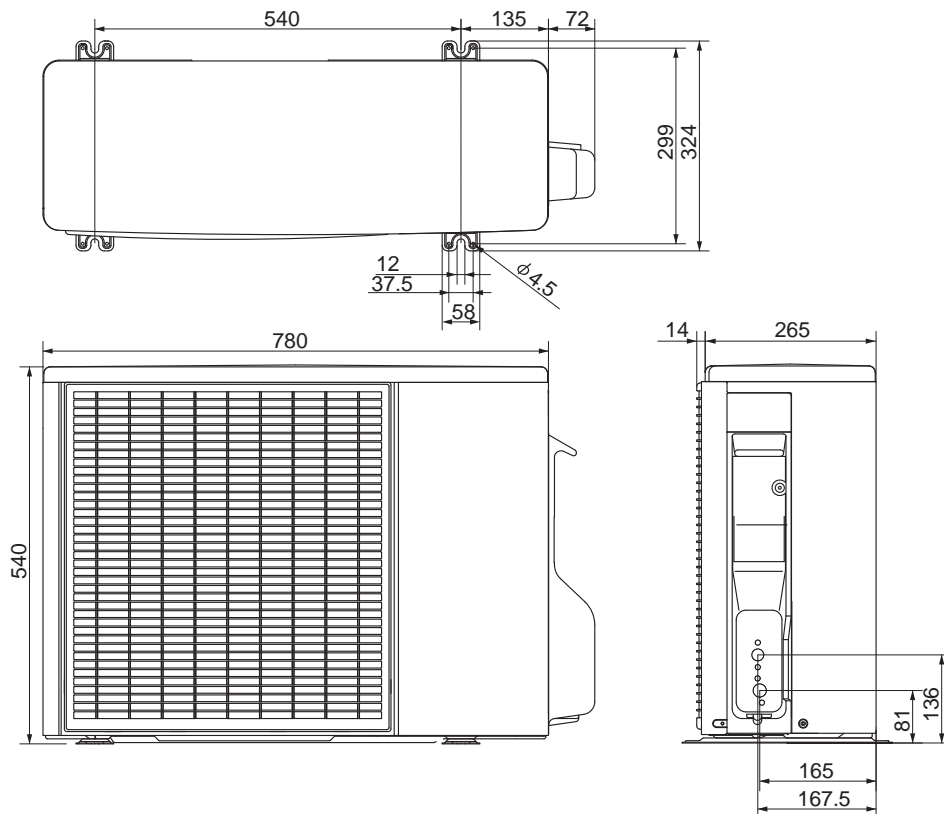
12PRN

## [2] EXTERNAL DIMENSION

### 1. Indoor unit



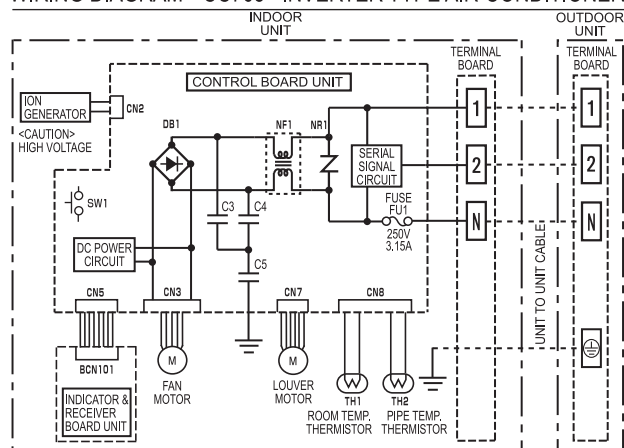
### 2. Outdoor unit



## [3] WIRING DIAGRAM

### 1. Indoor unit

WIRING DIAGRAM <CC768> INVERTER TYPE AIR-CONDITIONER

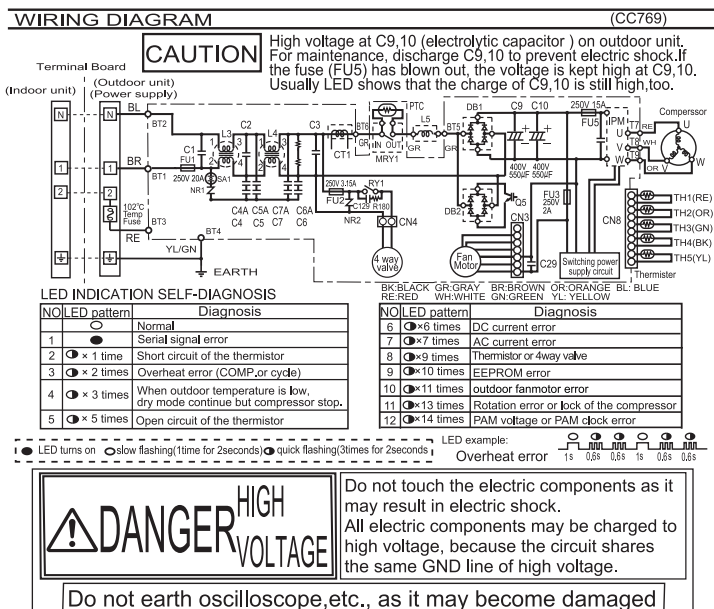


(ERROR GUIDE) (E916)

The lamps indicate error state while halting.

Orange lamp Blink	O : ON
X : OFF	
Red lamp Blink	- : OFF for 5 sec.
	Description
X X X X O	Short circuit of outdoor thermistor
X X X X X	Compressor overheating or protection of heat pump
X X X X O	Halting dehumidification
X X X X O	Open circuit of outdoor thermistor
X X X X X	Overcurrent in DC line
X X X X O	Abnormal current in AC line
X O X X O	Anomalies in four-way valve or thermistor
X O X X X	Abnormal EEPROM of outdoor unit
X O X X O	Anomalies in outdoor fan motor
X O X X X	Abnormal rotation of compressor
X O X X O	Abnormal voltage or clock in PAM circuit
O X X X O	Open circuit of serial signal line or outdoor thermal fuse
O X X X X	Short circuit of serial signal line
O X X X O	Anomalies in indoor fan motor
O X X X X	Abnormal EEPROM of indoor unit

### 2. Outdoor unit



## [4] ELECTRICAL PARTS

### 1. Indoor unit

DESCRIPTION	MODEL	REMARKS
Indoor fan motor	MLB469	DC motor
Transformer	—	RTRNWA054JBZZ
FUSE1	—	QFS-GA078JBZZ (250V, 3.15A)

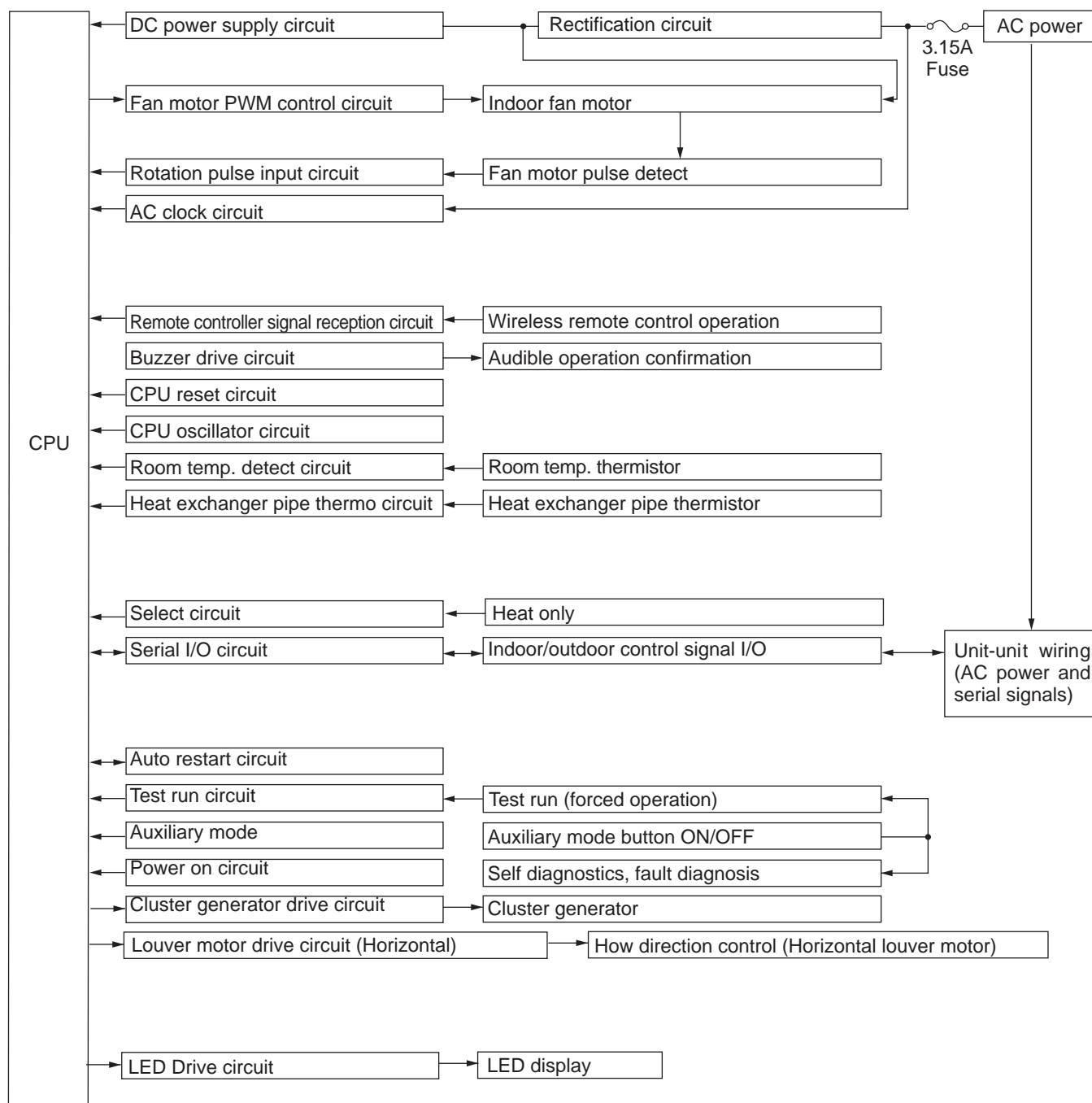
### 2. Outdoor Unit

DESCRIPTION	MODEL	REMARKS
Compressor	5RS102XBE01	DC motor
Outdoor fan motor	MLB427	DC motor
Fu3	—	QFS-GA077JBZZ(250V, 2A)
Fu2	—	QFS-GA078JBZZ(250V, 3.15A)
Fu1	—	QFS-CA001JBZZ(250V, 20A)
Fu5	—	QFS-CA002JBZZ(250V, 15A)

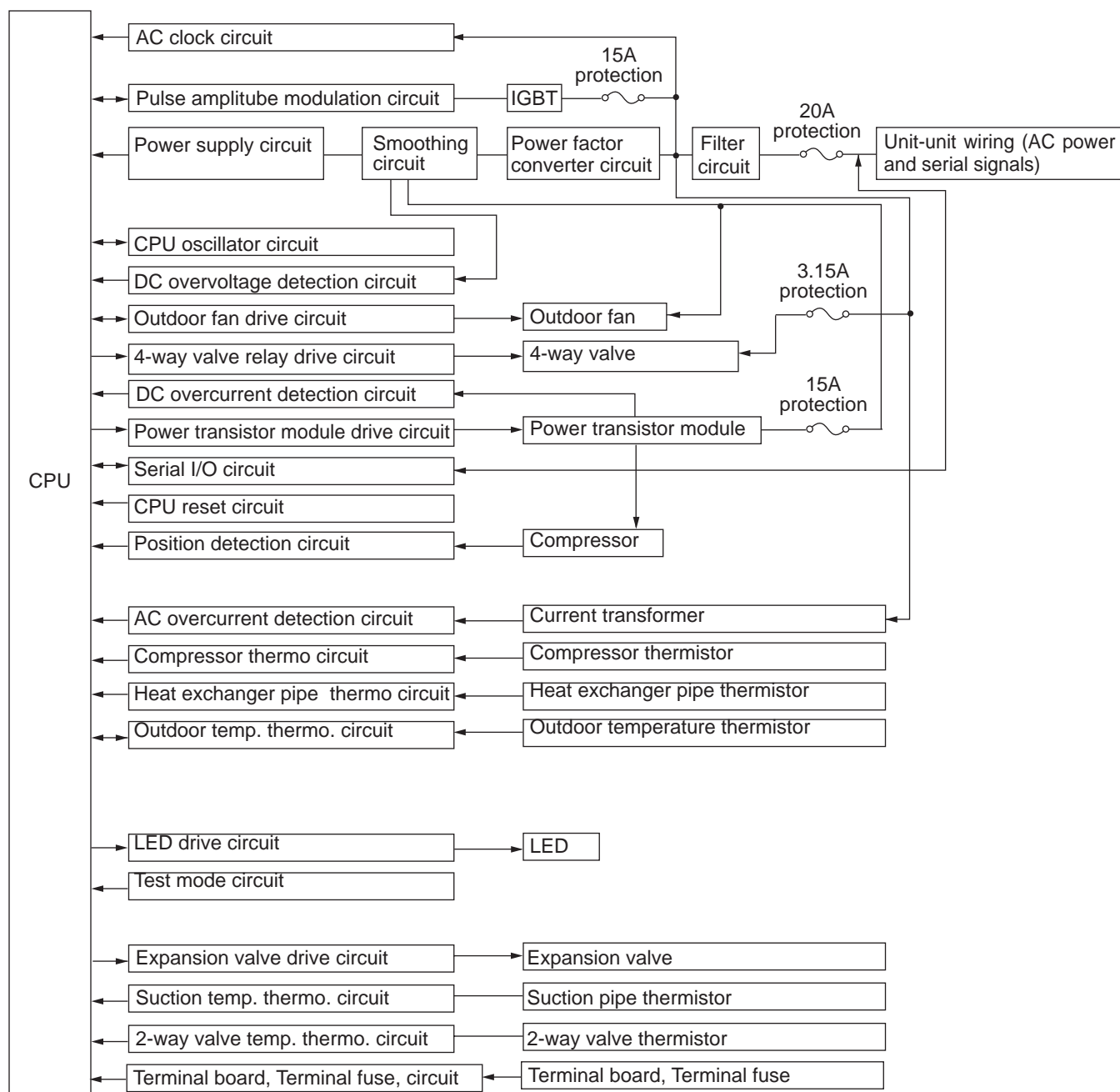
## CHAPTER 2. EXPLANATION OF CIRCUIT AND OPERATION

### [1] BLOCK DIAGRAMS

#### 1. Indoor unit



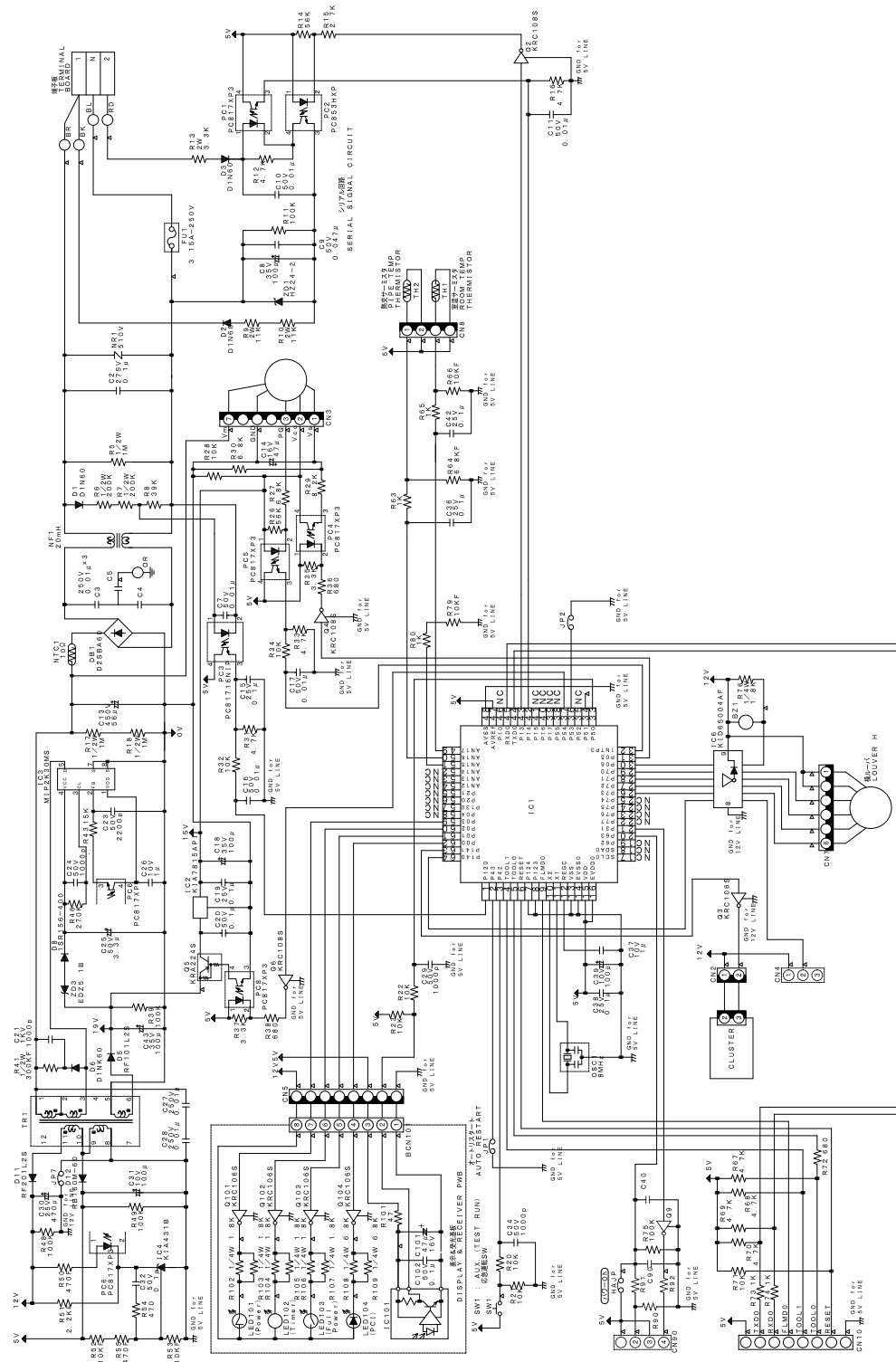
## 2. Outdoor unit



## [2] MICROCOMPUTER CONTROL SYSTEM

## 1. Indoor unit

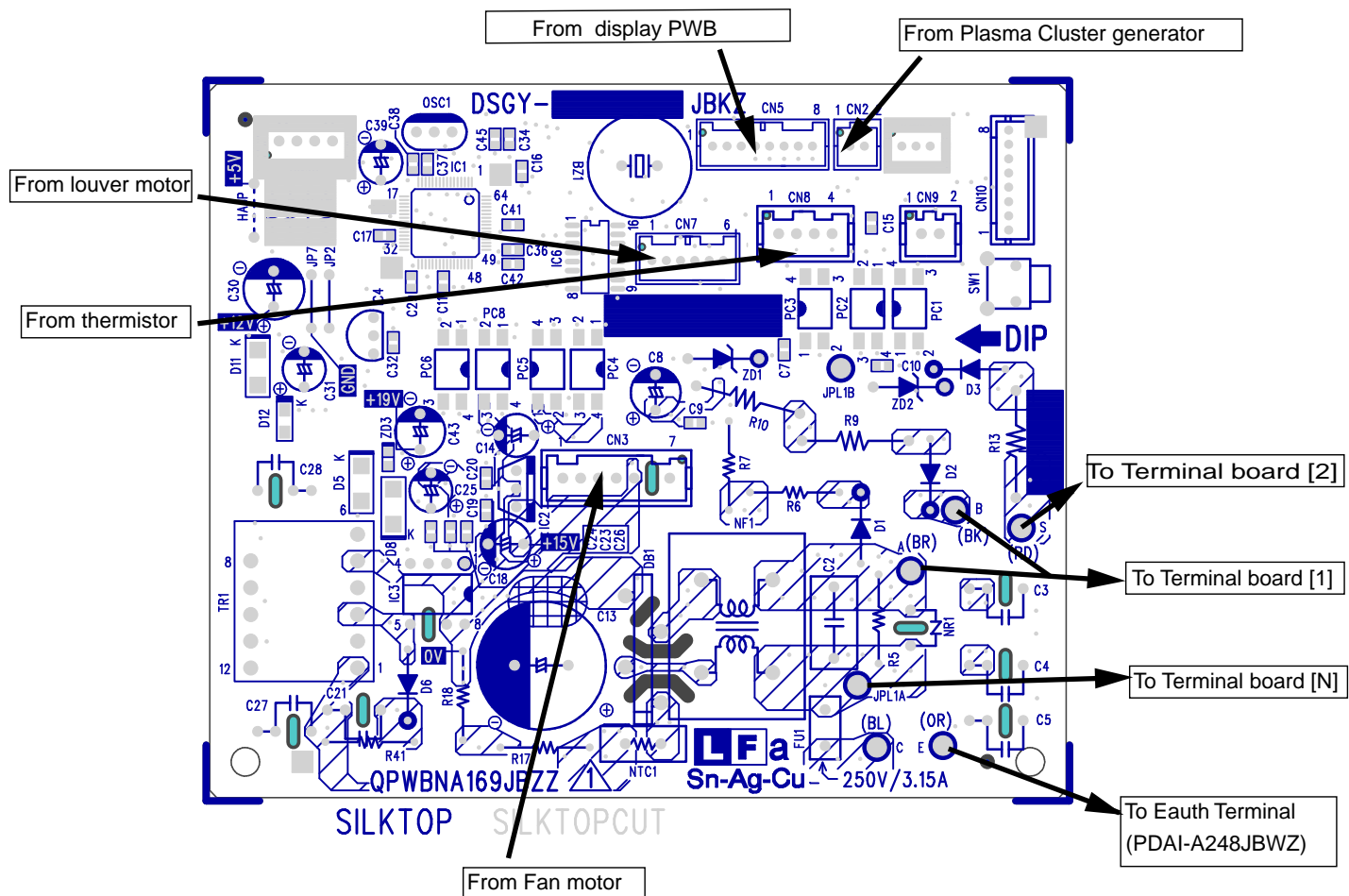
## 1.1. Electronic control circuit diagram



