SHARP SERVICE MANUAL

No. S2038AEX2MLRT

MULITI SPLIT TYPE ROOM AIR CONDITIONERS (OUTDOOR UNIT)

MODEL AE-X2M14LR

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

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.

SHARP CORPORATION

CHAPTER 1. SPECIFICATIONS

[1] SPECIFICATION

ITEMS			INDOOR UNIT AY-XPM7FR/9FR/12FR	OUTDOOR UNIT AE-X2M14LR
Cooling capacity	kW			
2-INDOOR OPERATION	7K & 7K		3.8(1.8 – 4.3)*	
Heating capacity	kW			
2-INDOOR OPERATION	7K & 7K		4.4 (1.9 – 5.4)*	
Moisture removal	Liters/h		1.6	

☆ Electrical data

Phase			Single	
Rated frequency	Hz		50	
Rated voltage	V		230V	
Rated current	Cool	A	4.1 (1.6 – 5.3)*	
	Heat	A	4.4 (1.7 – 5.9)*	
Rated input	Cool	W	900(350– 1160)*	
	Heat	W	950 (370 – 1300)*	
Power factor	Cool	%	95	
	Heat	%	94	
Compressor	Type		Hermetically sealed DC twin rotary	
	Model		DA130A1F-28F	
	Oil charge		Ester oil VG74	
Refrigerant system	Evaporator		Silt Fin and Grooved tube type	
	Condenser		Corrugate Fin and Grooved tube type	
	Control		Expansion valve	
	Name of refrigerant		R410A	
	Refrigerant volume		1680g	
Noise level (at cooling)		dB(A)	High/Med/Low	
			7FR: 37/34/28	45
			9FR: 39/36/28	
			12FR: 40/37/29	
Fan system				
Drive			Direct drive	
Air flow quantity (at cooling)		. m^3/min.	High/Med/Low	
			7FR: 8.0/7.4/5.4	33
			9FR: 8.6/7.9/5.6	
			12FR: 10.2/8.6/6.1	
Fan			Cross flow fan	Propeller fan

Connections

Refrigerant coupling		Flare type	
Refrigerant tube size Gas, Liquid		3/8”, 1/4”	
Maximum length (per unit)	m	25	
Maximum length (total)	m	40	
Maximum charge-less length	m	25	
Maximum height difference	m	10	
Additional Charge (per m)	g	15	
Drain joint	mm	Connected part O.D.ϕ16	

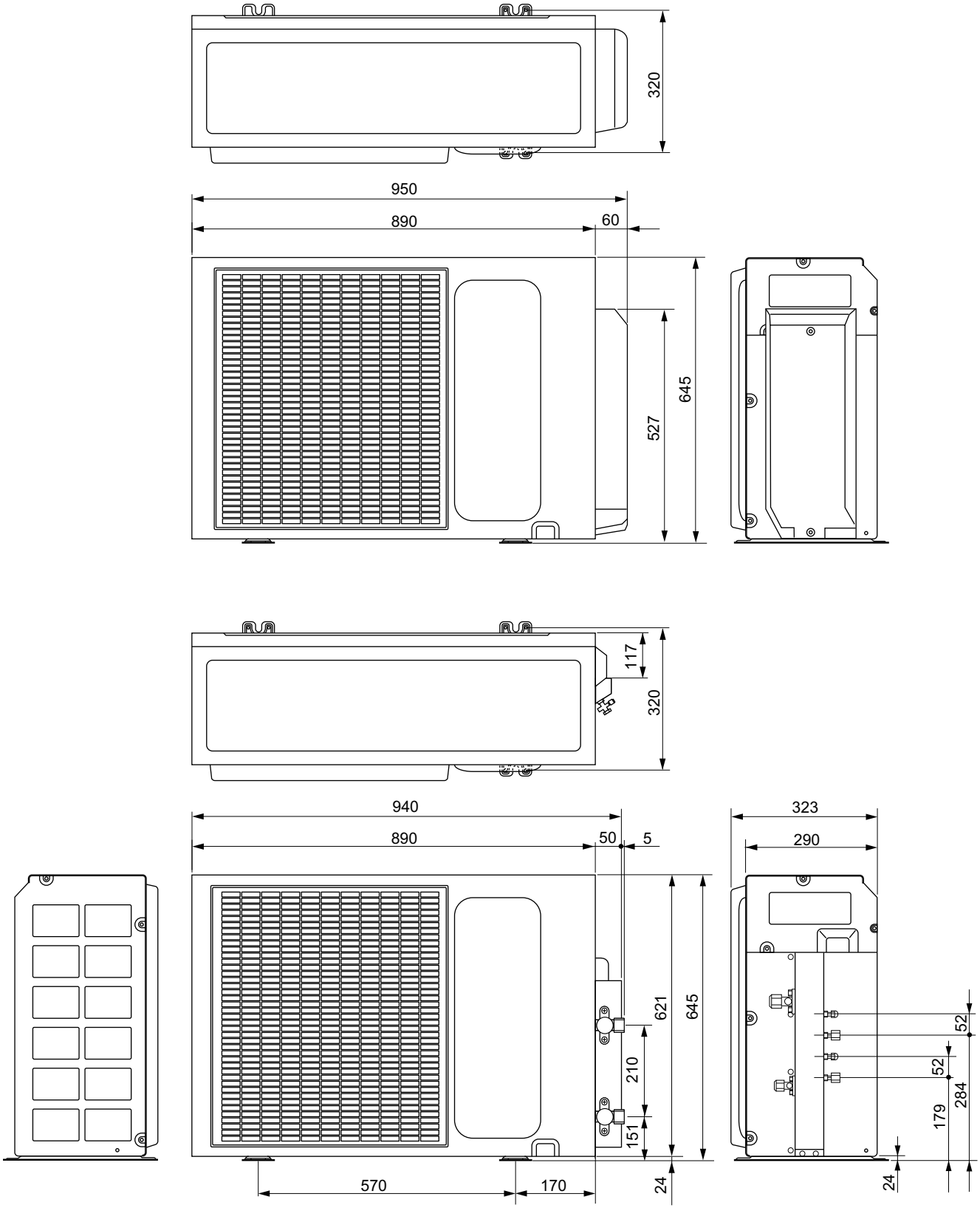
Others

Safety device	Compressor: Thermistor Fan motors: Thermal fuse (indoor unit). Thermal protector (Out door unit) Fuse, Micro computer control			
Air filters	Anti-mold polypropylene net of injection type (Washable)			
Net dimensions	Width	mm	790	950 (890+60)
	Height	mm	278	645
	Depth	mm	198	323 (290+33)
Net weight		kg	10	51

NOTE: The condition of star “☆“marked item are ‘ISO5151’:

*: Representative connection

[2] EXTERNAL DIMENSION



[3] CAPACITY TABLE

Recommended Combination		
Outdoor Units	**Indoor Units**	
	AY-XPM7/9/12FR, GS-XPM9/12, GS-XPM7/9/12FR	
AE-X2M14LR	12	7
	9	9
	9	7
	7	7

COOLING CAPACITY TABLE

Operating Status	Combination of Indoor Units		Cooling Capacity (kW)			Running Current (A)	Power Consumption (W)
	A	B	A	B	RATING (Min. - Max.)	RATING (Min. - Max.)	RATING (Min. - Max.)
2-Room	12	09	2.2	1.6	3.8 (1.8 - 4.3)	4.1 (1.6 - 5.3)	900 (350 - 1160)
	12	07	2.4	1.4	3.8 (1.8 - 4.3)	4.1 (1.6 - 5.3)	900 (350 - 1160)
	09	09	1.9	1.9	3.8 (1.8 - 4.3)	4.1 (1.6 - 5.3)	900 (350 - 1160)
	09	07	2.1	1.7	3.8 (1.8 - 4.3)	4.1 (1.6 - 5.3)	900 (350 - 1160)
	07	07	1.9	1.9	3.8 (1.8 - 4.3)	4.1 (1.6 - 5.3)	900 (350 - 1160)
1-Room	12	OFF	3.4	OFF	3.4 (1.4 - 4.0)	4.2 (1.5 - 6.0)	900 (320 - 1320)
	09	OFF	2.6	OFF	2.6 (1.4 - 3.3)	3.0 (1.5 - 4.2)	660 (320 - 920)
	07	OFF	2.0	OFF	2.0 (1.4 - 2.7)	2.3 (1.5 - 3.2)	510 (320 - 700)

HEATING CAPACITY TABLE

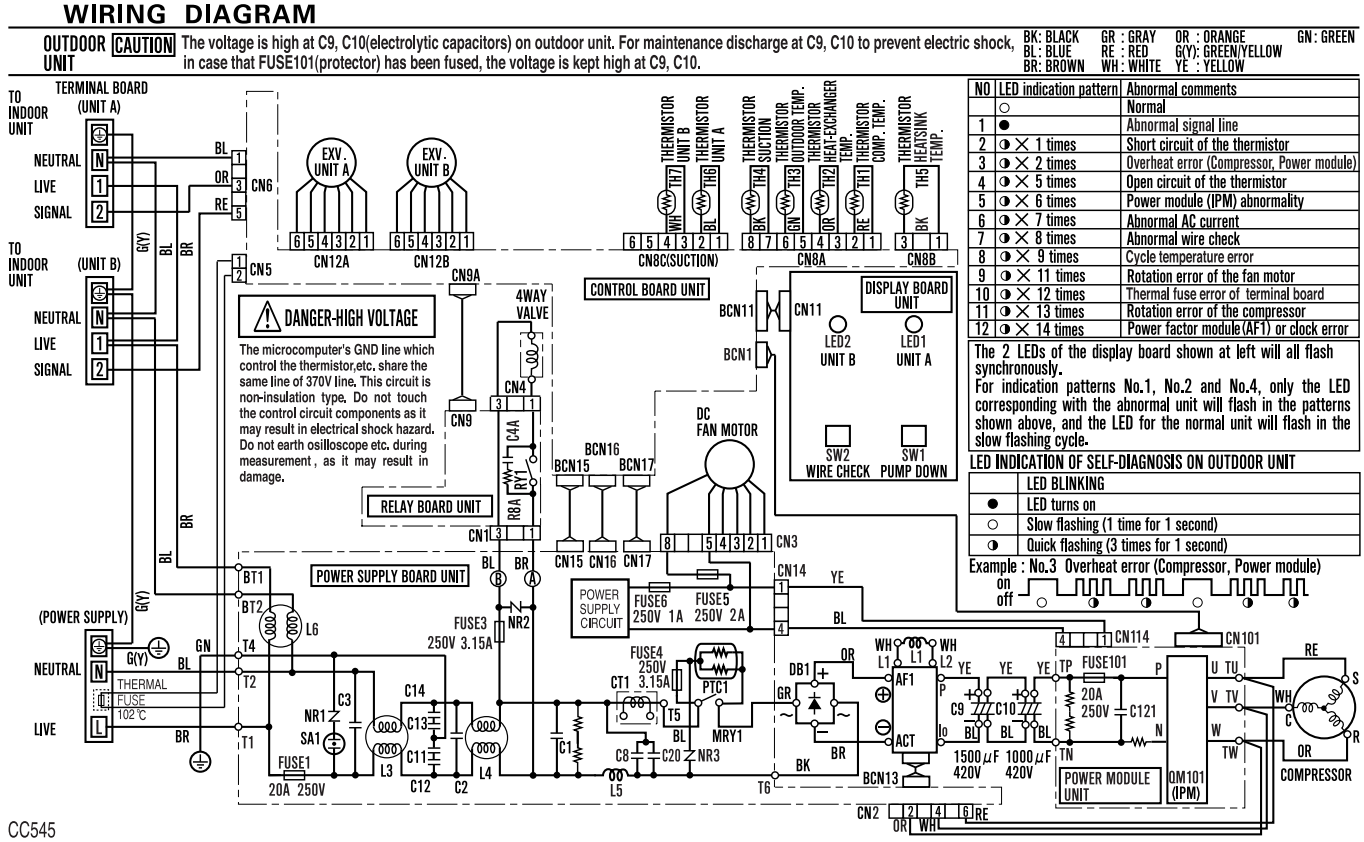
Operating Status	Combination of Indoor Units		Heating Capacity (kW)			Running Current (A)	Power Consumption (W)
	A	B	A	B	RATING (Min. - Max.)	RATING (Min. - Max.)	RATING (Min. - Max.)
2-Room	12	09	2.5	1.9	4.4 (1.9 - 5.4)	6.6 (1.7 - 5.9)	950 (370 - 1300)
	12	07	2.8	1.6	4.4 (1.9 - 5.4)	6.6 (1.7 - 5.9)	950 (370 - 1300)
	09	09	2.2	2.2	4.4 (1.9 - 5.4)	6.6 (1.7 - 5.9)	950 (370 - 1300)
	09	07	2.5	1.9	4.4 (1.9 - 5.4)	6.6 (1.7 - 5.9)	950 (370 - 1300)
	07	07	2.2	2.2	4.4 (1.9 - 5.4)	6.6 (1.7 - 5.9)	950 (370 - 1300)
1-Room	12	OFF	3.9	OFF	3.9 (1.2 - 4.6)	5.2 (1.5 - 7.2)	1140 (320 - 1570)
	09	OFF	3.0	OFF	3.0 (1.2 - 4.2)	3.8 (1.5 - 6.4)	830 (330 - 1400)
	07	OFF	2.4	OFF	2.4 (1.2 - 3.3)	3.1 (1.5 - 4.6)	680 (320 - 1010)

[4] ELECTRICAL PARTS

Compressor	DA130A1F-28F	Hermetically sealed DC twin rotary
Outdoor fan motor	MLB051	
Fuse 1, 101	—	QFS-GA065JBZZ(20A,250V)
Fuse 6	—	QFS-GA064JBZZ(1A,250V)
Fuse 3, 4	—	QFS-GA062JBZZ(3.15A,250V)
Fuse 5	—	QFS-GA063JBZZ(2A,250V)

[5] WIRING DIAGRAMS

WIRING DIAGRAM



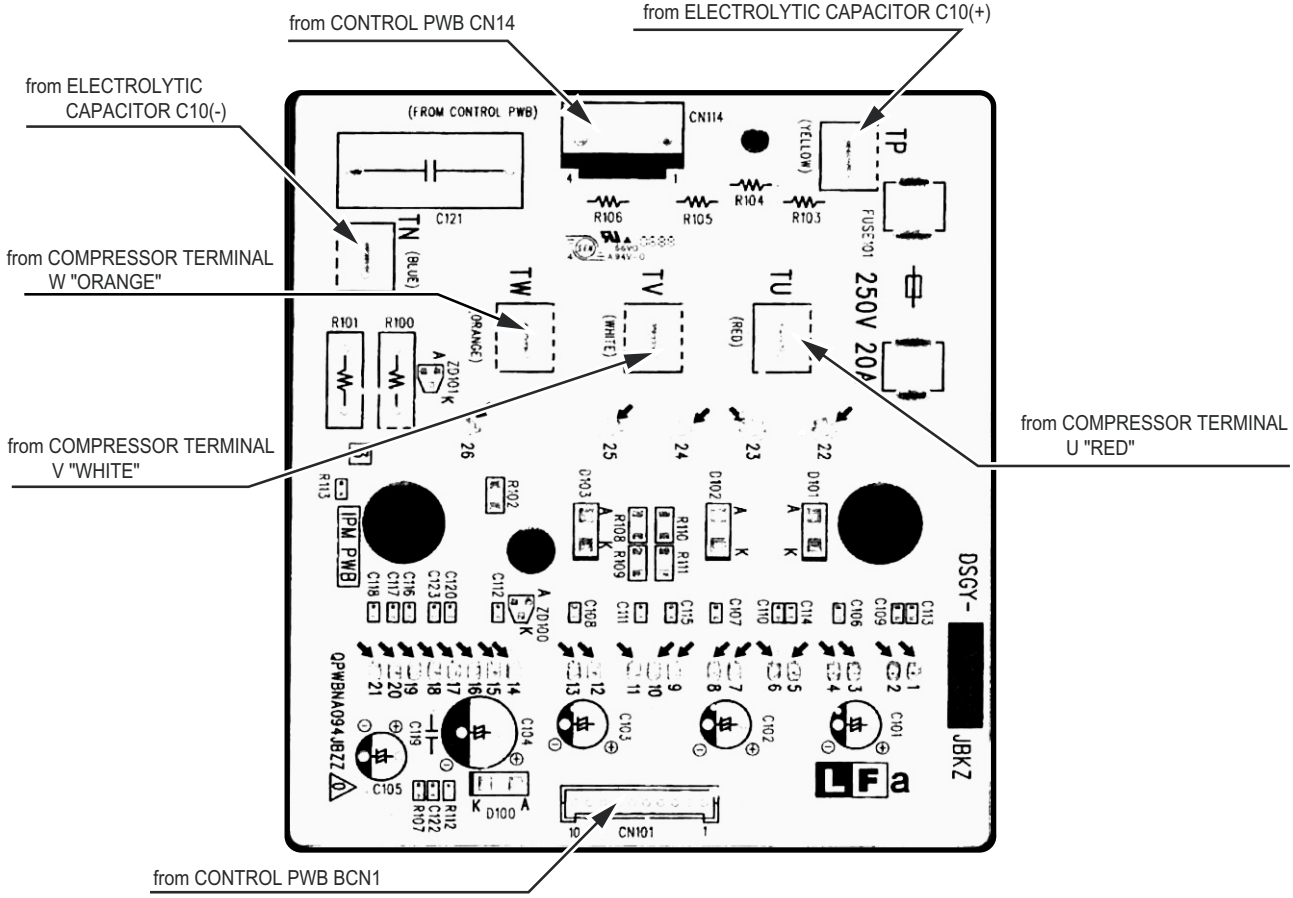
NO	LED indication pattern	Abnormal comments
	○	Normal
1	●	Abnormal signal line
2	◑ × 1 times	Short circuit of the thermistor
3	◑ × 2 times	Overheat error (Compressor, Power module)
4	◑ × 5 times	Open circuit of the thermistor
5	◑ × 6 times	Power module (IPM) abnormality
6	◑ × 7 times	Abnormal AC current
7	◑ × 8 times	Abnormal wire check
8	◑ × 9 times	Cycle temperature error
9	◑ × 11 times	Rotation error of the fan motor
10	◑ × 12 times	Thermal fuse error of terminal board
11	◑ × 13 times	Rotation error of the compressor
12	◑ × 14 times	Power factor module(AF1) or clock error

The 2 LEDs of the display board shown at left will all flash synchronously.
For indication patterns No.1, No.2 and No.4, only the LED corresponding with the abnormal unit will flash in the patterns shown above, and the LED for the normal unit will flash in the slow flashing cycle.

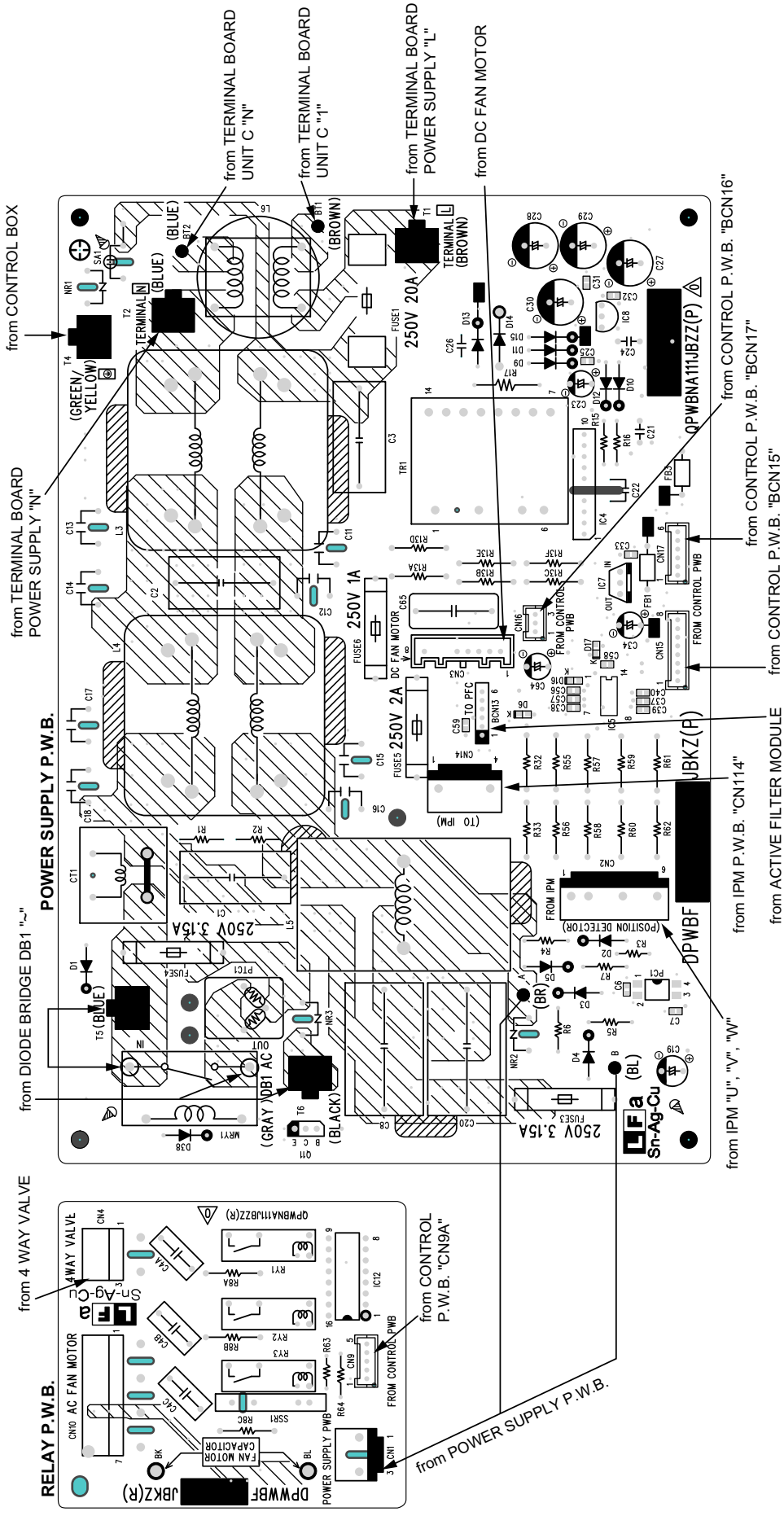
LED INDICATION OF SELF-DIAGNOSIS ON OUTDOOR UNIT

●	LED BLINKING
●	LED turns on
○	Slow flashing (1 time for 1 second)
◑	Quick flashing (3 times for 1 second)

