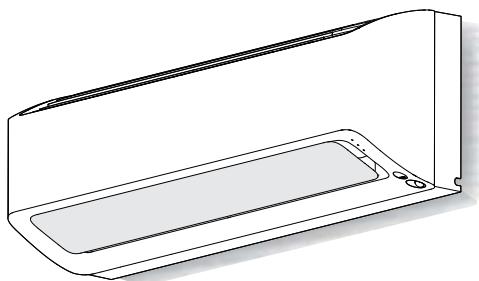


SHARP SERVICE MANUAL

S7305AYXPC2ZUT

SPLIT TYPE ROOM AIR CONDITIONER



	INDOOR UNIT	OUTDOOR UNIT
12K Btu/h models	AY-XP12ZU1 AY-XP12ZHU1	AE-X12ZU1 AE-X12ZHU1
15K Btu/h models	AY-XP15ZU1	AE-X15ZU1
18K Btu/h models	AY-XP18ZU1 AY-XP18ZHU1	AE-X18ZU1 AE-X18ZHU1
24K Btu/h models	AY-XP24ZU1	AE-X24ZU1

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

CHAPTER 1. PRODUCT SPECIFICATION	[5] GENERAL TROUBLESHOOTING CHART	4-6
[1] SPECIFICATION	[6] MALFUNCTION (PARTS) CHECK METHOD ...	4-8
[2] EXTERNAL DIMENSION	[7] OUTDOOR UNIT CHECK METHOD.....	4-11
[3] WIRING DIAGRAM	[8] TROUBLESHOOTING GUIDE	4-13
[4] ELECTRICAL PARTS.....		
CHAPTER 2. EXPLANATION OF CIRCUIT AND OPERATION		
[1] BLOCK DIAGRAMS	[1] SCHEMATIC DIAGRAM	5-1
[2] MICROCOMPUTER CONTROL SYSTEM.....	[2] STANDARD CONDITION.....	5-1
[3] TEMPERATURE AT EACH PART AND PRESSURE IN 3-WAY VALVE.....	[3] PERFORMANCE CURVES.....	5-3
CHAPTER 3. FUNCTION		
[1] FUNCTION	[4] PERFORMANCE CURVES.....	5-3
[2] PAM Circuit.....		
[3] IPM Drive Circuit.....		
[4] 180deg. Energizing Control		
CHAPTER 4. FUNCTION AND OPERATION OF PROTECTIVE PROCEDURES		
[1] PROTECTION DEVICE FUNCTIONS AND OPERATIONS.....	[1] INDOOR UNIT(For AY-XP12ZU1 model)	6-1
[2] AIR CONDITIONER OPERATION IN THERMISTOR ERROR	[2] INDOOR UNIT(For AY-XP15ZU1, AY-XP18ZU1, AY-XP24ZU1 models)	6-6
[3] THERMISTOR TEMPERATURE CHARACTERISTICS	[3] INDOOR UNIT(For AY-XP12ZHU1, AY-XP18ZHU1 models)	6-11
[4] HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY	[4] OUTDOOR UNIT(12K/15K Btu/h models).....	6-17
	[5] OUTDOOR UNIT(18K/24K Btu/h models).....	6-20
	OPERATION MANUAL	
	INSTALLATION MANUAL	
	PARTS LIST	
	FAILURE DIAGNOSIS FLOW CHART	

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.

"Vertical louver (V-louver)" in this document means "horizontal air flow louver" in the operation manual.
 "Horizontal louver (H-louver)" in this document means "vertical air flow louver" in the operation manual.

This document has been published to be used for after sales service only.
 The contents are subject to change without notice.

REVISION RECORD

CHAPTER 1. PRODUCT SPECIFICATION**[1] SPECIFICATION**

ITEMS			MODEL	INDOOR UNIT AY-XP12ZU1	OUTDOOR UNIT AE-X12ZU1	INDOOR UNIT AY-XP12ZHU1	OUTDOOR UNIT AE-X12ZHU1	
Rated cooling capacity (Min. - Max.)			Btu/h	12000 (2800 - 13600)		12000 (3500 - 14000)		
Rated heating capacity (Min. - Max.)			Btu/h	14000 (3200 - 19000)		16000 (3100 - 23000)		
Moisture removal (at cooling)			Pt/h	3.2		1.9		
Electrical data								
Phase				1		1		
Rated frequency			Hz	60		60		
Rated voltage			V	208 / 230		208 / 230		
Rated input	Cool	W		960		750		
	Heat	W		1030		1100		
Circuit Breaker			A	15		15		
Compressor			Type	Hermetically sealed single rotary type		Hermetically sealed twin rotary type		
			Model	KSN98D42UFZA		KTN150D63UFZR3		
			Oil charge	ESTEL OIL VG74 300cc		ESTEL OIL VG75r 420cc		
Refrigerant system			Evaporator	Slit Fin and Grooved tube type		Slit Fin and Grooved tube type		
			Condenser	Corrugate Fin and Grooved tube type		Corrugate Fin and Grooved tube type		
			Control	Expantion Valve		Expantion Valve		
			Refrigerant (R32)	33.2 oz(940 g)		36.0 oz(1020 g)		
			De-Ice system	Micro computer controled reversed systems		Micro computer controled reversed systems		
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	42	-	43	-	
		High	dB(A)	39	49	40	49	
		Low	dB(A)	34	-	36	-	
		Soft	dB(A)	27	-	28	-	
		Silent	dB(A)	23	-	24	-	
	Heating	Full power	dB(A)	43	-	44	-	
		High	dB(A)	40	50	40	50	
		Low	dB(A)	35	-	35	-	
		Soft	dB(A)	28	-	29	-	
		Silent	dB(A)	23	-	22	-	
Fan system								
Drive				Direct drive		Direct drive		
Air flow quantity	Cooling	Full power	CFM (m ³ /min)	438 (12.4)	-	597 (16.9)	-	
		High	CFM (m ³ /min)	385 (10.9)	1102 (31.2)	519 (14.7)	1013 (28.7)	
		Low	CFM (m ³ /min)	307 (8.7)	-	403 (11.4)	-	
		Soft	CFM (m ³ /min)	219 (6.2)	-	290 (8.2)	-	
		Silent	CFM (m ³ /min)	145 (4.1)	-	212 (6.0)	-	
	Heating	Full power	CFM (m ³ /min)	438 (12.4)	-	636 (18.0)	-	
		High	CFM (m ³ /min)	385 (10.9)	1102 (31.2)	558 (15.8)	1013 (28.7)	
		Low	CFM (m ³ /min)	318 (9.0)	-	466 (13.2)	-	
		Soft	CFM (m ³ /min)	254 (7.2)	-	374 (10.6)	-	
		Silent	CFM (m ³ /min)	145 (4.1)	-	212 (6.0)	-	
Fan revolution	Cooling	Full power	rpm	1050	-	1000	-	
		High	rpm	950	860	900	800	
		Low	rpm	800	-	750	-	
		Soft	rpm	640	-	600	-	
		Silent	rpm	500	-	500	-	
	Heating	Full power	rpm	1050	-	1050	-	
		High	rpm	950	860	950	800	
		Low	rpm	820	-	830	-	
		Soft	rpm	700	-	710	-	
		Silent	rpm	500	-	500	-	
Fan			Cross flow fan	Propeller fan	Cross flow fan	Propeller fan		
Connections								
Refrigerant coupling				Flare type		Flare type		
Refrigerant tube size Gas, Liquid			inch	3/8", 1/4"		3/8", 1/4"		
Drain piping mm			mm	O.D. φ 17 and φ 20		O.D. φ 17 and φ 20		
Others								
Safety device				Compressor: Thermistor		Compressor: Thermistor		
				Fan motors: Inherent thermistor		Fan motors: Inherent thermistor		
				Fuse, Micro computer control		Fuse, Micro computer control		
Air filters				Polypropylene net (Washable)		Polypropylene net (Washable)		
Net dimensions	Width	inch (mm)	34 39/64 (879)	30 23/32 (780)	41 27/64 (1052)	30 23/32 (780)		
	Height	inch (mm)	11 3/8 (289)	21 1/4 (540)	12 7/16 (316)	21 1/4 (540)		
	Depth	inch (mm)	9 1/64 (229)	10 19/32 (269)	9 51/64 (249)	10 19/32 (269)		
Net weight			lbs (kg)	22 (10)	67 (30)	31 (14)	67 (30)	

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

ITEMS		MODEL	INDOOR UNIT AY-XP15ZU1	OUTDOOR UNIT AE-X15ZU1	INDOOR UNIT AY-XP18ZU1	OUTDOOR UNIT AE-X18ZU1	
Rated cooling capacity (Min. - Max.)		Btu/h	15000 (5000 - 17000)		18000 (6000 - 21600)		
Rated heating capacity (Min. - Max.)		Btu/h	18000 (4500 - 21800)		21600 (5500 - 25600)		
Moisture removal (at cooling)		Pt/h	3.2		5.1		
Electrical data							
Phase			1		1		
Rated frequency		Hz	60		60		
Rated voltage		V	208 / 230		208 / 230		
Rated input	Cool	W	1120		1380		
	Heat	W	1300		1500		
Circuit Breaker		A	15		20		
Compressor		Type	Hermetically sealed twin rotary type		Hermetically sealed twin rotary type		
Model			KTN150D63UFZR3		KTN150D63UFZR3		
Oil charge			ESTEL OIL VG75r 420cc		ESTEL OIL VG75r 420cc		
Refrigerant system		Evaporator	Slit Fin and Grooved tube type		Slit Fin and Grooved tube type		
Condenser			Corrugate Fin and Grooved tube type		Corrugate Fin and Grooved tube type		
Control			Expantion Valve		Expantion Valve		
Refrigerant (R32)			36.0 oz(1020 g)		49.0 oz(1390 g)		
De-Ice system			Micro computer controlled reversed systems		Micro computer controled reversed systems		
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	46	-	45	-
		High	dB(A)	42	49	43	52
		Low	dB(A)	38	-	38	-
		Soft	dB(A)	30	-	31	-
		Silent	dB(A)	26	-	28	-
	Heating	Full power	dB(A)	46	-	49	-
		High	dB(A)	42	50	47	52
		Low	dB(A)	36	-	41	-
		Soft	dB(A)	30	-	31	-
		Silent	dB(A)	23	-	25	-
Fan system							
Drive			Direct drive		Direct drive		
Air flow quantity	Cooling	Full power	CFM (m³/min)	636 (18.0)	-	636 (18.0)	-
		High	CFM (m³/min)	558 (15.8)	1102 (31.2)	597 (16.9)	1723 (48.8)
		Low	CFM (m³/min)	441 (12.5)	-	480 (13.6)	-
		Soft	CFM (m³/min)	328 (9.3)	-	328 (9.3)	-
		Silent	CFM (m³/min)	251 (7.1)	-	251 (7.1)	-
	Heating	Full power	CFM (m³/min)	674 (19.1)	-	752 (21.3)	-
		High	CFM (m³/min)	597 (16.9)	1102 (31.2)	713 (20.2)	1723 (48.8)
		Low	CFM (m³/min)	505 (14.3)	-	558 (15.8)	-
		Soft	CFM (m³/min)	413 (11.7)	-	403 (11.4)	-
		Silent	CFM (m³/min)	251 (7.1)	-	290 (8.2)	-
Fan revolution	Cooling	Full power	rpm	1050	-	1050	-
		High	rpm	950	860	1000	850
		Low	rpm	800	-	850	-
		Soft	rpm	650	-	650	-
		Silent	rpm	550	-	550	-
	Heating	Full power	rpm	1100	-	1200	-
		High	rpm	1000	860	1150	850
		Low	rpm	880	-	950	-
		Soft	rpm	760	-	750	-
		Silent	rpm	550	-	600	-
Fan			Cross flow fan	Propeller fan	Cross flow fan	Propeller fan	
Connections							
Refrigerant coupling			Flare type		Flare type		
Refrigerant tube size Gas, Liquid		inch	3/8", 1/4"		3/8", 1/4"		
Drain piping mm		mm	O.D. φ 17 and φ 20		O.D. φ 17 and φ 20		
Others							
Safety device			Compressor: Thermistor		Compressor: Thermistor		
			Fan motors: Inherent thermistor		Fan motors: Inherent thermistor		
			Fuse, Micro computer control		Fuse, Micro computer control		
Air filters			Polypropylene net (Washable)		Polypropylene net (Washable)		
Net dimensions	Width	inch (mm)	41 27/64 (1052)	30 23/32 (780)	41 27/64 (1052)	33 15/32 (850)	
	Height	inch (mm)	12 7/16 (316)	21 1/4 (540)	12 7/16 (316)	27 15/16 (710)	
	Depth	inch (mm)	9 51/64 (249)	10 19/32 (269)	9 51/64 (249)	13 (330)	
Net weight		lbs (kg)	31 (14)	67 (30)	31 (14)	95 (43)	

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

ITEMS		MODEL	INDOOR UNIT AY-XP18ZHU1	OUTDOOR UNIT AE-X18ZHU1	INDOOR UNIT AY-XP24ZU1	OUTDOOR UNIT AE-X24ZU1		
Rated cooling capacity (Min. - Max.)		Btu/h	18000 (6000 - 21600)		22000 (6000 - 23000)			
Rated heating capacity (Min. - Max.)		Btu/h	21600 (5500 - 30000)		24000 (5500 - 27100)			
Moisture removal (at cooling)		Pt/h	5.9		6.8			
Electrical data								
Phase			1		1			
Rated frequency		Hz	60		60			
Rated voltage		V	208 / 230		208 / 230			
Rated input	Cool	W	1380		2200			
	Heat	W	1500		1820			
Circuit Breaker		A	20		20			
Compressor	Type	Hermetically sealed twin rotary type			Hermetically sealed twin rotary type			
	Model	KTN150D63UFZR3			KTN150D63UFZR3			
	Oil charge	ESTEL OIL VG75r 420cc			ESTEL OIL VG75r 420cc			
Refrigerant system	Evaporator	Slit Fin and Grooved tube type			Slit Fin and Grooved tube type			
	Condenser	Corrugate Fin and Grooved tube type			Corrugate Fin and Grooved tube type			
	Control	Expantion Valve			Expantion Valve			
	Refrigerant (R32)	49.0 oz(1390 g)			49.0 oz(1390 g)			
	De-Ice system	Micro computer controled reversed systems			Micro computer controled reversed systems			
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	45	-	47	-	
		High	dB(A)	43	52	45	53	
		Low	dB(A)	38	-	40	-	
		Soft	dB(A)	31	-	33	-	
		Silent	dB(A)	28	-	30	-	
	Heating	Full power	dB(A)	49	-	49	-	
		High	dB(A)	47	52	47	54	
		Low	dB(A)	41	-	41	-	
		Soft	dB(A)	31	-	31	-	
		Silent	dB(A)	25	-	25	-	
Fan system								
Drive		Direct drive			Direct drive			
Air flow quantity	Cooling	Full power	CFM (m³/min)	636 (18.0)	-	674 (19.1)	-	
		High	CFM (m³/min)	597 (16.9)	1723 (48.8)	636 (18.0)	1723 (48.8)	
		Low	CFM (m³/min)	480 (13.6)	-	519 (14.7)	-	
		Soft	CFM (m³/min)	328 (9.3)	-	367 (10.4)	-	
		Silent	CFM (m³/min)	251 (7.1)	-	290 (8.2)	-	
	Heating	Full power	CFM (m³/min)	752 (21.3)	-	752 (21.3)	-	
		High	CFM (m³/min)	713 (20.2)	1723 (48.8)	713 (20.2)	1723 (48.8)	
		Low	CFM (m³/min)	558 (15.8)	-	558 (15.8)	-	
		Soft	CFM (m³/min)	403 (11.4)	-	403 (11.4)	-	
		Silent	CFM (m³/min)	290 (8.2)	-	290 (8.2)	-	
Fan revolution	Cooling	Full power	rpm	1050	-	1100	-	
		High	rpm	1000	850	1050	850	
		Low	rpm	850	-	900	-	
		Soft	rpm	650	-	700	-	
		Silent	rpm	550	-	600	-	
	Heating	Full power	rpm	1200	-	1200	-	
		High	rpm	1150	850	1150	850	
		Low	rpm	950	-	950	-	
		Soft	rpm	750	-	750	-	
		Silent	rpm	600	-	600	-	
Fan		Cross flow fan		Propeller fan	Cross flow fan	Propeller fan		
Connections								
Refrigerant coupling		Flare type			Flare type			
Refrigerant tube size Gas, Liquid		inch	3/8", 1/4"		3/8", 1/4"			
Drain piping mm		mm	O.D.φ 17 and φ 20		O.D.φ 17 and φ 20			
Others								
Safety device			Compressor: Thermistor		Compressor: Thermistor			
			Fan motors: Inherent thermistor		Fan motors: Inherent thermistor			
			Fuse, Micro computer control		Fuse, Micro computer control			
Air filters			Polypropylene net (Washable)		Polypropylene net (Washable)			
Net dimensions	Width	inch (mm)	41 27/64 (1052)	33 15/32 (850)	41 27/64 (1052)	33 15/32 (850)		
	Height	inch (mm)	12 7/16 (316)	27 15/16 (710)	12 7/16 (316)	27 15/16 (710)		
	Depth	inch (mm)	9 51/64 (249)	13 (330)	9 51/64 (249)	13 (330)		
Net weight		lbs (kg)	31 (14)	95 (43)	31 (14)	95 (43)		

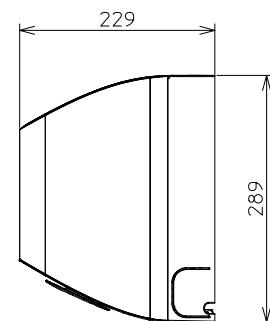
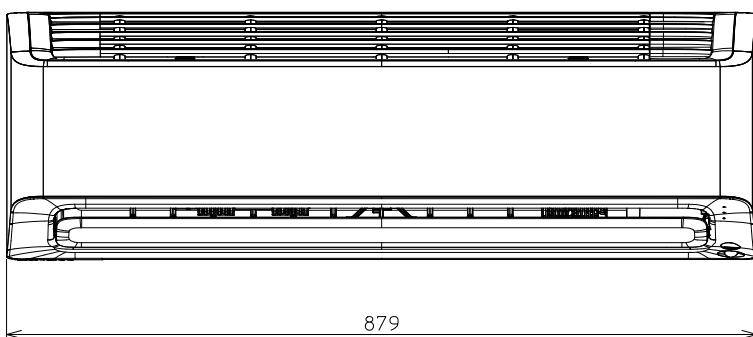
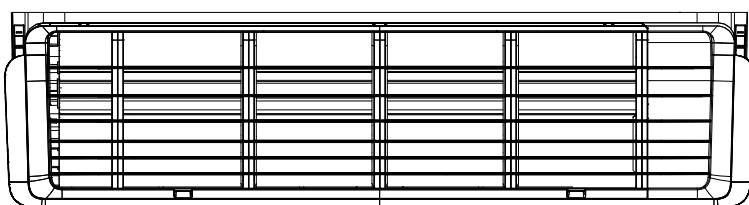
NOTE: Test conditions are based on AHRI 210/240. (Piping length : 25ft [7.6m])

[2] EXTERNAL DIMENSION

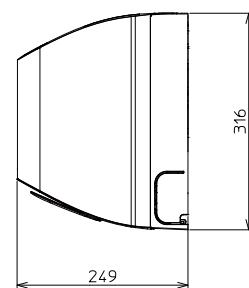
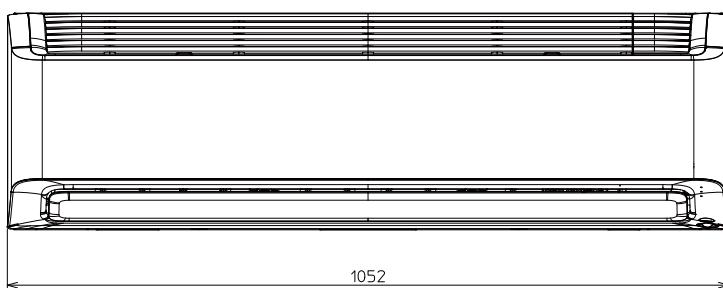
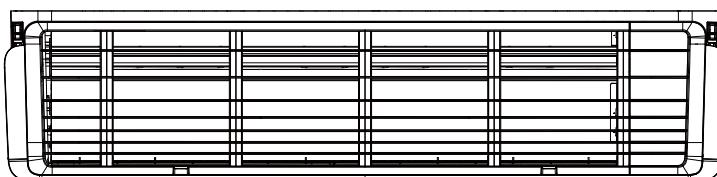
1. Indoor unit

AY-XP12ZU1

Length unit: mm



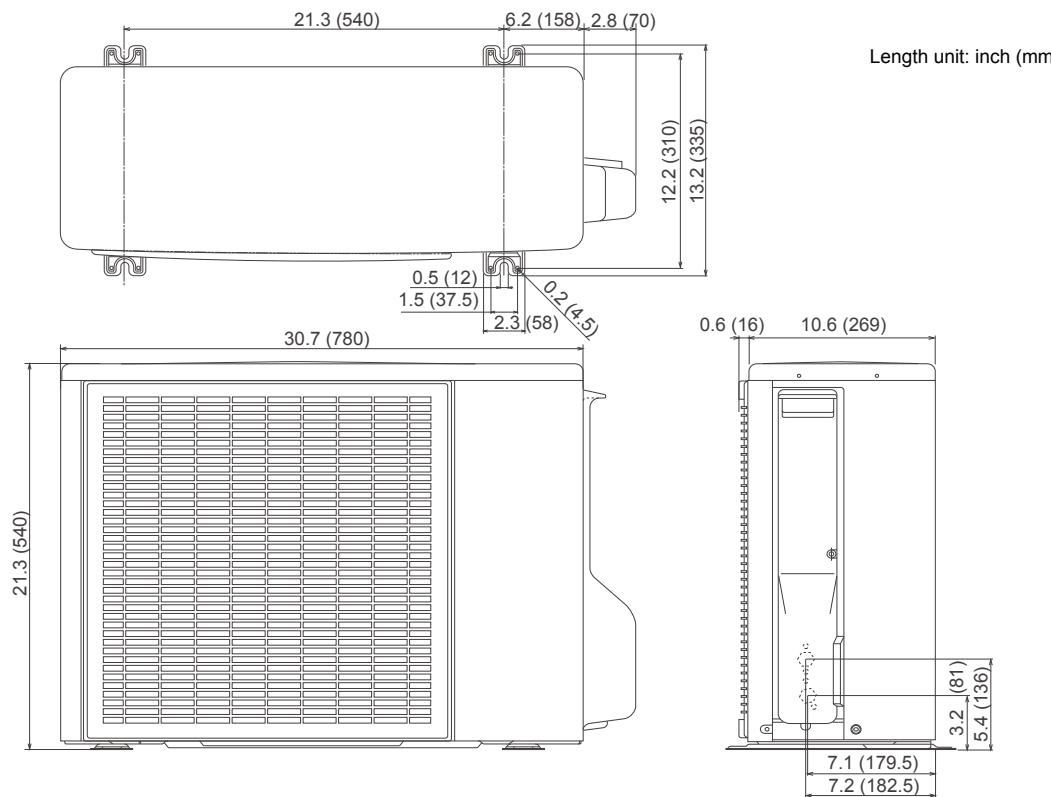
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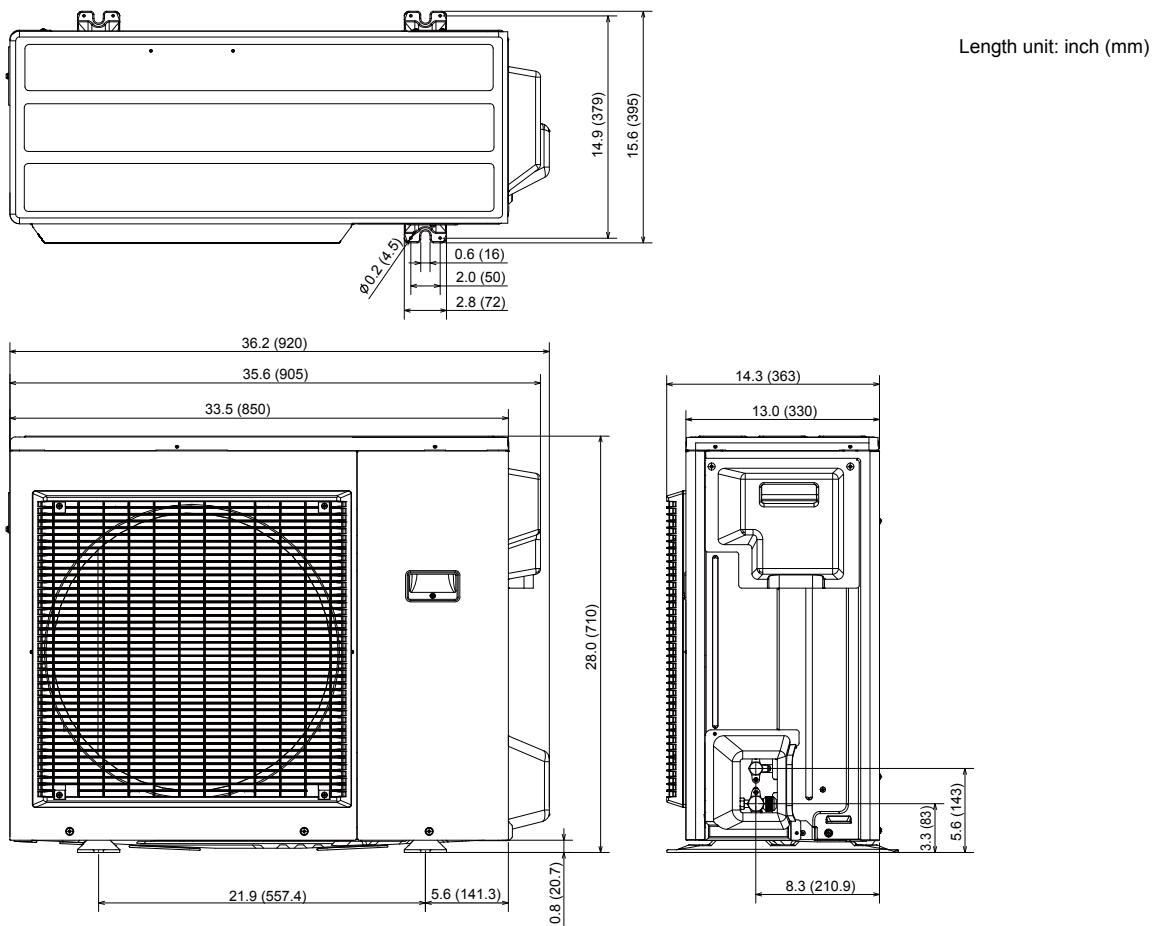
2. Outdoor unit

AY-XP12ZU1, AY-XP12ZHU1, AY-XP15ZU1

Length unit: mm

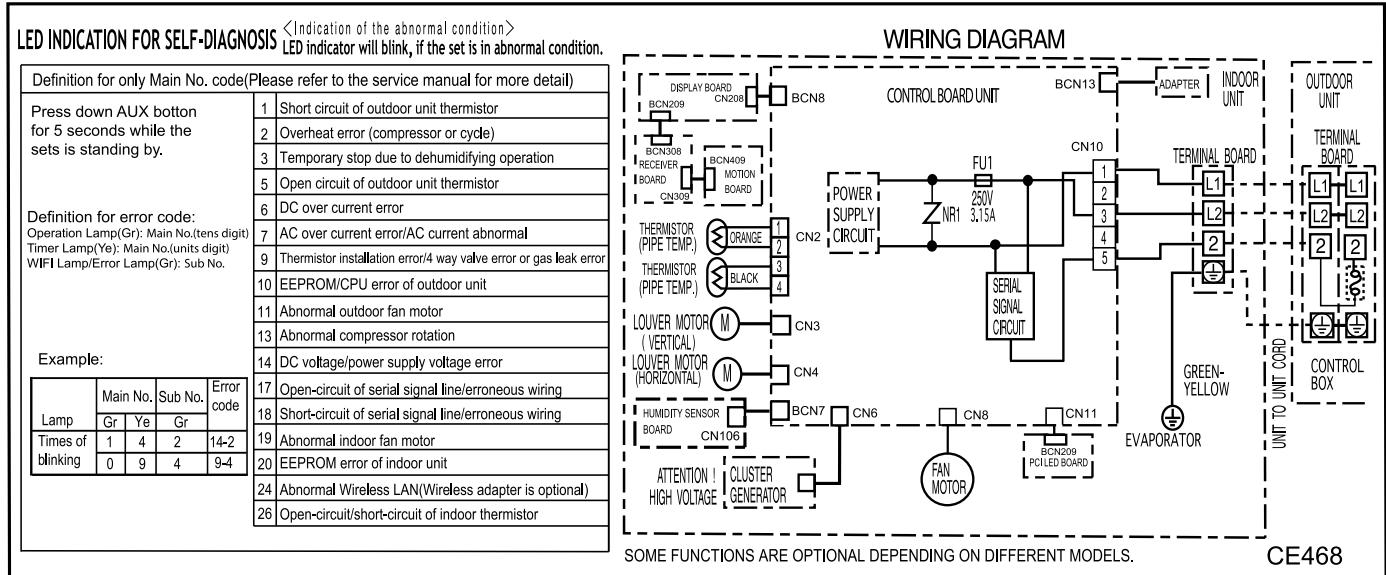


AY-XP18ZHU1, AY-XP18ZU1, AY-XP24ZU1

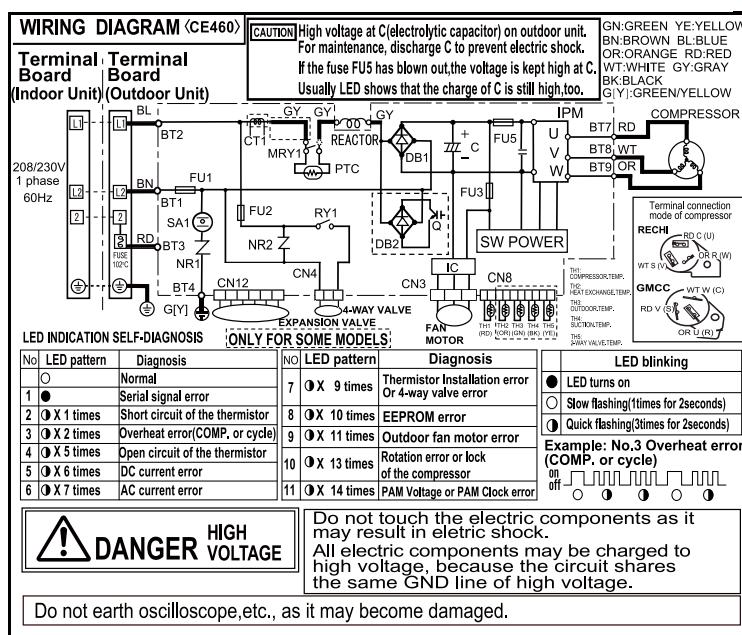


[3] WIRING DIAGRAM

1. Indoor unit



2. Outdoor unit



[4] ELECTRICAL PARTS**1. Indoor unit**

DESCRIPTION	MODEL	REMARKS
Indoor fan motor	DAI239P-H030A-3207/ZKFP-30-8-277L	30W,Class E
Transformer	TE20SMSW-G08V/BCK-19-0701	DC 5V,12V,19V
Fu1	2010 T3.15A 250V	3.15A,250V

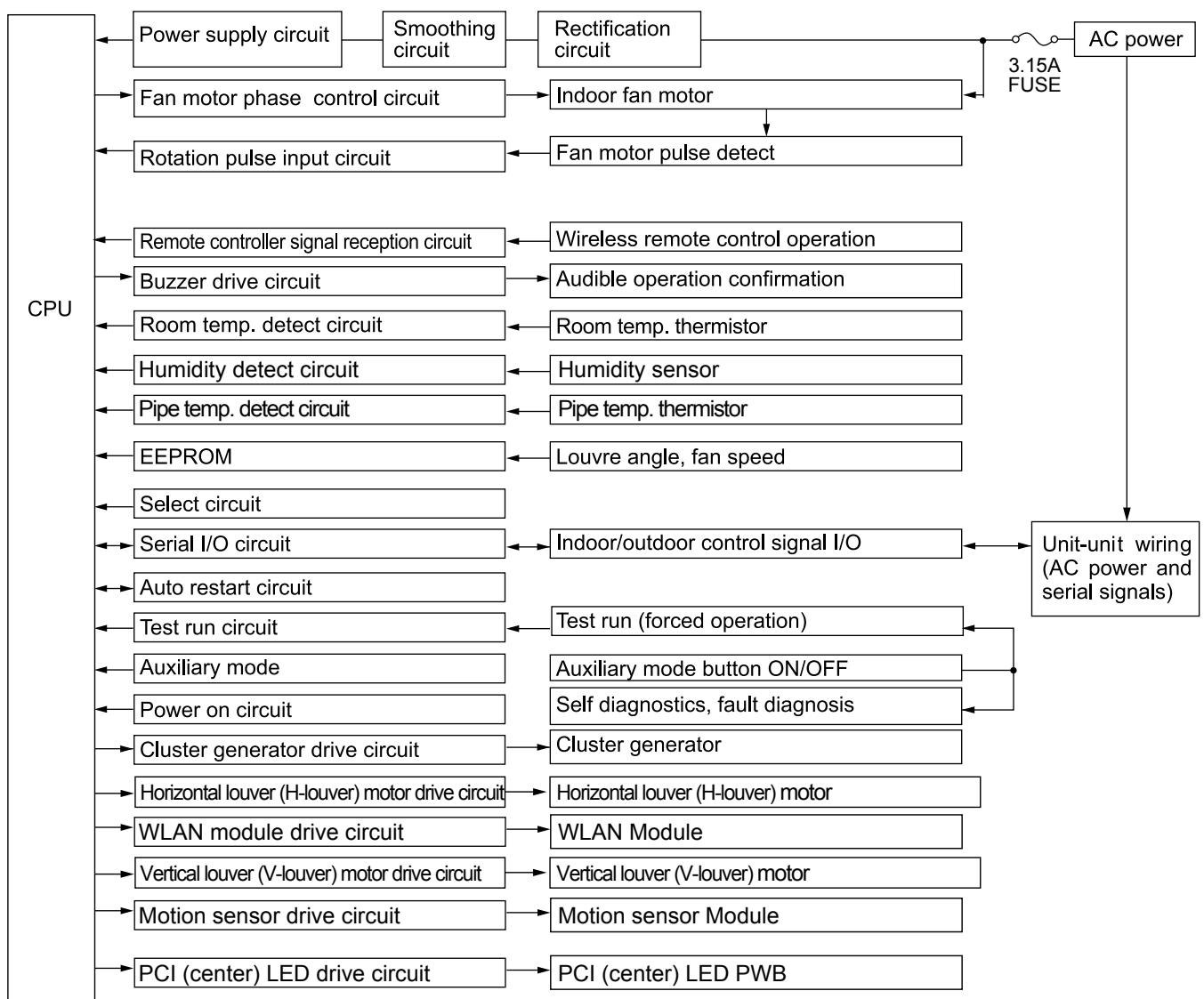
2. Outdoor unit

DESCRIPTION	MODEL	REMARKS
Compressor	KSN98D42UFZA (For AE-X12ZU1) KTN150D63UFZR3 (For AE-X12ZHU1, AE-X18ZHU1, AE-X15ZU1, AE-X18ZU1, AE-X24ZU1)	
Outdoor fan motor	DBI445P-L041A-AL01-1	280V 41W 8P
Fu5, Fu1	-	250V 20A
Fu2	-	250V 3.15A
Fu3	-	250V 2A

