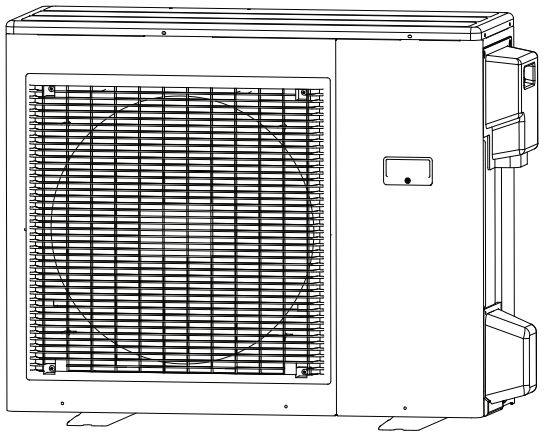
SHARP SERVICE MANUAL

SA210AEX15PU/T



SPLIT TYPE
ROOM AIR CONDITIONER
(OUTDOOR UNIT)

MODEL AE-X15PU
AE-X18PU
AE-X24PU

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. SPECIFICATION

[1] SPECIFICATION

[2] Outdoor

ITEMS	INDOOR MODEL	AE-X15PU	AE-X18PU	AE-X24PU
Power supply				
Phase		Single	Single	Single
Rated frequency	V	208/230	208/230	208/230
Reted voltage	Hz	60	60	60
System				
Indoor units number		1	1	1
Maximum length (per unit)	ft (m)	65.6 (20)	98.4 (30)	98.4 (30)
Maximum height difference	ft (m)	32.8 (10)	49.2 (15)	49.2 (15)
Performance				
Rated (Cooling) Capacity (Min.-Max.)	Btu/h	14000(5000 - 14000)	17000(6000 - 19000)	22000(6000 - 22000)
Rated (Cooling) Moisture removal (Liters/h)	1/h	3.2	--	6.8
Rated (Cooling) Power input	W	1120	1415	2440
Rated (Cooling) Running current	A	7.5	8.0	12.0
Rated (Heating) Capacity (Min.-Max.)	Btu/h	18000(4500 - 20000)	21600(5500 - 25000)	24000(5500 - 26000)
Rated (Heating) Power input	W	1550	1920	2200
Rated (Heating) Running current	A	10.0	11.0	12.5
Noise level	Cooling dB(A)	49	52	53
	Heating dB(A)	50	53	54
Air flow quantity	Cooling m3/min	42.7	42.3	41.8
	Heating m3/min	45.8	42.3	44.4
Fan speed	Cooling rpm	800	820	820
	Heating rpm	800	820	820
Compressor system				
Compressor		SIAM(13.0cc)SNB130FGBMT	SIAM(13.0cc)SNB130FGBMT	SIAM(13.0cc)SNB130FGBMT
		900W	900W	900W
Oil		FV50S (350cc)	FV50S (350cc)	FV50S (350cc)
Type		Twin Rotary	Twin Rotary	Twin Rotary
Fan system				
Fan motor		CMOTLB537JBEZ	CMOTLB537JBEZ	CMOTLB537JBEZ
		8poles,43W	8poles,43W	8poles,43W
Fan		Propeller fan Φ460, 3-wing	Propeller fan Φ460, 3-wing	Propeller fan Φ460, 3-wing
Refrigerant system				
Condenser		Louver fin and Grooved tube type	Louver fin and Grooved tube type	Louver fin and Grooved tube type
Refrigerant control		Expansion valve FUJIKOKI Φ1.8	Expansion valve FUJIKOKI Φ2.2	Expansion valve FUJIKOKI Φ2.2
Refrigerant		R410A	R410A	R410A
Refrigerant filling		2.64lb (1200g)	3.31lb (1500g)	3.31lb (1500g)
Connections				
Refrigerant coupling		Flare type	Flare type	Flare type
Refrigerant tube size (A:Gas line,B:Liquid line)		A: 1/2" (Flared connection 1/2") B: 1/4" (Flared connection 1/4")	A: 1/2" (Flared connection 1/2") B: 1/4" (Flared connection 1/4")	A: 1/2" (Flared connection 1/2") B: 1/4" (Flared connection 1/4")
Drain joint		Connected part O.D.Φ16	Connected part O.D.Φ16	Connected part O.D.Φ16
Others				
Net dimensions	Width inch(mm)	33.5 (850)	33.5 (850)	33.5 (850)
	Height inch(mm)	28.0 (710)	28.0 (710)	28.0 (710)
	Depth inch(mm)	13.0 (330)	13.0 (330)	13.0 (330)
Net weight	lb (kg)	93.7 (42.5)	103.6 (47)	103.6 (47)

NOTE:Test conditions are based on AHRI 210/240. (Refrigerant piping length [per unit] : 25ft [7.6m])

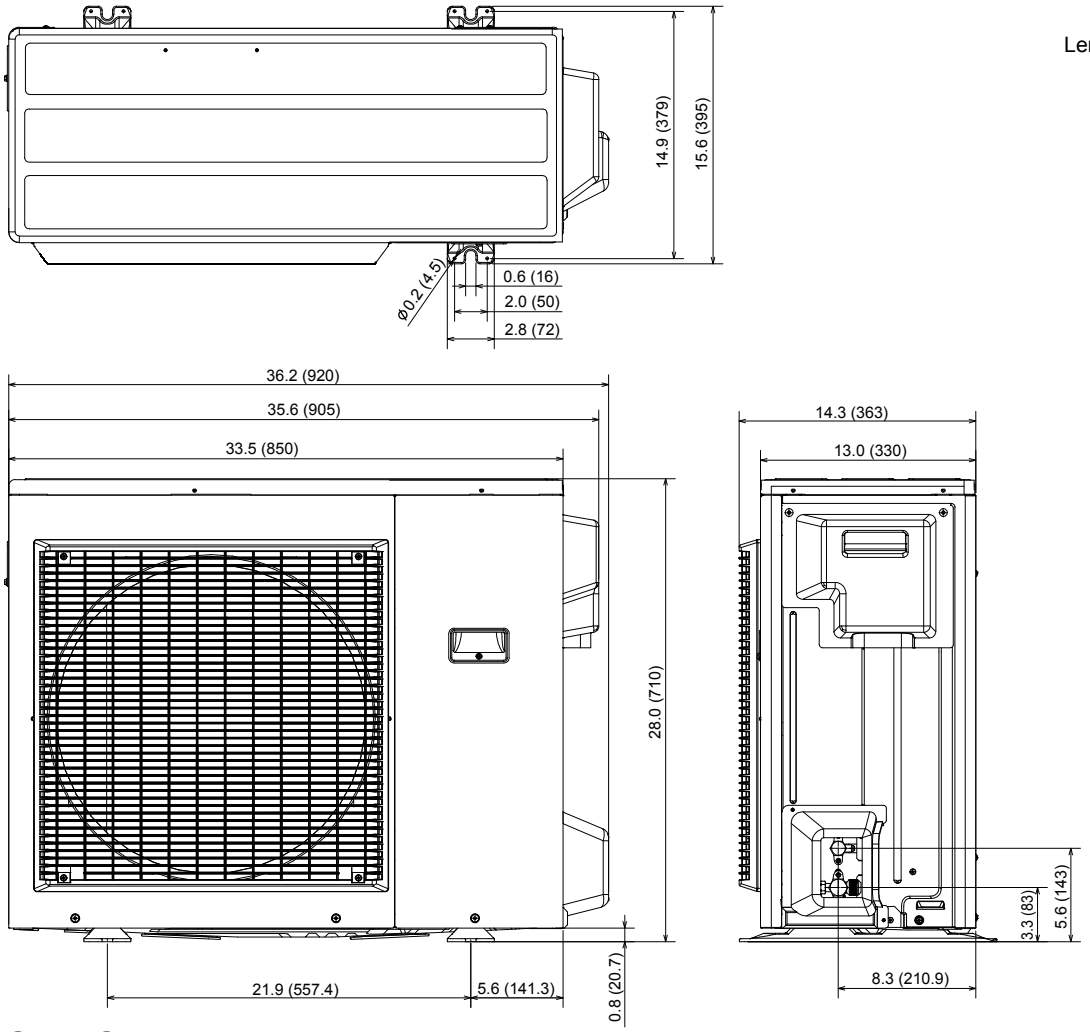
[TEST CONDITIONS COOLING]

INDOOR DB26.7℃/WB19.4℃

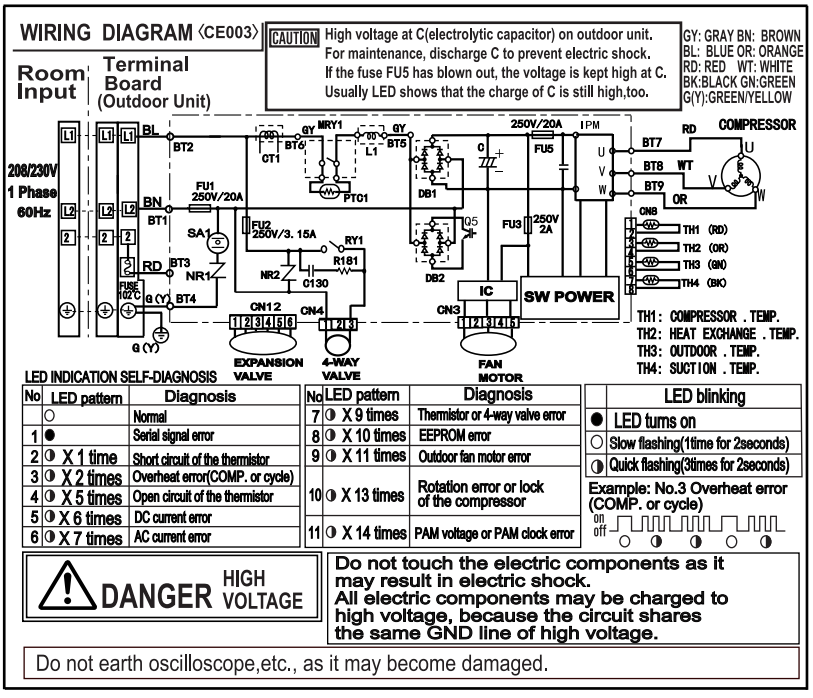
OUTDOOR DB35.0℃/WB --

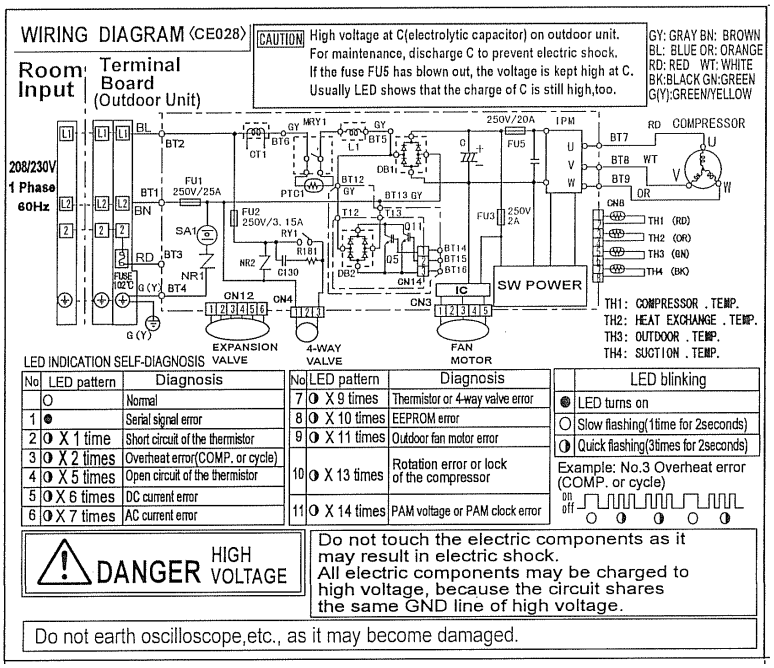
[2] EXTERNAL DIMENSION

Length unit: inch (mm)



[3] WIRING DIAGRAM





AE-X24PU

[4] ELECTRICAL PARTS

AE-X15PU / AE-X18PU

Part Name	Model	Remarks
Compressor	SNB130FGBMT	SIAM (13.0 CC) (FCMPRA333JBKZ)
Fan motor	SHA-52FV-D843-2	DC motor (CMOTLB537JBEZ)
Fu 1	-	QFS-GA090JBZZ (20A 250V)
Fu 2	-	QFS-GA078JBZZ (3.15A 250V)
Fu 3	-	QFS-GA077JBZZ (2A 250V)
Fu 5	-	QFS-GA090JBE0 (20A 250V)

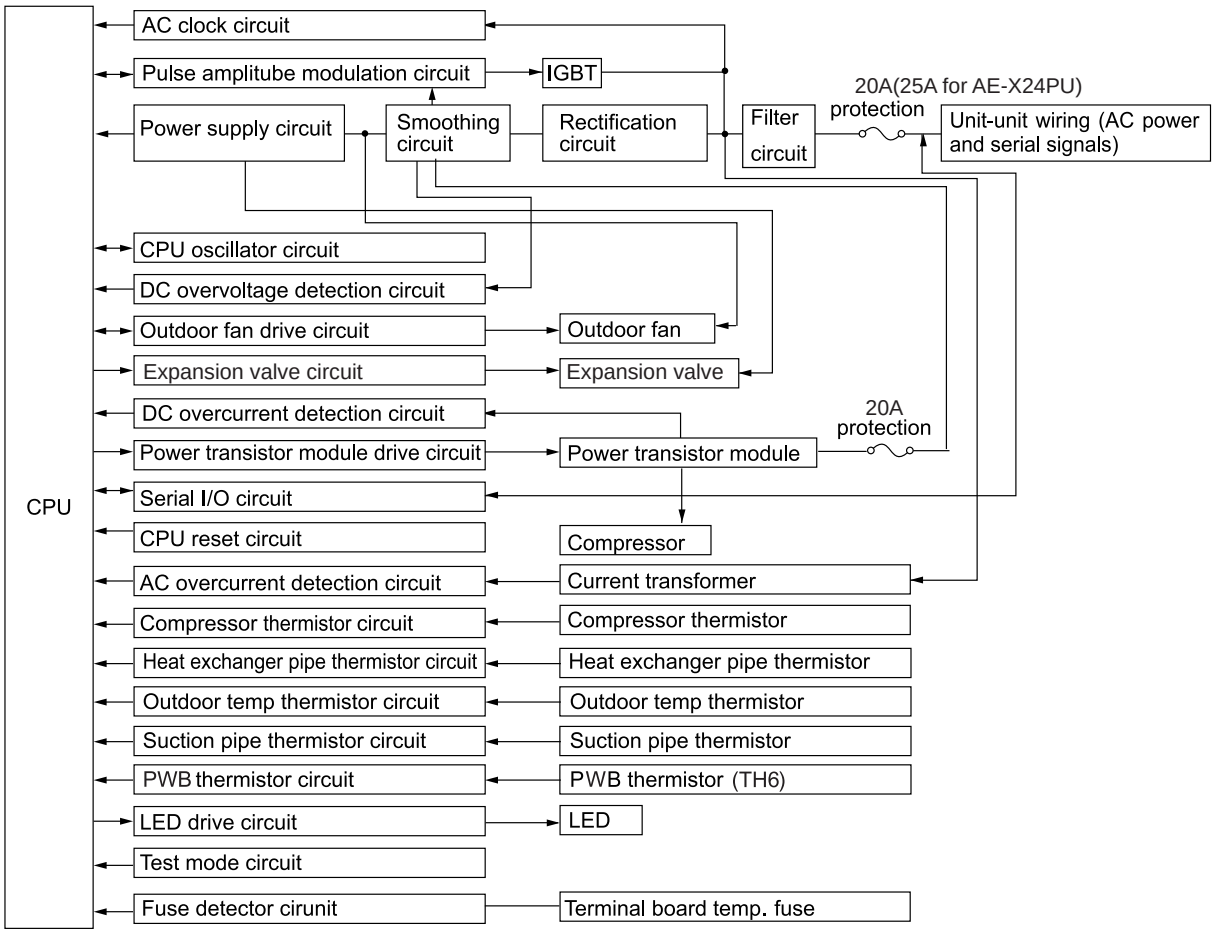
AE-X24PU

Part Name	Model	Remarks
Compressor	SNB130FGBMT	DC motor (FCMPRA333JBKZ)
Fan motor	SHA-52FV-D843-2	DC motor (CMOTLB537JBEZ)
Fu 1	-	QFS-GA091JBZZ (25A 250V)
Fu 2	-	QFS-GA078JBZZ (3.15A 250V)
Fu 3	-	QFS-GA077JBZZ (25A 250V)
Fu 5	-	QFS-GA090JBE0 (20A 250V)