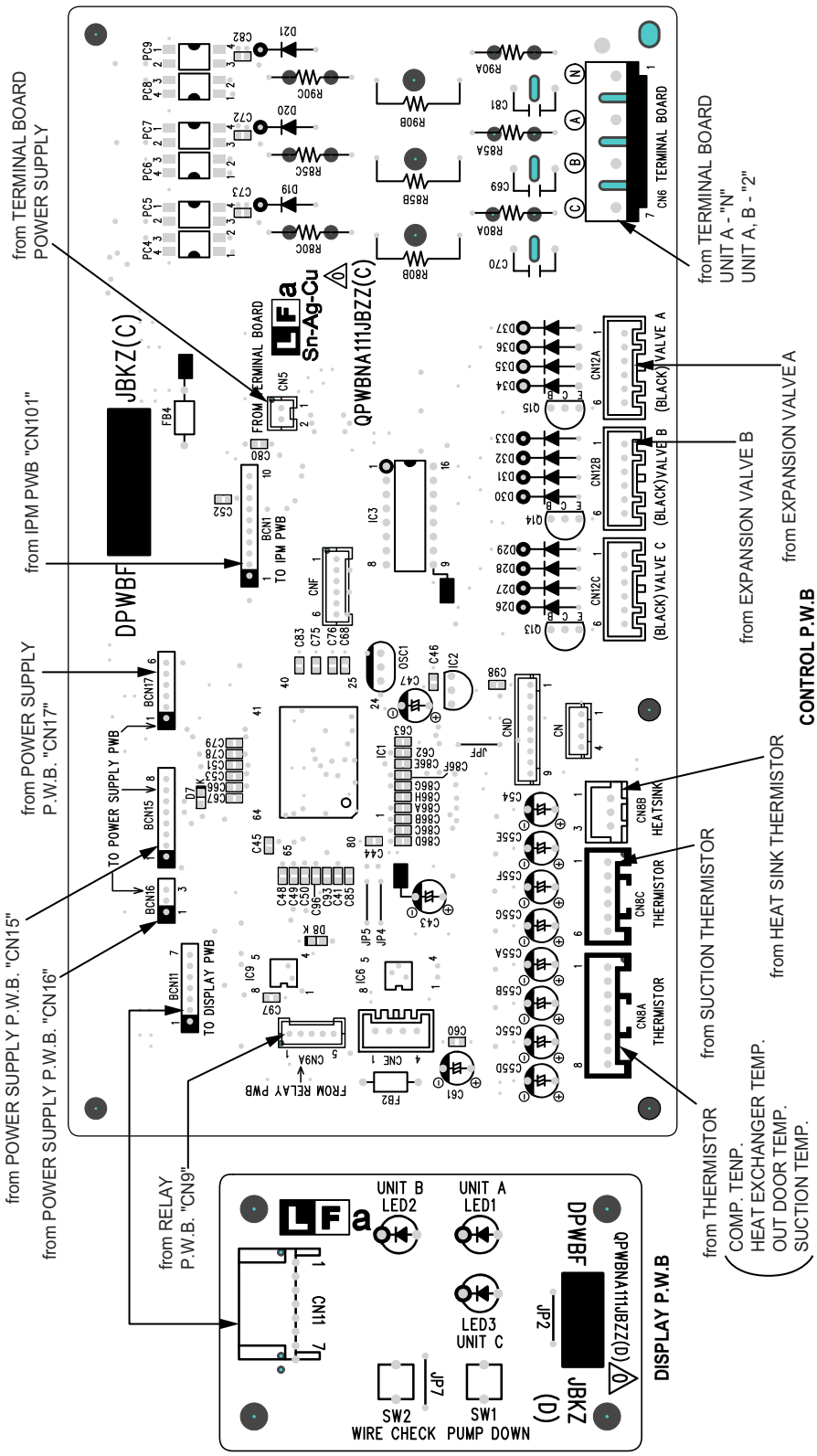
Example : No.3 Overheat error (Compressor, Power module)



IPM P.W.B.

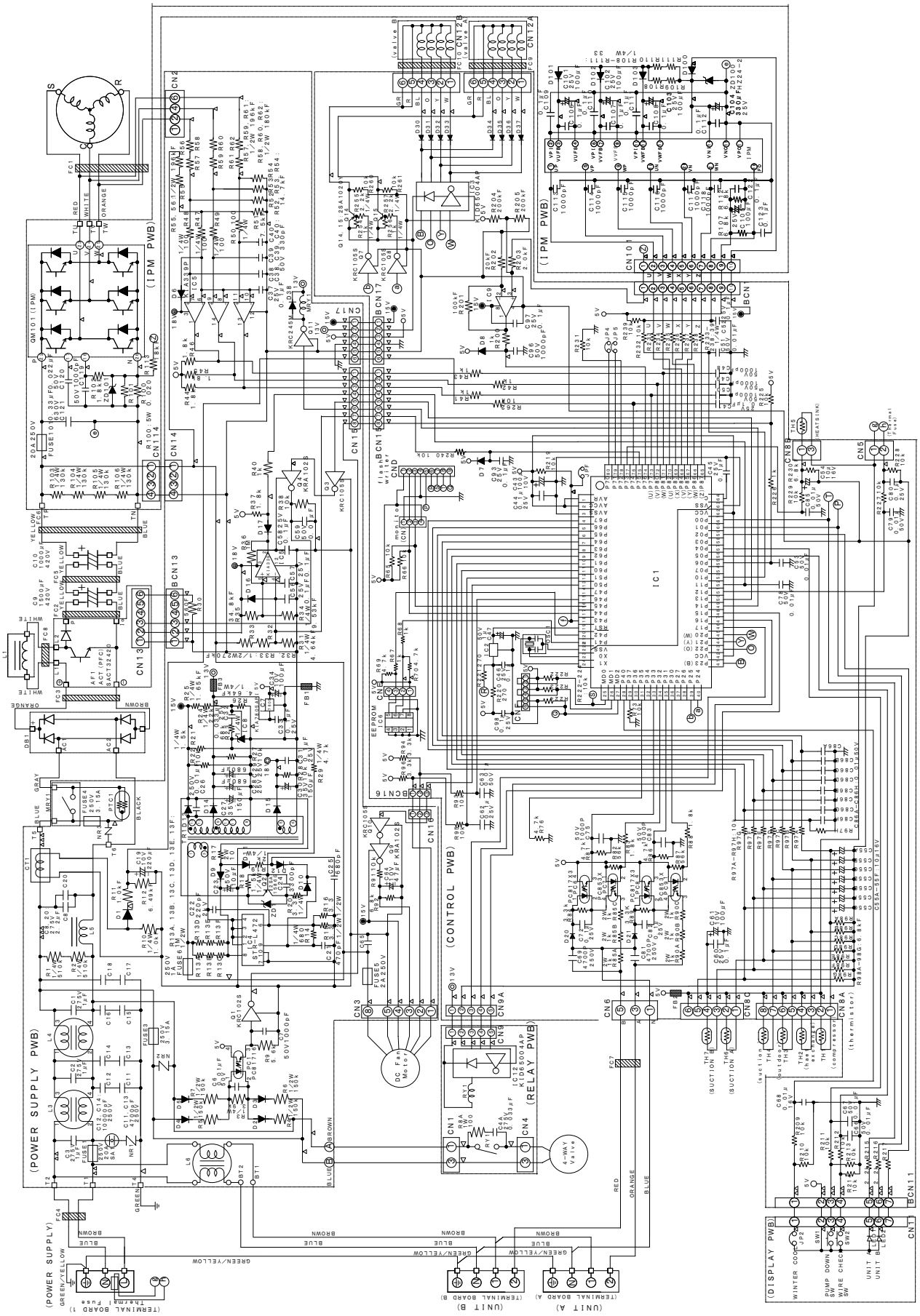


RELAY P.W.B and POWER SUPPLY P.W.B.



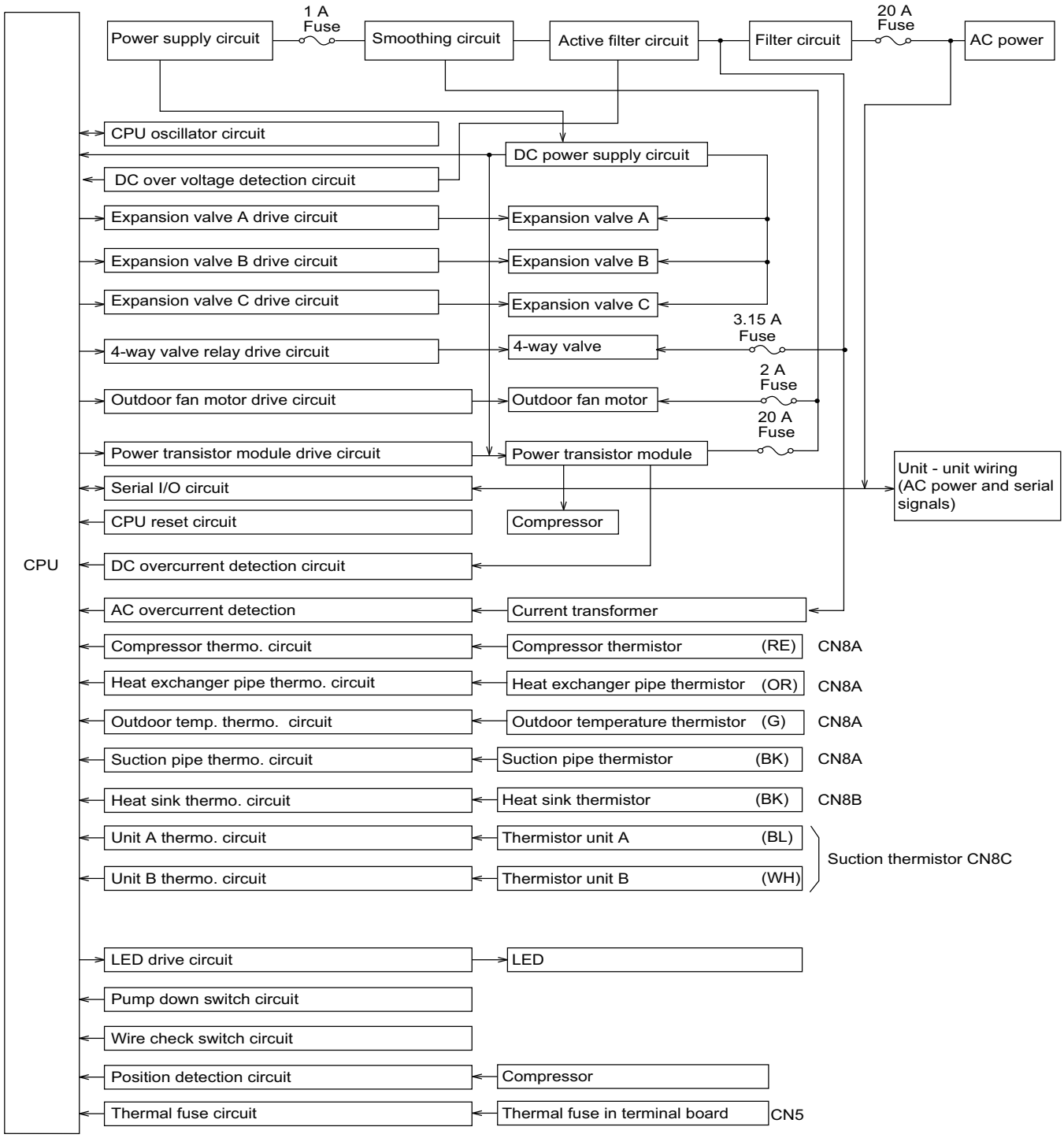
CONTROL P.W.B and DISPLAY P.W.B

AE−X2M14LR CIRCUIT DIAGRAM



CHAPTER 2. EXPLANATION OF CIRCUIT AND OPERATION

[1] BLOCK DIAGARM



[2] FUNCTIONS

1. FREQUENCY CONTROL

1) AC current peak control

Cooling mode	Heating mode
13.6A	13.6A

2) Prevention control of outdoor heat exchanger overheating

If the temperature of the outdoor heat exchanger exceeds the overheating prevention line 1 or 2 during cooling, the operating frequency is lowered by approximately 5 to 15Hz. After that, the frequency is lowered approximately 5Hz once every 60 seconds or approximately 15Hz once every 120 seconds. When the temperature of the outdoor heat exchanger goes below the overheating prevention clear line, the frequency is raised by approximately 5Hz once every 60 seconds, and normal operation is restored. If the frequency is lowered to minimum frequency without the temperature of the outdoor heat exchanger decreasing and this condition lasts for 1 minute, the compressor will be stopped.

Overheating Prevention line 1	55°C	Lower 5Hz once every 60 seconds
Overheating Prevention line 2	57°C	Lower 15Hz once every 120 seconds
Overheating Prevention clear line	54°C	

3) Prevention control of compressor overheating

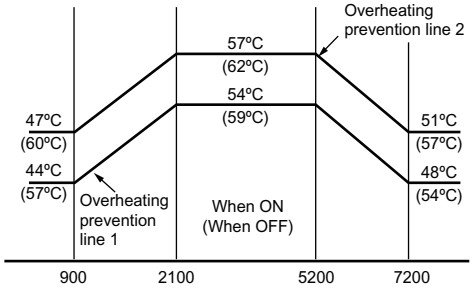
If the temperature of the compressor exceeds approximately 108 °C, the operating frequency is lowered approximately 5Hz. After that, the frequency is lowered approximately 5Hz once every 60 seconds. When the compressor temperature drops below approximately 108°C, the frequency is raised approximately 5Hz once every 60 seconds, and normal operation is restored. If the frequency is lowered to minimum frequency without the temperature of the compressor decreasing, and this condition lasts for 1 minute, the compressor will be stopped.

4) Prevention control of indoor heat exchanger overheating

Two minutes after room several decrease If the temperature of any of indoor heat exchangers exceeds the overheating prevention line 1 or 2 during heating, the operating frequency is lowered to minimum frequency. When the temperature of all of indoor heat exchangers go below the overheating prevention line 1, the frequency is raised by approximately 5Hz once every 60 seconds, and normal operation is restored. If the condition that the frequency is minimum lasts for 2 minutes, the compressor will be stopped.

<when normal >

If the temperature of any of indoor heat exchangers exceeds the overheating prevention line 1 or 2 during heating, the operating frequency is lowered by approximately 5 to 15Hz. After that, the frequency is lowered approximately 5Hz once every 60 seconds or approximately 15Hz once every 90 seconds. When the temperature of all of indoor heat exchangers go below the overheating prevention line 1, the frequency is raised by approximately 5Hz once every 60 seconds, and normal operation is restored. If the condition that the frequency is minimum lasts for 2 minutes, the compressor will be stopped.



2. OVER CURRENT PROTECTION

DC over current detection, AC over current detection. To protect against over current due to sudden change in load, the compressor is stopped if 24A DC is exceeded in the DC section. If the set value of AC current is exceeded in the AC section, the compressor is stopped. 90 seconds after the compressor has been stopped, another starting try will be made. Three retries are allowed. On the fourth retry, a complete stop request signal is sent to the indoor unit, and the outdoor unit will remain stopped until the indoor operation is stopped. DC over current is detected by the power module. AC over current is detected by CT1, on the outdoor PWB.

Cooling mode	Heating mode
16.0A	16.0A

3. COMPRESSOR PROTECTION CONTROL

If the temperature of the compressor exceeds 113°C, the compressor is stopped. In this case, the outdoor fan is not stopped until the temperature of compressor drops below 99°C. In 90 seconds after the compressor is stopped, if the temperature is below 90°C, another starting try will be made. Three retries are allowed. On the fourth retry, a complete stop request signal is sent to the indoor unit, and the outdoor unit will remain stopped until the indoor operation is stopped.

4. POWER TRANSISTOR MODULE PROTECTION

If the temperature of the heat-sink exceeds 90°C, the compressor is stopped. In this case, the outdoor fan does not stop, and when the temperature of the heat-sink decreases to 80°C 180 seconds after operation is stopped, another try will be made. Three retries are allowed. On the fourth retry, a complete stop request signal is sent to the indoor unit, and the outdoor unit will remain stopped until reset is performed. At this time, the 3-minutes delay for control of the outdoor unit will not function; therefore, do not cancel by removing the plug and cutting the power. Also if the temperature of the heat-sink exceeds 100°C, a complete stop request signal is sent to the indoor unit, and the outdoor unit will remain stopped until reset is performed. At this time, the 3-minutes delay for control of the outdoor unit will not function; therefore, do not cancel by removing the plug and cutting the power.

5. SERIAL SIGNALS

Serial signals consist of all 96-bit signals. If the condition as outdoor unit unable to receive a serial signal from the indoor unit continues for 30 seconds, it closes the expansion valve which corresponds to the room which can not be communicated. If all indoor units can not communicate with the outdoor unit, the compressor is stopped.

6. THERMISTOR OPEN OR SHORT

When compressor, heat exchanger, outdoor thermistor, suction thermistor (CN8A) are in OPEN or SHORT condition, even if they are in the condition which an operation signal is transmitted from indoors, the compressor will not start. If any suction thermistors (CN8C) become OPEN or SHORT resistance, the protective procedure will work only for the cycle corresponding to the malfunctioning suction thermistor.

7. MISWIRING CHECK

“Mis-wiring check” is conducted by detecting the indoor heat exchanger temp. For example, when the expansion valve for only room A is open, and the wiring is correct, the indoor heat exchanger temp for room A will reduce. If the wiring is incorrect, the indoor heat exchanger temp for a different room will reduce.

8. SAFETY TIME

When the unit is operated by the remote control after the breaker is turned on, the safety device of the compressor will work and the compressor will not operate for 90 seconds.

9. PUMP DOWN SWITCH

When the PUMP DOWN SWITCH (SW1) is pressed for 5 seconds or more, the total A/C system will start its TEST RUN automatically and the compressor frequency will be 48.3 Hz. When operating only the outdoor unit (cooling 48.3 Hz fixed mode) To make only the outdoor unit run in cooling mode, and apply a voltage of 230 V AC to N and L on the terminal board and push the pump down switch. (SW1) (Avoid operating the outdoor unit alone for long periods of time.)

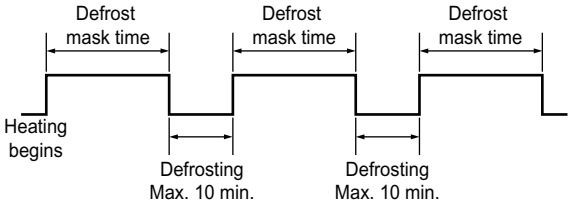
10. CONTROL OF COMPRESSOR OR AND EXPANSION VALVE

For 90 seconds after turning on the AC power, the compressor will not be activated even if indoor units request the compressor to do so. If the compressor receives a request from one or more indoor units after 90 seconds have passed, it will be turned on and the expansion valve corresponding to the requesting indoor unit will be opened. When the indoor unit of a room requests for the cooling operation to the outdoor unit and it runs responding to the request, requests for the heating can't be accepted if the indoor units in other rooms send individual requests. If the indoor unit in another room sends a request for the heating operation, the operation lamp and timer lamp of the indoor unit in that room start flashing in turn to inform that the unit is in the standby mode. If the operation in one room is stopped while the indoor unit in another room is in the stand-by mode, the operation mode requested by the indoor unit which is now in the stand-by mode will be accepted. At this time, the compressor will be temporarily stopped to switch the four- way valve and restart after 90 seconds. During the cooling or dry operation, the expansion valve corresponding to the indoor unit that is not running is closed. Therefore, the refrigerant will not flow into those units However, if the heating operation is in progress, it is possible that it flows into indoor units which are out of operation depending on the cycle conditions. As a result, the indoor exchanger may be heated up even if it is not activated. This is not abnormal. When the operations in all rooms are stopped, the compressor is off and the expansion valves in all rooms are fully opened.

11. DEFROST OPERATION

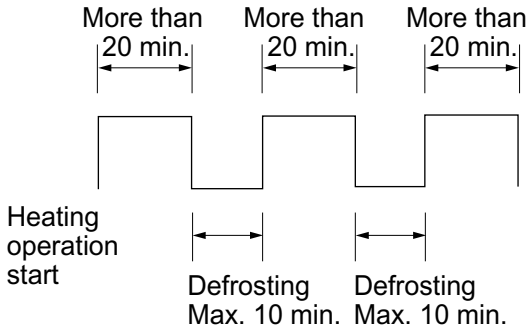
1) Overview

Defrosting begins during heating if the conditions for compressor operation time and outdoor heat exchanger temperature are met. When defrosting begins, the indoor and outdoor fans stop. Defrosting stops when the temperature of the outdoor heat exchanger goes above approximately 15°C or defrosting time exceeds 10 minutes.



2) Defrosting

If the compressor operation time is more than 20 minutes in the heating mode and the outdoor air temperature and outdoor heat exchange temperature satisfy the defrosting conditions, the defrosting operation is started. When the defrosting operation is started, the indoor fan starts to run intermittently. When the outdoor heat exchanger temperature reaches approx. 15°C or above or when the defrosting time exceeds 10minutes, the defrosting operation is quit.



3) During defrosting

When defrosting begins, the compressor stops. Approximately 1 minutes later, the compressor reactivates in the refrigeration cycle, and the outdoor heat exchanger is defrosted. Each mode is as follows:

The outdoor fan is s topped

The operating frequency is as shown in the table below.

The indoor fan is s topped.

All expansion valve are open.

for 5 minutes 3900 rpm

after that 3700 rpm

4) Defrost stop

When defrosting time exceeds 10 minutes When the temperature of the outdoor heat exchanger rises above approximately 15°C Defrost stop is determined by either of the above conditions, and the compressor is stopped. At the same time, the outdoor fan go ON. The compressor is reactivated in the heating cycle 1 minutes after it was stopped, and normal control resumes.

12. Power factor module Output voltage

If a voltage error over 450V is detected at power factor module output voltage, the compressor is stopped for 3 minutes. In this case, the outdoor fan does not stop for 3 minutes, and another try will be made. Three retries are allowed. On the fourth retry, a complete stop request signal is sent to the indoor unit, and the outdoor unit will remain stopped until reset is performed. At this time, the 3 minutes delay for control of the outdoor unit will not function; therefore, do not cancel by removing the plug and cutting the power.