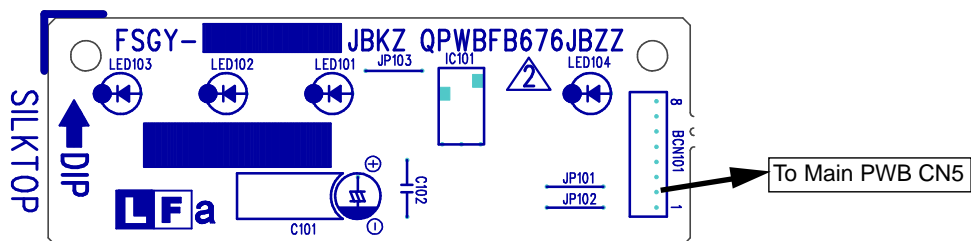


## 1.2. Printed wiring board

For 09PR-N/12PR-N model main PWB

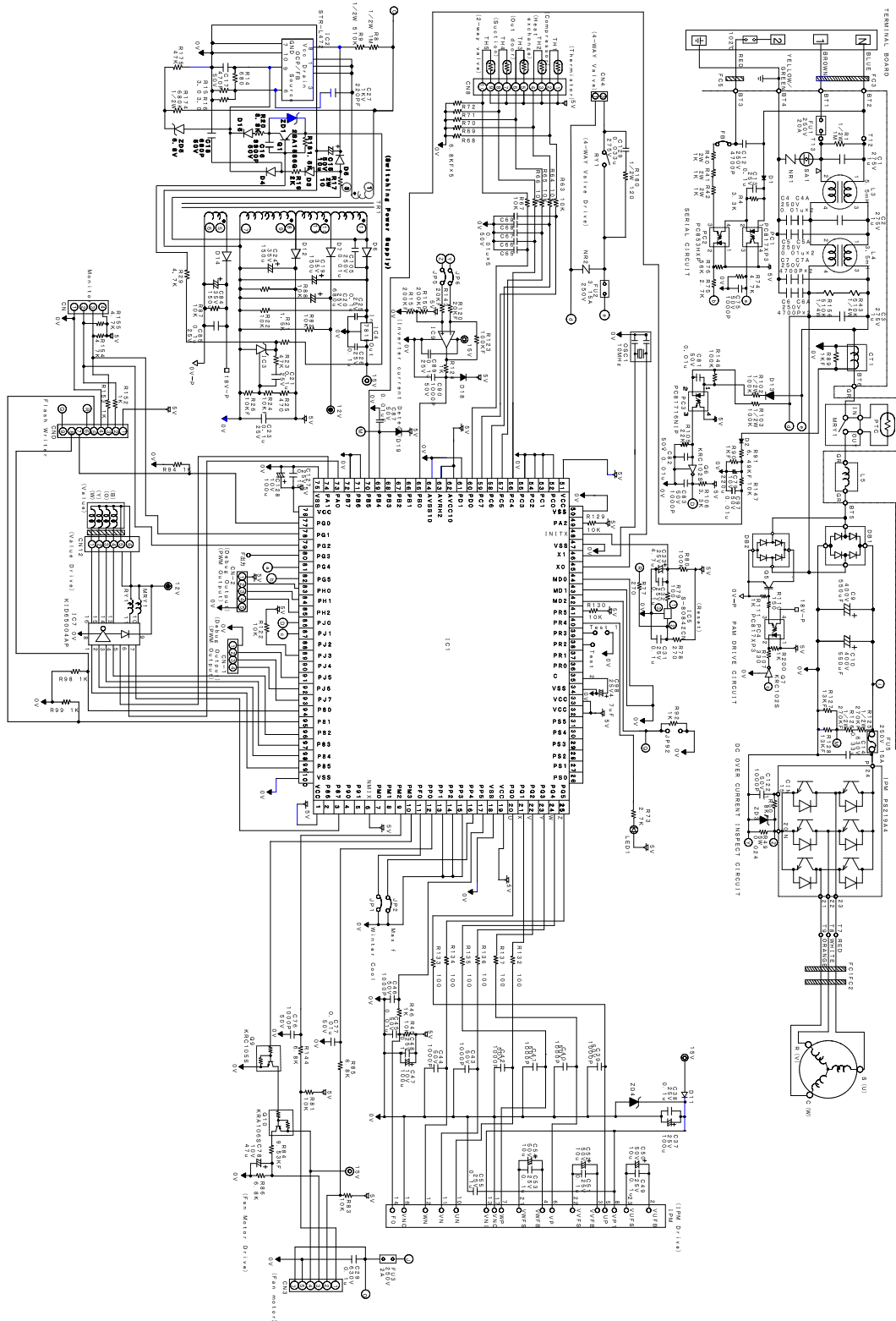


For 09PR-N/12PR-N model Display PWB

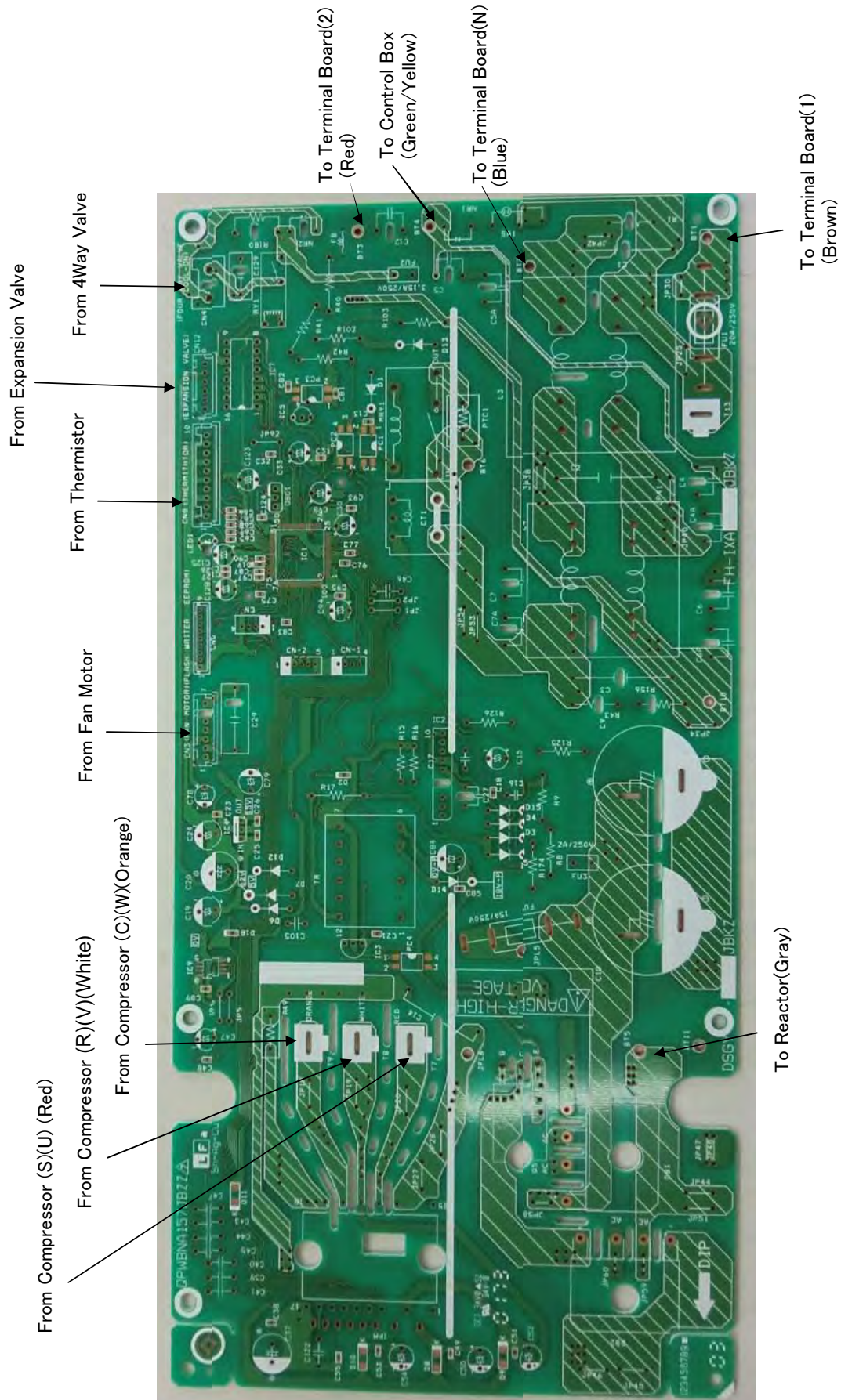


## 2. Outdoor unit

## 2.1. Electronic control circuit diagram



## 2.2. Printed wiring board



## [3] FUNCTION

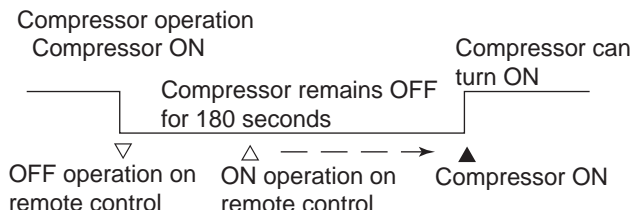
### 1. Function

#### 1.1. Restart control

Once the compressor stops operating, it will not restart for 180 seconds to protect the compressor.

Therefore, if the operating compressor is shut down from the remote control and then turned back on immediately after, the compressor will restart after a preset delay time.

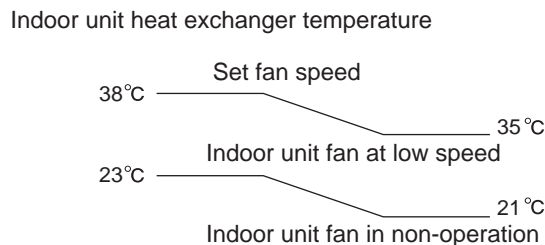
(The indoor unit will restart operation immediately after the ON switch is operated on the remote control.)



#### 1.2. Cold air prevention control

When the air to air heat pump starts up in heating mode, the indoor unit fan will not operate until the temperature of the indoor unit heat exchanger reaches about 23°C in order to prevent cold air from blowing into the room.

Also, the indoor unit fan operates at low speed until the temperature of the indoor unit heat exchanger reaches about 38°C so that people in the room will not feel chilly air flow.



#### 1.3. Indoor unit heat exchanger freeze prevention control

If the temperature of the indoor unit heat exchanger remains below 0°C for 4 consecutive minutes during cooling or dehumidifying operation, the compressor operation stops temporarily in order to prevent freezing.

When the temperature of the indoor unit heat exchanger rises to 2°C or higher after about 180 seconds, the compressor restarts and resumes normal operation.

#### 1.4. Outdoor unit 2-way valve freeze prevention control

If the temperature of the outdoor unit 2-way valve remains below 0°C for 10 consecutive minutes during cooling or dehumidifying operation, the compressor operation stops temporarily in order to prevent freezing.

When the temperature of the 2-way valve rises to 10°C or higher after about 180 seconds, the compressor restarts and resumes normal operation.

#### 1.5. Indoor unit overheat prevention control

During heating operation, if the temperature of the indoor unit heat exchanger exceeds the indoor unit heat exchanger overheat prevention temperature (about 45 to 54°C) which is determined by the operating frequency and operating status, the operating frequency is decreased by about 4 to 15 Hz. Then, this operation is repeated every 60 seconds until the temperature of the indoor unit heat exchanger drops below the overheat protection temperature.

Once the temperature of the indoor unit heat exchanger drops below the overheat protection temperature, the operating frequency is increased by about 4 to 10 Hz every 60 seconds until the normal operation condition resumes.

If the temperature of the indoor unit heat exchanger exceeds the overheat protection temperature for 60 seconds at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the abovementioned control is repeated.

#### 1.6. Outdoor unit overheat prevention control

During cooling operation, if the temperature of the outdoor unit heat exchanger exceeds the outdoor unit heat exchanger overheat prevention temperature (about 55°C), the operating frequency is decreased by about 4 to 15 Hz. Then, this operation is repeated every 60 seconds until the temperature of the outdoor unit heat exchanger drops to about 54°C or lower.

Once the temperature of the outdoor unit heat exchanger drops to about 54°C or lower, the operating frequency is increased by about 4 to 10 Hz every 60 seconds until the normal operation condition resumes.

If the temperature of the outdoor unit heat exchanger exceeds the outdoor unit heat exchanger overheat protection temperature for (120 sec : outdoor temperature  $\geq 40^{\circ}\text{C}$  - 60 sec : outdoor temperature  $< 40^{\circ}\text{C}$ ) at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the abovementioned control is repeated.

#### 1.7. Compressor overheat prevention control

If the temperature of the compressor exceeds the compressor overheat prevention temperature (110°C), the operation frequency is decreased by about 4 to 10 Hz. Then, this operation is repeated every 60 seconds until the temperature of the compressor drops below the overheat protection temperature (100°C).

Once the temperature of the compressor drops below the overheat protection temperature, the operating frequency is increased by about 4 to 10 Hz every 60 seconds until the normal operation condition resumes.

If the temperature of the compressor exceeds the overheat protection temperature (for 120 seconds in cooling operation or 60 seconds in heating operation) at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the abovementioned control is repeated.

#### 1.8. Startup control

When the air to air heat pump starts in the cooling or heating mode, if the room temperature is 2°C higher than the set temperature (in cooling operation) or 3.5°C lower (in heating operation), the air to air heat pump operates with the operating frequency at maximum. Then, when the set temperature is reached, the air to air heat pump operates at the operating frequency determined by fuzzy logic calculation, then enters the normal control mode after a while.



## 1.9. Peak control

If the current flowing in the air to air heat pump exceeds the peak control current the operation frequency is decreased until the current value drops below the peak control current regardless of the frequency control demand issued from the indoor unit based on the room temperature.

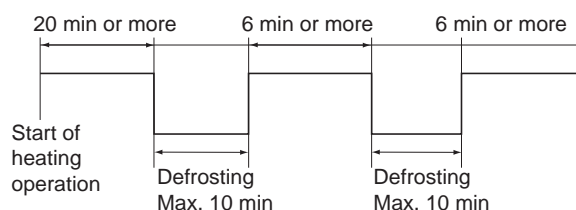
## 1.10. Outdoor unit fan delay control

The compressor stops immediately after cooling, dehumidifying or heating operation is shut down, but the outdoor unit fan continues operation for 50 seconds before it stops.

## 1.11. Defrosting

### 1.11.1 Reverse defrosting

The defrost operation starts when the compressor operating time exceeds 20 minutes during heating operation, as shown below, and the outside air temperature and the outdoor unit heat exchanger temperature meet certain conditions. When the defrost operation starts, the indoor unit fan stops. The defrost operation stops by the state of cycle temperature or defrosting time exceeds 10 minutes.



## 1.12. ON timer

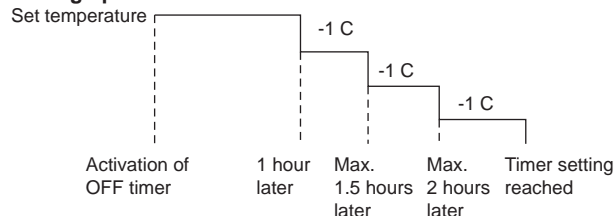
The ON timer can be activated by pressing the ON timer button. When the ON timer is activated, the operation start time is adjusted based on fuzzy logic calculations 1 hour before the set time so that the room temperature reaches the set temperature at the set time.

## 1.13. OFF timer

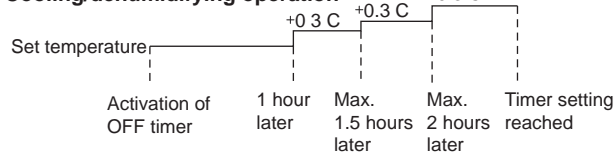
The OFF timer can be activated by pressing the OFF timer button. When the OFF timer is set, the operation stops after the set time.

When this timer is set, the compressor operating frequency lowers for quieter operation, and the room temperature is gradually varied after one hour (reduced 1°C three times (max. 3°C) in heating, or increased 0.3°C three times (max. 1°C) in cooling or dehumidifying operation) so that the room temperature remains suitable for comfortable sleeping.

### Heating operation



### Cooling/dehumidifying operation



## 1.14. Power ON start

If a jumper cable is inserted in the location marked with HAJP on the indoor unit control printed circuit board (control PCB), connecting the power cord to an AC outlet starts the air to air heat pump in either cooling or heating mode, which is determined automatically by the room temperature sensor.

When a circuit breaker is used to control the ON/OFF operation, please insert a jumper as described above.

## 1.15. Self-diagnostic malfunction code display

### 1.15.1 Indoor unit

- 1) When a malfunction is confirmed, a flashing malfunction code number is displayed to indicate the type of malfunction.

When the air to air heat pump is in non-operating condition, holding down AUX button for more than 5 seconds activates the malfunction code display function.

The operation continues only in the case of a serial open-circuit, and the main relay turns off after 30 seconds if the open-circuit condition remains.

In the case of a serial short-circuit, the air to air heat pump continues operating without a malfunction code display.

The malfunction information is stored in memory, and can be recalled later and shown on display.

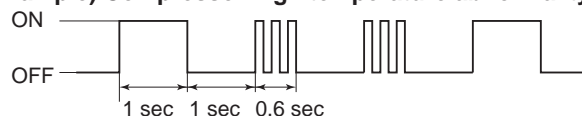
- 2) The self-diagnostic memory can be recalled and shown on the display by stopping the operation and holding down AUX button for more than 5 seconds.
- 3) The content of self-diagnosis (malfunction mode) is indicated by a flashing number.

(For details, refer to the troubleshooting section.)

### 1.15.2 Outdoor unit

If a malfunction occurs, LED1 on the outdoor unit flashes in 0.2-second intervals as shown below.

#### (Example) Compressor high temperature abnormality



## 1.16. Information about auto mode

In the AUTO mode, the temperature setting and mode are automatically selected according to the room temperature and outdoor temperature when the unit is turned on.

### Modes and Temperature Settings

		0	10	18	28	34	outdoor temp. (°C)
indoor temp. (°C)	26	Heat (24°C)	Heat (23°C)		Cool (24°C)	Cool (25°C)	
	21			Dry (Room Temp. -2°C)		Cool (26°C)	
Heat (22°C)							

the figures in ( ) are temperature settings

During operation, if the outdoor temperature changes, the temperature settings will automatically slide as shown in the chart.

### 1.17. Difference of operation in Auto and Manual modes

In the Auto mode, the temperature setting is automatically determined based on the outside air temperature. In addition, the air to air heat pump operation differs from the operation in the Manual mode as explained below.

#### 1.17.1 Difference relating to set temperature

	Auto mode			Manual mode		
	Cooling	Heating	Dehumidifying	Cooling	Heating	Dehumidifying
Temperature setting method	Automatic temperature setting based on outside air temperature. Can be changed within $\pm 2^{\circ}\text{C}$ using remote control.			Can be changed between 18 and $32^{\circ}\text{C}$ using remote control.	Can be changed between 18 and $32^{\circ}\text{C}$ using remote control.	Automatic setting. Can be changed within $\pm 2^{\circ}\text{C}$ .

### 1.18. Dehumidifying operation control

If the room temperature is  $26^{\circ}\text{C}$  or higher when dehumidifying operation starts, the dehumidifying operation provides a low cooling effect in accordance with the room temperature setting automatically determined based on the outside air operation. (The setting value is the same as the set temperature for cooling operation in the auto mode.)

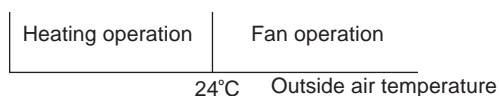
If the room temperature is lower than  $26^{\circ}\text{C}$  when dehumidifying operation starts, the dehumidifying operation minimizes the lowering of the room temperature.

### 1.19. Self Clean operation

Heating or Fan operation and Cluster operation are performed simultaneously.

The judgment of whether Heating or Fan operation is used is based on the outside air temperature at 3 minutes after the start of internal cleaning.

The operation stops after 40 minutes.



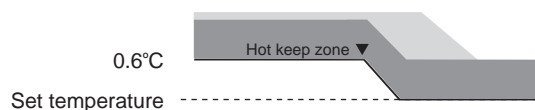
### 1.20. Plasmacluster Ion function

Plasmacluster Ion generator inside the air conditioner will release positive and negative plasmacluster ions into the room. Plasmacluster ions released into the air will reduce some airborne mold.

### 1.21. Hot keep

If the room temperature is in the Hot keep zone during heating, the compressor is turned off to prevent overheating.

ZONE	COM-PRESSOR	FAN	
Hot keep (When room temperature reaches setting temperature)	OFF	AUTO	Ultra soft (Lower than Fan speed "soft")
		SOFT LOW HIGH	Keep the setting



### 1.22. Winter cool

Cooling operation is available during the winter season by the built in winter cool function.

Lower limit of outdoor temperature range is  $-10^{\circ}\text{C}$  DB.

When the outside air temperature is low, the outdoor unit fan operates at slower speed.

NOTE: Built-in protect device may work when outdoor temperature falls below  $21^{\circ}\text{C}$  DB., depending on conditions.

### 1.23. Auto restart

When power failure occurs, after power is recovered, the unit will automatically restart in the same setting which were active before the power failure.

#### 1.23.1 Operating mode (Cool, Heat, Dry)

- Temperature adjustment (within  $2^{\circ}\text{C}$  range) automatic operation
- Temperature setting
- Fan setting
- Air flow direction
- Power ON/OFF
- Automatic operation mode setting
- Swing louvre
- Plasmacluster mode

#### 1.23.2 Setting not memorized

- Timer setting
- Full power setting
- Self clean setting

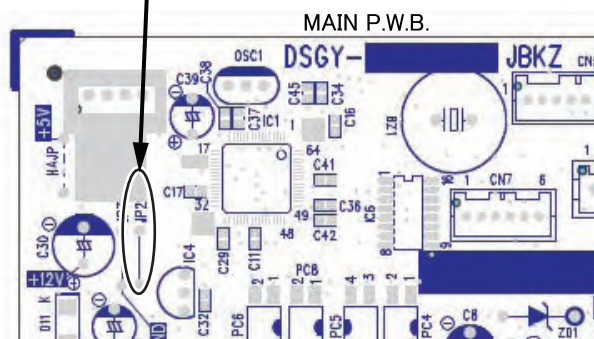
#### 1.23.3 Disabling auto restart function

By removing (cutting) jumper 8 (JP8) on the printed circuit board (PCB), the auto restart function can be disabled.

### 1.24. Heat only mode.

When heat only mode, cut the JP2 jumper

■ cool/heat mode ..... JP2 connected  
 ■ heat only mode ..... JP2 cut

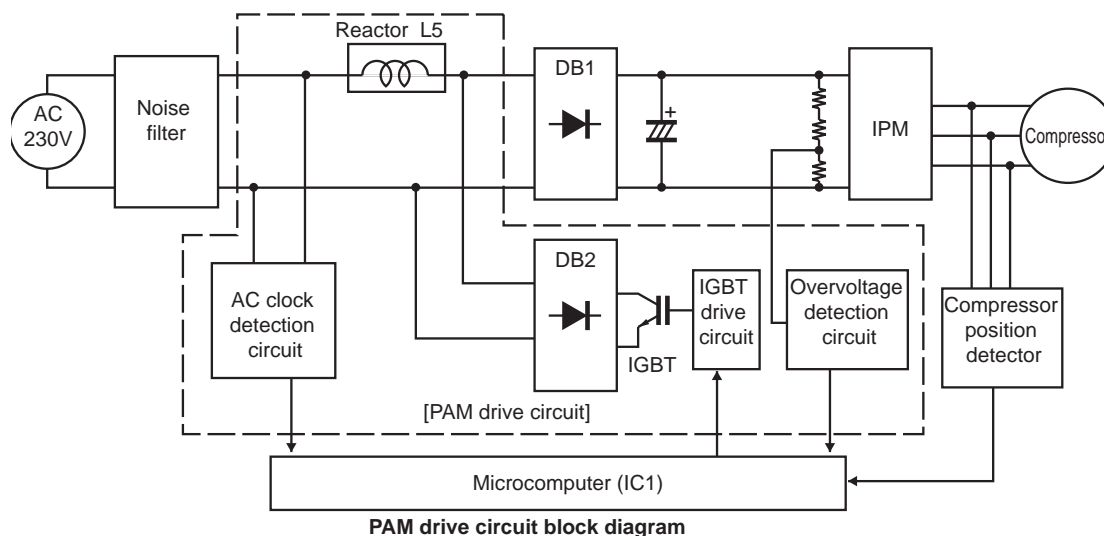


## 2. Outline of PAM circuit

### 2.1. PAM (Pulse Amplitude Modulation)

The PAM circuit varies the compressor drive voltage and controls the rotation speed of the compressor.

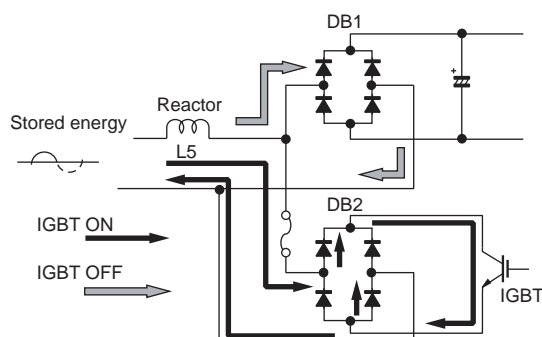
The IGBT shown in the block diagram charges the energy (electromotive force) generated by the reactor to the electrolytic capacitor for the inverter by turning ON and OFF.



When the IGBT is ON, an electric current flows to the IGBT via the reactor (L5) and diode bridge (DB2).

When the IGBT turns OFF, the energy stored while the IGBT was ON is charged to the capacitor via the diode bridge (DB1).

As such, by varying the ON/OFF duty of the IGBT, the output voltage is varied.



### 2.2. High power factor control circuit

This circuit brings the operating current waveform closer to the waveform of commercial power supply voltage to maintain a high power factor.

Because of the capacitor input, when the PAM circuit is OFF, the phase of the current waveform deviates from the voltage waveform as shown below.

To prevent this deviation, a current is supplied during the periods indicated by "O" in the diagram.

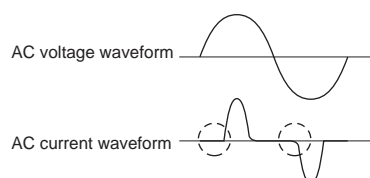
To determine the length of period to supply a current, the zero-cross timing of the AC input voltage is input to the microcomputer via the clock circuit.

The power source frequency is also determined at the same time.

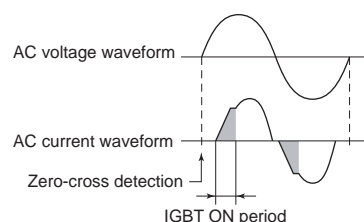
The IGBT turns ON after the time length determined by the zero-cross point to supply a current to the IGBT via the reactor.

This brings the current waveform closer to the voltage waveform in phase.

As described above, the ON/OFF operation of the IGBT controls the increase/decrease of the compressor power supply voltage (DC voltage) to improve the compressor efficiency and maintain a high power factor by keeping the current phase closer to that of the supply voltage.

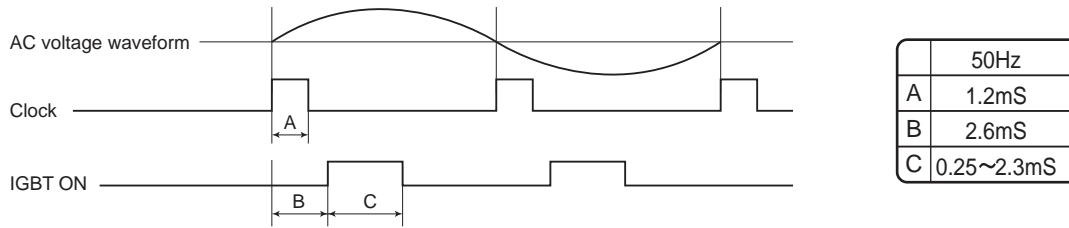


AC voltage and current waveforms when PAM is OFF



AC voltage and current waveform when PAM is ON

### 2.2.1 Detailed explanation of PAM drive circuit sequence



#### 2.2.2 AC clock (zero-cross) judgment

- The clock circuit determines the time from one rising point of the clock waveform to the next rising point. The detected clock waveform is used to judge the power source frequency (50 Hz).
- The zero-cross of the AC voltage is judged as the rising of the clock waveform, as shown in the diagram above.

#### 2.2.3 IGBT ON start time (delay time B)

- Based on the zero-cross of the AC voltage, the IGBT turns ON after a delay time set according to the power source frequency.

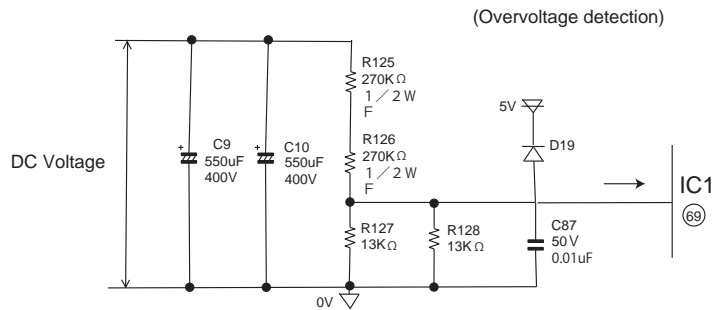
#### 2.2.4 IGBT ON time (C)

- After the above delay time, the IGBT turns ON to supply a current to the reactor.
- The ON time of the IGBT determines the amount of energy (level of DC voltage rise) supplied to the reactor.