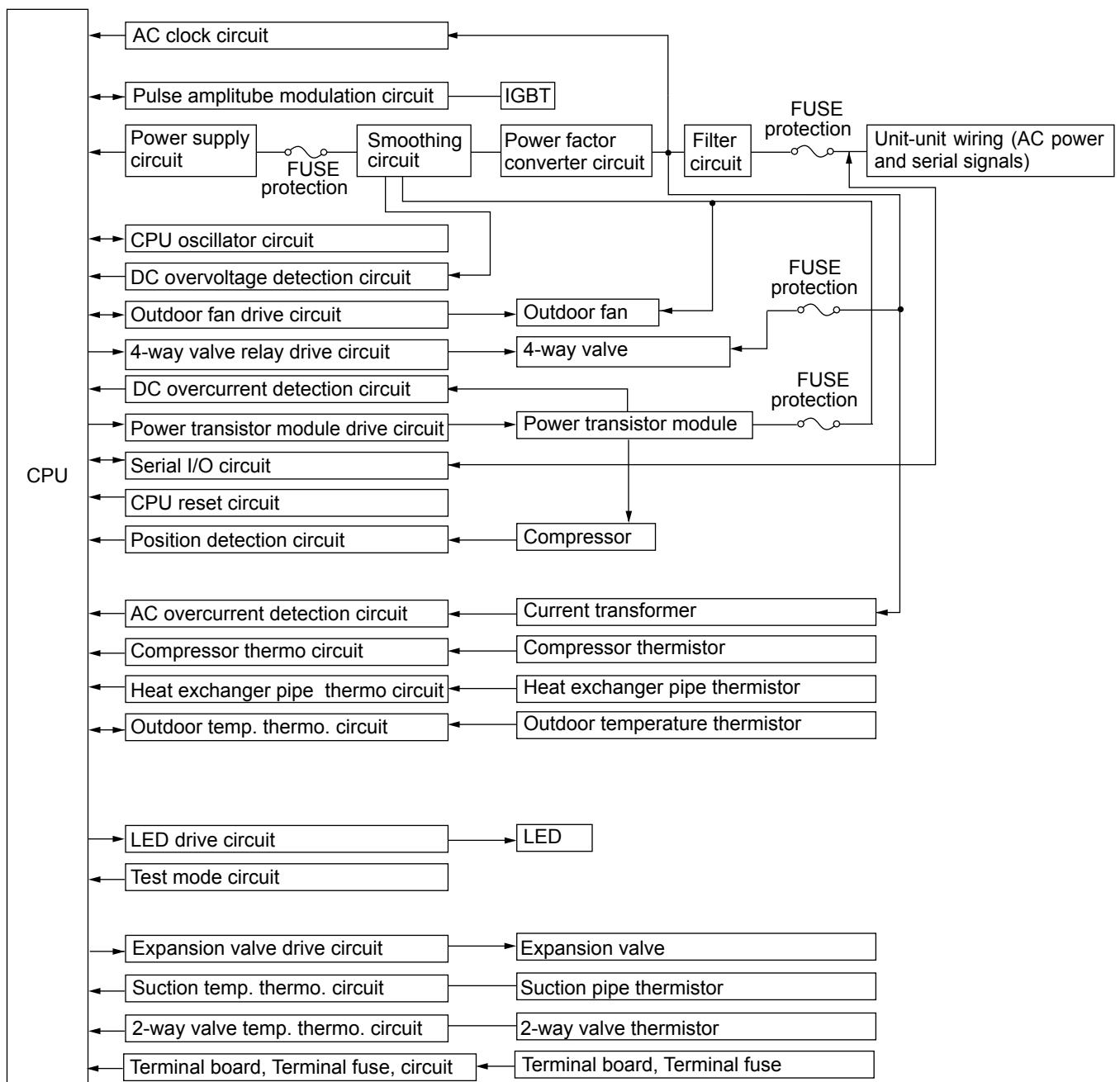
CHAPTER 2. EXPLANATION OF CIRCUIT AND OPERATION

[1] BLOCK DIAGRAMS

1. Indoor unit



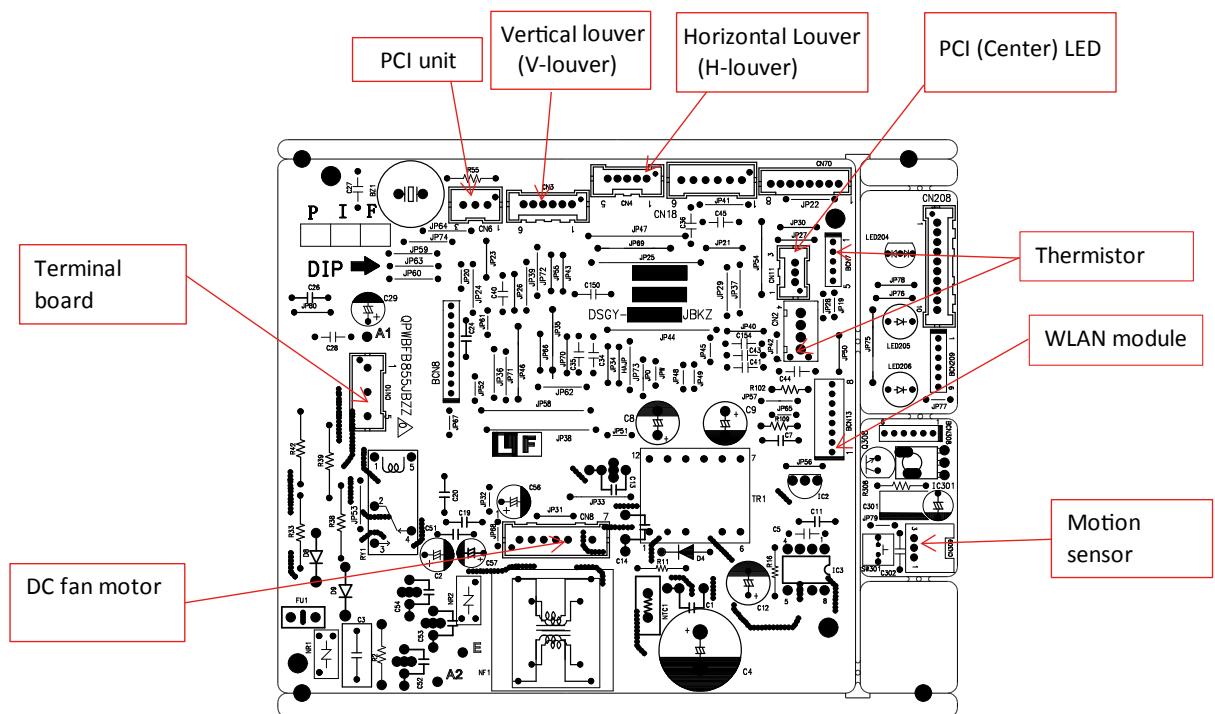
2. Outdoor unit



[2] MICROCOMPUTER CONTROL SYSTEM

1. Indoor unit

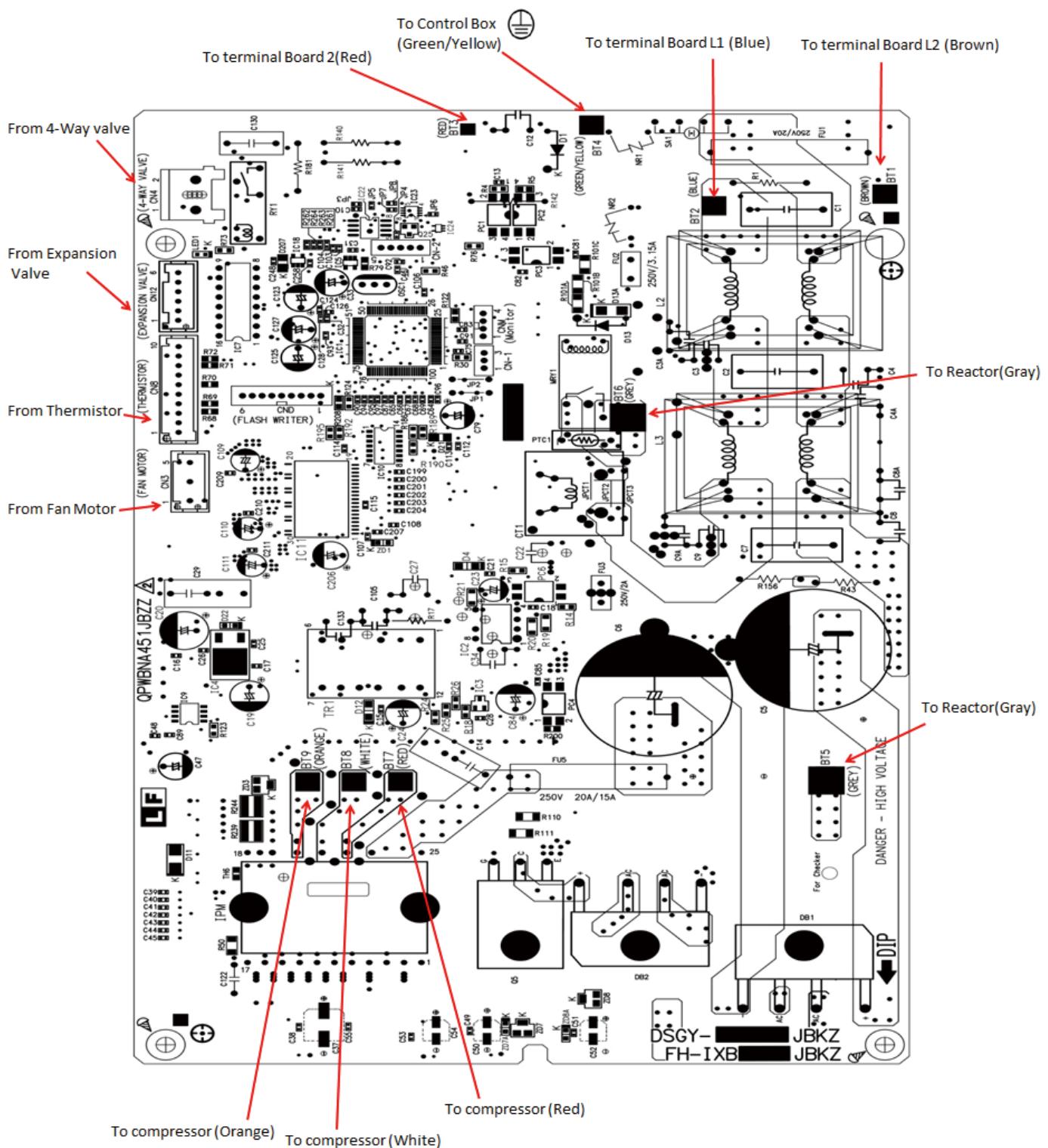
Printed wiring board



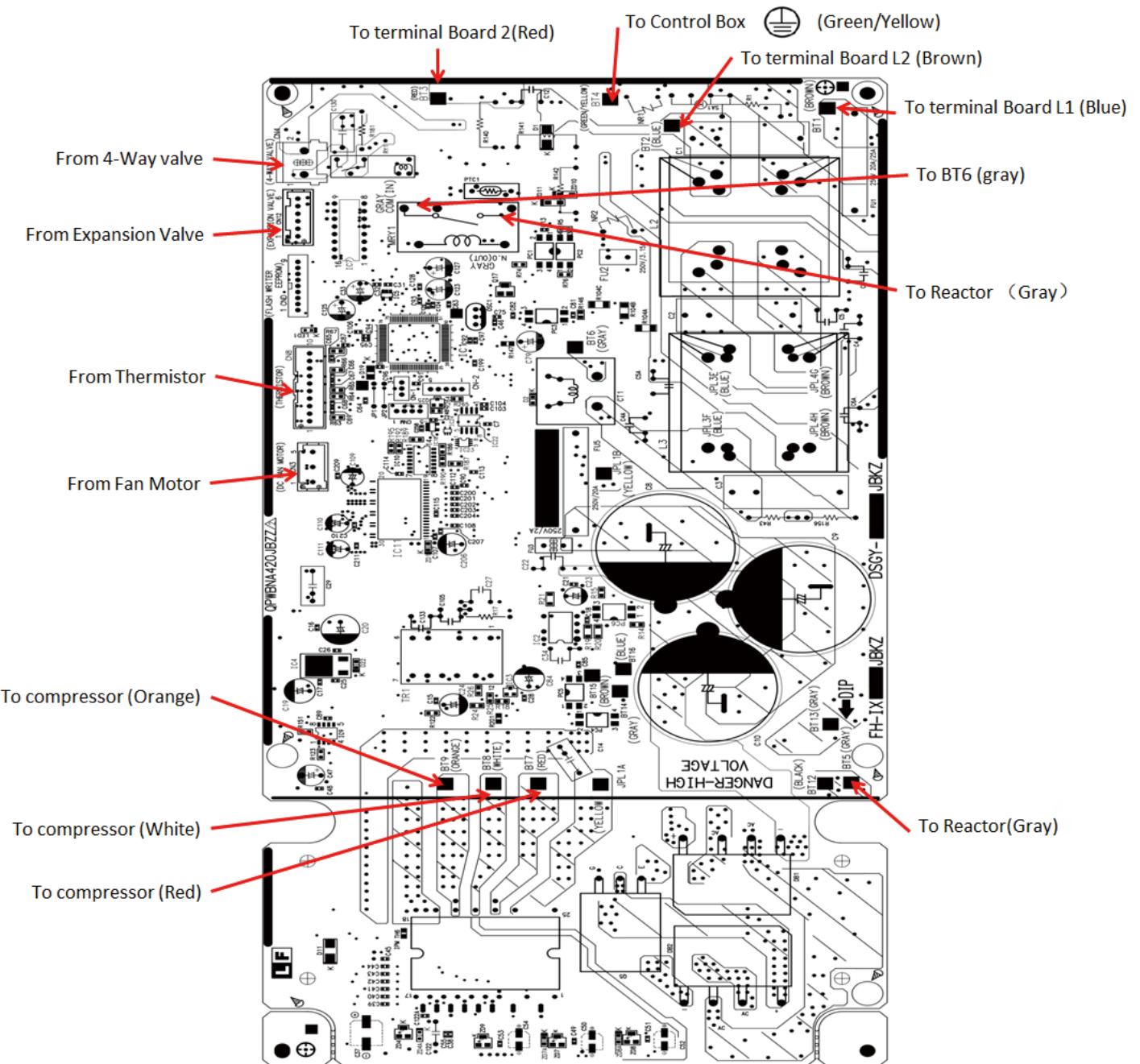
2. Outdoor unit

2.1. Printed wiring board

12K, 15K Btu/h models



18K,24K Btu/h models



CHAPTER 3. FUNCTION

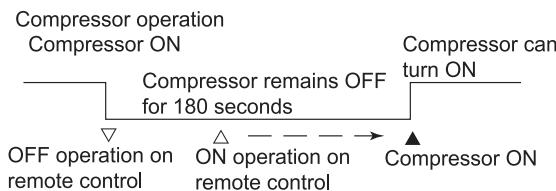
[1] FUNCTION

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.)



2. Indoor unit heat exchanger freeze prevention control

If the temperature of the indoor unit heat exchanger remains below 0°C for 4 consecutive minutes during cooling or dehumidifying operation, the compressor operation stops temporarily in order to prevent freezing. When the temperature of the indoor unit heat exchanger rises to 2°C or higher after about 180 seconds, the compressor restarts and resumes normal operation.

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 $\geq 40^{\circ}\text{C} \cdot 60$ sec : outdoor temperature $< 40^{\circ}\text{C}$) at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the above mentioned control is repeated.

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 (110°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 a certain time (120 sec : outdoor temperature $\geq 40^{\circ}\text{C} \cdot 60$ sec : outdoor temperature $< 40^{\circ}\text{C}$) at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the above control is repeated.

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.

Mode	Peak Control Current(A)			
	Cooling		Heating	
Outdoor Air Temp.	<104°F (<40°C)	≥104°F (≥40°C)	<54°F (<12°C)	≥54°F (≥12°C)
AE-X12ZU1	7.0	7.0	9.1	7.6
AE-X15ZU1	8.2	8.2	11.8	9.5

AE-X18ZU1	10.5	9.5	12.6	10.6
AE-X24ZU1	12.5	9.5	13.0	10.6
AE-X12ZHU1	6.2	6.2	12.0	9.4
AE-X18ZHU1	10.5	9.5	13.0	10.6

6. Startup control

When the air conditioner starts in the cooling mode, if the room temperature is 2°C higher than the set temperature the air conditioner operates with the operating frequency at maximum.

When the air conditioner starts in the heating mode, if the room temperature is 5.3°C lower than the set temperature the air conditioner operates with the operating frequency at maximum. Then, when the set temperature is reached, the air conditioner operates at the operating frequency determined by fuzzy logic calculation, then enters the normal control.

7. Outdoor unit fan delay control

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

8 ON timer

The ON timer can be activated by pressing the ON timer button. When the ON timer is activated, the operation start time is adjusted based on fuzzy logic calculations 2 hour before the set time so that the room temperature reaches the set temperature at the set time.

9. OFF timer

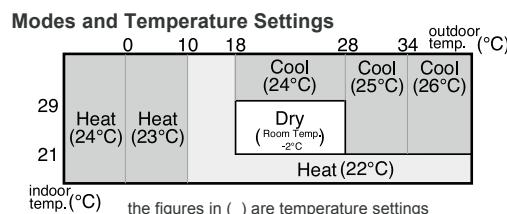
The OFF timer can be activated by pressing the OFF timer button. When the OFF timer is activated, the internal timer start to count down the remaining time from set time. And the unit will turn off automatically when it reach to zero.

10. Power ON start

If the connecting wire HAJP is put on the PWB assembly, when the power is supplied by turning on a circuit breaker, the air conditioner automatically starts of operation in "AUTO". (Refer to Indoor side PWB).

11. AUTO MODE

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



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

12. Auto restart

When power failure occurs during operation, the unit will automatically restart in the same setting which were active before the power failure.

1) Setting memorized

- Operating mode (Heat, Cool, Dry, PCI)
- Temperature adjustment (within 2°C range) automatic operation.
- Temperature setting
- Fan setting
- Air flow direction
- Power ON/OFF
- Automatic operation mode setting
- Plasmacluster mode
- SPOT setting

2) Setting not memorized

- Timer setting
- Full power setting
- Self cleaning
- Multi Space setting
- ECO setting

3) Disabling auto restart function

By removing (cutting) jumper (JP0) on the printed circuit board(PCB), the auto restart function can be disabled.

12. Save operation

This control is valid only in ECO mode.

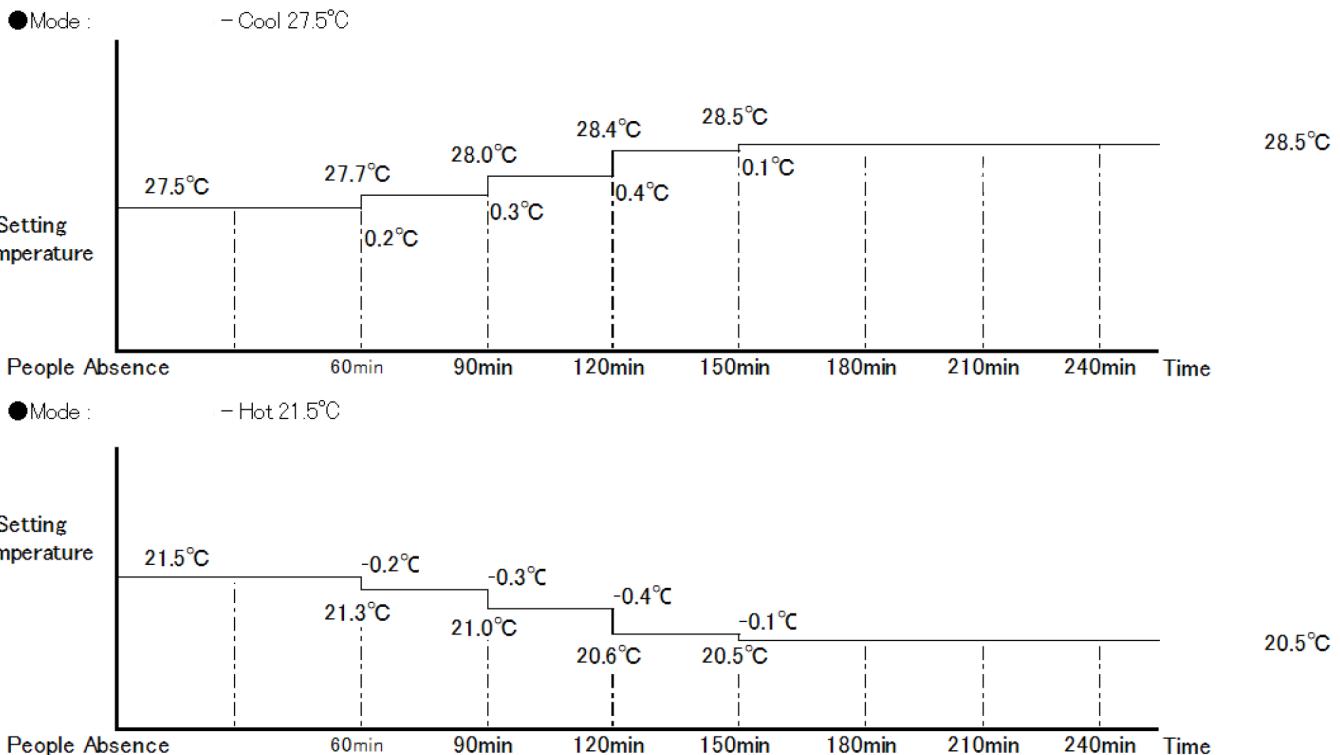
If there is no person for 1 hour, the air conditioner will arise setting temperature.

If a person is detected, correction temperature will be restored.

Limit of Temperature

Cool	
Correction Temperature Limit	+1.0°C
Heat	
Correction Temperature Limit	-1.0°C

e.g.



13. Activity Detection

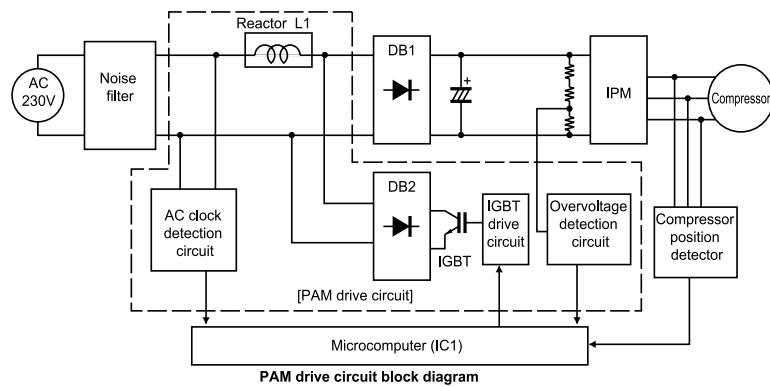
This control is valid only in ECO mode. If the amount of human activity increases for few minutes, setting temperature is lowered, fan rotation is increased by 100rpm when fan setting is ECO, and horizontal louver (H-louver) is turned downward when the louver setting is ECO. If a person's activity decreases, it is returned to original state.

Setting temperature is corrected lower by the amount of human activity as following.

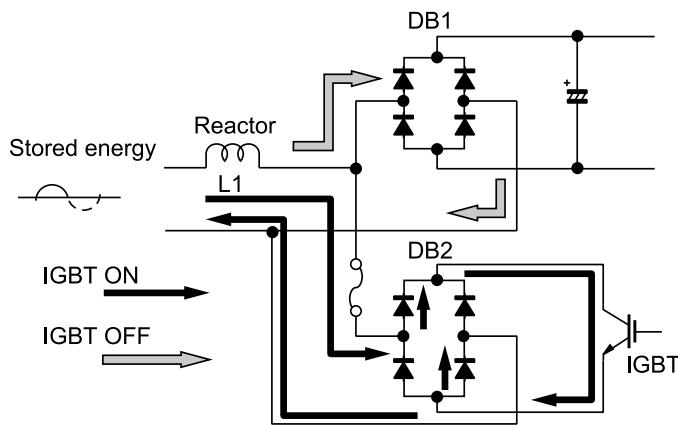
temperature correction table	temperature correction degree		
	activity weak	activity mid	activity strong
room temperature(°C)	28~	1	1.75
	26~28	1	1.5
	24~26	0.5	1
	22~24	0.25	0.75
	17~22	0.25	0.5
	~17	0	0

1. PAM (Pulse Amplitude Modulation)

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



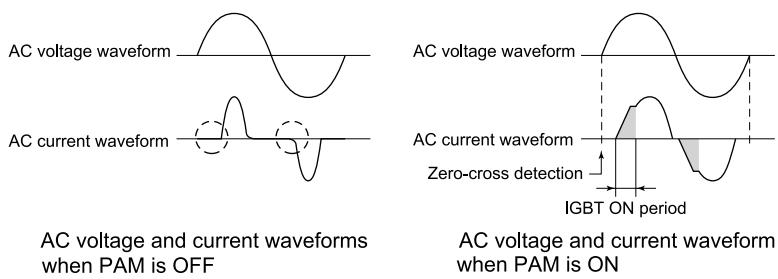
When the IGBT is ON, an electric current flows to the IGBT via the reactor (L1) and diode bridge (DB2). When the IGBT turns OFF, the energy stored while the IGBT was ON is charged to the voltage capacitor via the diode bridge (DB1). As such, by varying the ON/OFF duty of the IGBT, the output voltage is varied.



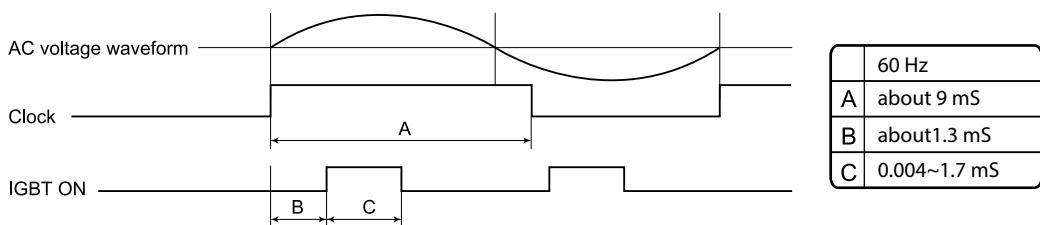
2. High power factor control circuit

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 “” in the diagram. To determine the length of period to supply a current, the zero-cross timing of the AC input voltage is input to the microcomputer via the clock circuit. The power source frequency is also determined at the same time. The IGBT turns ON after the time length determined by the zero-cross point to supply a current to the IGBT via the reactor. This brings the current waveform closer to the voltage waveform in phase. As described above, the ON/OFF operation of the IGBT controls the increase/decrease of the compressor power supply voltage (DC voltage) to improve the compressor efficiency and maintain a high power factor by keeping the current phase closer to that of the supply voltage.



1) Detailed explanation of PAM drive circuit sequence



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.

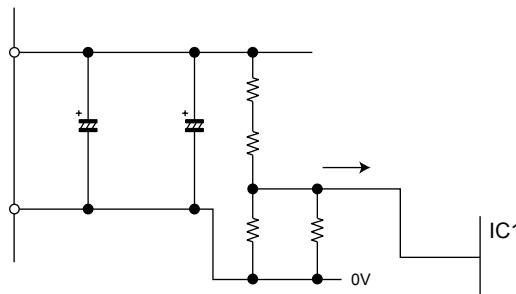
3) IGBT ON start time (delay time B)

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

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 --- 220 to 290 V

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.

Details of troubleshooting procedure for PAM

1) PAM shutdown due to error

- When the DC voltage detection circuit sends a signal exceeding the specified voltage to the microcomputer
 - DC voltage of 400 V or higher (detection circuit input voltage of about 9.2 V or higher)
 - When an error is detected
 - PAM IGBT turns OFF.
 - Compressor turns OFF.
 - All units shut down completely when the error occurs four times.

- When the outdoor unit clock waveform differs from the specified value immediately before the PAM IGBT turns ON
 - When there is no clock waveform input
 - When a clock signal of other than specified power source frequency (60Hz) is input
 - When 14-1 error is detected
 - PAM IGBT does not turn ON.
 - Compressor turns OFF.
 - All units shut down completely when the error occurs four times.

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 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.
- Check items
 - Clock circuit check
 - PAM IGBT check

[3] IPM Drive Circuit

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

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.

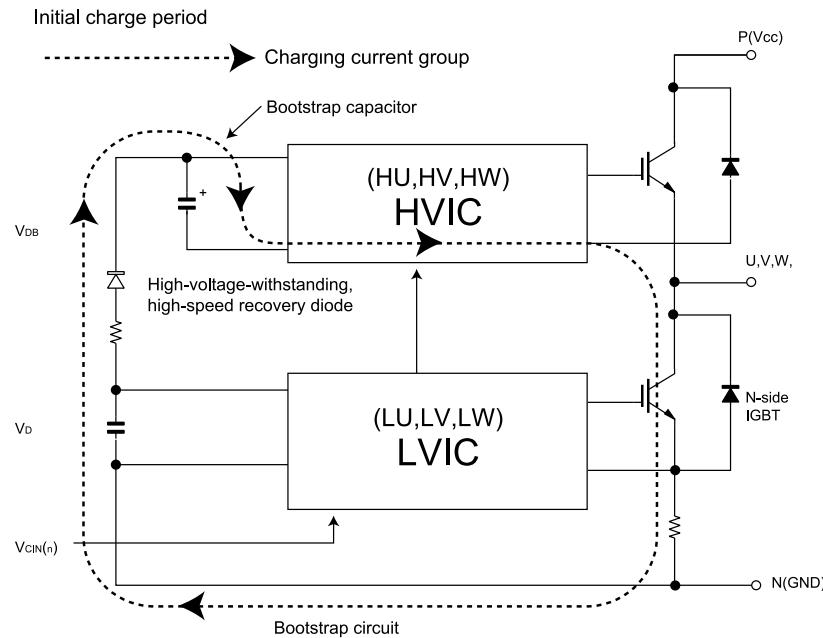
The 15-V power supply for the lower-phase IC is provided by the control printed wiring board (PWB).

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).

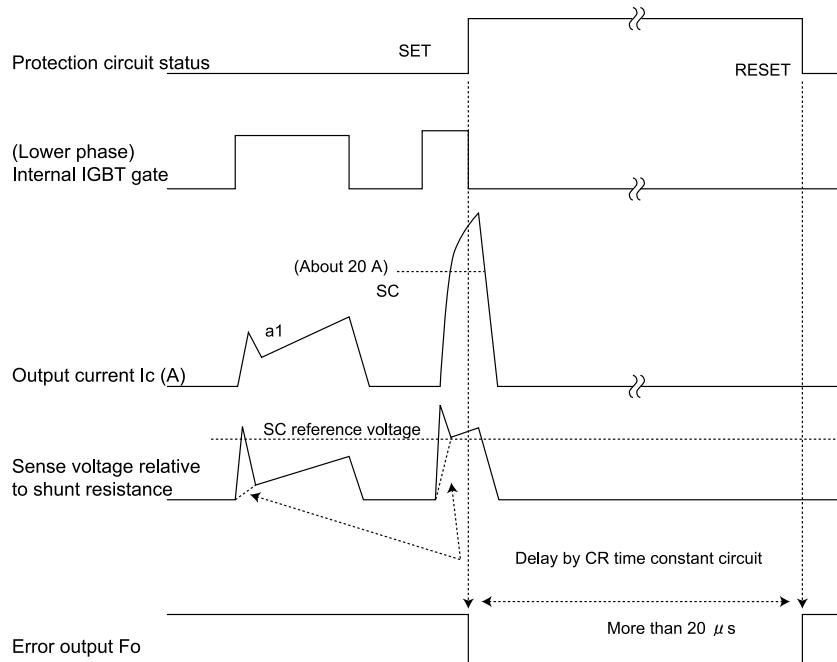
This results in a charging current that flows to the electrolytic capacitor of each upper-phase IC input and charges the bootstrap capacitor with a 15V current.