13. Winter cool

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

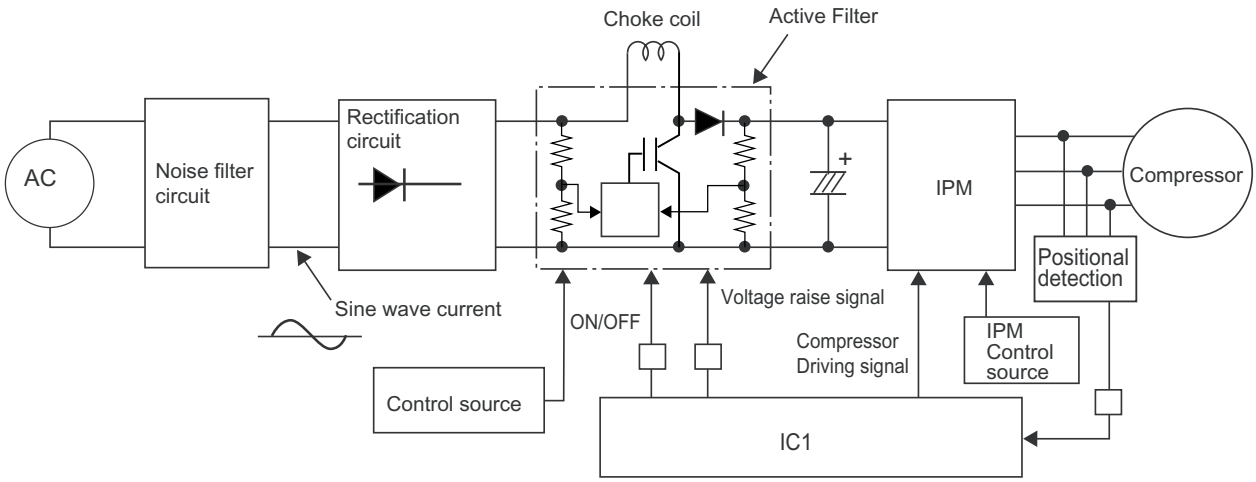
Lower limit of outdoor temperature range is -10°C DB.

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

NOTE: Built-in protect drive may work when outdoor temperature falls below 21°C DB, depending on conditions.

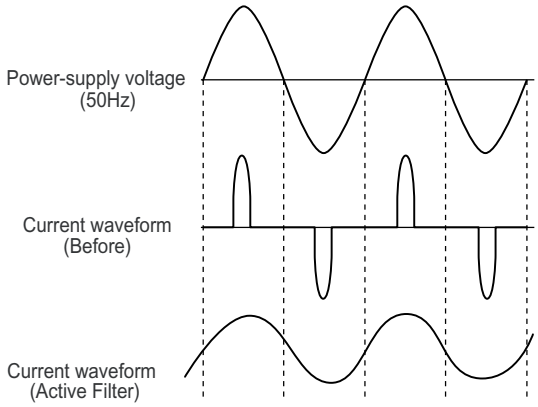
[3] ACTIVE FILTER CIRCUIT

This circuit uses Active Filter Module and IPM as the figure below for the high efficiency operation of compressor.



1. Active Filter

In the case the direct current is obtained by the diode bridge and smooth capacitor from the commercial power source, the current wave shape will be the pulse shape at the peak of the voltage wave shape as shown in the figure below. For this reason, the harmonic current will be generated and at the same time the power factor will be deteriorated. While monitoring the AC input voltage in the control circuit, in order to be the same phase and wave shape as this voltage wave shape, IGBT is made ON/OFF by the carrier frequency of approximately 20 kHz. By adoption of this Active Filter, the current wave shape can be made to the sine wave synchronized to the commercial power source and the power factor can be made to almost 99%. As a result of this, reactor can be disused. Active Filter works for the improvement of power factor and as the countermeasures for the harmonic current.



2. Active Filter Voltage Raise Circuit

The IGBT in the figure below is the switching transistor of the Active Filter. By adding ON signal to the gate of IGBT from the control IC, IGBT turns ON and the collector current Ic flows. This current flows from the + side of the diode bridge DB to the Choke coil, the - side of the diode bridge DB through IGBT from the Choke coil L. At this time, energy is stored in the choke coil L. Next, when gate signal of IGBT turned OFF, IGBT will be turned OFF and the energy stored in L during the ON time of IGBT will be discharged through the diode D, electrolytic capacitor C, load, primary side and the + side of DB. Assuming the input voltage of Active Filter (voltage between + and - of DB) as Ei, the output voltage (voltage at the both ends of smooth capacitor) as Vo, switching cycle of IGBT as T and ON time of IGBT as ton, the voltage between collector emitter of IGBT Vs will be as follows;

Vs= 0 (during ON of IGBT: ton)

Vs= Vo (during OFF of IGBT: T-ton)

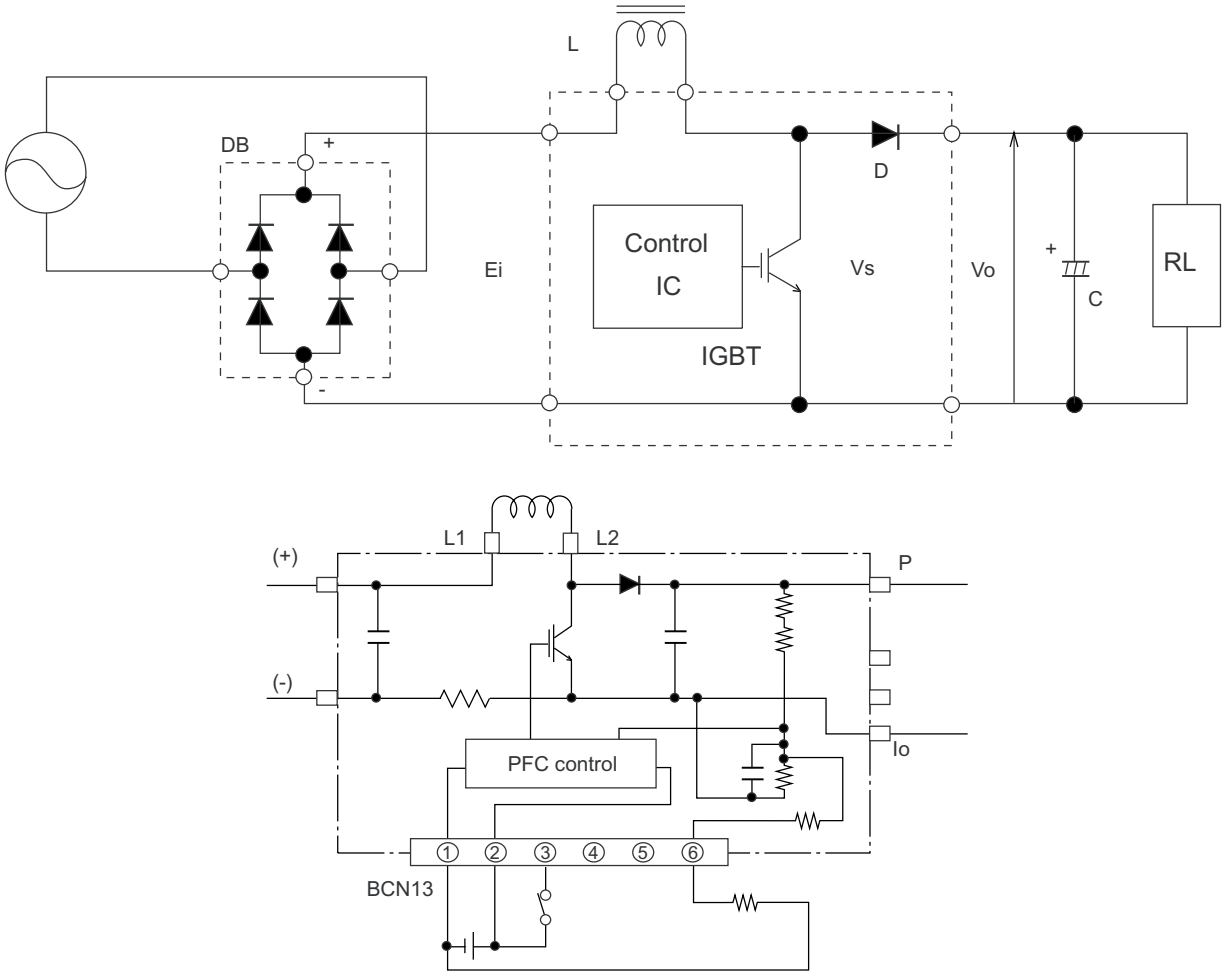
Here, assuming no loss in L and IGBT, average value of Vs turns equal to Ei,

Ei = (T-ton)/T x Vo

Therefore

Vo = T/(T-ton) x Ei

As ton is a smaller value than T, output voltage Vo will be higher than input voltage Ei.



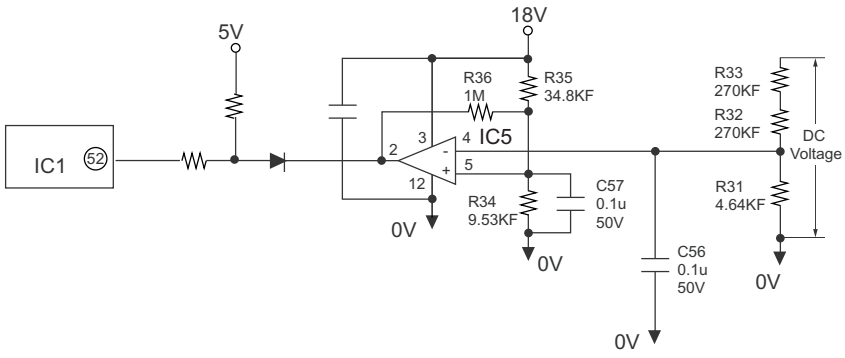
Active Filter Circuit

3. Active Filter Driving Electronics Circuit

At the operation of compressor, the microcomputer (IC1), as the 50th pin gets “H”, will turn the transistor Q4 ON through the transistor Q3. By this, 18V is supplied to the 3rd pin of connector BCN13 of the Active Filter and the Active Filter will be turned ON.

4. Protection Circuit of Active Filter

In order to prevent from the destruction of Active Filter due to the excessive over output voltage of Active Filter, the Active Filter will be turned OFF immediately at the abnormal output voltage by monitoring the output voltage. At the same time, the operation of compressor will be stopped. Detection circuit of the abnormal voltage detects the abnormal voltage by inputting the output voltage of Active Filter to the 4th pin of comparator IC (IC5) at the divided voltage by the resistors (R31, R32 and R33) and comparing with reference voltage. When the output voltage of Active Filter reaches 450V or higher, the 4th pin of IC5 will be higher than the reference voltage at the 5th pin, the output of comparator will be reversed (H→L), the L signal will be entered at the 52nd. pin of microcomputer (IC1) and the operation of the Active Filter will be stopped.



[4] EXPLANATION OF IPM DRIVE CIRCUIT

The power supply for the IPM drive, and the shunt resistor for over current detection, etc., are provided out of the IPM (in control PWB).

1. IPM drive power supply circuit

The power supply for driving the upper-phase IGBT (HU, HV, HW) drive employs a Bootstrap system.

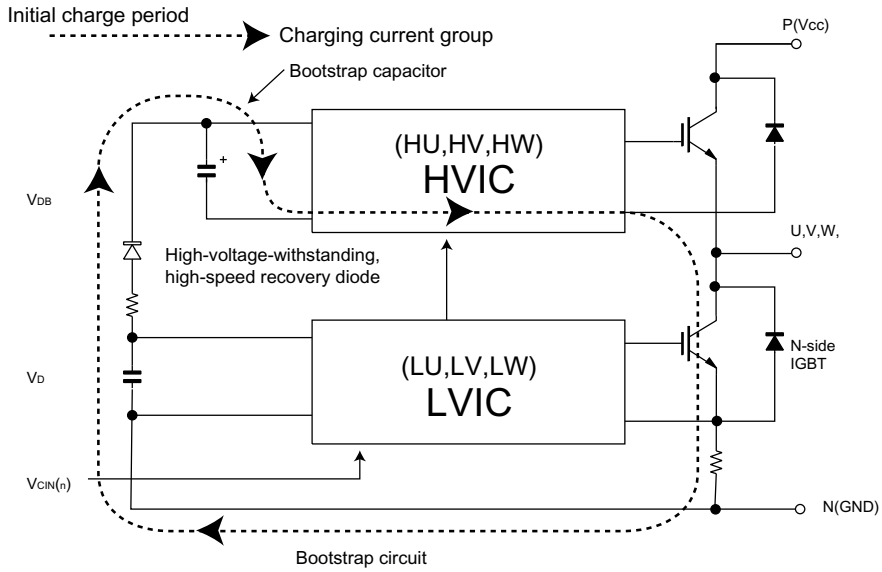
The 15-V power supply for the lower-phase IC is provided by the control printed circuit board (PWB).

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).

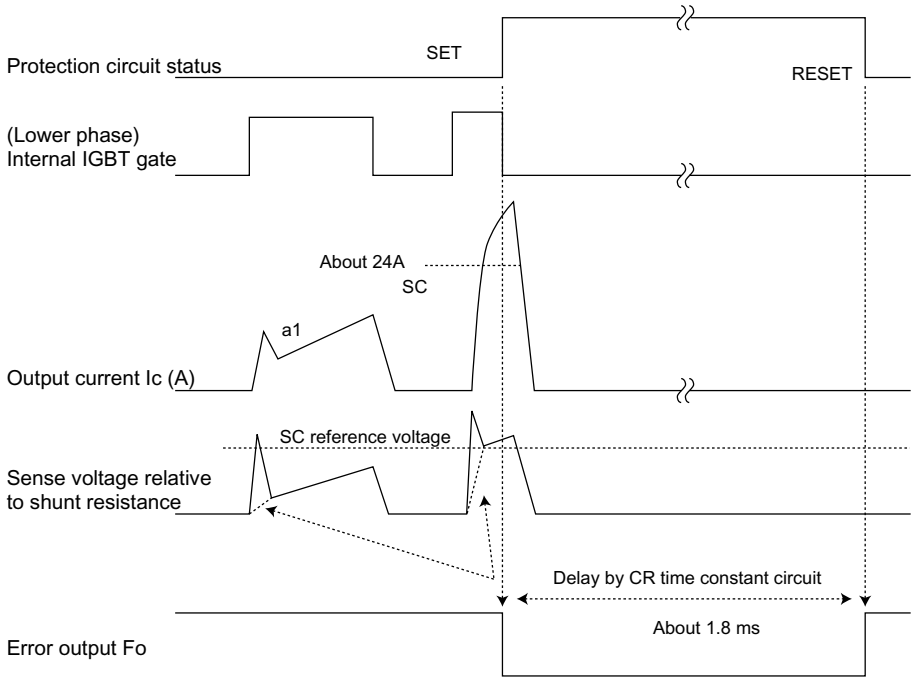
   It results in a charging current that flows through the electrolytic capacitor in each upper-phase IC input and charges the Bootstrap capacitor up to 15V voltage.

   The power supply for the subsequent stages is stored when the lower-phase IGBT is ON in common drive control of the compressor.



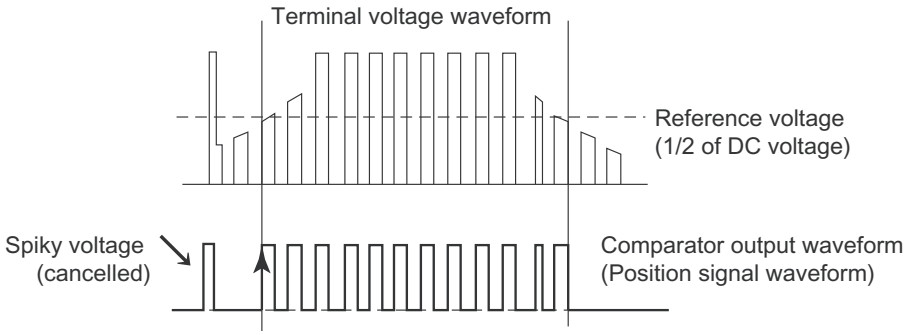
2. DC over current detection circuit

When a current about 24A or higher flows through the shunt resistor (R100) on IPM printed circuit board (PWB), the voltage on this resistor is input to IPM CIN pin (16). Then, the gate voltage of the lower-phase IGBT (LU, LV, LW) inside the IPM turns OFF to cut the over current off. At the same time, an L output which lasts about 1.8 ms is generated from IPM Fo pin (18), and it results in an L level input to over current detection input pin (53) of the microcomputer (IC1) and then turns OFF the compressor driving signal output (IC1 from pins (65) to (70)) to the IGBT gate.



3. 120° energizing control (digital position detection control)

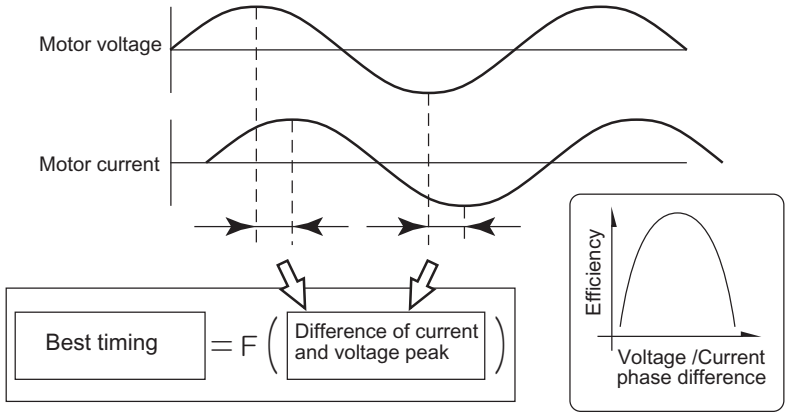
This control system detects the digital position detection signal and adjusts the rate of acceleration/deceleration accordingly. The motor's induced voltage waveform is input to the comparator in the form of PWM-switched pulse, and a position detection signal is generated as a reference voltage which is equal to 1/2 of 370 VDC. However, since there is no induced voltage waveform when the PWM waveform is OFF, the microcomputer works in an internal processing so that detection is enabled only when it is ON. Based on the position signal detected, actual PWM waveform output timing is determined. Since it does not use a filter circuit, the accuracy of detection. The microcomputer works in an internal processing to eliminate spiky voltage during the regenerative process. Furthermore, even if the induced voltage is low, position detection is still possible, and it allows sensor-less operation at low rotation speed in the initial stage of operation. These reduce the starting current and improve reliability of IPM.



4. 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.

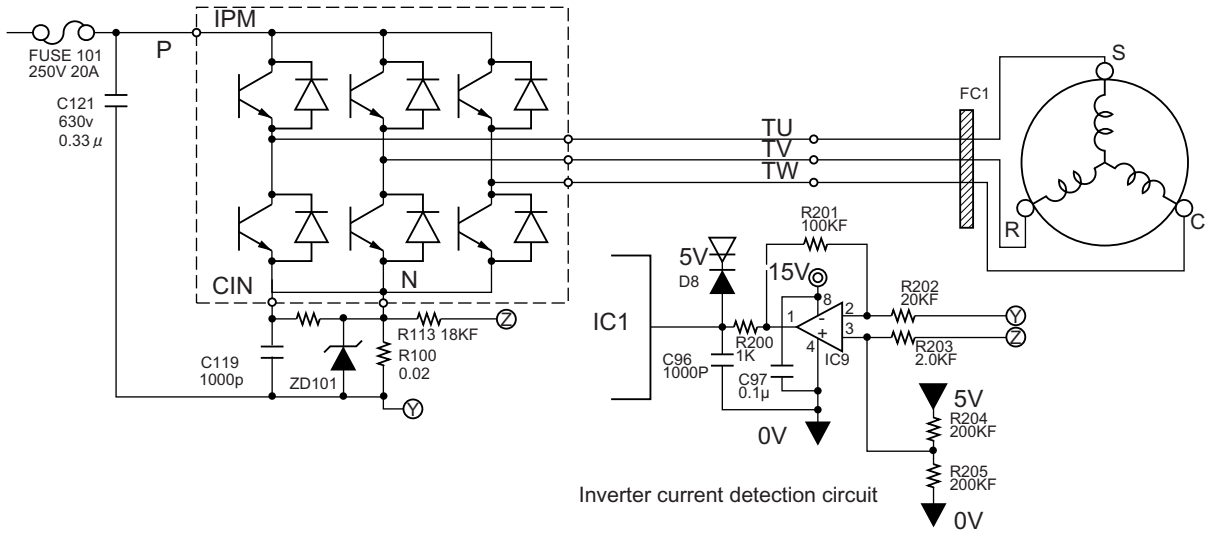
This control is the forced magnetization system independent of the location of rotor, detecting the phase difference between driving voltage phase and line current phase flowing in motor coil, and controls the modulation rate data to get the phase difference at the best efficiency.



Concept chart of the current phase difference control

5. DC Current Detection Sensor Circuit

Control of current phase difference is made by reading in the phase difference generated at the both edges of shunt registor (R100) by the compressor electrifying current on the PWB through the Op-amp (IC9) to the microcomputer. This is a control to modulate up to the phase with the best efficiency by comparing the phase of this input current, so called compressor electrifying current, with the compressor driving voltage. In the case that phase difference between motor voltage and current is large (current delay is large), the control will be made by lowering the compressor modulation rate data (compressor effective value).