DC voltage level in each operation mode (varies depending on external load conditions)

- Cooling operation --- 260 to 280 V
- Heating operation --- 260 to 290 V

### 2.3. PAM protection circuit



To prevent excessive voltage of PAM output from damaging the IPM and electrolytic capacitor as well as the control printed circuit board (PCB), this circuit monitors the PAM output voltage and turns off the PAM control signal and PAM drive immediately when an abnormal voltage output is generated. At the same time, it shuts off the compressor operation.

The protection voltage level is as follows.

#### 2.3.1 Details of troubleshooting procedure for PAM

##### 1) PAM shutdown due to error

- When the DC voltage detection circuit sends a signal exceeding the specified voltage to the microcomputer

DC voltage of 400 V or higher (detection circuit input voltage of about 8.4 V or higher) [IC8 pin (4)]

- When an error is detected
  - PAM IGBT turns OFF.
  - Compressor turns OFF.
  - All units shut down completely when the error occurs four times.

- When the outdoor unit clock waveform differs from the specified value immediately before the PAM IGBT turns ON

When there is no clock waveform input

When a clock signal of other specified power source frequency (50 Hz) is input

- When an error is detected
  - PAM IGBT does not turn ON.
  - Compressor operates normally.
  - Complete shutdown does not occur.



## 2) PAM error indication

In case of error "1)"

- An error signal is sent to the indoor unit as soon as an error is generated.
  - Malfunction No. 14-0 is indicated when the error code is called out by the indoor unit's self-diagnosis function.
- The LED on the outdoor unit flashes 14 times when an error is generated.
  - The LED continues flashing in the 14-time cycle even after the compressor stops operating.
  - The LED turns off (data is deleted from the memory) when the outdoor unit power is turned off.

In case of error "2)"

- An error signal is sent to the indoor unit as soon as an error is judged.
  - Malfunction No. 14-1 is indicated when the error code is called out by the indoor unit's self-diagnosis function.
- The LED on the outdoor unit flashes 14 times when an error is judged.
  - The LED on the outdoor unit flashes in normal pattern when the compressor stops operating.  
(Compressor OFF from remote control)

\* When a user complains that the air to air heat pump does not provide sufficient cool air or warm air

In addition to conventional error-generating reasons, there is a possibility that the PAM IGBT does not turn ON even if the compressor is operating.

In that case, the DC voltage does not rise even though the compressor is operating.

- Check items
  - Clock circuit check
  - PAM IGBT check
  - Fuse (Fu6) open-circuit check

### 3. Explanation of IPM drive circuit

The IPM for compressor drive is made by Mitsubishi Electric.

The power supply for the IPM drive and the shunt resistance for overcurrent detection, are provided outside the IPM.

#### 3.1. IPM drive power supply circuit

The power supply for the upper-phase IGBT (HU, HV, HW) drive employs a bootstrap system, and provides power to the upper-phase IC.

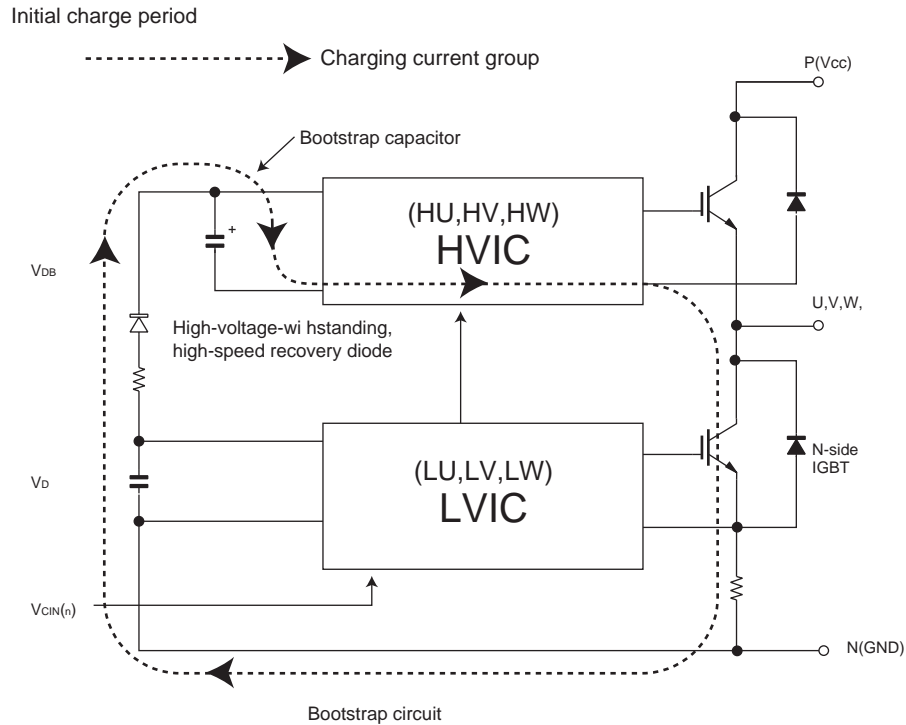
The 15-V power supply for the lower-phase IC is provided by the control printed circuit board (PCB).

##### 3.1.1 Brief explanation of bootstrap system (single power drive system)

To supply power to the upper-phase IC, the microcomputer (IC1) turns ON the lower-phase IGBT (LU, LV, LW).

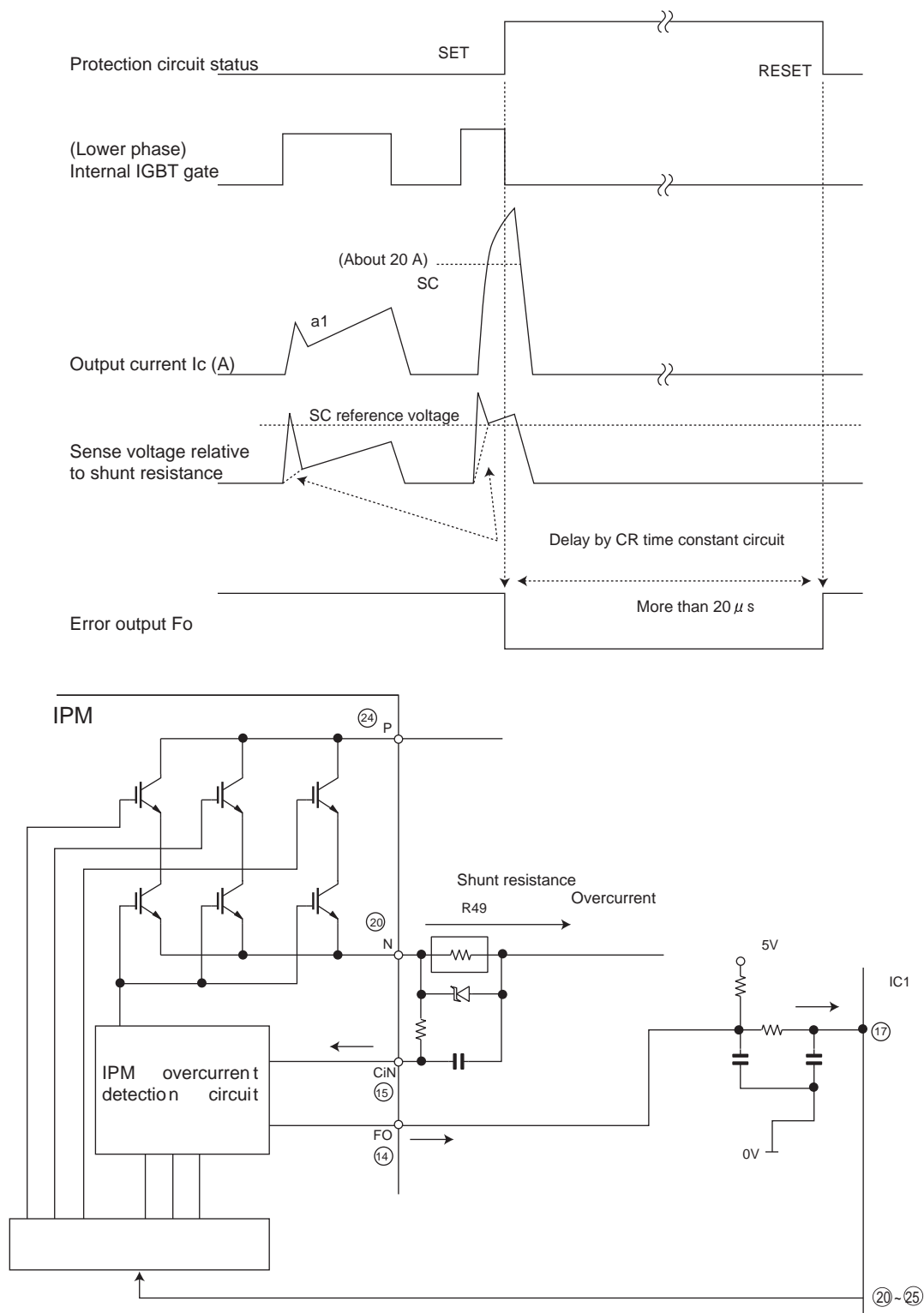
This results in a charging current that flows to the electrolytic capacitor of each upper-phase IC input and charges the bootstrap capacitor with a 15-V current.

The power supply for the subsequent stages is charged while the lower-phase IGBT is ON in ordinary compressor drive control.



### 3.1.2 DC overcurrent detection circuit

When a current of about 20 A or higher flows through the shunt resistance (R49) on the control printed circuit board (PCB), the voltage at this resistance is input to IPM CIN pin (15). Then, the gate voltage of the lower-phase IGBT (LU, LV, LW) inside the IPM turns OFF to cut off the overcurrent. At the same time, an L output of more than 20 $\mu$ s. is generated from IPM Fo pin (14), and this results in an L input to overcurrent detection input pin (17) of the microcomputer (IC1) and turns OFF the PWM signal output (IC1 pins (20) through (25)) to the IGBT gate.



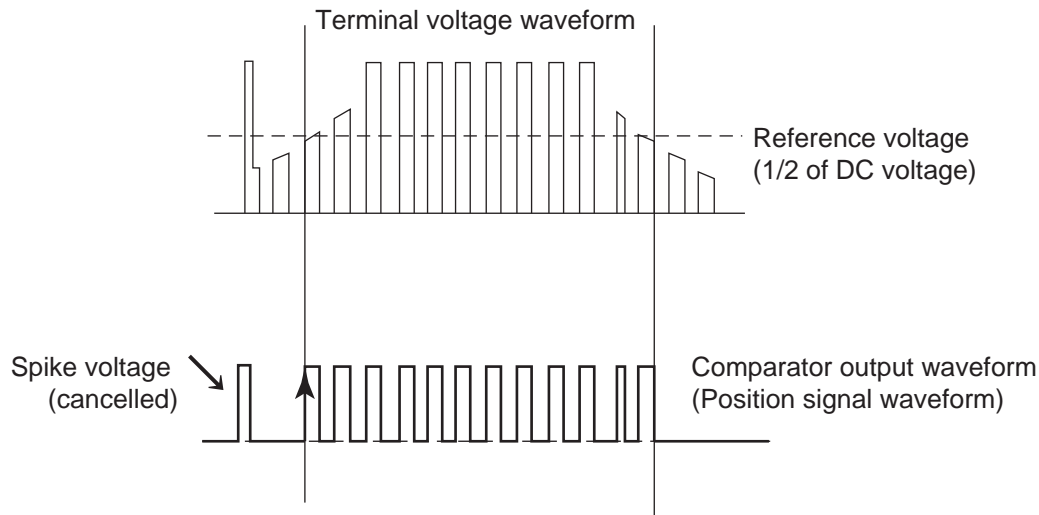
#### 4. 120° energizing control (digital position detection control)

This control system detects the digital position detection signal and adjusts the rate of acceleration/deceleration accordingly.

The motor's induced voltage waveform is input to the comparator in the form of PWM-switched pulse waveform, and a position detection signal is generated as a reference voltage equaling 1/2 of 280 VDC. However, since there is no induced voltage waveform when the PWM waveform is OFF, the microcomputer performs internal processing so that detection is enabled only when it is ON. Based on the detected position signal, actual PWM waveform output timing is determined. Since it does not use a filter circuit, the detection accuracy is high.

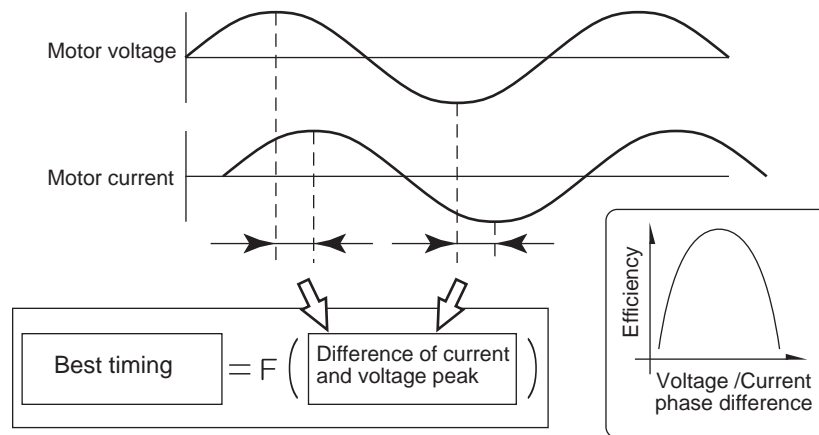
The microcomputer performs internal processing to cancel spike voltage during the regenerative process.

Furthermore, even if the induced voltage is low, position detection is still possible, thus allowing sensor-less operation at low rotation speed in the initial stage of operation. This reduces the starting current and improves the IPM reliability.



#### 5. 180° Energizing Control

This is the control system to moderate the speed by the current phase difference for higher efficiency and lower noise of the compressor. The current phase difference control is the control system paid attention to the interrelation between efficiency and phase gap generated by the applied voltage of motor and current in the coil of motor as shown in the figure below.

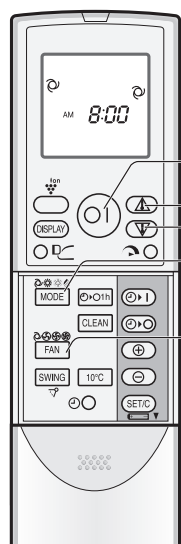


Concept chart of the current phase difference control

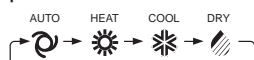
This control is the V/F drive system independent of the location of rotor, detecting the phase difference between driving voltage phase and line current phase flowing in motor coil, and controls the modulation rate data to get the phase difference at the best efficiency.

## [4] OPERATION MANUAL

### BASIC OPERATION



- 1 Press the MODE button to select the operation mode.**



- 2 Press the ON/OFF button to start operation.**

• The red OPERATION lamp ( ) will light up.

#### TO TURN OFF

Press the ON/OFF button again.

• The red OPERATION lamp ( ) will turn off.

- 3 Press the THERMOSTAT button to set the desired temperature.**

(AUTO/DRY mode)

The temperature can be changed up to  $\pm 2$  °C the automatically set of temperature.



(COOL/HEAT mode)

The temperature setting range: 18-32 °C.



- 4 Press the FAN button to set the desired fan speed.**



#### NOTE:

##### AUTO MODE

In the AUTO mode, the temperature setting and mode are automatically selected according to the room temperature and outdoor temperature when the unit is turned on. During operation, if the outdoor temperature changes, the temperature settings will automatically change.

##### DRY MODE

The fan speed is preset to AUTO and cannot be changed.

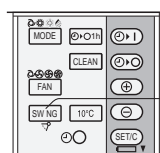
### ADJUSTING THE AIR FLOW DIRECTION

#### VERTICAL AIR FLOW DIRECTION

- 1 Press the SWING button.**

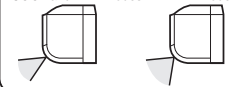
• The vertical airflow louvre will swing.

- 2 Press the SWING button again to stop the desired position.**



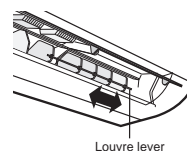
#### Adjustment range

COOL and DRY modes HEAT mode



#### HORIZONTAL AIR FLOW DIRECTION

Adjust the horizontal air flow direction with the louvre.



#### CAUTION:

Never attempt to adjust the vertical airflow louvre manually.

• Manual adjustment of the vertical airflow louvre can cause the unit to malfunction.

• When the vertical adjustment louvre is positioned at the lowest position in the COOL or DRY mode for an extended period of time, condensation may result.

### COANDA AIRFLOW

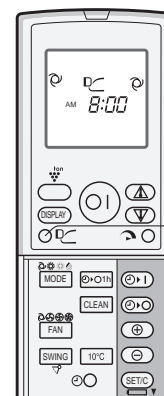
In cool or dry mode, vertical airflow louvre is set obliquely upward to deliver cool air to the ceiling in order to avoid direct airflow. In heat mode, vertical airflow louvre is set downward to deliver the warm air down to the floor.

- 1 During operation, press the COANDA AIRFLOW button.**

• The remote control will display "C".

#### TO CANCEL

Press the COANDA AIRFLOW button again.



#### NOTE:

• If you want COANDA AIRFLOW operation in FULL POWER mode, press COANDA AIRFLOW button during FULL POWER operation.

### FULL POWER OPERATION

The air conditioner works at the maximum power to makes the room cool or warm rapidly.

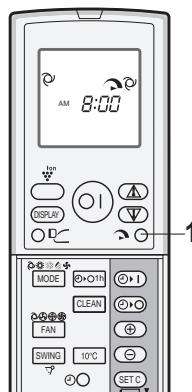
- 1 During operation, press the FULL POWER button.**

- The remote control will display "P".
- The temperature display will go off.
- The green FULL POWER lamp ( ) will light up.

#### TO CANCEL

Press the FULL POWER button again.

- The green FULL POWER lamp ( ) will turn off.



#### NOTE:

- The air conditioner will operate at "Extra HIGH" fan speed for 5 minutes, and then shift to "HIGH" fan speed.
- You can not set the temperature or fan speed during the FULL POWER operation.
- The FULL POWER operation will be automatically cancelled in one hour, and the unit will return to the original settings. The green FULL POWER lamp ( ) on the unit will turn off.

### 10°C OPERATION

Heating operation with 10 °C set temperature will be performed to protect your home and furniture from frost damage, even when you are out.

- 1 Press the MODE button and select HEAT mode.**

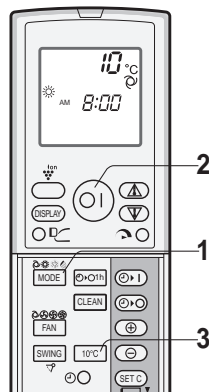
- 2 Press the ON/OFF button to start HEAT operation.**

- 3 Press the 10°C button.**

• The remote control will display "10°C".

#### TO CANCEL

Press the 10 °C button again.



#### NOTE:

- 10°C operation will not be available with heating operation automatically selected by AUTO mode.

### PLASMACLUSTER OPERATION

Plasmacluster ions released into the room will reduce some airborne mold.

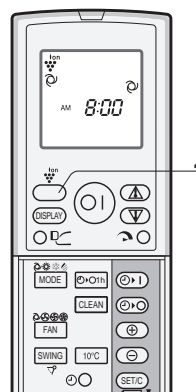
- 1 During operation, press the PLASMACLUSTER button.**

- The remote control will display "P".
- The blue PLASMACLUSTER lamp will light up.

#### TO CANCEL

Press the PLASMACLUSTER button again.

- The blue PLASMACLUSTER lamp will turn off.



#### NOTE:

- Use of the PLASMACLUSTER operation will be memorized, and it will be activated the next time you turn on the unit.
- To perform Plasmacluster operation in FAN only mode, press the PLASMACLUSTER button when the unit is not operating. The mode symbol of the remote control will go off and the fan speed cannot be set to AUTO.

### SELF CLEAN OPERATION

SELF CLEAN operation will reduce the growth mold fungus with Plasmacluster ions and dry inside of the unit. Utilize the operation at seasonal change over terms.

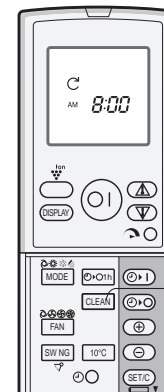
- 1 Press the SELF CLEAN button when the unit is not operating.**

- The remote control will display "C".
- The blue PLASMACLUSTER lamp will light up.
- The unit will stop operation after 40 minutes.

#### TO CANCEL

Press the SELF CLEAN button.

- The blue PLASMACLUSTER lamp will turn off.



#### NOTE:

- You cannot set the temperature, fan speed, air flow direction or timer setting during the SELF CLEAN operation.
- Mold fungus already grown can not be eliminated by this operation.

**1-HOUR OFF TIMER**

When the 1-HOUR OFF TIMER is set, the unit will automatically turn off after 1 hour.

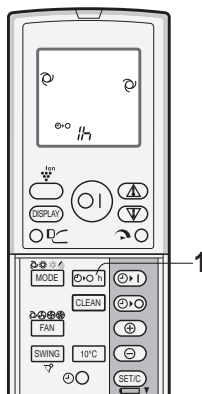
**1 Press the 1-HOUR OFF TIMER button.**

- The remote control will display "1h".
- The orange TIMER lamp (●) will light up.

**TO CANCEL**

Press the SET/C button.

- The orange TIMER lamp (●) will turn off.

**TIMER OPERATION****TIMER OFF****1 Press the TIMER OFF button.**

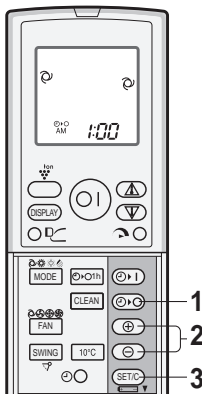
- The TIMER OFF indicator will blink.

**2 Press the TIME ADVANCE or REVERSE button to set the desired time.**

- The time can be set in 10-minute increments.

**3 Press the SET/C button.**

- The orange TIMER lamp (●) will light up.

**TIMER ON****1 Press the TIMER ON button.**

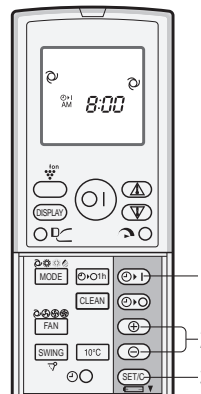
- The TIMER ON indicator will blink.

**2 Press the TIME ADVANCE or REVERSE button to set the desired time.**

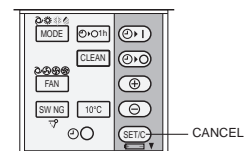
- The time can be set in 10-minute increments.

**3 Press the SET/C button.**

- The orange TIMER lamp (●) will light up.

**TO CANCEL****Press the SET/C button.**

- The orange TIMER lamp (●) will turn off.
- The current time will be displayed on the remote control.

**TO CHANGE TIME SETTING**

Cancel the TIMER setting, then set it again

**TO COMBINE TIMER ON AND TIMER OFF**

Set the TIMER OFF and TIMER ON.

Example  
(Current time: 9:00 p.m.)  
OFF TIMER at 11:00 p.m.  
ON TIMER at 7:00 a.m.



- The arrow (▼ or ▲) between the TIMER ON indicator and the TIMER OFF indicator shows which timer will activate first.

**NOTE:**

- The 1-HOUR OFF TIMER has priority over TIMER ON and TIMER OFF.
- If the 1-HOUR OFF TIMER is set while the unit is not operating, the unit will operate at the formerly set condition.
- The 1-HOUR OFF TIMER can be extended for an additional hour from the point when 1-HOUR OFF TIMER button is pressed.
- If TIMER ON and/or TIMER OFF are set, TIMER CANCEL button cancels every setting.

**NOTE:**

- When the TIMER OFF is set, the temperature setting is automatically adjusted to prevent the room from becoming excessively cold or warm, for example while you sleep. (Auto Sleep function)  
COOL mode: One hour after the timer is set, the temperature setting rises by 1 °C.  
HEAT mode: One hour after the timer is set, the temperature setting drops by 3 °C.

**NOTE:**

- The unit will turn on prior to the set time to allow the room to reach the desired temperature. (Awaking function)

**NOTE:**

- You cannot program the ON-TIMER and OFF-TIMER to operate the unit at different temperatures or other settings.
- Either timer can be programmed to activate prior the other.

**AUXILIARY MODE**

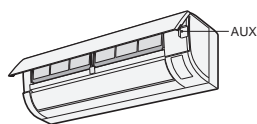
Use this mode when the remote control is not available.

**TO TURN ON****Press the AUX button.**

- The red OPERATION lamp (●) will light and the unit will start operating in the AUTO mode.
- The fan speed and temperature setting are set to AUTO.

**TO TURN OFF****Press the AUX button again.**

- The red OPERATION lamp (●) will turn off.

**DISPLAY BUTTON**

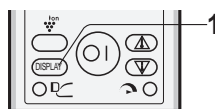
Press the DISPLAY button when the lamps on the unit are too bright. (The red OPERATION lamp and the orange TIMER lamp cannot be turned off.)

**1 During operation, press the DISPLAY button.**

- The blue PLASMA CLUSTER lamp and/or the green FULL POWER lamp (●) will turn off.

**TO LIGHT UP**

Press the DISPLAY button again.