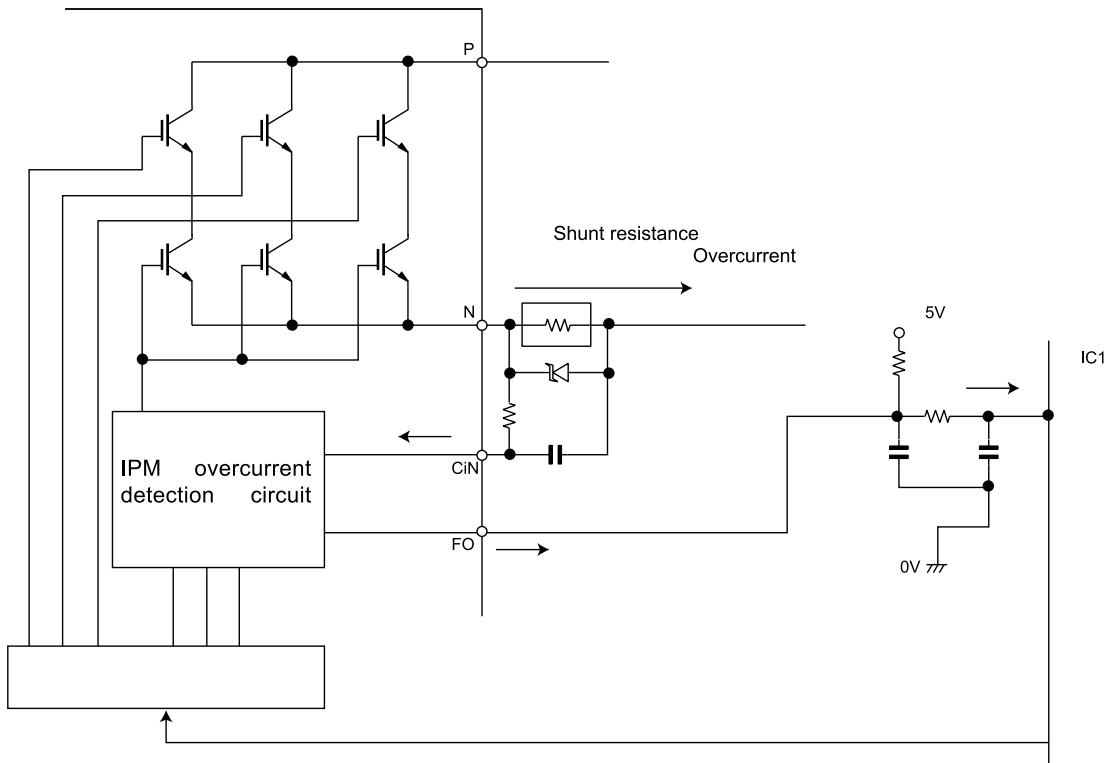
The power supply for the subsequent stages is charged while the lower-phase IGBT is ON in ordinary compressor drive control.



1.2 DC over current detection circuit

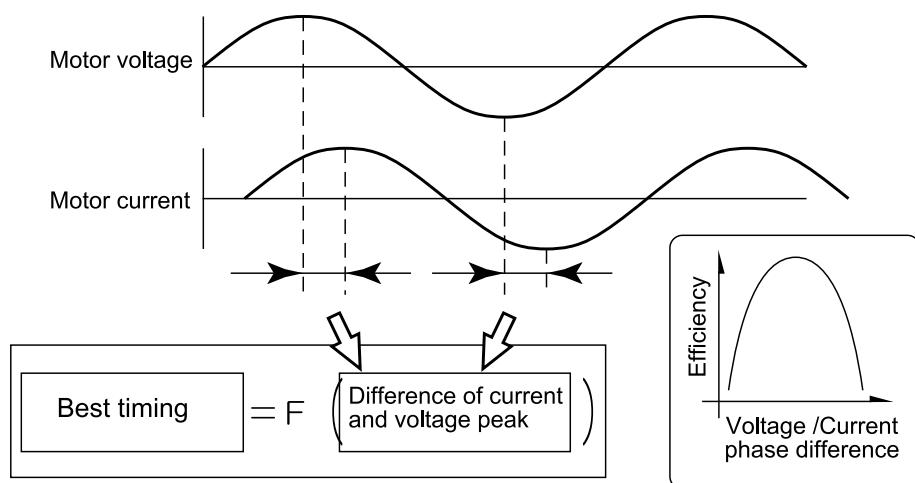
When a current of about 20 A or higher flows through the shunt resistance on the control printed wiring board (PWB), the voltage at this resistance is input to IPM CIN pin (15). Then, the gate voltage of the lower-phase IGBT (LU, LV, LW) inside the IPM turns OFF to cut off the over current. At the same time, an L output of more than 20μs is generated from IPM from pin (14), and this results in an L input to over current detection input pin (45) of the microcomputer (IC1) and turns OFF the PWM signal output (IC1 pins (37) through (39) and pins (42) through (44)) to the IGBT gate.





[4] 180deg. Energizing Control

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



Concept chart of the current phase difference control

This control is the 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 4. FUNCTION AND OPERATION OF PROTECTIVE PROCEDURES

[1] PROTECTION DEVICE FUNCTIONS AND OPERATIONS

* These models have following thermistors

INDOOR UNIT	OUTDOOR UNIT
TH1, TH2	TH1, TH2, TH3, TH4, TH5

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	☆ 2	Yes	None
	Indoor unit fan rotation speed error	Operation stops if rotation pulse signal from indoor unit fan indicates abnormally low speed (about 300 rpm or slower).	When indoor unit fan is in operation	Operation OFF or ON	☆ 2	Yes	None
2	2-way valve freeze prevention	Compressor stops if temperature of outdoor unit 2-way valve remains below 0°C for 10 continuous minutes during cooling or dehumidifying operation.	When in cooling or dehumidifying operation	Automatic reset when temperature of 2-way valve rises above 10°C.	None	None	Yes
3	Outdoor unit heat exchanger overheat shutdown	Operation frequency lowers if outdoor unit heat exchanger temperature exceeds about 55°C during cooling operation. Compressor stops if outdoor unit heat exchanger temperature exceeds about 55°C for 120 seconds at minimum frequency.	When in cooling or dehumidifying operation	Automatic reset after safety period (180 sec).	None	None	Yes
4	Compressor discharge overheat shutdown	Operating frequency lowers if temperature of compressor discharge thermistor (TH1) falls below about 110°C. Compressor stops if temperature of compressor discharge thermistor (TH1) remains at about 110°C (for 120 seconds in cooling operation, or 60 seconds in heating operation) at minimum frequency.	When compressor is in operation	Automatic reset after safety period (180 sec).	None	None	Yes
5	Dehumidifying operation temporary stop	Compressor stops if outside air temperature thermistor is lower than about 16°C during dehumidifying operation.	When in dehumidifying operation	Automatic reset when outside air temperature rises above 16°C.	None	None	Yes
6	DC over current error	Compressor stops if DC current of about 16 A or higher flows in IPM.	When compressor is in operation	Operation OFF or ON	Yes ☆ 3	Yes	Yes
7	AC over current error	Operating frequency lowers if outdoor 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	Yes ☆ 1	Yes	Yes
8	AC over current error in compressor OFF status	Indoor and outdoor units stop if outdoor AC current exceeds about 3 A while compressor is in non-operation status.	When compressor is in non-operation	Replacement of defective parts such as IPM	Yes ☆ 2	Yes	Yes
9	AC maximum current error	Compressor stops if outdoor AC current exceeds 17 A.	When compressor is in operation	Operation OFF or ON	Yes ☆ 2	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 ☆ 1	Yes	Yes
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 ☆ 1	Yes	Yes
12	Compressor high temperature error	Compressor stops if compressor discharge thermistor (TH1) exceeds about 114°C, or if there is short-circuit in TH1.	When in operation	Operation OFF or ON	Yes ☆ 1	Yes	Yes

Function		Operation				Self-diagnosis result display	
		Description	Detection period	Reset condition	Indoor unit error display	Indoor unit	Outdoor unit
13	Outdoor unit heat exchanger thermistor short-circuit error	Compressor stops if there is shortcircuit in outdoor unit heat exchanger thermistor (TH2).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
14	Outdoor unit outside air temperature thermistor short-circuit error	Compressor stops if there is shortcircuit in outdoor unit outside air temperature thermistor (TH3).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
15	Outdoor unit suction thermistor short-circuit error	Compressor stops if there is shortcircuit in outdoor unit suction thermistor (TH4).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
16	Outdoor unit 2-way valve thermistor short-circuit error	Compressor stops if there is shortcircuit in outdoor unit 2-way valve thermistor (TH5).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
17	Outdoor unit heat exchanger thermistor open-circuit error	Compressor stops if there is opencircuit in outdoor unit heat exchanger thermistor (TH2).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
18	Outdoor unit outside air temperature thermistor open-circuit error	Compressor stops if there is opencircuit in outdoor unit outside air temperature thermistor (TH3).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
19	Outdoor unit suction thermistor open-circuit error	Compressor stops if there is opencircuit in outdoor unit suction thermistor (TH4).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
20	Outdoor unit 2-way valve thermistor open-circuit error	Compressor stops if there is opencircuit in outdoor unit 2-way valve thermistor (TH5).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
21	Outdoor unit discharge thermistor open-circuit error	Compressor stops if there is opencircuit in outdoor unit discharge thermistor (TH1).	At compressor startup	Operation OFF or ON	Yes ☆ 1	Yes	Yes
22	Serial signal error	Compressor stops if outdoor unit cannot receive serial signal from indoor unit for 30 seconds.	When in operation	Reset after reception of serial signal	None	None	None
23	Compressor startup error	Compressor stops if compressor fails to start up.	At compressor startup	Operation OFF or ON	Yes ☆ 3	Yes	Yes
24	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
25	PAM over voltage error	Compressor stops if DC voltage is 400 V or higher.	When in operation	Operation OFF or ON	Yes ☆ 1	Yes	Yes
26	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	Operation OFF or ON	Yes ☆ 1	Yes	Yes
27	Outdoor unit thermal fuse blown in the Terminal board	Serial signal is lost. As a result,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

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

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

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

[2] AIR CONDITIONER OPERATION IN THERMISTOR ERROR

* These models have following thermistors

INDOOR UNIT	OUTDOOR UNIT
TH1, TH2	TH1, TH2, TH3, TH4, TH5

The errors for the thermistors that are not mentioned above are irrelevant.

These indoor units don't have power relay.

1. Indoor unit

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

2. Outdoor unit

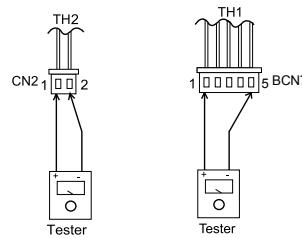
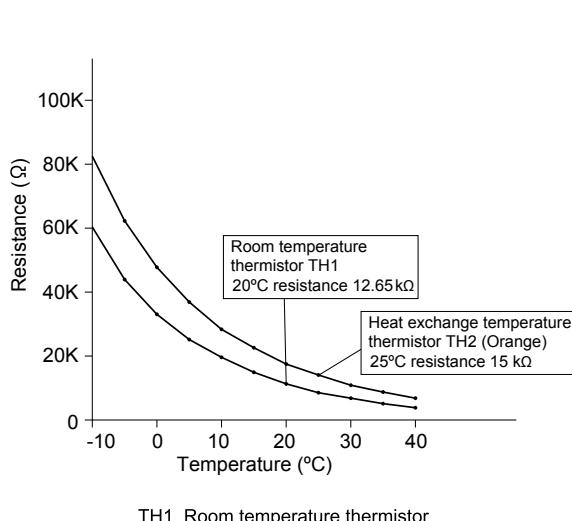
Item	Mode	Control operation	When resistance is low (temperature judged higher than actual)	Short-circuit	When resistance is high (temperature judged lower than actual)	Open-circuit
Compressor discharge thermistor (TH1)	Cooling Dehumidifying Heating	Expansion valve control and compressor protection	Compressor 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.

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
Outside air temperature thermistor (TH3)	Auto	Operation mode judgment	Cooling mode is activated even if room temperature is low.	Outdoor unit thermistor short-circuit error indication.	Heating mode is activated even if room temperature is high.	Outdoor unit thermistor open-circuit error indication.
	Cooling Dehumidifying	Operation not affected	Normal operation.	Outdoor unit thermistor short-circuit error indication.	Normal operation.	Outdoor unit thermistor open-circuit error indication.
	Heating	Rating control Defrosting	Defrosting operation is activated unnecessarily.	Outdoor unit thermistor short-circuit error indication.	Defrosting operation is not activated, and frost accumulates on outdoor unit.	Outdoor unit thermistor open-circuit error indication.
Suction pipe thermistor (TH4)	Cooling Dehumidifying	Expansion valve control	Compressor operates, but room does not become cool (expansion valve is open).	Outdoor unit thermistor short-circuit error indication.	Frost accumulates on evaporator inlet section, and room does not become cool (expansion valve is closed).	Outdoor unit thermistor open-circuit error indication.
	Heating	Expansion valve control	Compressor operates, but room does not become warm (expansion valve is open).	Outdoor unit thermistor short-circuit error indication.	Frost accumulates on expansion valve outlet section, and room does not become warm (expansion valve is closed).	Outdoor unit thermistor open-circuit error indication.
2-way valve thermistor (TH5)	Cooling Dehumidifying	Expansion valve control	Frost accumulates on indoor unit evaporator and room does not become cool (expansion valve is closed).	Outdoor unit thermistor short-circuit error indication.	Compressor operates, but room does not become cool (expansion valve is open).	Outdoor unit thermistor open-circuit error indication.
	Heating	Operation not affected	Normal operation.	Outdoor unit thermistor short-circuit error indication.	Normal operation.	Outdoor unit thermistor open-circuit error indication.

[3] THERMISTOR TEMPERATURE CHARACTERISTICS

1. Indoor unit

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



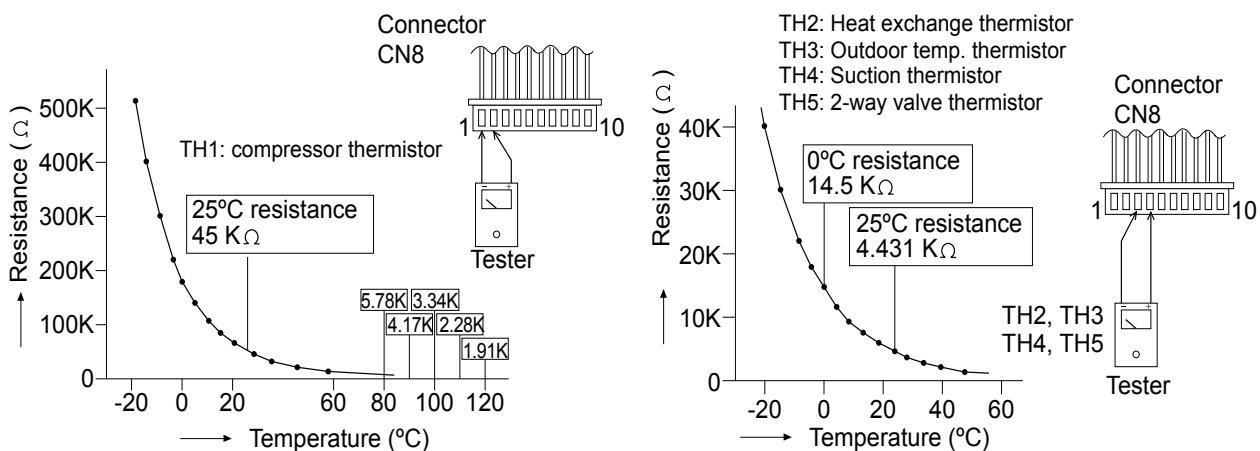
Thermistor	Symbol	Connector	Color
Room temperature	TH1 (BCN7)	(1) - (5)	-
Heat exchange temperature	TH2 (CN2)	(1) - (2)	Orange

Before measuring resistance,
disconnect connectors as
shown above

2. Outdoor unit

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 thermistor	TH4	(7) - (8)	Black
2-way valve thermistor	TH5	(9) - (10)	Yellow

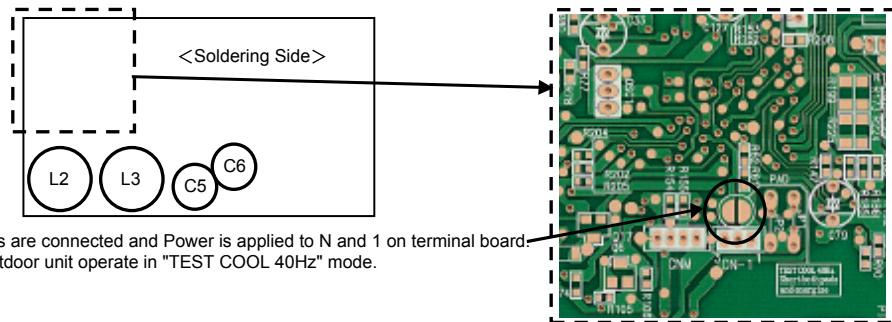


[4] HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

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 230 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.)



[5] GENERAL TROUBLESHOOTING CHART

1. Indoor unit does not turn on

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

2. Indoor unit fan does not operate

Main cause	Inspection method	Normal value/condition	Remedy
Open-circuit in heat exchanger thermistor (TH2) (in heating operation)	Measure thermistor resistance (dismount for check).	Refer to THERMISTOR TEMPERATURE 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.

Main cause	Inspection method	Normal value/condition	Remedy
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 are 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 5 and 9 of connector BCN8).	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 L1-L2: 230 VAC, 60 Hz Terminal board 2: serial signal	Correct wiring.
Damaged IPM.	Check IPM continuity.	-	Replace outdoor unit PWB.
Dried-up electrolytic capacitor.	Check electrolytic capacitor.	-	Replace outdoor unit PWB.
Blown outdoor unit fuse.	Check 20-A fuse.	Fuse should not be blown.	Replace fuse. Replace outdoor unit PWB.
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 outdoor unit PWB.
Layer short-circuit in expansion valve coil.	Measure resistance.	46±3Ω in each phase (at 20°C)	Replace coil.

CAUTION:

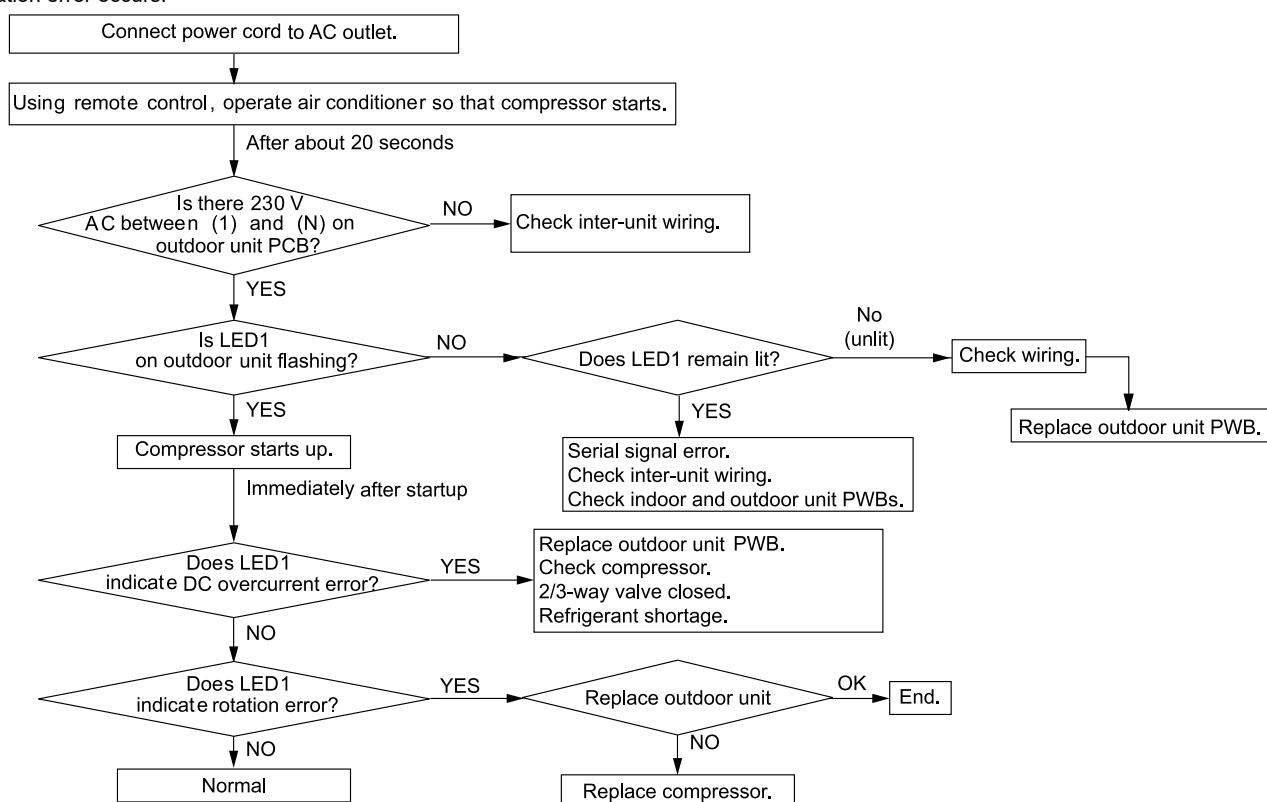
If fuse FU1/FU5 (outdoor unit control circuit board) is blown, be careful of charging voltage in inverter electrolytic capacitor C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models.

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 C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models.

[6] MALFUNCTION (PARTS) CHECK METHOD

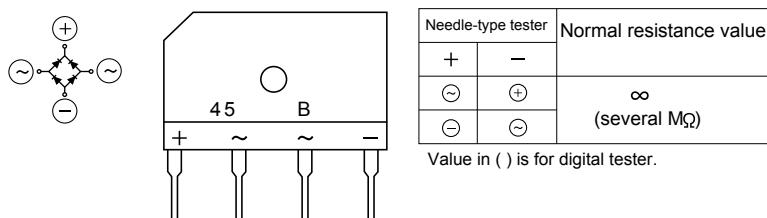
1. Procedure for determining defective outdoor unit IPM/compressor

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



2. Diode bridge check method

Turn off the power and let the inverter electrolytic capacitor 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.



3.Inverter electrolytic capacitor (C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models) check method

Turn off the power, let the inverter electrolytic capacitor (C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models) 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

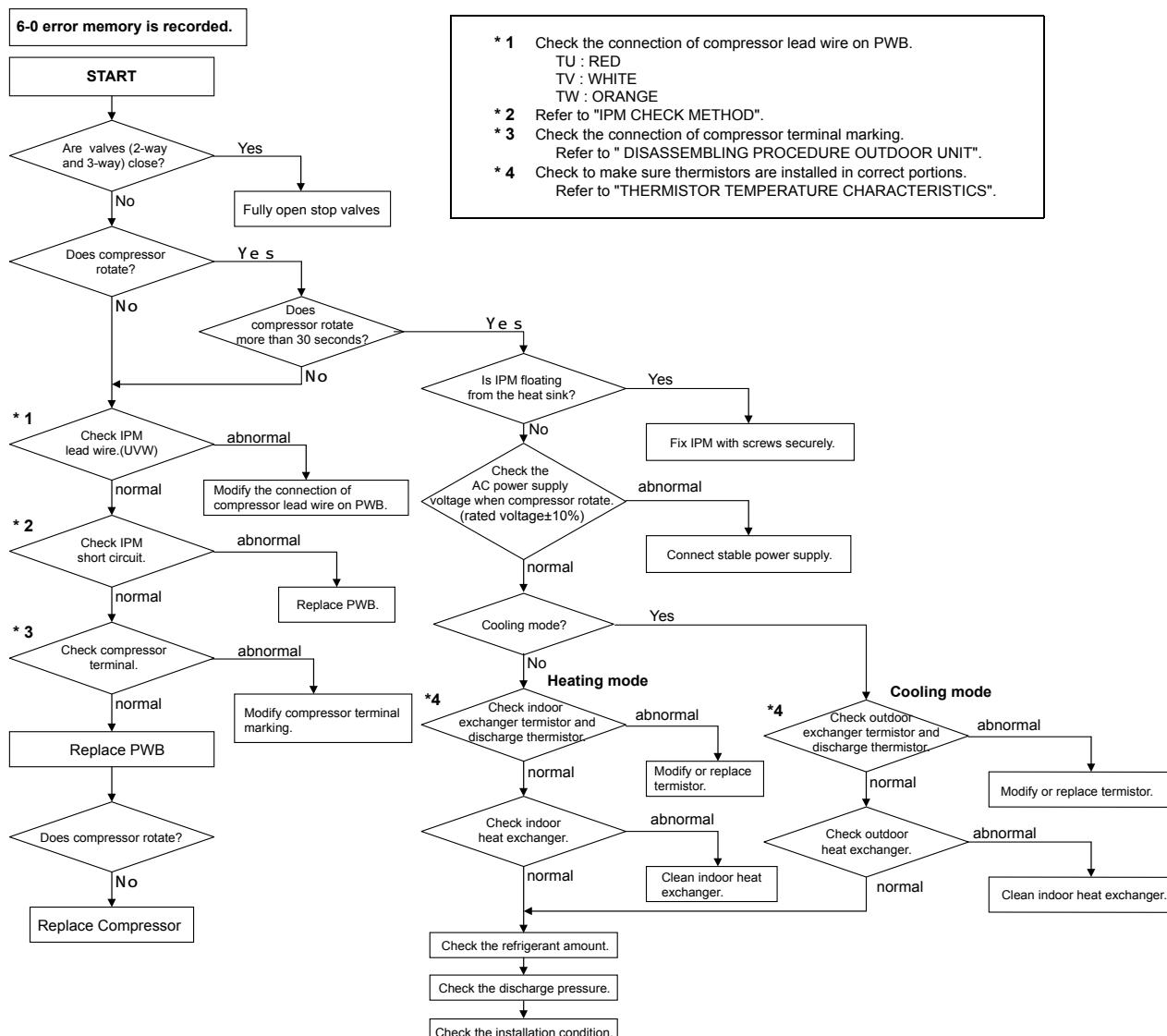
Turn off the power, let the large capacity electrolytic capacitor (C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models) discharge completely, and dismount the IPM. Then, using a tester, check leak current between C and E. When using a digital tester, the (+) and (-) tester lead wires in the table must be reversed.

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

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

Values in () are for digital tester

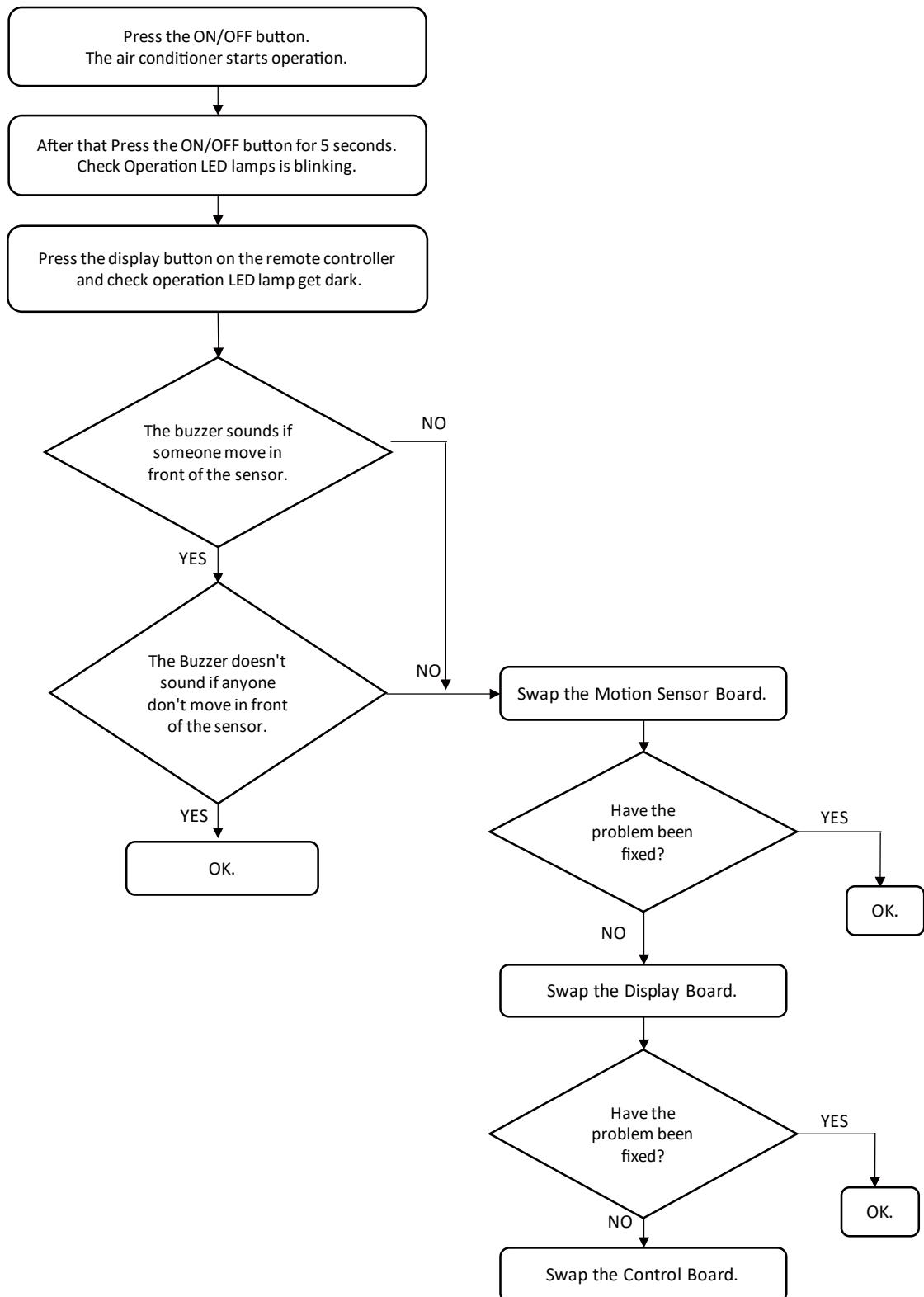
5.DC Over Current Error (6-0 error)



6.Motion sensor trouble-shooting

! CAUTION !

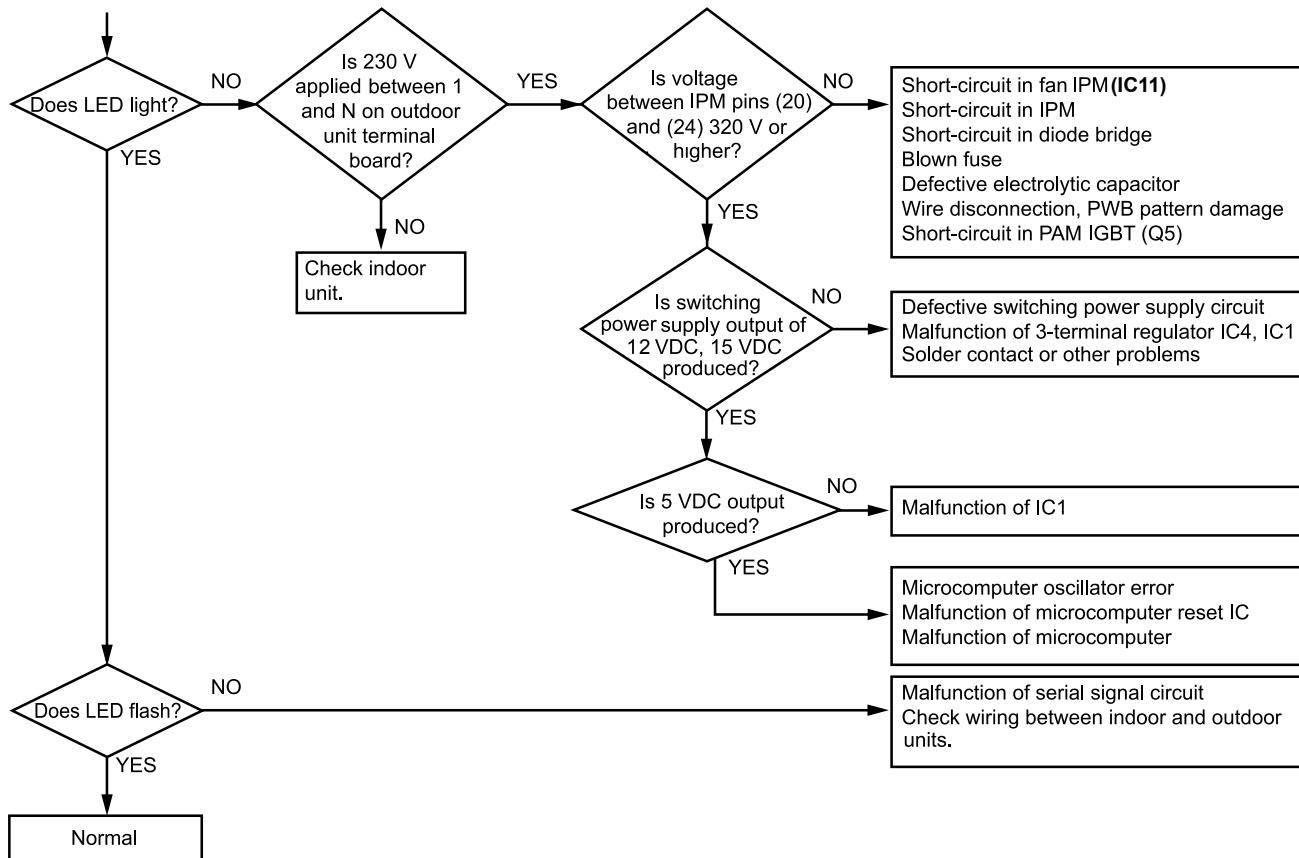
- Sometimes, the buzzer sound is not stable for 3 minutes at just after plugging the power supply.
- Sometimes, the buzzer sound lags behind movement.