CHAPTER 2. ELECTROIC CIRCUIT

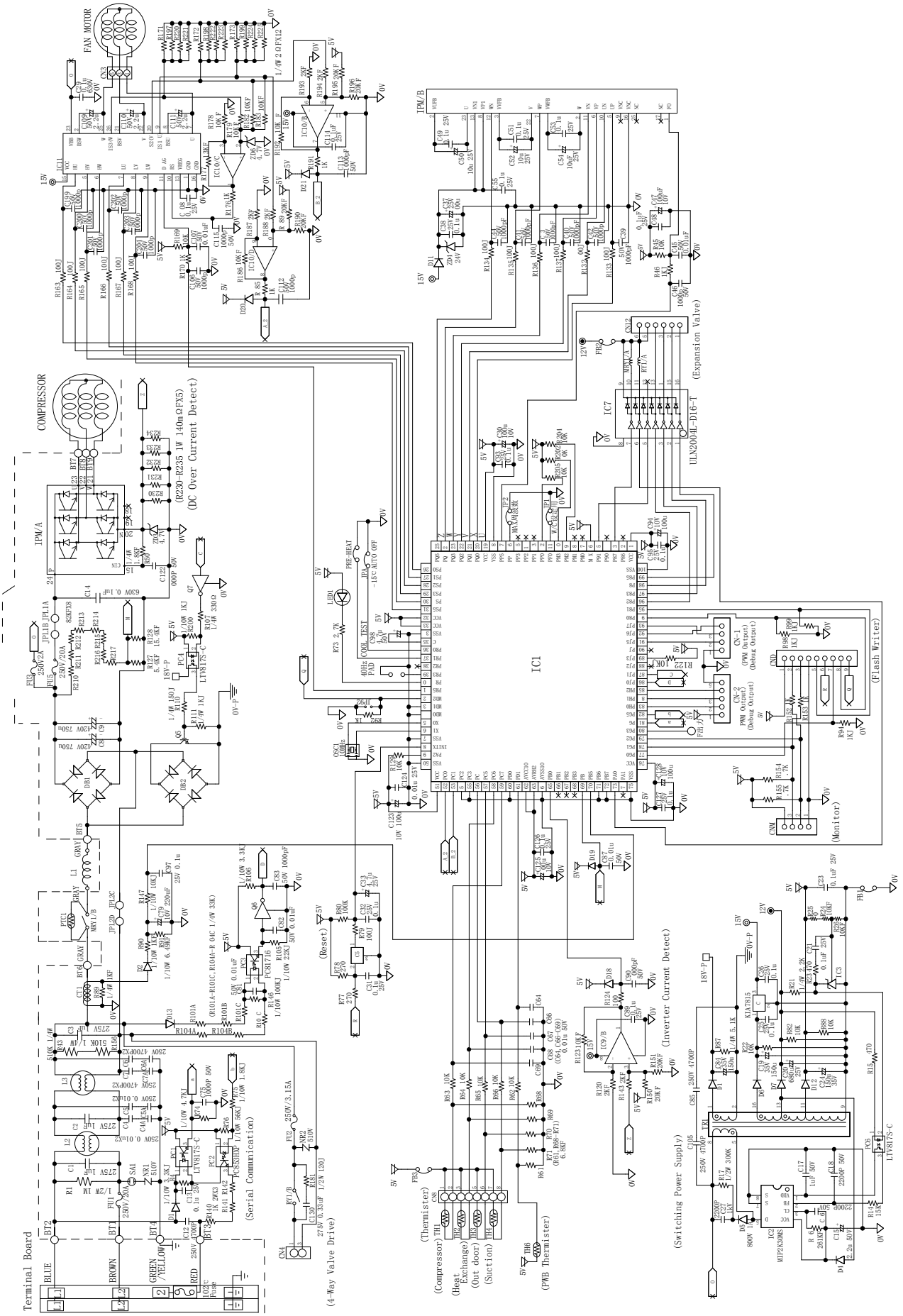
[1] BLOCK DIAGRAMS

1. Outdoor unit

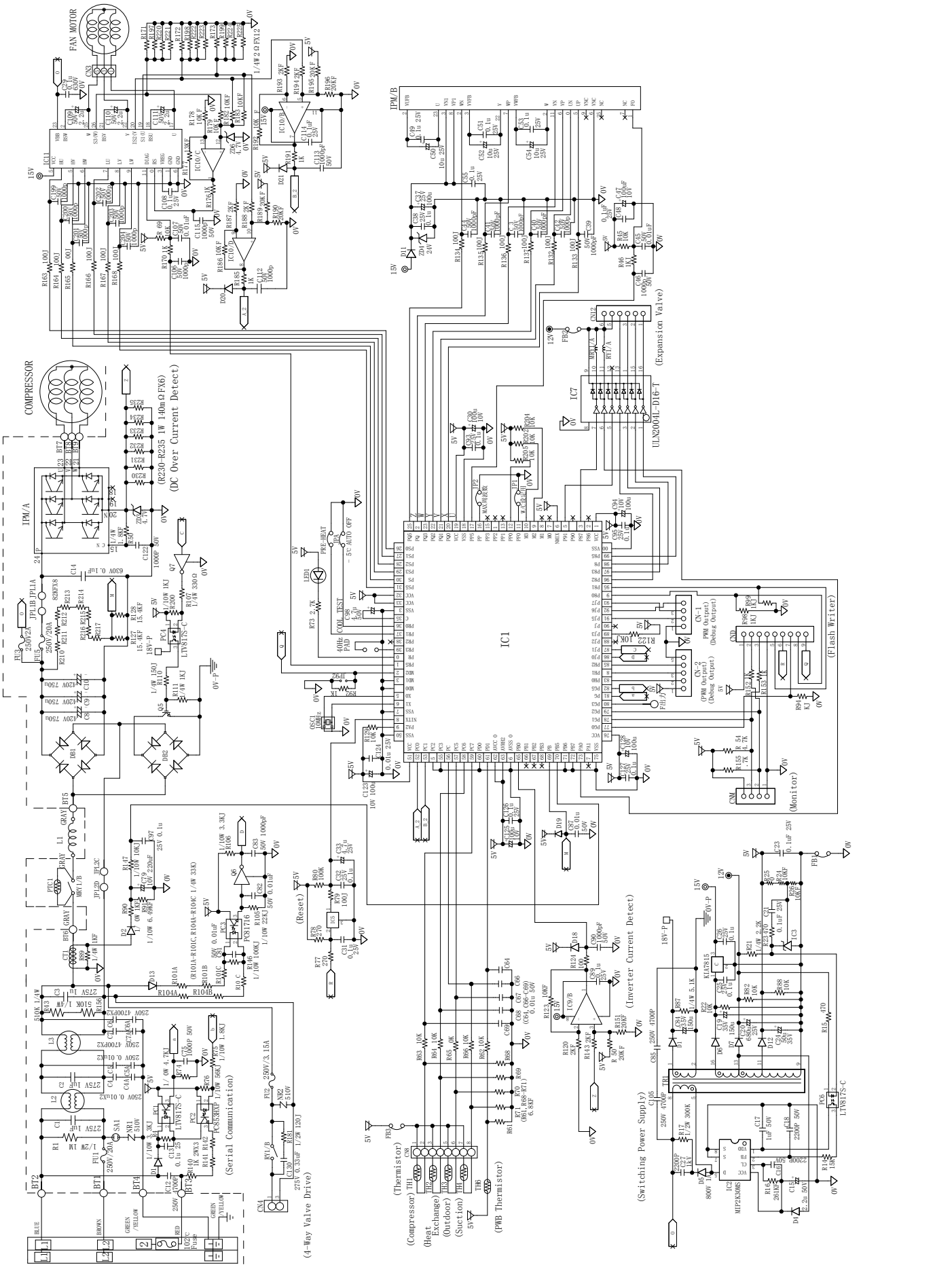


[2] MICROCOMPUTER CONTROL SYSTEM

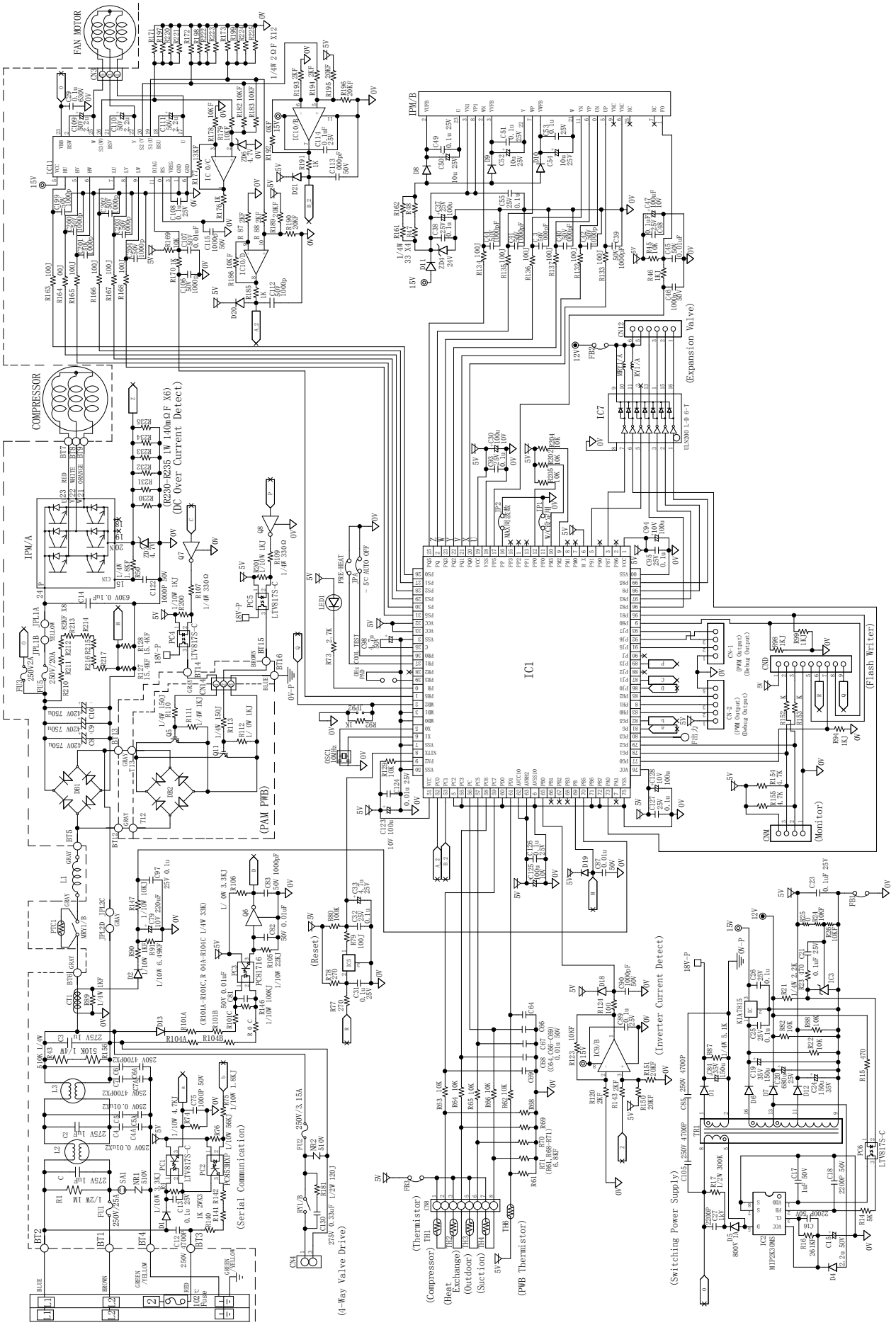
1-1 Electronic control circuit diagram: AE-X15PU



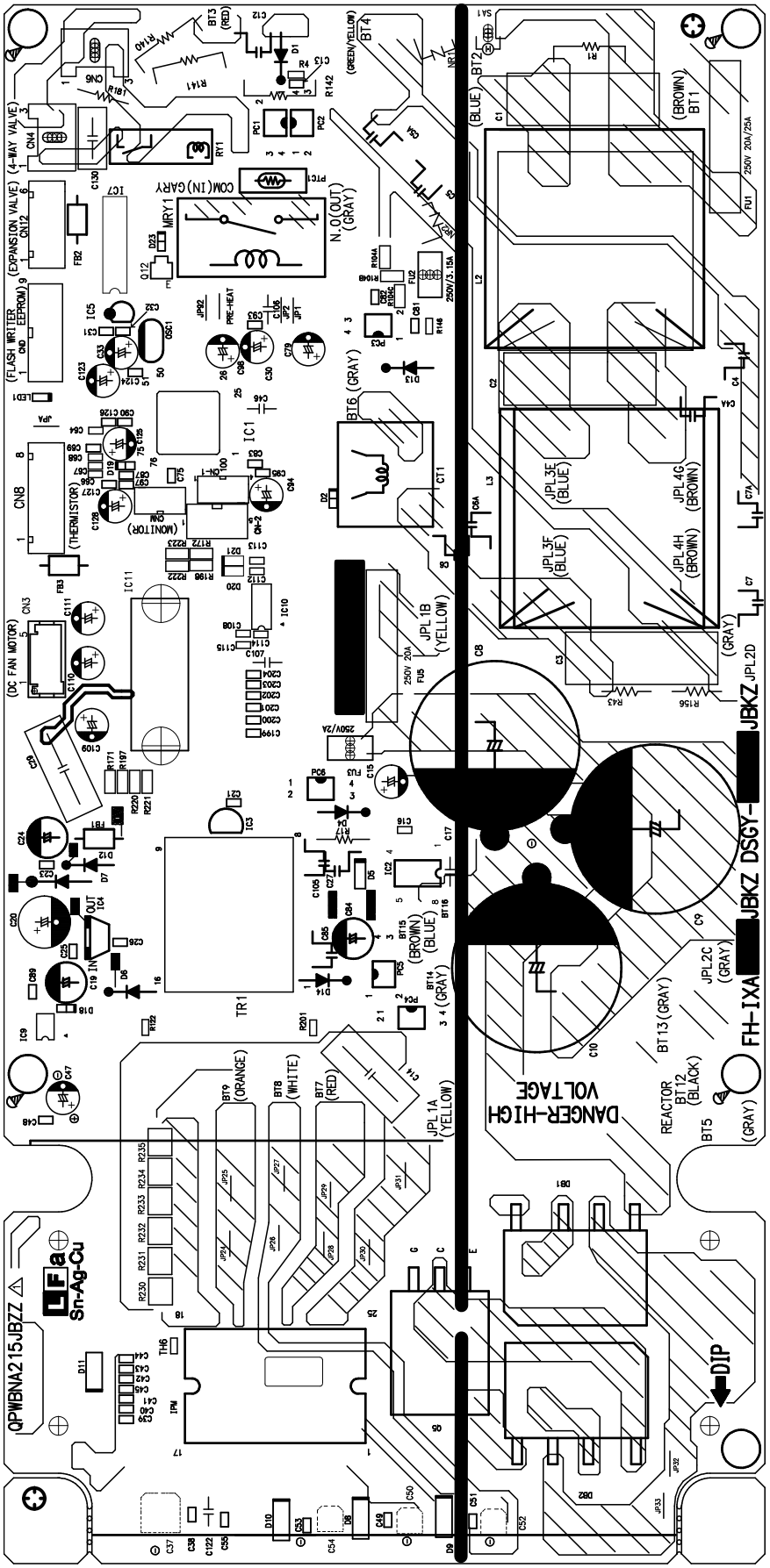
1-2 Electronic control circuit diagram: AE-X18PU



1-3 Electronic control circuit diagram: AE-X24PU



2. Printed wiring board: AE-X15PU



This PCB is common for AE-X15PU/X18PU/X24PU, but for AE-X24PU, there will be a sub-board. Will be released after approval.

[3] FUNCTION

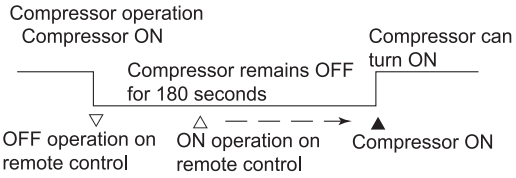
1. Function

1.1. Restart control

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

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

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



1.2. Outdoor unit 2-way valve freeze prevention control

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

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

1.3. Outdoor unit overheat prevention control

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

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

If the temperature of the outdoor unit heat exchanger exceeds the outdoor unit heat exchanger overheat protection temperature for (120 sec. : outdoor temperature ≥ 40˚C, 60 sec : outdoor temperature < 40˚C) at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the above mentioned control is repeated.

1.4. Compressor overheat prevention control

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

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

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

1.5. Peak control

If the current flowing in the air conditioner exceeds the peak control current (see the table below), the operation frequency is decreased until the current value drops below the peak control current regardless of the frequency control demand issued from the indoor unit based on the room temperature.

Model	Mode	Peak Control Current(A)	Overload Current Compensation(A)
AE-X15PU	Cooling	7.6	0
	Heating	9.5	-1.5
AE-X18PU	Cooling	7.7	0
	Heating	10.3	-1.8
AE-X24PU	Cooling	11.8	0
	Heating	12.0	-1.9

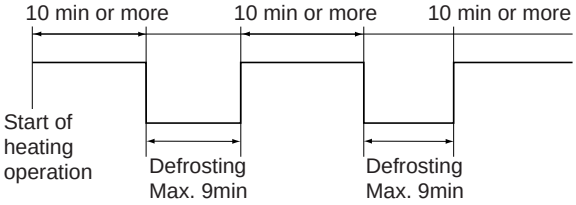
1.6. Outdoor unit fan delay control

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

1.7. Defrosting

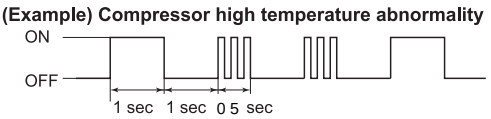
1.7.1 Reverse defrosting

The defrost operation starts when the compressor operating time exceeds 10 minutes during heating operation, as shown below, and the outside air temperature and the outdoor unit heat exchanger temperature meet certain conditions. When the defrost operation starts, the indoor unit fan stops. The defrost operation stops when the outdoor unit heat exchanger temperature rises to about 15˚C or higher or the defrosting time exceeds 9 minutes.



1.8. Self-diagnostic malfunction code display of Outdoor unit

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



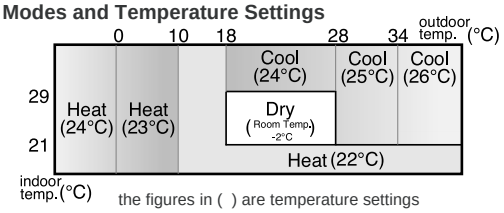
When reading the result of self-diagnosis, you shall combine it with indoor unit indication in order to get a correct conclusion.

For details, please refer to the troubleshooting section.

1.9. AUTOMATIC AIR CONDITIONING

In the AUTO mode, the unit will automatically select COOL or HEAT mode by comparing the room temperature and your desired temperature.
The unit will automatically switch between HEAT and COOL mode to keep the desired temperature.
COANDA and MULTI SPACE button will be inactivated during AUTO mode.

Modes and Temperature Settings



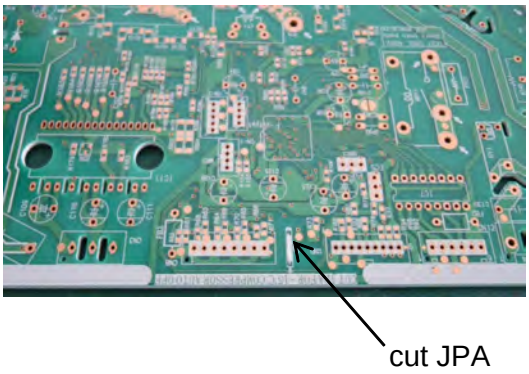
the figures in ( ) are temperature settings

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

1.10. INACTIVATE 5°F(-15°C) AUTO STOP FUNCTION

During the heating operation, the unit will automatically stop when the outdoor temperature drops below 5°F(-15°C) to prevent the outdoor unit from the damage caused by the freezing of the drained water. The unit will stop its operation for 4 hour and then resume the operation when the outdoor temperature rises above 7°F(-13.9°C).