## CHAPTER 3. FUNCTION AND OPERATION OF PROTECTIVE PROCEDURES

### [1] PROTECTION DEVICE FUNCTIONS AND OPERATIONS

Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
1	Indoor unit fan lock	Operation stops if there is no input of rotation pulse signal from indoor unit fan motor for 1 minute.	When indoor unit fan is in operation	Operation OFF or ON	☆2	Yes	None
	Indoor unit fan rotation speed error	Operation stops if rotation pulse signal from indoor unit fan indicates abnormally low speed (about 300 rpm or slower).	When indoor unit fan is in operation	Operation OFF or ON	☆2	Yes	None
2	Indoor unit freeze prevention	Compressor stops if temperature remains below 0°C for 4 minutes.	When in cooling or dehumidifying operation	Automatic reset when heat exchanger temperature rises above freeze prevention temperature (2°C or higher)	—	None	None
3	2-way valve freeze prevention	Compressor stops if temperature of outdoor unit 2-way valve remains below 0°C for 10 continuous minutes during cooling or dehumidifying operation.	When in cooling or dehumidifying operation	Automatic reset when temperature of 2-way valve rises above 10°C.	None	Yes	Yes
4	Indoor unit heat exchanger overheat shutdown	Operating frequency lowers if indoor unit heat exchanger temperature exceeds overheat temperature during heating operation. Compressor stops if indoor unit heat exchanger temperature exceeds overheat temperature for 60 seconds at minimum frequency. Overheat temperature setting value indoor unit heat exchanger thermistor temperature: about 45 to 54°C	When in heating operation	Automatic reset after safety period (180 sec).	None	Yes	Yes
5	Outdoor unit heat exchanger overheat shutdown	Operation frequency lowers if outdoor unit heat exchanger temperature exceeds about 55°C during cooling operation. Compressor stops if outdoor unit heat exchanger temperature exceeds about 55°C for 120 seconds at minimum frequency.	When in cooling or dehumidifying operation	Automatic reset after safety period (180 sec).	None	Yes	Yes
6	Compressor discharge overheat shutdown	Operating frequency lowers if temperature of compressor chamber thermistor (TH1) falls below about 110°C. Compressor stops if temperature of compressor chamber thermistor (TH1) remains at about 110°C (for 120 seconds in cooling operation, or 60 seconds in heating operation) at minimum frequency.	When compressor is in operation	Automatic reset after safety period (180 sec).	None	Yes	Yes
7	Dehumidifying operation temporary stop	Compressor stops if outside air temperature thermistor is lower than about 16°C during dehumidifying operation.	When in dehumidifying operation	Automatic reset when outside air temperature rises above 16°C.	None	Yes	Yes
8	DC overcurrent error	Compressor stops if DC current of about 25 A or higher flows in IPM.	When compressor is in operation	Operation OFF or ON	Yes ☆1	Yes	Yes
9	AC overcurrent error	Operating frequency lowers if outdoor AC current exceeds peak control current value. outdoor stops if compressor AC current exceeds peak control current value at minimum frequency.	When compressor is in operation	Operation OFF or ON	Yes ☆1	Yes	Yes

Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
10	AC overcurrent error in compressor OFF status	Indoor and outdoor units stop if outdoor AC current exceeds about 3 A while compressor is in non-operation status.	When compressor is in non-operation	Replacement of defective parts such as IPM	Yes ☆2	Yes	Yes
11	AC maximum current error	Compressor stops if outdoor AC current exceeds 17 A.	When compressor is in operation	Operation OFF or ON	Yes ☆1	Yes	Yes
12	AC current deficiency error	Compressor stops if operating frequency is 50 Hz or higher and outdoor AC current is about 2.0 A or lower.	When compressor is in operation	Operation OFF or ON	Yes ☆1	Yes	Yes
13	Thermistor installation error or 4-way valve error	Compressor stops if high and low values of temperatures detected by outdoor unit heat exchanger thermistor (TH2) and 2-way valve thermistor (TH5) do not match operating cycle.	3 minutes after compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
14	Compressor high temperature error	Compressor stops if compressor chamber thermistor (TH1) exceeds about 114°C, or if there is short-circuit in TH1.	When in operation	Operation OFF or ON	Yes ☆1	Yes	Yes
15	Outdoor unit heat exchanger thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit heat exchanger thermistor (TH2).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
16	Outdoor unit outside air temperature thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit outside air temperature thermistor (TH3).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
17	Outdoor unit suction thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit suction thermistor (TH4).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
18	Outdoor unit 2-way valve thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit 2-way valve thermistor (TH5).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
19	Outdoor unit heat exchanger thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit heat exchanger thermistor (TH2).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
20	Outdoor unit outside air temperature thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit outside air temperature thermistor (TH3).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
21	Outdoor unit suction thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit suction thermistor (TH4).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
22	Outdoor unit 2-way valve thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit 2-way valve thermistor (TH5).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
23	Outdoor unit discharge thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit discharge thermistor (TH1).	At compressor startup	Operation OFF or ON	Yes ☆1	Yes	Yes
24	Serial signal error	Compressor stops if outdoor unit cannot receive serial signal from indoor unit for 30 seconds.	When in operation	Reset after reception of serial signal	None	None	None
25	Compressor startup error	Compressor stops if compressor fails to start up.	At compressor startup	Operation OFF or ON	Yes ☆3	Yes	Yes
26	Compressor rotation error (at 120° energizing)	Compressor stops if there is no input of position detection signal from compressor or input is abnormal.	Compressor operating at 120° energizing	Operation OFF or ON	Yes ☆3	Yes	Yes
27	Outdoor unit DC fan error	Operation stops if there is no input of rotation pulse signal from outdoor unit fan motor for 30 seconds.	When outdoor unit fan is in operation	Operation OFF or ON	Yes ☆1	Yes	Yes
28	PAM overvoltage error	Compressor stops if DC voltage is 400 V or higher.	When in operation	Operation OFF or ON	Yes ☆1	Yes	Yes



Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
29	PAM clock error	When power source frequency cannot be determined (at startup), or when power source clock cannot be detected for 1 continuous second (at startup).	At compressor startup, when in operation	Compressor continues operation without stopping.	None	Yes	Yes

☆1—The outdoor unit restarts four times before the indoor unit error is displayed (complete shutdown).

☆2—A single error judgment results in the display of the indoor unit error (complete shutdown).

☆3—The outdoor unit restarts eight times before the indoor unit error is displayed (complete shutdown).

## [2] AIR TO AIR HEAT PUMP OPERATION IN THERMISTOR ERROR

### 1. Indoor unit

Item	Mode	Control operation	When resistance is low (temperature judged higher than actual)	Short-circuit	When resistance is high (temperature judged lower than actual)	Open-circuit
Room temperature thermistor (TH1)	Auto	Operation mode judgment	Cooling mode is activated even if room temperature is low.	Cooling mode is activated in most cases.	Heating mode is activated even if room temperature is high.	Heating mode is always activated.
	Cooling	Frequency control	Room becomes too cold.	Air conditioner operates in full power even when set temperature is reached.	Room does not become cool.	Compressor does not operate.
	Dehumidifying	Room temperature memory Frequency control	Normal operation.	Room temperature is stored in memory as 31.0°C, and compressor does not stop.	Normal operation.	Room temperature is stored in memory as 18.5°C, and compressor does not operate.
	Heating	Frequency control	Room does not become warm.	Hot keep status results immediately after operation starts. Frequency does not increase above 30 Hz (40 Hz).	Room becomes too warm.	Air conditioner operates in full power even when set temperature is reached.
Heat exchanger thermistor (TH2)	Cooling Dehumidifying	Freeze prevention	Indoor unit evaporator may freeze.	Indoor unit evaporator may freeze.	Compressor stops occasionally.	Compressor does not operate.
	Heating	Cold air prevention	Cold air prevention deactivates too soon and cold air discharges.	Compressor operates at low speed or stops, and frequency does not increase.	Cold air prevention deactivates too slow.	Cold air prevention does not deactivate, and indoor unit fan does not rotate.

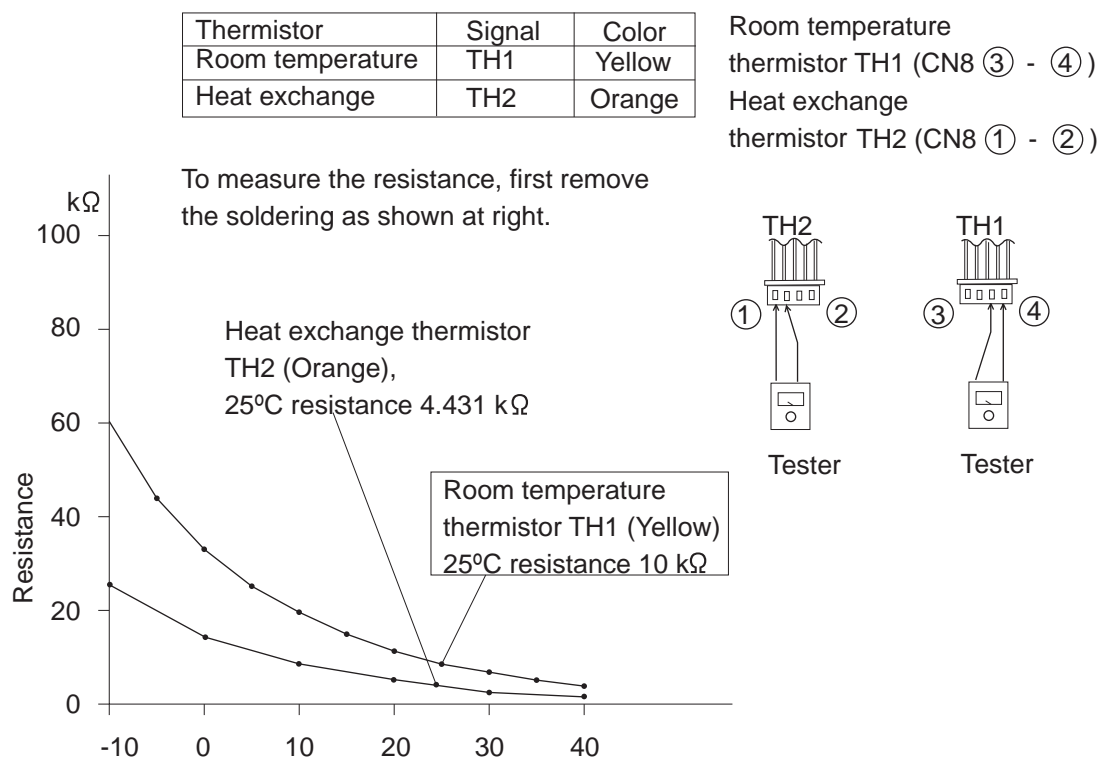
## 2. Outdoor unit

Item	Mode	Control operation	When resistance is low (temperature judged higher than actual)	Short-circuit	When resistance is high (temperature judged lower than actual)	Open-circuit
Compressor chamber thermistor (TH1)	Cooling Dehumidifying Heating	Expansion valve control and compressor protection	Compressor operates, but room does not become cool or warm (expansion valve is open).	Compressor high temperature error indication.	Layer short-circuit or open-circuit may result in compressor in normal operation.	Outdoor unit thermistor open-circuit error indication.
Heat exchanger thermistor (TH2)	Cooling Dehumidifying	Outdoor unit heat exchanger over-heat prevention	Compressor operates at low speed or stops.	Outdoor unit thermistor short-circuit error indication.	Normal operation.	Outdoor unit thermistor open-circuit error indication.
	Heating	Expansion valve control Defrosting	Defrosting operation is not activated as needed, and frost accumulates on outdoor unit (expansion valve is closed).	Outdoor unit thermistor short-circuit error indication.	Defrosting operation is activated unnecessarily, and room does not become warm (expansion valve is open).	Outdoor unit thermistor open-circuit error indication.
Outside air temperature thermistor (TH3)	Auto	Operation mode judgment	Cooling mode is activated even if room temperature is low.	Outdoor unit thermistor short-circuit error indication.	Heating mode is activated even if room temperature is high.	Outdoor unit thermistor open-circuit error indication.
	Cooling Dehumidifying	Operation not affected	Normal operation.	Outdoor unit thermistor short-circuit error indication.	Normal operation.	Outdoor unit thermistor open-circuit error indication.
	Heating	Rating control Defrosting	Defrosting operation is activated unnecessarily.	Outdoor unit thermistor short-circuit error indication.	Defrosting operation is not activated, and frost accumulates on outdoor unit.	Outdoor unit thermistor open-circuit error indication.
Suction pipe thermistor (TH4)	Cooling Dehumidifying	Expansion valve control	Compressor operates, but room does not become cool (expansion valve is open).	Outdoor unit thermistor short-circuit error indication.	Frost accumulates on evaporator inlet section, and room does not become cool (expansion valve is closed).	Outdoor unit thermistor open-circuit error indication.
	Heating	Expansion valve control	Compressor operates, but room does not become warm (expansion valve is open).	Outdoor unit thermistor short-circuit error indication.	Frost accumulates on expansion valve outlet section, and room does not become warm (expansion valve is closed).	Outdoor unit thermistor open-circuit error indication.
2-way valve thermistor (TH5)	Cooling Dehumidifying	Expansion valve control	Frost accumulates on indoor unit evaporator and room does not become cool (expansion valve is closed).	Outdoor unit thermistor short-circuit error indication.	Compressor operates, but room does not become cool (expansion valve is open).	Outdoor unit thermistor open-circuit error indication.
	Heating	Operation not affected	Normal operation.	Outdoor unit thermistor short-circuit error indication.	Normal operation.	Outdoor unit thermistor open-circuit error indication.

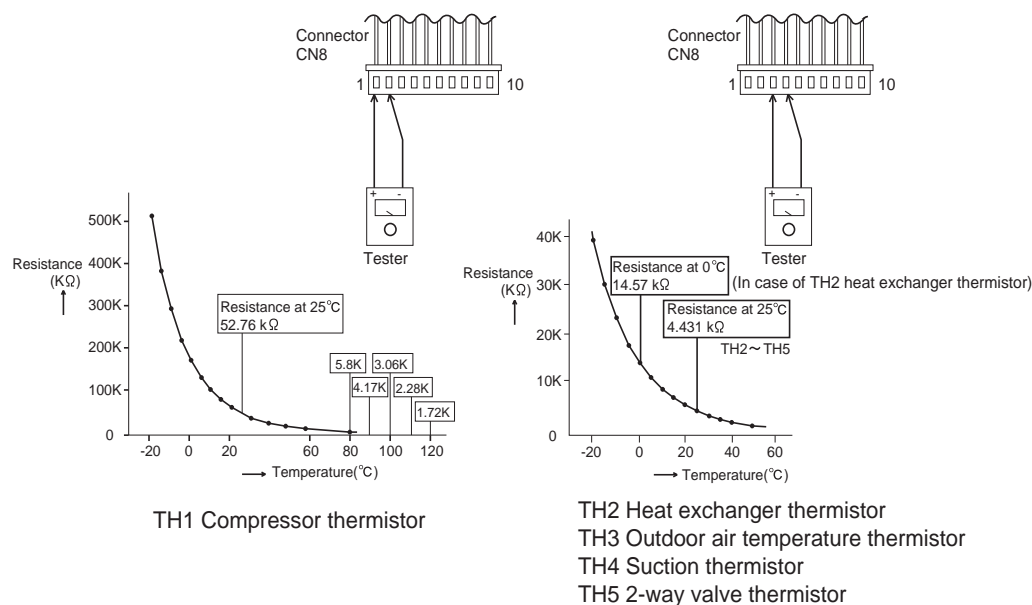
### [3] THERMISTOR TEMPERATURE CHARACTERISTICS

#### 1. Indoor unit thermistor temperature characteristics

Figure 1 Temperature properties of indoor thermistors



#### 2. Outdoor unit thermistor temperature characteristics



Thermistor	No.	Connector	Color
Compressor thermistor	TH1	No. (1) - No. (2)	Red
Heat exchanger thermistor	TH2	No. (3) - No. (4)	Orange
Outdoor air temperature thermistor	TH3	No. (5) - No. (6)	Green
Suction thermistor	TH4	No. (7) - No. (8)	Black
2-way valve thermistor	TH5	No. (9) - No. (10)	Yellow

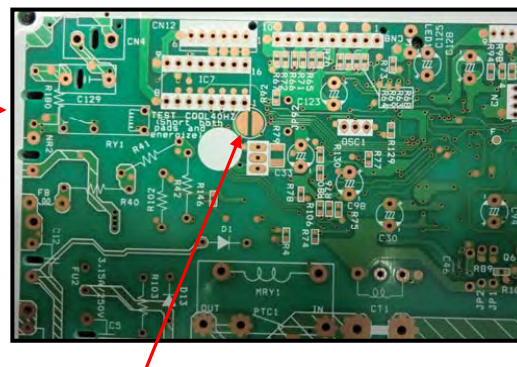
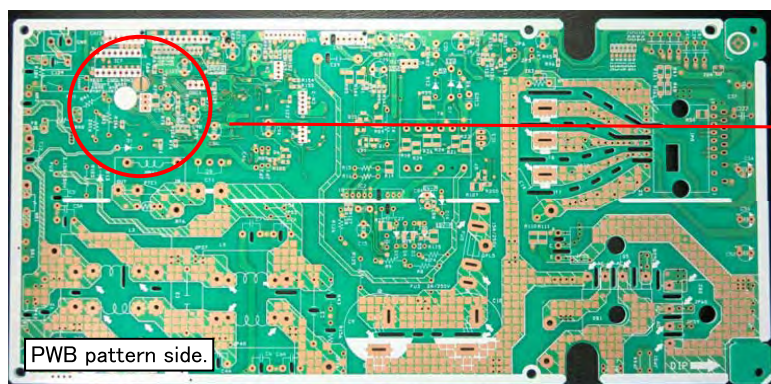
Before measuring resistance,  
disconnect connectors from PWB.

## [4] HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

### 1. Cooling in 40 Hz fixed mode

To operate the outdoor unit independently, short-circuit the sections indicated by arrows in the diagram below with an adapter, and apply 220-240 VAC between (1) and (N) on the terminal board of the outdoor unit. This allows the outdoor unit to be operated in cooling mode independently.

(Do not operate the outdoor unit in this condition for an extended period of time.)



Short both pads and energize.

## [5] GENERAL TROUBLESHOOTING CHART

### 1. Indoor unit does not turn on

Main cause	Inspection method	Normal value/condition	Remedy
Cracked PWB. (Cracked pattern)	Check visually.	There should be no cracking in PWB or pattern.	Replace PWB.
Open-circuit in FU1 (250 V, 3.15 A)	Check melting of FU1.	There should be no open-circuit.	Replace PWB.

### 2. Indoor unit fan does not operate

Main cause	Inspection method	Normal value/condition	Remedy
Open-circuit in heat exchanger thermistor (TH2) (in heating operation)	Measure thermistor resistance (dis-mount for check).	CN8(1)–(2)	Replace thermistor.
		There should be no open-circuit or faulty contact.	Replace thermistor.
Disconnected heat exchanger thermistor (TH2) (in heating operation)	Inspect connector on PWB. Check thermistor installation condition.	Thermistor should not be disconnected.	Install correctly.

### 3. Indoor unit fan speed does not change

Main cause	Inspection method	Normal value/condition	Remedy
Remote control is not designed to allow fan speed change in several operation mode.	Check operation mode.	Fan speed should change except during dehumidifying operation, ventilation, light dehumidifying operation, internally normal operation	Explain to user.

### 4. Remote control signal is not received

Main cause	Inspection method	Normal value/condition	Remedy
Batteries at end of service life.	Measure battery voltage.	2.5 V or higher (two batteries in series connection)	Install new batteries.
Batteries installed incorrectly.	Check battery direction.	As indicated on battery compartment.	Install batteries in indicated direction.
Lighting fixture is too close, or Fluorescent lamp is flickering in the room.	Turn off light and check.	Signal should be received when light is turned off.	Change light position or install new fluorescent lamp.
Sevick light (Hitachi) is used in the room.	Check room lights.	Signal may not be received sometimes due to effect of Sevick light.	Replace light or change position.
Operating position/angle are inappropriate.	Operate within range specified in manual.	Signal should be received within range specified in manual.	Explain appropriate handling to user.

Main cause	Inspection method	Normal value/condition	Remedy
Open-circuit or short-circuit in wiring of light receiving section.	Check if wires of light receiving section are caught.	Wires of light receiving section should not have any damage caused by pinching.	Replace wires of light receiving section.
Light receiving unit is defective	Check signal receiving circuit (measure voltage between terminals 8 and 10, 9 and 10 of connector CN17).	Tester indicator should move when signal is received.	Replace PWB.
Dew condensation on light receiving unit.	Check for water and rust.	Signal should be received within range specified in manual.	Take moisture-proof measure for lead wire outlet of light receiving section.

## 5. Louvers do not move

Main cause	Inspection method	Normal value/condition	Remedy
Caught in sliding section.	Operate to see if louvers are caught in place.	Louvers should operate smoothly.	Remove or correct catching section.
Disconnected connector (CN7) on PWB,	Inspect connectors.	Connectors or pins should not be disconnected.	Install correctly.
Contact of solder on PWB (connector section on PWB)	Check visually.	There should not be solder contact.	Correct contacting section.

## 6. There is noise in TV/radio

Main cause	Inspection method	Normal value/condition	Remedy
Grounding wires not connected properly.	Check grounding wire connections.	Grounding wires should be connected properly.	Connect grounding wires properly.
TV/radio is placed too close to outdoor unit.	Check distance between TV/radio and outdoor unit.	If TV/radio is placed too close, it may become affected by noise.	Move TV/radio away from outdoor unit.
Other than above.	Check for radio wave interference.		

## 7. Malfunction occurs

Main cause	Inspection method	Normal value/condition	Remedy
Malfunction caused by noise.	Check for radio wave interference.		

## 8. Compressor does not start

Main cause	Inspection method	Normal value/condition	Remedy
Erroneous inter-unit connection.	Check wiring between indoor and outdoor units.	Terminal board 1-N: 220-240 VAC, 50 Hz Terminal board 2: serial signal	Correct wiring.
Damaged IPM.	Check IPM continuity.	See [IPM check method] on page 3-10	Replace IPM.
Dried-up electrolytic capacitor.	Check electrolytic capacitor.	See [Inverter electrolytic capacitor (C9,C10) check method] on page 3-9	Replace electrolytic capacitor.
Blown outdoor unit fuse.	Check 20A fuse. Check 15A fuse.	Fuse should not be blown.	Replace fuse/diode bridge. Replace fuse. Replace outdoor unit PWB assembly.
Power supply voltage is too low.	Measure power supply voltage during startup.	230±10 VAC, 50 Hz	Make sure that power supply voltage is 200 V or higher.
Compressor lock.  ·Temp. fuse of terminal is error ·EEPROM error ·AC Over current error	Supply current and touch compressor cover (sound absorbing material) to check if operation starts. See (Diagnosis Function and display mode) on page 3-13	Compressor should start normally.  Malfunction display section (0-0) Compressor should start normally.	Apply external impact to compressor. Replace compressor. ·Replace terminal ·Replace outdoor unit PWB ·Replace outdoor unit PWB

## 9. Operation stops after a few minutes and restarts, and this process repeats

Main cause	Inspection method	Normal value/condition	Remedy
Dried-up electrolytic capacitor.	Measure 320VDC line voltage.	300 V or higher.	Replace electrolytic capacitor.
Layer short-circuit in expansion valve coil.	Measure resistance.	$46 \pm 3\Omega$ in each phase (at 20°C)	Replace coil.

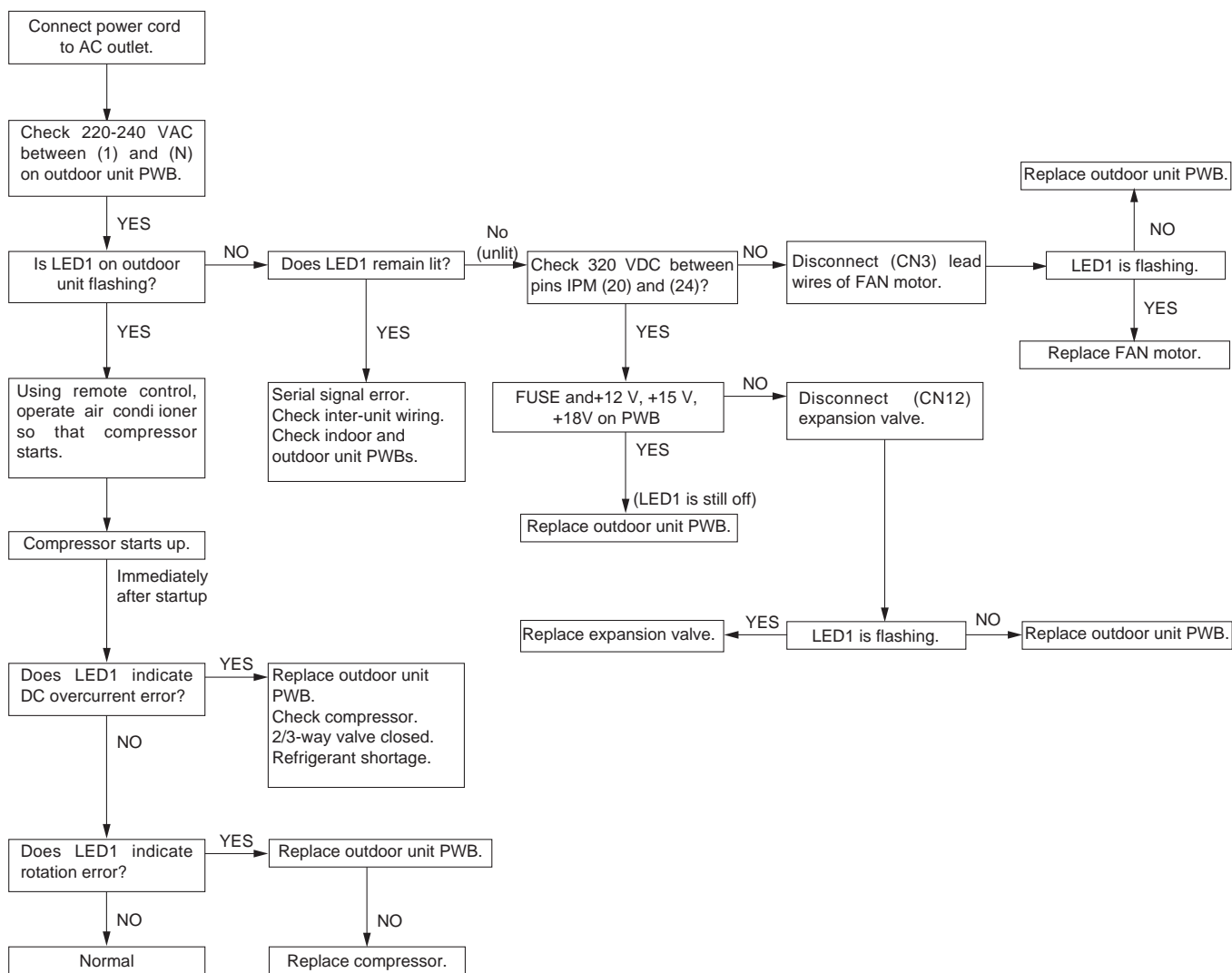
CAUTION: If fuse FU1/FU4/FU5 (outdoor unit control circuit board) is blown, be careful of charging voltage in inverter electrolytic capacitor C9, C10.