[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. Troubleshooting of outdoor unit electric components



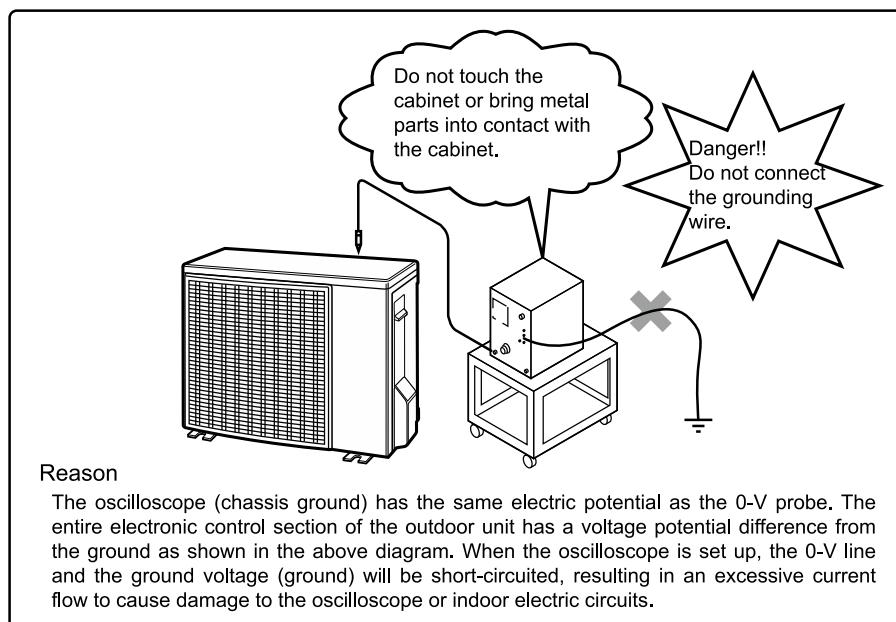
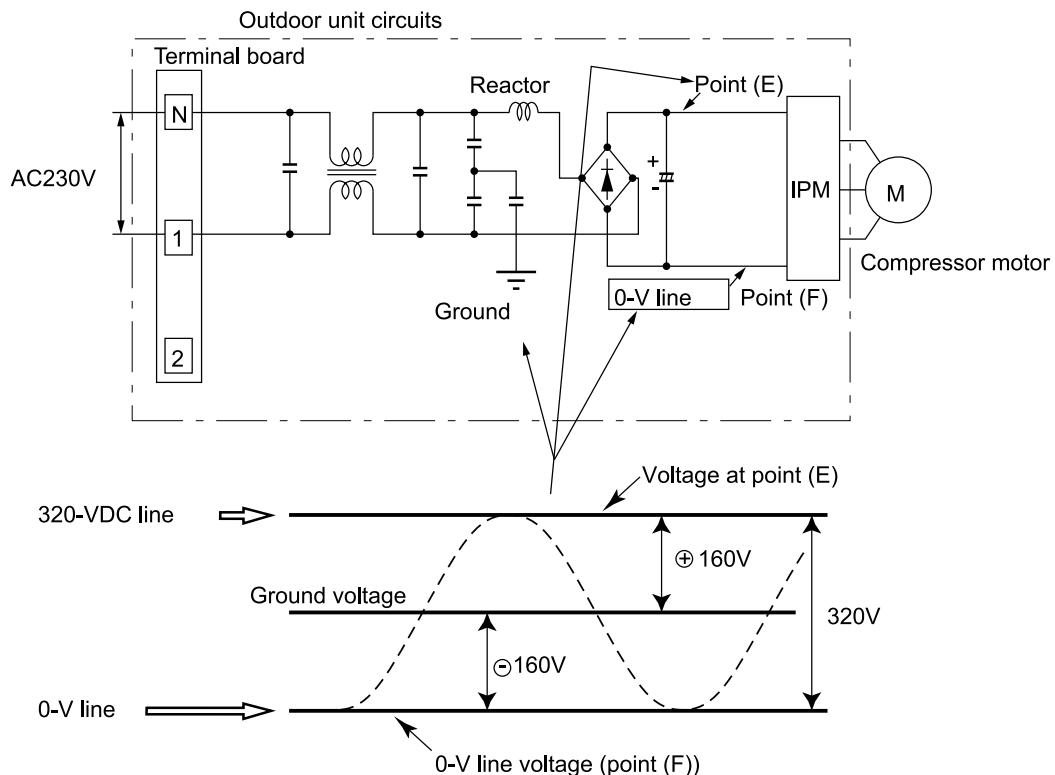
2. Caution in checking printed circuit boards (PWB)

2.1. Non-insulated control circuit

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

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

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

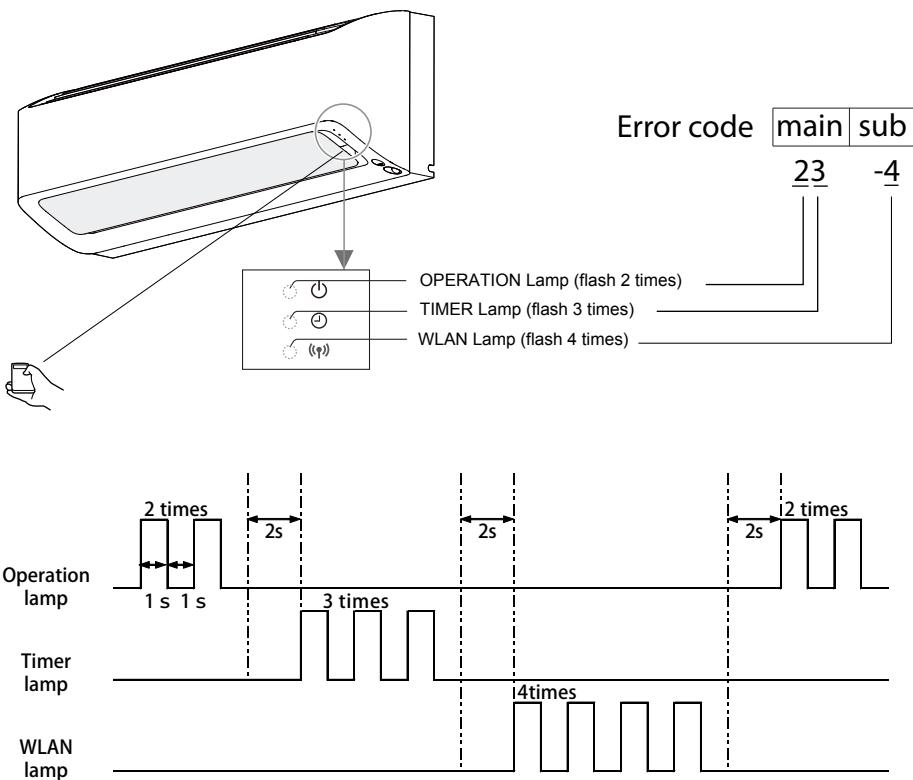


[8] TROUBLESHOOTING GUIDE

1. Self-Diagnosis Function

1.1 Indoor unit

- At below situation, the operation lamp (Green), timer lamp (Orange) and WLAN lamp(Green) flash to indicate the information of malfunction.



1) when the unit stops all operation by itself due to malfunction, the error will indicate.

2) Press the 'STOP' button on remote control by more than 5 times when unit is not operating,

"STOP"(Bip-) → "STOP"(Bip-) → "STOP"(Bip-) → "STOP"(Bip-) → "STOP"(Bip Bip Bip), the newest error will indicate.



3) Hold the 'Temp' button on remote control for a while when unit is not operating, the error will indicate.

4) Hold down the ON/OFF button for over 5 seconds on the indoor unit when the indoor unit is not operating,

	Buzzer (Bip sound)	Indication on unit
Step 1	Bip (when hold the button) Bip Bip Bip (after 5 seconds)	Indicate the newest error information
Step 2	Bip (when hold the button) Bip Bip (after 5 seconds)	Indicate the second newest error information
Step 3	Bip (when hold the button) Bip Bip Bip (after 5 seconds)	Indicate the third newest error information
Step 4	Bip (when hold the button) Bip Bip Bip Bip (after 5 seconds)	Indicate the fourth newest error information
Step 5	Bip (when hold the button) Bip- (after 10 seconds)	Delete the memory of below 4 error information.

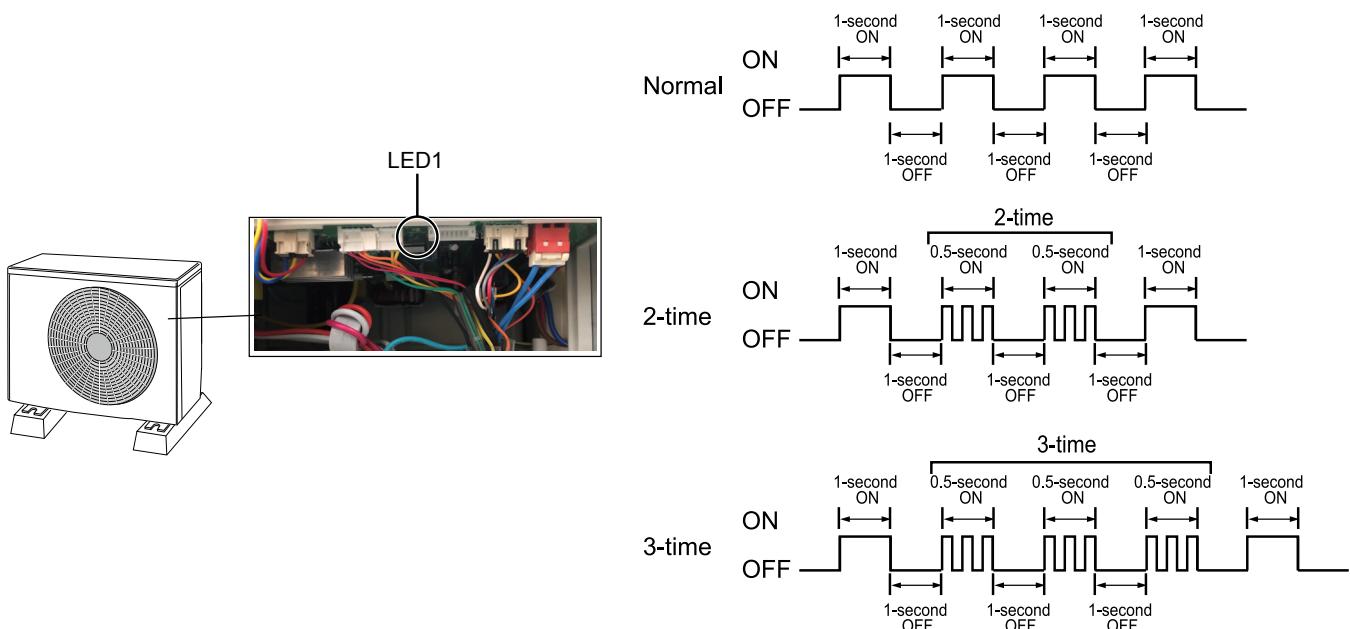
• When service finished, make sure the error information is deleted, **that will benefit to distinguish new error and old error.**

• The indication on unit will stop,

- after indicate for 3 minutes (only at the situation of 2), 3)).
- after indicate for 5 minutes (only at the situation of 4)).
- unit received signal of operation start.
- unit received signal of operation stop.

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 about 3-10 minutes. Then, the LED1 returns to normal display.



2. Self-Diagnosis Function

<Error code display on remote control >

Example: Error 23 -4.

STEP1

- To display the self-diagnosis, hold down the THERMOSTAT button ① for over 5 seconds on remote control when the indoor unit and remote control are off.
- The remote control will display "00".

STEP2

- Press the THERMOSTAT button ① and ②, remote control display will change from "00" to "31" step by step.
- Meanwhile, buzzer makes a short beep sound on every step.
- When it displays "23", the buzzer will make a long beep sound to remind you this error code "23" is main error code..

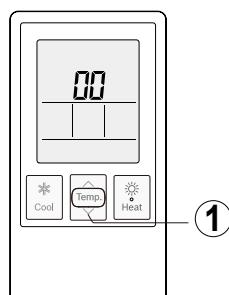
STEP3

- Press the FAN button ③ once, the remote control will display "-0".

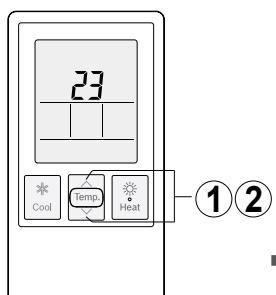
STEP4

- then press the THERMOSTAT button ① and ②, remote control display will change from "-0" to "-7" step by step.
- Meanwhile, buzzer makes a short beep sound on every step.
- When it displays "-4", the buzzer will make a long beep sound to remind you this error code "4" is sub error code.

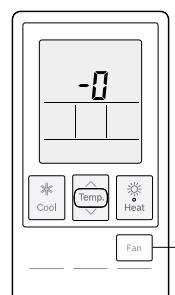
Step 1



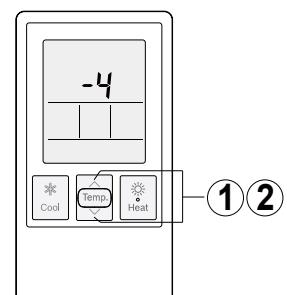
Step 2



Step 3



Step 4



3.Chart for Reading Self-Diagnosis

Problem symptom	Outdoor unit indication (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Normal condition	Normal blinking	0	0	Normal			
Indoor and outdoor units do not operate.	1-time	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 short circuit. 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 PWB assembly.
			1		Outdoor temperature thermistor short circuit error		
			2		Suction thermistor short circuit error		
			3		2-way valve thermistor short circuit error		
			4		Heatsink thermistor error	-	Replace the outdoor unit control PWB.
			5		Discharge thermistor short-circuit	"(1) Measure the resistance of the outdoor unit thermistors. (2) Check the lead wire of the outdoor unit thermistor for torn sheath and short circuit. (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 PWB assembly."
Indoor and outdoor units do not operate.	2-time	2	0	Cycle temperature	Compressor high temperature error	1) Check the outdoor unit air outlet for blockage.	1) Ensure unobstructed air flow from the outdoor unit air outlet.
						2) Check if the power supply voltage is AC 230V at full power.	2) Connect power supply of proper voltage.
						3) Check the pipe connections for refrigerant leaks.	3) Charge the specified amount of refrigerant.
						4) Measure resistance of the outdoor unit compressor thermistor.	4) Replace the outdoor unit compressor thermistor assembly.
						5) Check the expansion valve for proper operation.	5) Replace the expansion valve coil, expansion valve or outdoor unit control PWB assembly.

Problem symptom	Outdoor unit indication (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Indoor unit operates. Outdoor unit does not operate temporarily	2-time	2	1	Cycle temperature	Compressor discharge overheat.	1) (Temporary stop for cycle protection)	-
			2		Outdoor unit heat exchanger overheat.		-
			3		Indoor unit heat exchanger overheat.		-
							-
			5		IPM high temperature error	(1)Check the outdoor unit air outlet for blockage. (2)Check the outdoor unit fan for proper rotation. (3)No abnormality found in above inspections (1) and (2).	(1)Ensure unobstructed air flow from the outdoor unit air outlet. (2)Check the outdoor unit fan motor. (3)Replace the outdoor unit control PWB.
Indoor unit operates. Outdoor unit does not operate temporarily.	3-time	3	0	Dry operation	Temporary stop due to dehumidifying operation	1) (Temporary stop for cycle protection).	-
Indoor and outdoor units do not operate.	5-time	5	0	Outdoor unit thermistor open-circuit	Heat exchanger thermistor open circuit error	1) Check connector of outdoor unit thermistor for secure installation. 2) Measure resistance of outdoor thermistors. 3) Check the lead wires of thermistors on the outdoor unit control PWB for open-circuit. 4) No abnormality found in above inspections (1) through (3).	1) Correct the installation. 2) Replace the outdoor unit thermistor assembly. 3) Replace the outdoor unit thermistor assembly. 4) Replace the outdoor unit control PWB assembly.
			1		Outdoor temperature thermistor open circuit error		
			2		Suction thermistor open circuit error		
			3		2-way valve thermistor open circuit error		
			4		Discharge thermistor open circuit error		
			5		Heat sink thermistor open circuit error		
Indoor and outdoor units do not operate.	6-time	6	0	Outdoor unit DC Current	DC over current error	-	Replace the outdoor unit IPM PWB assembly.
			1		IPM pin level error	Check the IPM is attached correctly to the outdoor unit IPM PWB.	
			2		Compressor rotation error	(1) Check the IPM and Heat Sink is attached correctly to the outdoor unit IPM PWB. (2) Check the outdoor unit fan motor (3) No abnormality found in above inspections (1) and (2).	(1)Correct the installation & Silicone grease application. (2)Replace the outdoor unit fan motor. (3) Replace the outdoor unit PWB assembly.
			3		Other factors	•Cycle error •Overheat judgment thermistor off •Filter and Heat Exchange dust cloogging	(See flowchart)

Problem symptom	Outdoor unit indication (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Indoor and outdoor units do not operate.	7-time	7	0	Outdoor unit AC Current	AC over current error	1) Check the outdoor unit air outlet for blockage. 2) Check the outdoor unit fan for proper rotation.	1) Ensure unobstructed air flow from the outdoor unit air outlet. 2) Check the outdoor unit fan motor.
			1		AC current error when OFF	1) IPM continuity check.	1) Replace the outdoor IPM PWB.
			2		AC maximum current error	1) Check the outdoor unit air outlet for blockage. 2) Check the outdoor unit fan for proper rotation.	1) Ensure unobstructed air flow from the outdoor unit air outlet. 2) Check the outdoor unit fan motor.
			3		AC current deficiency error	1) Check if there is an open-circuit in the secondary winding of the current transformer of the outdoor unit control PWB. 2) Check if the refrigerant volume is abnormally low. 3) Check if the refrigerant flows properly.	1) Replace the outdoor unit control PWB assembly. 2) Charge the specified amount of refrigerant. 3) Correct refrigerant clogs. (Stop valve, pipe, expansion valve).
Indoor and outdoor units do not operate.	9-time	9	0	Cycle temperature	Thermistor installation error or 4-way valve error.	1)Check the thermistor (heat exchanger) and (2-way valve) are installed in correct positions.	1)Correct the installation.
						2)Check resistance of thermistors (heat exchanger and 2-way valve).	2)Charge the specified amount of refrigerant.
						3)Check the 4-way valve for proper operation.	3)Replace the 4-way valve.
						4)No abnormality found in above inspections (1), through(3).	4)Replace the outdoor unit control PWB assembly.
Indoor and outdoor units do not operate.			4		4 way valve error or Gas leak error.	1) Check the indoor/ outdoor heat exchanger thermistors are installed in correct positions.	1) Correct the installation.
			5			2) Check if the refrigerant volume is abnormally low. 3) Check the 4-way valve for proper operation.	2) Change the specified amount of refrigerant. 3) Replace the 4-way valve.
Indoor and outdoor units do not operate.	10-time	10	2	EEPROM error	CPU(outdoor) RAM data error	-	1) Replace the outdoor unit control PWB assembly.
			3		CPU error	-	

Problem symptom	Outdoor unit indication (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Indoor and outdoor units do not operate.	11-time	11	1	Outdoor unit DC fan	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.
			2		Outdoor unit DC fan lock error	1) Check if the fan IPM terminal resistance values are uniform. 2) (1): Normal	1) Replace the outdoor unit control PWB assembly. 2) Replace the outdoor unit fan.
		3	Outdoor unit DC fan	Detection error of DC fan negative rotation before compressor is driven	1) (Temporary stop for DC fan circuit protection)	-	
					Detection error of inverter current for DC fan	-	1) Replace the outdoor unit control PWB assembly.
		4	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 indica-tion (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Indoor and outdoor units do not operate.	13-time	13	0	Compressor error	Compressor winding short circuit	-	Replace Compressor.
			1		Compressor winding open etc.		
			2		compressor Lock		
			3	over current pause	(pause to protect the outdoor unit control PWB)	-	
Indoor and outdoor units do not operate.	14-time	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 the installation. 2) Replace the PWB assembly.
			1		PAM clock error	1) Check the PAM clock for proper input.	1) Replace the outdoor unit control PWB assembly.
			2	Abnormal power supply voltage / DC low voltage.	1) Check the AC power supply voltage for fluctuation. 2) No abnormality found in above inspection.	1) Check the AC power supply voltage for fluctuation. 2) No abnormality found in above inspection.	1) Correct the installation. 2) Replace the PWB assembly.
			3				
			4				
			5				
			6				
Indoor unit operates. Outdoor unit does not operate.	Lighting or OFF	17	0	Wiring between units	Serial open circuit	1) Check the wires between units. 2) Check voltage between N and 1 the indoor/outdoor unit terminal boards. 3) Check the outdoor unit fuse. 4) Check voltages of 15V-0V,12V-0V and 5V-0V on the PWB. 15V-0V :15V 12V-0V :12V 5V-0V :5V Check resistance between IPM terminals. 5) No abnormality found in above inspections (1) through (4).	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 control PWB board.
			1				
			2				
			3				
			4				
Indoor unit operates. Outdoor unit does not operate.	Lighting or OFF	18	0	Wiring between units	Serial short-circuit	1) Check the wiring between units.	1) Correct the wiring.
			1		Serial erroneous wiring	1) Check the wiring between units.	1) Correct the wiring.
			2		serial communica-tion	1) Check the serial circuit of indoor or outdoor unit.	1) If the unit operates, no action required. If not, replace indoor or outdoor unit PWB.

Problem symptom	Outdoor unit indica-tion (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Indoor and outdoor units do not operate.	Normal blinking or OFF	19	0	Indoor unit fan	Indoor unit fan error	1) Check the indoor fan motor for proper rotating operation. (Check fan lock.)	1) Replace the indoor fan motor.
						2) Check the lead wire of the indoor fan motor for open-circuit.	2) Replace the indoor fan motor.
						3) Check connector of the indoor unit fan motor for secure installation	3) Correct the installation of the indoor fan motor connector.
						4) No abnormality found in above inspections (1) through (3).	4) Replace the indoor unit control PWB
Indoor and outdoor units do not operate.	Normal blinking or OFF	20	0	Indoor unit control PWB	EEPROM data error	1) (EEPROM read data error)	1) Replace the indoor unit control PWB

Problem symptom	Outdoor unit indica-tion (LED1)	Malfunction No.*		Content of diagnosis		Check point	Action
		Main	Sub	Main	Sub		
Indoor and outdoor units operate	Normal blinking or OFF	24	0	Wireless LAN	Wireless adapter communication error	1) Check Wireless adapter and related circuit.	1) Confirm assembly. 2) Confirm wireless adapter.
					Wireless router connection error	1) Check Wireless router. 2) Check Internet.	1) Confirm connecting with wireless router. 2) Confirm setting of wireless router. 3) Confirm connecting of internet.
					Internet communication error		
					communication with server error		
Indoor and outdoor units operate	Normal blinking or OFF	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.
				Indoor unit pipe temperature thermistor	Indoor unit pipe temperature thermistor		
				Indoor unit valve temperature thermistor	Indoor unit valve temperature thermistor		

4. OTHER MALFUNCTION ERROR INDICATIONS / BUZZERS

4.1 LED lamp indications during malfunction

MALFUNCTION	Blinking LED Lamps *Any LED lamp keeping lit and is not blinking indicates normal operation and setting				
	OPERATION (BLUE)	TIMER (ORANGE)	WLAN (GREEN)	PLASMACLUSTER (BLUE)	Main error code and details
Serial open circuit					17, Serial open circuit
Wireless LAN adapter communication error					24, Wireless LAN adapter communication errors · Wireless adapter communication error · Wireless router connection error · Internet communication error · Server connection error

4.2 LED lamp indications during normal operation

INDICATION	Blinking LED Lamps *Any LED lamp keeping lit and is not blinking indicate normal operation and setting					
	OPERATION (BLUE)	OPERATION (GREEN)	TIMER (ORANGE)	WLAN (GREEN)	PLASMACLUSTER (BLUE)	Notes
Replacement for Plasmacluster Ion Generator	Blinking for 10 seconds at a start of any operation mode.					Cumulative operation hours over 17,500 hours (※1) (Only for following models: AY-XP12ZHU, AY-XP18ZHU)
Filter Cleaning Recommendation	Blinking for 1 minute at a start of any operation mode.					
						Cumulative operation hours over 19,000 hours(※2) (Only for following models: AY-XP12ZHU, AY-XP18ZHU)
-27°C(-17°F) Auto OFF	Operation LED lamp blinks blue and green alternately.					
						Cumulative operation hours over 720 hours. Press ON/OFF button for 2 seconds to reset hours.
	Continuous blinking.					
						The unit turns off automatically when outside temperature is below -27°C (-17°F) and prevent damages to the outdoor unit.

※ 1 : If PLASMACLUSTER operates over 17,500 hours, the PLASMACLUSTER lamp will blink 10 seconds then turns off.

The LED lamp will blink as above when the unit starts PLASMACLUSTER operation again.

In this case, although the PLASMACLUSTER lamp turns off, PLASMACLUSTER ions are still released.

Other operations (e.g. Cooling and Heating) can run as usual.

※ 2 : If PLASMACLUSTER operates over 19,000 hours, the PLASMACLUSTER lamp will blink 1 minute then turns off.

The LED lamp will blink as above when unit starts PLASMACLUSTER operation again.

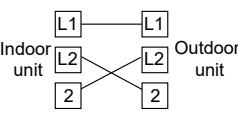
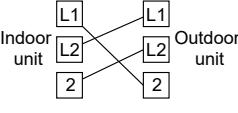
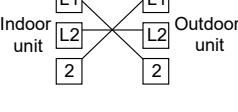
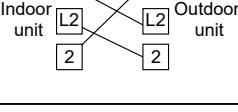
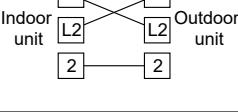
In this case, the unit will stop releasing PLASMACLUSTER ions.

Other operations (e.g. Cooling and Heating) can run as usual.

4.3 Errors without indication

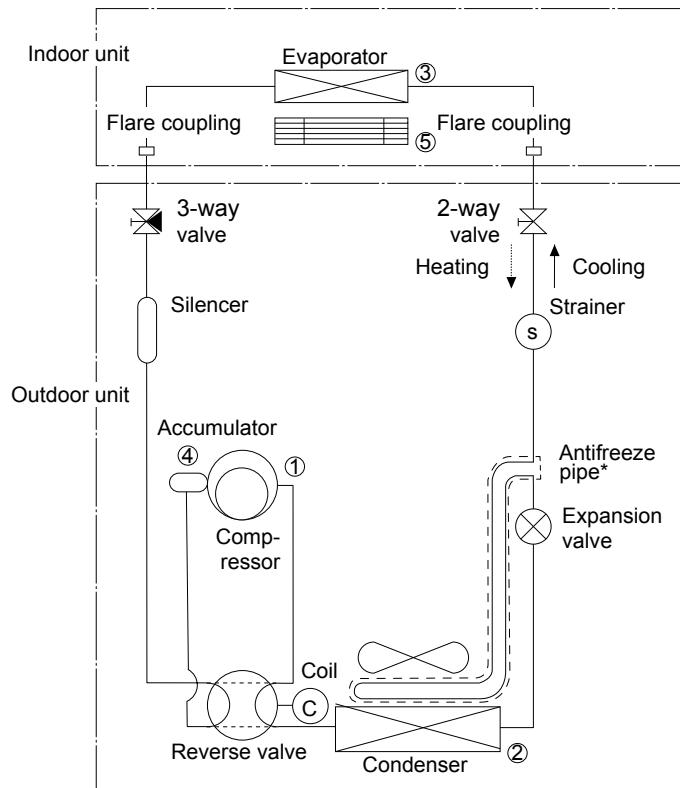
When EEPROM data has errors/problems at power supply connection, buzzer will beep continuously and all LED lamps remain OFF.

Malfunction indications due to wiring error during installation.

	Inter-unit wiring error mode	Symptoms
1	 Indoor unit Outdoor unit	<p>The unit stops operation. Malfunction diagnosis displays nothing. (Remote control also displays nothing when malfunction code is called out.)</p>
2	 Indoor unit Outdoor unit	<p>The unit stops operation. Malfunction diagnosis displays nothing. (Remote control also displays nothing when malfunction code is called out.)</p>
3	 Indoor unit Outdoor unit	<p>The unit stops operation. Malfunction diagnosis displays "18-1". (Remote control also displays "18-1" when malfunction code is called out.)</p>
4	 Indoor unit Outdoor unit	<p>The unit stops operation. Malfunction diagnosis displays nothing. (Remote control also displays nothing when malfunction code is called out.)</p>
5	 Indoor unit Outdoor unit	<p>The unit stops operation. Malfunction diagnosis displays "18-1". (Remote control also displays "18-1" when malfunction code is called out.)</p>

CHAPTER 5. REFRIGERATION CYCLE

[1] SCHEMATIC DIAGRAM



[2] STANDARD CONDITION

	Indoor side		Outdoor side	
	Dry-bulb Temp. (°F)	Relative Humidity (%)	Dry-bulb Temp. (°F)	Relative Humidity (%)
Cooling	80	51	95	-

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

Model	AY-XP12ZU1				AY-XP12ZH1			
	Cooling		Heating		Cooling		Heating	
Mode	Max *1	Test Run *2	Max *1	Test Run *2	Max *1	Test Run *2	Max *1	Test Run *2
AC Current (A)	6.1	3.3	9.1	2.9	5.5	5.0	10.7	3.9
3-way valve pressure (MPaG)	0.9	1.1	3.4	2.2	1.0	1.0	2.9	2.1
Outlet Air Temp. on (5) °F(°C)	13	16	49	33	15	15	46	33
Temp. on (1) °F(°C)	87	69	94	65	85	82	103	72
Temp. on (2) °F(°C)	40	40	2	3	40	40	0	0
Temp. on (3) °F(°C)	10	14	44	27	15	15	37	25
Temp. on (4) °F(°C)	10	15	1	5	16	16	-3	3

Model	AY-XP15ZU1			
	Cooling		Heating	
Mode	Max *1	Test Run *2	Max *1	Test Run *2
AC Current (A)	7.9	5.0	9.4	3.9
3-way valve pressure (MPaG)	0.9	1.0	2.8	2.1
Outlet Air Temp. on (5) °F(°C)	14	15	44	33
Temp. on (1) °F(°C)	95	82	99	71
Temp. on (2) °F(°C)	40	40	0	1
Temp. on (3) °F(°C)	15	16	33	25
Temp. on (4) °F(°C)	14	16	-1	4

Model	AY-XP18ZU1				AY-XP18ZHU1			
	Cooling		Heating		Cooling		Heating	
Mode	Max *1	Test Run *2	Max *1	Test Run *2	Max *1	Test Run *2	Max *1	Test Run *2
AC Current (A)	10.0	4.2	9.6	3.9	10.0	4.2	11.7	3.9
3-way valve pressure (MPaG)	0.8	1.1	2.9	2.2	0.8	1.1	3.1	2.2
Outlet Air Temp. on (5) °F(°C)	12	15	43	33	12	15	45	33
Temp. on (1) °F(°C)	96	59	94	65	96	59	99	65
Temp. on (2) °F(°C)	38	38	3	3	38	38	3	3
Temp. on (3) °F(°C)	14	16	25	22	14	16	27	22
Temp. on (4) °F(°C)	4	12	0	3	4	12	-1	3

Model	AY-XP24ZU1			
	Cooling		Heating	
Mode	Max *1	Test Run *2	Max *1	Test Run *2
AC Current (A)	11.7	4.3	11.7	3.9
3-way valve pressure (MPaG)	0.8	1.1	3.1	2.2
Outlet Air Temp. on (5) °F(°C)	12	16	45	33
Temp. on (1) °F(°C)	94	61	99	65
Temp. on (2) °F(°C)	39	37	3	3
Temp. on (3) °F(°C)	15	16	27	22
Temp. on (4) °F(°C)	3	12	-1	3

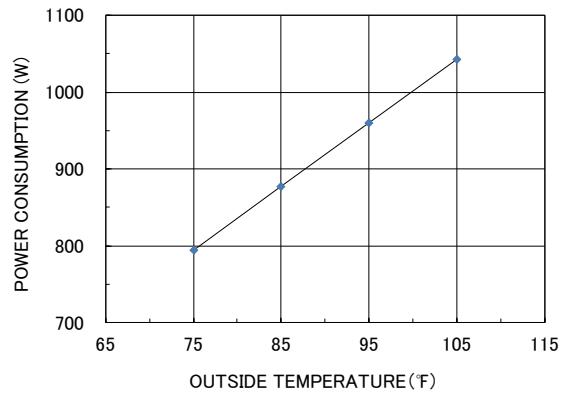
[4] PERFORMANCE CURVES

NOTE

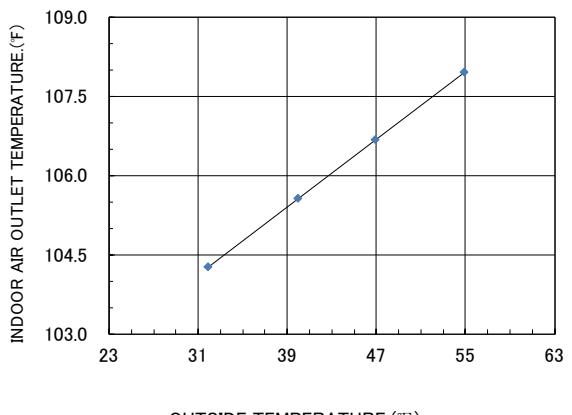
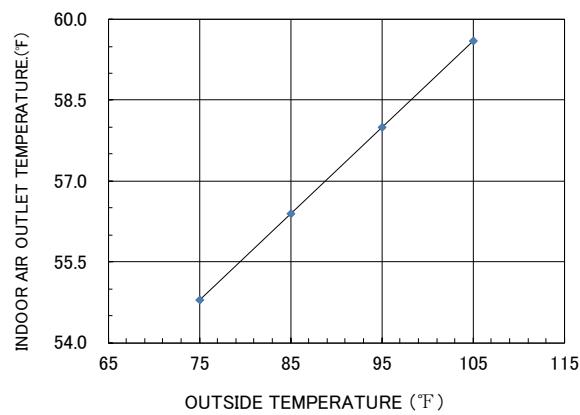
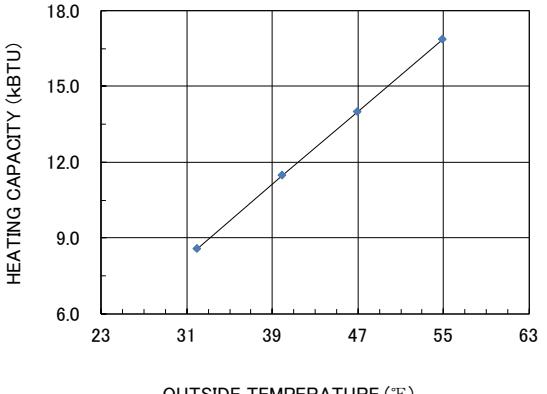
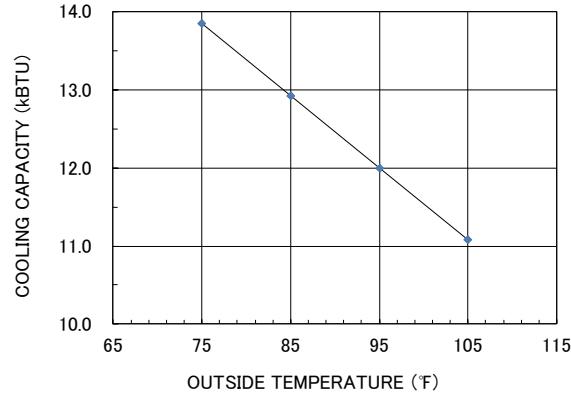
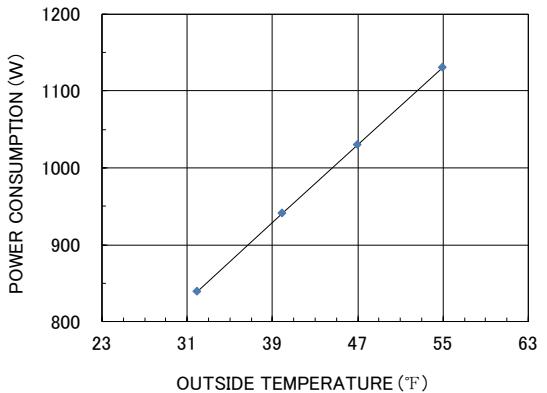
- 1) Indoor fan speed: High
- 2) Indoor air temp.: Cooling 80°F
- 3) Power source: 230V, 60Hz