Inverter current detection circuit

CHAPTER 3. FUNCTION AND OPERATION OF PROTECTIVE PROCEDURES

[1] PROTECTIVE FUNCTIONS AND OPERATIONS

NO.	Function	Operation					
		Description	Detection time	Restart condition	Restart time	In door	Out door
1	DC over current	Compressor is stopped if a current approximately 24A or more flows in the power transistor module.	During compressor operation	Automatically restarts after safety time (180 seconds)	4 times	Yes	Yes
2	AC over current	Lowers the operating frequency if the compressor AC current exceeds set value (16.0A). Stops the compressor if the current exceeds at minimum frequency.	During compressor operation	Automatically restarts after safety time (180 seconds)	4 times	Yes	Yes
3	Compressor overheat prevention control	Lowers the operating frequency if the temperature of the compressor thermistor (TH1) rises above 108°C. Compressor is stopped if the thermistor stay above 108°C for 2 minutes at minimum frequency.	During compressor operation	Automatically restarts after safety time (180 seconds)	No limit	No	No
4	Compressor high temperature error	Compressor is stopped if the compressor thermistor is above 113°C (Or when TH1 shorts)	During compressor operation	Automatically restarts when thermistor (TH1) temperature falls below 99°C (approximately 30 minutes)	4 times	Yes	Yes
5	Outdoor heat exchanger overheat prevention control	Lowers the operating frequency if the temperature of the outdoor heat exchanger rises above 57°C during cooling. Stops the compressor if the temperature stays above 57°C for 2 minutes at minimum frequency	During compressor operation	Automatically restarts after safety time (180 seconds)	No limit	No	No
6	Thermistor short	Compressor ia stopped, if heat exchanger or outdoor thermistor shorts. Close the expansion valve of the corresponding room, if some suction thermistor shorts.	When the room is activated turns ON and the compressor starts.	Operation OFF	1 time	Yes	Yes
7	Thermistor open	Compressor is stopped, if compressor or heat exchanger or outdoor thermistor opens. Close the expansion valve of the corresponding room, if some suction thermistor shorts. opens.	When the room turns ON and the compressor starts.	Operation OFF	1 time	Yes	Yes
8	AC abnormal current	Compressor is stopped, if the operating frequency is above 70Hz and the compressor current is below 0.8A.	During compressor operation	Automatically restarts after safety time.(180 sec.)	4 times	Yes	Yes
9	Serial signal error	INDOOR If open, while timer LED blinks, operation is continued. If short, operation is continued. OUTDOOR Closes the expansion valve of the corresponding room if the outdoor unit does not receive a serial signal from one or more indoor unit for 30 seconds. Compressor is stopped, if the outdoor unit does not receive a serial signal from all indoor units.	During operation	Automatically restarts as soon as the serial communication becomes possible.	No limit	Yes	Yes
10	Miswiring check error	Compressor is stopped, and miswiring check operation ends.	During miswiring operation	Miswiring check operation will not restart automatically.	4 times	Yes	Yes
11	Indoor heat exchanger overheat prevention control	Lowers the operating frequency if the temperature of any of indoor heat exchanger rises high temperature during heating. Stops the compressor if the temperature stay high for 2 minutes at minimum frequency.	During compressor operation	Automatically restarts after safety time.(180 sec.)	No limit	No	No
12	Power factor module (Active Filter) over voltage error	Compressor stops if DC voltage is 450V or higher.	During compressor operation	Automatically restarts after safety time.(180 sec.)	4 times	Yes	Yes
13	Power factor module (Active Filter) low voltage error	Compressor stops if DC voltage is 270V or lower.	During compressor operation	Automatically re-starts after safety time.(180 sec.)	4 times	Yes	Yes

NO.	Function	Operation					
		Description	Detection time	Restart condition	Restart time	In door	Out door
14	Power factor module (Active Filter) clock error	When power source frequency cannot be determined (at startup) or when power source clock can not be detected for 1 continuous second (at startup).	At compressor start up, when in operation.	Compressor continues operation without stopping.	None	Yes	Yes
15	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
16	DC compressor rotation error	Operation stops if rotation of compressor is abnormal.	During compressor operation	Automatically restarts after safety time.(180 sec.)	8 times	Yes	Yes
17	IPM overheat prevention control. IPM high temperature error	The compressor stops if the temperature of Heat sink exceeds 90°C.	During compressor operation	Automatically restarts after safety time.(180 sec.)	No limit	No	No
18	Thermal fuse error	When thermal fuse in the outdoor terminal board below.		Operation OFF	1 times	Yes	Yes

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

[2] TROUBLESHOOTING GUIDE

1. SELF-DIAGNOS IS FUNCTION AND DISPLAY MODE

1) To call out the content of the self-diagnosis memory, hold down the emergency operation button for more than five seconds when the indoor unit is not operating.

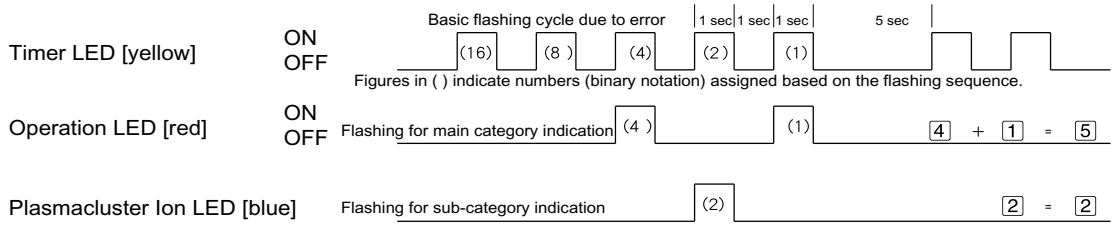
   a) According to the content of the self-diagnosis memory, the Operation LED (main category) and the Plasmacluster Ion LEDs (sub-category) flash in sync with the Timer LED on the indoor unit.

   b) In the event a complete shutdown occurs due to a malfunction, the Operation LED (red), Timer LED (yellow), Plasmacluster Ion LED (blue) flash to indicate the general information of the generated malfunction.

   c) If the power cord is unplugged from the AC outlet or the circuit breaker is turned off, the self-diagnose is memory loses the stored data.

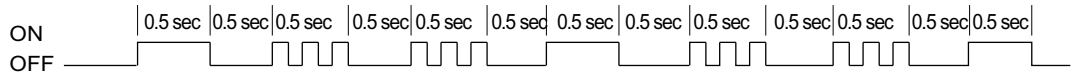
2) Display of detailed self-diagnosis result with main category and sub-category indications When malfunction information is called out, the main category and sub-category of the self-diagnose is result are indicated by the Operation, Timer, and Plasmacluster Ion LEDs on the indoor unit.

*1: Example of self-diagnosis result displayed on indoor unit: Suction thermistor open-circuit error (Malfunction No. 5 — 2 ; Main category, Sub-category)



*2: The self-diagnosis display function of the outdoor unit indicates the error information by flashing LED1 on the outdoor unit according to the content of self-diagnosis.
The self-diagnosis display function of the outdoor unit is active only for about 3 to 10 minutes after self-diagnosis is performed during operation, and the display returns to normal condition after this display period.
The content of self-diagnosis cannot be called out by the self-diagnosis display function of the outdoor unit.

Example of self-diagnosis display on outdoor unit : Compressor high-temperature abnormality



⊗Flashes in 1-sec intervals (normal) : 1sec ON / 1sec OFF ✕: : OFF ○: Flashes 3 times in 0.2-sec intervals

Status of indoor/outdoor units	Indication by LED1 on outdoor unit *2	Indication on indoor unit: Floor / ceiling — Lighting pattern at the time of timer lamp lighting (● ● ● ● ●→✕ for 5 seconds)	Indication on indoor unit: Floor / ceiling	Wall (Panel) Main	Wall (Panel) Sub	Content of diagnosis: Main category	Content of diagnosis: Sub category	Inspection location/method	Remedy
Indoor/outdoor units in operation	Normal flashing			0	-0		Normal	–	–
Indoor/outdoor units in complete shutdown	○ 1 time	●	Operation lamp(RED) Cluster lamp(BLUE)	1	-0	Outdoor unit thermistor short-circuit	Heat exchanger thermistor short circuit error	(1)Measure resistance of the outdoor unit thermistors. (TH2 ~ 4, 6 ~ 8: Approx.4.4k at 25ºC (2)Check the lead wire of the outdoor unit thermistor for torn sheath and shortcircuit. (3)No abnormality found in above inspections (1)and (2).	(1)Replace the outdoor unit thermistor assembly. (2)Replace the outdoor unit thermistor assembly. (3)Replace the outdoor unit control PCB assembly.
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		Outdoor temperature thermistor short circuit error		
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-2		Suction thermistor short circuit error		
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-3		Thermistor Unit A - C thermistor short circuit error		
Indoor/outdoor units in complete shutdown	○ 2 time	●	Operation lamp(RED) Cluster lamp(BLUE)	2	-0	Cycle temperature	Compressor high temperature error	(1)Check the outdoor unit air outlet for blockage. (2)Check if the power supply voltage is AC 230V at full power. (3)Check the pipe connections for refrigerant leaks. (4)Measure resistance of the outdoor unit compressor thermistor. (TH1:Approx.53k at 25ºC) (5)Check the expansion valve for proper operation.	(1)Ensure unobstructed air flow from the outdoor unit air outlet. (2)Connect power supply of proper voltage. (3)Charge the specified amount of refrigerant. (4)Replace the outdoor unit compressor thermistor assembly. (5)Replace the expansion valve coil,expansion valve or outdoor unit control PCB assembly.
							Suction thermistor open circuit error		
Indoor unit in operation Outdoor unit in temporary stop		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		Temporary stop due to compressor discharge overheat.	(Temporary stop for cycle protection)	–
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-2		Temporary stop due to out door unit heat exchanger overheat.	(Temporary stop for cycle protection)	–
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-3		Temporary stop due to indoor unit heat exchanger overheat.	(Temporary stop for cycle protection)	–
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-4		Temperature stop due to IPM over heat.		
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-5		IPM high temperature error	(1)Measure resistance of the heat-sink thermistor (CN8B).	(1)Change the heat-sink thermistor.
Indoor/outdoor units in complete shutdown	○ 5 time	● ●	Operation lamp(RED) Cluster lamp(BLUE)	5	-0	Outdoor unit thermistor open-circuit	Heat exchanger thermistor open circuit error	(1)Check connector CN8A and CN8C of the outdoor unit thermistor for secure installation. (2)Measure resistance of outdoor thermistors TH1 ~ 4, 6 ~ 8. (3)Check the lead wires of thermistors TH1 ~ 4, 6 ~ 8 on the outdoor unit control PCB for open-circuit. (4)No abnormality found in above inspections (1)through (3).	(1)Correct the installation. (2)Replace the outdoor unit thermistor assembly. (3)Replace the outdoor unit thermistor assembly. (4)Replace the outdoor unit control PCB assembly.
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		Outdoor temperature thermistor open circuit error		
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-2		Suction thermistor open circuit error		
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-4		Discharge thermistor open circuit error		
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-5		Thermistor Unit A - C thermistor open circuit error		
Indoor/outdoor units in complete shutdown	○ 6 time	● ●	Operation lamp(RED) Cluster lamp(BLUE)	6	-0	Outdoor unit DC Current	DC overcurrent error	(1)IPM continuity check. (2)Check the IPM and heat sink for secure installation. (3)Check the outdoor unit fan motor for proper rotation. (4)No abnormality found in above inspections (1)through (3). (5)No abnormality found in above inspections (1)through (4).	(1)Replace the outdoor unit IPM PCB assembly. (2)Correct the installation (tighten the screws). Apply silicon grease. (3)Replace the outdoor unit fan motor. (4)Replace the outdoor unit IPM PCB assembly. (5)Replace the compressor.
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		IPM pin level error	(1)Check the IPM is attached correcity to the outdoor unit IPM PWB.	(1)Replace the outdoor unit IPM PWB assembly.
Indoor/outdoor units in complete shutdown	○ 7 time	● ● ●	Operation lamp(RED) Cluster lamp(BLUE)	7	-0	Outdoor unit AC Current	AC overcurrent error	(1)Ensure unobstructed air flow from the outdoor unit air outlet. (2)Check the outdoor unit fan motor.	(1)Ensure unobstructed air flow from the outdoor unit air outlet. (2)Check the outdoor unit fan motor.
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		AC current error when OFF	(1)IPM continuity check	(1)Replace the outdoor IPM PWB
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-2		AC maximum current error	(1)Ensure unobstructed air flow from the outdoor unit air outlet. (2)Check the outdoor unit fan motor.	(1)Ensure unobstructed air flow from the outdoor unit air outlet. (2)Check the outdoor unit fan motor.
		● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-3		AC current deficiency error	(1)Replace the outdoor unit control PCB assembly. (2)Charge the specified amount of refrigerant. (3)Correct refrigerant clogs. (Stop valve,pipe,expansion valve)	(1)Replace the outdoor unit control PCB assembly. (2)Charge the specified amount of refrigerant. (3)Correct refrigerant clogs. (Stop valve,pipe,expansion valve)
Indoor/outdoor units in complete shutdown	○ 8 time	●	Operation lamp(RED) Cluster lamp(BLUE)	8	-0	Abnormal wire check	Abnormal wire check error	(1)Check the expansion valve. (unit A - C) (2)Are four expansion valves connected by mistake (3)Check the wiring between units.	(1)Replace the outdoor control board assembly. (2)Reattach (3)Check the wiring between units.
	○ 9 time	● ●	Operation lamp(RED) Cluster lamp(BLUE)	9	-4	Cycle temperature	4 way valve error or Gas leak error	(1)Check to make sure outdoor unit thermistor TH2 (exchange) and TH3 (pipe temperature) are installed in correct portions. (2)Check if the refigerant volume is abnomally low. (3)Check the 4-way valve for proper operation.	(1)Correct the installation. (2)Change the speccified amount of refrigerant. (3)Replace the 4-way valve.
Indoor/outdoor units in complete shutdown	○ 11 time	● ● ●	Operation lamp(RED) Cluster lamp(BLUE)	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. (2)Check the outdoor unit fan motor for proper rotation. (3)Check fuse FUSE5. (4)Outdoor unit control PCB	(1)Correct the installation. (2)Replace the outdoor unit fan motor. (3)Replace the outdoor unit control PCB assembly. (4)Replace the outdoor unit control PCB assembly.
Indoor/outdoor units in complete shutdown	○ 12 time	● ●	Operation lamp(RED) Cluster lamp(BLUE)	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) (2)Check connector CN5 of the outdoor unit.	(1)Replace terminal board for Power supply (2)Replace the outdoor unit control PCB assembly.

⊗Flashes in 1-sec intervals (normal) : 1sec ON / 1sec OFF ✕: : OFF ○: Flashes 3 times in 0.2-sec intervals

Status of indoor/outdoor units	Indication by LED1 on outdoor unit *2	Indication on indoor unit: Floor / ceiling — Lighting pattern at the time of timer lamp lighting (● ● ● ● ● → ✕ for 5 seconds)	Indication on indoor unit: Floor / ceiling	Wall (Panel) Main	Wall (Panel) Sub	Content of diagnosis: Main category	Content of diagnosis: Sub category	Inspection location/method	Remedy
Indoor/outdoor units in complete shutdown	○ 13 time	● ● ●	Operation lamp(RED) Cluster lamp(BLUE)	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) (2)Check if the IPM terminal resistance values are uniform. (3)Check if outdoor main relay (MRY1) turns on and voltage of both end of the condenser (C10) has become DC380V. (4)No abnormality found in above inspections(1)and(3). (5)No abnormality found in above inspections(1)and(4).	(1)Correct the installation. (U:Red,V:White,W:Orange) (2)Replace the outdoor unit control PWB assembly. (3)Replace the outdoor unit control PWB assembly. (4)Replace the outdoor unit control PWB assembly. (5)Replace the compressor.
		● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		Compressor rotation error. (at 120° energizing)		
		● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-2		Compressor rotation error (at 180° energizing)		
		● ● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-3		Detection error of inverter current.	(1)Check the circuit of detection of inverter current.	(1)Replace the outdoor unit control PCB assembly.
Indoor/outdoor units in complete shutdown	○ 14 time	● ● ●	Operation lamp(RED) Cluster lamp(BLUE)	14	-0	Outdoor unit Active Filter	Active Filter overvoltage error	(1)Check the AC power supply voltage for fluctuation. (2)No abnormality found in above inspection (1). (3)Replace the Active Filter.	(1)Connect stable power supply. (2)Replace the outdoor unit control PCB assembly.
		● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		Clock error	(1)Check the clock for proper inputt.	(1)Replace the outdoor unit control PCB assembly.
		● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)		-2		low valtage error	(1)Check the AC power supply valtage for fluntuation.	(1)Conect stable power supply. (2)Replace tfe outdoor unit control PCB assembly.
Indoor unit in operation Outdoor unit in complete shutdown	●	● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)	17	-0	Wires between units	Serial open-circuit	(1)Check the wires between units. (2)Check voltage between N and 1 the indoor/outdoor unit terminal boards.	(1)Connect stable power supply. (2)Replace the outdoor unit control PCB assembly.
	✕	● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)				Erroneous wiring	(1)Check the wires between units. (2)Check the outdoor unit fuse. (3)Check 15-V,13-V and 5-V voltages on the PCB. Check resistance between IPM terminals. (4)Check pins No.5 and 8 of connector CN3 of the outdoor unit fan motor for short-circuit. (5)Outdoor unit control PCB.	(1)Correct the wiring. (2)Replace the fuse/outdoor unit control PCB assembly. (3)Replace the outdoor unit control PCB assembly. (4)Replace the outdoor unit fan motor. (5)Replace the outdoor unit control PCB board.
Indoor unit in operation Outdoor unit in complete shutdown	●	●	Operation lamp(RED) Cluster lamp(BLUE)	18	-0	Wires between units	Serial short-circuit	(1)Check the wires between units.	(1)Correct the wiring.
		● ●	Operation lamp(RED) Cluster lamp(BLUE)		-1		Serial erroneous wiring	(1)Check the wires between units.	(1)Correct the wiring.
Indoor/outdoor units in complete shutdown	✕	● ●	Operation lamp(RED) Cluster lamp(BLUE)	19	-0	Indoor unit fan	Indoor unit fan error	(1)Check the indoor fan motor for proper rotating operation. (Check fan lock.) (2)Check the lead wire of the indoor fan motor for open-circuit. (3)Check connector of the indoor unit fan motor for secure installation. (4)No abnormality found in above inspections (1)through (3).	(1)Replace the indoor fan motor. (2)Replace the indoor fan motor. (3)Correct the installation of CN3 of the indoor fan motor. (4)Replace the indoor unit control PCB.
Indoor/outdoor units in operation	✕	● ●	Operation lamp(RED) Cluster lamp(BLUE)	20	-0	Indoor unit control PCB	EEPROM data error	(EEPROM read data error)	(1)Replace the indoor unit control PCB.
Indoor/outdoor units in operation	✕	● ● ● ●	Operation lamp(RED) Cluster lamp(BLUE)	30	-0	Drain pump unit	Drain pump unit error	(1)Check connector CN2 and CN10.	(1)Replace the Drain pump unit unit. (2)Re-insertion of CN2 and CN10.

CHECK METHOD

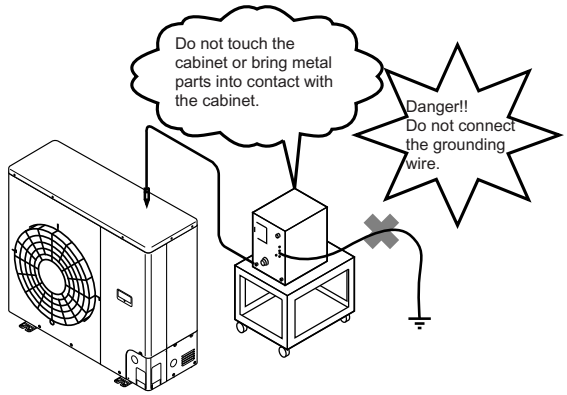
CAUTION: CHECKING PRINTED CIRCUIT BOARDS (PWB)

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 (370-VDC negative terminal). Therefore, exercise most 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.



Reason

The oscilloscope (chassis ground) has the same electric potential as the 0-V probe. The entire electronic control section of the outdoor unit has a voltage potential difference from the ground. When the oscilloscope is setup, the 0-V line and the ground voltage (ground) will be short circuited, resulting in an excessive current flow to cause damage to the oscilloscope or indoor electric circuits.

CAUTION: when attaching or removing the board

When operating only the outdoor unit (cooling 48.3 Hz fixed mode) to make the outdoor unit run in cooling mode, apply a voltage of 220 ~ 240V AC to L and N on the terminal board and push the pump down switch (SW1). (Avoid operating the outdoor unit alone for long periods of time.)

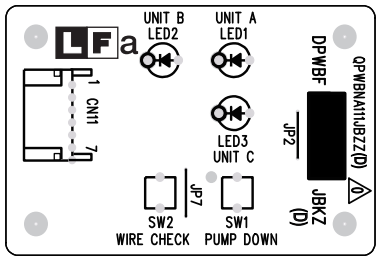
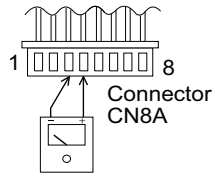
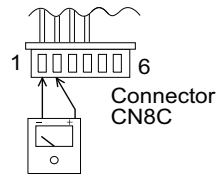


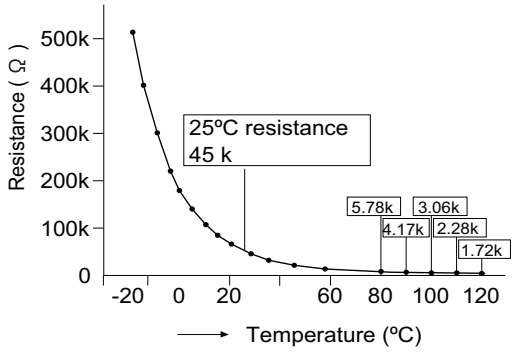
Figure 2 Temperature properties of outdoor thermistors

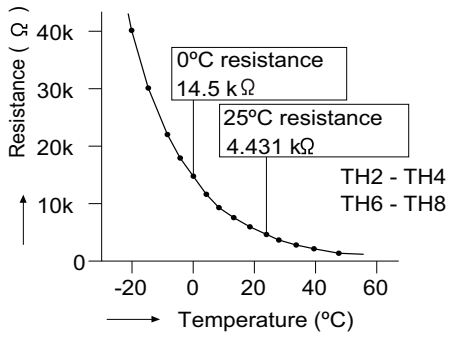
TH2 : Heat exchanger pipe thermistor (CN8A ③ - ④)
TH3 : Outdoor temp. thermistor (CN8A ⑤ - ⑥)
TH4 : Suction thermistor (CN8A ⑦ - ⑧)
TH6 : Thermistor unit A (CN8C ① - ②)
TH7 : Thermistor unit B (CN8C ③ - ④)





TH1 compressor thermistor (CN8A ① - ②)

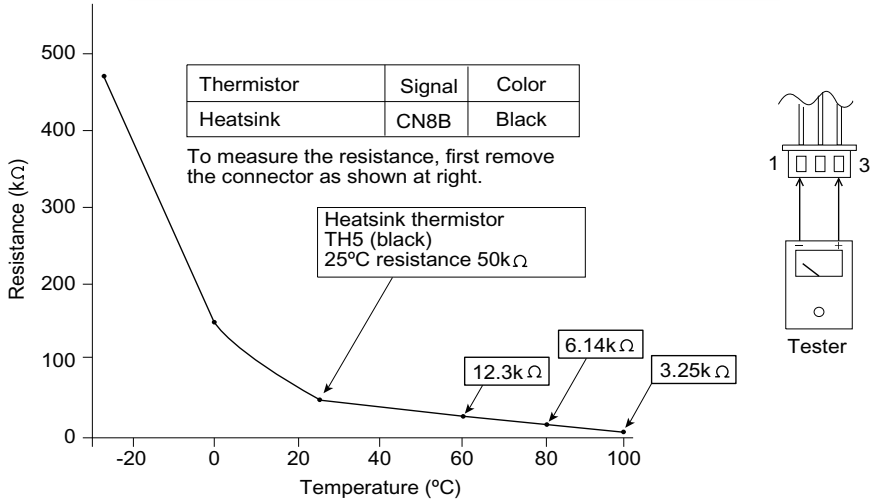




To measure the resistance, first remove the connector from the board.