To discharge stored electricity, unplug the power cord and connect the plug of a soldering iron (230VAC, 50W) between the positive and negative terminals of inverter electrolytic capacitor C9, C10.

## [6] MALFUNCTION (PARTS) CHECK METHOD

### 1. Procedure for determining defective outdoor unit IPM/compressor

The following flow chart shows a procedure for locating the cause of a malfunction when the compressor does not start up and a DC overcurrent indication error occurs.

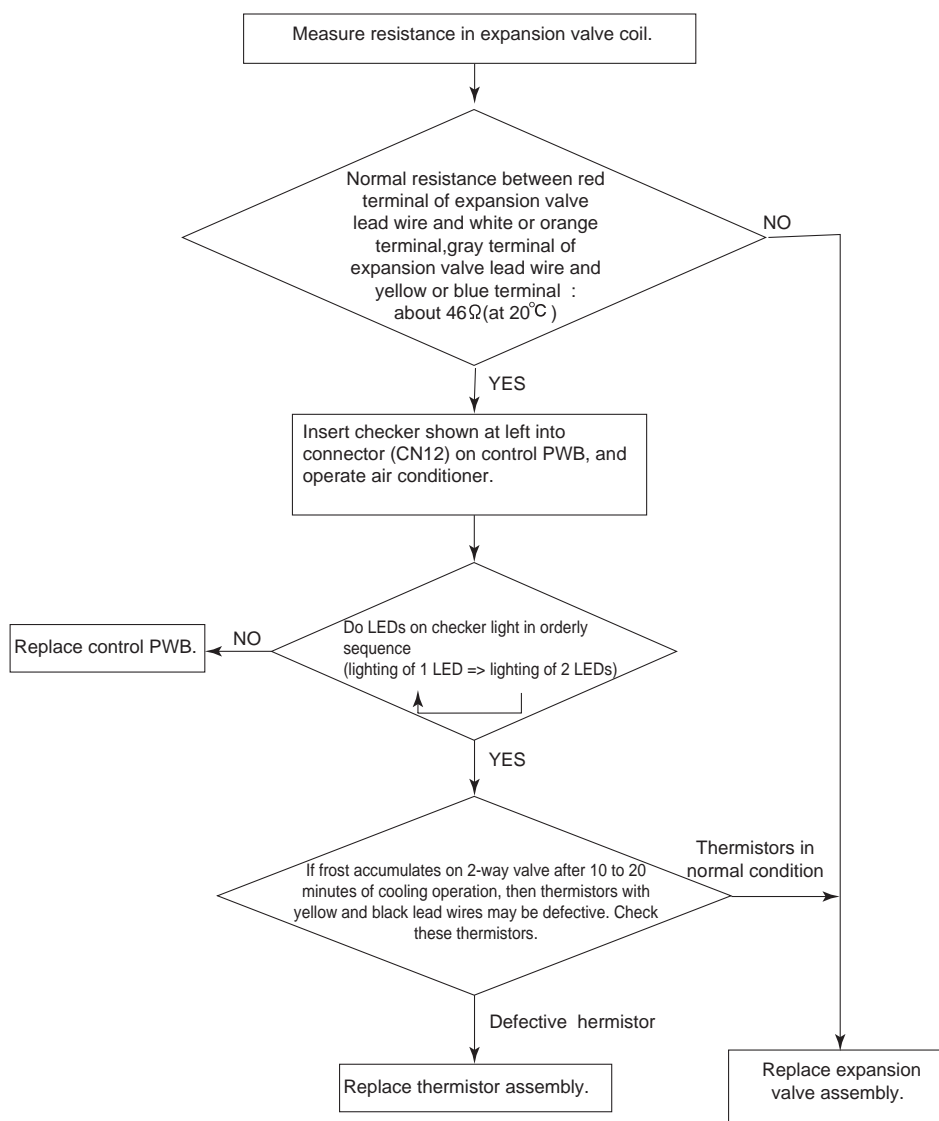
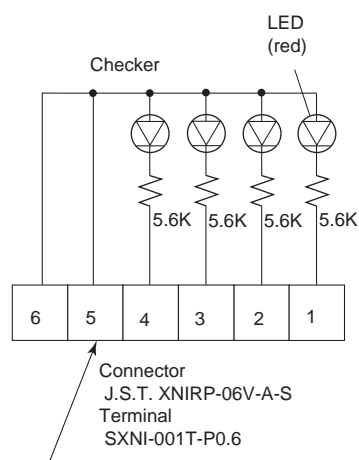


CAUTION: Please take care for electrical shock when you work to change defective parts or disconnect wires of defective application.

The outdoor unit has energy changed for a while even after unplugging the power supply cord.

After changing the part or unit, please retry check procedure from the beginning.

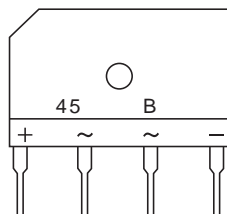
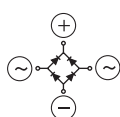
## 2. Procedure for determining defective expansion valve



## 3. Diode bridge check method

Turn off the power and let the inverter electrolytic capacitor (C9, C10) discharge completely. Then use a tester and check continuity.

When using a digital tester, the (+) and (-) tester lead wires in the table must be reversed.



Needle-type tester		Normal resistance value
+	-	$\infty$ (several MΩ)
~	+	
-	~	

Value in ( ) is for digital tester.

## 4. Inverter electrolytic capacitor (C9, C10) check method

Turn off the power, let the inverter electrolytic capacitor (C9, C10) discharge completely, and remove the capacitor from the control printed circuit board (PWB). First, check the case for cracks, deformation and other damages. Then, using a needle-type tester, check continuity.

### Determination of normal condition

The tester needle should move on the scale and slowly returns to the original position. The tester needle should move in the same way when polarities are reversed. (When measurement is taken with the polarities reversed, the tester needle exceeds the scale range. Therefore, let the capacitor discharge before measurement.)





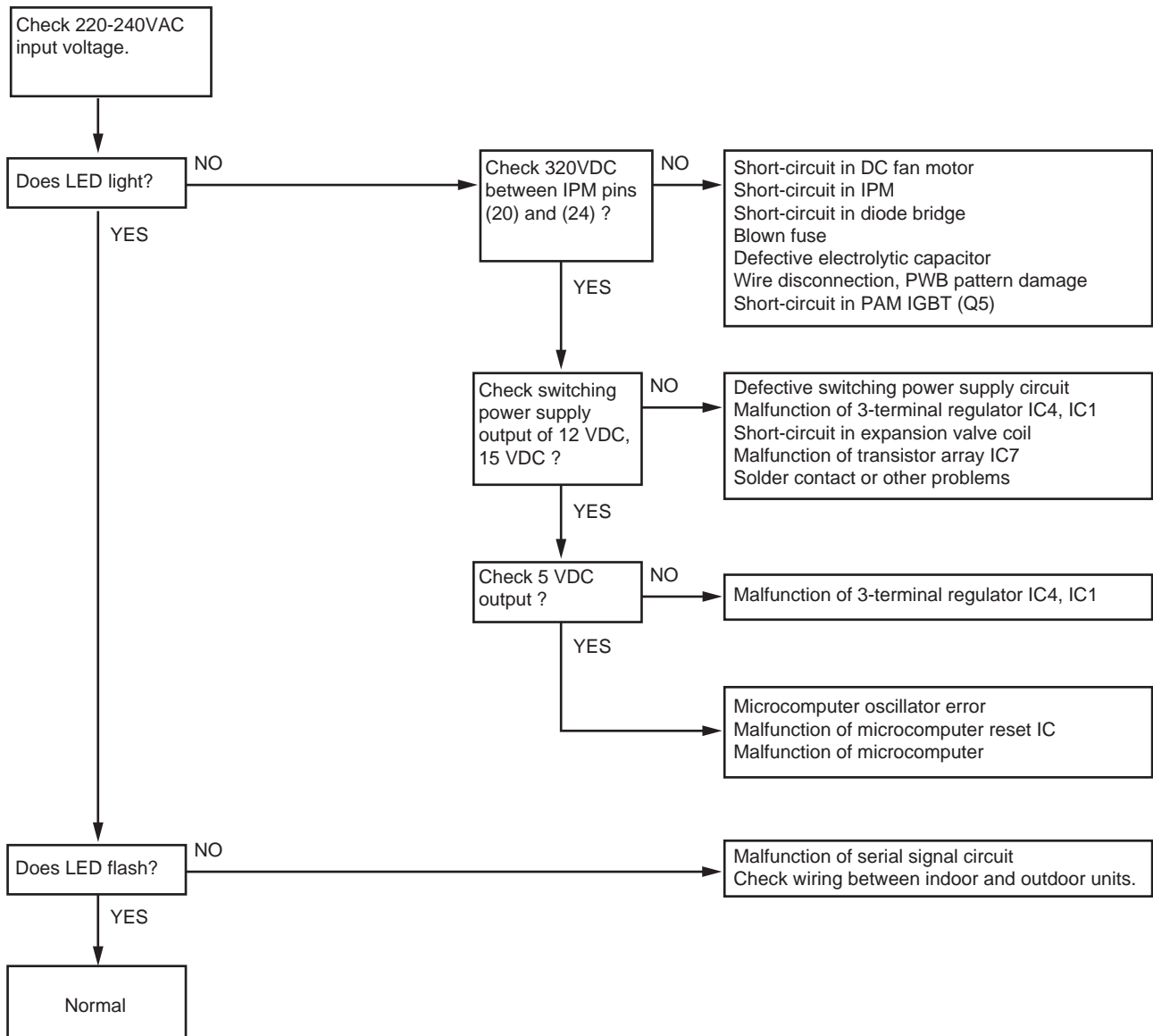
## [7] OUTDOOR UNIT CHECK METHOD

After repairing the outdoor unit, conduct the following inspection procedures to make sure that it has been repaired completely. Then, operate the compressor for a final operation check.

### 1. Checking procedures

No.	Item	Check method	Normal value/condition	Remedy
1	Preparation	Disconnect compressor cords (white, orange, red: 3 wires) from compressor terminals, and connect simulated load (lamp used as load). Operate air conditioner in cooling or heating test operation mode.		
2	Inverter DC power supply voltage check	Measure DC voltage between IPM pins (20) and (24).	320 VDC	Replace control PWB. Replace diode bridge. Correct soldered section of Fasten tabs (BT1,2,5,6,10,11, JPL1,2,5,6) on control PWB. (Repair solder cracks.)
3	IPM circuit check	Check that 3 lamps (load) light. Check position detection voltage (+15 V, 5 V) on control PWB.	Each voltage should be normal. All 3 lamps (load) should light with same intensity.	Replace control PWB.
4	Compressor check	Measure compressor coil resistance (for each phase of U, V and W). Use multi-meter or digital tester capable of displaying two digits right of the decimal point (0.01Ω).	Resistance value at 20°C --- 0.65Ω	Correct connections at compressor terminals. Replace compressor.
5	Expansion valve check	Measure expansion valve coil resistance.	Each phase 46±3Ω (at 20°C)	Replace expansion valve.
6	Final check	Turn off power, and connect compressor cords to compressor. Operate air conditioner. Measure DC voltage between IPM pins (20) and (24).	Compressor should operate normally. 320 VDC or higher.	Replace control PWB. Replace outdoor unit thermistor. Replace compressor (in case of compressor lock).

## 2. Troubleshooting of outdoor unit electric components



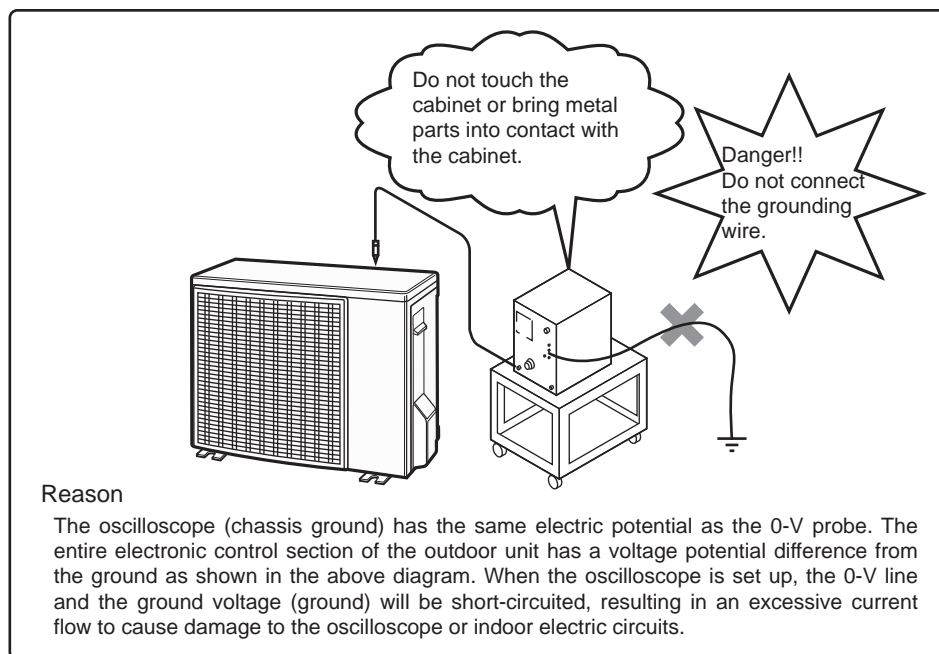
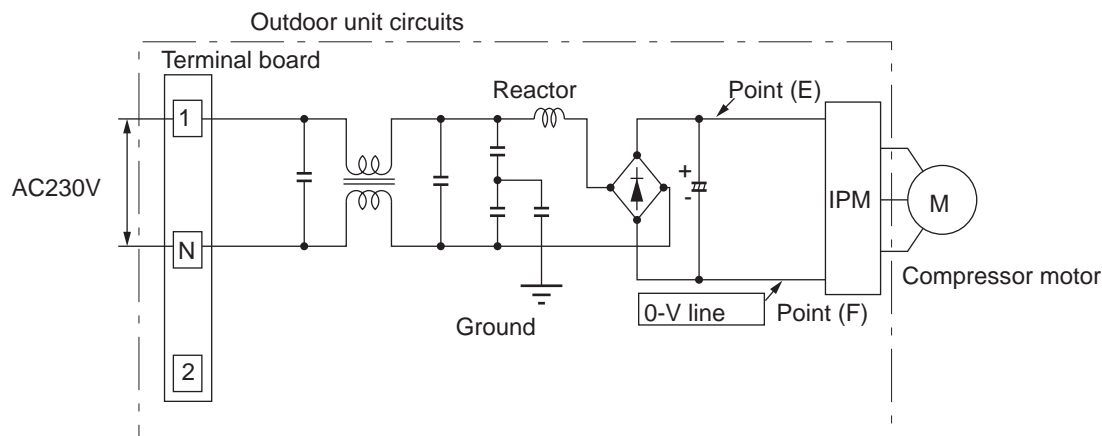
### 3. Caution in checking printed circuit boards (PWB)

#### 3.1. Non-insulated control circuit

The GND terminals of the low-voltage circuits (control circuits for microcomputer and thermistors and drive circuits for expansion valve and relays) on the control printed circuit board (PWB) are connected to the compressor drive power supply (320-VDC negative terminal). Therefore, exercise utmost caution to prevent electric shock.

If a measuring instrument used for the test is grounded, its chassis (ground) has the same electric potential as the 0-V probe. Since non-insulated circuits have the following voltage potential difference from the ground, connection of the grounding wire results in a short-circuit between the 0-V line and the ground, thus allowing an excessive current to flow to the tester to cause damage.

If the sheaths of the thermistor lead wires or expansion valve lead wires inside the outdoor unit become damaged due to pinching by the front panel or other metal parts or contacting a pipe, a high voltage can flow and destroy the circuits. To prevent these problems, carefully conduct assembly work.

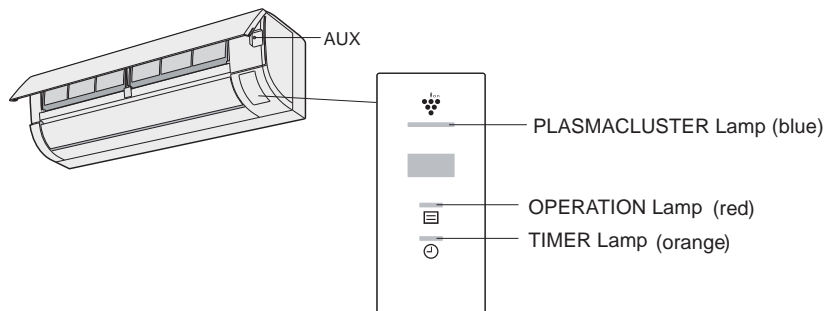


## [8] TROUBLESHOOTING GUIDE

### 1. Self-Diagnosis Function

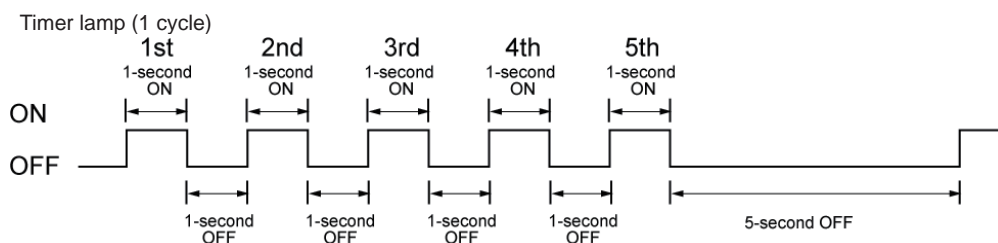
#### 1. Indoor unit

- To display the self-diagnosis, hold down the AUX button for over 5 seconds on the indoor unit when the indoor unit is not operating.
- The operation lamp (red), timer lamp (orange) and Plasmcluster lamp (blue) flash to indicate the information of malfunction.
- If the power cord is unplugged or the circuit breaker is turned off, the self-diagnosis memory is lost.



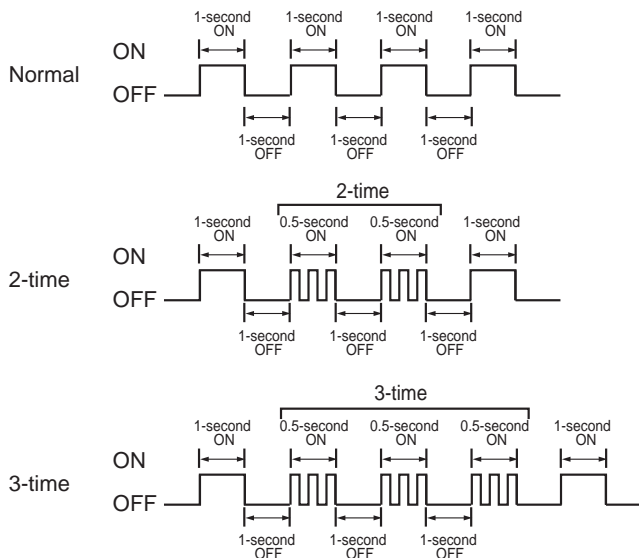
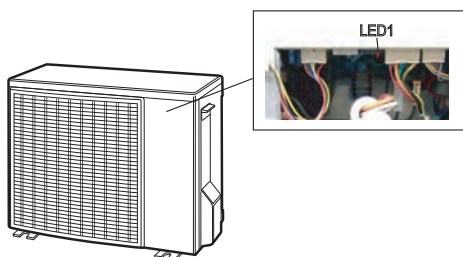
Display of self-diagnosis result

The operation lamp (red) and the Plasmacluster lamp (blue) flash in synchronization with the timer lamp (orange).



#### 2. Outdoor unit

- The self-diagnosis is indicated the error information by flashing LED1 on the outdoor unit.
- The self-diagnosis of outdoor unit is displayed for about 3-10 minutes. Then, the LED1 returns to normal display.



&lt;INDOOR UNIT&gt; ○:1-second ON / 1-second OFF

Problem symptom	Outdoor unit indication (LED1)	Indoor unit					Malfunction No.		Content of diagnosis		Check point	Action								
						Lamp	Main	Sub	Main	Sub										
Normal condition	Normal blinking	○	○	○	○	○	Timer (Orange)	0	0	Normal										
							Operation (Red)													
							Plasmacluster (Blue)													
Indoor and outdoor units do not operate.	1-time	○	○	○	○	○	Timer (Orange)	1	0	Outdoor unit thermistor short-circuit	Heat exchanger thermistor short circuit error	(1) Measure the resistance of the outdoor unit thermistors.	(1) Replace the outdoor unit thermistor assembly.							
						○	Operation (Red)													
							Plasmacluster (Blue)													
			○	○	○	○	○	Timer (Orange)	1					Outdoor temperature thermistor short circuit error	(2) Check the lead wire of the outdoor unit thermistor for torn sheath and shortcircuit.	(2) Replace the outdoor unit thermistor assembly.				
						○	Operation (Red)													
						○	Plasmacluster (Blue)													
			○	○	○	○	○	Timer (Orange)	2					Suction thermistor short circuit error			(3) No abnormality found in above inspections (1) and (2).	(3) Replace the outdoor unit control PWB assembly.		
						○	Operation (Red)													
						○	Plasmacluster (Blue)													
			○	○	○	○	○	Timer (Orange)	3					2-way valve thermistor short circuit error						
						○	Operation (Red)													
						○	Plasmacluster (Blue)													
Indoor and outdoor units do not operate.	2-time	○	○	○	○	○	Timer (Orange)	2	0	Cycle temperature	Compressor high temperature error	(1) Check the outdoor unit air outlet for blockage.	(1) Ensure unobstructed air flow from the outdoor unit air outlet.							
						○	Operation (Red)							(2) Check if the power supply voltage is AC 230V at full power.					(2) Connect power supply of proper voltage.	
							Plasmacluster (Blue)							(3) Check the pipe connections for refrigerant leaks.					(3) Charge the specified amount of refrigerant.	
														(4) Measure resistance of the outdoor unit compressor thermistor.	(4) Replace the outdoor unit compressor thermistor assembly.					
														(5) Check the expansion valve for proper operation.	(5) Replace the expansion valve coil, expansion valve or outdoor unit control PWB assembly.					
		Indoor unit operates. Outdoor unit does not operate temporarily.		○	○	○	○	○	Timer (Orange)		1		Compressor discharge overheat.	(Temporary stop for cycle protection)	-					
							○	Operation (Red)												
							○	Plasmacluster (Blue)												
			○	○	○	○	○	○	Timer (Orange)		2		Outdoor unit heat exchanger overheat.	(Temporary stop for cycle protection)	-					
							○	Operation (Red)												
					○	Plasmacluster (Blue)														
	○	○	○	○	○	○	Timer (Orange)	3		Indoor unit heat exchanger overheat.	(Temporary stop for cycle protection)	-								
					○	Operation (Red)														
					○	Plasmacluster (Blue)														
	○	○	○	○	○	○	Timer (Orange)	4		IPM high temperature error	(Temporary stop for cycle protection)	-								
					○	Operation (Red)														
					○	Plasmacluster (Blue)														
Indoor and outdoor units do not operate.		○	○	○	○	○	Timer (Orange)	5		IPM high temperature error	(1) Measure resistance of the heat-sink thermistor.	(1) Replace the outdoor unit PFCM PWB or control PWB assembly or change the heat-sink thermistor.								
						○	Operation (Red)													
						○	Plasmacluster (Blue)													

Problem symptom	Outdoor unit indication (LED1)	Indoor unit					Malfunction No.		Content of diagnosis		Check point	Action				
						Lamp	Main	Sub	Main	Sub						
Indoor unit operates. Outdoor unit does not operate temporarily.	3-time	○	○	○	○	○	Timer (Orange)	3	0	Dry operation	Temporary stop due to dehumidifying operation	(Temporary stop for cycle protection)	-			
					○	○	Operation (Red)									
							Plasmacluster (Blue)									
Indoor and outdoor units do not operate.	5-time	○	○	○	○	○	Timer (Orange)	5	0	Outdoor unit thermistor open-circuit	Heat exchanger thermistor open circuit error	(1) Check connector of the outdoor unit thermistor for secure installation. (2) Measure resistance of outdoor thermistors. (3) Check the lead wires of thermistors on the outdoor unit control PWB for open-circuit. (4) No abnormality found in above inspections (1) through (3).	(1) Correct the installation. (2) Replace the outdoor unit thermistor assembly.			
					○	○	Operation (Red)									
							Plasmacluster (Blue)		1		Outdoor temperature thermistor open circuit error		(2) Replace the outdoor unit thermistor assembly.			
		○	○	○	○	○	Timer (Orange)									
					○	○	Operation (Red)									
						○	Plasmacluster (Blue)		2		Suction thermistor open circuit error		(3) Replace the outdoor unit thermistor assembly.			
		○	○	○	○	○	Timer (Orange)									
					○	○	Operation (Red)									
						○	Plasmacluster (Blue)		3		2-way valve thermistor open circuit error.		(4) Replace the outdoor unit control PWB assembly.			
		○	○	○	○	○	Timer (Orange)									
					○	○	Operation (Red)									
							Plasmacluster (Blue)		4		Discharge thermistor open circuit error			(4) Replace the outdoor unit control PWB assembly.		
		○	○	○	○	○	Timer (Orange)									
					○	○	Operation (Red)									
						○	Plasmacluster (Blue)		5		Heat sink thermistor open circuit error				(4) Replace the outdoor unit control PWB assembly.	
		○	○	○	○	○	Timer (Orange)									
					○	○	Operation (Red)									
					○	○	Plasmacluster (Blue)									
Indoor and outdoor units do not operate.	6-time	○	○	○	○	○	Timer (Orange)	6	0	Outdoor unit DC Current	DC over current error	Go to "DC Over Current Error (6-0 error)".				
					○	○	Operation (Red)									
							Plasmacluster (Blue)		1			(1) Check the IPM is attached correctly to the outdoor unit IPM PWB.	(1) Replace the outdoor unit IPM PWB assembly.			
		○	○	○	○	○	Timer (Orange)									
					○	○	Operation (Red)									
						○	Plasmacluster (Blue)									

Problem symptom	Outdoor unit indication (LED1)	Indoor unit					Malfunction No.		Content of diagnosis		Check point	Action					
						Lamp	Main	Sub	Main	Sub							
Indoor and outdoor units do not operate.	7-time	○	○	○	○	○	Timer (Orange)	7	0	Outdoor unit AC Current	AC over current error	(1) Check the outdoor unit air outlet for blockage.	(1) Ensure unobstructed air flow from the outdoor unit air outlet.				
					○	○	○					Operation (Red)	(2) Check the outdoor unit fan for proper rotation.	(2) Check the outdoor unit fan motor.			
												Plasmacluster (Blue)					
		○	○	○	○	○	Timer (Orange)				1	AC current error when OFF	(1) IPM continuity check	(1) Replace the outdoor IPM PWB			
					○	○	○								Operation (Red)		
						○									Plasmacluster (Blue)		
		○	○	○	○	○	Timer (Orange)				2	AC maximum current error	(1) Check the outdoor unit air outlet for blockage.	(1) Ensure unobstructed air flow from the outdoor unit air outlet.			
					○	○	○								Operation (Red)	(2) Check the outdoor unit fan for proper rotation.	(2) Check the outdoor unit fan motor.
						○									Plasmacluster (Blue)		
		○	○	○	○	○	Timer (Orange)				3	AC current deficiency error	(1) Check if there is an open-circuit in the secondary winding of the current transformer of the outdoor unit control PWB.	(1) Replace the outdoor unit control PWB assembly.			
					○	○	○								Operation (Red)	(2) Check if the refrigerant volume is abnormally low.	(2) Charge the specified amount of refrigerant.
						○	○								Plasmacluster (Blue)		
Indoor and outdoor units do not operate.	8-time	○	○	○	○	○	Timer (Orange)	8	0	Abnormal wire check	Abnormal wire check error	(1) Check the expansion valve. (unit A - C)	(1) Replace the outdoor control board assembly.				
			○				Operation (Red)					(2) Are four expansion valves connected by mistake	(2) Reattach				
							Plasmacluster (Blue)					(3) Check the wiring between units.	(3) Check the wiring between units.				