AY-XP12ZU1

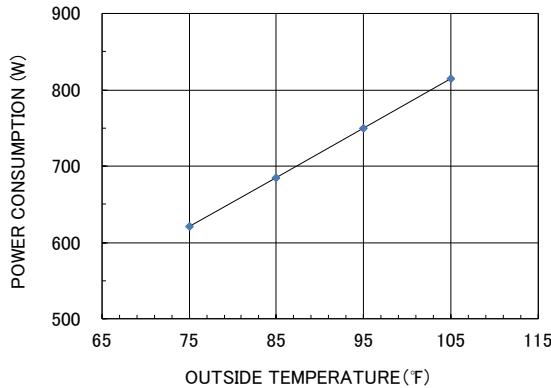
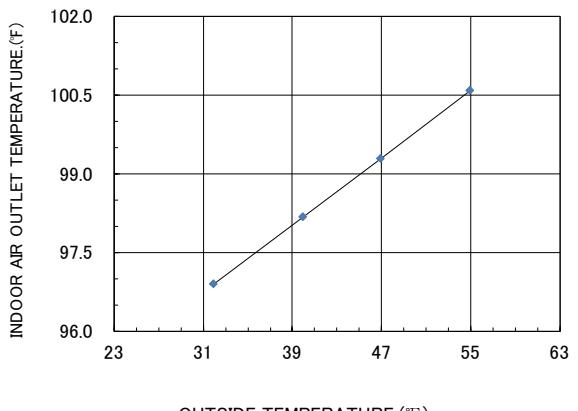
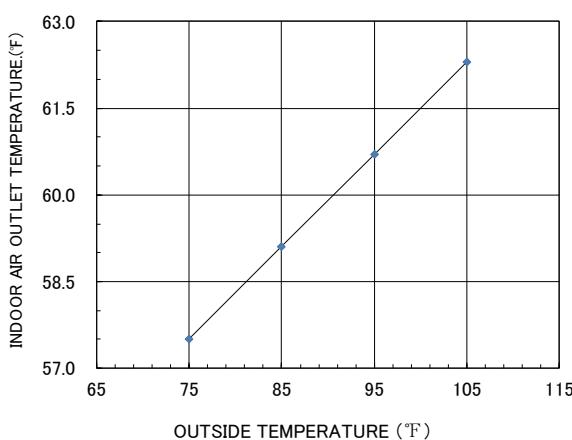
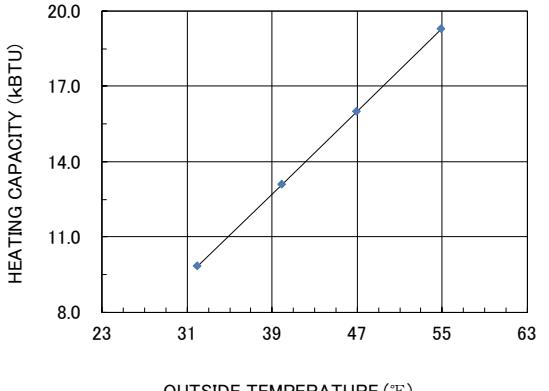
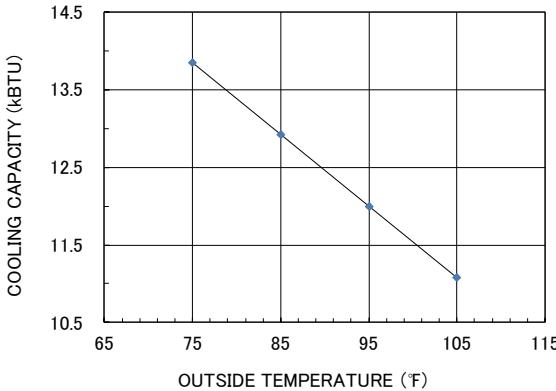
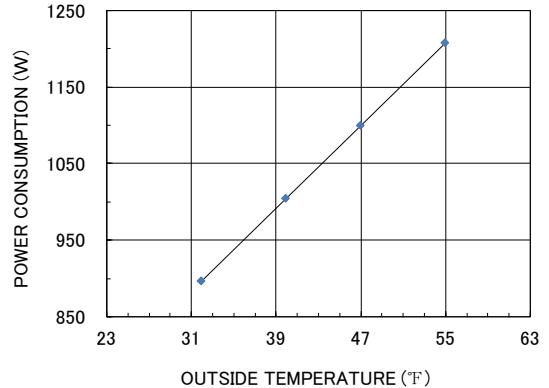
COOLING

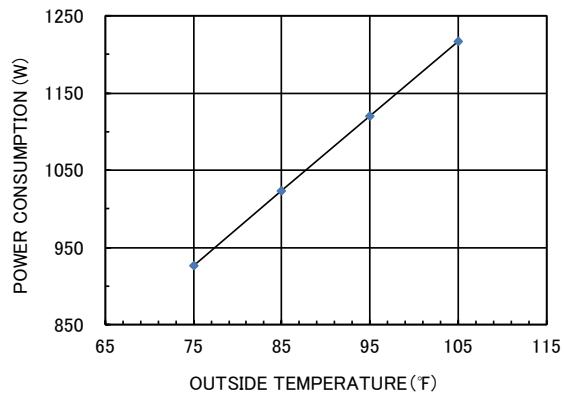
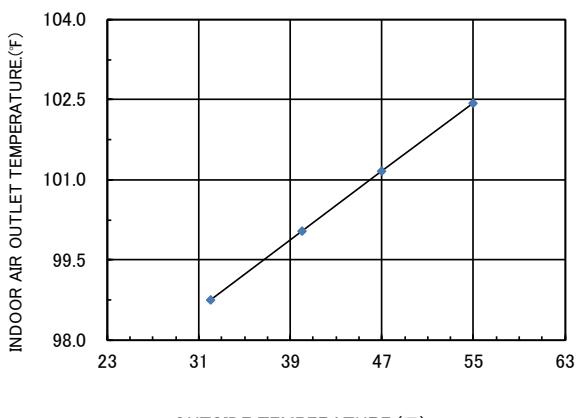
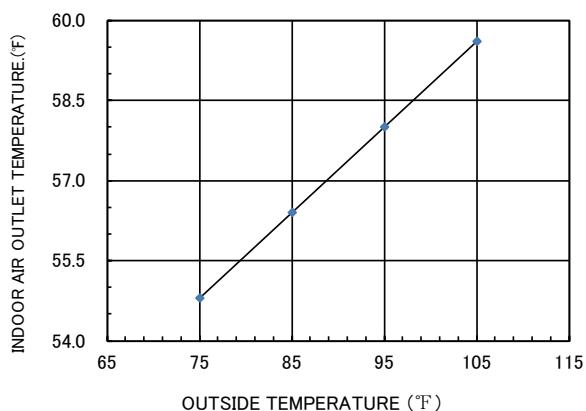
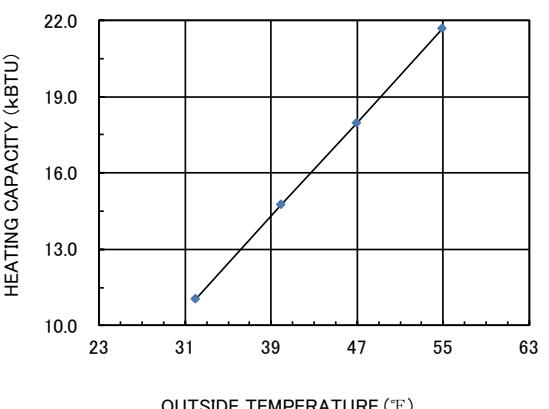
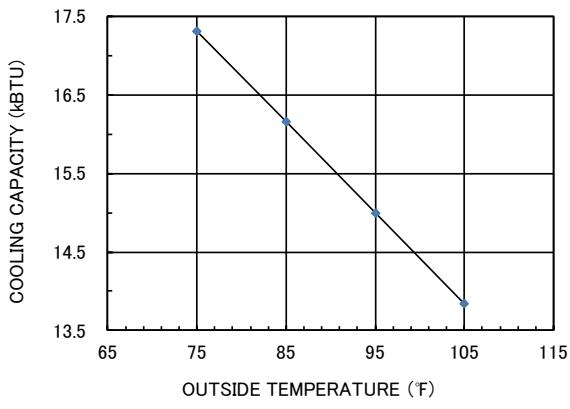
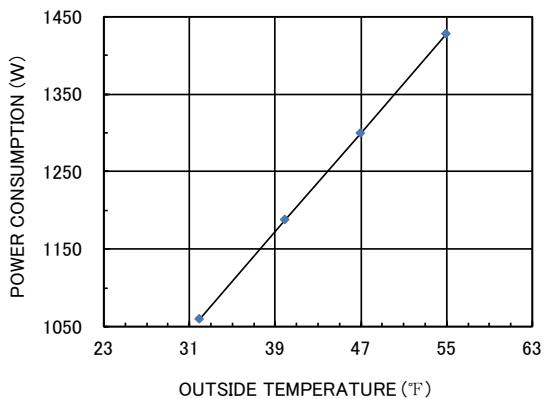


HEATING

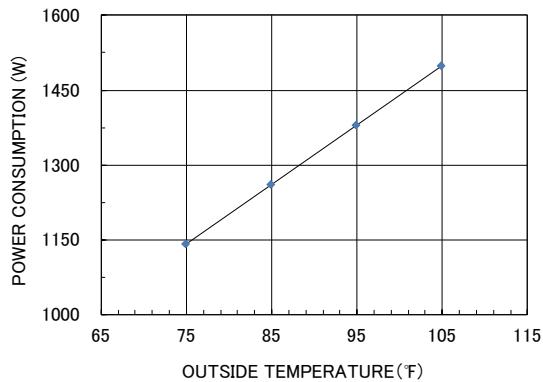
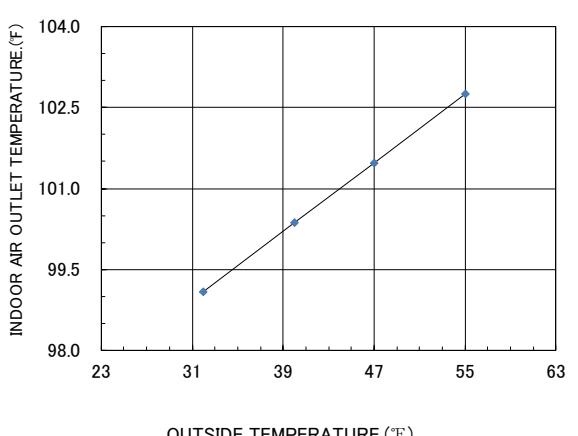
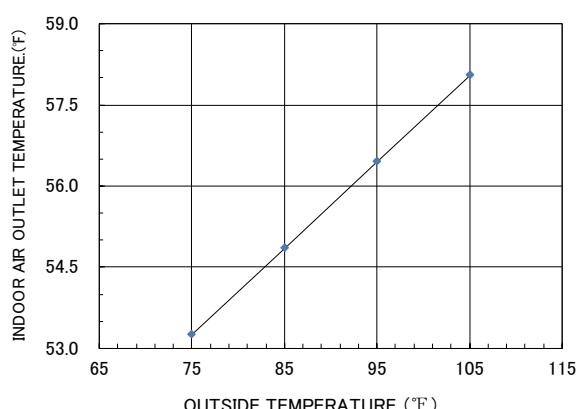
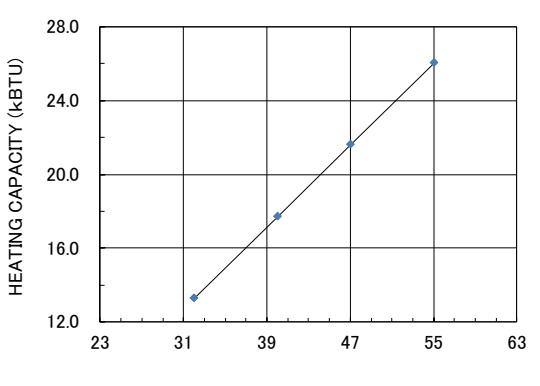
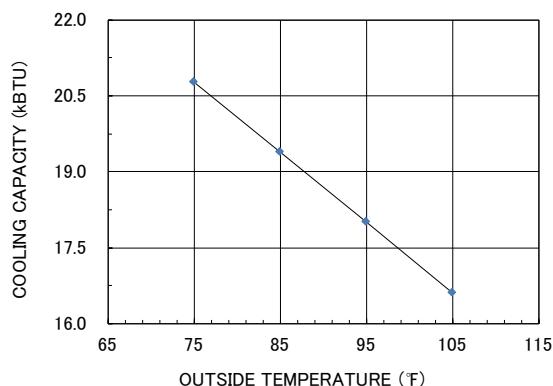
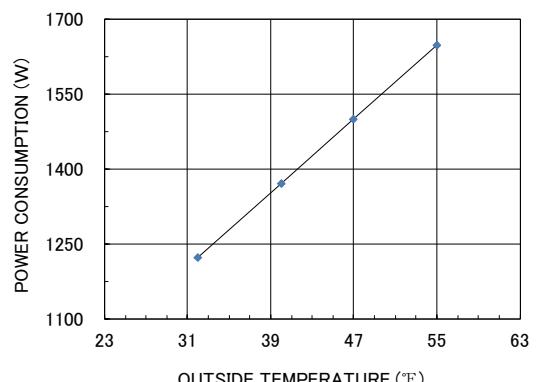


AY-XP12ZHU1

COOLING**HEATING**

COOLING**HEATING**

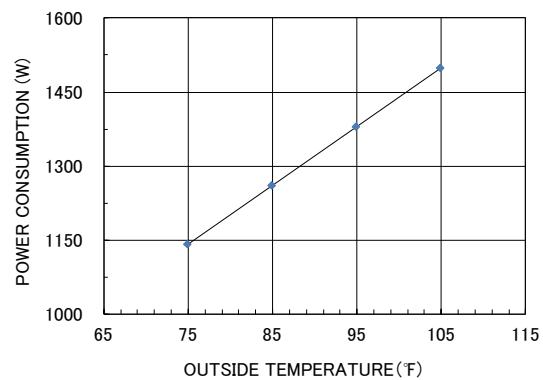
AY-XP18ZU1

COOLING**HEATING**

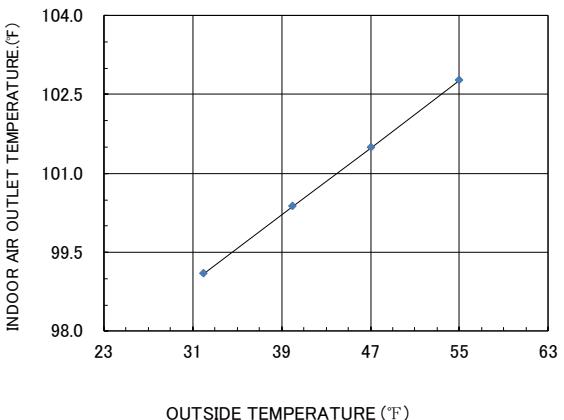
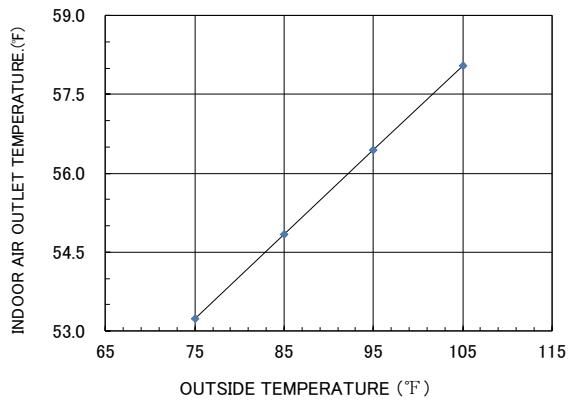
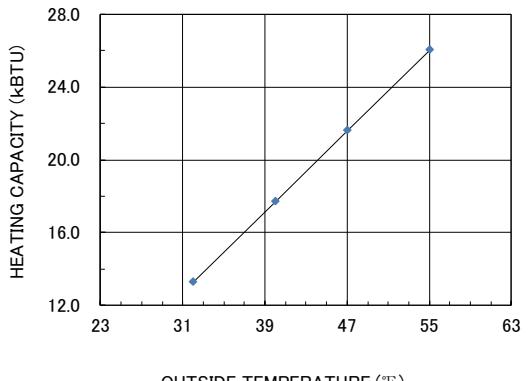
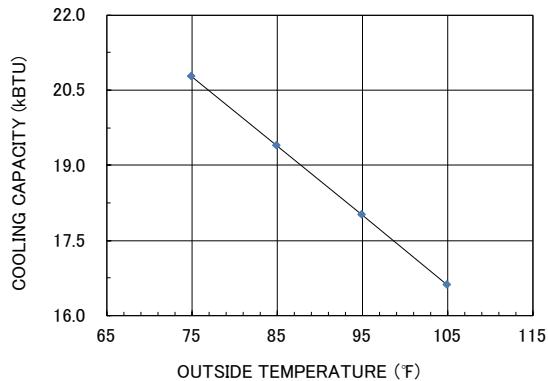
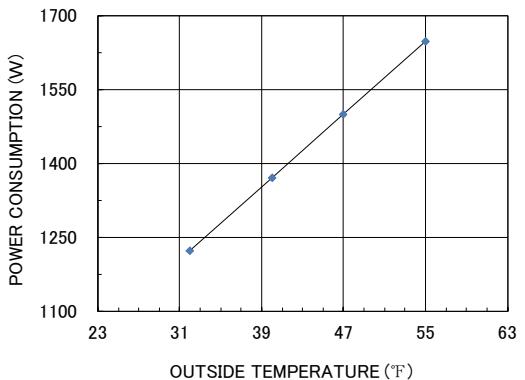
AY-XP12ZU1

AY-XP18ZHU1

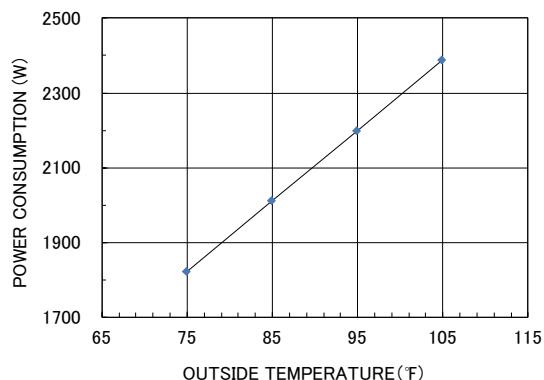
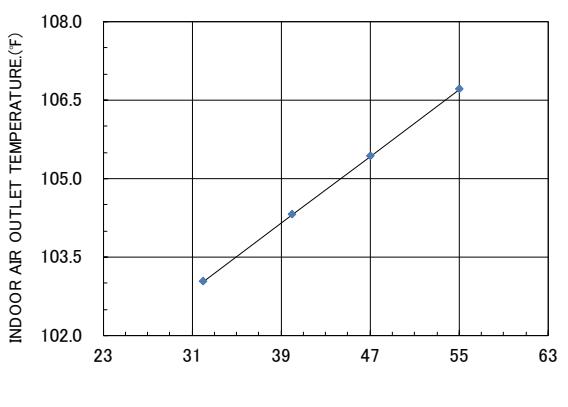
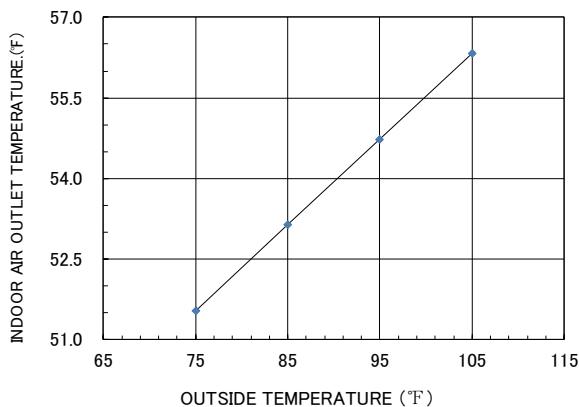
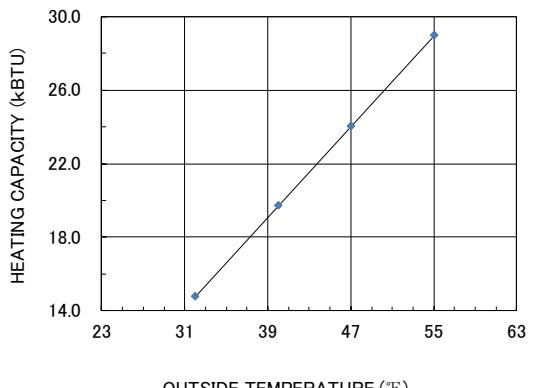
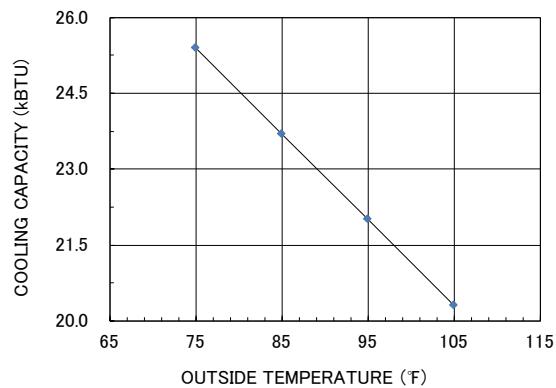
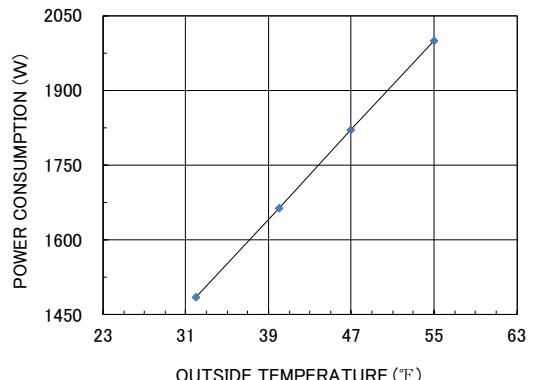
COOLING



HEATING



AY-XP24ZU1

COOLING**HEATING**

CHAPTER 6. DISASSEMBLY 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-resisstant 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 $1M\Omega$, inspect parts and repair or replace defective parts.

[1] INDOOR UNIT(For AY-XP12ZU1 model)

1. INDOOR UNIT

- Push the handles up to remove Air filter .

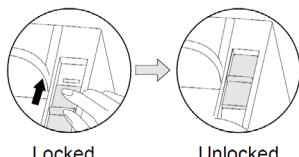


- Remove a scerw fixing the Cord Holder, then take the Cord Holder out.



- Remove Open Panel as below step.

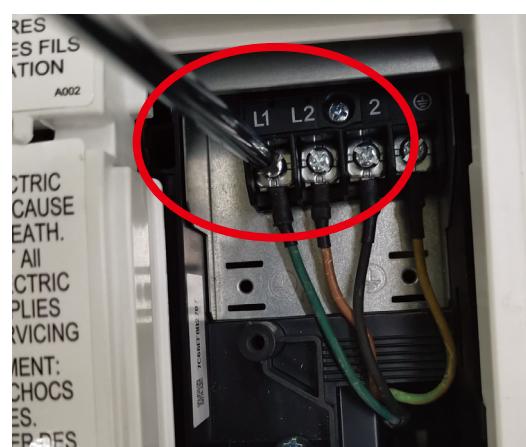
- Unlock Panel Lock (Right and left side).



- Lift the Open Panel up, then Slide the Open Panel' Hook along the Guide to remove it (right and left side).



- Loose the screw on Terminal Board and Unit-to-unit wiring.



5) Remove Horizontal Louver.

- Take the center Bearing out.



- Take the left side Louver Bushing out.



-Take the Horizontal Louver out.



6) Remove 2 screws fixing the Front Panel.



Pull the top side of Front Panel to release the hooks.



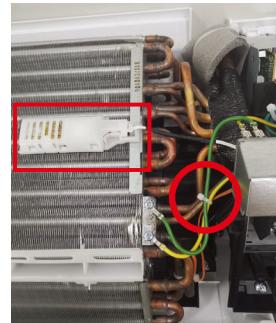
Pull this side to release these hooks.



Press below position to unfasten the hooks in side of Front Panel, then take the Front Panel out.



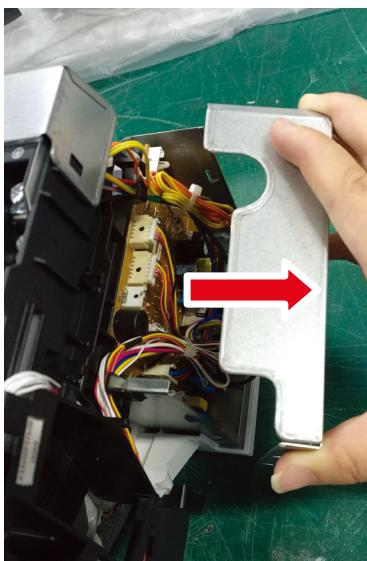
7) Cut the Wire Fixing Band and remove the Thermistor.



8) Remove 2 screw fixing the Ground wire.



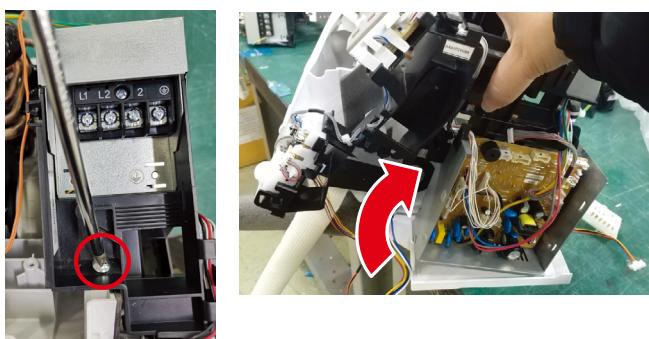
9) Take off the Control Box Cover.



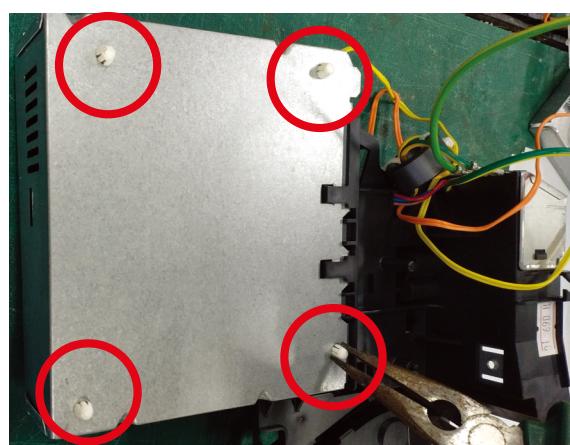
10) Cut the wire fixing band and remove all the connectors.



11) Remove 1 screw, then rotate the Control Unit as below to take it out.



12) Use a pincer to press the 4 spacer into the Control Angle to remove the PWB.



13) Release the hook of PCI Cover, take PLASMACLUSTER Unit out. Then remove the connector.



14) Remove the screw of Louver Motor, then take the Motor out.



15) Release Arm Auto/Manual from Louver Link R.



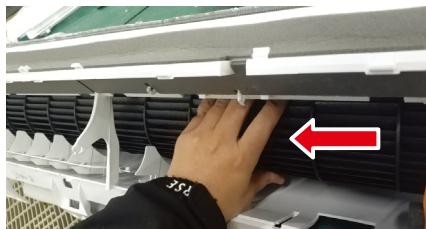
16) Remove 2 screw fixing the Fan Motor Cover, then remove Fan Motor Cover.



17) Remove 1 screw between Cross Flow Fan and Fan Motor.



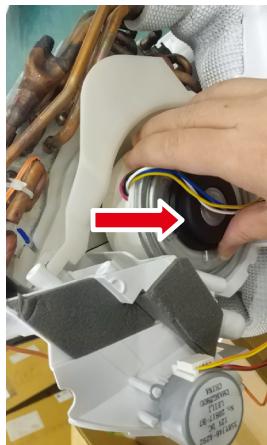
18) Hold and press the Cross Flow Fan to left side as much as possible, meanwhile, take Fan Motor out.



20) Remove 2 screws fixing Side Cover L.



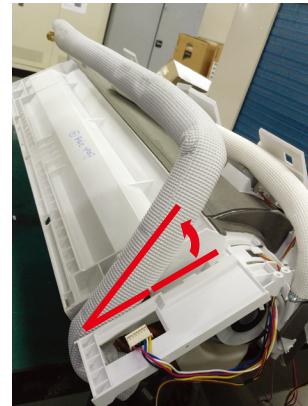
21) Push the Pipe Holder to remove Pipe Holder.



19) Remove a screws of Side Cover R.



22) Enlarge the angle between Tube Ass'y and Cabinet. Then take the Evaporator out.



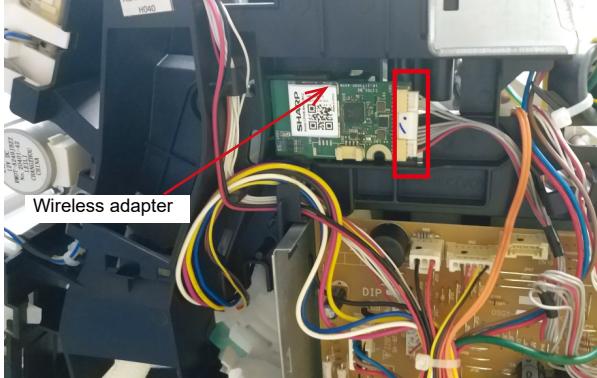
23) Take Corss Flow Fan out.



REPLACE WIRELESS ADAPTER

Maintenance shall be made by service personnel full of knowledge about wireless LAN.
Please contact SHARP for replacement.

- 1) Remove the Connector of Wireless adapter, and take it off from Control unit.



- 2) Replace the Wireless adapter by S-B01 WLAN PWB UNIT.

Note: The S-B01 WLAN PWB UNIT contains a wireless adapter and a QR label for service.



- 3) Paste the QR label for service to the bottom of indoor unit to replace the old QR label.



Old QR label
on the bottom of indoor unit



QR label for service

- 4) It's necessary to make the Wireless Lan connecting setting again.

Please finish the initial connection setting after replaced wireless adapter, the procedure is same as when you just bought the Air-conditioner.

[2] INDOOR UNIT

**(For AY-XP15ZU1, AY-XP18ZU1, AY-XP24ZU1
models)**

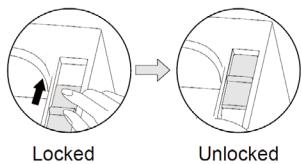
1. INDOOR UNIT

- 1) Push the handles up to remove Air filter .



- 2) Remove Open Panel as below step.

- Unlock Panel Lock (Right and left side).



- Lift the Open Panel up, then Slide the Open Panel' Hook along the Guide to remove it (right and left side).



- 3) Remove a scerw fixing the Cord Holder, then take the Cord Holder out.



- 4) Loose the screw on Terminal Board and remove the power cord and Unit-to-unit wiring.



5) Remove Horizontal Louver.

- Take the center Bearing out.



- Take the left side Louver Bushing out.



-Take the Horizontal Louver out.



6) Remove 2 screws fixing the Front Panel.



Pull the top side of Front Panel to release the hooks.



Pull this side to release these hooks.



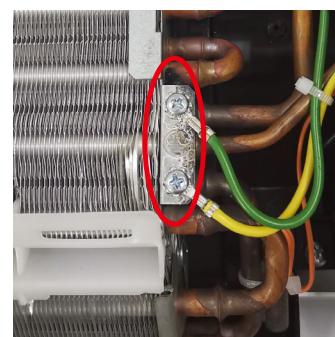
Press below position to unfasten the hooks in side of Front Panel, then take the Front Panel out.



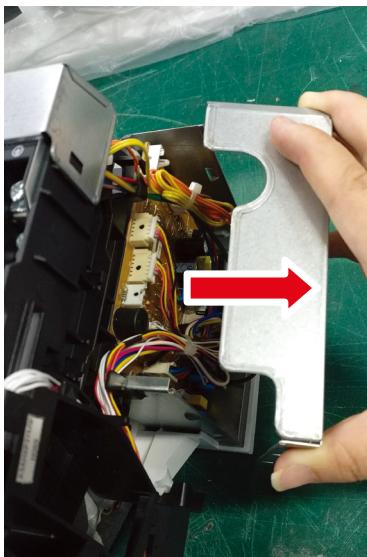
7) Cut the Wire Fixing Band and remove the Thermistor.



8) Remove 2 screw fixing the Ground wire.