If the customer do not want to use this function, this function can be inactivated by cutting JPA on outdoor PWB.
1. Power off.
2. Cut the JPA

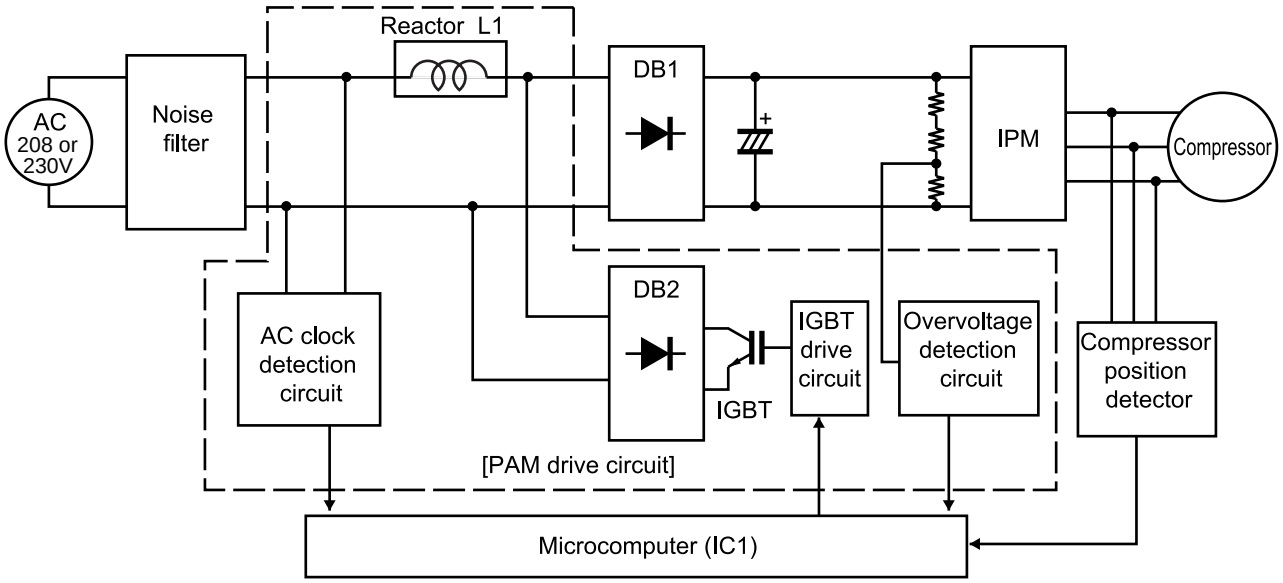


2. Outline of PAM circuit

2.1. PAM (Pulse Amplitude Modulation)

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

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

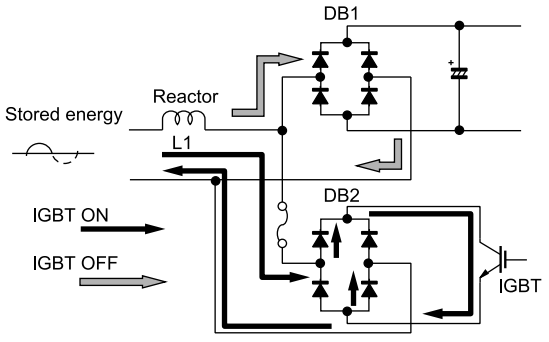


PAM drive circuit block diagram

When the IGBT is ON, an electric current flows to the IGBT via the reactor (L1) and diode bridge (DB2).

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

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



2.2. High power factor control circuit

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

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

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

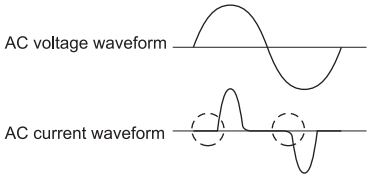
To determine the length of period to supply a current, the zero-cross timing of the AC input voltage is input to the microcomputer via the clock circuit.

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

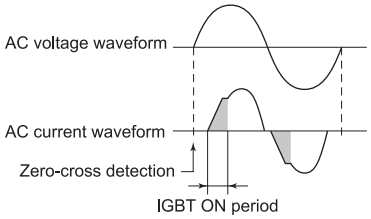
The IGBT turns ON after the time length determined by the zero-cross point to supply a current to the IGBT via the reactor.

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

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

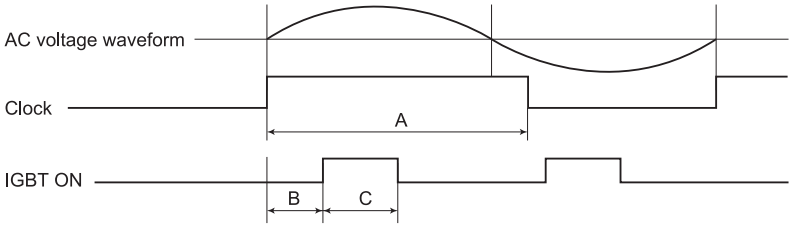


AC voltage and current waveforms when PAM is OFF



AC voltage and current waveform when PAM is ON

2.2.1 Detailed explanation of PAM drive circuit sequence



	60Hz
A	about 9 mS
B	1300uS
C	0.004~1.7ms

2.2.2 AC clock (zero-cross) judgment

- The clock circuit determines the time from one rising point of the clock waveform to the next rising point.
  The detected clock waveform is used to judge the power source frequency (60Hz).
- The zero-cross of the AC voltage is judged as the rising of the clock waveform, as shown in the diagram above.

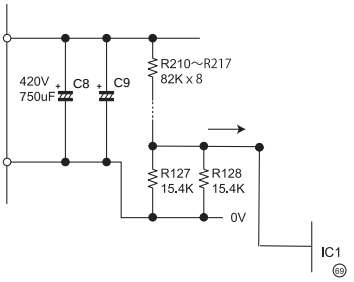
2.2.3 IGBT ON start time (delay time B)

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

2.2.4 IGBT ON time (C)

- After the above delay time, the IGBT turns ON to supply a current to the reactor.
- The ON time of the IGBT determines the amount of energy (level of DC voltage rise) supplied to the reactor.
  DC voltage level in each operation mode (varies depending on external load conditions)
  - Cooling operation --- 220 to 290 V
  - Heating operation --- 260 to 290 V

2.3. PAM protection circuit



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

The protection voltage level is as follows.

2.3.1 Details of troubleshooting procedure for PAM

1) PAM shutdown due to error

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

   DC voltage of 400 V or higher (detection circuit input voltage of about 4.6 V or higher) [IC1 69 pin]

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

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

   When there is no clock waveform input

   When a clock signal of other than specified power source frequency (60Hz) is input

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

2) PAM error indication

In case of error “1)”

– An error signal is sent to the indoor unit as soon as an error is generated.
   - Malfunction No. 14-0 is indicated when the error code is called out by the indoor unit's self-diagnosis function.

– The LED on the outdoor unit flashes 14 times when an error is generated.
   - The LED continues flashing in the 14-time cycle even after the compressor stops operating.
   - The LED turns off (data is deleted from the memory) when the outdoor unit power is turned off.

In case of error “2)”

– An error signal is sent to the indoor unit as soon as an error is judged.
   - Malfunction No. 14-1 is indicated when the error code is called out by the indoor unit's self-diagnosis function.

– The LED on the outdoor unit flashes 14 times when an error is judged.
   - The LED on the outdoor unit flashes in normal pattern when the compressor stops operating.

     (Compressor OFF or Thermostat OFF from remote control)

* When a user complains that the air conditioner does not provide sufficient cool air or warm air

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

   In that case, the DC voltage does not rise even though the compressor is operating, and lowers to the 180-VDC level.

   – Check items
      - Clock circuit check
      - PAM IGBT check

3. Explanation of IPM drive circuit

The IPM for compressor drive is made by Mitsubishi Electric.

The power supply for the IPM drive, the shunt resistance for over current detection, etc., are provided outside the IPM (control PWB).

3.1. IPM drive power supply circuit

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

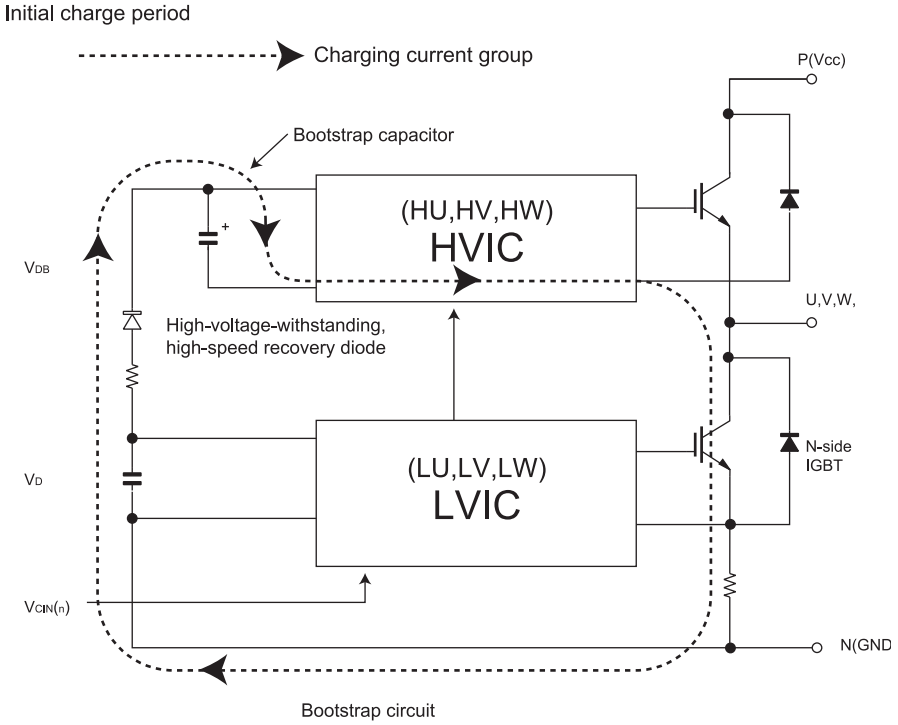
The 15-V power supply for the lower-phase IC is provided by the control printed wiring board (PWB).

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

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

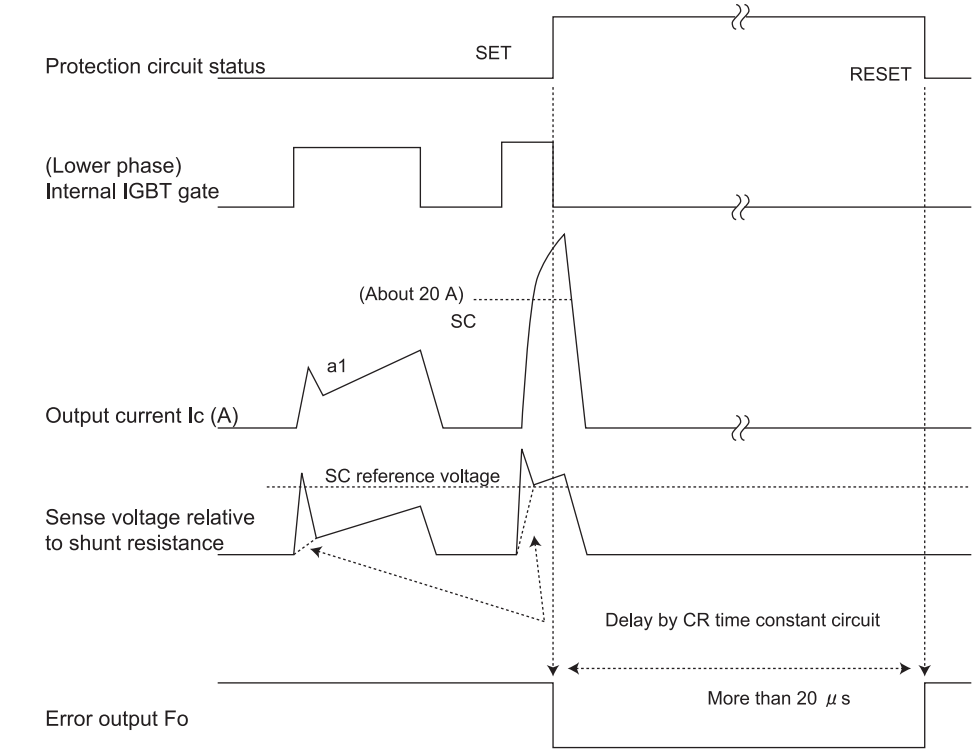
This results in a charging current that flows to the electrolytic capacitor of each upper-phase IC input and charges the bootstrap capacitor with a 15V current.

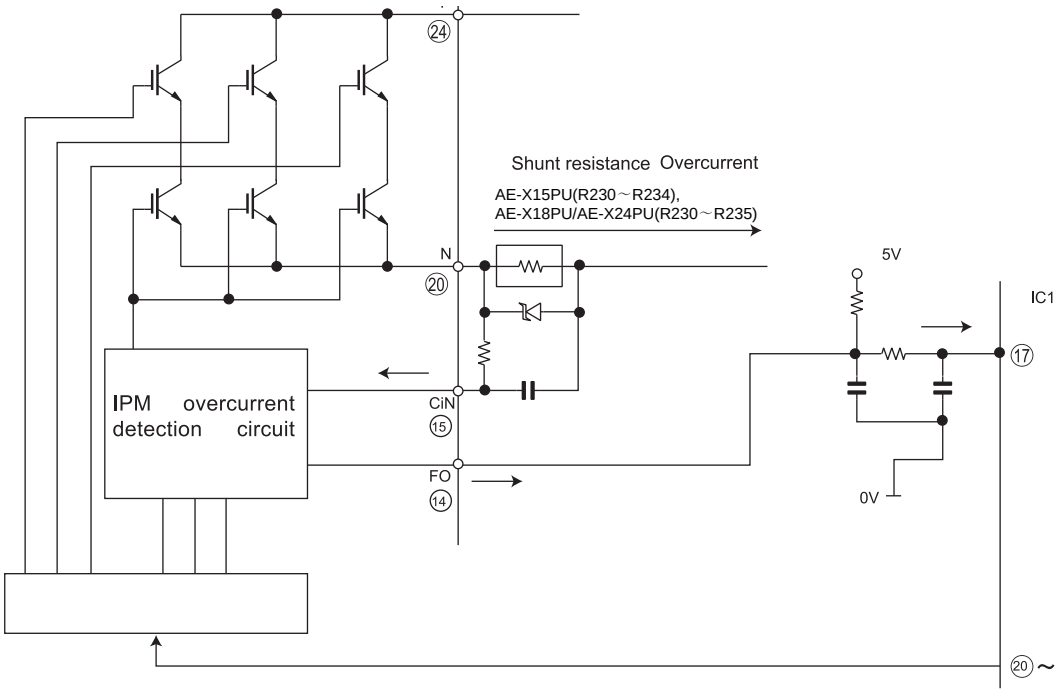
The power supply for the subsequent stages is charged while the lower-phase IGBT is ON in ordinary compressor drive control.



3.1.2 DC over current detection circuit

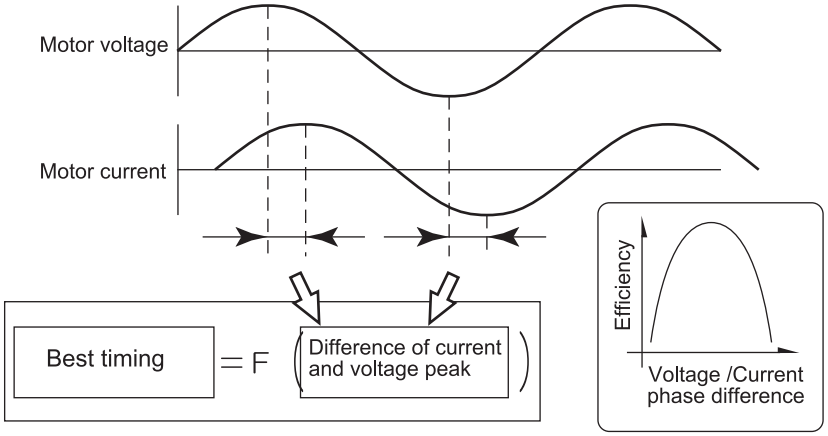
When a current of about 20 A or higher flows through the shunt resistance [AE-X15PU(R230～R234), AE-X18PU/AE-X24PU(R230～R235)] on the control printed wiring board (PWB), the voltage at this resistance is input to IPM CIN pin (15). Then, the gate voltage of the lower-phase IGBT (LU, LV, LW) inside the IPM turns OFF to cut off the over current. At the same time, an L output of more than 20 μs is generated from IPM from pin (14), and this results in an L input to over current detection input pin (17) of the microcomputer (IC1) and turns OFF the PWM signal output (IC1 pins (20) through (25)) to the IGBT gate.





4. 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.

CHAPTER 3. FUNCTION AND OPERATION OF PROTECTIVE PROCEDURES

[1] PROTECTION DEVICE FUNCTIONS AND OPERATIONS

* These models have following thermistors.

INDOOR UNIT	
AE-X15PU, AE-X18PU, AE-X24PU	TH1, TH2, TH3, TH4, TH6

The errors for the thermistors that are not mentioned above are irrelevant.
These indoor units don't have power relay.

Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
1	Indoor unit fan lock	Operation stops if there is no input of rotation pulse signal from indoor unit fan motor for 1 minute.	When indoor unit fan is in operation	Operation OFF or ON	I2	Yes	None
	Indoor unit fan rotation speed error	Operation stops if rotation pulse signal from indoor unit fan indicates abnormally low speed (about 300 rpm or slower).	When indoor unit fan is in operation	Operation OFF or ON	I2	Yes	None
2	2-way valve freeze prevention	Compressor stops if temperature of outdoor unit 2-way valve remains below 0℃ for 10 continuous minutes during cooling or dehumidifying operation.	When in cooling or dehumidifying operation	Automatic reset when temperature of 2-way valve rises above 10℃.	None	Yes	Yes
3	Outdoor unit heat exchanger overheat shutdown	Operation frequency lowers if outdoor unit heat exchanger temperature exceeds about 55℃ during cooling operation. Compressor stops if outdoor unit heat exchanger temperature exceeds about 55℃ for 120 seconds at minimum frequency.	When in cooling or dehumidifying operation	Automatic reset after safety period (180 sec).	None	Yes	Yes
4	Compressor discharge overheat shutdown	Operating frequency lowers if temperature of compressor chamber thermistor (TH1) falls below about 110℃. Compressor stops if temperature of compressor chamber thermistor (TH1) remains at about 110℃ (for 120 seconds in cooling operation, or 60 seconds in heating operation) at minimum frequency.	When compressor is in operation	Automatic reset after safety period (180 sec).	None	Yes	Yes
5	Dehumidifying operation temporary stop	Compressor stops if outside air temperature thermistor is lower than about 16℃ during dehumidifying operation.	When in dehumidifying operation	Automatic reset when outside air temperature rises above 16℃.	None	Yes	Yes
6	DC over current error	Compressor stops if electric current of about 20 A or higher flows in IPM.	When compressor is in operation	Operation OFF or ON	YesI1	Yes	Yes
7	AC over current error	Operating frequency lowers if compressor AC current exceeds peak control current value. Compressor stops if compressor AC current exceeds peak control current value at minimum frequency.	When compressor is in operation	Operation OFF or ON	YesI1	Yes	Yes
8	AC over current error in compressor OFF status	Indoor and outdoor units stop if AC current exceeds about 3 A while compressor is in non-operation status.	When compressor is in non-operation	Replacement of defective parts such as IPM	YesI2	Yes	Yes
9	AC maximum current error	Compressor stops if compressor AC current exceeds 17 A.	When compressor is in operation	Operation OFF or ON	Yes I1	Yes	Yes
10	AC current deficiency error	Compressor stops if operating frequency is 50 Hz or higher and compressor AC current is about 2.0 A or lower.	When compressor is in operation	Operation OFF or ON	Yes I1	Yes	Yes

Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
11	Thermistor installation error or 4-way valve error	Compressor stops if high and low values of temperatures detected by outdoor unit heat exchanger thermistor (TH2) and 2-way valve thermistor (TH5) do not match operating cycle.	3 minutes after compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
12	Compressor high temperature error	Compressor stops if compressor chamber thermistor (TH1) exceeds about 114℃, or if there is short-circuit in TH1.	When in operation	Operation OFF or ON	YesI1	Yes	Yes
13	Outdoor unit heat exchanger thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit heat exchanger thermistor (TH2).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
14	Outdoor unit outside air temperature thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit outside air temperature thermistor (TH3).	At compressor startup	Operation OFF or ON	YesI1	Yes	Yes
15	Outdoor unit suction thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit suction thermistor (TH4).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
16	Outdoor unit 2-way valve thermistor short-circuit error	Compressor stops if there is short-circuit in outdoor unit 2-way valve thermistor (TH5).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
17	Outdoor unit heat exchanger thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit heat exchanger thermistor (TH2).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
18	Outdoor unit outside air temperature thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit outside air temperature thermistor (TH3).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
19	Outdoor unit suction thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit suction thermistor (TH4).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
20	Outdoor unit 2-way valve thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit 2-way valve thermistor (TH5).	At compressor startup	Operation OFF or ON	Yes I1	Yes	Yes
21	Outdoor unit discharge thermistor open-circuit error	Compressor stops if there is open-circuit in outdoor unit discharge thermistor (TH1).	At compressor startup	Operation OFF or ON	YesI1	Yes	Yes
22	Serial signal error	Power relay turns OFF if indoor unit cannot receive serial signal from outdoor unit for 8 minutes.	When in operation	Operation OFF or ON (Automatic reset when less than 8 minutes)		Yes	None
		Compressor stops if outdoor unit cannot receive serial signal from indoor unit for 30 seconds.	When in operation	Reset after reception of serial signal	None	None	None
23	Compressor startup error	Compressor stops if compressor fails to start up.	At compressor startup	Operation OFF or ON	Yes I3	Yes	Yes
24	Compressor rotation error (at 120° energizing)	Compressor stops if there is no input of position detection signal from compressor or input is abnormal.	Compressor operating at 120° energizing	Operation OFF or ON	Yes I3	Yes	Yes
25	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 I1	Yes	Yes
26	PAM over voltage error	Compressor stops if DC voltage is 350 V or higher.	When in operation	Operation OFF or ON	Yes I1	Yes	Yes

Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
27	PAM clock error	When power source frequency cannot be determined (at startup), or when power source clock cannot be detected for 1 continuous second (at startup).	At compressor startup, when in operation	Compressor continues operation without stopping.	None	Yes	Yes
28	Outdoor unit thermal fuse error in the Terminal board	Compressor stops if outdoor unit cannot receive serial signal from indoor unit for 30 seconds.	When in operation	Reset after reception of serial signal	None	None	None

I1—The outdoor unit restarts four times before the indoor unit error is displayed (complete shutdown).

I2—A single error judgment results in the display of the indoor unit error (complete shutdown).

I3—The outdoor unit restarts eight times before the indoor unit error is displayed (complete shutdown).

[2] AIR CONDITIONER OPERATION IN THERMISTOR ERROR

* These models have following thermistors.

INDOOR UNIT	
AE-X15PU, AE-X18PU, AE-X24PU	TH1, TH2, TH3, TH4, TH6

The errors for the thermistors that are not mentioned above are irrelevant.
These indoor units don't have power relay.

1. Outdoor unit

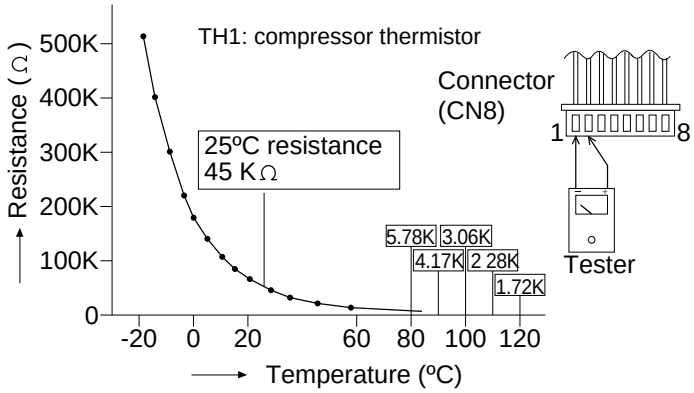
Item	Mode	Control operation	When resistance is low (temperature judged higher than actual)	Short-circuit	When resistance is high (temperature judged lower than actual)	Open-circuit
Compressor chamber thermistor (TH1)	Cooling Dehumidifying Heating	Expansion valve control and compressor protection	Compressor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

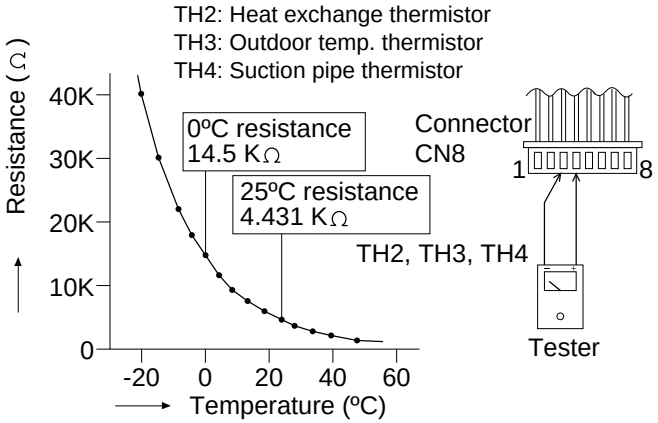
[3] THERMISTOR TEMPERATURE CHARACTERISTICS

1. Outdoor unit thermistor temperature characteristics

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

Thermistor	No.	Connector	Color
Compressor thermistor	TH1	① - ②	Red
Heat exchanger pipe thermistor	TH2	③ - ④	Orange
Outdoor temp. thermistor	TH3	⑤ - ⑥	Green
Suction temp. thermistor	TH4	⑦ - ⑧	Black



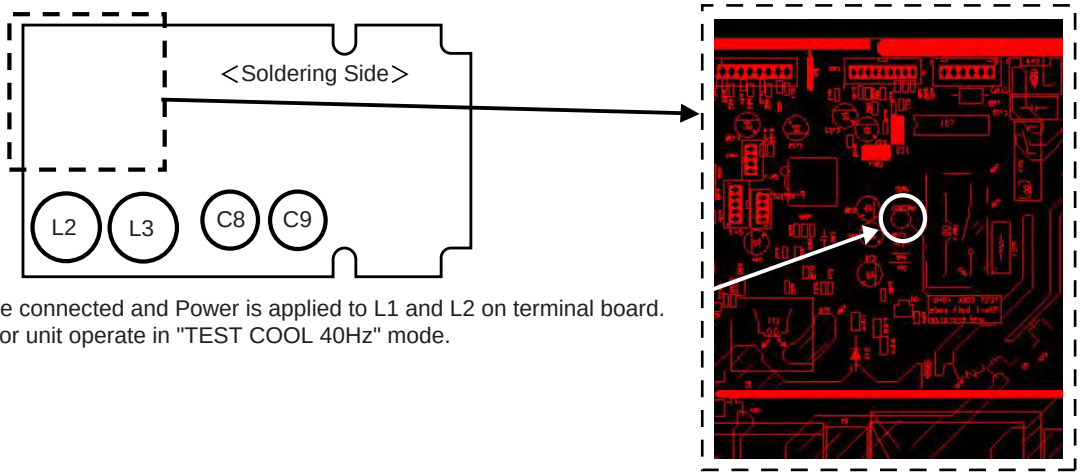


[4] HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

1. Cooling in 40 Hz fixed mode

To operate the outdoor unit independently, short-circuit the sections indicated by arrows in the diagram below with an adapter, and apply rated VAC between (L1) and (L2) on the terminal board of the outdoor unit. This allows the outdoor unit to be operated in cooling mode independently.

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



these pads are connected and Power is applied to L1 and L2 on terminal board.
hen the outdoor unit operate in "TEST COOL 40Hz" mode.

[5] GENERAL TROUBLESHOOTING CHART

* These models have following thermistors.

INDOOR UNIT	
AE-X15PU, AE-X18PU, AE-X24PU	TH1, TH2, TH3, TH4, TH6

The errors for the thermistors that are not mentioned above are irrelevant.
These indoor units don't have power relay.

1. Indoor unit does not turn on

Main cause	Inspection method	Normal value/condition	Remedy
Cracked PWB. (Cracked pattern)	Check visually.	There should be no cracking in PWB or pattern.	Replace PWB.
Open-circuit in FU1 (250 V, 2.5A).	Check melting of FU1.	There should be no open-circuit.	Replace PWB.

2. Indoor unit fan does not operate

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

3. Indoor unit fan speed does not change

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

4. Remote control signal is not received

Main cause	Inspection method	Normal value/condition	Remedy
Batteries at end of service life.	Measure battery voltage.	2.5 V or higher (two batteries in series connection)	Install new batteries.
Batteries installed incorrectly.	Check battery direction.	As indicated on battery compartment.	Install batteries in indicated direction.
Lighting fixture is too close, or fluorescent lamp is burning out.	Turn off light and check.	Signal should be received when light is turned off.	Change light position or install new fluorescent lamp.
Use Sevick light (Hitachi).	Check if Sevick light (Hitachi) is used.	Signal may not be received sometimes due to effect of Sevick light.	Replace light or change position.
Operating position/angle is inappropriate.	Operate within range specified in manual.	Signal should be received within range specified in manual.	Explain appropriate handling to user.
Open-circuit or short-circuit in wiring of light receiving section.	Check if wires of light receiving section are caught.	Wires of light receiving section should not have any damage caused by pinching.	Replace wires of light receiving section.
Defective light receiving unit.	Check signal receiving circuit (measure voltage between terminals 9 and 10 of connector CN7).	Tester indicator should move when signal is received.	Replace PWB.
Dew condensation on light receiving unit.	Check for water and rust.	Signal should be received within range specified in manual.	Take moisture-proof measure for lead wire outlet of light receiving section.

5. Louvers do not move

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

6. There is noise in TV/radio

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

7. Malfunction occurs

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

8. Compressor does not start

Main cause	Inspection method	Normal value/condition	Remedy
Erroneous inter-unit connection.	Check wiring between indoor and outdoor units.	Terminal board 1-N: 230 VAC, 60 Hz Terminal board 2: serial signal	Correct wiring.
Damaged IPM.	Check IPM continuity.		Replace IPM.
Dried-up electrolytic capacitor.	Check electrolytic capacitor.		Replace electrolytic capacitor.
Blown outdoor unit fuse.	Check 20-A fuse.	Fuse should not be blown.	Replace fuse/diode bridge. Replace fuse. Replace outdoor unit PWB assembly.
Power supply voltage is too low.	Measure power supply voltage during startup.	230±10 VAC, 60 Hz	Make sure that power supply voltage is 180 V or higher.
Compressor lock.	Supply current and touch compressor cover (sound absorbing material) to check if operation starts.	Compressor should start normally.	Apply external impact to compressor. Replace compressor.

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

Main cause	Inspection method	Normal value/condition	Remedy
Dried-up electrolytic capacitor.	Measure 290-VDC line voltage.	250 V or higher.	Replace electrolytic capacitor.
Layer short-circuit in expansion valve coil.	Measure resistance.	46±3Ωin each phase (at 20℃)	Replace coil.

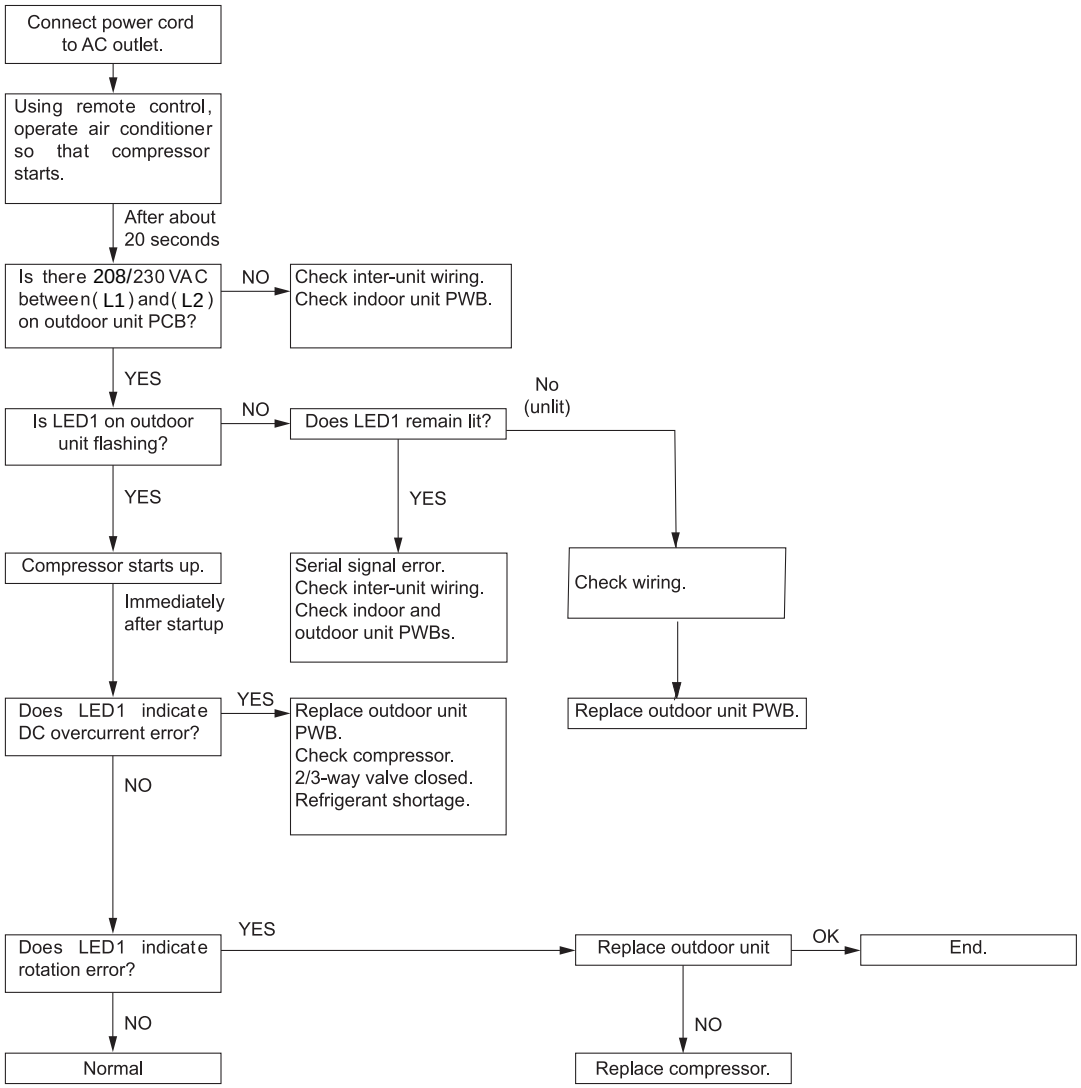
CAUTION: If fuse FU1/FU5 (outdoor unit control circuit board) is blown, be careful of charging voltage in inverter electrolytic capacitor C8, C9.

To discharge stored electricity, unplug the power cord and connect the plug of a soldering iron (230VAC, 30W) between the positive and negative terminals of inverter electrolytic capacitor C8, C9.

[6] MALFUNCTION (PARTS) CHECK METHOD

1. Procedure for determining defective outdoor unit IPM/compressor

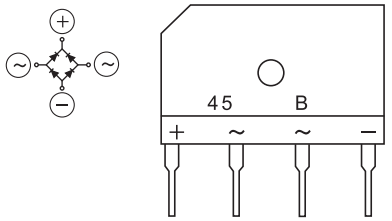
The following flow chart shows a procedure for locating the cause of a malfunction when the compressor does not start up and a DC overcurrent indication error occurs.



2. Diode bridge check method

Turn off the power and let the inverter electrolytic capacitor (C8, C9) discharge completely. Then use a tester and check continuity.

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



Needle-type tester		Normal resistance value
+	–	∞ (several MΩ)
~	⊕	
⊖	~	

Value in ( ) is for digital tester.

3. Inverter electrolytic capacitor (C8, C9) check method

Turn off the power, let the inverter electrolytic capacitor (C8, C9) discharge completely, and remove the capacitor from the control printed circuit board (PWB). First, check the case for cracks, deformation and other damages. Then, using a needle-type tester, check continuity.

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

4. IPM check method

Turn off the power, let the large capacity electrolytic capacitor (C8, C9) discharge completely, and dismount the IPM. Then, using a tester, check leak current between C and E.

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

Needle-type tester		Normal resistance value
(-)	(+)	
P	N	∞ (several MΩ)
	U	
	V	
	W	

Needle-type tester		Normal resistance value
(-)	(+)	
U	N	∞ (several MΩ)
V		
W		

Values in ( ) are for digital tester.