Problem symptom	Outdoor unit indication (LED1)	Indoor unit				Malfunction No.		Content of diagnosis		Check point	Action		
					Lamp	Main	Sub	Main	Sub				
Indoor and outdoor units do not operate.	9-time	○	○	○	○	9	0	Cycle temperature	Thermistor installation error or 4-way valve error.	(1) Check the thermistor (heat exchanger) and (2-way valve) are installed in correct positions.	(1) Correct the installation.		
			○		○							(2) Check resistance of thermistors (heat exchanger and 2-way valve).	(2) Change the specified amount of refrigerant.
												(3) Check the 4-way valve for proper operation.	(3) Replace the 4-way valve.
												(4) No abnormality found in above inspections (1) through (3).	(4) Replace the outdoor unit control PWB assembly.
Indoor and outdoor units do not operate.		○	○	○	○		4		4 way valve error or Gas leak error	(1) Check the indoor/outdoor heat exchanger thermistors are installed in correct positions.	(1) Correct the installation.		
			○		○							(2) Check if the refrigerant volume is abnormally low.	(2) Change the specified amount of refrigerant.
				○								(3) Check the 4-way valve for proper operation.	(3) Replace the 4-way valve.
Indoor and outdoor units do not operate.	10-time	○	○	○	○	10	0	EEPROM error	EEPROM (outdoor) data error	-	(1) Replace the outdoor unit control PWB assembly.		
		○		○									
Indoor and outdoor units do not operate.		○	○	○	○	1	EEPROM (outdoor) data error						
		○		○									
					○								
Indoor and outdoor units do not operate.		○	○	○	○	2	CPU (outdoor) RAM data error						
		○		○									
					○								



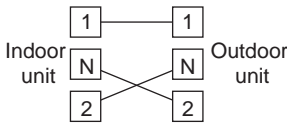
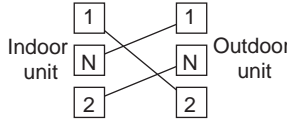
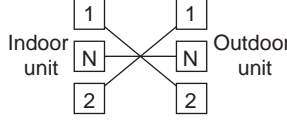
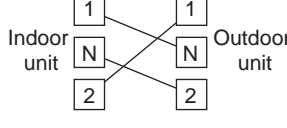
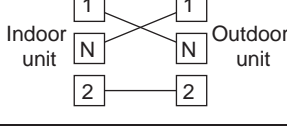
Problem symptom	Outdoor unit indication (LED1)	Indoor unit					Malfunction No.		Content of diagnosis		Check point	Action		
						Lamp	Main	Sub	Main	Sub				
Indoor and outdoor units do not operate.	11-time	○	○	○	○	○	Timer (Orange)	11	0	Outdoor unit DC fan	Outdoor unit DC fan rotation error	(1) Check connector CN3 of the outdoor unit DC fan motor for secure installation.	(1) Correct the installation.	
			○		○	○	Operation (Red)					(2) Check the outdoor unit fan motor for proper rotation.	(2) Replace the outdoor unit fan motor.	
							Plasmacluster (Blue)					(3) Check fuse FUSE5.	(3) Replace the outdoor unit control PWB assembly.	
												(4) No abnormality found in above inspections (1) through (3).	(4) Replace the outdoor unit control PWB assembly.	
		○	○	○	○	○	Timer (Orange)				1	Outdoor unit DC fan drive IC error	(1) Check if the fan IPM terminal resistance values are uniform.	(1) Replace the outdoor unit control PWB assembly.
			○		○	○	Operation (Red)						(2) Outdoor unit fan motor continuity check.	(2) Replace the outdoor unit fan.
						○	Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)				2	Outdoor unit DC fan lock error	(1) Check the outdoor unit fan motor for proper rotation.	(1) Replace the outdoor unit control PWB assembly.
			○		○	○	Operation (Red)						(2) (1):Normal	(2) Replace the outdoor unit fan.
					○		Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)				3	Detection error of DC fan negative rotation before compressor is driven	(1) (Temporary stop for DC fan circuit protection)	-
			○		○	○	Operation (Red)							
					○	○	Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)				4	Detection error of inverter current for DC fan	-	(1) Replace the outdoor unit control PWB assembly.
			○		○	○	Operation (Red)							
				○			Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)				5	Outdoor unit DC fan open connector error	(1) Check connector CN3 of the outdoor unit DC fan motor for secure installation.	(1) Correct the installation.
			○		○	○	Operation (Red)						(2) No abnormality found in above inspections (1).	(2) Replace the outdoor unit control PWB assembly.
				○		○	Plasmacluster (Blue)							
Indoor and outdoor units do not operate.	12-time	○	○	○	○	○	Timer (Orange)	12	0	Thermal fuse in terminal board	Thermal fuse error in terminal board (for power supply)	(1) Check the thermal fuse in terminal board (for Power supply)	(1) Replace terminal board for Power supply	
			○	○			Operation (Red)					(2) Check connector CN5 of the outdoor unit.	(2) Correct the installation.	
							Plasmacluster (Blue)					(3) No abnormality found in above inspections (1) and (2).	(3) Replace the outdoor unit control PWB assembly.	

Problem symptom	Outdoor unit indication (LED1)	Indoor unit				Malfunction No.		Content of diagnosis		Check point	Action			
					Lamp	Main	Sub	Main	Sub					
Indoor and outdoor units do not operate.	13-time	○	○	○	○	○	Timer (Orange)	13	0	DC compressor	Compressor startup error	(1) Check the colors (red, white, orange) of the compressor cords for proper connection. (PWB side, compressor side)	(1) Correct the installation. (U: Red, V: White, W: Orange)	
			○	○	○	○	Operation (Red)							
							Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)	1		Compressor rotation error. (at 120° energizing)	(2) Check if the IPM terminal resistance values are uniform.	(2) Replace the outdoor unit control PWB assembly.		
			○	○	○	○	Operation (Red)							
						○	Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)	2		Compressor rotation error (at 180° energizing)	(3) Check if outdoor main relay (MRY1) turns on and voltage of both end of the condenser (C10) has become DC290-330V.	(3) Replace the outdoor unit control PWB assembly.		
			○	○	○	○	Operation (Red)							
					○		Plasmacluster (Blue)							
		Indoor and outdoor units operate.		○	○	○	○	○	Timer (Orange)	3		Detection error of inverter current.	(1) Check the circuit of detection of inverter current.	(1) Replace the outdoor unit control PWB assembly.
					○	○	○	○	Operation (Red)					
					○	○	Plasmacluster (Blue)							
Indoor and outdoor units do not operate.	14-time	○	○	○	○	○	Timer (Orange)	14	0	Outdoor unit PAM	PAM over voltage error	(1) Check the AC power supply voltage for fluctuation.	(1) Correct the installation.	
			○	○	○	○	Operation (Red)							
							Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)	1		PAM clock error	(1) Check the PAM clock for proper input.	(1) Replace the outdoor unit control PWB assembly.		
			○	○	○	○	Operation (Red)							
						○	Plasmacluster (Blue)							
		○	○	○	○	○	Timer (Orange)	2		PAM under voltage error	(1) Check the AC power supply voltage for fluctuation.	(1) Correct the installation.		
			○	○	○	○	Operation (Red)							
					○		Plasmacluster (Blue)							
							○		Plasmacluster (Blue)				(2) No abnormality found in above inspection.	(2) Replace the PWB assembly.

Problem symptom	Outdoor unit indication (LED1)	Indoor unit					Malfunction No.		Content of diagnosis		Check point	Action
						Lamp	Main	Sub	Main	Sub		
Indoor unit operates. Outdoor unit does not operate.	Lighting or OFF	○	○	○	○	Timer (Orange)	17	0	Wiring between units	Serial open-circuit	(1) Check the wires between units.	(1) Connect stable power supply. Correct the wiring.
		○				Operation (Red)					(2) Check voltage between N and 1 the indoor/outdoor unit terminal boards.	(2) Replace the outdoor unit control PWB assembly.
						Plasmacluster (Blue)					(3) Check the outdoor unit fuse.	(3) Replace the fuse/outdoor unit control PWB assembly.
											(4) Check 15-V, 13-V and 5-V voltages on the PWB. Check resistance between IPM terminals.	(4) Replace the outdoor unit control PWB assembly.
											(5) Check pins No.5 and 8 of connector CN3 of the outdoor unit fan motor for short-circuit.	(5) Replace the outdoor unit fan motor.
											(6) No abnormality found in above inspections (1) through (5).	(6) Replace the outdoor unit control PWB board.
Indoor unit operates. Outdoor unit does not operate.	Lighting or OFF	○	○	○	○	Timer (Orange)	18	0	Wiring between units	Serial short-circuit	(1) Check the wiring between units.	(1) Correct the wiring.
		○				Operation (Red)						
Indoor and outdoor units do not operate.	Lighting or OFF					Plasmacluster (Blue)		1		Serial erroneous wiring	(1) Check the wiring between units.	(1) Correct the wiring.
		○	○	○	○	Timer (Orange)						
Indoor and outdoor units do not operate.	Normal blinking or OFF	○	○	○	○	Timer (Orange)	19	0	Indoor unit fan	Indoor unit fan error	(1) Check the indoor fan motor for proper rotating operation. (Check fan lock.)	(1) Replace the indoor fan motor.
		○				Operation (Red)					(2) Check the lead wire of the indoor fan motor for open-circuit.	(2) Replace the indoor fan motor.
						Plasmacluster (Blue)					(3) Check connector of the indoor unit fan motor for secure installation.	(3) Correct the installation of the indoor fan motor connector.
											(4) No abnormality found in above inspections (1) through (3).	(4) Replace the indoor unit control PWB.
Indoor and outdoor units do not operate.	Normal blinking or OFF	○	○	○	○	Timer (Orange)	20	0	Indoor unit control PWB	EEPROM data error	(1) (EEPROM read data error)	(1) Replace the indoor unit control PWB.
		○				Operation (Red)						
						Plasmacluster (Blue)						

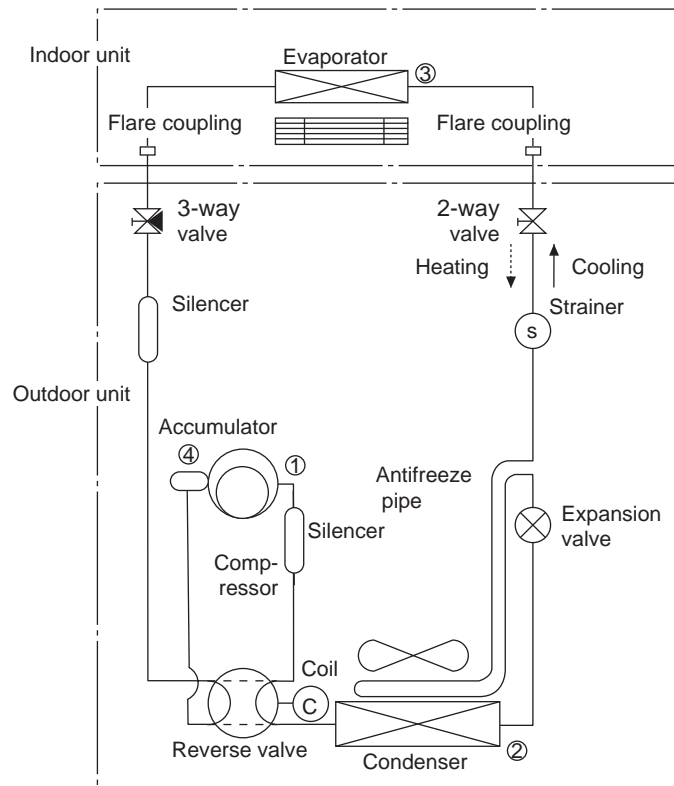
## 12PRN

Malfunction indications due to erroneous wiring during air conditioner installation

Inter-unit wiring error mode		Symptom
1	 <p>Indoor unit terminals: 1, N, 2. Outdoor unit terminals: 1, N, 2. Connections: 1 to 1, N to N, 2 to 2.</p>	Malfunction diagnosis display "18-1"
2	 <p>Indoor unit terminals: 1, N, 2. Outdoor unit terminals: 1, N, 2. Connections: 1 to 1, N to 2, 2 to N.</p>	Malfunction diagnosis display None (Displays "18-0" when malfunction code is called out.)
3	 <p>Indoor unit terminals: 1, N, 2. Outdoor unit terminals: 1, N, 2. Connections: 1 to 1, N to 1, 2 to N.</p>	Malfunction diagnosis display None (Displays "18-0" when malfunction code is called out.)
4	 <p>Indoor unit terminals: 1, N, 2. Outdoor unit terminals: 1, N, 2. Connections: 1 to 1, N to N, 2 to 2.</p>	Malfunction diagnosis display "18-1"
5	 <p>Indoor unit terminals: 1, N, 2. Outdoor unit terminals: 1, N, 2. Connections: 1 to 1, N to N, 2 to 1.</p>	Malfunction diagnosis display "18-1"

## CHAPTER 4. REFRIGERATION CYCLE

### [1] FLOW FOW REFRIGERANT



### [2] STANDARD CONDITION

	Indoor side		Outdoor side	
	Dry-bulb Temp. (°C)	Relative Humidity (%)	Dry-bulb Temp. (°C)	Relative Humidity (%)
Cooling	27	47	35	40
Heating	20	—	7	87

\* REFRIGERANT PIPE LENGTH 5m

### [3] TEMPERATURE AT EACH PART AND PRESSURE IN 3-WAY VALVE

Model	12PR-N		09PR-N	
NO. Condition	Cooling	Heating	Cooling	Heating
Temp. on ① (°C)	66	63	66	65
Temp. on ② (°C)	40	2	40	2
Temp. on ③ (°C)	14	22	14	23
Temp. on ④ (°C)	17	6	16	6
3-way valve pressure (MPaG)	1.05	2.14	1.04	2.23

\* On test run mode

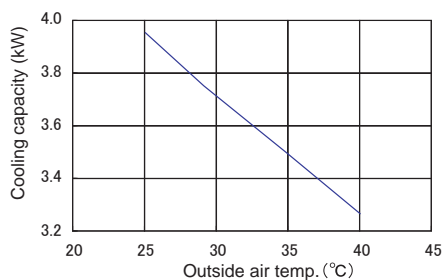
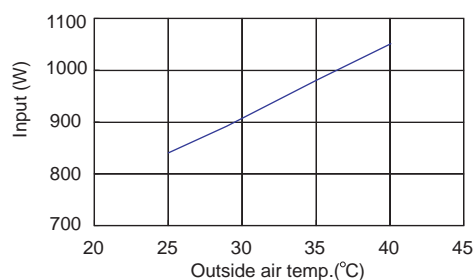
## [4] PERFORMANCE CURVES

### NOTE

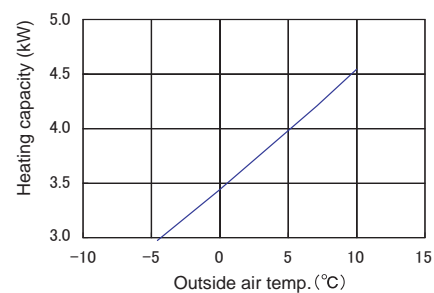
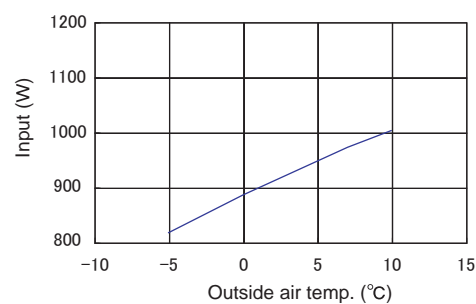
- 1) Indoor fan speed: Hi
- 2) Vertical adjustment louver "45°", Horizontal adjustment louver "front"
- 3) Indoor air temp.: Cooling 27°C, Heating 20°C
- 4) Power source: 230V, 50Hz
- 5) Performance corresponding to change in outside temperature when compressor is fixed to rated operation.

### 1. 12PR-N

#### 1.1. At Cooling

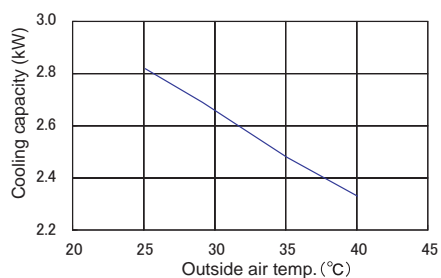
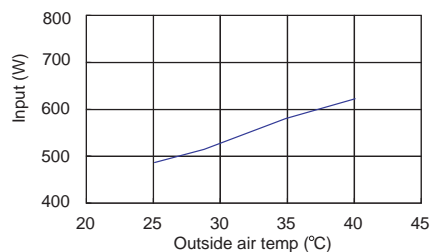


#### 1.2. At Heating

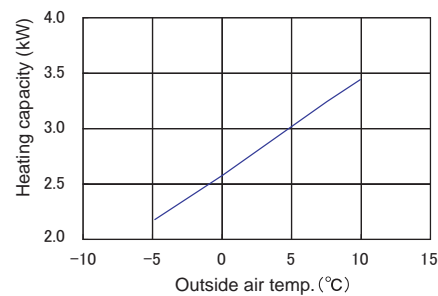
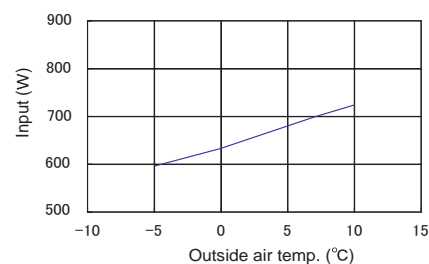


### 2. 09PR-N

#### 2.1. At Cooling



#### 2.2. At Heating



## CHAPTER 5. DISASSEMBLY PROCEDURE

Be sure to disconnect the power cord from the AC power outlet before starting the disassembly procedure.

Be sure to install screws to their original positions after repairing

After the air conditioner is repaired or parts are replaced, measure insulation resistance of the equipment using an insulation resistance meter. If the measured resistance is lower than 1MΩ inspect parts and repair or replace defective parts.

### [1] INDOOR UNIT

1) Open the open panel.



2) Remove a screw fixing the cord holder.



3) Remove the cord holder.



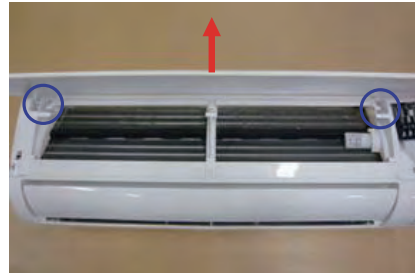
4) Loosen the screws on the terminal board remove the Unit-to Unit wiring connected with board.



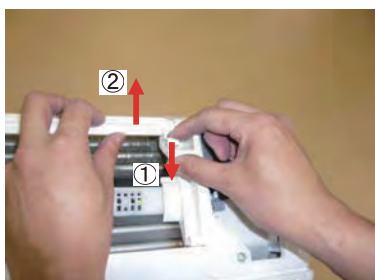
5) Slide out the 2 air filter.



6) Pull out two hooks and remove the panel.



7) Remove the grill (Unhook the 3 hooks shown in the picture.)



8) Remove the 2 screws fixing the front panel R and front panel L.



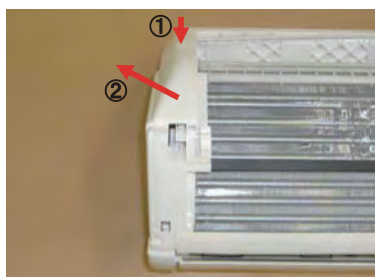
9) Remove the front panel R.

Push the upper hook and pull the front panel R out.

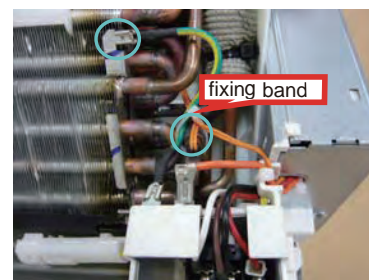


10) Remove the front panel L.

Push the upper hook and pull the front panel L out.



11) Cut the fixing band and remove the thermistor and earth wire.



12) Remove the screw fixing the control box cover.



13) Remove the 3 connectors. (FAN MOTOR, LOUVER MOTOR and PLASMCLUSTER)

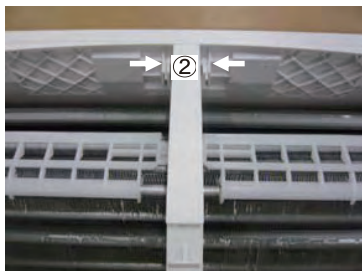
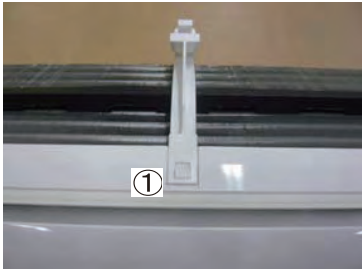
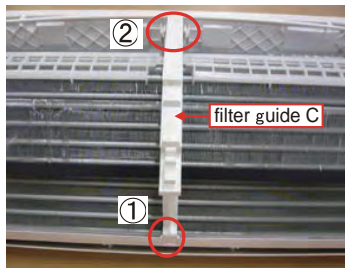


14) Unscrew the screw and remove the control box.

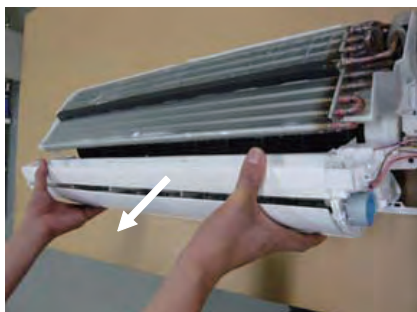
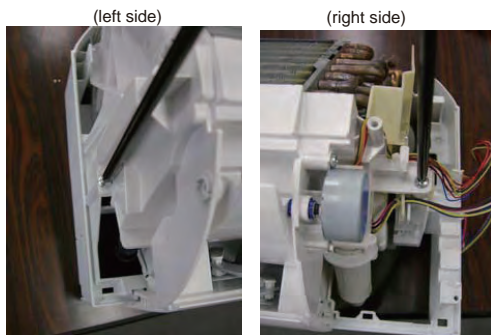




15)Unhook the 2 hooks and remove the filter guide C.

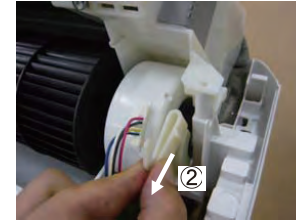
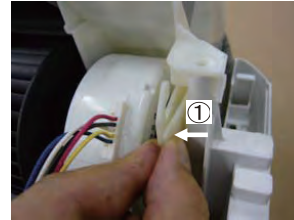


16)Unscrew the 2 screws and remove the drain pan assembly.

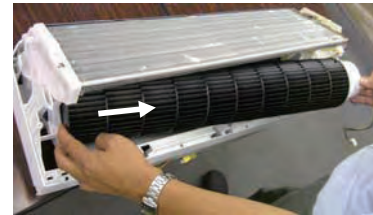


17)Unhook of the motor cover.

Support the motor with your hand when unhooking the motor cover.

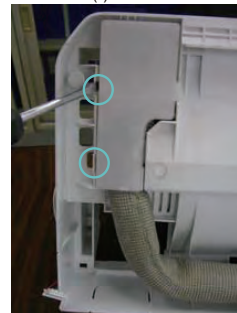


18)Slide the Cross-flow fan motor to the right and remove it.



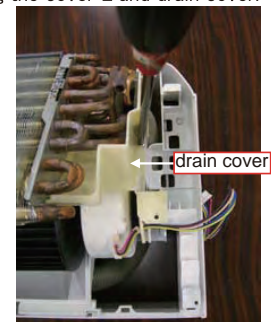
19)Remove the pipe holder.