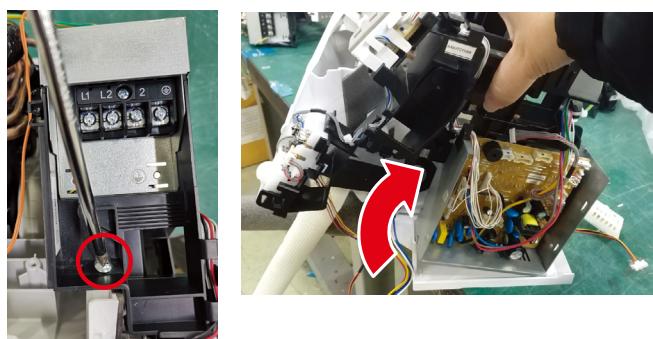
9) Take off the Control Box Cover.



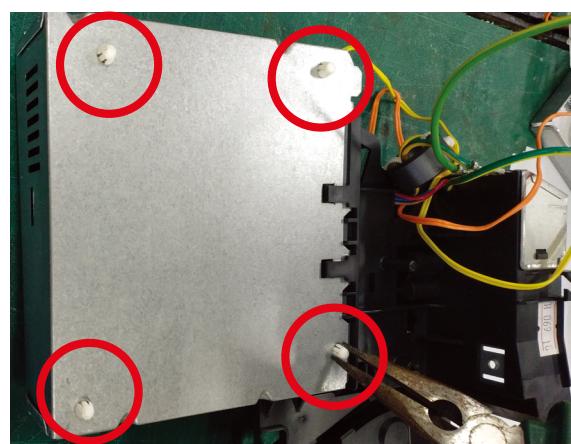
10) Cut the wire fixing band and remove all the connectors.



11) Remove 1 screw, then rotate the Control Unit as below to take it out.



12) Use a pincer to press the 4 spacer into the Control Angle to remove the PWB.



13) Remove a screws of Side Cover R.



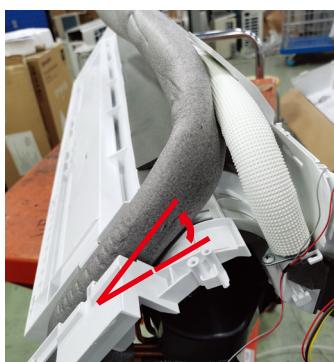
14) Remove 2 screws fixing Side Cover L.



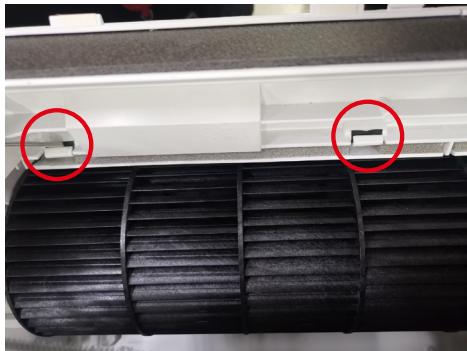
15) Push the Pipe Holder to remove Pipe Holder.



16) Enlarge the angle between Tube Ass'y and Cabinet. Then take the Evaporator out.



17) Release 2 hooks of Stabilizer R, and take Stabilizer R Ass'y out. Release the hook of PCI Cover, take PLASMACLUSTER Unit out. Then remove the connector.



20) Remove 2 screw fixing the Fan Motor Cover, then remove Fan Motor Cover.



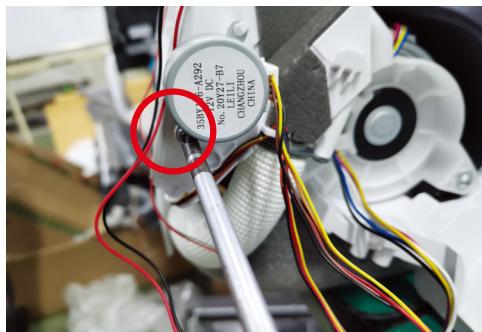
21) Remove 1 screw between Cross Flow Fan and Fan Motor.



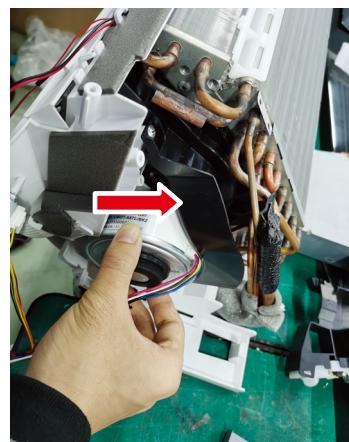
22) Hold and press the Cross Flow Fan to left side as much as possible, meanwhile, take Fan Motor out.



18) Remove the screw of Louver Motor, then take the Motor out.



19) Release Arm Auto/Manual from Louver Link R.



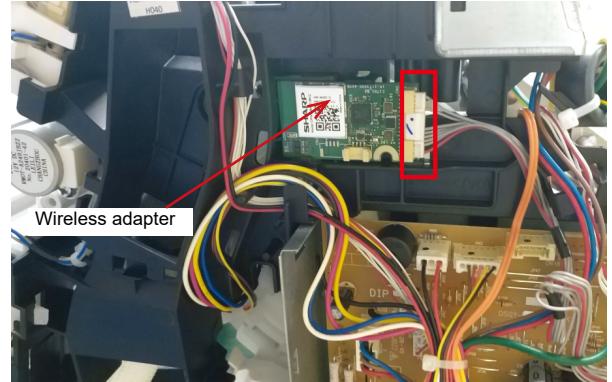
23) Take Corsc Flow Fan out.



REPLACE WIRELESS ADAPTER

Maintenance shall be made by service personnel full of knowledge about wireless LAN.
Please contact SHARP for replacement.

- 1) Remove the Connector of Wireless adapter, and take it off from Control unit.



- 2) Replace the Wireless adapter by S-B01 WLAN PWB UNIT.

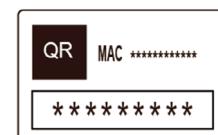
Note: The S-B01 WLAN PWB UNIT contains a wireless adapter and a QR label for service.



- 3) Paste the QR label for service to the bottom of indoor unit to replace the old QR label.



Old QR label
on the bottom of indoor unit



QR label for service

- 4) It's necessary to make the Wireless Lan connecting setting again.

Please finish the initial connection setting after replaced wireless adapter, the procedure is same as when you just bought the Air-conditioner.

[3] INDOOR UNIT

(For AY-XP12ZHU1, AY-XP18ZHU1 models)

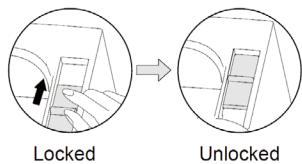
1. INDOOR UNIT

- Push the handles up to remove Air filter .



- Remove Open Panel as below step.

- Unlock Panel Lock (Right and left side).



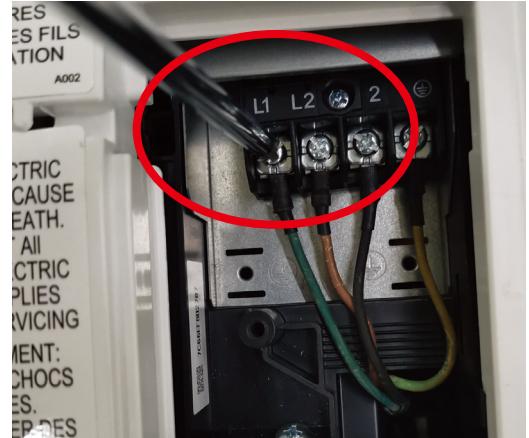
- Lift the Open Panel up, then Slide the Open Panel' Hook along the Guide to remove it (right and left side).



- Remove a screw fixing the Cord Holder, then take the Cord Holder out.



- Loose the screw on Terminal Board and remove the power cord and Unit-to-unit wiring.



5) Remove Horizontal Louver.

- Take the center Bearing out.



- Take the left side Louver Bushing out.



-Take the Horizontal Louver out.



6) Remove 2 screws fixing the Front Panel.



Pull the top side of Front Panel to release the hooks.



Pull this side to release these hooks.



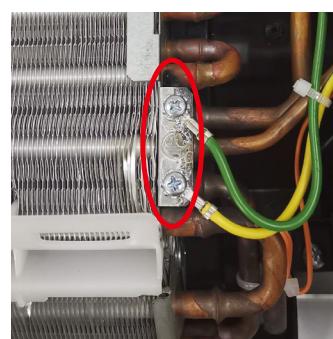
Press below position to unfasten the hooks in side of Front Panel, then take the Front Panel out.



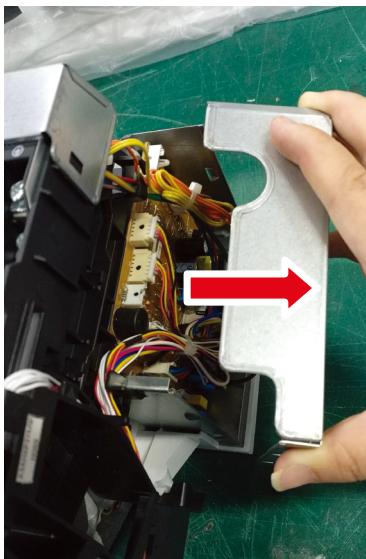
7) Cut the Wire Fixing Band and remove the Thermistor.



8) Remove 2 screw fixing the Ground wire.



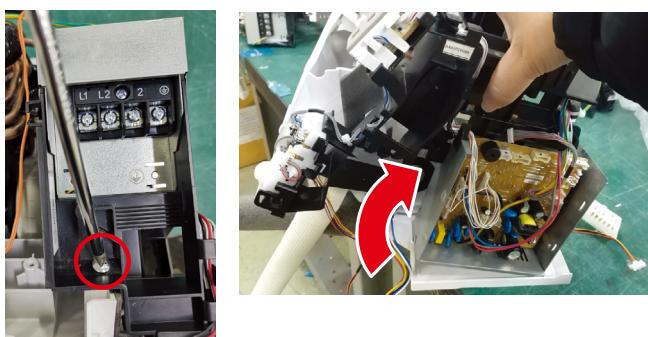
9) Take off the Control Box Cover.



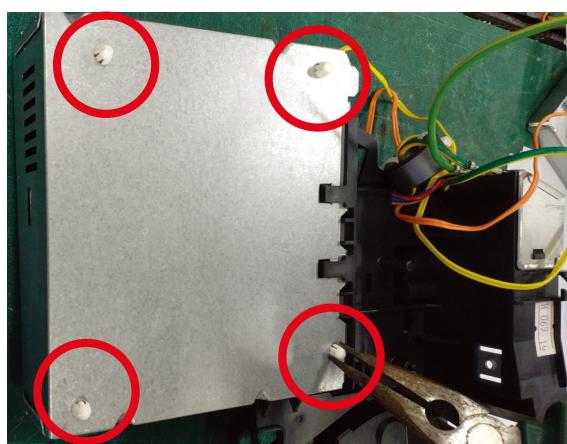
10) Cut the wire fixing band and remove all the connectors.



11) Remove 1 screw, then rotate the Control Unit as below to take it out.



12) Use a pincer to press the 4 spacer into the Control Angle to remove the PWB.



13) Remove PCI UNIT.

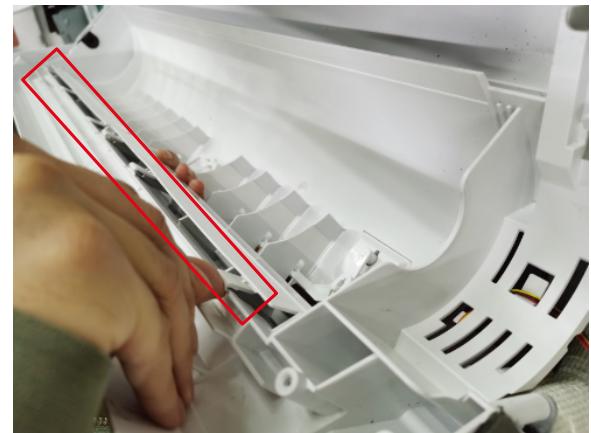
- Press the hook to rotate the PCI LOCK



- Slide the PCI cover to right side, then lift it to take it out



- Release the hook of Stabilizer R&L Ass'Y, rotate Stabilizer R&L Ass'Y out.

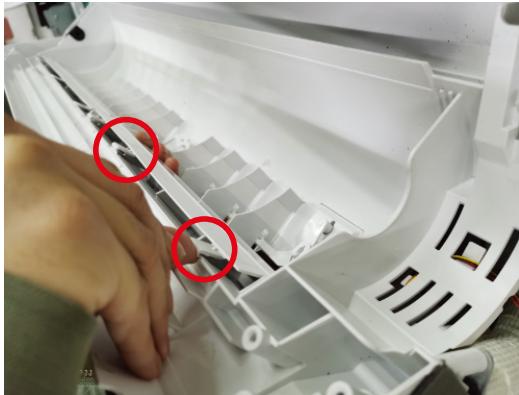


- Loose the screw of the PCI JOINT PWB UNIT B, take the PWB out.

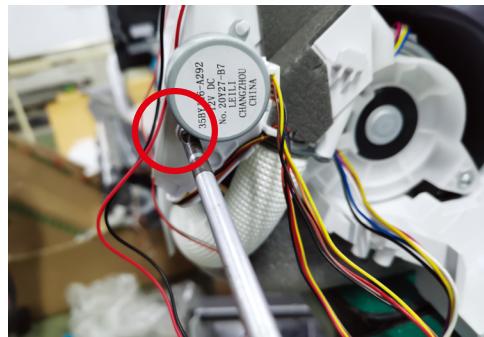


Remove Center LED UNIT.

- Release the hook of Stabilizer R Ass'Y, rotate Stabilizer R Ass'Y out.



14) Remove the screw of Louver Motor, then take the Motor out.



- Release a hook, take out the LED CASE, then take the center LED CASE out.



15) Release Arm Auto/Manual from Louver Link R.



16) Remove the screw of Bracket, and take Bracket out.



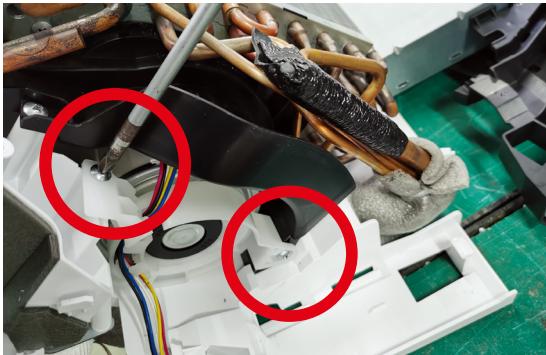
17) Remove the 2 screws of Louver Motor V to take the motor out.



- Unfold the LIGHT GUIDE COVER, take out the LIGHT GUIDE.



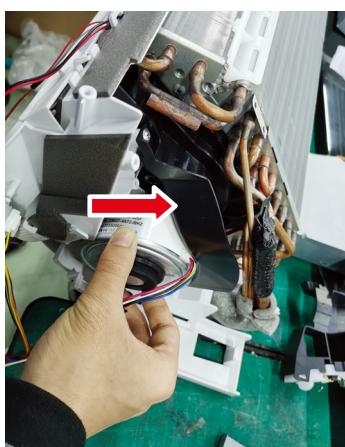
18) Remove 2 screw fixing the Fan Motor Cover, then remove Fan Motor Cover.



19) Remove 1 screw between Cross Flow Fan and Fan Motor.



20) Hold and press the Cross Flow Fan to left side as much as possible, meanwhile, take Fan Motor out.



21) Remove a screws of Side Cover R.



22) Remove 2 screws fixing Side Cover L.



23) Push the Pipe Holder to remove Pipe Holder.



24) Enlarge the angle between Tube Ass'y and Cabinet. Then take the Evaporator out.



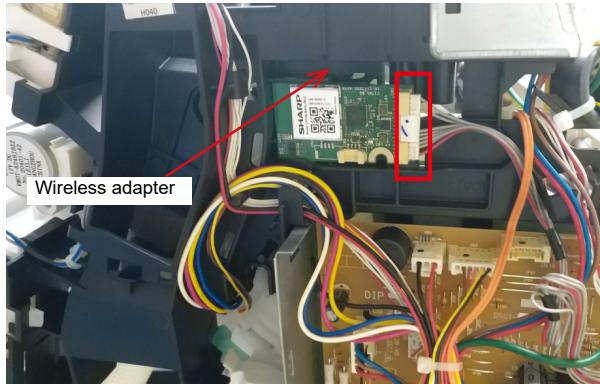
25) Take Cross Flow Fan out.



REPLACE WIRELESS ADAPTER

Maintenance shall be made by service personnel full of knowledge about wireless LAN.
Please contact SHARP for replacement.

- 1) Remove the Connector of Wireless adapter, and take it off from Control unit.



- 2) Replace the Wireless adapter by S-B01 WLAN PWB UNIT.

Note: The S-B01 WLAN PWB UNIT contains a wireless adapter and a QR label for service.



- 3) Paste the QR label for service to the bottom of indoor unit to replace the old QR label.



Old QR label
on the bottom of indoor unit



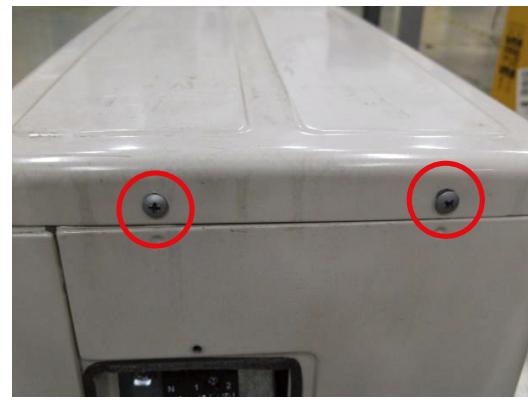
QR label for service

- 4) It's necessary to make the Wireless Lan connecting setting again.

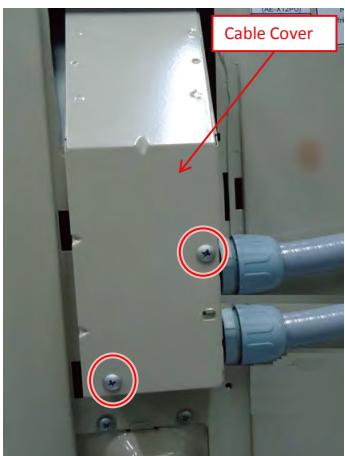
Please finish the initial connection setting after replaced wireless adapter, the procedure is same as when you just bought the Air-conditioner.

[4] OUTDOOR UNIT (12K/15K Btu/h models)

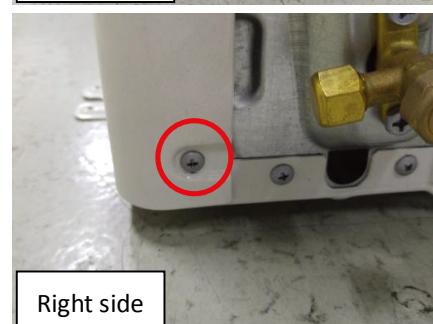
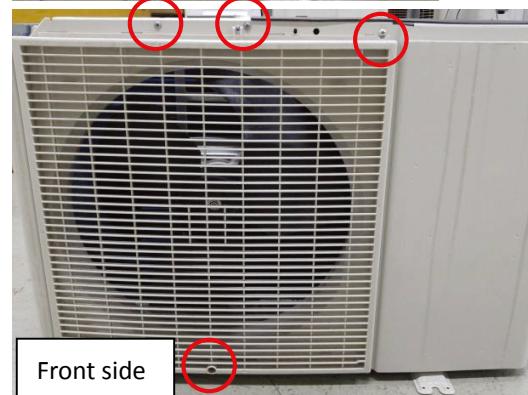
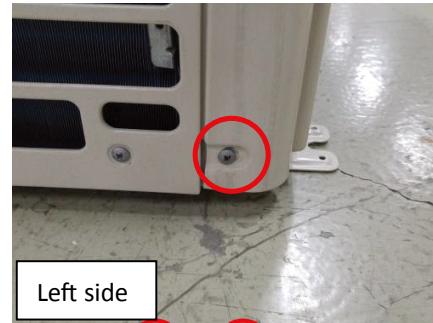
1) Remove the screw fixing the Cover, then take the cover out.



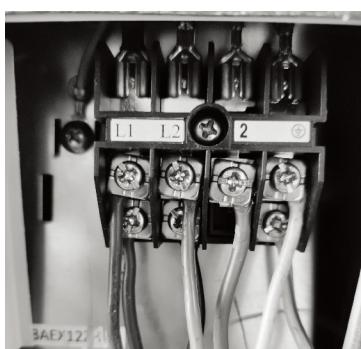
2) Remove the screw fixing Terminal Cover and Cord Clamp, then take them out.



5) Remove six screws fixing the Front Panel, move it out.

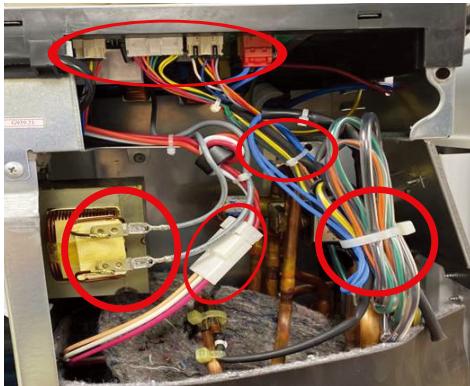


3) Loose the screws, remove the connecting cable from Terminal Board.

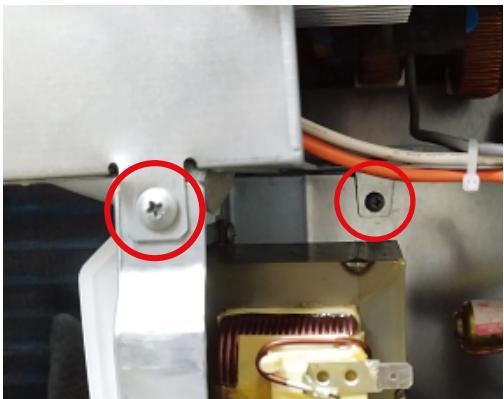


4) Remove five screws, lift the Top Panel to take it out.

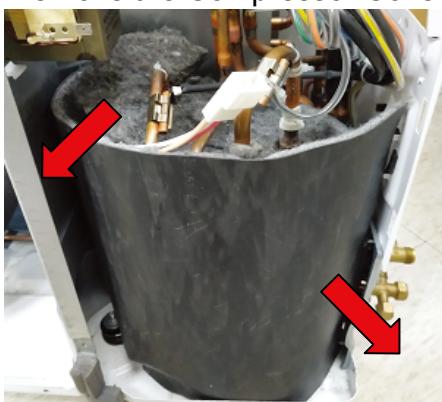
6) Cut the Wire Fixing Band. Remove two terminals from the Reactor and all connectors on the Control Board Unit, and remove compressor connector.



7) Remove four screws fixing the Control Box, then take it out.



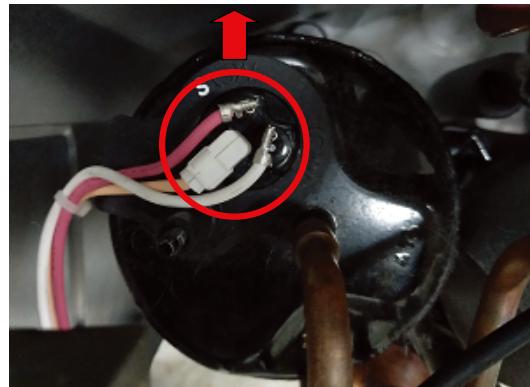
8) Remove the Compressor Cover(2pcs).



9) Unscrew the nut, move the Terminal Cover.



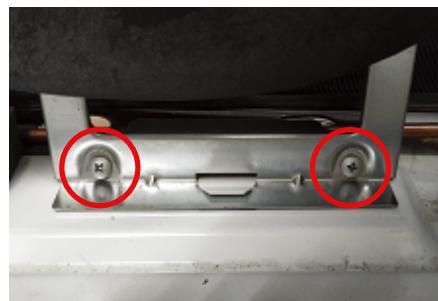
10) Disconnect three terminals on the Compressor.



11) Remove two screws fixing the Bulkhead, and remove the Bulkhead.



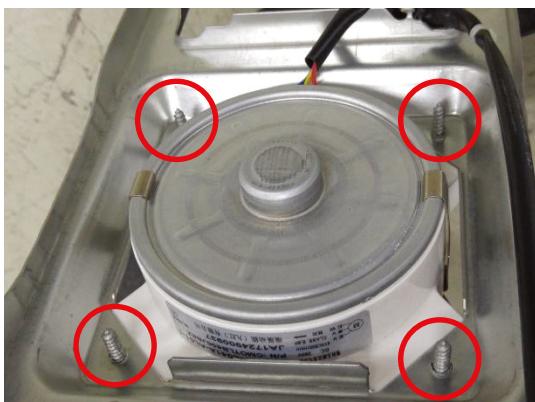
12) Remove the screw fixing Motor Angle, then take it out.



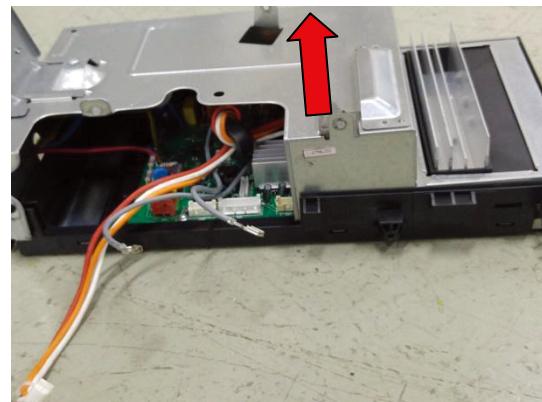
13) Unscrew the nut, take out the Propeller Fan carefully.



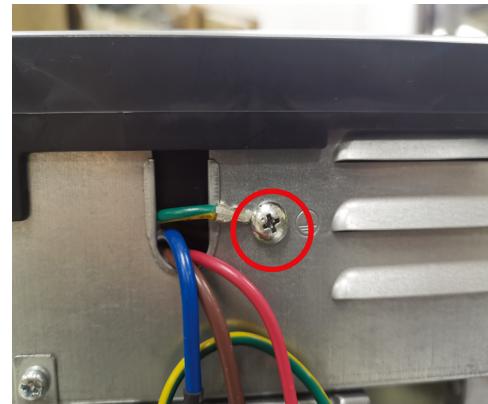
14) Remove all screws, take out the Motor.



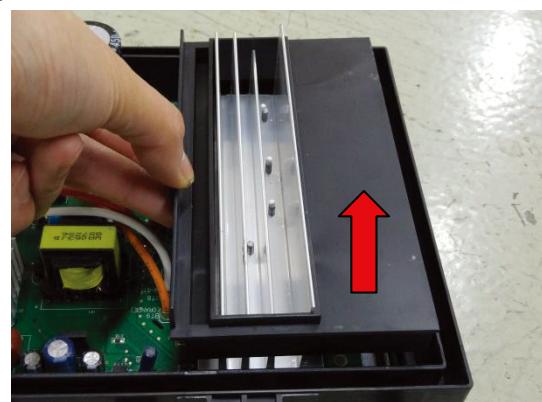
3) Lift up to remove the metal cover.



4) Remove the screw fixing the earth wire.



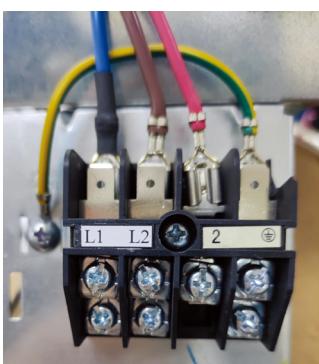
5) Move out the Heat Sink Holder.



6) Unscrew all four screws to remove the Control Board Unit.



2) Remove the screw, then remove the Terminal Board.



Note: Before changing control board, the workmen should wear anti-electrostatic gloves.

[5] OUTDOOR UNIT (18K/24K Btu/h models)

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.

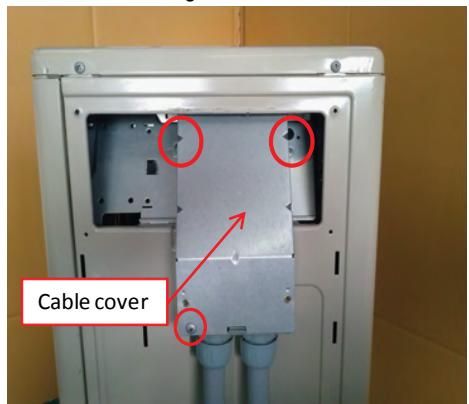
After the air conditioner is repaired or parts are replaced, measure insulation resistance of the equipment using an insulation resistance meter. If the measured resistance is lower than $1\text{ M}\Omega$, inspect parts and repair or replace defective parts.

1. MAIN UNIT

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



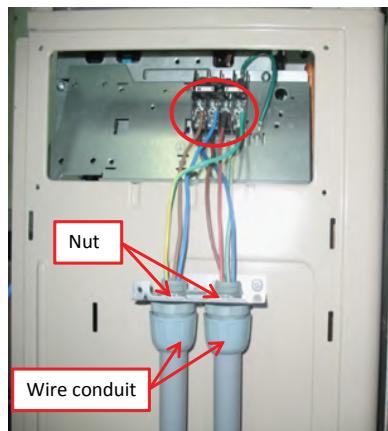
3) Unscrew 3 screws fixing the cable holder and remove it.



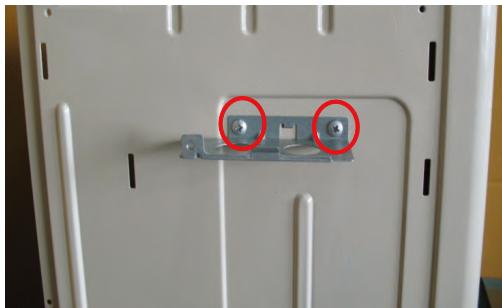
2) Unscrew the 2 screws fixing the valve cover and remove it.



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



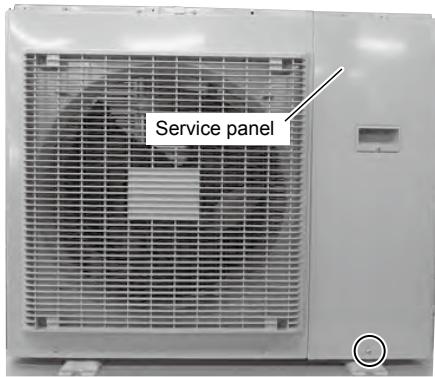
5) Unscrew the 2 screws fixing the cable holder and remove it.



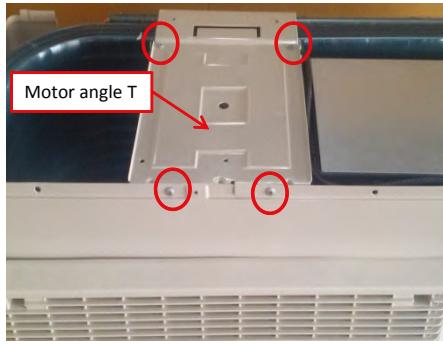
6) Unscrew the 6 screws fixing the top plate and remove it.



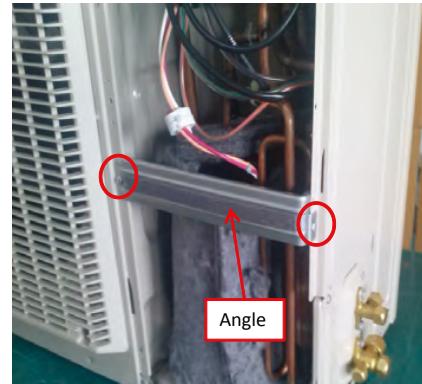
7) Unscrew the screw fixing the service panel, then slide the panel downward and remove it.



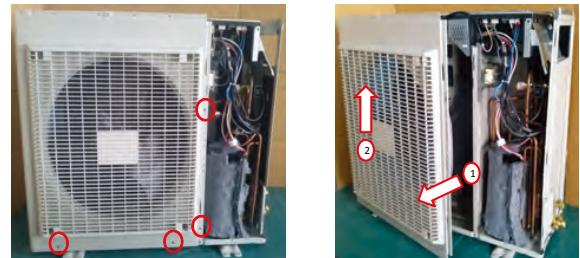
8) Unscrew the 4 screws fixing the motor angle T and remove it.



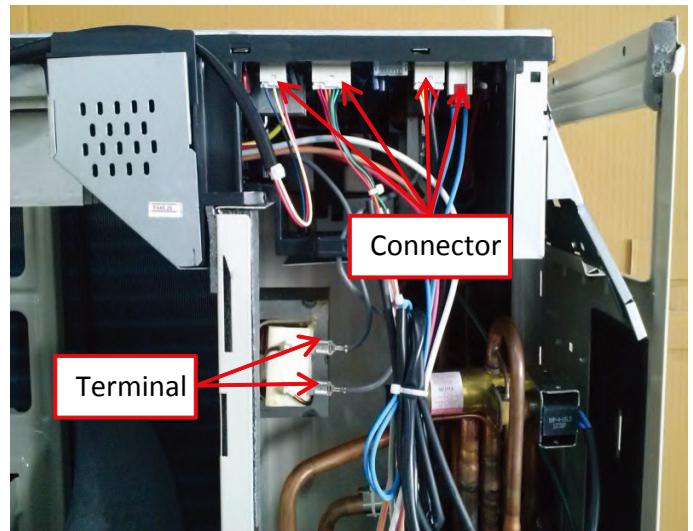
9) Unscrew the 2 screws fixing the angle and remove it.



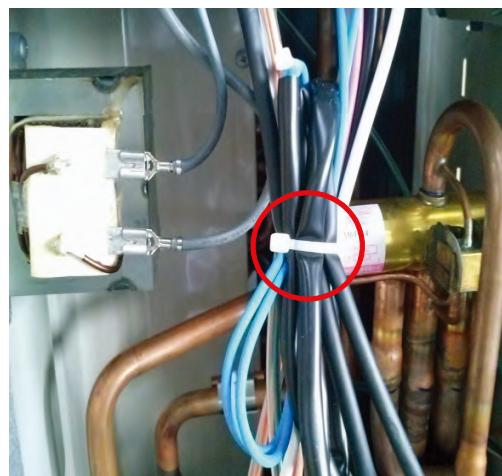
10) Unscrew the 4 screws fixing the front panel and remove it.