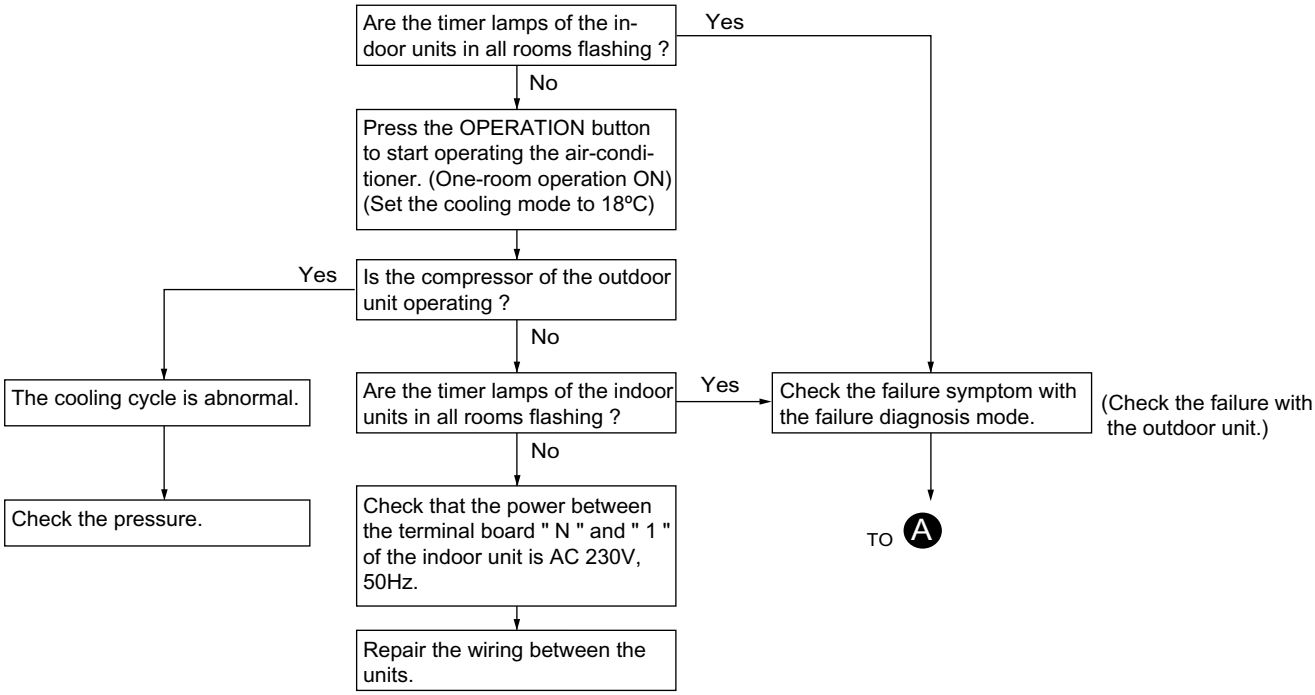
Thermistor	No.	Connector	Color	Connector pin
Compressor thermistor	TH1	CN8A	Red	No. 1 to 2
Heat exchanger pipe thermistor	TH2	CN8A	Orange	No. 3 to 4
Outdoor temp. thermistor	TH3	CN8A	Green	No. 5 to 6
Suction thermistor	TH4	CN8A	Black	No. 7 to 8
Thermistor unit A (suction)	TH6	CN8C	Blue	No. 1 to 2
Thermistor unit B (suction)	TH7	CN8C	White	No. 3 to 4

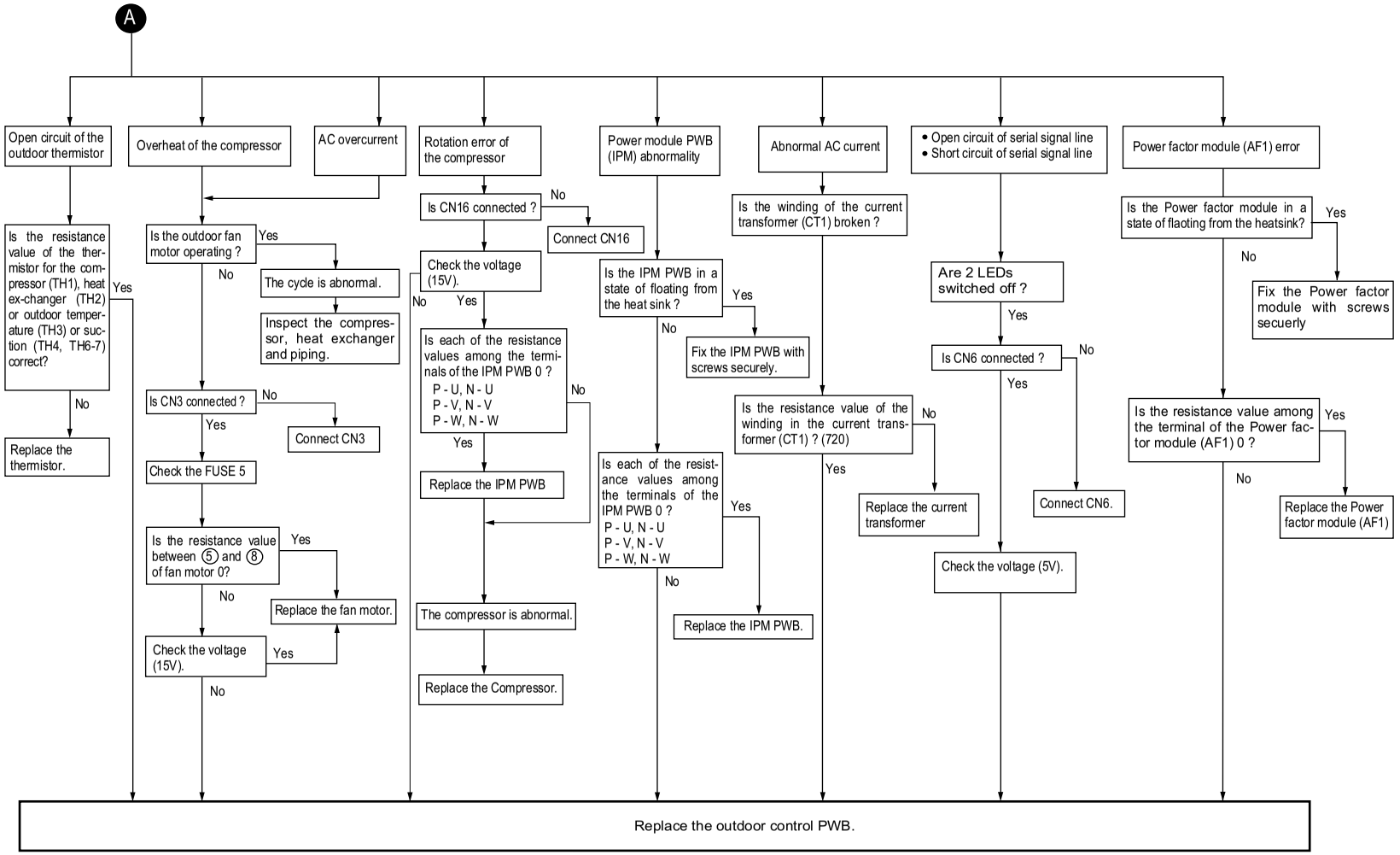
Figure 3 Temperature properties of heatsink thermistor



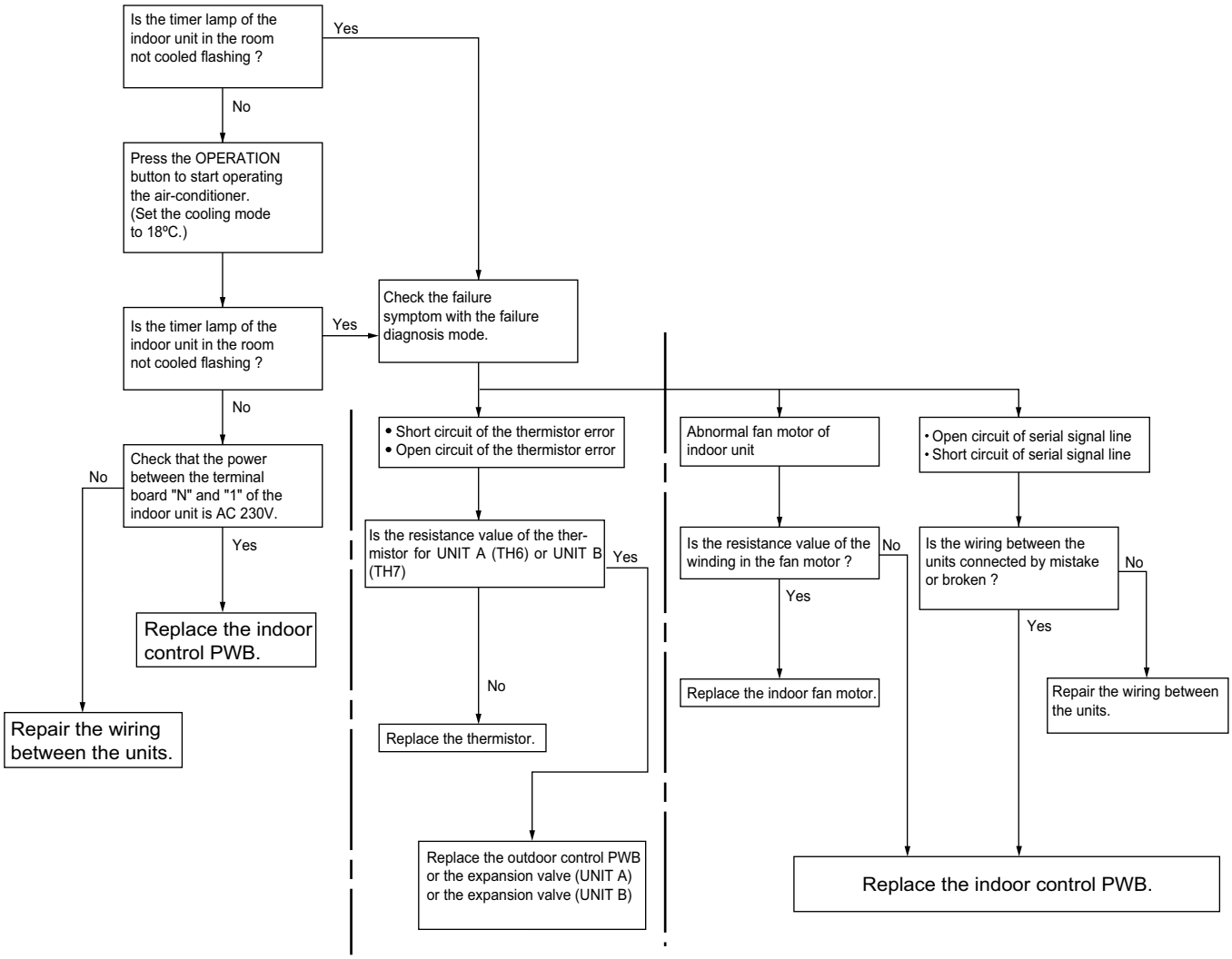
2. How to distinguish the defective parts

1. When all rooms are not cooled

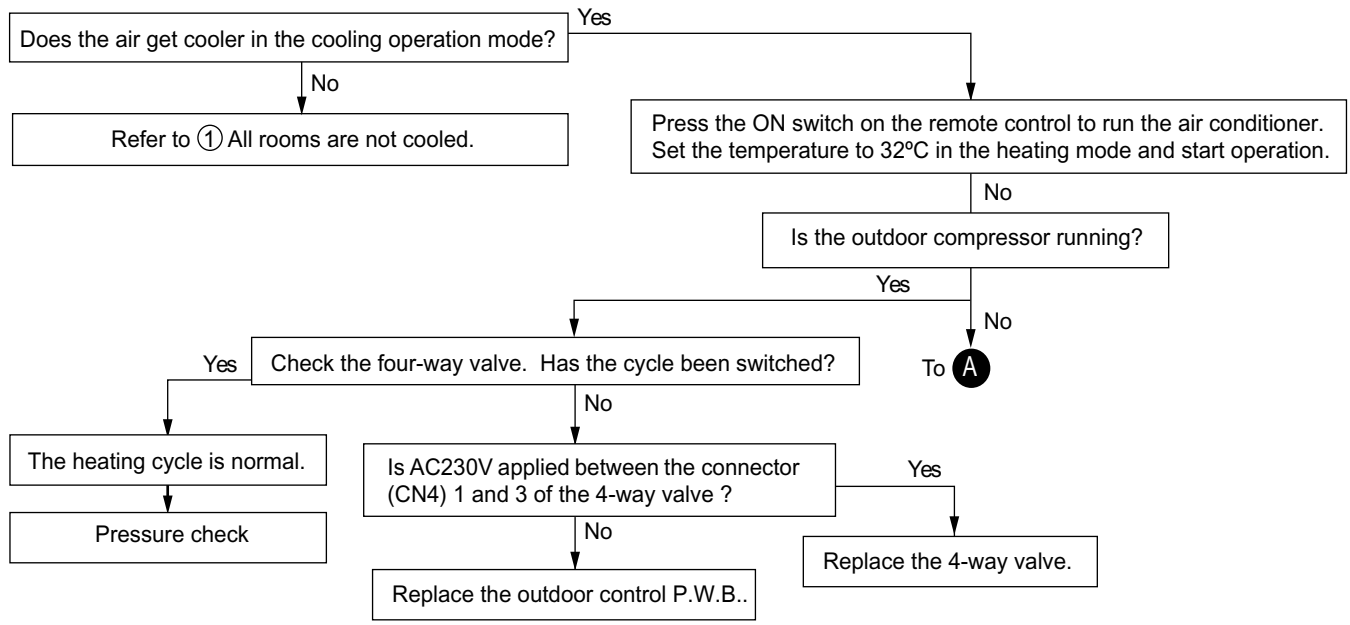



A
Open circuit of the outdoor thermistor
Overheat of the compressor
AC overcurrent
Rotation error of the compressor
Power module PWB (IPM) abnormality
Abnormal AC current
• Open circuit of serial signal line
• Short circuit of serial signal line
Power factor module (AF1) error
Is the resistance value of the thermistor for the compressor (TH1), heat ex-changer (TH2) or outdoor temperature (TH3) or suction (TH4, TH6-7) correct?
Yes
No
Replace the thermistor.
Is the outdoor fan motor operating ?
Yes
No
The cycle is abnormal.
Inspect the compressor, heat exchanger and piping.
Is CN3 connected ?
No
Yes
Connect CN3
Check the FUSE 5
Is the resistance value between ⑤ and ⑧ of fan motor 0?
Yes
No
Replace the fan motor.
Check the voltage (15V).
Yes
No
Is CN16 connected ?
No
Connect CN16
Check the voltage (15V).
No
Yes
Is each of the resistance values among the terminals of the IPM PWB 0 ?
P - U, N - U
P - V, N - V
P - W, N - W
No
Yes
Replace the IPM PWB
The compressor is abnormal.
Replace the Compressor.
Is the IPM PWB in a state of floating from the heat sink ?
Yes
No
Fix the IPM PWB with screws securely.
Is each of the resistance values among the terminals of the IPM PWB 0 ?
P - U, N - U
P - V, N - V
P - W, N - W
Yes
No
Replace the IPM PWB.
Is the winding of the current transformer (CT1) broken ?
Is the resistance value of the winding in the current transformer (CT1) ? (720)
No
Yes
Replace the current transformer
Are 2 LEDs switched off ?
Yes
Is CN6 connected ?
No
Yes
Connect CN6.
Check the voltage (5V).
Is the Power factor module in a state of flaoting from the heatsink?
Yes
No
Fix the Power factor module with screws securely
Is the resistance value among the terminal of the Power factor module (AF1) 0 ?
Yes
No
Replace the Power factor module (AF1)
Replace the outdoor control PWB.

2. When one room is not cooled (other rooms are cooled)

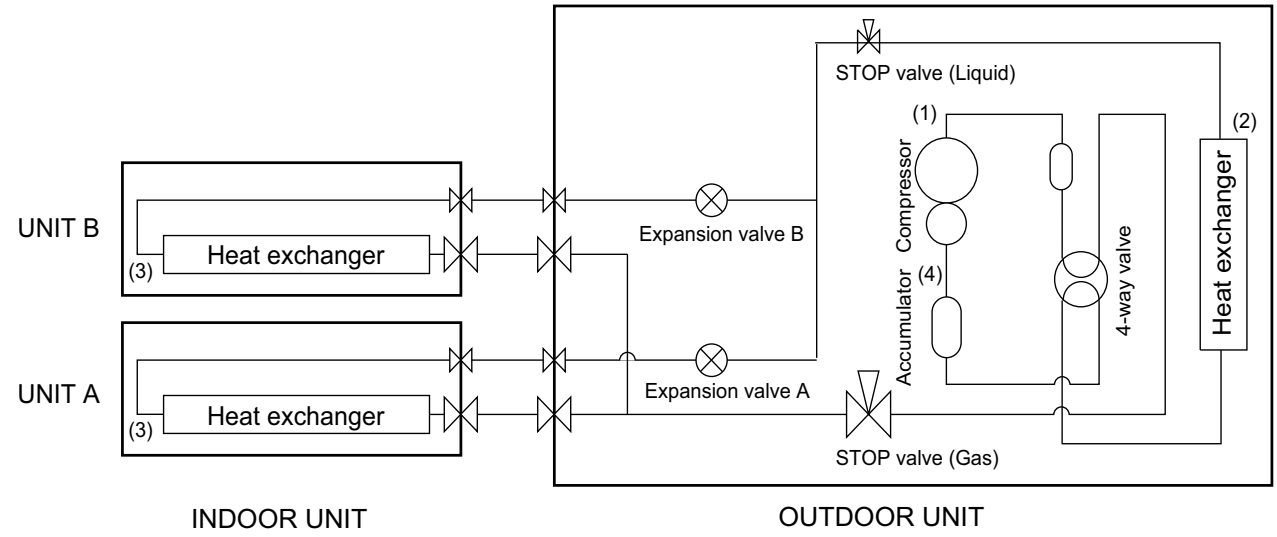


3. When all rooms are not heated

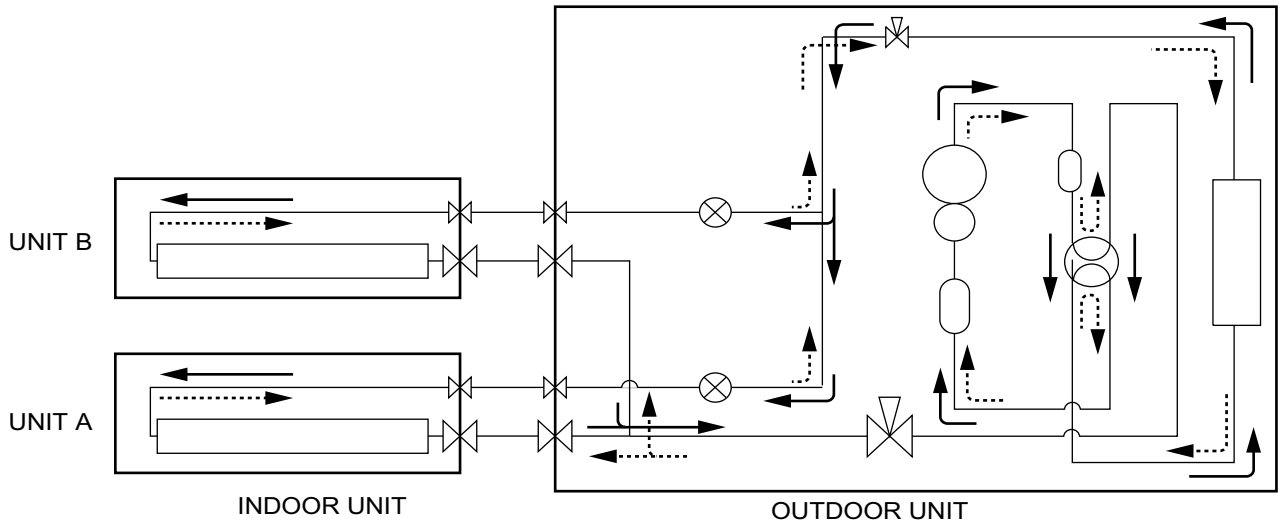


CHAPTER 4. REFRIGERATION CYCLE

[1] REFRIGERATION SYCLE



Refrigeration Cycle



Flow of Refrigerant

1. Cycle temperature and pressure in stop valve

Running unit	No	Operation Mode			
		Cool (MAX)	Cool (Test run)	Heat (MAX)	Heat (Test run)
AY-XPM7FR & AY-XPM7FR & (2 units)	(1)	72	63	69	43
	(2)	40	38	1	3
	(3)	13	15	28	24
	(4)	17	21	4	4
	Stop valve pressure (gas side) (MPa gauge)	1.00	1.13	2.35	1.72
	Frequency (Hz)	60	35	70	30
AY-XPM12FR (1 unit)	(1)	80	67	77	54
	(2)	38	37	2	3
	(3)	10	13	39	28
	(4)	12	18	3	5
	Stop valve pressure (gas side) (MPa gauge)	0.78	1.01	3.20	2.25
	Frequency (Hz)	65	35	70	35

Running unit	No	Operation Mode			
		Cool (MAX)	Cool (Test run)	Heat (MAX)	Heat (Test run)
AY-XPM9FR (1 unit)	(1)	73	63	77	48
	(2)	37	37	2	4
	(3)	10	14	38	28
	(4)	14	20	4	5
	Stop valve pressure (gas side) (MPa gauge)	0.87	1.07	3.12	1.98
	Frequency (Hz)	50	30	60	25
AY-XPM7FR (1 unit)	(1)	68	62	69	41
	(2)	37	36	3	4
	(3)	11	14	34	28
	(4)	16	20	5	6
	Stop valve pressure (gas side) (MPa gauge)	0.93	1.07	2.83	1.79
	Frequency (Hz)	40	20	50	20

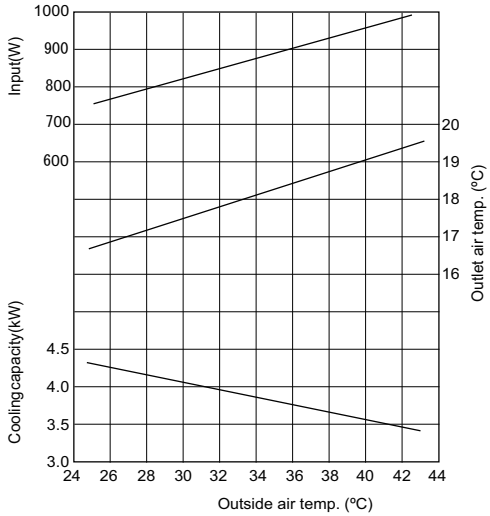
Standard conditions

	Indoor side		Outdoor side	
	Dry-bulb temp. (°C)	Relative humidity (%)	Dry-bulb temp. (°C)	Relative humidly (%)
Cooling	27	47	35	40
Heating	20	–	7	87

2. PERFORMANCE CURVES

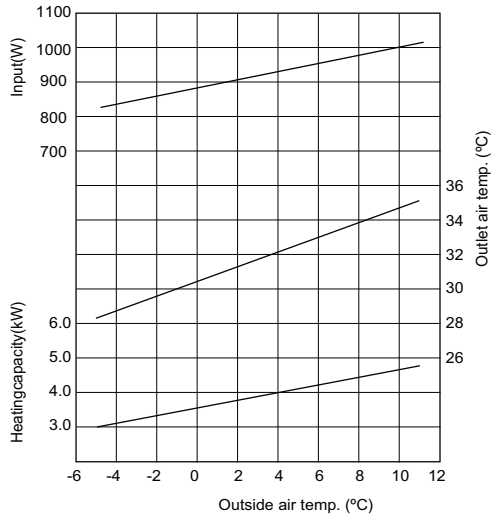
NOTE: Total cooling capacity and total input with 2 units running.