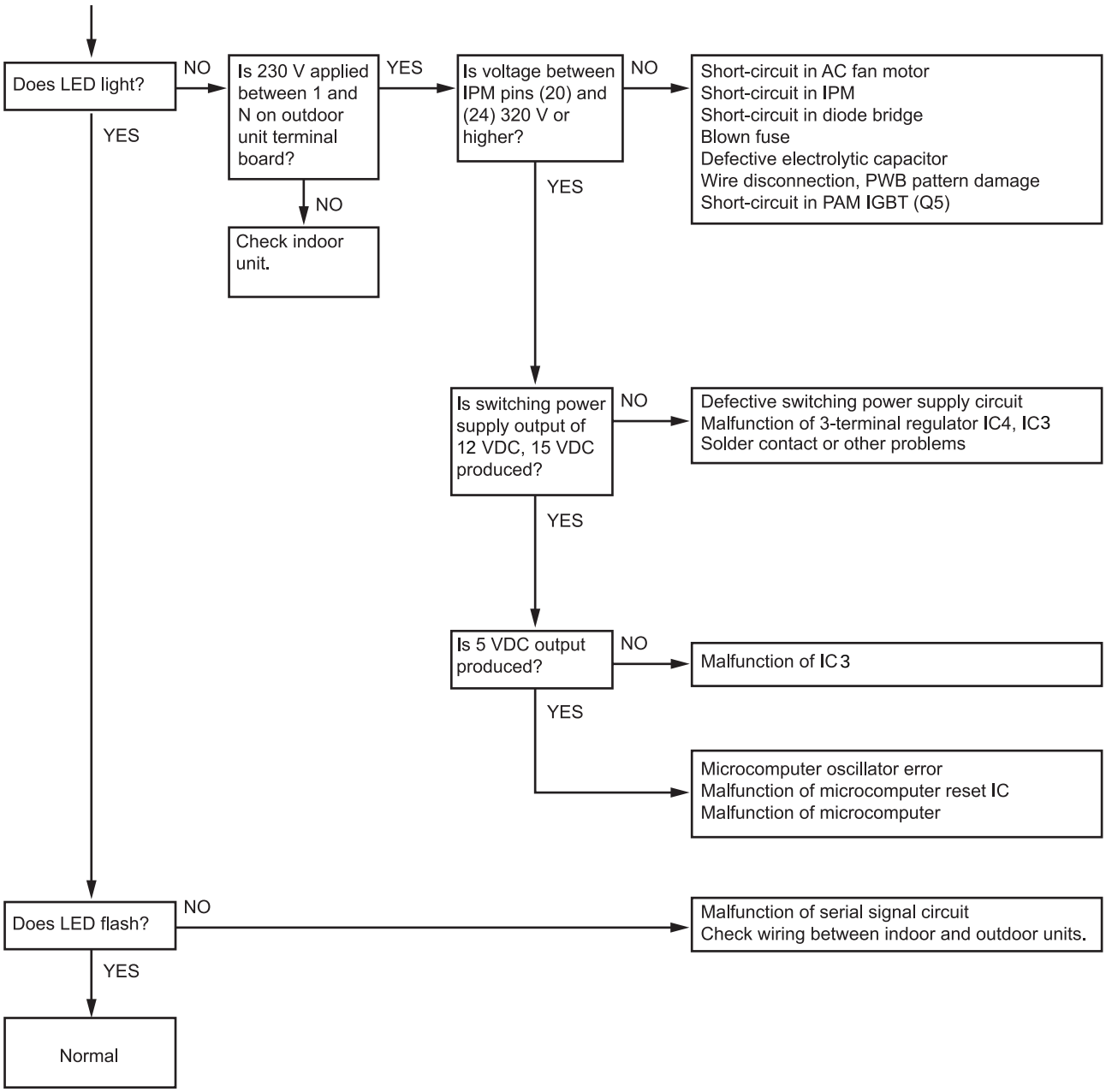
[7] OUTDOOR UNIT CHECK METHOD

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

1. Checking procedures

No.	Item	Check method	Normal value/condition	Remedy
1	Preparation	Disconnect compressor cords (white, orange, red: 3 wires) from compressor terminals, and connect simulated load (lamp used as load). Operate air conditioner in cooling or heating test operation mode.		
2	Inverter DC power supply voltage check	Measure DC voltage between IPM pins (20) and (24).	320 VDC	Replace control PWB. Replace diode bridge. Correct soldered section of Fasten tabs (BT1, BT2, BT5,BT6) on control PWB and IPM (S, C, R). (Repair solder cracks.)
3	IPM circuit check	Check that 3 lamps (load) light. Check position detection voltage (+15 V, 5 V) on control PWB.	Each voltage should be normal. All 3 lamps (load) should light with same intensity.	Replace control PWB.
4	Compressor check	Measure compressor coil resistance (for each phase of U, V and W). Use multi-meter or digital tester capable of displaying two digits right of the decimal point (0.01Ω).	Resistance value at 20℃ --- 0.65Ω	Correct connections at compressor terminals. Replace compressor.
5	Expansion valve check	Measure expansion valve coil resistance.	Each phase 46±3Ω (at 20℃)	Replace expansion valve.
6	Final check	Turn off power, and connect compressor cords to compressor. Operate air conditioner. Measure DC voltage between IPM pins (20) and (24).	Compressor should operate normally. 200 VDC or higher.	Replace control PWB. Replace outdoor unit thermistor. Replace compressor (in case of compressor lock).

2. Troubleshooting of outdoor unit electric components



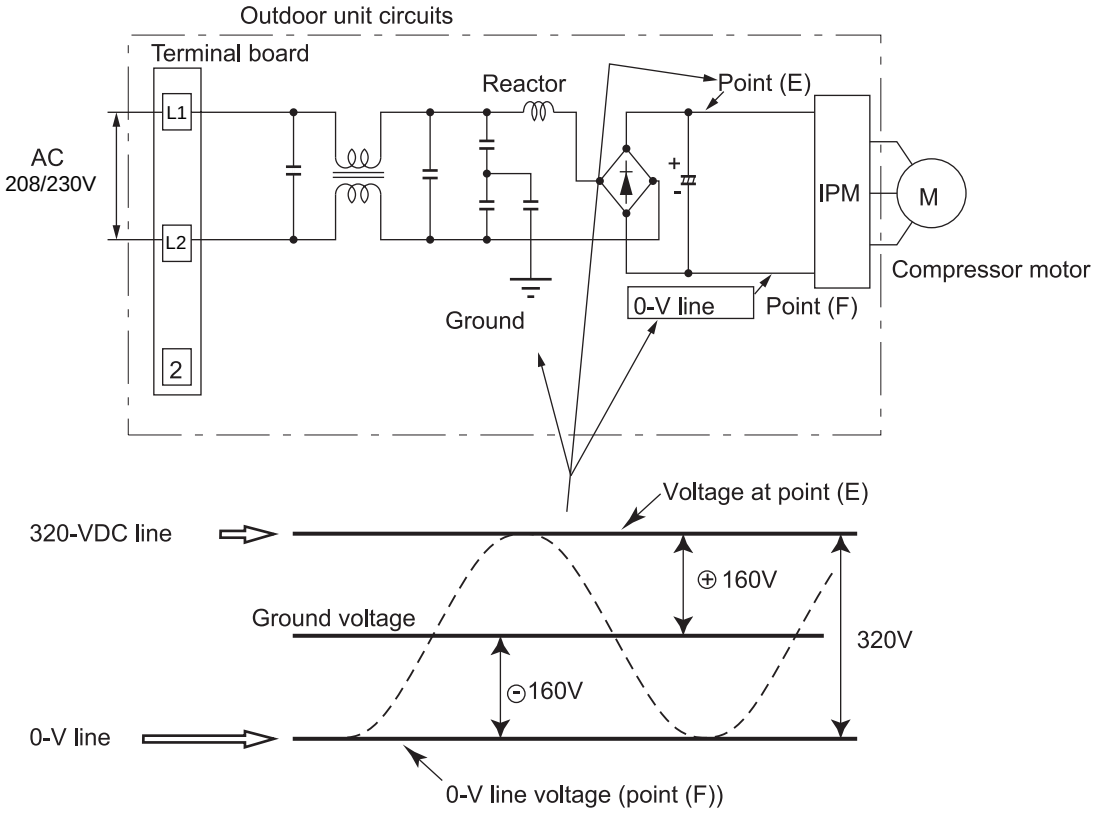
3. Caution in checking printed wiring boards (PWB)

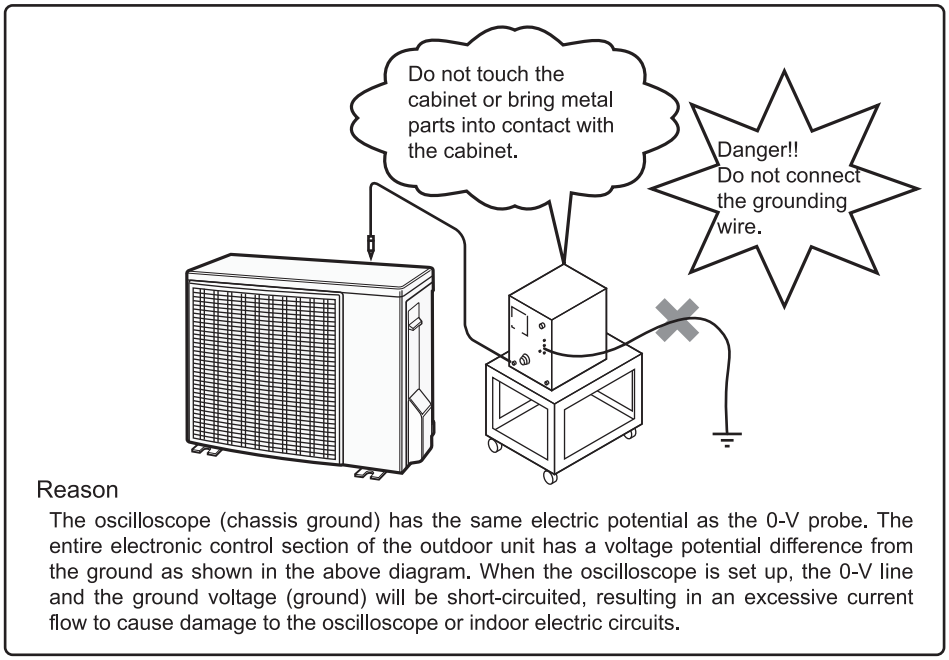
3.1. Non-insulated control circuit

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

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

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





Reason

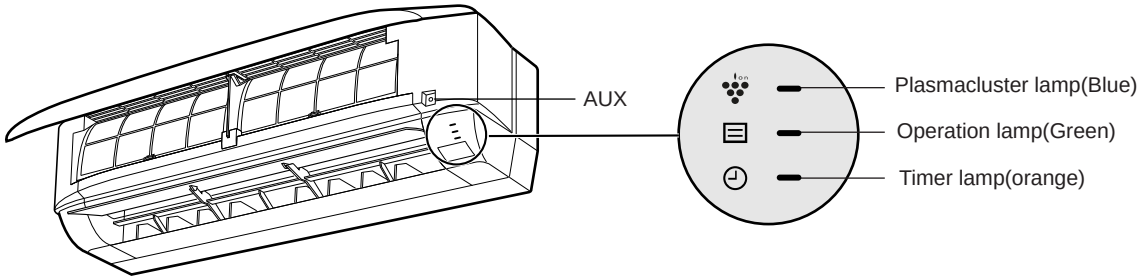
The oscilloscope (chassis ground) has the same electric potential as the 0-V probe. The entire electronic control section of the outdoor unit has a voltage potential difference from the ground as shown in the above diagram. When the oscilloscope is set up, the 0-V line and the ground voltage (ground)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

[8] TROUBLESHOOTING GUIDE

1. Self-Diagnosis Function

1.1. Indoor unit

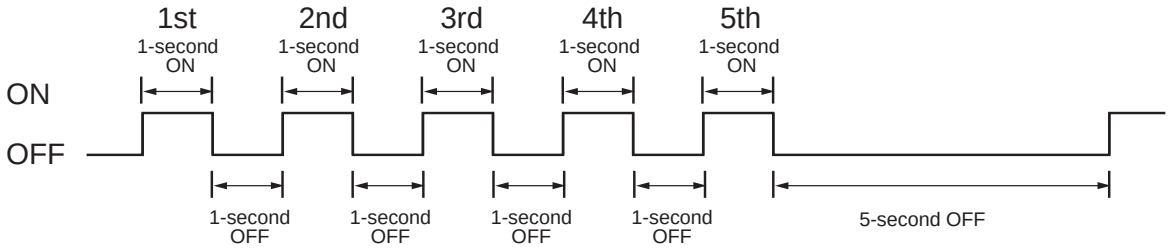
- To display the self-diagnosis, hold down the AUX button for over 5 seconds on the indoor unit when the indoor unit is not operating.
- The operation lamp (green), timer lamp (orange) and Plasmacluster lamp (blue) flash to indicate the information of malfunction.
- If the power cord is unplugged or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



<Display of self-diagnosis result>

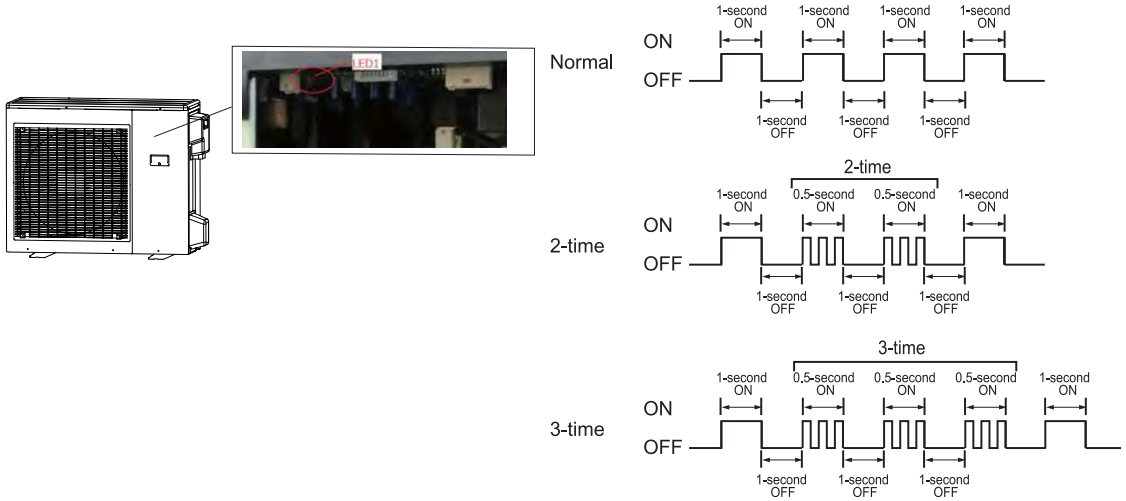
The operation lamp (green) and the Plasmacluster lamp (blue) flash in synchronization with the timer lamp (orange).

Timer lamp (1 cycle)



1.2. Outdoor unit

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



[9] CHART

<INDOOR UNIT> ○:1-second ON / 1-second OFF

Problem symptom	Outdoor unit indication (LED1)	Indoor unit →	Lamp	Malfunction No.* Main	Sub	Content of diagnosis Main	Sub	Check point	Action
Normal condition	Normal blinking	O O O O O	Timer (Orange)	0	0	Normal			
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	1-time	O O O O O	Timer (Orange)	1	0	Outdoor unit thermistor short-circuit	Heat exchanger thermistor short circuit error	1) Measure the resistance of the outdoor unit thermistors. 2) Check the lead wire of the outdoor unit thermistor for torn sheath and shortcircuit. 3) 1) 2):Normal	1) Replace the outdoor unit thermistor assembly. 2) Replace the outdoor unit thermistor assembly. 3) Replace the outdoor unit control PCB assembly.
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		1		Outdoor temperature thermistor short circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		2		Suction hermistor short circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		3		Suction hermistor (for unit A, B, C) short circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	2-time	O O O O O	Timer (Orange)	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. 5) Check the expansion valve for proper opera ion.	1) Ensure unobstructed air flow from the outdoor unit air ou let. 2) Connect power supply of proper voltage. 3) Charge the specified amount of refriger-ant. 4) Replace he outdoor unit compressor thermistor assem-bly. 5) Replace he expan-sion valve coil, expansion valve or outdoor unit control PCB assembly.
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor unit operates. Outdoor unit does not operate temporarily		O O O O O	Timer (Orange)		1		Compressor discharge overheat.	(Temporary stop for cycle protection)	-
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		2		Outdoor unit heat exchanger overheat.	(Temporary stop for cycle protection)	-
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		3		Indoor unit heat exchanger overheat.	(Temporary stop for cycle protection)	-
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		4		IPM high temperature error	Measure resistance of the heat-sink hermistor.	-
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor and outdoor units do not operate.		O O O O O	Timer (Orange)		5		IPM high temperature error	Replace the outdoor unit control PCB assembly.	-
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor unit operates. Outdoor unit does not operate temporarily.	3-time	O O O O O	Timer (Orange)	3	0	Dry operation	Temporary stop due to dehumidifying opera ion	(Temporary stop for cycle protection)	-
			Operation (Green)						
			Plasmacluster (Blue)			Heat operation	5℉/-15℃ AUTO OFF	Measure the resistance of outdoor temperature thermister.	Replace the indoor unit thermister assembly.

Problem symptom	Outdoor unit indication (LED1)	Indoor unit →	Lamp	Malfunction No.* Main	Sub	Content of diagnosis Main	Sub	Check point	Action
Indoor and outdoor units do not operate.	5-time	O O O O O	Timer (Orange)	5	0	Outdoor unit thermistor open-circuit	Heat exchanger thermistor open circuit error	1) Check connector of outdoor unit thermistor for secure installa ion. 2) Measure resistance of outdoor hermistors 3) Check the lead wires of hermistors on the outdoor unit control PCB for open-circuit. 4) 1) 2) 3):Normal	1) Correct the installa-ion 2) Replace the outdoor unit thermistor assembly. 3) Replace the outdoor unit thermistor assembly. 4) Replace the outdoor unit control PWB assembly.
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		1		Outdoor temperature thermistor open circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		2		Suction thermistor open circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		3		Suction thermistor open circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		4		Discharge thermistor open circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		5		Heat sink thermistor open circuit error		
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	6-time	O O O O O	Timer (Orange)	6	0	Outdoor unit DC Current	DC over current error	Go to “DC Over Current Error (6-0 error)”.	
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		1		IPM pin level error	Check the IPM is attached correctly to the outdoor unit IPM PWB.	Replace the outdoor unit IPM PWB assembly.
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	7-time	O O O O O	Timer (Orange)	7	0	Outdoor unit AC Current	AC over 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 (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		1		AC current error when OFF	1) IPM con inuity check	1) Replace the outdoor IPM PWB
			Operation (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		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 (Green)						
			Plasmacluster (Blue)						
		O O O O O	Timer (Orange)		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 refriger-ant. 3) Correct refrigerant clogs. (Stop valve, pipe, expansion valve)
			Operation (Green)						
			Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	8-time	O O O O O	Timer (Orange)	8	0	Abnormal wire check	Abnormal wire check error	1) Check the expansion valve. 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.
			Operation (Green)						
			Plasmacluster (Blue)						

Problem symptom	Outdoor unit indication (LED1)	Indoor unit →	Lamp	Malfunction No.* Main	Sub	Content of diagnosis Main	Sub	Check point	Action
Indoor and outdoor units do not operate.	9- ime	O O O O O	Timer (Orange)	9	0	Cycle temperature	Thermistor installation error or 4-way valve error.	1)Check the thermistor (heat exchanger) and (2-way valve) are installed in correct positions. 2)Check resistance of hermistors (heat exchanger and 2-way valve). 3)Check the 4-way valve for proper operation. 4)No abnormality found in above inspections (1), (2), (3).	1)Correct the installa ion. 2)Change he specified amount of refrigerant. 3)Replace the 4-way valve. 4)Replace the outdoor unit control PWB assembly.
		O O O O O	Timer (Orange)		4	Cycle temperature	4 way valve error or Gas leak error	1) Check the unit thermistor TH2 (exchange) and TH3 (pipe temperature) are installed in correct portions. 2) Check if the refrigerant volume is abnormally low. 3) Check the 4-way valve for proper operation.	1) Correct the installation. 2) Change the specified amount of refrigerant. 3) Replace the 4-way valve.
Indoor and outdoor units do not operate.	10-time	O O O O O	Timer (Orange)	10	0	EEPROM error	EEPROM (outdoor) data error	-	Replace the outdoor unit control PWB assembly.
		O O O O O	Timer (Orange)		1		EEPROM (outdoor) data error		
		O O O O O	Timer (Orange)	10	2	EEPROM error	EEPROM (outdoor) data error	-	Replace the outdoor unit control PWB assembly.
Indoor and outdoor units do not operate.	11-time	O O O O O	Timer (Orange)	11	0	Outdoor unit DC fan	Outdoor unit DC fan rotation error	1) Check connector CN3 of the outdoor unit DC fan motor for secure installation. 2) Check the outdoor unit fan motor for proper rotation. 3) Check fuse FUSE5. 4) Outdoor unit control PWB	1) Correct the installation. 2) Replace the outdoor unit fan motor. 3) Replace the outdoor unit control PWB assembly. 4) Replace the outdoor unit control PWB assembly.
		O O O O O	Timer (Orange)		1		Outdoor unit DC fan driver IC error	1) Check if the fan IPM terminal resistance values are uniform. 2) Outdoor unit fan motor continuity check.	1) Replace the outdoor unit control PWB assembly. 2) Replace the outdoor unit fan.
		O O O O O	Timer (Orange)		2		Outdoor unit DC fan lock error	1) Check the outdoor unit fan motor for proper rotation. 2) 1): Normal	1) Replace the outdoor unit control PWB assembly. 2) Replace the outdoor unit fan.
		O O O O O	Timer (Orange)		3		Detection error of DC fan nega ive rotation before compressor is driven	(Temporary stop for DC fan circuit protection)	-
		O O O O O	Timer (Orange)		4		Detection error of inverter current for DC fan	-	Replace the outdoor unit control PWB assembly.
		O O O O O	Timer (Orange)		5		Outdoor unit DC fan open connector error	1) Check connector CN3 of the outdoor unit DC fan motor for secure installation. 2) No abnormality found in above inspection 1).	1) Correct the installation. 2) Replace the outdoor unit control PWB assembly.