• Insert the (-) screwdriver in the 2 holes to unhook the pipe holder.

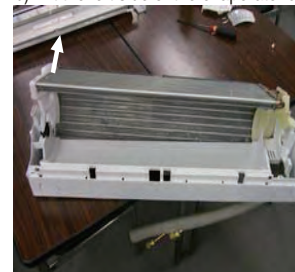


20)Remove the cycle assembly

a) Remove the 2 screws fixing the cover L and drain cover.



b) Lift the left side of the evaporator and pull out the pipe from the cabinet.



## [2] THE WIRE GUARD AND THE PLASM-CLUSTER UNIT

- 1) Remove the 2 screws fixing the guard holder L and guard holder R.

(left side)



(right side)



- 2) Pull the left side of wire guard forward, and the hook of the guard holder L will be unhooked.



- 3) Rotate the guard holder L in clockwise and remove.



- 4) Slide the wire guard L to the left and remove.



- 5) Pull the right side of the wire guard R, and unhook the guard holder R.

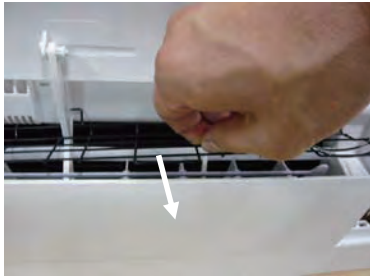


- 6) Rotate the guard holder R in anticlockwise and remove.



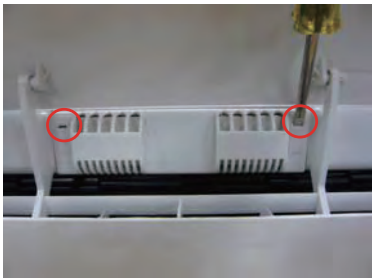
## 12PRN

7) Slide the wire guard R to the right and remove.

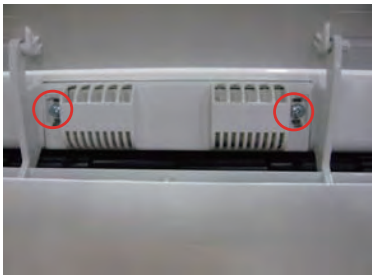


8) Remove the 2 screw covers.

·Insert the (–) screwdriver in the 2 holes.



9) Unscrew the 2 screws.

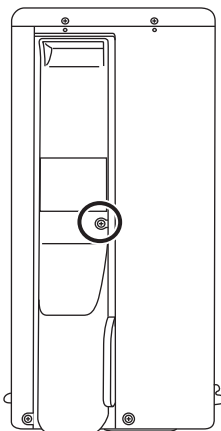


10) Disconnect the connector, and remove the plasmacluster unit.

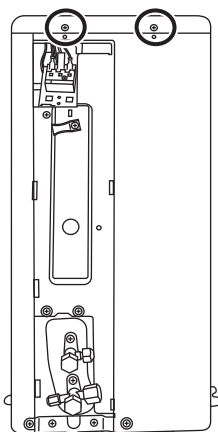


### [3] OUTDOOR UNIT

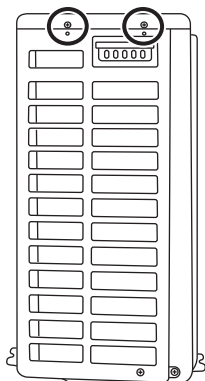
1) Unscrew the screw and remove the control box cover.



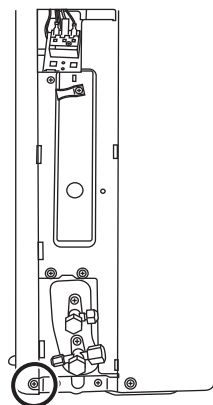
2) Unscrew the 2 screws on the right side of the top plate.



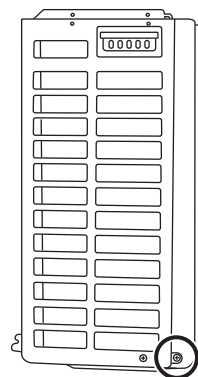
3) Unscrew the 2 screws on the left side of the top plate, and remove the top plate.



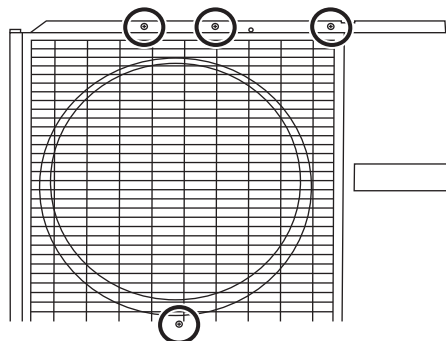
4) Unscrew the screw on the right side of the front panel.



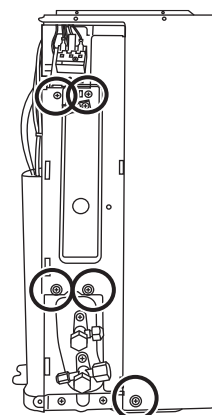
5) Unscrew the screw on the left side of the front panel.



6) Unscrew the 4 screws on the front panel, and remove front panel.



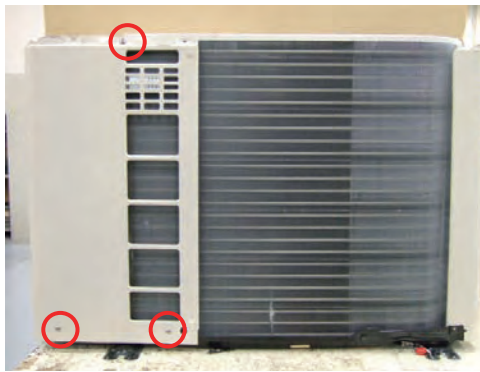
7) Unscrew the 5 screws on the side cover R.



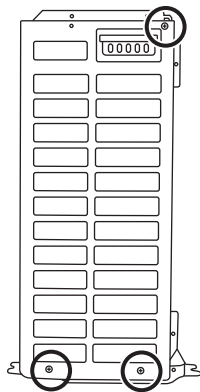


## 12PRN

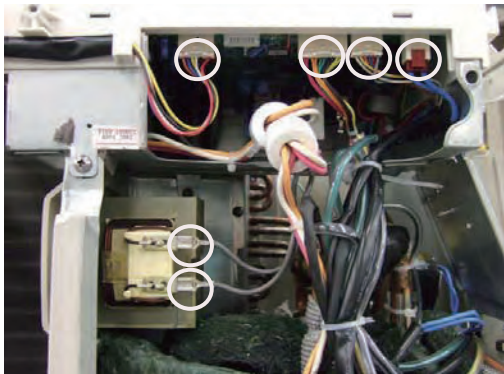
- 8) Unscrew the 3 screws on the back side of the side cover R, and remove the side cover R.



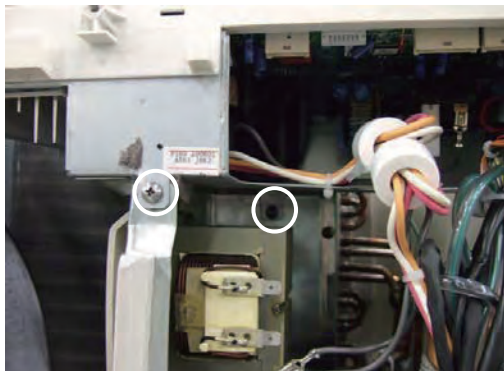
- 9) Unscrew the 3 screws on the side cover L, and remove the side cover L.



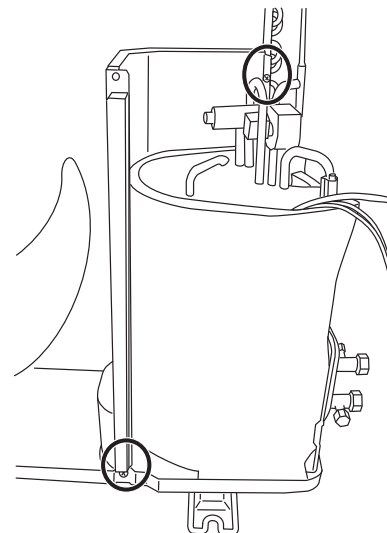
- 10) Remove the connectors and reactor in the control box.



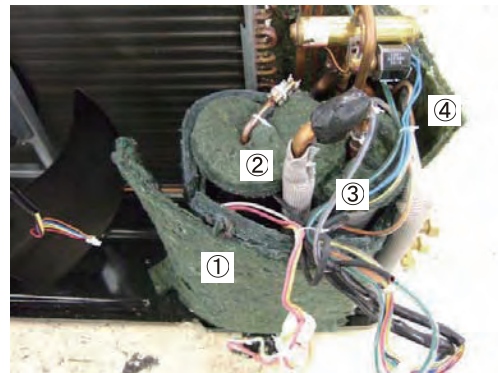
- 11) Remove the 2 screws fixed the control box.



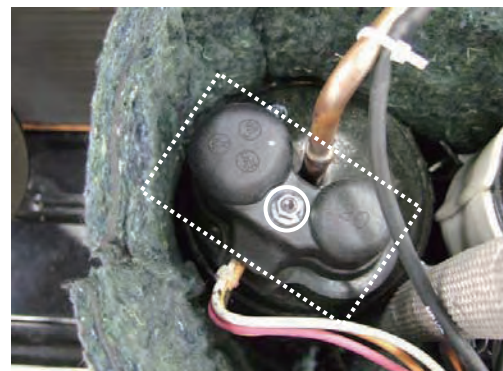
- 12) Remove the 2 screws fixed the bulkhead plate.



- 13) Remove the compressor covers 1, 2, 3 and 4.



- 14) Remove the nut, and remove the terminal cover.



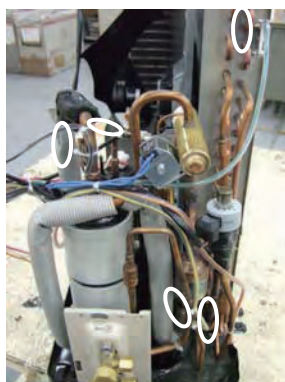
15) Remove the lead wire, the thermistor, and the cover gasket.



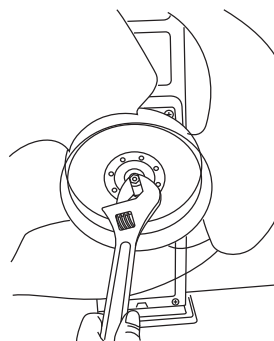
16) Remove the compressor cover.



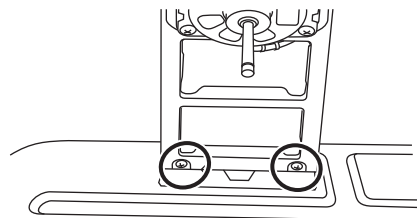
17) Remove the 5 thermistors. \*



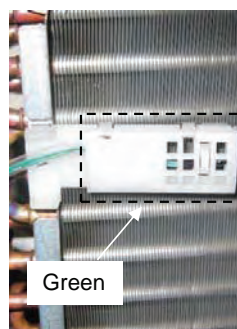
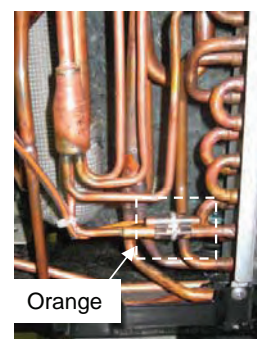
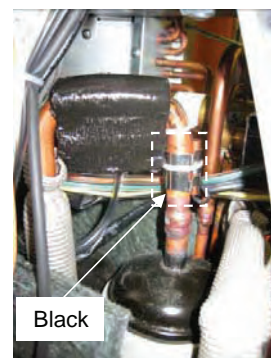
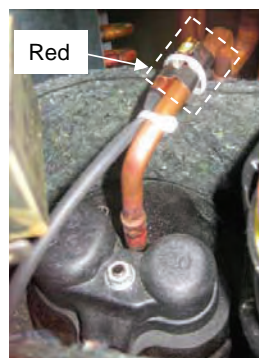
18) Remove the outdoor fan.



19) Unscrew the 2 screws and remove the motor angle.

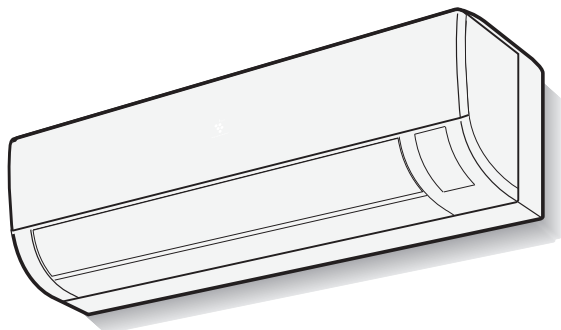


20) \*Thermistor position.





# PARTS LIST



## SPLIT TYPE AIR TO AIR HEAT PUMP

MODEL **12PR-N**  
**09PR-N**

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

### CONTENTS

- |                          |                           |
|--------------------------|---------------------------|
| [1] INDOOR UNIT PARTS    | [5] OUTDOOR UNIT PARTS    |
| [2] ACCESSORY PARTS      | [6] OTHER PARTS           |
| [3] OTHER PARTS          | [7] OUTDOOR PACKING PARTS |
| [4] INDOOR PACKING PARTS | ■ INDEX                   |

### HOW TO ORDER REPLACEMENT PARTS

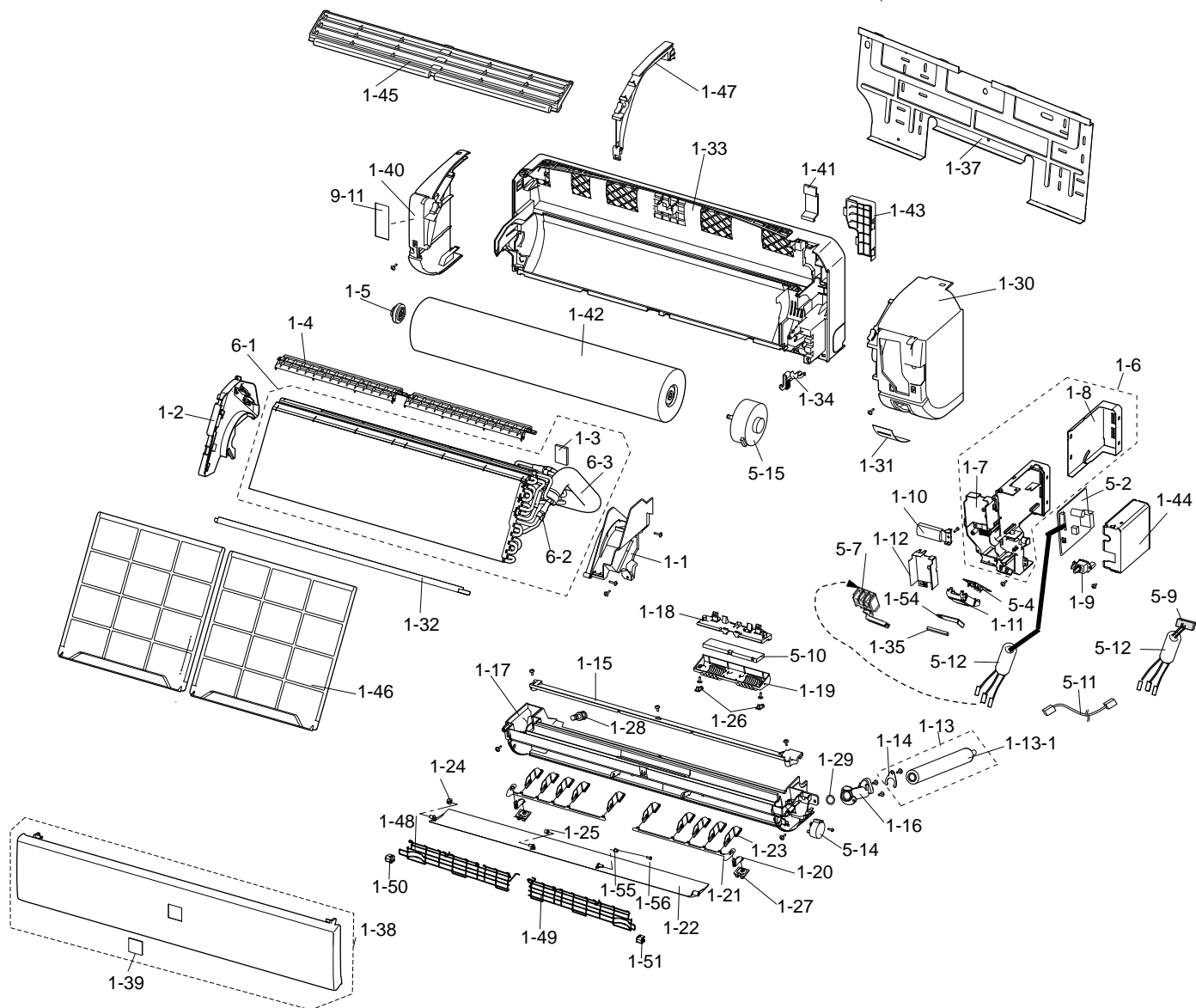
To have your order filled promptly and correctly, please furnish the following information.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.



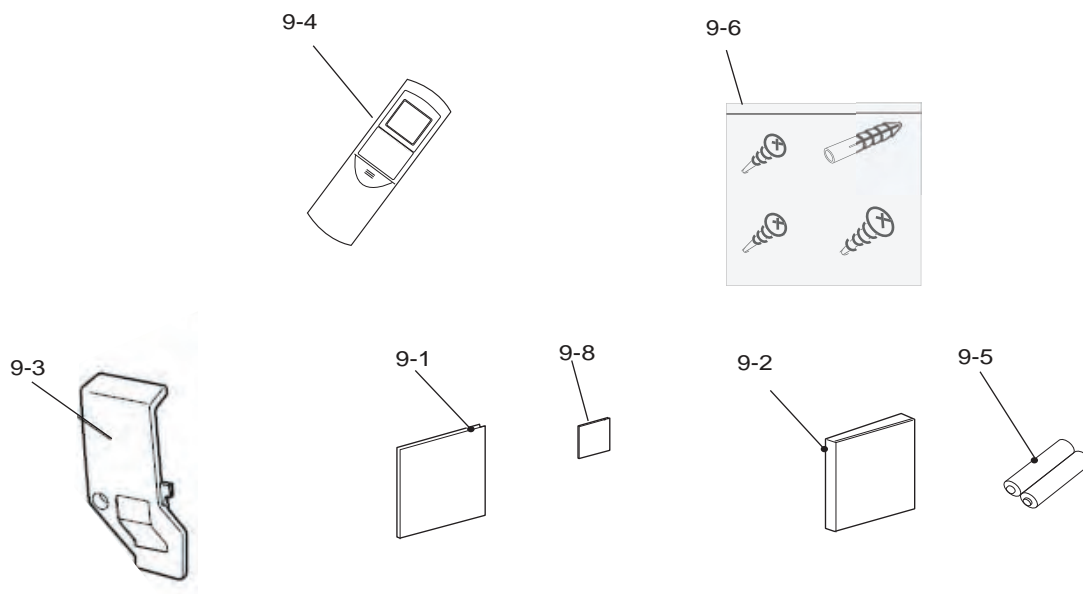
# [1] INDOOR UNIT PARTS



NO.	PARTS CODE	PRICE RANK	DESCRIPTION
<b>[1] INDOOR UNIT PARTS</b>			
1-1	DCOV-A354JBKZ	AH	Drain Cover K
1-2	DCOV-A334JBKZ	AF	Cover-L Assembly
1-3	PFPPE188JBEZ	AB	Insulator
1-4	PGID-A180JBFA	AE	Guide
1-5	CHLD-A139JBKZ	AG	Bearing Assembly
1-6	DBox-A084JBKZ	AN	Control Box Assembly
1-7	PBox-A551JBFA	AL	Control Box
1-8	PCOV-B695JBWZ	AG	Cont.Box Cover
1-9	GBTN-A012JBFA	AC	Button
1-10	LHLD-A990JBFZ	AD	Thermistor Holder
1-11	PCOV-B792JBFA	AC	Led Guide
1-12	PDAI-A248JBWZ	AH	Terminal Board
1-13	CHOS-A050JBKZ	AH	Drain Hose Assembly
1-13-1	PHOS-A062JBEZ	AK	Drain Hose
1-14	LPLT-A058JBPZ	AC	Hose Holder
1-15	DCOV-A345JBKZ	AH	Drain Cover K
1-16	DPFT-A022JBKZ	AF	Drain Joint Assembly
1-17	DSRA-A346JBKZ	BB	Drain Pan Sub Assembly
1-18	LHLD-B083JBFA	AE	Holder
1-19	LHLD-B084JBFA	AE	Cover
1-20	MARMPA070JBFA	AD	Arm
1-21	MJNTPA166JBFA	AD	Louver Link
1-22	MLOV-A553JBFA	AL	Louver

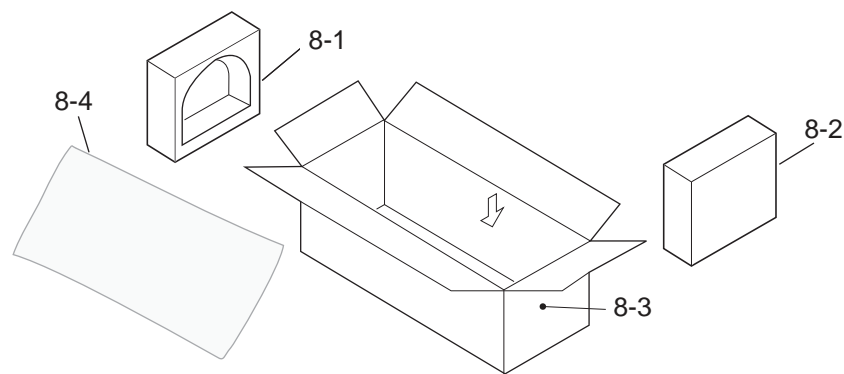
NO.	PARTS CODE	PRICE RANK		DESCRIPTION
<b>[1] INDOOR UNIT PARTS</b>				
1-23	MLOV-A554JBFA	AD		Vertical Louver
1-24	NBRG-A028JBFL	AB		Bearing
1-25	NBRG-A038JBFP	AB		Bearing C
1-26	PCOV-B727JBFA	AC		Screw Cover
1-27	PDAI-A249JBFA	AD		Louver Base
1-28	PGUMMA381JBEZ	AF		Drain Plug
1-29	PPACGA037JBEZ	AC		O Ring
1-30	GWAK-A374JBFA	AN		Front Panel R
1-31	HDECQA345JBEA	AH		Display Panel
1-32	PCOV-B738JBEZ	AF		Cover
1-33	DCHS-A724JBKZ	AY		Cabinet Assembly
1-34	PCOV-B700JBFZ	AC		Cover
1-35	PSEL-E209JBEZ	AB		Led Seal
1-37	PPLTNA128JBZZ	AN		Moun ing Angle
1-38	DPNL-A149JBKZ	AT		Panel Assembly
1-39	HBDG-A169JBEA	AG		Panel Badge
1-40	GWAK-A368JBFA	AK		Front Panel L
1-41	LHLD-A394JBFA	AD		Pipe Holder
1-42	NFANCA132JBKZ	AX		Cross Flow Fan
1-43	PCOV-B693JBFZ	AD		Pipe Holder
1-44	PCOV-B697JBWZ	AG		Box Cover
1-45	PCOV-B699JBFA	AH		Grill
1-46	PFILMA260JBEA	AK		Air Filter
1-47	PGID-A181JBFA	AE		Filter Guide C
1-48	GGAD-A073JBTA	AP		Wire Guard L
1-49	GGAD-A074JBTA	AP		Wire Guard R
1-50	LHLD-B105JBFA	AC		Guard Holder L
1-51	LHLD-B106JBFA	AC		Guard Holder R
1-54	PSHE-A321JBEZ	AD		Jyukou Cover
1-55	NBRG-A052JBFA	AC		Bearing
1-56	LX-BZA449JBEZ			Special Screw
5-2	DSGY-E345JBKZ	AF		Service PWB-K-2LRN
5-2	DSGY-E346JBKZ	AF		Service PWB-K-9LRN
5-4	FSGY-A893JBKZ	AS		Display Board Unit
5-7	QTANZA054JBZZ	AT		Terminal Board 3P
5-9	RH-HXA136JBZZ	AM		Thermistor
5-10	CKITTA133AKKZ	AM		Plasmacluster Unit
5-11	QW-VZG333JBZZ	AE		Lead Wire
5-12	RCORFA007JBZZ	AG		Ferrite Core
5-14	RMOT-A201JBZZ	AM		Louver Motor
5-15	CMOT-A532JBKZ	AK		Fan Motor Sub Assembly
6-1	CCYC-C673JBKZ	AU		Cycle Assembly
6-2	CPIPCB494JBKZ	AX		Tube Assembly
6-3	PFPFPE268JBEZ	AG		Pipe Dan-S
9-11	TLAB-E916JBRZ	AB		Error Code Label