(Running frequency: 50HZ)



At Cooling for AY-XPM9FR (for AE-X2M14LR)

(Running frequency: 60HZ)



At Heating for AY-XPM9FR (for AE-X2M14LR)

[2] REFRIGERANT PIPE INSTALLATION WORKS

1. Piping

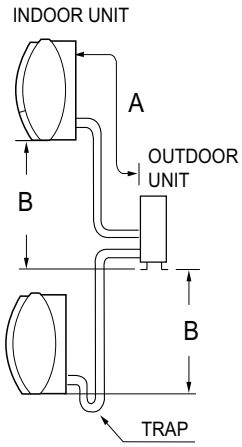
Max. piping length A ---------- 25m

Min. piping length A ---------- 3m

Max. total piping length of all unit --- 40m

Max. level difference B ---------- 10m

- If total piping length exceeds 25m, add 15g of refrigerant per 1m.
- When the outdoor unit is placed at a higher level than the indoor units, provide a trap near the hose's lead-in port.



2. Air-removing

Use an adapter for preventing vacuum pump oil from flowing back to the gauge manifold hose. ON/OFF operation of the vacuum pump should be made by the adapter switch.

1) Remove both valve shaft caps of the stop valves.
2) Remove the service port cap of the stop valve (gas side).
3) Connect the gauge manifold hose to the service port and the vacuum pump. Be sure that the hose end to be connected to the service port has a valve core pusher.
4) Open the gauge manifold valve and operate the vacuum pump for 10-15 minutes. Make sure the compound gauge reads -0.1MPa (-76cmHg).
5) Close the gauge manifold valve.
6) Turn off the vacuum pump.
7) Fully open the stop valve (liquid side) with hexagon socket screw key. Turn all the way up to contact.

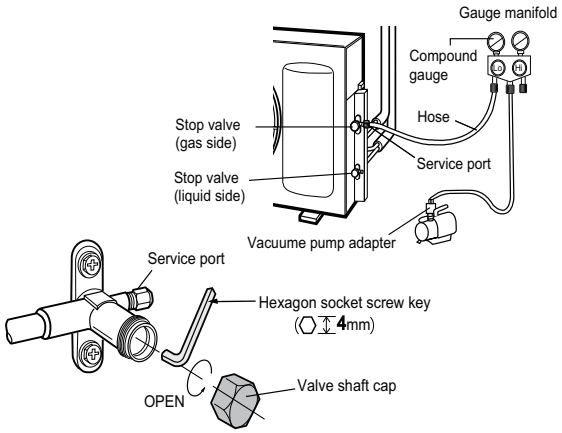
8) Fully open the stop valve (gas side) with hexagon socket screw key. Turn all the way up to contact.

9) Disconnect the gauge manifold hose from the service port.

10) Replace the service port cap and both valve shaft caps tightly. Turn until the torque suddenly increases. Now tighten a 1/6-turn more.

NOTE: * Use a gauge manifold and hoses exclusive for R410A.

* After air removal, check the tube connections for gas leak using a leakage detector or soapy water. Regarding leakage detector, use high-sensitivity type designed specially for R410A.



3. Pump down

(Pump down is adopted in the case of unit removal for reinstallation, abandonment, repair etc.) Pump down is to collect the refrigerant into the outdoor unit by control of the stop valves and the compressor.

1) Turn the circuit breaker on.

2) Check that all LED (LED1, 2) on the display board unit are flashing synchronously in a slow (one flash per second) cycle.

3) Stop the air conditioner operation.

4) Remove both valve shaft caps of the stop valves.

5) Press the PUMP DOWN SWITCH (SW1) on the display board unit for 5 seconds or more. The indoor/outdoor unit will start operation in the pump down mode. (the OPERATION lamp on the indoor unit will flash and three BEEP will be emitted.)

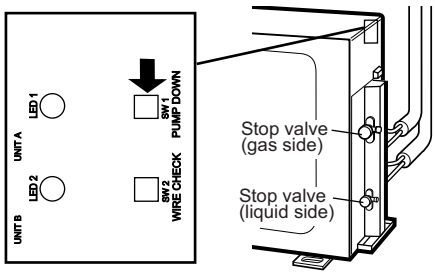
6) After 5 – 10 minutes, fully close the stop valve (liquid side) by turning the hexagon socket screw key clockwise.

7) After 2 – 3 minutes, immediately close the stop valve (gas side) fully.

8) Press the PUMP DOWN SWITCH (SW1) on the display board unit for 5 seconds or more. The operation of indoor/outdoor unit will stop.

9) Replace the service port cap and both valve shaft caps tightly.

NOTE: Wait more than 90 seconds after finishing pump down, and turn off the circuit breaker off.



CAUTION: Execute the pump down operation using with PUMP DOWN SWITCH. The compressor might stop on the way if pump down is operated while cooling operation mode without PUMP DOWN SWITCH.

4. MISWIRING CHECK

Miswiring check must be performed after installation, reinstallation and service. This multi-type air conditioner is designed with a WIRE CHECK SWITCH on the outdoor unit, and miswiring of unit-to-unit wiring will be self-corrected by microcomputer. Miswiring check may not be performed when the outdoor temperature is below 5°C.

1) Complete the unit-to-unit wiring/piping and perform the air removing of the pipes. Turn the electrical circuit breaker ON. Before turning the circuit breaker ON, make sure no one is working on the indoor units installation. Electrical shock or injury may occur.

2) Check that all LED (LED1, 2) on the display board unit are flashing synchronously in a slow (one flash per second) cycle. If either one or more of all LED is/are kept lighted on, check and correct the wrong wirings among, ⏚N, 1, 2, terminals so that all LED will flash slowly, showing normal condition.

3) Press the WIRE CHECK SWITCH (SW2) on the display board unit for 5 seconds or more. The flashing of all LED will change. Mis-wiring (mis-piping) check will start and the indoor and outdoor units will start operating. (The red operation lamp on the indoor unit will flash, and three BEEP will be emitted.) Miswiring of unit-to-unit wiring will be self-corrected.

4) Wrong piping works cannot be corrected, and will be detected as an error. When an error is detected during checking, all LED will show triple flash for eight times. The indoor and outdoor operation will stop. Turn the circuit breaker OFF and check and correct the miswiring (mispiping)*. After correction, return to step 1 and repeat the miswiring (mispiping) check again. If error is still detected, or other types of LED signal should be indicated, please contact a service technician. (Refer to wiring diagram attached inside the outdoor unit cabinet for self diagnosis signal.)

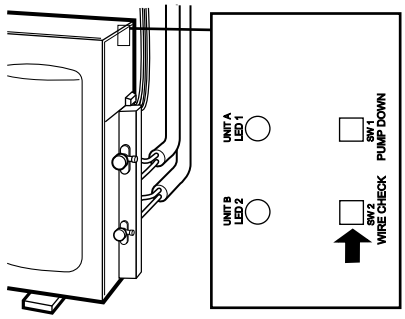
5) All LED (LED1, 2) will flash synchronously in a slow (one flash per second) cycle when miswiring (mispiping) check is completed with no error detection (3–6 minutes), and the operation of indoor and outdoor units will stop. (The red operation lamp flashing on the indoor unit will go off.)

6) Place the control box cover back in the reverse order.

*Correction points on error detection

a) Are all piping the total multi air conditioner system connected?

b) Are the stop valves open?



CHAPTER 5. DISASSEMBLING PROCEDURE

If, in carrying out repairs and modifications, the work requires the use of arc- and flame-producing apparatus, such as welding, brazing and soldering equipment, this work shall only be started after the rooms have been thoroughly ventilated. While the work is being carried out, the mechanical ventilation, if any, shall be kept in constant operation and all windows and doors kept open. In the case of repairs to parts of the refrigerant circuit, it may be necessary that not only the workman but also a second person shall be present for observation and assistance.

Necessary protective equipment shall be available and, in the case of open flames or arcs, fire extinguishing apparatus shall be ready to hand.

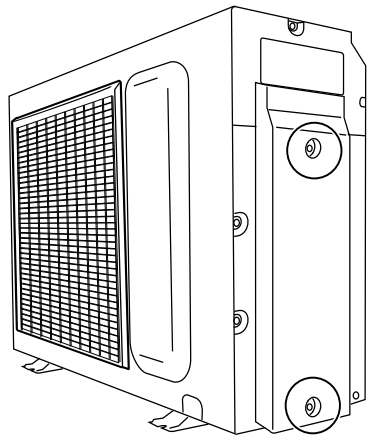
Welding and brazing shall be carried out by qualified workmen.

[1] OUTDOOR UNIT

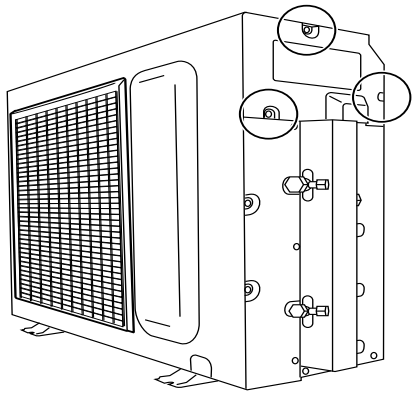
CAUTION: DISCONNECT THE UNIT FROM POWER SUPPLY BEFORE ANY SERVICING.

1. PROCEDURE

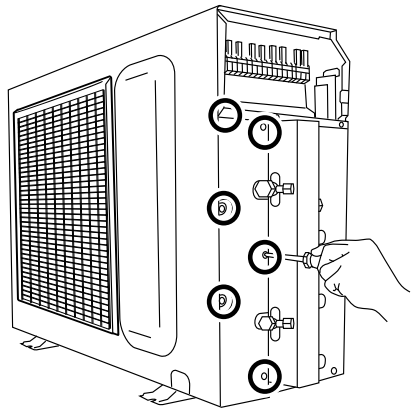
1. Remove the 2 screws fixing the pipe cover then remove it.



2. Remove the 3 screws fixing the control box cover then remove it.



3. Remove the 6 screws fixing the side cover R then remove it.



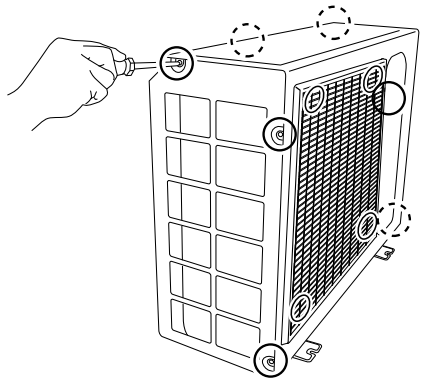
4. Remove the 4 screws fixing the fan guard then remove it and remove the 7 screws fixing the cabinet then remove it.

   3 screws are at the left.

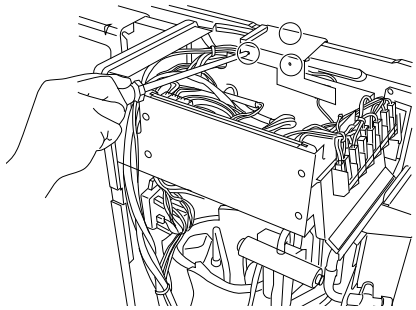
   2 screws are at the right.

   1 screw is at the front.

   1 screw is at the rear.

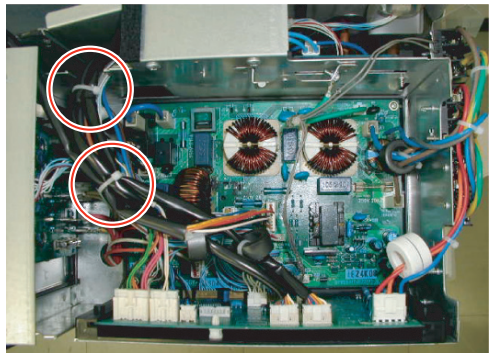


5. Remove the 3 screws fixing the control box angle then remove it.



CAUTION: DISCHARGE ELECTROLYTIC CAPACITOR BEFORE TOUCHING THIS CAPACITOR OR OTHER COMPONENTS OR WIRINGS.

6. Cut the 2 wire fixing bands.



7. Disconnect the 9 connectors.

   Expansion valve (CN12A, CN12B): 2pcs.

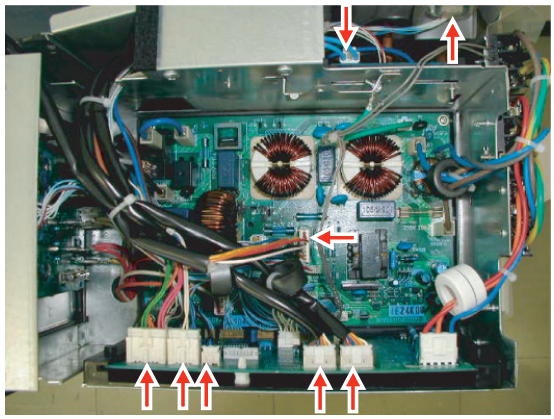
   Thermistor (CN8A, CN8B): 2pcs.

   Fan motor (CN3): 1pc.

   Reverse valve coil (CN4): 1pc

   Display board unit (CN11): 1pc

NOTE: Caution to connectors position especially the expansion valves, when reinstalling



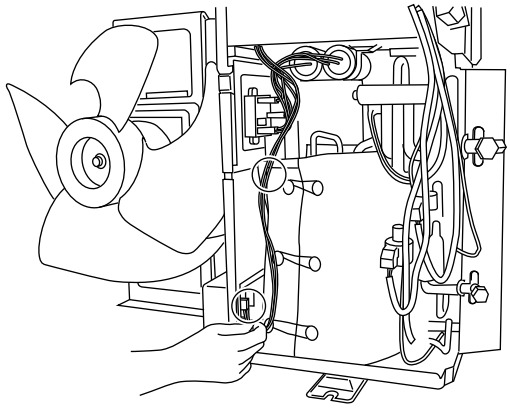
8. Remove the compressor cover B.

   Disconnect 5 terminals.

   Coil for PFC1 (L1): 2pcs (White)

   Compressor: 3pcs (Red, White and Orange)

NOTE: Caution to connectors position especially the compressor, when reinstalling.

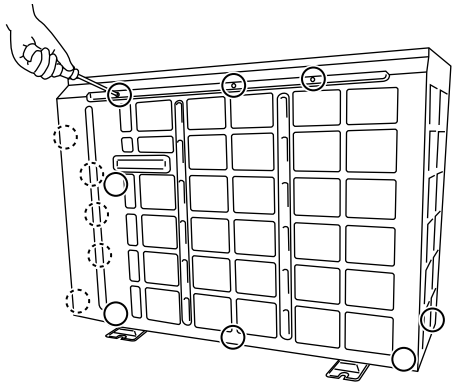


9. Remove the 13 screws fixing the rear cabinet then remove it.

   1 screw is at the left.

   5 screws are at the right.

   7 screws are at the rear.



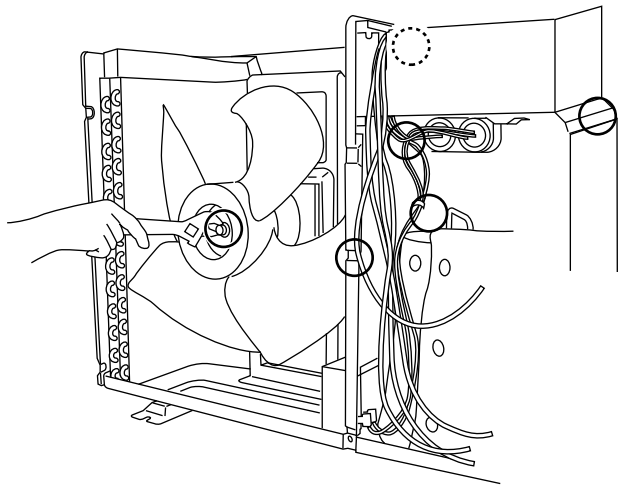
10. Unfasten the nut fixing the propeller fan then remove it.

    Remove the 5 screws fixing the control box then remove it.

    1 screw is at the right.

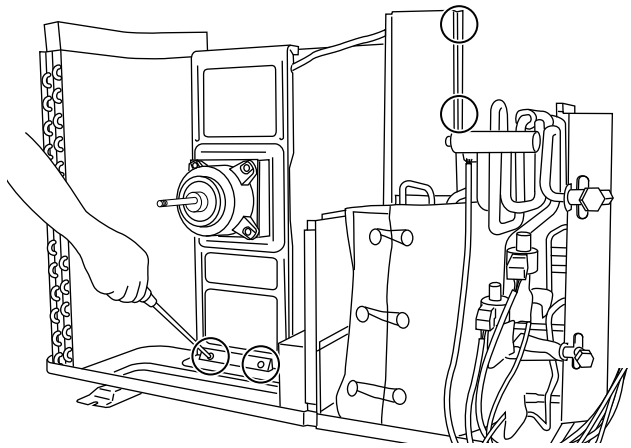
    4 screws are at the front.

NOTE: How to disassemble of control box assembly is shown in step 15 - 25.

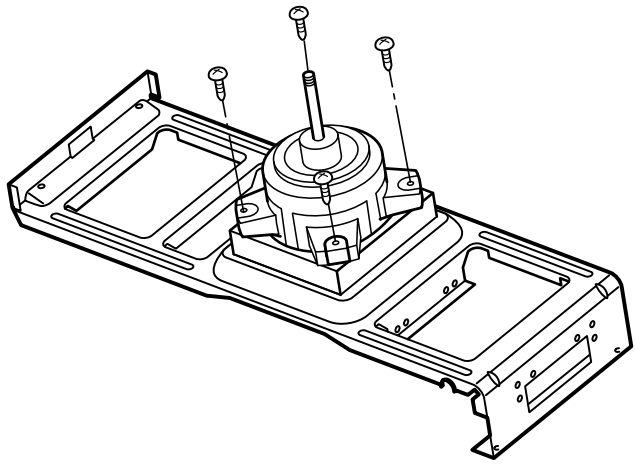


11. Remove the 2 screws fixing the fan motor angle assembly then remove it with lifting up as unhook the hook on the base pan.

    Remove the 3 screws fixing the fan bulkhead assembly then remove.

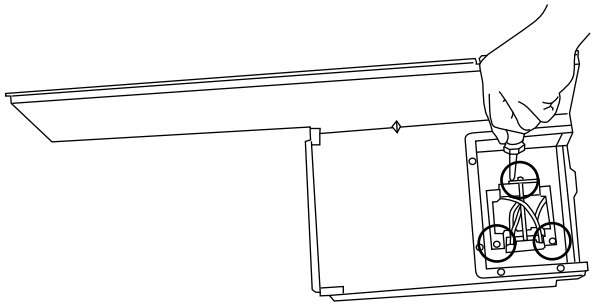


12. Remove the 4 screws fixing the fan motor then remove it.

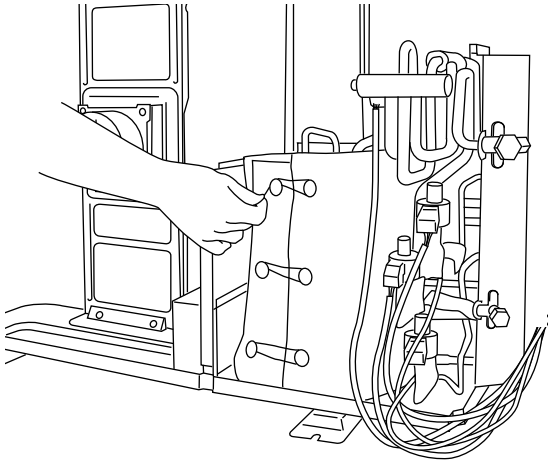


13.Remove the 3 screws fixing the coil for PFC then remove it

NOTE: When the coil re-install, silicone grease must be paste to the back face of the coil.

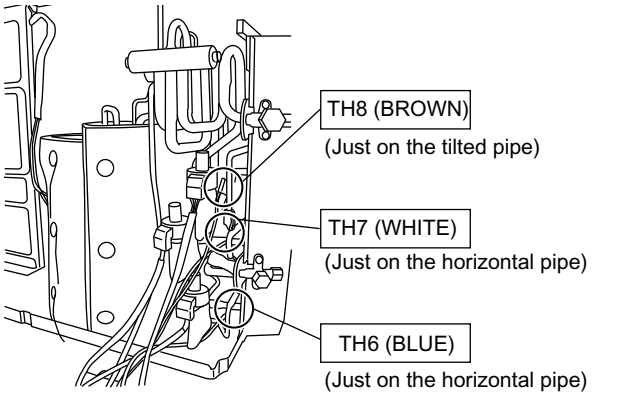


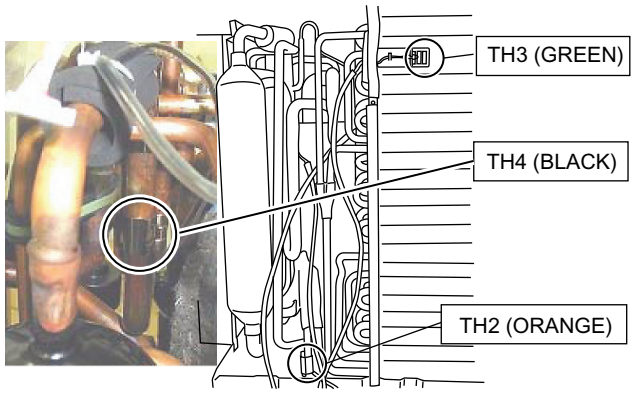
14.Remove the 3 strings on the compressor cover A then remove it



15.Remove the 6 thermistors on copper tube.