Problem symptom	Outdoor unit indication (LED1)	Indoor unit →					Lamp	Malfunction No.* Main	Malfunction No.* Sub	Content of diagnosis Main	Content of diagnosis Sub	Check point	Action
Indoor and outdoor units do not operate.	12- ime	O	O	O	O	O	Timer (Orange)	12	0	Thermal fuse in terminal board	Thermal fuse error in terminal board (for power supply)	1) Check he thermal fuse in terminal board (for Power supply) 2) Check connector CN5 of the outdoor unit. 3) 1) 2): Normal	1) Replace terminal board for Power supply. 2) Correct he installation. 3) Replace the outdoor unit control PCB assembly.
			O	O			Operation (Green)						
							Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	13- ime	O	O	O	O	O	Timer (Orange)	13	0	DC compressor	Compressor startup error	1) Check he colors (red, white, orange) of the compressor cords for proper connection. (PWB side, compressor side) 2) Check if he IPM terminal resistance values are uniform. 3) Check if outdoor main relay (MRY1) turns on and voltage of both end of the condenser (C8 or C9) has become DC290-330V. 4) 1) 2) 3) : Normal	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 compressor.
			O	O		O	Operation (Green)						
							Plasmacluster (Blue)						
		O	O	O	O	O	Timer (Orange)		1		Compressor rota ion error. (at 120° energizing)		
			O	O		O	Operation (Green)						
						O	Plasmacluster (Blue)						
		O	O	O	O	O	Timer (Orange)		2		Compressor rota ion error (at 180° energizing)		
			O	O		O	Operation (Green)						
					O		Plasmacluster (Blue)						
Indoor and outdoor units operate.		O	O	O	O	O	Timer (Orange)		3		Detection error of inverter current	Check the circuit of detection of inverter current.	Replace the outdoor unit control PWB assembly.
			O	O		O	Operation (Green)						
					O	O	Plasmacluster (Blue)						
Indoor and outdoor units do not operate.	14- ime	O	O	O	O	O	Timer (Orange)	14	0	Outdor unit PAM	PAM over voltage error	1) Check the AC power supply voltage for fluctuation. 2) No abnormality found in above inspection.	1) Correct he installation. 2) Replace the PWB assembly.
			O	O	O		Operation (Green)						
							Plasmacluster (Blue)						
		O	O	O	O	O	Timer (Orange)		1		PAM clock error	Check the PAM clock for proper input.	Replace the outdoor unit control PWB assembly.
			O	O	O		Operation (Green)						
						O	Plasmacluster (Blue)						
		O	O	O	O	O	Timer (Orange)		2		PAM under voltage error	1) Check the AC power supply voltage for fluctuation. 2) No abnormality found in above inspection.	1) Correct he installation. 2) Replace the PWB assembly.
			O	O	O		Operation (Green)						
					O		Plasmacluster (Blue)						
Indoor unit operates. Outdoor unit does not operate.	Lighting or OFF	O	O	O	O	O	Timer (Orange)	17	0	Wiring between units	Serial opencircuit	1) Check he wires between units. 2) Check voltage between N and 1 the indoor/ outdoor unit terminal boards. 3) Check the outdoor unit fuse. 4) Check 15-V,12-V and 5-V voltages on the PCB. Check resistance between IPM terminals. 5) Check pins No 3 and 5 of connector CN3 of he outdoor unit fan motor for shortcircuit. 6) Outdoor unit control PCB.	1) Connect stable power supply. Correct the wiring. 2) Replace the outdoor unit control PWB assembly. 3) Replace the fuse/ outdoor unit control PWB assembly. 4) Replace the outdoor unit control PWB assembly. 5) Replace the outdoor unit fan motor. 6) Replace the outdoor unit control PWB.
		O				O	Operation (Green)						
							Plasmacluster (Blue)						
Indoor unit operates. Outdoor unit does not operate.	Lighting or OFF	O	O	O	O	O	Timer (Orange)	18	0	Wiring between units	Serial opencircuit	Check the wiring between units.	Correct the wiring.
		O			O		Operation (Green)						
							Plasmacluster (Blue)						
Indoor and outdoor units do not operate.		O	O	O	O	O	Timer (Orange)		1			Check the wiring between units.	Correct the wiring.
		O			O		Operation (Green)						
						O	Plasmacluster (Blue)						

Problem symptom	Outdoor unit indication (LED1)	Indoor unit →	Lamp	Malfunction No.* Main	Sub	Content of diagnosis Main	Sub	Check point	Action
Indoor and outdoor units do not operate.	Normal blinking or OFF	O O O O O O O O 	Timer (Orange) Operation (Green) Plasmacluster (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 ofthe indoor unit fanmotor for secureinstallation. 4) 1) 2) 3): Normal	1) Replace the indoor fan motor. 2) Replace the indoor fan motor. 3) Correct the installation of the indoor fan motor connector. 4) Replace the indoorunit control PCB.
Indoor and outdoor units do not operate.	Normal blinking or OFF	O O O O O O O 	Timer (Orange) Operation (Green) Plasmacluster (Blue)	20	0	Indoor unit control PCB	EEPROM data error	(EEPROM read data error)	Replace the indoor unit control PWB.
Indoor and outdoor units operate.	Normal blinking or OFF	O O O O O O O O 	Timer (Orange) Operation (Green) Plasmacluster(Blue)	26	1	Indoor unit room temperature thermistor	Indoor unit room temperature thermistor	(1)Check connector of thermistor for secure installation. (2)Check the temperature properties of the thermistor.	(1)Replace the thermistor. (2)Replace the thermistor.
		O O O O O O O O 	Timer (Orange) Operation (Green) Plasmacluster(Blue)		2	Indoor unit pipe temperature thermistor	Indoor unit pipe temperature thermistor	(1)Check connector of thermistor for secure installation. (2)Check the temperature properties of the thermistor.	(1)Replace the thermistor. (2)Replace the thermistor.
		O O O O O O O O 	Timer (Orange) Operation (Green) Plasmacluster(Blue)		3	Indoor unit valve temperature thermistor	Indoor unit valve temperature thermistor	(1)Check connector of thermistor for secure installation. (2)Check the temperature properties of the thermistor.	(1)Replace the thermistor. (2)Replace the thermistor.

***Remark**

The malfunction No. is calculated using the following way.

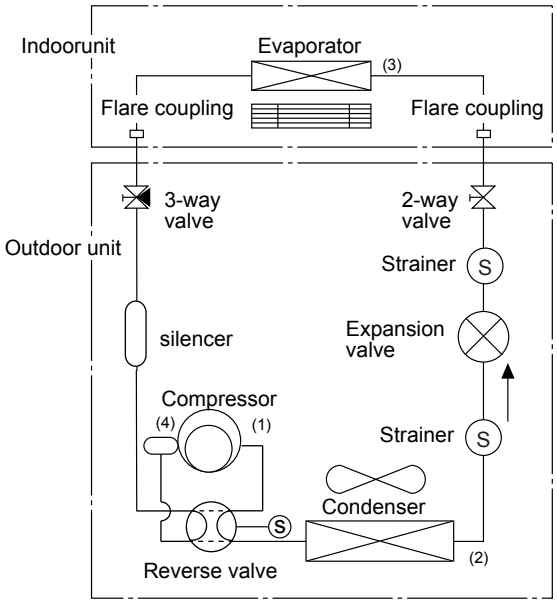
Example)

Indoor unit lamp	→Lamp 16	8	4	2	1	Calculation	Main	Sub
Timer (orange)	O	O	O	O	O			
Operation (Green)			O		O	4+1=5	5	
Plasmacluster (blue)				O		2		2

CHAPTER 4. REFRIGERATION CYCLE

The content of this section is currently under revision.
Will be released after approval.

[1] SCHEMATIC DIAGRAM



[2] STANDARD CONDITION

Temperature of each part and presure of 3-way valve are acquired in standard condition, and would change with condition around. The standard condition is as follows:

	Indoor side		Outdoor side	
	Dry-bulb Temp. ℉(℃)	**Relative Humidity (%)**	**Dry-bulb Temp. (℃)**	**Relative Humidity (%)**
Cooling	80 (26.7)	51.1	95 (35.0)	—
Heating	70 (21.1)	—	47 (8.33)	73

* REFRIGERANT PIPE LENGTH 25feet (7.6m).

[3] PEAK OPERATION CURRENT

	PEAK CURRENT	
	Cooling	**Heating**
AE-X15PU	7.6 A	9.5 A
AE-X18PU	7.7 A	10.3 A
AE-X24PU	11.8 A	12.0 A

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

(AY-XPC15PU / AE-X15PU)

MODE	COOLING MAX	HEATING MAX	COOLING TEST RUN	HEATING TEST RUN
Hz / No.	62 OR MORE	80 OR MORE	42 FIXED	42 FIXED
Temp. on (1) ℉(℃)	165.2 (74)	194.5 (90.3)	147.6 (64.2)	140.0 (60.0)
Temp. on (2) ℉(℃)	101.5 (38.6)	40.3 (4.6)	101.1 (38.4)	39.2 (4.0)
Temp. on (3) ℉(℃)	49.6 (9.8)	124.7 (51.5)	55.2 (12.9)	99.0 (37.2)
Temp. on (4) ℉(℃)	57.6 (14.2)	39.7 (4.3)	60.4 (15.8)	41.5 (5.3)
3-way valve pressure (MPaG)	0.919	3.318	1.041	2.265

CAUTION: Indoor fan speed is set to [HIGH].

The content of this page is currently under revision.
Will be released after approval.

(AY-XPC18PU / AE-X18PU)

MODE	COOLING MAX	HEATING MAX	COOLING TEST RUN	HEATING TEST RUN
Hz / No.	73 OR MORE	88 OR MORE	42 FIXED	42 FIXED
Temp. on (1) ℉(℃)	158.9 (70.5)	198.0 (92.2)	138.9 (59.4)	13.4. (56.9)
Temp. on (2) ℉(℃)	101.1 (38.4)	42.4 (5.8)	102.9 (39.4)	38.3 (3.5)
Temp. on (3) ℉(℃)	49.6 (9.8)	94.6 (34.8)	55.9 (13.3)	78.1 (25.6)
Temp. on (4) ℉(℃)	50.9 (10.5)	37.0 (2.8)	58.2 (14.6)	41.5 (5.3)
3-way valve pressure (MPaG)	0.876	3.449	1.056	2.116

CAUTION: Indoor fan speed is set to [HIGH].

(AY-XP24PU / AE-X24PU)

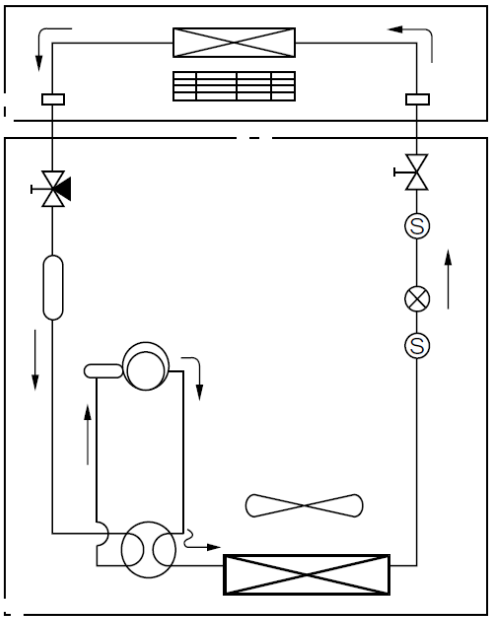
MODE	COOLING MAX	HEATING MAX	COOLING TEST RUN	HEATING TEST RUN
Hz / No.	105 OR MORE	97 OR MORE	42 FIXED	42 FIXED
Temp. on (1) ℉(℃)	165.0 (73.9)	169.5 (76.4)	137.5 (58.6)	125.8 (52.1)
Temp. on (2) ℉(℃)	113.2 (45.1)	45.5 (7.5)	103.3 (39.6)	41.0 (5.0)
Temp. on (3) ℉(℃)	50.4 (10.2)	107.4 (41.9)	58.5 (14.7)	94.6 (34.8)
Temp. on (4) ℉(℃)	41.4 (5.2)	35.2 (1.2)	60.6 (15.9)	39.0 (3.9)
3-way valve pressure (MPaG)	0.770	2.874	1.073	2.170

CAUTION: Indoor fan speed is set to [HIGH].

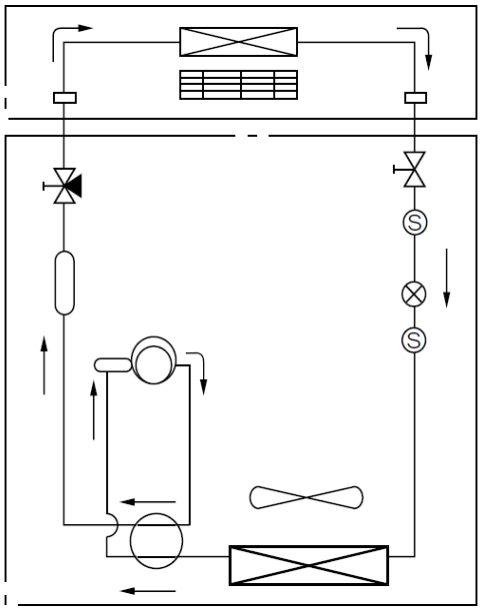
"Hz" in the table above is converted by frequency, and has nothing to do with power supply frequency.
Note: For COOLING/HEATING max, please set the temperature to low/high limit (COOLING 61℉[16℃], HEATING 86℉[30℃]).
However, it is possible that the COOLING/HEATING max operation can not be obtained depending on the circumambient condition.

[5] FLOW CHART OF REFRIGERANT CYCLE

5-1 COOLING & DEFROSTING



5-2 HEATING

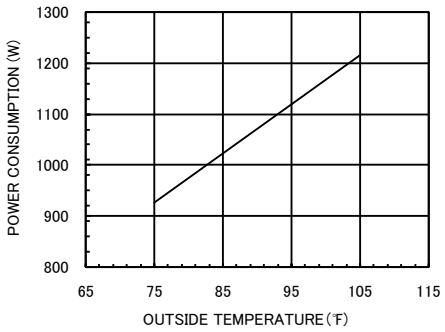


[6] CHARACTERISTIC OF COOLING AND HEATING OPERATION

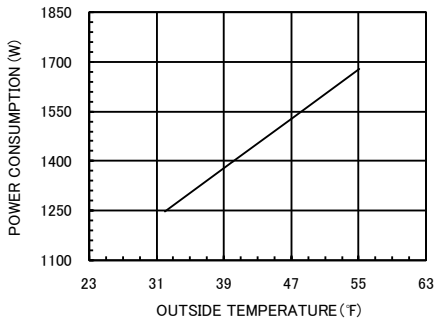
6-1 AY-XPC15PU / AE-X15PU

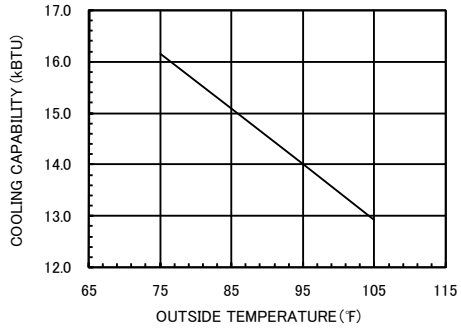
CAUTION: Indoor fan speed is set to [HIGH].
Airflow direction is initial.
Air inlet temperature of is 80°F (26.7℃) during COOLING operation, and 70°F (21.1℃) during HEATING operation.