11) Disconnect the 4 connectors and the 2 terminals.

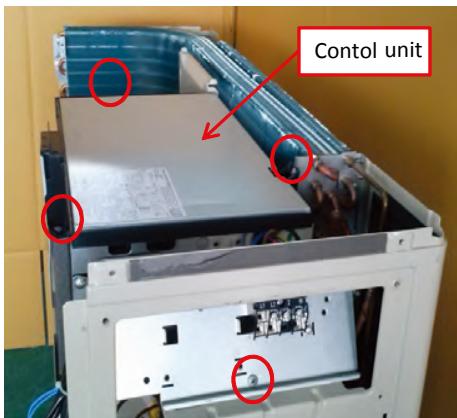


12) Cut the fixing band.



13).Cut 1pcs Fixing Band.

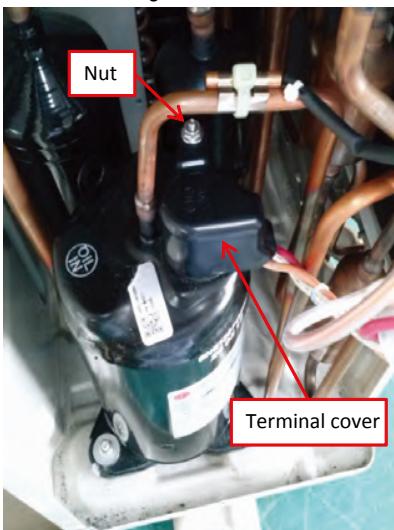
Unscrew the 3 screws fixing control unit and remove it.



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.



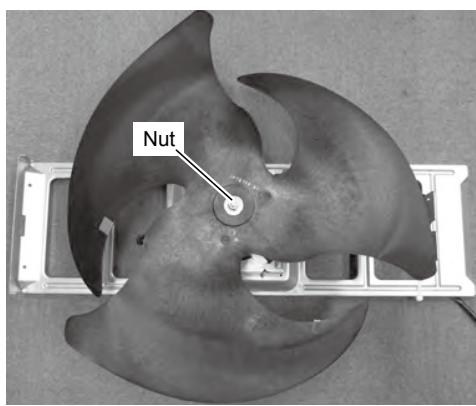
17)Unscrew the 2 screws fixing the bu khead and remove it.



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



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



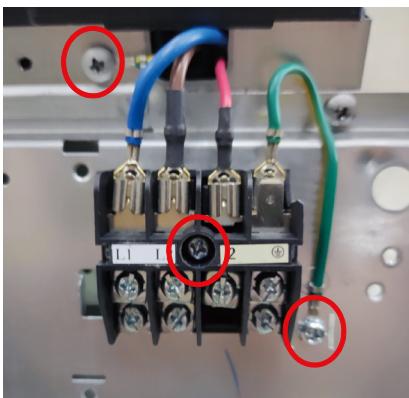
20)Unscrew the 4 screws fixing the motor and cut the fixing band, and then remove the motor.



DISASSEMBLY OF CONTROL UNIT

1. Control unit box's Approach to decomposition

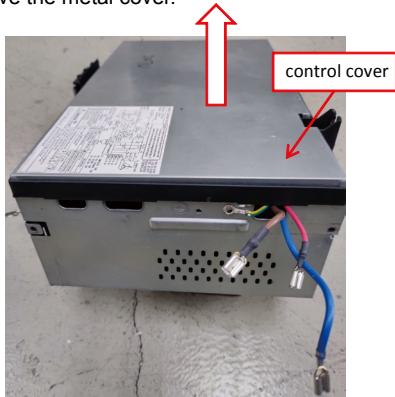
1) Unscrew the 3 screws and remove the terminal board.



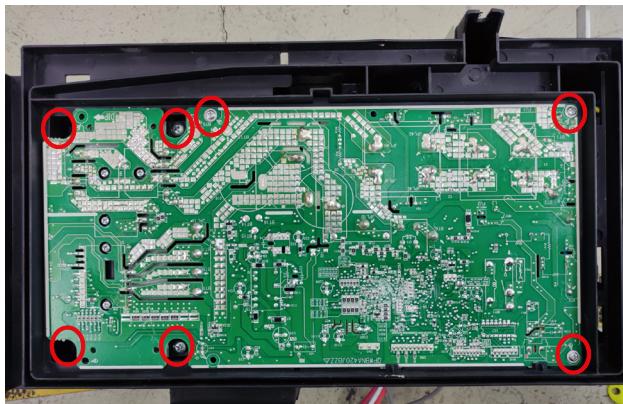
2) Unscrew the 2 screws fixing the terminal angle and remove it.



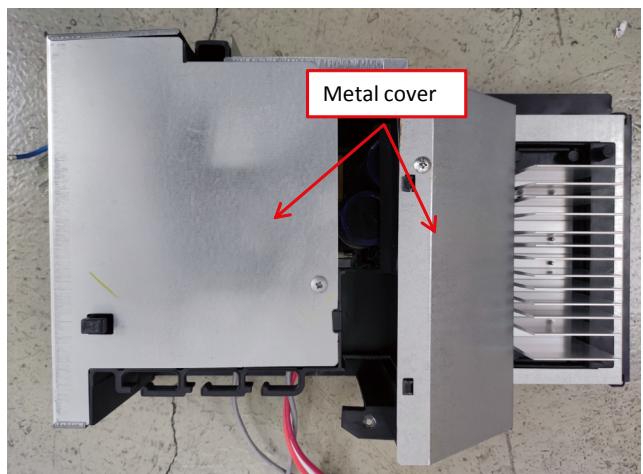
3) Remove the metal cover.



4) Unscrew the 7 screws fixing the control board unit and remove it



5) Remove 2 screws and the 3 metal covers.



Failure diagnosis flowchart

Table of contents

Error code	Contents
1	Short circuit of ODU thermistor
2	Overheat error (Compressor or cycle)
5	Open circuit of ODU thermistor
6	DC current error
7	AC current error
9	Cycle error
10	EEPROM mutual memory Error
11	ODU fan motor error
13	Compressor rotation error
14	AC voltage error
17	Serial open circuit error
18	Serial short circuit error
19	Indoor unit fan error
20-4	EEPROM mutual memory Error
25-1	AC clock error
26-1	Indoor room temperature thermistor error
26-2	Indoor pipe temperature thermistor error
	Appendix

Error Code

1

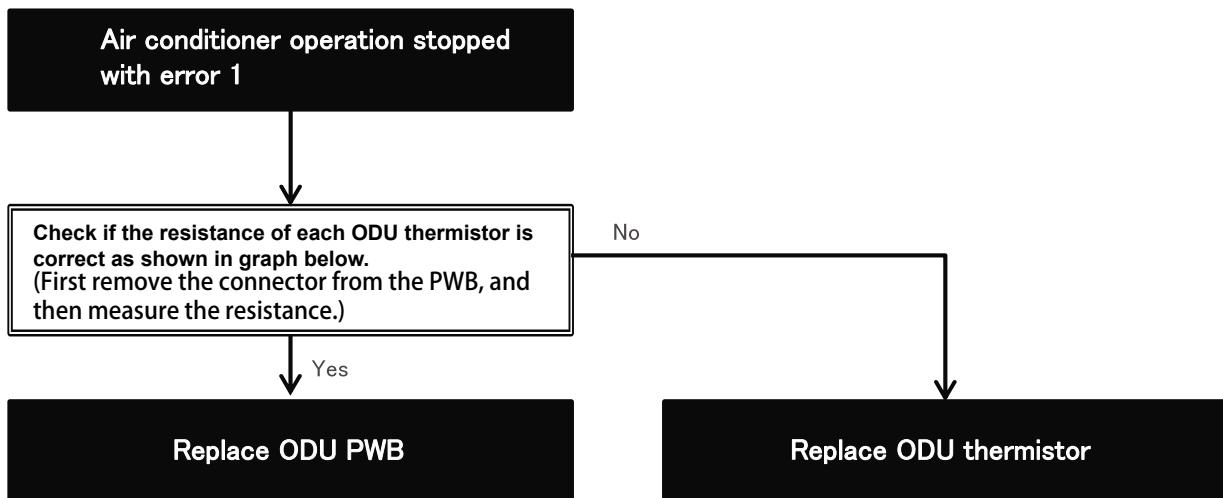
Short circuit of ODU thermistor

1-0 Heat exchanger thermistor short-circuit(Orange)
 1-1 Outside air temperature thermistor short-circuit(Green)
 1-2 Suction thermistor short-circuit(Black)
 1-3 2-way valve thermistor short-circuit(Yellow)
 1-4 Heat sink thermistor short-circuit

★Check the thermistor short-circuit.

◇ Main cause

- The lead wire sheath of the ODU thermistor has been damaged due to edge or long-time friction by vibration, and the wire touches the pipe, etc.



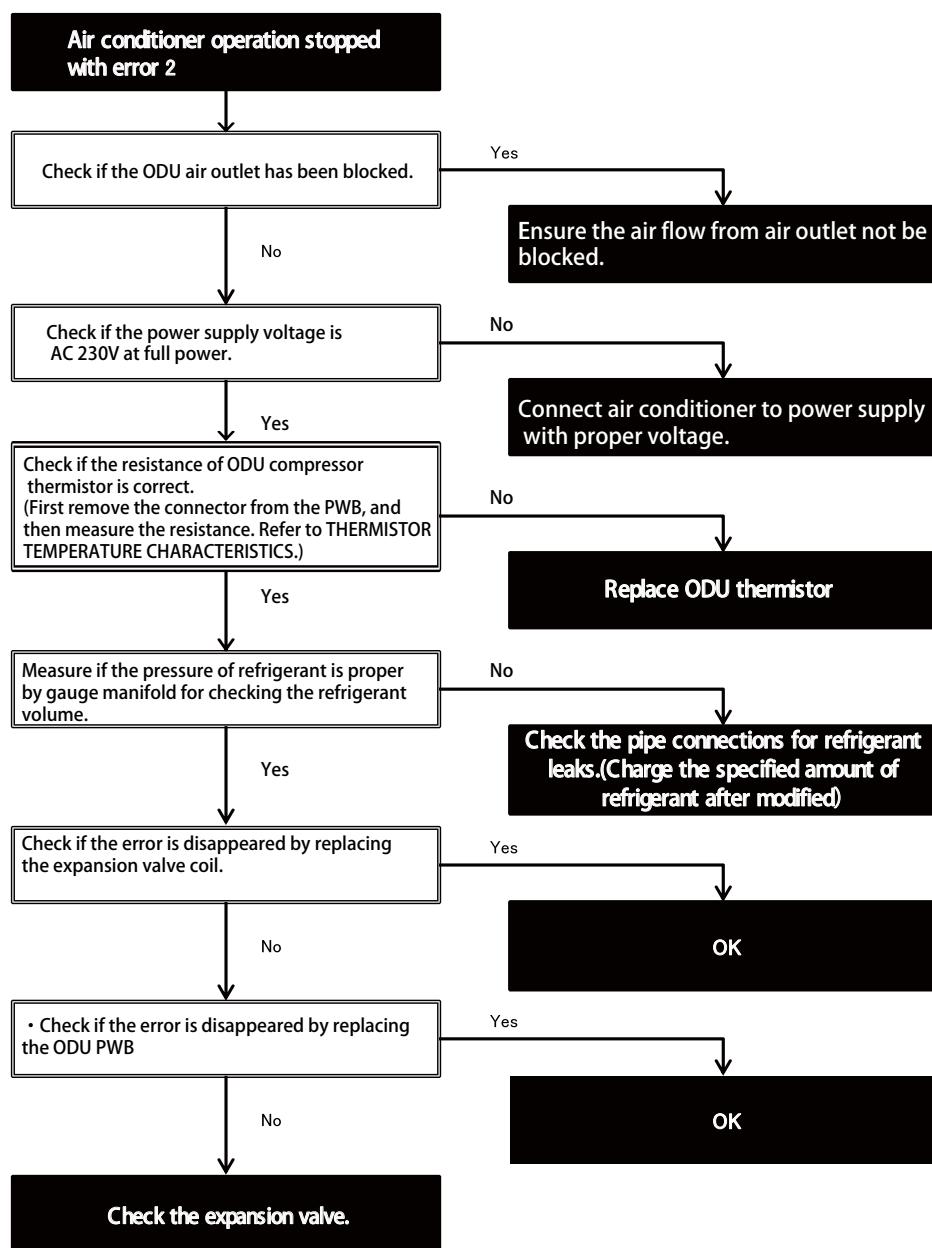
Please see Appendix ① (ODU thermister R-T)

Error Code 2	Overheat error (Compressor or cycle)	2-0 Compressor high temperature error 2-1 Compressor discharge overheating 2-2 Outdoor unit pipe overheating 2-3 Indoor unit pipe overheating 2-5 IPM high temperature error
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★Check the failure of compressor

◇ Main cause

- Temperature of compressor or cycle parts becomes too high.



Please see Appendix ② (expansion valve check)

Error Code

5

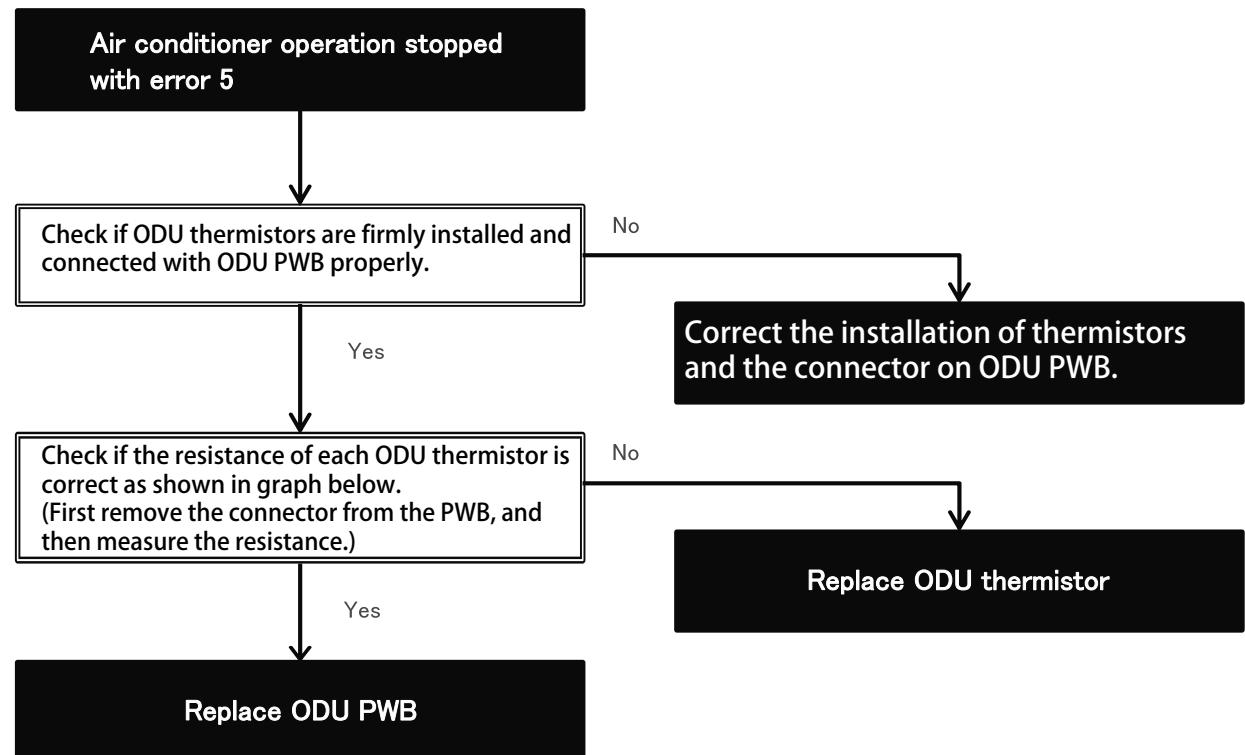
Open circuit of ODU thermistor

5-0 Heat exchanger thermistor open-circuit(Orange)
5-1 Outside air temperature thermistor open-circuit(Green)
5-2 Suction thermistor open-circuit(Black)
5-3 2-way valve thermistor open-circuit(Yellow)
5-4 Compressor thermistor open-circuit(Red)
5-5 Heat sink thermistor open-circuit

☆Check the thermistor open-circuit.

◇ Main cause

- The lead wire of ODU thermistor has broken due to the edge or vibration.
- The attachment of connector has broken by inside tension due to unsuitable wiring process.



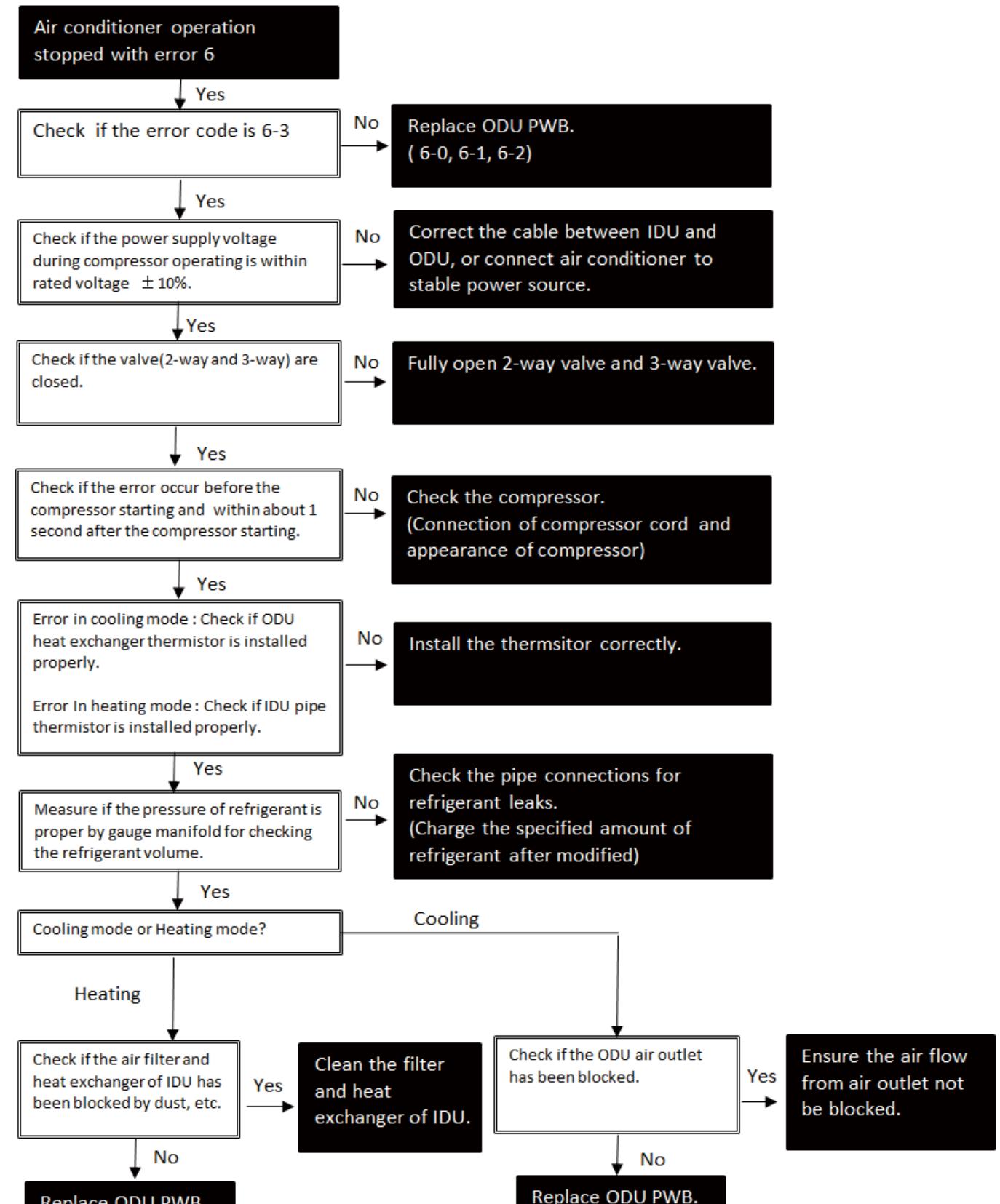
Please see Appendix ① (ODU thermister R-T)

Error Code

6**DC current error**

6-0 DC current error
 6-1 DC current error 1
 6-2 DC current error 2
 6-3 DC current error 3

★Check the cause due to compressor or PWB.



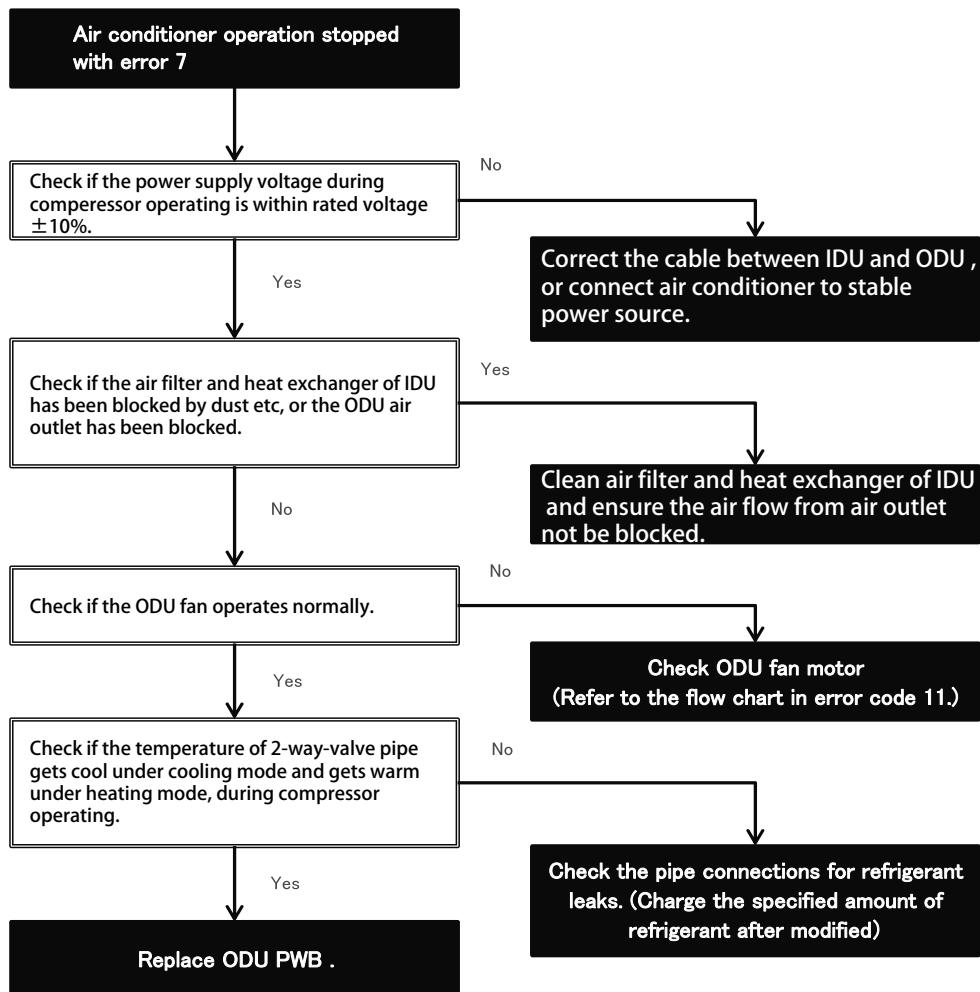
Error Code

7

AC current error

- 7-0 AC over current error
- 7-1 AC current error when compressor OFF
- 7-2 AC maximum current error
- 7-3 AC current deficiency error

★Check the cause due to PWB or another parts.



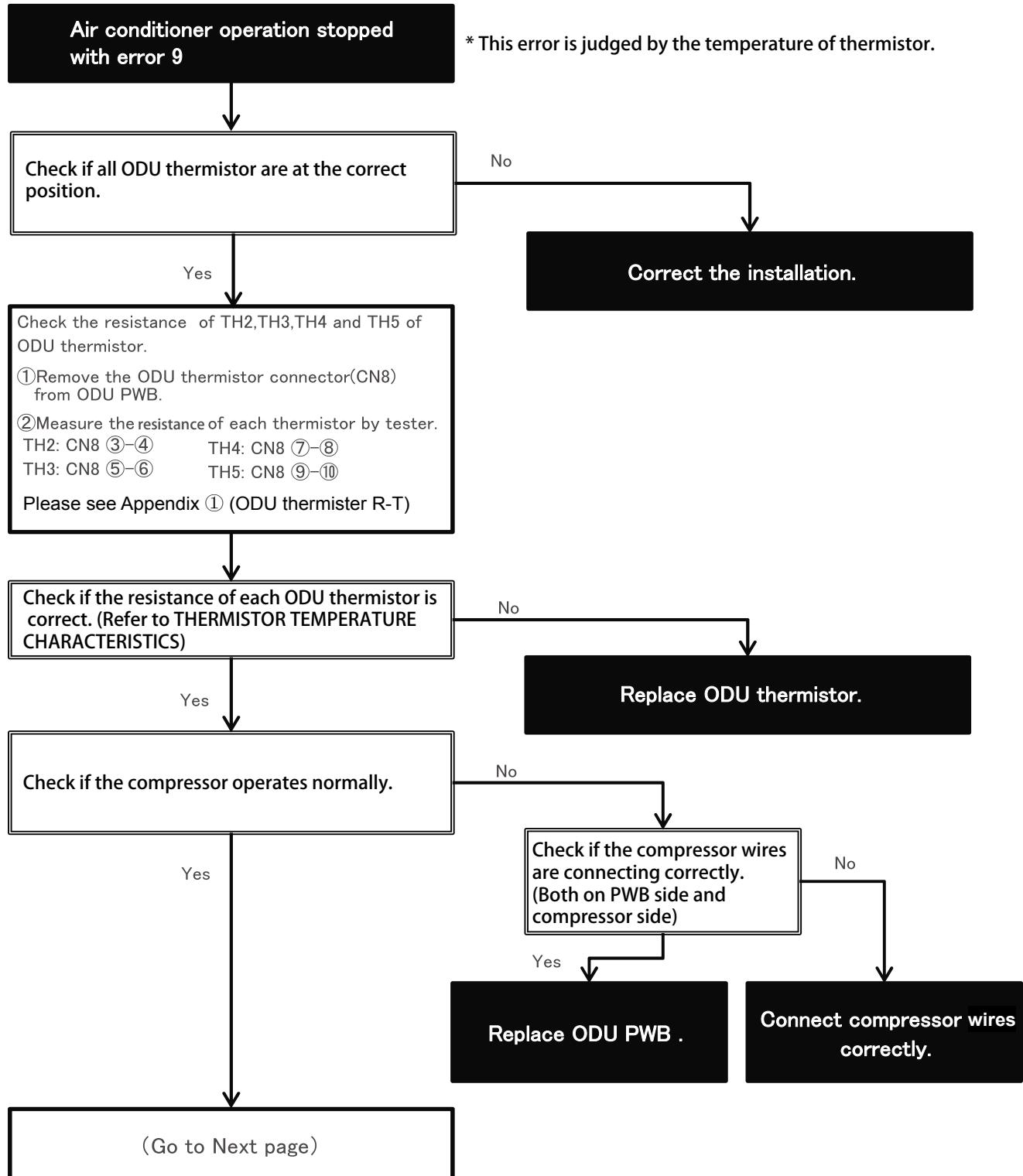
Error Code

9

Cycle error (1/3)

9-0 cycle temperature error
9-4 gas leak error

★Check the cause due to PWB or another parts.



Error Code

9**Cycle error (2/3)**

9-0 cycle temperature error
9-4 gas leak error

★Check the cause due to PWB or another parts.

(From previous page.)



Check if the temperature of ODU heat exchanger pipe and 2-way valve changes properly.
(Refer to below method.)



In cooling mode: Whether the ODU heat exchanger pipe has higher temperature and the 2-way valve pipe has lower one.

In heating mode: Whether the ODU heat exchanger pipe has lower temperature and the 2-way valve pipe has higher one.

Yes



Check if IDU pipe temperature thermistor is installed properly.

No



Install the IDU pipe temperature thermistor correctly.

No

Yes

Check if the resistance of IDU pipe thermistor satisfy the R-T characteristics.
(Refer to THERMISTOR TEMPERATURE CHARACTERISTICS)

- ①remove the IDU thermistor connector (CN*) from IDU PWB.
- ②Measure the resistance of the thermistor by tester.

Please see Appendix ④ (IDU thermister)

Yes

Replace ODU PWB.

Replace IDU pipe thermistor

No

Check if the unit becomes operating normally.

Yes

OK

Replace IDU PWB.

(Go to next page.)

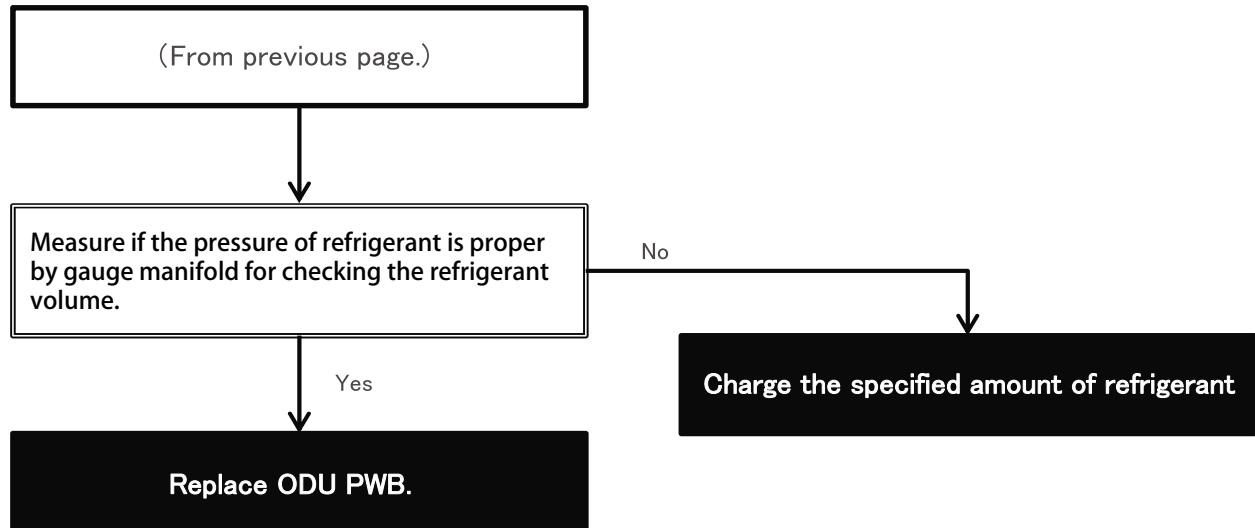
Error Code

9

Cycle error(3/3)

9-0 cycle temperature error
9-4 gas leak error

★Check the cause due to PWB or another parts.



Error Code

10**EEPROM mutual memory Error**

- ★ Identify whether the cause is outdoor unit data error or indoor unit data error.

Air conditioner operation stopped with error 10

Rewrite the outdoor EEPROM data.

Does the error improve?

Rewrite the indoor EEPROM data.