NOTE: Caution to position when re-installing.



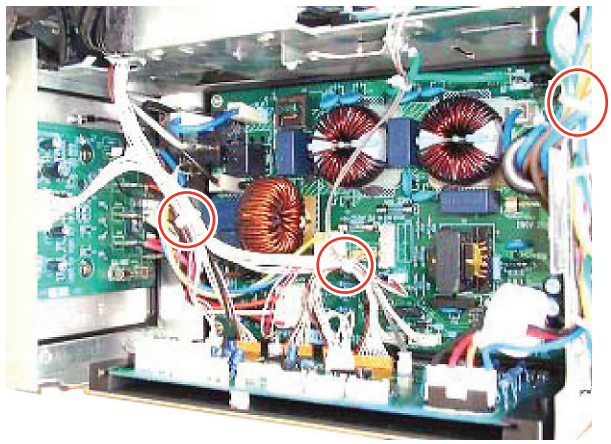


Refer to page 5-5 (Mounting position of thermistors and expansion valves)

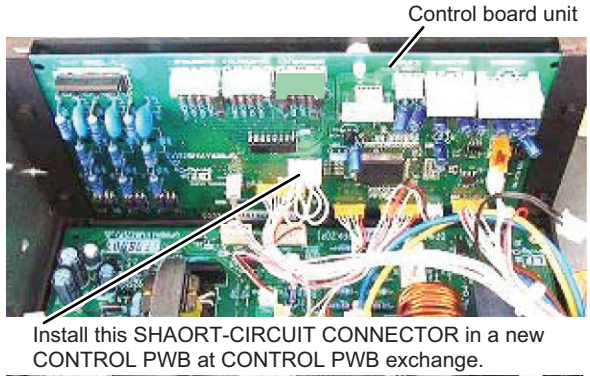
How to disassemble the control box assembly

16.Cut the 3 wire fixing bands.

Disconnect the 7 connectors. [CN6, CN15, CN9A, CN16, CN17, CN5, CN101 (IPM)]

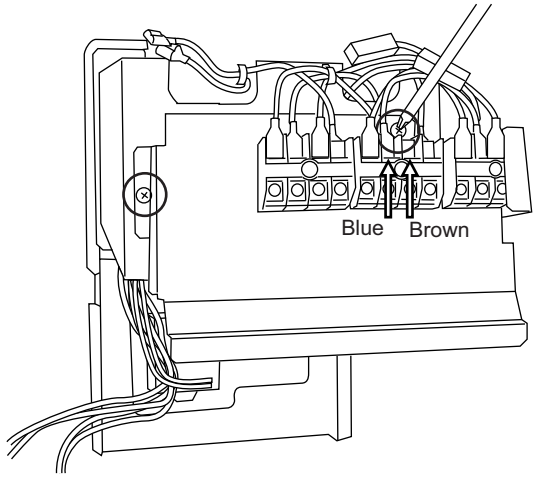


Lift up the Control Board Unit (PWB) and remove it.

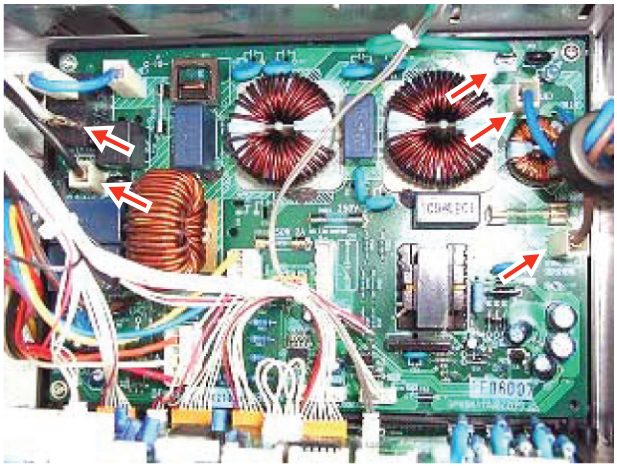


17.Disconnect the 2 terminals (Blue and Brown).

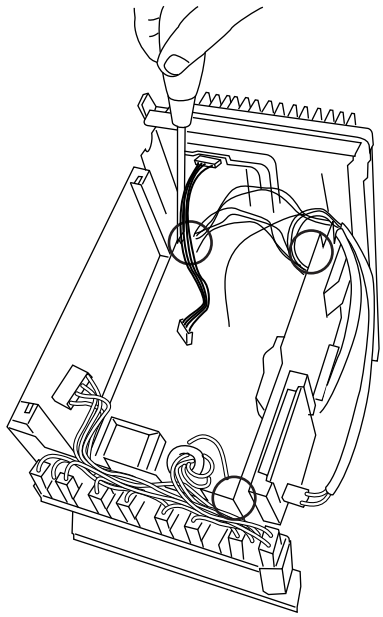
And Remove the 3 screws fixing the terminal board angle assembly then turn it inside out.



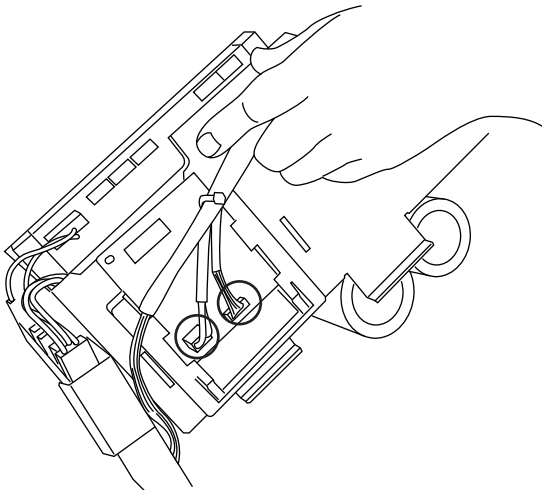
18.Disconnect the 5 terminals (T1, 2, 4, 6, MRY1) and 3 connectors (CN14, CN2, CN13 (Active Filter)).



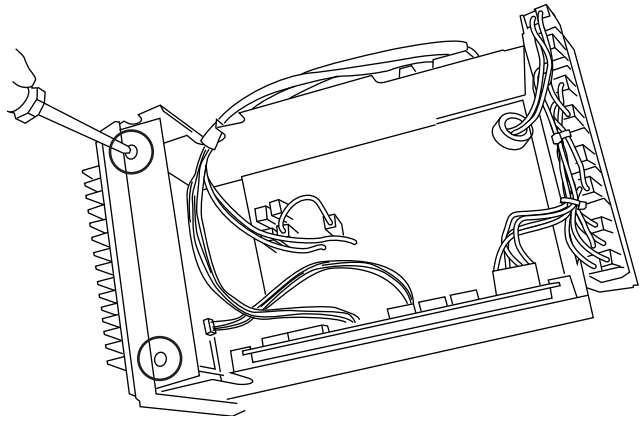
19.Remove the 3 screws fixing the power supply board unit (PWB).



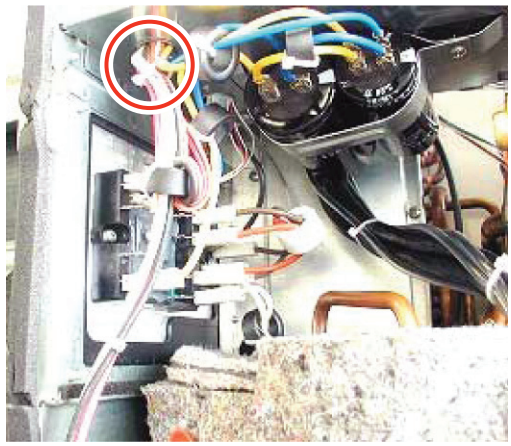
20.Disconnect 2 connectors (CN1,CN9). Then lift up the relay board unit (PWB) and remove it.



21.Remove the 2 screws fixing the heat sink cover then remove it.



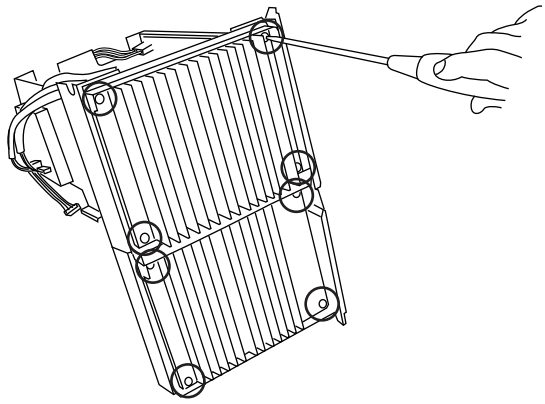
22.Cut a wire fixing board.



23.Remove the each of 4 screws fixing the heat sink.

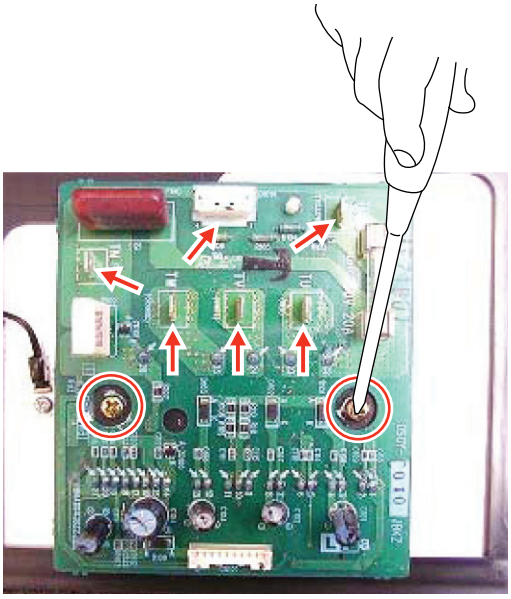
NOTE: Confirm two kinds of spacer put in 4 holes have clung.

Seal the 4 burring holes with silicone sealer before reinstalling.



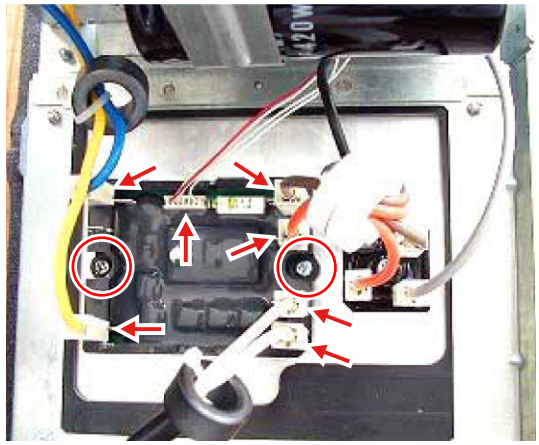
24. Disconnect the 5 terminals (TP, TU, TV. TW, TN) and 1 connector (CN114) on the IPM PWB. And Remove the 2 screws fixing the IPM PWB and remove it.

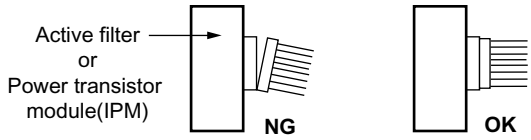
NOTE: When the IPM PWB re-install, silicone grease must be paste to the back face of the IPM.



25. Disconnect the 6 terminals (P, Io, +, -, L1, L2) and 1 connector (CN13) on the active filter. And Remove the 2 screws fixing the power module and remove it.

NOTE: When the active filter re-install, silicone grease must be paste to the back face of the Active Filter.





CAUTION: Fix the connector of the power module securely.

2. Mounting position of thermistors and expansion valves

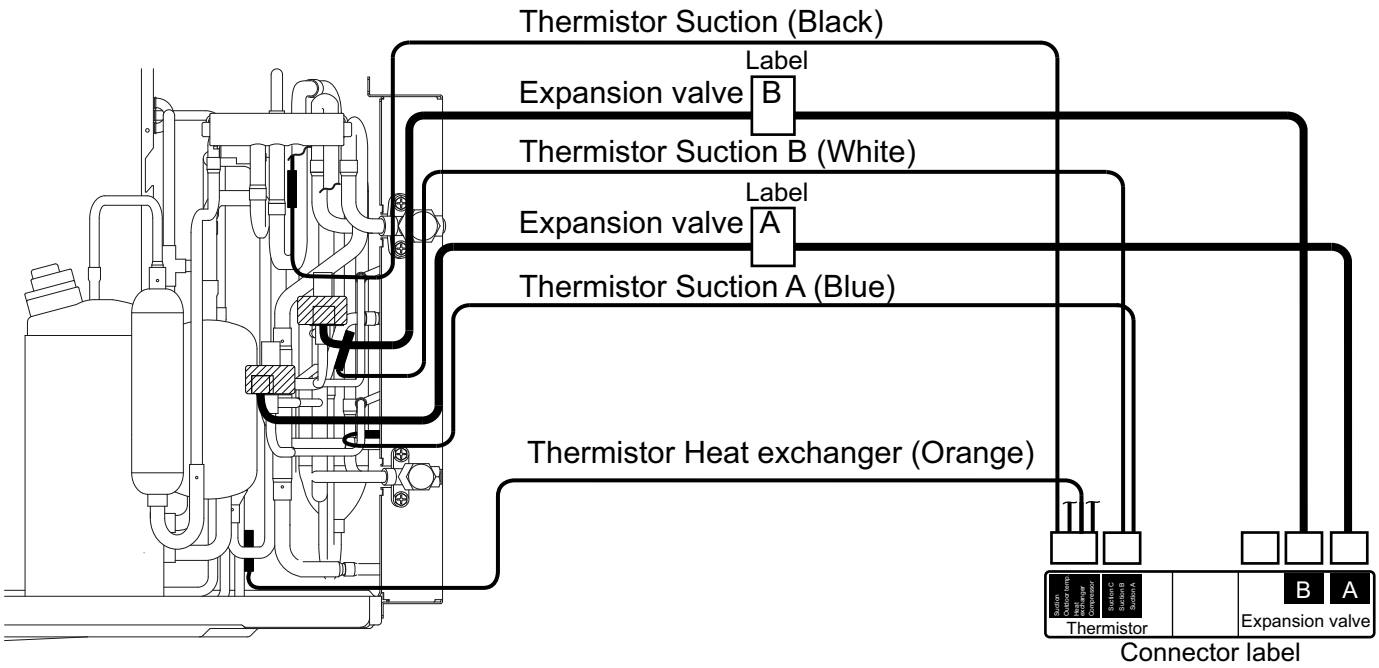
Mounting position of thermistors and expansion valves are shown below.

Thermistor

- Check the cord color of thermistor before mounting.
- Thermistor Suction, Suction A, Suction B, Suction C are mounted on GAS side pipes.
- Thermistor Heat exchanger is mounted on LIQUID side pipe.

Expansion valve

- Check the labels before connecting to the Control Board Unit.



CAUTION: Mismounting and misconnecting will cause error or failure.

MEMO

SHARP **PARTS GUIDE**

MULITI SPLIT TYPE ROOM AIR CONDITIONERS (OUTDOOR UNIT)

MODEL AE-X2M14LR

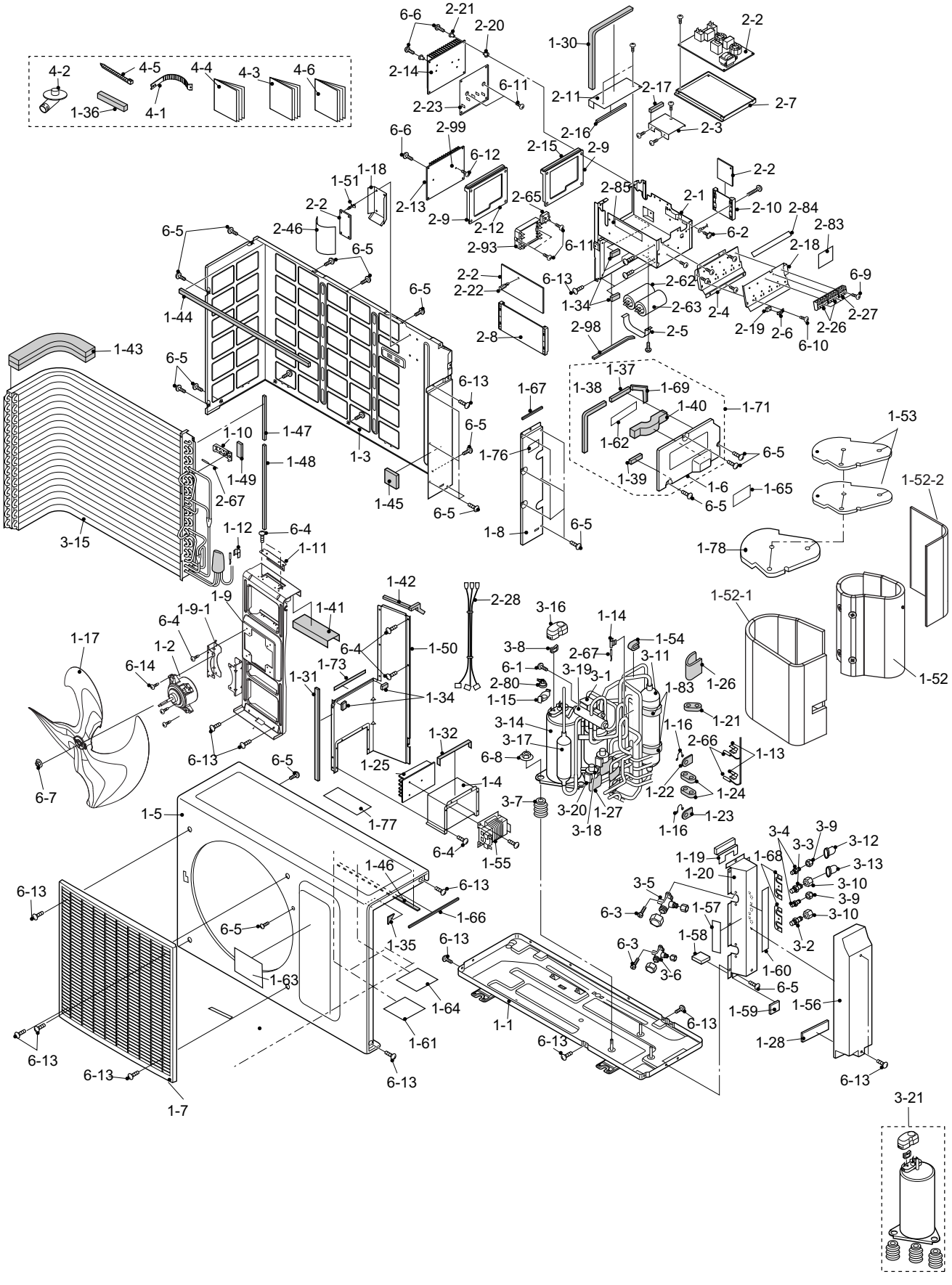
In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

CONTENTS

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.

SHARP CORPORATION

[1] OUTDOOR UNIT

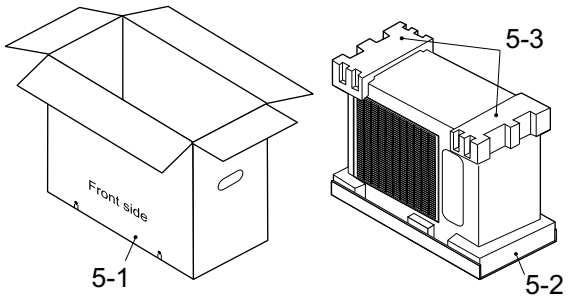


NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
[1] OUTDOOR UNIT					
					CABINET AND UNIT PARTS
1-1	CCHS-A789JBTB	BD			Base pan assembly
1-2	CMOTLB426JBEZ	CA			Fan motor
1-3	DCAB-A161JBTA	BN			Rear cabinet assembly
1-4	FCOV-A330JBWZ	AZ			Coil cover assembly
1-5	GCAB-A366JBTA	BR			Cabinet
1-6	GFTA-A455JBTB	AP			Control box cover
1-7	GGADFA042JBFA	BH			Fan guard
1-8	GPLTMA059JBTB	AF			Side cover R
1-9	LANGKA236JBPZ	AY			Motor angle
1-9-1	LANGKA253JBPZ	AM			Fan Motor angle sub
1-10	LHLD-A574JBFA	AE			Thermistor holder
1-11	LSUB-A024JBPZ	AP			Motor angle sub
1-12	MSPR-A026JBE0	AB			Spring
1-13	MSPR-A027JBE0	AB			Thermistor spring
1-14	MSPR-A036JBE0	AB			Thermistor spring
1-15	MSPR-A046JBE0	AC			Protector spring
1-16	MSPR-A129JBE0	AD			Cycle spring
1-17	NFANPA142JBFA	BE			Propeller fan
1-18	PCOV-A578JBEZ	AE			Sw board cover
1-19	PCOV-A589JBEZ	AF			Cover
1-20	PDAi-A241JBTA	BC			Flare coupling base
1-21	PGUM-A115JBEZ	AM			Damper rubber
1-22	PGUM-A119JBEZ	AG			Valve rubber
1-23	PGUM-A120JBEZ	AG			Valve rubber
1-24	PGUM-A121JBEZ	AE			Damper rubber
1-25	PRDAFA163JBEZ	AP			Heat sink
1-26	PGUMS0170JBE0	AE			Damper rubber
1-27	PGUMSA319JBEZ	AF			Damper rubber
1-28	PSEL-D235JBEZ	AG			INSULATOR
1-30	PSEL-B954JBEZ	AF			Bulkhead insulator
1-31	PSEL-B956JBEZ	AF			Bulkhead seal
1-32	PSEL-B966JBEZ	AC			Bulkhead seal
1-34	PSEL-C011JBEZ	AC			Insulator
1-35	PSEL-C017JBEZ	AC			Cabinet seal
1-36	PSEL-C019JBEZ	AD			Insulator
1-37	PSEL-C260JBEZ	AC			Seal A
1-38	PSEL-C261JBEZ	AC			Seal B
1-39	PSEL-C262JBEZ	AC			Seal C
1-40	PSEL-C277JBEZ	AG			Cover insulator
1-41	PSEL-C282JBEZ	AD			Cushion
1-42	PSEL-C343JBEZ	AE			Bulkhead insulator A
1-43	PSEL-C353JBEZ	AP			Insulator
1-44	PSEL-C354JBEZ	AE			Insulator
1-45	PSEL-C369JBEZ	AC			Accum.cushion
1-46	PSEL-C370JBEZ	AC			Insulator
1-47	PSEL-C371JBEZ	AC			Seal
1-48	PSEL-C372JBEZ	AC			Seal
1-49	PSEL-C373JBEZ	AC			Seal
1-50	PSKR-A353JBWZ	AZ			Bulkhead
1-51	PSPA-A146JBE0	AC			Spacer
1-52	PSPF-B112JBEZ	AY			Compressor cover A2
1-52-1	PSPF-B113JBEZ	AY			
1-52-2	PSPF-B114JBEZ	AQ			
1-53	PSPF-B072JBEZ	AK			Compressor cover B2
1-54	PTUB-A196JBEZ	AK			Pipe insulator
1-55	RTRN-A294JBZZ	BG			Active coil (L1)
1-56	PCOV-B484JBFA	AG			TUBE COVER
1-57	TLAB-B709JBRA	AH			Label
1-58	PFPFPD477JBEZ	AG			INSULATOR
1-59	PSEL-D236JBEZ	AG			INSULATOR
1-60	TLAB-C250JBRA	AG			Unit label
1-61	TLAB-E544JBRZ	AM			Service label
1-62	TLAB-C773JBRZ	AN			Label
1-63	TLABMA819JBRA		N		INVERTER LABEL
1-64	TLABCC545JBRZ	AH			Wiring diagram
1-65	TSPC-G699JBRZ	AK	N		Name label
1-66	PSEL-C378JBEZ	AB			Insulator
1-67	PSEL-C379JBEZ	AB			Insulator
1-68	LSUB-A038JBWZ	AN			Flare cup.sub-S
1-69	PSEL-C382JBEZ	AC			Seal D
1-71	CFTA-A339JBKZ	AY			Control cover assembly
1-73	PSEL-C938JBEZ	AK			Insulator
1-76	TLAB-C511JBRA	AC			Label
1-77	TLAB-E787JBEZ	AK			EU energy label
1-78	PSPF-B073JBEZ	AK			Compressoor cover C2
1-83	PSEL-D274JBEZ	AG			Accum cushion
					CONTROL BOX PARTS
2-1	DBOX-A079JBYZ	AS			Cont.box spot assembly
2-2	DSGY-E095JBKZ	CB	N		Control board unit
2-3	LANG-A451JBWZ	AE			Cont.box angle
2-4	LANG-A458JBWZ	AR			Terminal board ang.
2-5	LBNDKA154JBWZ	AN			Capacitor band
2-6	LHLD-0261JBM0	AB			Cord holder
2-7	LPLTPA016JBFZ	AG			Pwb support A