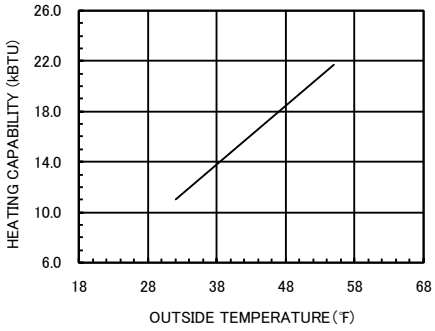
6-1-1 COOLING



6-1-2 HEATING



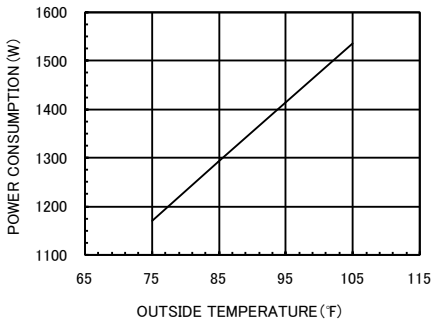




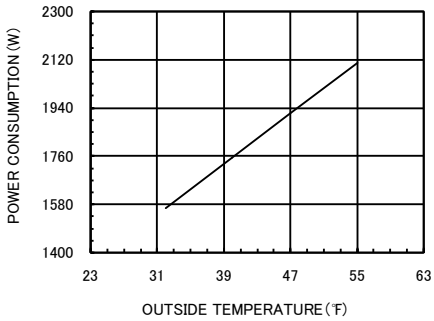
6-2 AY-XPC18PU / AE-X18PU

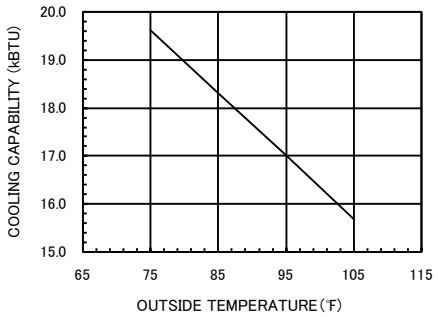
CAUTION: Indoor fan speed is set to [HIGH].
Airflow direction is initial.
Temperature of inlet is 80°F (26.7℃) during COOLING operation, and 70°F (21.1℃) during HEATING operation.

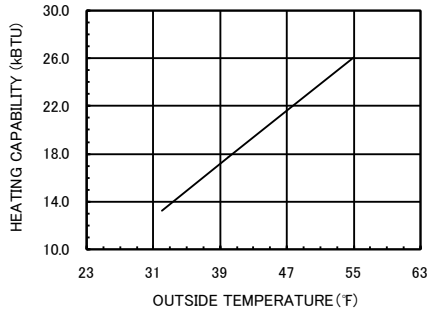
6-2-1 COOLING



6-2-2 HEATING



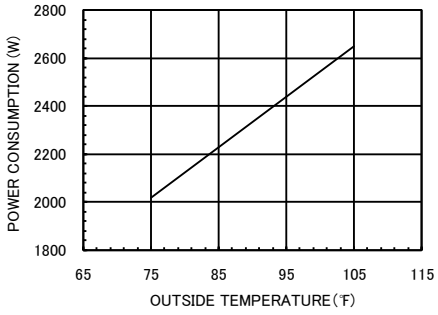




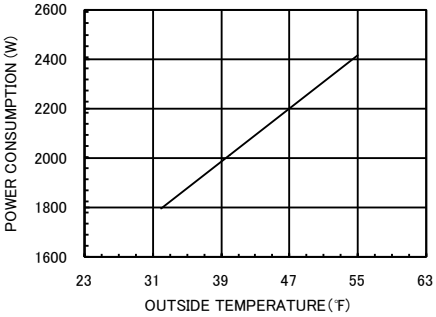
6-3 AY-XP24PU / AE-X24PU

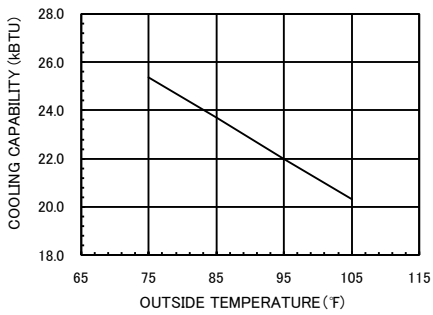
CAUTION: Indoor fan speed is set to [HIGH].
Airflow direction is initial.
Temperature of inlet is 80°F (26.7℃) during COOLING operation, and 70°F (21.1℃) during HEATING operation.

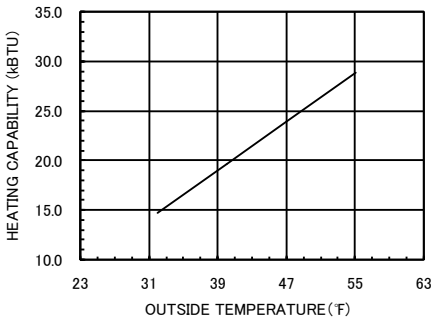
6-3-1 COOLING



6-3-2 HEATING







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. Be sure to disconnect the power cord from the AC power outlet before starting the disassembly procedure. When reassembling the unit after repairing, be sure to install screws to their original positions. The screws used are not the same in specifications such as corrosion-resistant treatment, tip shape and length. After the air conditioner is repaired or parts are replaced, measure insulation resistance of the equipment using an insulation resistance meter. If the measured resistance is lower than 1 MΩ, inspect parts and repair or replace defective parts.

[1] OUTDOOR UNIT

Be sure to disconnect the power cord from the AC power outlet before starting the disassembly procedure. When reassembling the unit after repairing, be sure to install screws to their original positions.

The screws used are not the same in specifications such as corrosion-resistant treatment, tip shape and length.

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

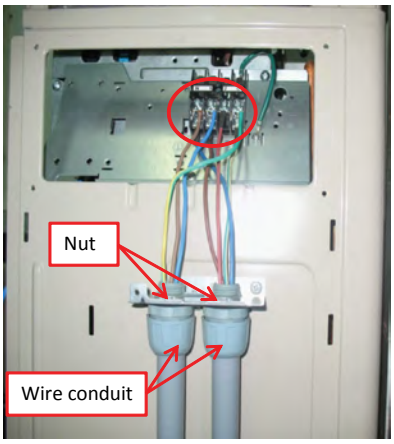
1. MAIN UNIT

1) Unscrew the 2 screws fixing the control box cover and remove it.

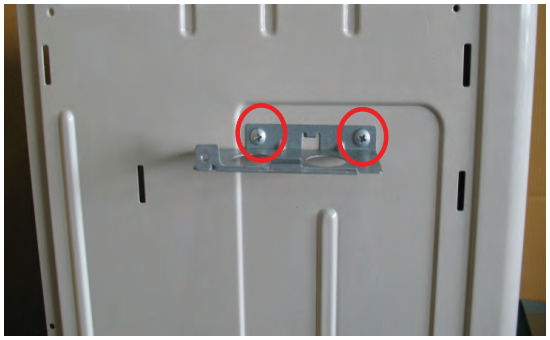
2) Unscrew the 2 screws fixing the valve cover and remove it.

3) Unscrew 3 screws fixing the cable holder and remove it.

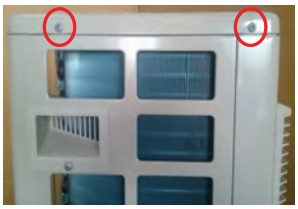
4) Loose the screws fixing the connecting cable and unscrew the Nut, remove the Wire conduit



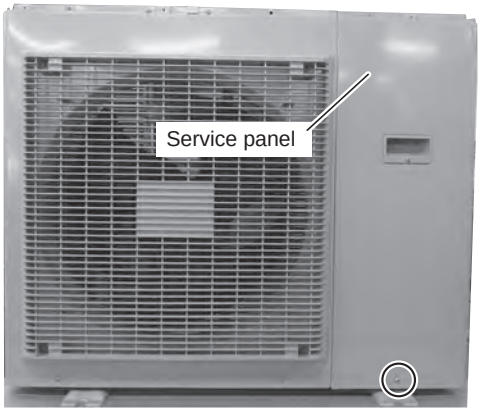
5) Unscrew the 2 screws fixing the cable holdor and remove it



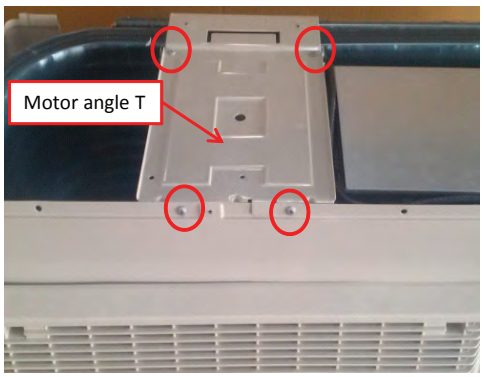
6) Unscrew the 6 screws fixing the top plate and remove it.



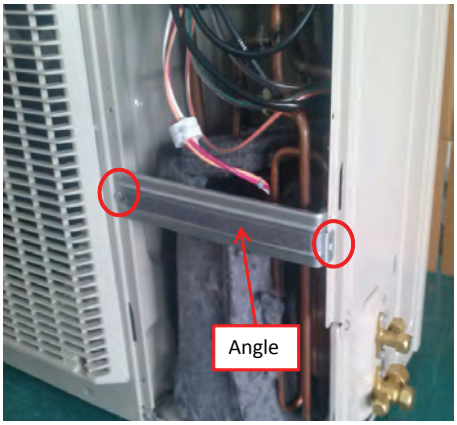
7) Unscrew the screw fixing the service panel, then slide the panel downward and remove it.



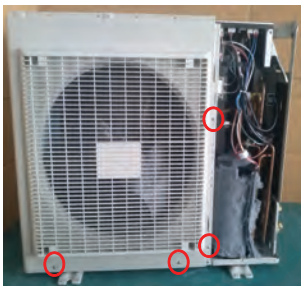
8) Unscrew the 4 screws fixing the motor angle T and remove it.



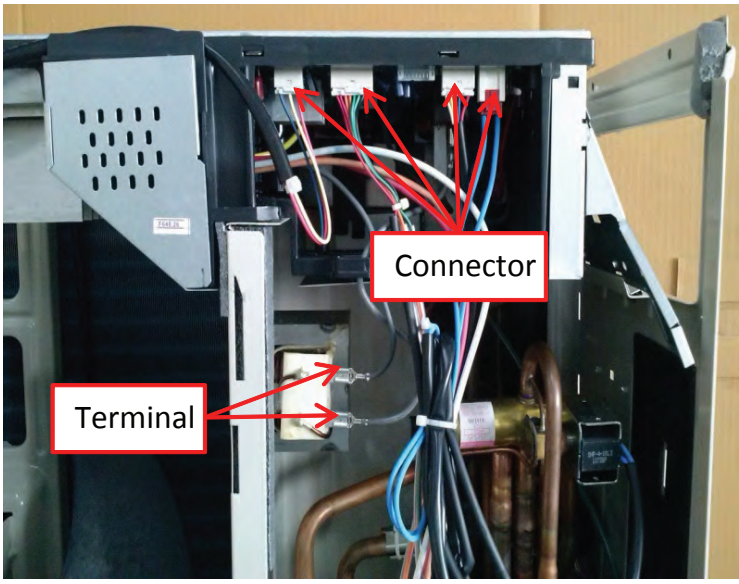
9) Unscrew the 2 screws fixing the angle and remove it.



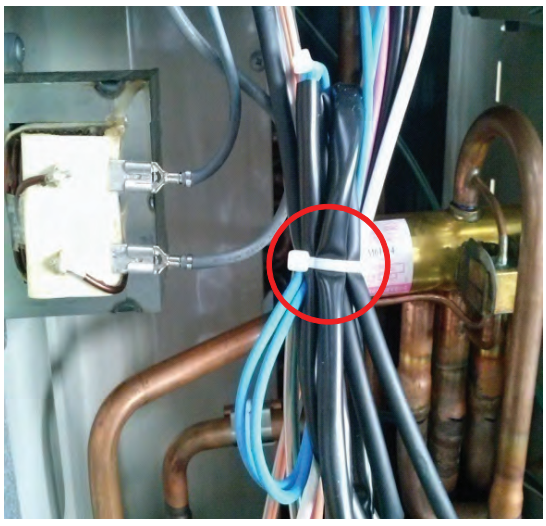
10) Unscrew the 4 screws fixing the front panel and remove it.



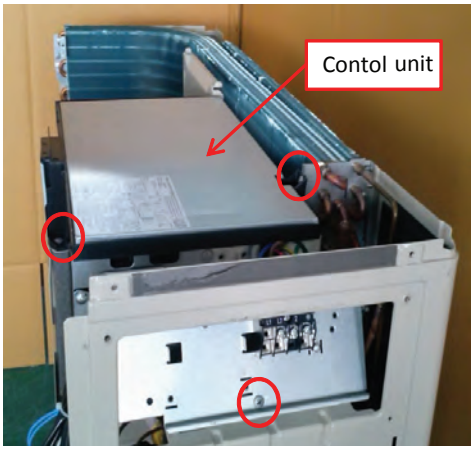
11)Disconnect the 4 connectors and the 2 terminals.



12)Cut the fixing band.

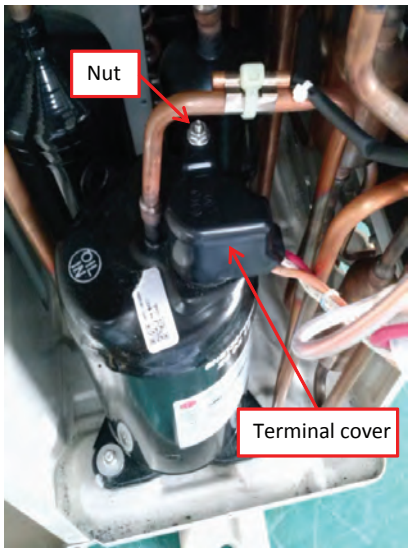


13).Unscrew the 3 screws fixing control unit and remove it.



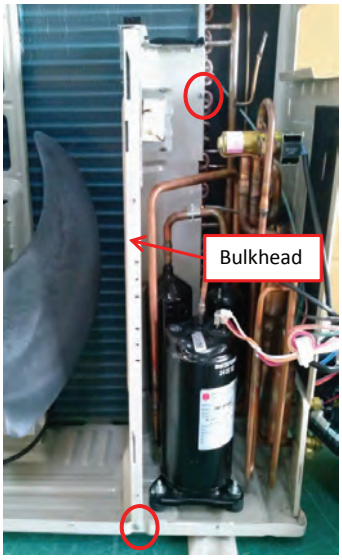
14)Remove the 2 compressor covers.

15)Unscrew the nut fixing the terminal cover and remove it.



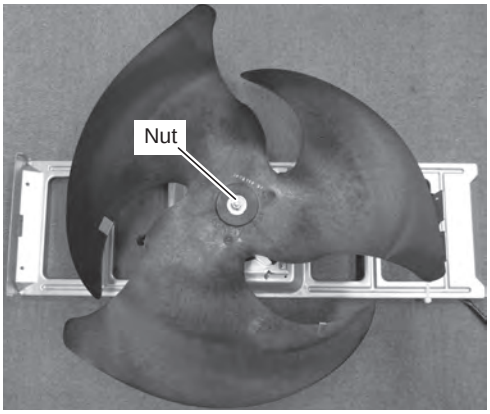
16)Disconnect the 3 terminal connected with the compressor.

17)Unscrew the 2 screws fixing the bu khead and remove it.

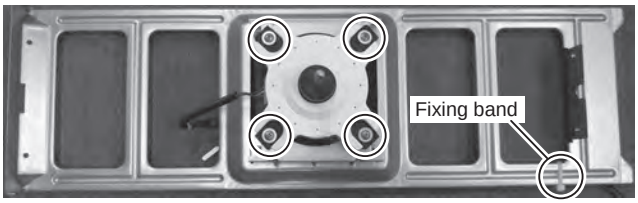


18)Unscrew the 2 screws fixing the motor angle and remove it.

19)Unscrew the nut fixing the fan and remove it.



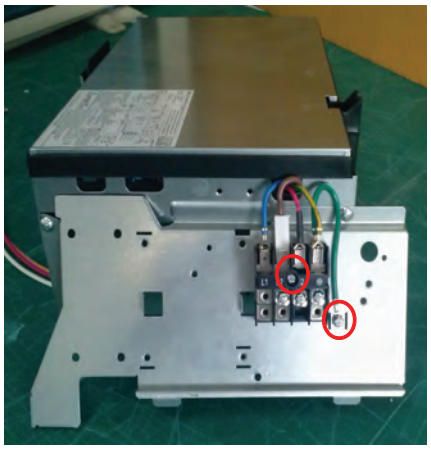
20)Unscrew the 4 screws fixing the motor and cut the fixing band, and then remove the motor.



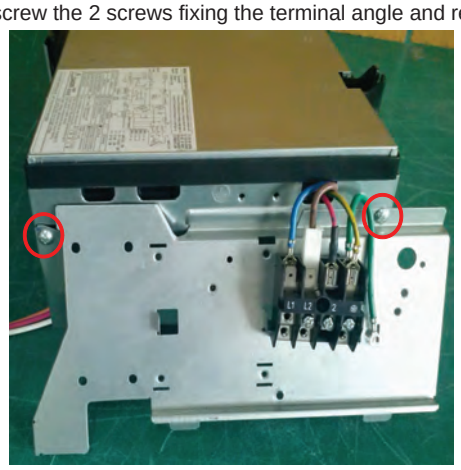
[2] DISASSEMBLY OF CONTROL UNIT

1. Control unit box's Approach to decomposition

1) Unscrew the 2 screws and remove the terminal board.

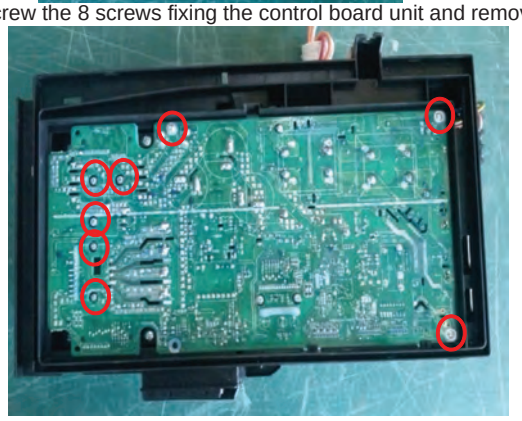


2) Unscrew the 2 screws fixing the terminal angle and remove it.

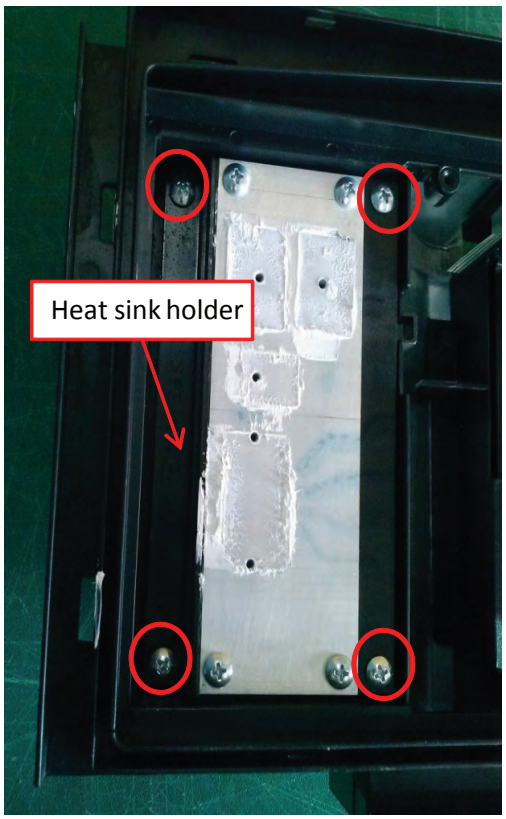


3) Remove the metal cover.