## [2] ACCESSORY PARTS



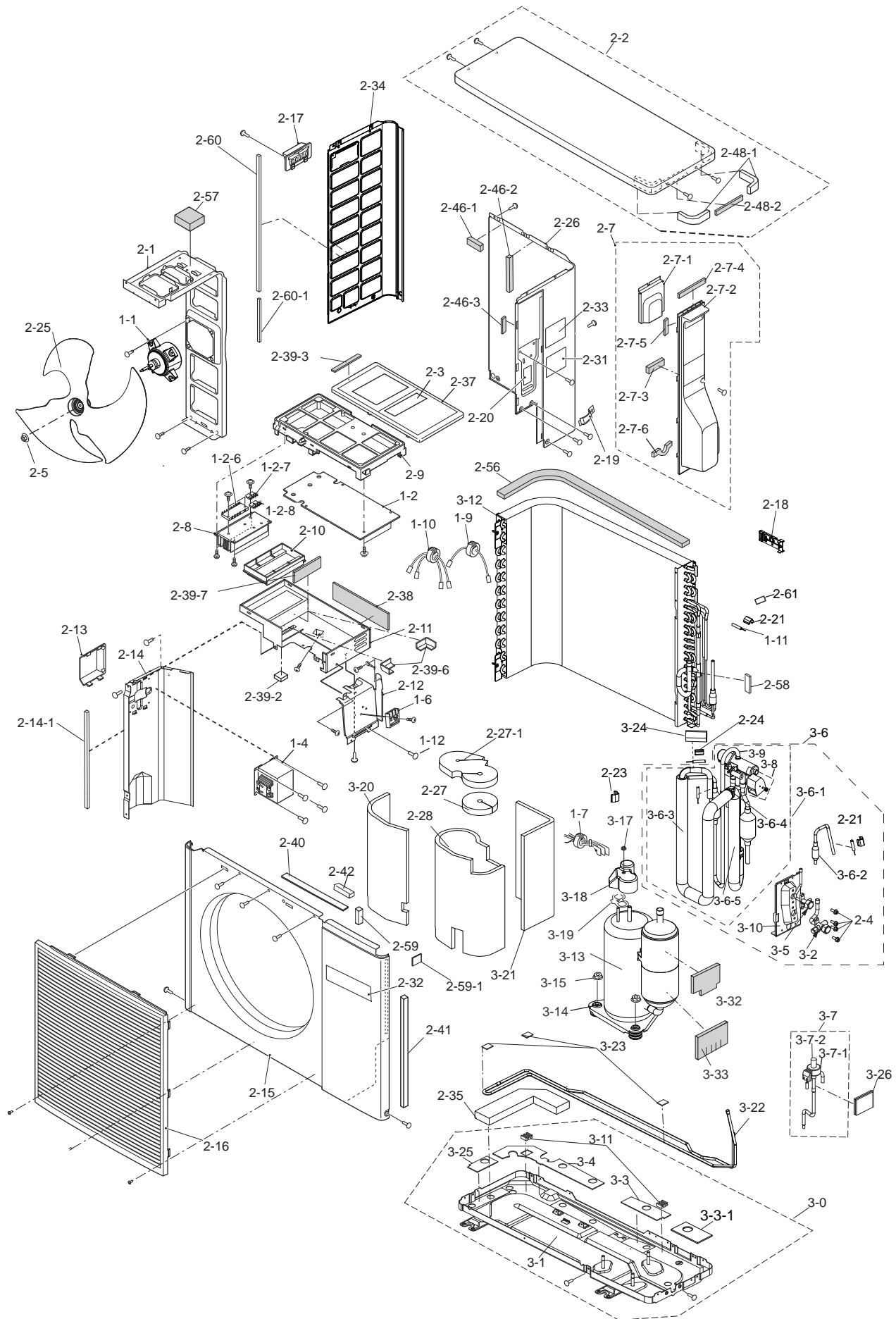
NO.	PARTS CODE	PRICE RANK		DESCRIPTION
<b>[2] ACCESSORY PARTS</b>				
9-1	TINS-B475JBRZ	AC		Installation Manual
9-2	TINSE817JBRZ	AD		Operation Manual
9-3	DHLD-A051JBKZ	AF		Cord Holder A'Ssy
9-4	CRMC-A673JBEZ	BA		Remote Control
9-5	UBATUA027JBE0	AE		Battery Pack
9-6	FFZK-A265JBKZ	AK		Screws Kit
9-8	PGUMSA420JBEZ	AC		Cable Sheet
<b>[3] OTHER PARTS</b>				
5-8	QW-VZG335JBZZ	AE		Lead Wire
6-2-1	PSEN-A071JBKZ	AH		Flare Nut Assembly (3/8)
6-2-2	PSEN-A070JBKZ	AL		Flare Nut Assembly(1/4)
6-2-3	QFS-GA078JBZZ	AD		Fuse(Fu1) (On PWB)
6-2-4	VHVTNR9V511-A+	AD		Varistor(Nr1) (On PWB)
6-2-5	QW-VZG320JBZZ	AH		Lead Wire (On Display Board Unit)
9-7	TLABCC768JBRZ	AC		Wiring Diagram
9-13	TLAB-F858JBEZ	AC		Eu-Energy Label (12PRN)
9-13	TLAB-F856JBEZ	AC		Eu-Energy Label (09PRN)
9-14	TSPC-J060JBRZ			Name Label (12PRN)
9-14	TSPC-J058JBRZ			Name Label (09PRN)

[4] INDOOR PACKING PARTS



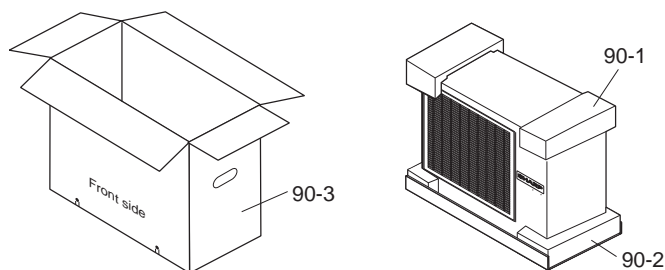
NO.	PARTS CODE	PRICE RANK		DESCRIPTION
[4] INDOOR PACKING PARTS				
8-1	SPADBA515JBEZ	AG		Pad L
8-2	CPADBA163JBKZ	AG		Pad R-K
8-3	SPAKCE463JBEZ	AP		Packing Case (12PRN)
8-3	SPAKCE450JBEZ	AP		Packing Case (09PRN)
8-4	SSAKAA168JBEZ	AE		Bag

## [5] OUTDOOR UNIT PARTS



NO.	PARTS CODE	PRICE RANK		DESCRIPTION
<b>[5] OUTDOOR UNIT PARTS</b>				
1-1	CMOTLB427JBEZ	BP		Fan Moter
1-2	DSGY-E347JBKZ	BY		Service PWB-K-AEX2LRN
1-2	DSGY-E348JBKZ	BY		Service PWB-K-AEX9LRN
1-2-6	RH-IXB019JBZZ	BC		lpm
1-2-7	VHDD25XB60+-F	AH		Diode Bridge
1-2-8	VHDD15XB60H-F	AG		Diode Bridge
1-4	RCILZA031JBZZ	BF		Reactor
1-6	QTANZA074JBZZ	AS		Terminal Board
1-7	FW-VZA056JBKZ	AR		Lead Wire
1-9	RFIL-A132JBEZ			Ferrite Core
1-10	RNF--A001VBE0	AF		Ferrite Core
1-11	RH-HXA154JBZZ	AA		Thermistor
1-12	LX-BZA075JBE0	AA		Special Screw
2-1	LANGKA263JBPZ	AQ		Motor Angle
2-2	CCAB-A542JBKZ	AV		Top Plate Assembly
2-3	TLABCC769JBRZ	AC		Wiring Diagram
2-4	LX-BZA355JBEZ	AE		Special Screw
2-5	LX-NZA412JBEZ			Special Nut
2-7	CFTA-A268JBKZ	AN		Cover
2-7-1	PCOV-A594JBPZ	AE		Terminal Cover
2-7-2	PFTA-A090JBFA	AL		Cover
2-7-3	PSEL-C025JBEZ	AE		Sealnet Seal
2-7-4	PSEL-C225JBEZ	AB		Seal
2-7-5	PSEL-C116JBEZ	AC		Condenser Seal
2-7-6	PSEL-C157JBEZ	AF		Seal
2-8	PRDAFA219JBEZ	AS		Heat Sink
2-9	LHLD-A684JBFA	AN		Holder
2-10	LHLD-A685JBFA	AF		Holder
2-11	DBOX-A077JBWZ	AT		Control Box Assembly
2-12	PDAL-A239JBWZ	AF		Terminal Holder
2-13	PCOV-A595JBFZ	AE		Cover
2-14	PSKR-A284JBPZ	AT		Bulkhead
2-14-1	PSEL-E215JBEZ	AC		Seal C
2-15	GCAB-A376JBTA	BB		Front Panel
2-16	GGADPA021JBFA			Fan Gaurd
2-17	JHNDPA015JBFA	AD		Handle
2-18	LHLD-A874JBFZ	AD		Thermistor Holder
2-19	LHLD-0079SRFZ	AC		Cord Clamp
2-20	LHLD-A699JBFA	AF		Holder Base
2-21	MSPR-A195JBEZ	AF		Thermistor Spring
2-23	MSPR-A212JBEZ	AB		Thermistor Spring
2-24	MSPR-A208JBEZ	AB		Spring
2-25	NFANPA145JBEZ	AR		Propeller Fan
2-26	PPLT-A663JBTA	AL		Side Cover R
2-27	PSPF-B204JBEZ	AC		Comp Cover Top A
2-27-1	PSPF-B205JBEZ	AE		Comp Cover Top B
2-28	PSPF-B203JBEZ	AR		Compressor Cover
2-31	TLAB-D433JBRZ			Sub Label
2-32	TLABBA286JBRA	AK		lvt Label
2-33	TSPC-J059JBRZ			Name Label[09PRN]
2-33	TSPC-J061JBRZ			Name Label[12PRN]
2-34	PPLT-A606JBTA	AR		Side Cover L
2-35	PSEL-E206JBEZ	AF		Seal
2-37	PCOV-A997JBWZ	AM		Cover
2-38	PSEL-C685JBEZ	AC		Seal
2-39-2	PSEL-C769JBEZ	AB		Seal
2-39-3	PSEL-C684JBEZ	AB		Seal
2-39-6	PSEL-C345JBEZ	AL		Seal
2-39-7	PSEL-C767JBEZ	AB		Seal
2-40	PSEL-C029JBEZ	AC		Seal A
2-41	PSEL-C222JBEZ	AB		Seal B
2-42	PSEL-C270JBEZ	AC		Seal
2-46-1	PSEL-C341JBEZ	AB		Seal Side-R
2-46-2	PSEL-E213JBEZ	AB		Seal Side-R
2-46-3	PSEL-C339JBEZ	AB		Seal Side-R
2-48-1	PSEL-C338JBEZ	AC		Seal Top
2-48-2	PSEL-C337JBEZ	AB		Seal Top
2-56	PSEL-E103JBEZ	AE		Condenser Seal
2-57	PSEL-D063JBEZ	AC		Insulator
2-58	PSEL-0194SRE0	AA		Seal
2-59	PSEL-C491JBEZ	AB		F-Panelseal
2-59-1	PSEL-E214JBEZ	AB		Seal D
2-60	PSEL-E211JBEZ	AB		Seal Side-L A
2-60-1	PSEL-E212JBEZ	AB		Seal Side-L B
2-61	PSEL-E531JBEZ	AB		Thermistor seal
3-0	CCHS-B127JBKZ	BD		Base Pan Assembly
3-1	CCHS-A931JBTA	BB		Base Pan Assembly
3-2	DVLV-B144JBKZ			3Way Valve Unit
3-3	PFPFPE118JBEZ	AB		Base Pan Insu. A
3-3-1	PFPFPE273JBEZ	AB		Heat Tube Insulator
3-4	PFPFPE119JBEZ	AE		Base Pan Insu. B
3-5	DVLV-A757JBKZ	AR		2Way Valve Unit
3-6	CVLV-B110JBKZ	BR		Reverse Valve Assembly
3-6-1	DVLV-B135JBKZ	BH		Reverse Valve Assembly
3-6-2	PSRN-A091JBEZ	AG		Strainer
3-6-3	PFPFPE271JBEZ	AT		Insulator

NO.	PARTS CODE	PRICE RANK		DESCRIPTION
<b>[5] OUTDOOR UNIT PARTS</b>				
3-6-4	LBND-A014JBE0	AA		Wire Fixing Band
3-6-5	PFPPE275JBEZ	AE		Insulator
3-7	DVLV-B136JBKZ	BC		Control Valve Assembly
3-7-1	RMOTSA043JBZZ			Coil
3-7-2	PVLVRA042JBEZ	BD		Control Valve
3-8	CCIL-A142JBKZ	AT		Coil Assembly
3-9	PVLVXA085JBEZ	BB		Reverse Valve
3-10	PDAI-A123JBTA	AL		Flare Coupling Base
3-11	PGUM-A203JBEZ	AD		Tube Holder Rubber
3-12	DCON-A608JBKZ	BX		Condenser Assembly
3-13	PCMPRA487JBEZ	CH		Compressor
3-14	GLEG-A149JBEZ	AD		Compressor Cushion
3-15	LX-NZA313JBEZ	AE		Special Nut
3-17	LX-NZA002JBE0	AA		Special Nut
3-18	PCOV-A010JBE0	AF		Terminal Cover
3-19	PSEL-A403JBE0	AB		Cover Gasket
3-20	PSPF-B206JBEZ	AN		Comp Cover Front
3-21	PSPF-B212JBEZ	AM		Comp Cover Rear
3-22	CPIPCB497JBKZ	AS		Heat Tube Assembly
3-23	PGUMSA415JBEZ	AB		Damper Rubber
3-24	PGUMS0170JBE0	AE		Damper Rubber
3-25	PFPPE148JBEZ	AC		Base Pan Insu. C
3-26	PGUMSA386JBEZ	AE		Damper Rubber
3-32	PFPPE276JBEZ	AD		Insula
3-33	PFPPE277JBEZ	AE		Insulator
<b>[6] OTHER PARTS</b>				
1-2-1	QFS-CA001JBZZ	AK		Fuse 20A 250V
1-2-2	QFS-GA077JBZZ	AD		Fuse 2A 250V
1-2-3	QFS-GA078JBZZ	AD		Fuse 3.15A 250V
1-2-4	QFS-CA002JBZZ	AH		Fuse 15A 250V

**[7] OUTDOOR PACKING PARTS**

NO.	PARTS CODE	PRICE RANK		DESCRIPTION
<b>[7] OUTDOOR PACKING PARTS</b>				
90-1	CPADBA048JBKZ	AF		Top Pad Assembly
90-2	CPADBA049JBKZ	AM		Bottom Pad Assembly
90-3	SPAKCE462JBEZ	AS		Packing Case [09PR-N]
90-3	SPAKCE464JBEZ	AS		Packing Case [12PR-N]

## ■INDEX

PARTS CODE	No.	PRICE RANK	NEW MARK	PART RANK
[ C ]				
CCAB-A542JBKZ	5-2-2	AV		
CCHS-A931JBTA	5-3-1	BB		
CCHS-B127JBKZ	5-3-0	BD		
CCIL-A142JBKZ	5-3-8	AT		
CCYC-C673JBKZ	1-6-1	BU		
CFTA-A268JBKZ	5-2-7	AN		
CHLD-A139JBKZ	1-1-5	AG		
CHOS-A050JBKZ	1-1-13	AH		
CKITTA133AKKZ	1-5-10	BM		
CMOT-A532JBKZ	1-5-15	BK		
CMOTLB427JBEZ	5-1-1	BP		
CPADBA048JBKZ	7-90-1	AF		
CPADBA049JBKZ	7-90-2	AM		
CPADBA163JBKZ	4-8-2	AG		
CPIPCB494JBKZ	1-6-2	AX		
CPIPCB497JBKZ	5-3-22	AS		
CRMC-A673JBEZ	2-9-4	BA		
CVLV-B110JBKZ	5-3-6	BR		
[ D ]				
DBOX-A077JBWZ	5-2-11	AT		
DBOX-A084JBKZ	1-1-6	AN		
DCHS-A724JBKZ	1-1-33	AY		
DCON-A608JBKZ	5-3-12	BX		
DCOV-A334JBKZ	1-1-2	AF		
DCOV-A345JBKZ	1-1-15	AH		
DCOV-A354JBKZ	1-1-1	AH		
DHLD-A051JBKZ	2-9-3	AF		
DPFT-A022JBKZ	1-1-16	AF		
DPNL-A149JBKZ	1-1-38	AT	N	
DSGY-E345JBKZ	1-5-2	BF		
DSGY-E346JBKZ	1-5-2	BF		
DSGY-E347JBKZ	5-1-2	BY		
DSGY-E348JBKZ	5-1-2	BY		
DSRA-A346JBKZ	1-1-17	BB		
DVLV-A757JBKZ	5-3-5	AR		
DVLV-B135JBKZ	5-3-6-1	BH		
DVLV-B136JBKZ	5-3-7	BC		
DVLV-B144JBKZ	5-3-2			
[ F ]				
FFZK-A265JBKZ	2-9-6	AK		
FSGY-A893JBKZ	1-5-4	AS		
FW-VZA056JBKZ	5-1-7	AR		
[ G ]				
GBTN-A012JBFA	1-1-9	AC		
GCAB-A376JBTA	5-2-15	BB		
GGAD-A073JBTA	1-1-48	AP		
GGAD-A074JBTA	1-1-49	AP		
GGADPA021JBFA	5-2-16			
GLEG-A149JBEZ	5-3-14	AD		
GWAK-A368JBFA	1-1-40	AK		
GWAK-A374JBFA	1-1-30	AN		
[ H ]				
HBDG-A169JBEA	1-1-39	AG		
HDECQA345JBEA	1-1-31	AH		
[ J ]				
JHNDPA015JBFA	5-2-17	AD		
[ L ]				
LANGKA263JBPZ	5-2-1	AQ		
LBND-A014JBE0	5-3-6-4	AA		
LHLD-0079SRFZ	5-2-19	AC		
LHLD-A394JBFA	1-1-41	AD		
LHLD-A684JBFA	5-2-9	AN		
LHLD-A685JBFA	5-2-10	AF		
LHLD-A699JBFA	5-2-20	AF		
LHLD-A874JBFZ	5-2-18	AD		
LHLD-A990JBFZ	1-1-10	AD		
LHLD-B083JBFA	1-1-18	AE		
LHLD-B084JBFA	1-1-19	AE		
LHLD-B105JBFA	1-1-50	AC		
LHLD-B106JBFA	1-1-51	AC		
LPLT-A058JBPZ	1-1-14	AC		
LX-BZA075JBE0	5-1-12	AA		
LX-BZA355JBEZ	5-2-4	AE		
LX-BZA449JBEZ	1-1-56			
LX-NZA313JBEZ	5-3-15	AE		
LX-NZA412JBEZ	5-2-5			
[ M ]				
MARMPA070JBFA	1-1-20	AD		

PARTS CODE	No.	PRICE RANK	NEW MARK	PART RANK
MJNTPA166JBFA	1-1-21	AD		
MLOV-A553JBFA	1-1-22	AL		
MLOV-A554JBFA	1-1-23	AD		
MSPR-A208JBEZ	5-2-24	AB		
MSPR-A212JBEZ	5-2-23	AB		
MSPR-A195JBEZ	5-2-21	AF		
[ N ]				
NBRG-A028JBFL	1-1-24	AB		
NBRG-A038JBFP	1-1-25	AB		
NBRG-A052JBFA	1-1-55	AC		
NFANCA132JBKZ	1-1-42	AX		
NFANPA145JBEZ	5-2-25	AR		
[ P ]				
PBOX-A551JBFA	1-1-7	AL		
PCMPRA487JBEZ	5-3-13	CH		
PCOV-A010JBE0	5-3-18	AF		
PCOV-A594JBPZ	5-2-7-1	AE		
PCOV-A595JBFZ	5-2-13	AE		
PCOV-A997JBWZ	5-2-37	AM		
PCOV-B693JBFZ	1-1-43	AD		
PCOV-B695JBWZ	1-1-8	AG		
PCOV-B697JBWZ	1-1-44	AG		
PCOV-B699JBFA	1-1-45	AH		
PCOV-B700JBFZ	1-1-34	AC		
PCOV-B727JBFA	1-1-26	AC		
PCOV-B738JBEZ	1-1-32	AF		
PCOV-B792JBFA	1-1-11	AC		
PDAl-A123JBTA	5-3-10	AL		
PDAl-A239JBWZ	5-2-12	AF		
PDAl-A248JBWZ	1-1-12	AH		
PDAl-A249JBFA	1-1-27	AD		
PFILMA260JBEA	1-1-46	AK		
PFPFPE118JBEZ	5-3-3	AB		
PFPFPE119JBEZ	5-3-4	AE		
PFPFPE148JBEZ	5-3-25	AC		
PFPFPE188JBEZ	1-1-3	AB		
PFPFPE268JBEZ	1-6-3	AG		
PFPFPE271JBEZ	5-3-6-3	AT		
PFPFPE273JBEZ	5-3-3-1	AB		
PFPFPE275JBEZ	5-3-6-5	AE		
PFPFPE276JBEZ	5-3-32	AD		
PFPFPE277JBEZ	5-3-33	AE		
PFTA-A090JBFA	5-2-7-2	AL		
PGID-A180JBFA	1-1-4	AE		
PGID-A181JBFA	1-1-47	AE		
PGUM-A203JBEZ	5-3-11	AD		
PGUMMA381JBEZ	1-1-28	AF		
PGUMS0170JBE0	5-3-24	AE		
PGUMSA386JBEZ	5-3-26	AE		
PGUMSA415JBEZ	5-3-23	AB		
PGUMSA420JBEZ	2-9-8	AC		
PHOS-A062JBEZ	1-1-13-1	AK		
PPACGA037JBEZ	1-1-29	AC		
PPLT-A606JBTA	5-2-34	AR		
PPLT-A663JBTA	5-2-26	AL		
PPLTNA128JBZZ	1-1-37	AN		
PRDAFA219JBEZ	5-2-8	AS		
PSEL-0194SRE0	5-2-58	AA		
PSEL-A403JBE0	5-3-19	AB		
PSEL-C025JBEZ	5-2-7-3	AE		
PSEL-C029JBEZ	5-2-40	AC		
PSEL-C116JBEZ	5-2-7-5	AC		
PSEL-C157JBEZ	5-2-7-6	AF		
PSEL-C222JBEZ	5-2-41	AB		
PSEL-C225JBEZ	5-2-7-4	AB		
PSEL-C270JBEZ	5-2-42	AC		
PSEL-C337JBEZ	5-2-48-2	AB		
PSEL-C338JBEZ	5-2-48-1	AC		
PSEL-C339JBEZ	5-2-46-3	AB		
PSEL-C341JBEZ	5-2-46-1	AB		
PSEL-C345JBEZ	5-2-39-6	AL		
PSEL-C491JBEZ	5-2-59	AB		
PSEL-C684JBEZ	5-2-39-3	AB		
PSEL-C685JBEZ	5-2-38	AC		
PSEL-C767JBEZ	5-2-39-7	AB		
PSEL-C769JBEZ	5-2-39-2	AB		
PSEL-D063JBEZ	5-2-57	AC		
PSEL-E103JBEZ	5-2-56	AE		
PSEL-E206JBEZ	5-2-35	AF		
PSEL-E209JBEZ	1-1-35	AB		
PSEL-E531JBEZ	5-2-61	AB		



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PSEL-E211JBEZ	5-2-60	AB		
PSEL-E212JBEZ	5-2-60-1	AB		
PSEL-E213JBEZ	5-2-46-2	AB		
PSEL-E214JBEZ	5-2-59-1	AB		
PSEL-E215JBEZ	5-2-14-1	AC		
PSEN-A070JBKZ	3-6-2-2	AL		
PSEN-A071JBKZ	3-6-2-1	AH		
PSHE-A321JBEZ	1-1-54	AD		
PSKR-A284JBPZ	5-2-14	AT		
PSPF-B203JBEZ	5-2-28	AR		
PSPF-B204JBEZ	5-2-27	AC		
PSPF-B205JBEZ	5-2-27-1	AE		
PSPF-B206JBEZ	5-3-20	AN		
PSPF-B212JBEZ	5-3-21	AM		
PSRN-A091JBEZ	5-3-6-2	AG		
PVLVRA042JBEZ	5-3-7-2	BD		
PVLVXA085JBEZ	5-3-9	BB		
[ Q ]				
QFS-CA001JBZZ	6-1-2-1	AK		
QFS-CA002JBZZ	6-1-2-4	AH		
QFS-GA077JBZZ	6-1-2-2	AD		
QFS-GA078JBZZ	3-6-2-3	AD		
"	6-1-2-3	AD		
QTANZA054JBZZ	1-5-7	AT		
QTANZA074JBZZ	5-1-6	AS		
QW-VZG320JBZZ	3-6-2-5	AH		
QW-VZG333JBZZ	1-5-11	AE		
QW-VZG335JBZZ	3-5-8	AE		
[ R ]				
RCILZA031JBZZ	5-1-4	BF		
RCORFA007JBZZ	1-5-12	AG		
RFIL-A132JBEZ	5-1-9			
RH-HXA136JBZZ	1-5-9	AM		
RH-HXA154JBZZ	5-1-11	AA		
RH-IXB019JBZZ	5-1-2-6	BC		
RMOT-A201JBZZ	1-5-14	AM		
RMOTSA043JBZZ	5-3-7-1			
RNF--A001VBE0	5-1-10	AF		
[ S ]				
SPADBA515JBEZ	4-8-1	AG		
SPAKCE463JBEZ	4-8-3	AP	N	
SPAKCE464JBEZ	7-90-3	AS	N	
SPAKCE450JBEZ	4-8-3	AP	N	
SPAKCE462JBEZ	7-90-3	AS	N	
SSAKAA168JBEZ	4-8-4	AE		
[ T ]				
TINS-B475JBRZ	2-9-1	AC	N	
TINSE817JBRZ	2-9-2	AD	N	
TLABBA286JBRA	5-2-32	AK		
TLABCC768JBRZ	3-9-7	AC		
TLABCC769JBRZ	5-2-3	AC		
TLAB-D433JBRZ	5-2-31			
TLAB-E916JBRZ	1-9-11	AB		
TLAB-F858JBEZ	3-9-13	AC	N	
TLAB-F856JBEZ	3-9-13	AC	N	
TSPC-J058JBRZ	3-9-14		N	
TSPC-J060JBRZ	3-9-14		N	
TSPC-J059JBRZ	5-2-33		N	
TSPC-J061JBRZ	5-2-33		N	
[ U ]				
UBATUA027JBE0	2-9-5	AE		
[ V ]				
VHDD15XB60H-F	5-1-2-8	AG		
VHDD25XB60+-F	5-1-2-7	AH		
VHVTNR9V511-A+	3-6-2-4	AD		