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
[1] OUTDOOR UNIT					
2-8	LPLTPA017JBFZ	AG			Pwb support B
2-9	LPLTPA018JBFZ	AG			Heatsink support
2-10	LPLTPA027JBFZ	AN			Pwb support C
2-11	PCOV-A601JBWZ	AQ			Heatsink cover
2-12	PSEL-C376JBEZ	AC			Insulator
2-13	PRDAFA215JBEZ	BE			Haet sink
2-14	PRDAFA216JBEZ	BC			Heat sink
2-15	PSEL-C037JBEZ	AE			Insulator
2-16	PSEL-C074JBEZ	AC			Insulator
2-17	PSEL-C374JBEZ	AC			Seal
2-18	PSHE-A195JBEZ	AH			Angle sheet
2-19	PSHE-A196JBEZ	AE			Cord holder sheet
2-20	PSPA-A064JBE0	AA			Spacer
2-21	PSPA-A065JBE0	AA			Spacer
2-22	PSPA-A150JBZZ	AF			Spacer
2-23	DSGY-C347JBKZ	BV			IPM30A board assembly
2-26	QTANZA021JBZZ	AN			Terminal board 4P
2-27	QTANZA044JBZZ	AU			Terminal board 3P
2-28	QW-iZA120JBZZ	AU			Compressor cord (for compressor)
2-46	PSHE-A273JBEZ	AF			Protection sheet (for display PWB)
2-62	RC-AZA046JBE0	BE			Electrolytic capacitor (C9)
2-63	RC-EZA250JBZZ	BG			Electrolytic capacitor (C10)
2-65	VHDD25VB60+-1	AN			Diode bridge (DB1)
2-66	RH-HXA096JBZZ	AZ			Thermistor (TH6-TH8)
2-67	RH-HXA095JBZZ	BC			Thermistor (TH1-TH4)
2-80	RTHM-A022JBE0	AN			Thermistor (TH1)
2-83	TLAB-B777JBRZ	AC			Caution label
2-84	TLAB-D246JBRZ	AF			Label
2-85	TLAB-D243JBRZ	AM			Label
2-93	RH-TXA008JBZZ	BR			Active filter
2-98	PSEL-C377JBEZ	AC			Insulator
2-99	RHOG-A169JBE0	AK			Thermistor (HEATSINK)
					CYCLE PARTS
3-1	CCiL-A158JBKZ	AX			Coil
3-2	DVLV-A952JBKZ	AU			Flare union unit 3S
3-3	DVLV-A953JBKZ	AU			Flare union unit 3S
3-4	DVLV-A954JBKZ	AU			Flare union unit 2S
3-5	DVLV-A668JBKZ	AZ			3way valve unit
3-6	DVLV-A669JBKZ	AW			3way valve unit
3-7	GLEG-A029JBE0	AE			Comp. cushion rubber
3-8	LBSHCA005JBE0	AA			Terminal bushing
3-9	LX-NZA250JBEZ	AE			Flare nut
3-10	LX-NZA251JBEZ	AG			Flare nut
3-11	PACU-A052JBEZ	BH	N		Accumulator
3-12	PCAP-A083JBEZ	AC			Nut bonnet
3-13	PCAP-A084JBEZ	AC			Nut bonnet
3-14	PCMPRA524JBEZ	CM			Compressor
3-15	PCON-A611JBPZ	CH			Condenser
3-16	PCOV-0562JBE0	AD			Terminal cover
3-17	PMUF-A091JBEZ	AZ			Muffler
3-18	PVLVRA040JBEZ	BM			Expansion valve
3-19	PVLVXA081JBEZ	BB			Reverse valve
3-20	RMOTSA038JBZZ	BD	N		Coil
3-21	FCMPRA244JBKZ	CM			Compressor assembly (3-7, 3-8, 3-14, 3-16)
					ACCESSORY PARTS
4-1	LHLD-A459JBEZ	AD			Holder
4-2	LPFT-A029JBF0	AD			Drain joint
4-3	TiNS-B240JBRZ	AK	N		Installation manual (English, Italian)
4-4	TiNS-B241JBRZ	AK	N		Installation manual (French, Spanish)
4-5	LBND-A046JBE0	AE			Wire fixing band
4-6	TiNS-B242JBRZ	AK	N		Installation manual (Portuguese)
					SCREWS AND NUTS
6-1	LX-BZA434JBEZ	AR			Special screw
6-2	LX-BZA075JBE0	AA			Special screw (for earth)
6-3	LX-BZA078JBEZ	AB			Special screw
6-4	LX-BZA140JBE0	AB			Special screw
6-5	LX-BZA364JBEZ	AC			Special screw
6-6	LX-HZA007JBEZ	AE			Special screw
6-7	LX-NZA319JBEZ	AE			Special nut
6-8	LX-NZA313JBEZ	AE			Special nut
6-9	XBPS740P14JS0	AB			Machine screw
6-10	XCTS740P10000	AC			Tapping screw
6-11	XBPS740P20J00	AF			Machine screw
6-12	XBPS730P10000	AF			Machine screw
6-13	LX-BZA140JBE0	AB			Special screw
6-14	XTTWW40P16000	AC			Special screw

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
[2] CONTROL BOARD UNIT PARTS					
2-2	DSGY-E095JBKZ	CB	N		Control board unit
2-2-1	QFS-GA065JBZZ	BA			Fuse (FUSE1,101)
2-2-2	QFS-GA062JBZZ	AF			Fuse (FUSE3, 4)
2-2-3	QFS-GA063JBZZ	AE			Fuse (FUSE5)
2-2-4	QFS-GA064JBZZ	AF			Fuse (FUSE6)
D2-4	VHD1SR139-6-1	AB			Diode
L5	RFiLNA013JBZZ	BE			Normal coil (L5)
L6	RFiLNA007CBZZ	AR			Common coil (L6)
Q2	VS2SA1586G+-1L	AB			Transistor (Q2)
CT1	RTRN-A305JBZZ		N		Transformer (CT1)
D14	VHDRK36LF011B	AD			Diode (D14)
D19-21	VHD1SR139-6-1	AB			Diode
D26-37	VHD1SR35-4A-1	AC			Diode (D26~37)
IC1	RH-iXB001JBNA				Micro computer (IC1)
IC2	RH-iZA140JBE0	AE			Integrated circuit (IC2)
IC4	VHiSTRL472+-1	AL			Integrated circuit (IC4)
IC5	VHiKiA339F+-1L	AD			Integrated circuit (IC5)
IC6	FH-iXA494JBKZ		N		EEPROM-AEX2M4LR (IC6)
IC7	RiC--A022BDE0	AE			Integrated circuit (IC7)
IC8	VHiMM1431A+-1+	AD			Integrated circuit (IC8)
IC9	VHiNJM2904M-1R	AD			Integrated circuit (IC9)
NR1-NR3	RH-VXA002JBZZ	AF			Varistor (NR1-NR3)
PC1	VHGPC81716P-1L	AD			Photo coupler (PC1)
Q11	VSKRC245M//-3	AC			Transistor (Q11)
Q13-15	VS2SA1020Y+-1+	AH			Transistor (Q13~15)
RY1	RRLYDA008JBZZ	AH			Relay (RY1)
SA1	QSPGCA006JBZZ	AH			Surge absorb (SA1)
SW1-3	QSW-PA016DRE0	AB			Tact switch (SW1,2,3)
TR1	RTRNWA034JBZZ	AG			Transformer (TR1)
MRY1	RRLYDA010JBZZ	AN			Relay (MRY1)
PTC1	RH-QXA005JBZZ	AW			PTC thermistor (PTC1)
L3 L4	RFiL-A116JBZZ	AY			Coil (L3,4)
D1 D38	VHD1SS133//-1	AA			Diode (D1,38)
PC4.6.8	VHGPC817XP3-1L	AD			Photo coupler (PC4,6,8)
PC5.7.9	VHGPC853HXP-1R	AG			Photo coupler (PC5,7,9)
IC3 IC12	RiC--A025BDE0	AE			Integrated circuit (IC3, IC12)
[3] IPM30A BOARD PARTS					
2-23	DSGY-C347JBKZ	BV			IPM30A board assembly
2-23-1	RH-iXA859JBZZ	BQ			Power module (PS21267-P)
R1	RR-WZA028JBE0	AE			Cement Resistor (R100)
	RH-TXA008JBZZ	BR			ACTIVE FILTER(SACT32420G)
	VHDD25VB+-1				DIODE BRIDGE(D25VB60)

[4] PACKING PARTS



NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
[4] PACKING PARTS					
5-1	SPAKCC801JBEZ	BD	N		Packing case
5-2	CPADBA131JBKZ	AZ			Bottom pad assembly
5-3	CPADBA132JBKZ	AS			Packing pad assembly

■INDEX

PARTS CODE	No.	PRICE RANK	NEW MARK	PART RANK
【 C 】				
CCHS-A789JBTB	1-1-1	BD		
CCiL-A158JBKZ	1-3-1	AX		
CFTA-A339JBKZ	1-1-71	AY		
CMOTLB426JBEZ	1-1-2	CA		
CPADBA131JBKZ	4-5-2	AZ		
CPADBA132JBKZ	4-5-3	AS		
【 D 】				
DBOX-A079JBYZ	1-2-1	AS		
DCAB-A161JBTA	1-1-3	BN		
DSGY-C347JBKZ	1-2-23	BV		
〃	3-2-23	BV		
DSGY-E095JBKZ	1-2-2	CB	N	
〃	2-2-2	CB	N	
DVLV-A668JBKZ	1-3-5	AZ		
DVLV-A669JBKZ	1-3-6	AW		
DVLV-A952JBKZ	1-3-2	AU		
DVLV-A953JBKZ	1-3-3	AU		
DVLV-A954JBKZ	1-3-4	AU		
【 F 】				
FCMPRA244JBKZ	1-3-21	CM		
FCOV-A330JBWZ	1-1-4	AZ		
FH-iXA494JBKZ	2-iC6		N	
【 G 】				
GCAB-A366JBTA	1-1-5	BR		
GFTA-A455JBTB	1-1-6	AP		
GGADFA042JBFA	1-1-7	BH		
GLEG-A029JBE0	1-3-7	AE		
GPLTMA059JBTB	1-1-8	AF		
【 L 】				
LANG-A451JBWZ	1-2-3	AE		
LANG-A458JBWZ	1-2-4	AR		
LANGKA236JBPZ	1-1-9	AY		
LANGKA253JBPZ	1-1-9-1	AM		
LBND-A046JBE0	1-4-5	AE		
LBNDKA154JBWZ	1-2-5	AN		
LBSHCA005JBE0	1-3-8	AA		
LHLD-0261JBM0	1-2-6	AB		
LHLD-A459JBEZ	1-4-1	AD		
LHLD-A574JBFA	1-1-10	AE		
LPFT-A029JBF0	1-4-2	AD		
LPLTPA016JBFZ	1-2-7	AG		
LPLTPA017JBFZ	1-2-8	AG		
LPLTPA018JBFZ	1-2-9	AG		
LPLTPA027JBFZ	1-2-10	AN		
LSUB-A024JBPZ	1-1-11	AP		
LSUB-A038JBWZ	1-1-68	AN		
LX-BZA075JBE0	1-6-2	AA		
LX-BZA078JBEZ	1-6-3	AB		
LX-BZA140JBE0	1-6-4	AB		
〃	1-6-13	AB		
LX-BZA364JBEZ	1-6-5	AC		
LX-BZA434JBEZ	1-6-1	AR		
LX-HZA007JBEZ	1-6-6	AE		
LX-NZA250JBEZ	1-3-9	AE		
LX-NZA251JBEZ	1-3-10	AG		
LX-NZA313JBEZ	1-6-8	AE		
LX-NZA319JBEZ	1-6-7	AE		
【 M 】				
MSPR-A026JBE0	1-1-12	AB		
MSPR-A027JBE0	1-1-13	AB		
MSPR-A036JBE0	1-1-14	AB		
MSPR-A046JBE0	1-1-15	AC		
MSPR-A129JBE0	1-1-16	AD		
【 N 】				
NFANPA142JBFA	1-1-17	BE		
【 P 】				
PACU-A052JBEZ	1-3-11	BH	N	
PCAP-A083JBEZ	1-3-12	AC		
PCAP-A084JBEZ	1-3-13	AC		
PCMPRA524JBEZ	1-3-14	CM		
PCON-A611JBPZ	1-3-15	CH		
PCOV-0562JBE0	1-3-16	AD		
PCOV-A578JBEZ	1-1-18	AE		
PCOV-A589JBEZ	1-1-19	AF		
PCOV-A601JBWZ	1-2-11	AQ		
PCOV-B484JBFA	1-1-56	AG		
PDAi-A241JBTA	1-1-20	BC		
PFPFPD477JBEZ	1-1-58	AG		

PARTS CODE	No.	PRICE RANK	NEW MARK	PART RANK
PGUM-A115JBEZ	1-1-21	AM		
PGUM-A119JBEZ	1-1-22	AG		
PGUM-A120JBEZ	1-1-23	AG		
PGUM-A121JBEZ	1-1-24	AE		
PGUMS0170JBE0	1-1-26	AE		
PGUMSA319JBEZ	1-1-27	AF		
PMUF-A091JBEZ	1-3-17	AZ		
PRDAFA163JBEZ	1-1-25	AP		
PRDAFA215JBEZ	1-2-13	BE		
PRDAFA216JBEZ	1-2-14	BC		
PSEL-B954JBEZ	1-1-30	AF		
PSEL-B956JBEZ	1-1-31	AF		
PSEL-B966JBEZ	1-1-32	AC		
PSEL-C011JBEZ	1-1-34	AC		
PSEL-C017JBEZ	1-1-35	AC		
PSEL-C019JBEZ	1-1-36	AD		
PSEL-C037JBEZ	1-2-15	AE		
PSEL-C074JBEZ	1-2-16	AC		
PSEL-C260JBEZ	1-1-37	AC		
PSEL-C261JBEZ	1-1-38	AC		
PSEL-C262JBEZ	1-1-39	AC		
PSEL-C277JBEZ	1-1-40	AG		
PSEL-C282JBEZ	1-1-41	AD		
PSEL-C343JBEZ	1-1-42	AE		
PSEL-C353JBEZ	1-1-43	AP		
PSEL-C354JBEZ	1-1-44	AE		
PSEL-C369JBEZ	1-1-45	AC		
PSEL-C370JBEZ	1-1-46	AC		
PSEL-C371JBEZ	1-1-47	AC		
PSEL-C372JBEZ	1-1-48	AC		
PSEL-C373JBEZ	1-1-49	AC		
PSEL-C374JBEZ	1-2-17	AC		
PSEL-C376JBEZ	1-2-12	AC		
PSEL-C377JBEZ	1-2-98	AC		
PSEL-C378JBEZ	1-1-66	AB		
PSEL-C379JBEZ	1-1-67	AB		
PSEL-C382JBEZ	1-1-69	AC		
PSEL-C938JBEZ	1-1-73	AK		
PSEL-D235JBEZ	1-1-28	AG		
PSEL-D236JBEZ	1-1-59	AG		
PSEL-D274JBEZ	1-1-83	AG		
PSHE-A195JBEZ	1-2-18	AH		
PSHE-A196JBEZ	1-2-19	AE		
PSHE-A273JBEZ	1-2-46	AF		
PSKR-A353JBWZ	1-1-50	AZ		
PSPA-A064JBE0	1-2-20	AA		
PSPA-A065JBE0	1-2-21	AA		
PSPA-A146JBE0	1-1-51	AC		
PSPA-A150JBZZ	1-2-22	AF		
PSPF-B072JBEZ	1-1-53	AK		
PSPF-B073JBEZ	1-1-78	AK		
PSPF-B112JBEZ	1-1-52	AY		
PSPF-B113JBEZ	1-1-52-1	AY		
PSPF-B114JBEZ	1-1-52-2	AQ		
PTUB-A196JBEZ	1-1-54	AK		
PVLVRA040JBEZ	1-3-18	BM		
PVLVXA081JBEZ	1-3-19	BB		
【 Q 】				
QFS-GA062JBZZ	2-2-2-2	AF		
QFS-GA063JBZZ	2-2-2-3	AE		
QFS-GA064JBZZ	2-2-2-4	AF		
QFS-GA065JBZZ	2-2-2-1	BA		
QSPGCA006JBZZ	2-SA1	AH		
QSW-PA016DRE0	2-SW1-3	AB		
QTANZA021JBZZ	1-2-26	AN		
QTANZA044JBZZ	1-2-27	AU		
QW-iZA120JBZZ	1-2-28	AU		
【 R 】				
RC-AZA046JBE0	1-2-62	BE		
RC-EZA250JBZZ	1-2-63	BG		
RFiL-A116JBZZ	2-L3 L4	AY		
RFiLNA007CBZZ	2-L6	AR		
RFiLNA013JBZZ	2-L5	BE		
RH-HXA095JBZZ	1-2-67	BC		
RH-HXA096JBZZ	1-2-66	AZ		
RH-iXA859JBZZ	3-2-23-1	BQ		
RH-iXB001JBNA	2-iC1			
RH-iZA140JBE0	2-iC2	AE		
RHOG-A169JBE0	1-2-99	AK		
RH-QXA005JBZZ	2-PTC1	AW		

PARTS CODE	No.	PRICE RANK	NEW MARK	PART RANK
RH-TXA008JBZZ	1-2-93	BR		
〃	3-	BR		
RH-VXA002JBZZ	2-NR1-NR3	AF		
RiC--A022BDE0	2-iC7	AE		
RiC--A025BDE0	2-iC3 iC12	AE		
RMOTSA038JBZZ	1-3-20	BD	N	
RRLYDA008JBZZ	2-RY1	AH		
RRLYDA010JBZZ	2-MRY1	AN		
RR-WZA028JBE0	3-R1	AE		
RTHM-A022JBE0	1-2-80	AN		
RTRN-A294JBZZ	1-1-55	BG		
RTRN-A305JBZZ	2-CT1		N	
RTRNWA034JBZZ	2-TR1	AG		
【 S 】				
SPAKCC801JBEZ	4-5-1	BD	N	
【 T 】				
TiNS-B240JBRZ	1-4-3	AK	N	
TiNS-B241JBRZ	1-4-4	AK	N	
TiNS-B242JBRZ	1-4-6	AK	N	
TLAB-B709JBRA	1-1-57	AH		
TLAB-B777JBRZ	1-2-83	AC		
TLAB-C250JBRA	1-1-60	AG		
TLAB-C511JBRA	1-1-76	AC		
TLAB-C773JBRZ	1-1-62	AN		
TLABCC545JBRZ	1-1-64	AH		
TLAB-D243JBRZ	1-2-85	AM		
TLAB-D246JBRZ	1-2-84	AF		
TLAB-E544JBRZ	1-1-61	AM		
TLAB-E787JBEZ	1-1-77	AK		
TLABMA819JBRA	1-1-63		N	
TSPC-G699JBRZ	1-1-65	AK	N	
【 V 】				
VHD1SR139-6-1	2-D2-4	AB		
〃	2-D19-21	AB		
VHD1SR35-4A-1	2-D26-37	AC		
VHD1SS133//-1	2-D1 D38	AA		
VHDD25VB+-1	3-			
VHDD25VB60+-1	1-2-65	AN		
VHDRK36LF011B	2-D14	AD		
VHGPC81716P-1L	2-PC1	AD		
VHGPC817XP3-1L	2-PC4.6.8	AD		
VHGPC853HXP-1R	2-PC5.7.9	AG		
VHiKiA339F+-1L	2-iC5	AD		
VHiMM1431A+-1+	2-iC8	AD		
VHiNJM2904M-1R	2-iC9	AD		
VHiSTRL472+-1	2-iC4	AL		
VS2SA1020Y+-1+	2-Q13-15	AH		
VS2SA1586G+-1L	2-Q2	AB		
VSKRC245M//-3	2-Q11	AC		
【 X 】				
XBPS730P10000	1-6-12	AF		
XBPS740P14JS0	1-6-9	AB		
XBPS740P20J00	1-6-11	AF		
XCTS740P10000	1-6-10	AC		
XTTWW40P16000	1-6-14	AC		

SHARP