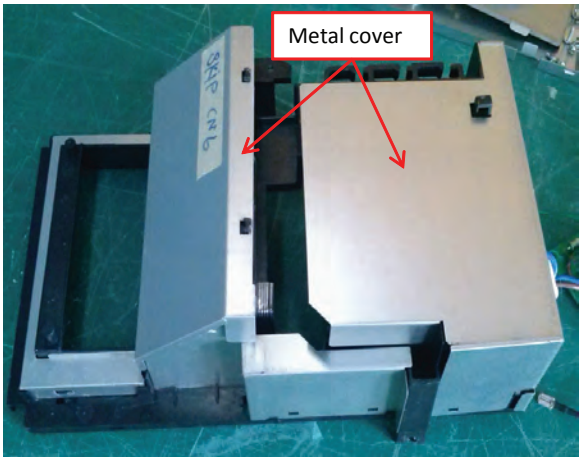
4) Unscrew the 8 screws fixing the control board unit and remove it



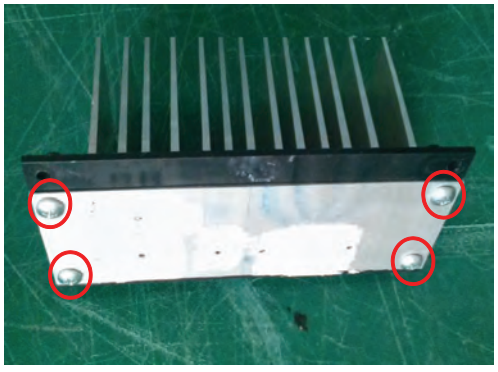
5) Unscrew the 4 screws fixing the Heatsink holder and remove it.



6) Remove 1 screw and the 2 metal covers.

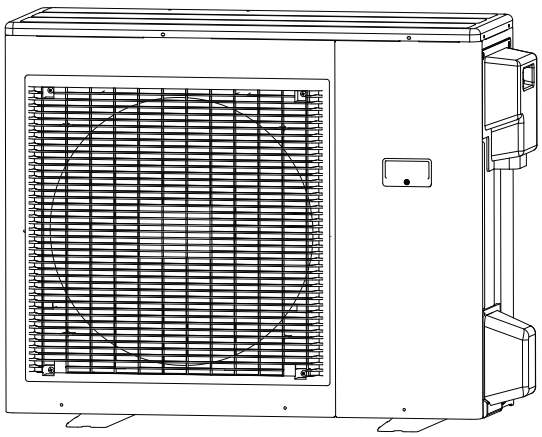


7) Unscrew the 4 screws fixing the Heatsink and remove it from Heatsink holder



SHARP PARTS GUIDE

SPLIT TYPE
ROOM AIR CONDITIONER



MODEL

OUTDOOR UNIT

AE-X15PU
AE-X18PU
AE-X24PU

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

CONTENTS

"HOW TO ORDER REPLACEMENT PARTS"

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

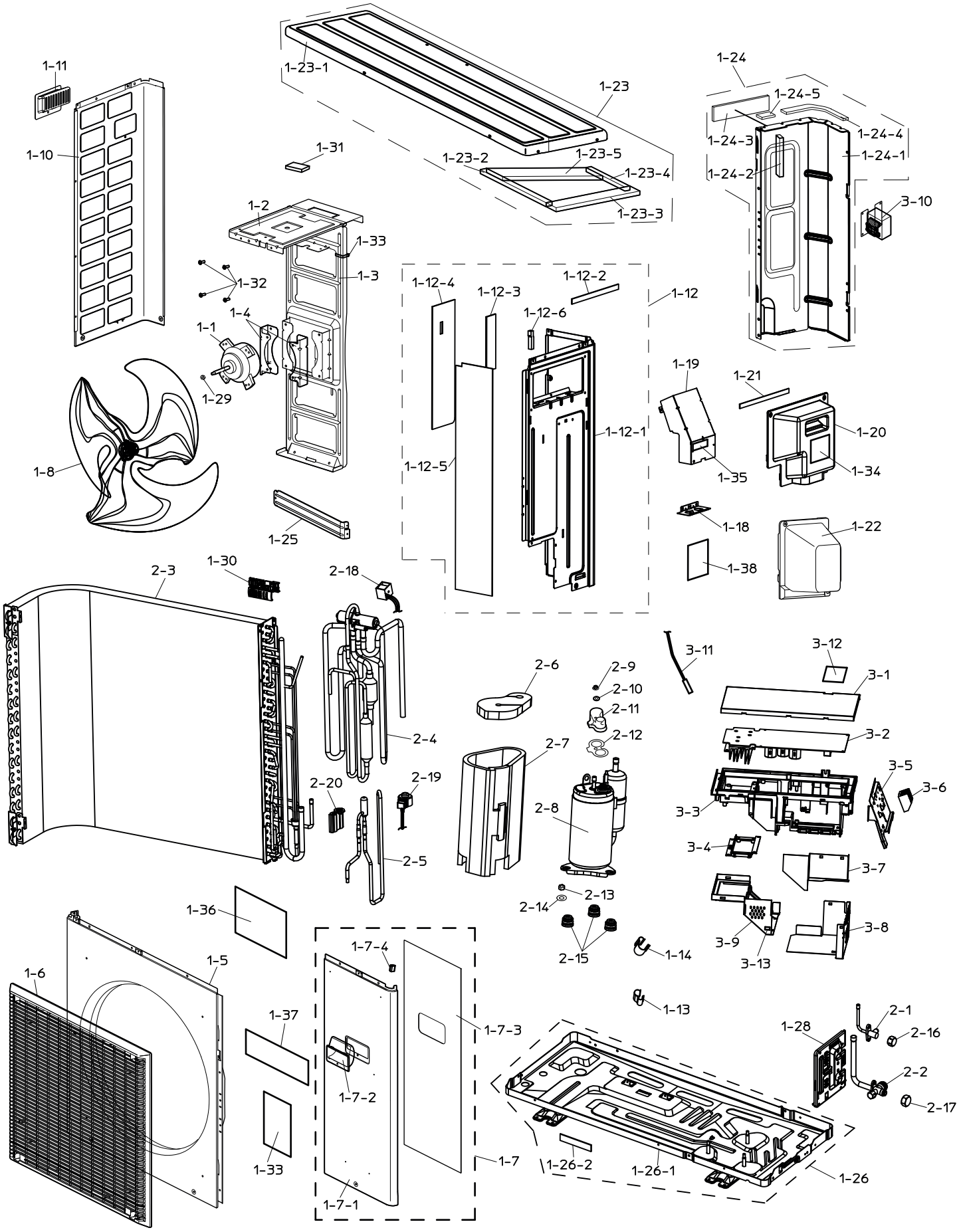
1. MODEL NUMBER
2. REF. No.
3. PART NO.
4. DESCRIPTION

★ MARK: SPARE PARTS-DELIVERY SECTION

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 PARTS FOR AE-X15PU, AE-X18PU, AE-X24PU

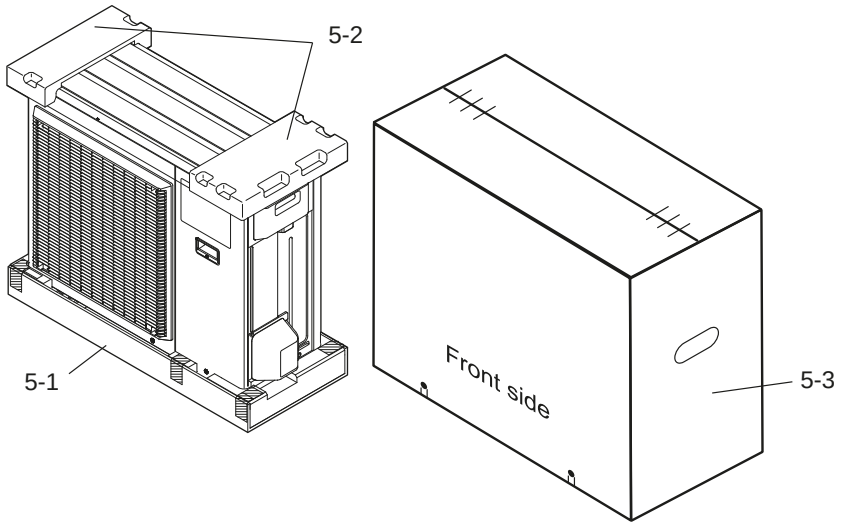


NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION	Qty
[2] OUTDOOR UNIT STRUCTURE AND CYCLE PARTS(AE-X15PU,AE-X18PU,AE-X24PU)						
1-1	CMOTLB537JBEZ	BL	N		FAN MOTOR	1
1-2	LANGKA326JBTA	AN	N		MOTOR ANGLE T	1
1-3	LANGKA325JBTA	AY	N		MOTOR ANGLE	1
1-4	LANGKA324JBTA	AH	N		FAN MOTOR ANGLE SUB	2
1-5	GCAB-A469JBTA	BB	N		FRONT PANEL L	1
1-6	GGADFA049JBFA	BC			FAN GUARD	1
1-7	CCAB-A586JBKZ	AZ	N		FRONT PANEL R ASS'Y	1
1-7-1	GCAB-A468JBTA	AW	N		FRONT PANEL R	1
1-7-2	JHNDPA030JBFA	AG	N		HANDLE	1
1-7-3	PSPF-B182JBEZ	AY			IIR SHEET A	1
1-7-4	PSEL-E252JBEZ	AC			FRONT PANEL R SEAL	1
1-8	NFANPA152JBEZ	AY	N		PROPELLER FAN	1
1-10	GPLTMA081JBTA	AX	N		SIDE CABINET L	1
1-11	JHNDPA032JBFA	AG			HANDLE	1
1-12	CPLT-A216JBKZ	BC	N		SIDE CABINET R ASS'Y	1
1-12-1	GPLTMA080JBTA	AZ	N		SIDE CABINET R	1
1-12-2	PSEL-E388JBEZ	AC	N		SIDE CABINET R SEAL B	1
1-12-3	PGUMSA148JBE0	AE			DAMPER RUBBER	1
1-12-4	PSPF-E329JBEZ	AG	N		IIR SHEET	1
1-12-5	PSPF-B185JBEZ	AX			IIR SHEET B	1
1-12-6	PSEL-E120JBEZ	AK			SIDE CABINET R SEAL	1
1-13	MSPR-A026JBE0	AB			SPRING	2
1-14	MSPR-A036JBE0	AB			THERMISTOR SPRING	1
1-18	LHLD-B206JBWZ	AE	N		CABLE HOLDER	1
1-19	PCOV-B982JBWZ	AK	N		CABLE COVER	1
1-20	PCOV-B981JBFA	AT	N		SIDE COVER 2	1
1-21	PSEL-E389JBEZ	AC	N		SIDE COVER SEAL	1
1-22	PCOV-C030JBFA	AP	N		VALVE COVER	1
1-23	DCAB-A185JBKZ	BC	N		TOP PLATE ASS'Y	1
1-23-1	GCAB-A478JBTA	AZ	N		TOP PLATE	1
1-23-2	PSEL-E129JBEZ	AK			TOP PLATE SEAL A	1
1-23-3	PSEL-E130JBEZ	AN			TOP PLATE SEAL B	1
1-23-4	PSEL-E131JBEZ	AK			TOP PLATE SEAL C	1
1-23-5	PSEL-E284JBEZ	AL			TOP PLATE SEAL E	1
1-24	CSKR-A569JBKZ	AW	N		BULKHEAD ASS'Y	1
1-24-1	PSKR-A410JBTA	AU	N		BULKHEAD	1
1-24-2	PSEL-E285JBEZ	AE			BULKHEAD SEAL	1
1-24-3	PSEL-E286JBEZ	AD			BULKHEAD SEAL A	1
1-24-4	PFPFPE480JBEZ	AC			BULKHEAD SEAL B	1
1-24-5	PFPFPE481JBEZ	AC			BULKHEAD SEAL C	1
1-25	CANG-A358JBKZ	AK			ANGLE ASS'Y	1
1-26	CCHS-B373JBKZ	BC			BASE PAN ASS'Y	1
1-26-1	CCHS-B375JBTA	BC	N		BASE PAN SUB ASS'Y	1
1-26-2	PFPFPE477JBEZ	AC			BASE PAN SEAL C	1
1-28	PDAI-A292JBTA	AM	N		FLARE COUPLING BASE	1
1-29	LX-NZA428JBEZ	AC			SPECIAL NUT	1
1-30	LHLD-B217JBFA	AE	N		THERMISTOR HOLDER	1
1-31	PSEL-E406JBEZ	AC			MOTOR ANGLE T SEAL	1
1-32	XTTWW40P16000	AC			TAPPING SCREW	4
1-33	TLAB-F617JBRA	AM	N		ENERGY LABEL	1
1-34	TLAB-F696JBRZ	AF	N		CAUTION LABEL UL	1
1-35	TLAB-F748JBRZ	AF	N		UL COPPER WIRE LABEL	1

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION	Qty
1-36	TLABBA291JBRA	AK			PCI LABEL	1
1-37	TLABMA849JBRA	AM			INVERTER LABEL	1
1-38	TSPC-H649JBRZ	AH	N		NAME LABEL	1
2-1	DVLV-B073JBKZ	AY			2WAY VALVE UNIT	1
2-2	DVLV-B074JBKZ	BC			3WAY VALVE UNIT	1
2-3	DCON-A753JBPZ	CP	N		CONDENSER (AE-X15PU)	1
2-3	DCON-A754JBPZ	CU	N		CONDENSER (AE-X18PU,AE-X24PU)	1
2-4	DVLV-B343JBKZ	BS	N		REVERSE VALVE ASS'Y (AE-X15PU)	1
2-4	DVLV-B346JBKZ	BT	N		REVERSE VALVE ASS'Y (AE-X18PU,AE-X24PU)	1
2-5	DVLV-B344JBKZ	BG	N		EXPAN.VALVE ASS'Y (AE-X15PU)	1
2-5	DVLV-B354JBKZ	BH	N		EXPAN.VALVE ASS'Y (AE-X18PU,AE-X24PU)	1
2-6	PSPF-B239JBEZ	AK			COMRESSOR COVER TOP	1
2-7	PSPF-B328JBEZ	AS	N		COMRESSOR COVER	1
2-8	PCMPRA688JBEZ	CF	N		COMRESSOR	1
2-9	LX-NZA411JBEZ	AH			FRANGE NUT	1
2-10	PSEL-E239JBEZ	AH			GASKET WASHER	1
2-11	PCOV-B887JBEZ	AR			TERMINAL COVER	1
2-12	PSEL-E240JBEZ	AK			TERMINAL GASKET	1
2-13	XNFS760-50000	AB			NUT	1
2-14	LX-WZA057JBEZ	AC			WASHER 22	1
2-15	GLEG-A162JBEZ	AF			COMPRESSOR CUSHION	1
2-16	PSEN-A044JBKZ	AG			FLARE NUT ASS'Y	1
2-17	PSEN-A053JBKZ	AN			FLARE NUT ASS'Y	1
2-18	CCIL-A185JBKZ	AU	N		COIL ASS'Y	1
2-19	RMOTSA037JBZZ	BC			COIL	1
2-20	PGUMS0170JBE0	AE			DAMPER RUBBER	1
3-1	PCOV-B888JBWZ	AL			COVER	1
3-2	DSGY-F029JBKZ	CA	N		CONTROL BOARD UNIT (AE-X15PU)	1
3-2	DSGY-F033JBKZ	CA	N		CONTROL BOARD UNIT (AE-X18PU)	1
3-2	DSGY-F122JBKZ	CA	N		CONTROL BOARD UNIT (AE-X24PU)	1
3-3	LHLD-B240JBFZ	AT	N		HOLDER	1
3-4	LHLD-B241JBFZ	AF	N		HOLDER C	1
3-5	LANG-A771JBWZ	AN	N		TERMINAL ANGLE	1
3-6	QTANZA091JBZZ	AU	N		TERMINAL BOARD	1
3-7	PBOX-A570JBWZ	AK			CONTROL BOX B	1
3-8	PBOX-A576JBWZ	AM			CONTROL BOX	1
3-9	CBOX-A082JBKZ	AQ	N		CONTROL BOX C ASS'Y	1
3-10	RCILZA051JBZZ	AY	N		REACTOR	1
3-11	RH-HXA187JBZZ	AY	N		THERMISTOR	1
3-12	TLABCE028JBRZ	AD	N		WIRING DIAGRAM	1
3-13	TLABNA002JBRZ	AF			LABEL	1
[2] OTHER OUTDOOR UNIT ELECTRIC PARTS(AE-X15PU,AE-X18PU,AE-X24PU)						
4-1	QFS-GA077JBZZ	AD			Fuse (FU3)	1
4-2	QFS-GA078JBZZ	AD			Fuse (FU2)	1
4-3	QFS-GA090JBZZ	AG			Fuse (FU5)	2
4-4	QFS-GA091JBZZ	AG	N		Fuse (FU1)	1
4-5	QSPGCA006JBZZ	AH			Surge absorb (SA1)	1
4-6	QW-VZG365JBZZ	AF			Lead wire(BT2)	1
4-7	QW-VZG366JBZZ	AF			Lead wire (BT1)	1
4-8	QW-VZG372JBZZ	AF			Lead wire (BT6)	1
4-9	QW-VZG613JBZZ	AG			Lead wire (BT12)	1
4-10	QW-VZG614JBZZ	AG			Lead wire (BT13)	1

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION	Qty
4-11	QW-VZG615JBZZ	AG			Lead wire (BT14,BT15,BT16)	1
4-12	QW-VZG713JBZZ	AF			Lead wire (BT5)	1
4-13	QW-VZG762JBZZ	AE			Lead wire (BT4)	1
4-14	QW-VZG772JBZZ	AE			Lead wire (JPL1A-JPL1B)	1
4-15	QW-VZG773JBZZ	AE			Lead wire (JPL2C-JPL2D)	1
4-16	QW-VZG775JBZZ	AE			Lead wire (BT3)	1
4-17	RC-EZA371JBZZ	BB			Capacitor(C8,C9,C10)	2
4-18	VHVTVR10511-B+	AD			Varistot(NR1,NR2)	2

[4] OUTDOOR PACKAGE PARTS



NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
5-1	**CPADBA164JBKZ**	**AZ**			Bottom Pad Assembly
5-2	**CPADBA165JBKZ**	**AN**			Packing Pad Assembly
5-3	**SPAKCE213JBEZ**	**BA**			Packing Case