Yes

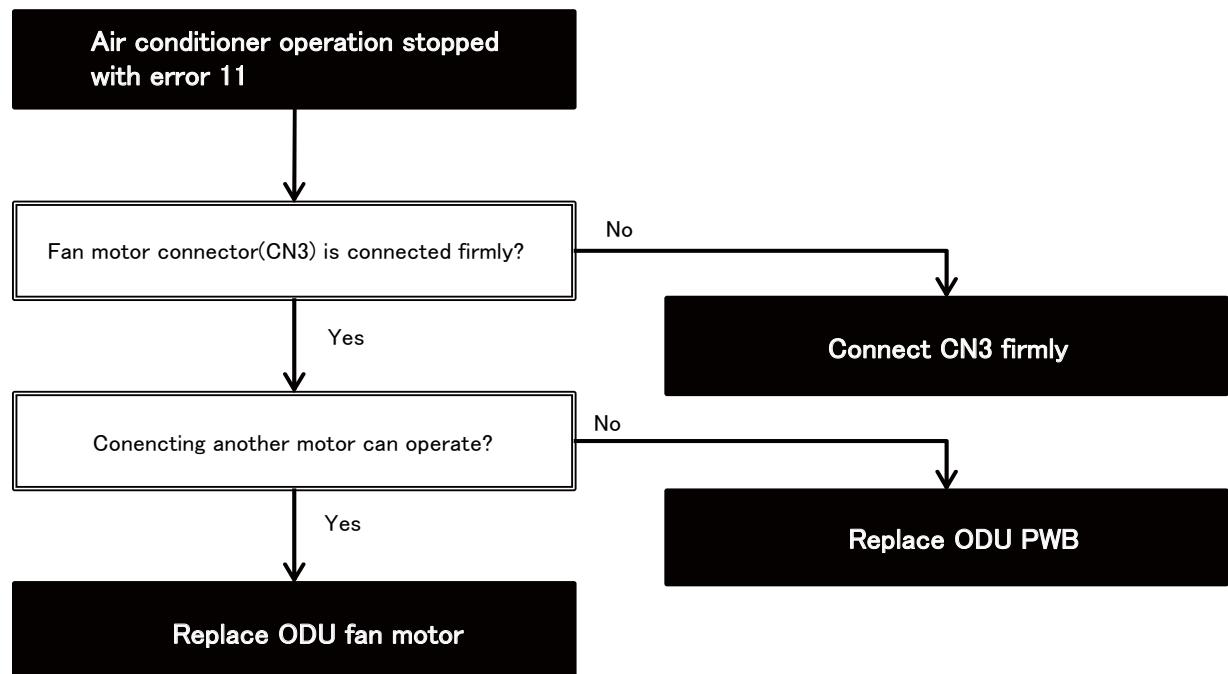
No

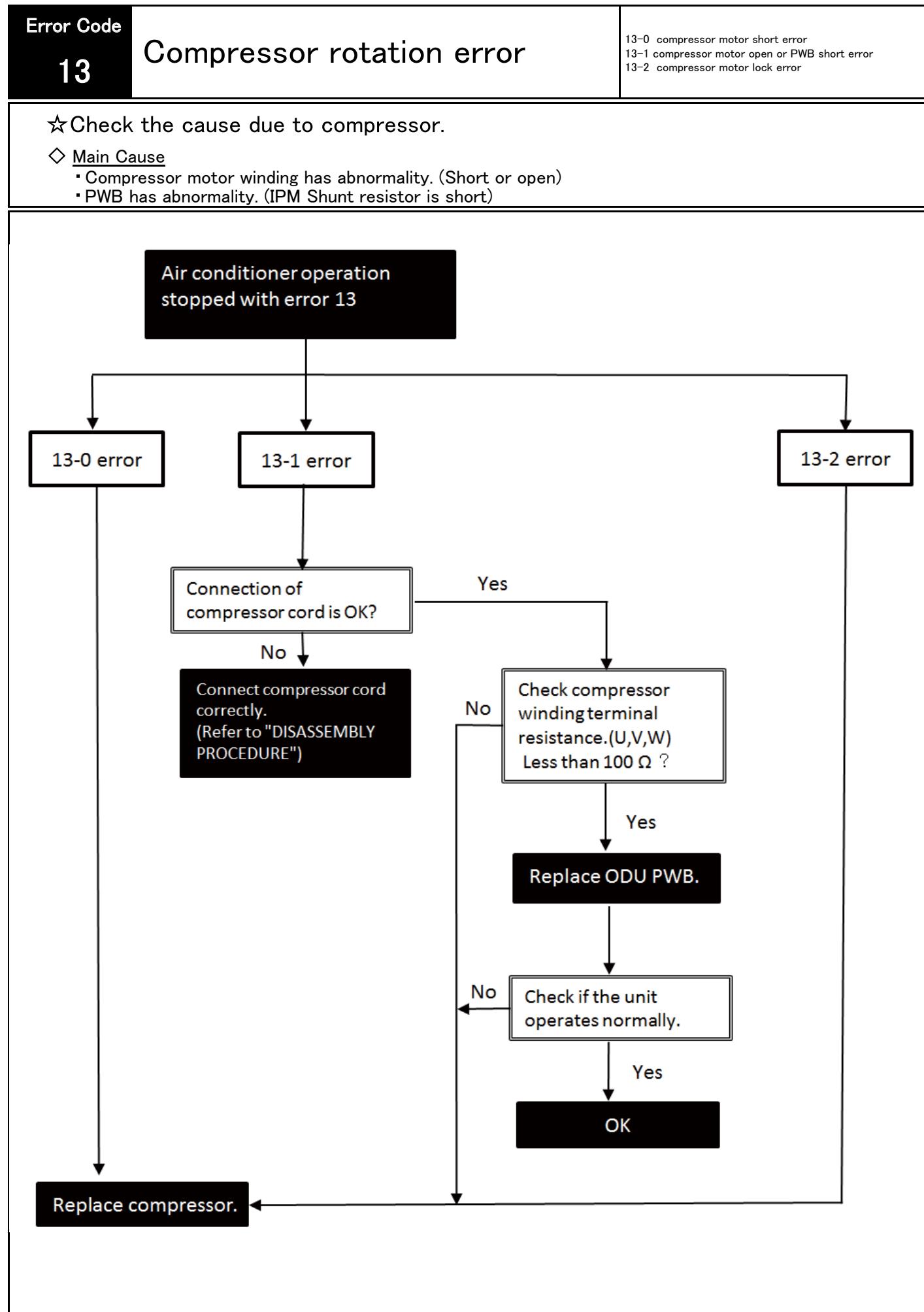
Complete

Since this failure is an abnormality of the EEPROM data and not a failure of the board, the failure can be improved by rewriting the EEPROM data.

Error Code 11	ODU fan motor error	11-1 DC fan driver IC error 11-2 DC fan lock error 11-3 Detection error of negative rotation before compressor start 11-4 Detection error of inverter current 11-5 open connector error
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★Check the cause due to PWB or DC fan motor.





Error Code

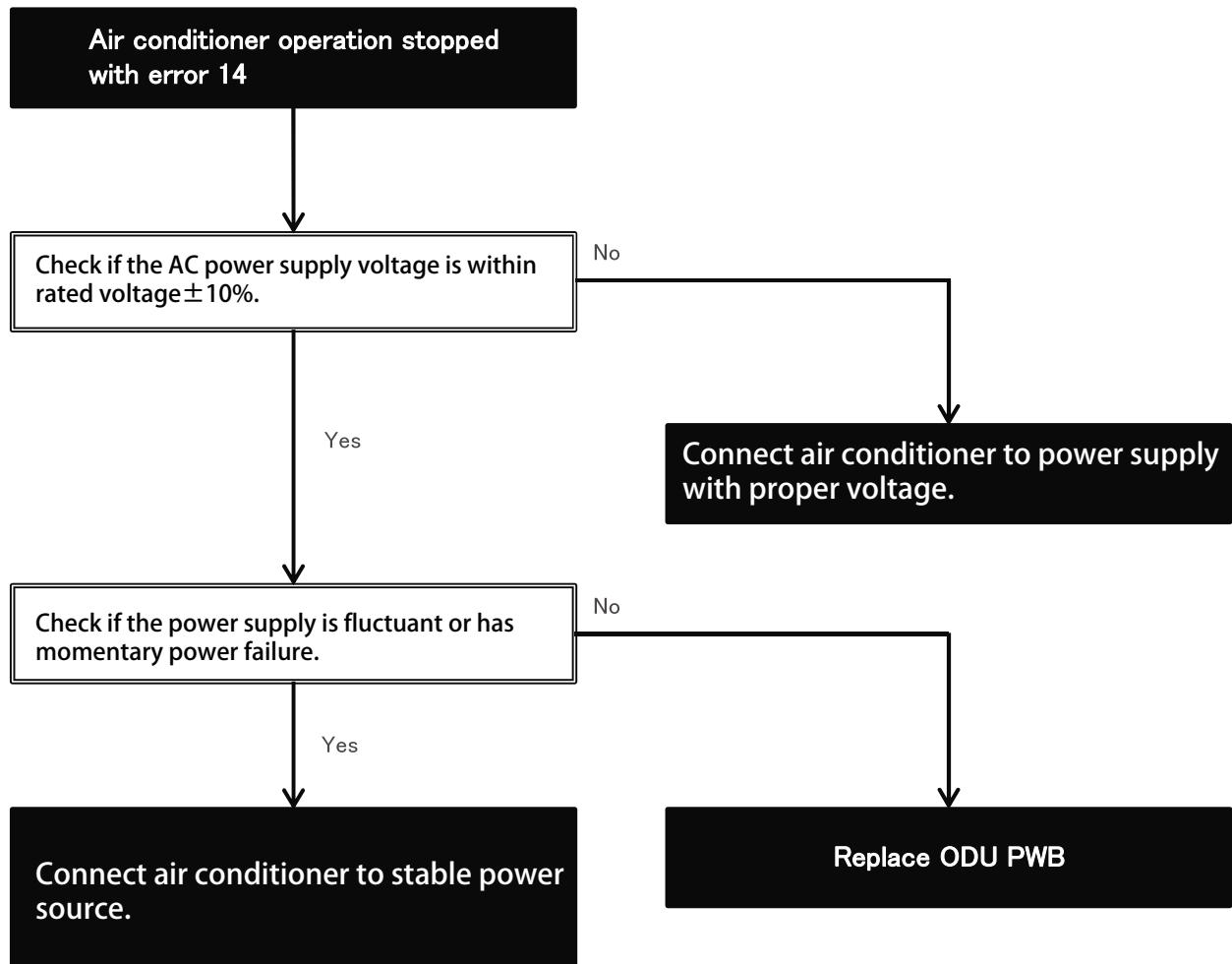
14**AC voltage error**

14-0 over voltage error
 14-1 clock error
 14-2 Abnormal AC power supply voltage or DC low voltage error

★ Check AC power supply.

◇ Main cause

- AC power supply voltage is abnormal. (Not within rated voltage $\pm 10\%$)
- Big fluctuation of AC power supply voltage
- Instantaneous voltage drop



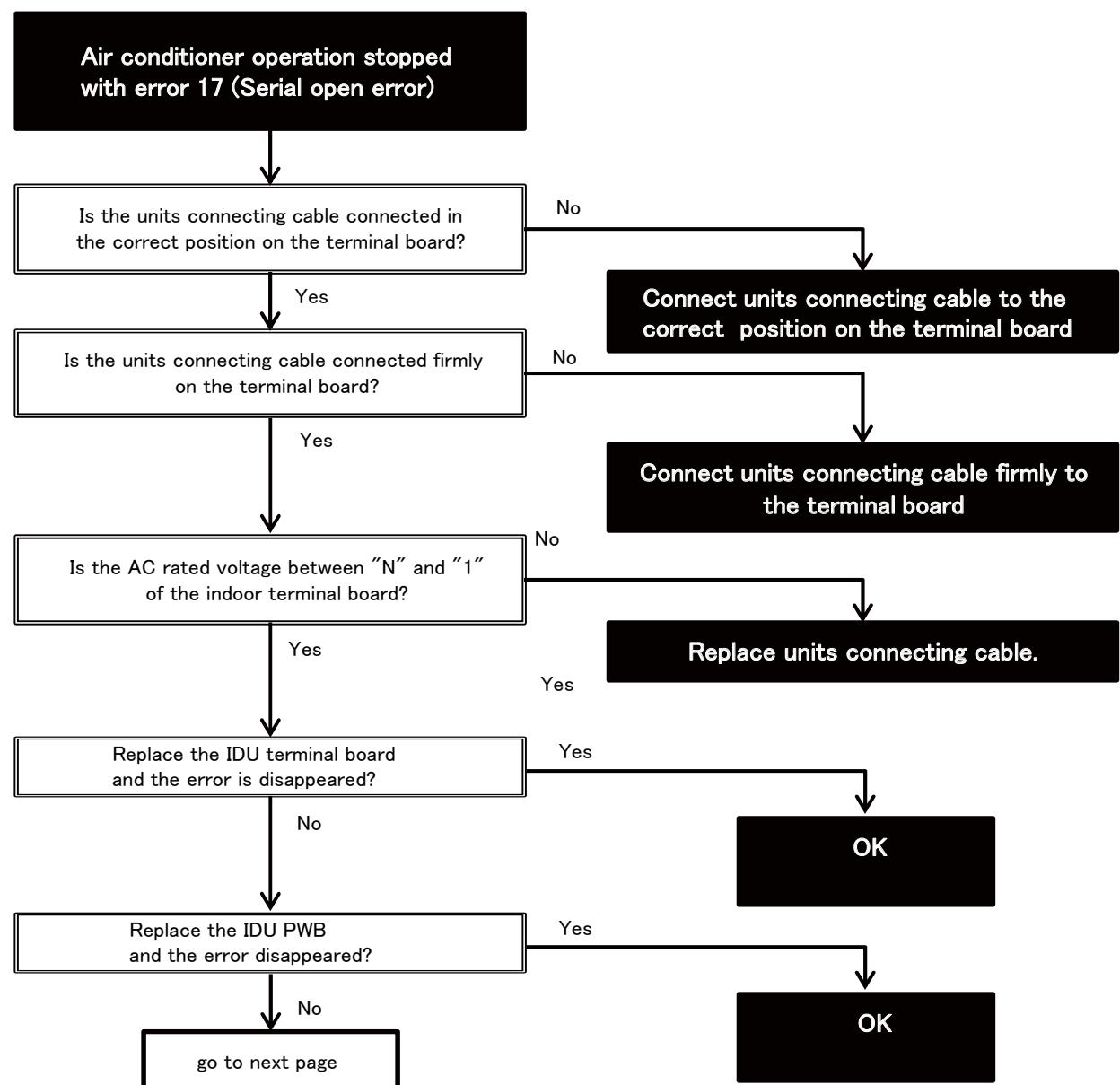
Error Code

17**Serial open error (1/2)**

17-0 Serial open error

★ Determine why serial communication is not possible.

- Defective PWB of IDU (Serial circuit failure, power supply circuit operation failure, etc.)
- Defective PWB of ODU (Serial circuit failure, power supply circuit operation failure, etc.)
- Poor connection of the wiring between the units connecting the IDU and the ODU
- Defective terminal board of IDU / ODU.
- Poor connection of electrical components mounted other than the PWB (outdoor unit reactor, etc.)



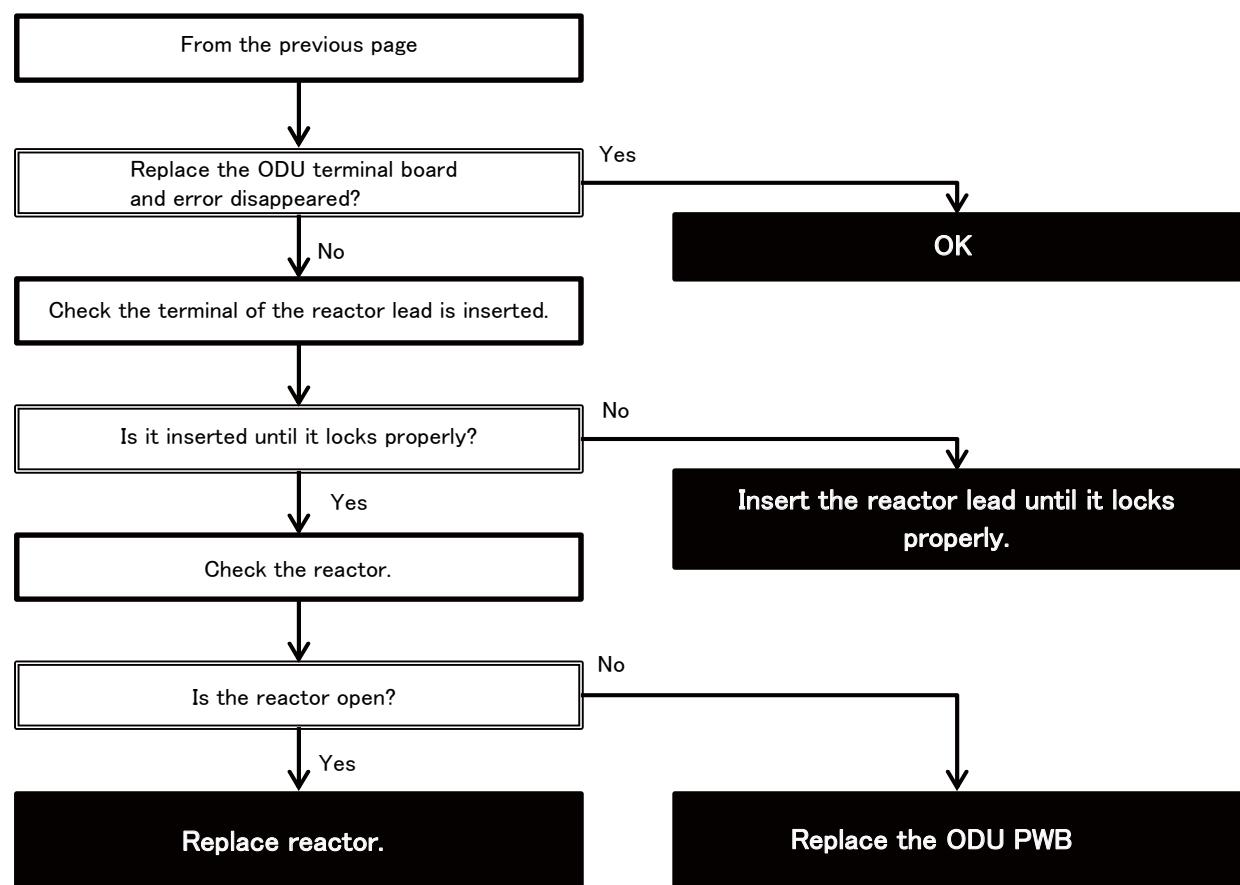
Error Code

17**Serial open error(2/2)**

17-0 Serial open error

★Determine why serial communication is not possible.

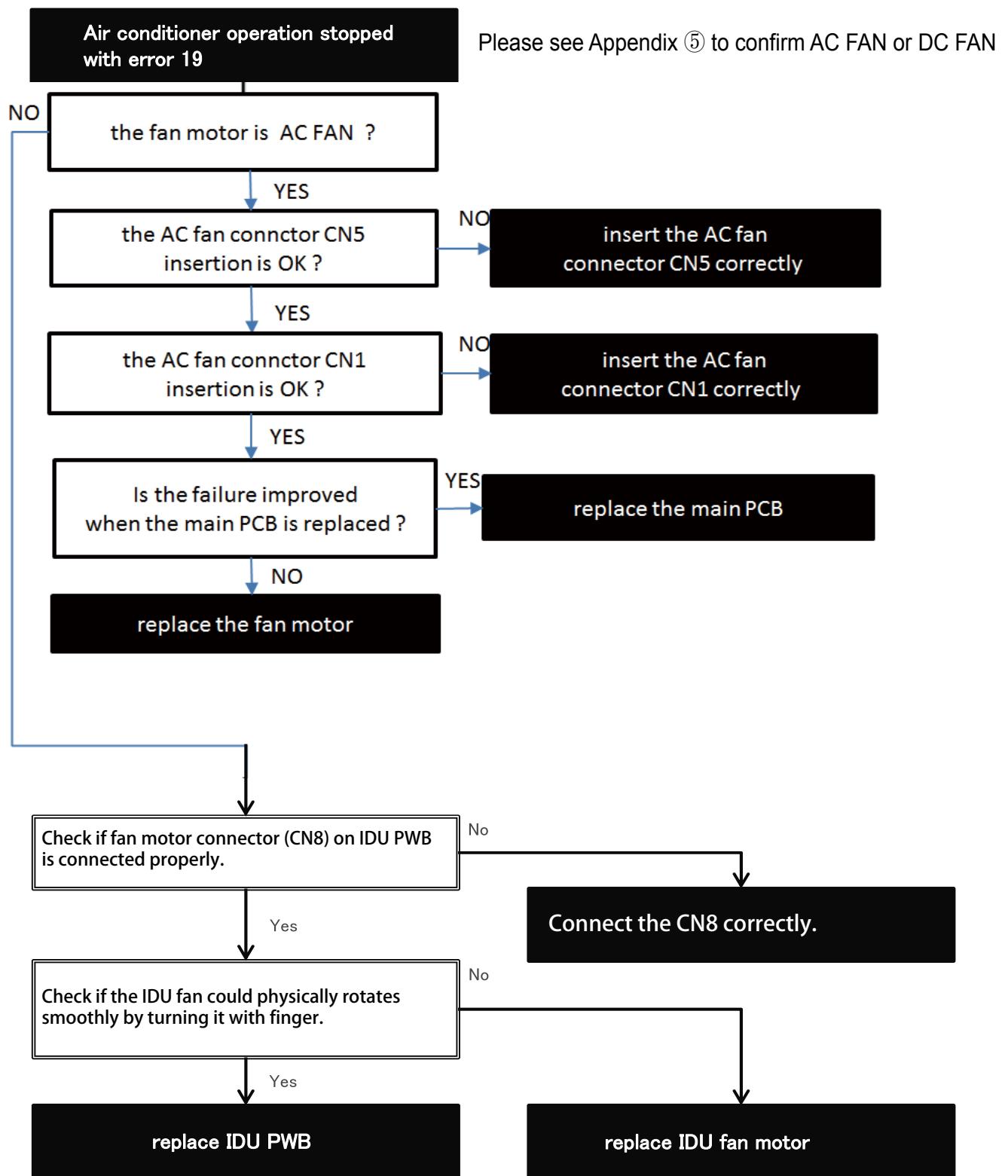
- Defective PWB of IDU (Serial circuit failure, power supply circuit operation failure, etc.)
- Defective PWB of ODU (Serial circuit failure, power supply circuit operation failure, etc.)
- Poor connection of the wiring between the units connecting the IDU and the ODU
- Defective terminal board of IDU / ODU.
- Poor connection of electrical components mounted other than the PWB (outdoor unit reactor, etc.)



Error Code	Serial short error	
18		18-0 Serial short 18-1 Incorrect wiring
★Determine if the units connecting cable is incorrectly inserted or the control board is defective.		
◇ <u>Main causes of serial shorts</u> <ul style="list-style-type: none"> ▪ Incorrect insertion of units connecting cable ▪ Indoor unit serial circuit failure ▪ Outdoor unit serial circuit failure 		
<pre> graph TD A["Air conditioner operation stopped with error 18"] --> B["Units connecting cable is correctly inserted into terminal board."] B -- No --> C["Insert the units connecting cable correctly."] B -- Yes --> D["Replace the IDU PWB and Serial short error continues?"] D -- No --> E["replace IDU PWB"] D -- Yes --> F["replace ODU PWB"] </pre>		

Error Code	Indoor fan error	19-0 Indoor fan error
19		

★Determine whether the cause is the indoor fan motor or the IDU PWB.



Error Code

20-4**EEPROM mutual memory Error**

- ★ Identify whether the cause is outdoor unit data error or indoor unit data error.

Air conditioner operation stopped
with error 20-4

Rewrite the indoor EEPROM data.

Does the error improve?

Rewrite the outdoor EEPROM data.

Yes

No

Complete

Since this failure is an abnormality of the EEPROM data and not a failure of the board, the failure can be improved by rewriting the EEPROM data.

Error Code

25-1

AC Clock Error

Air conditioner operation stopped
with error 25-1



Replace the IDU main PCB.

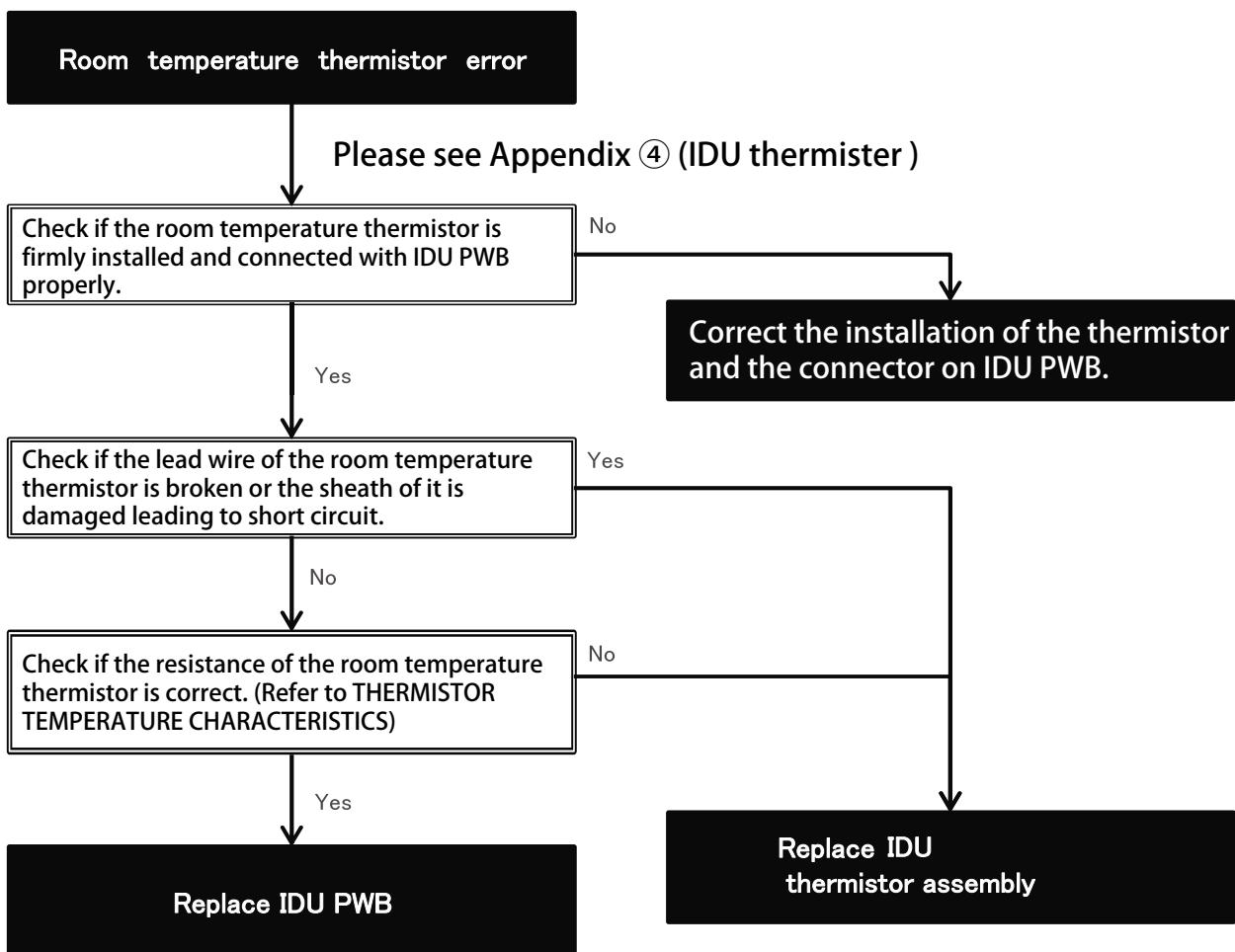
Error Code

26-1

Indoor unit room temperature thermistor open short error

26-1 Room temperature thermistor error
26-2 Pipe thermistor error

★Determine whether the cause is room temperature thermistor or IDU PWB.



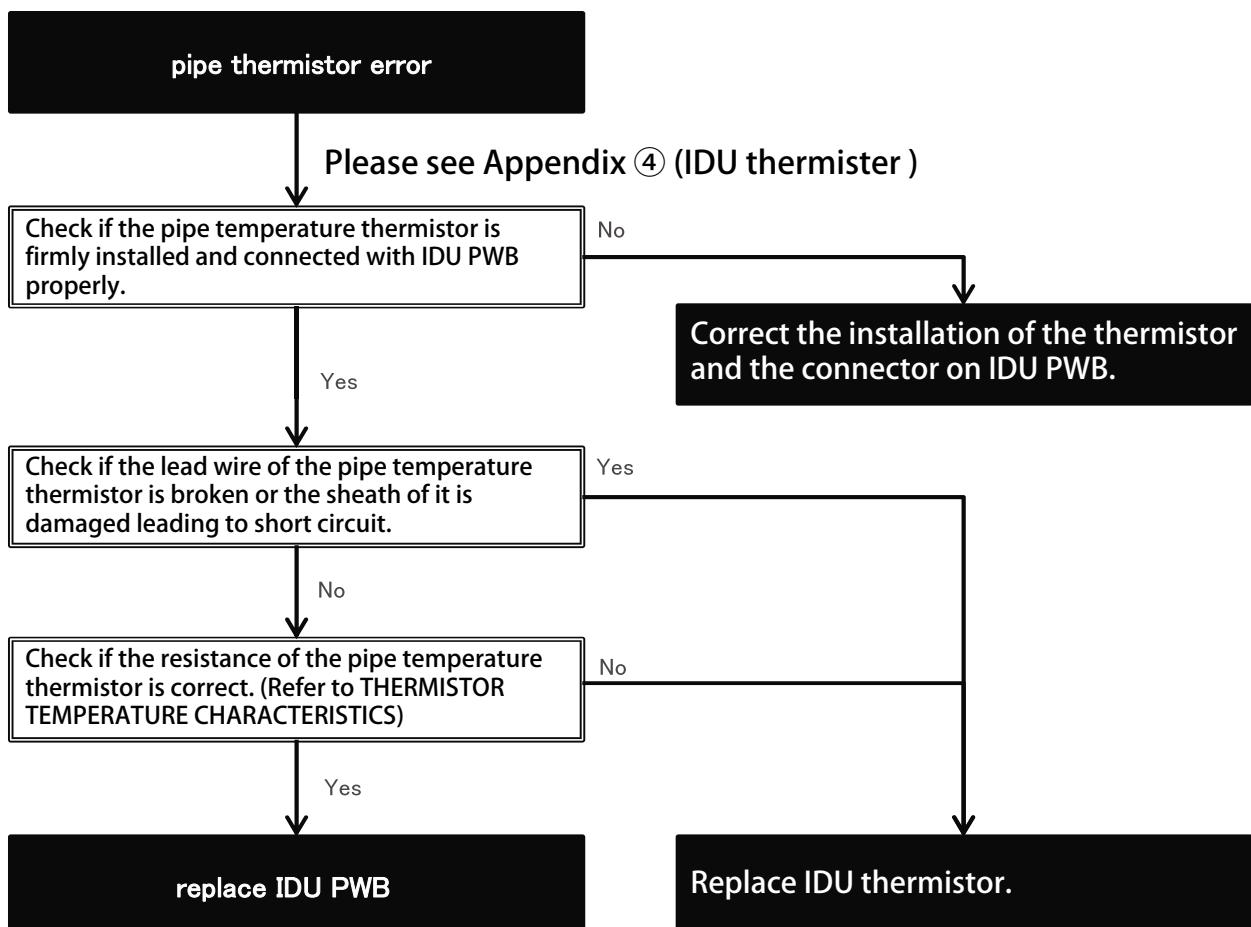
Error Code

26-2

Indoor unit pipe thermistor open short error

26-1 Room temperature thermistor error
26-2 Pipe thermistor error

★Determine whether the cause is pipe thermistor or IDU PWB.

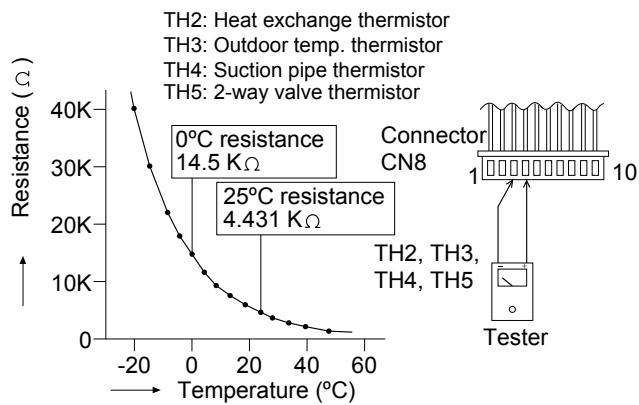
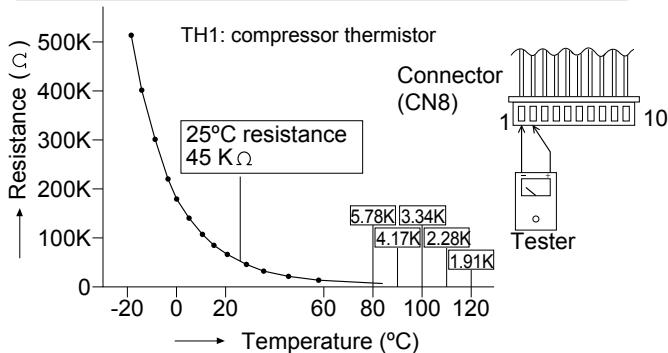


APPENDIX

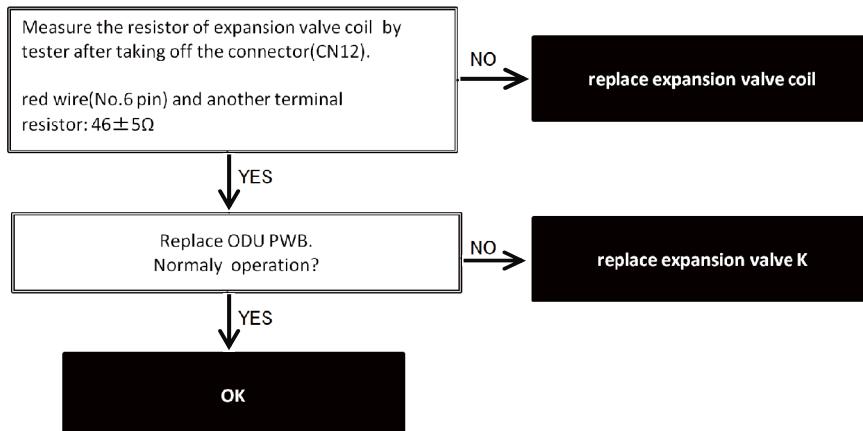
① ODU thermister

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
2-way valve thermistor	TH5	⑨ - ⑩	Yellow



② Expansion valve check



NO

replace expansion valve coil

YES

NO

replace expansion valve K

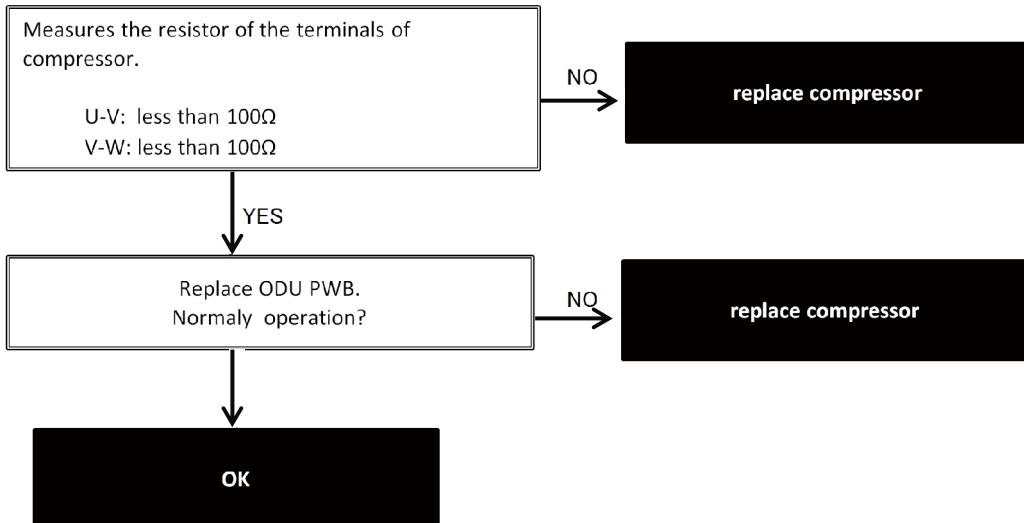
YES

OK

YES

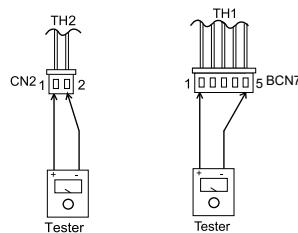
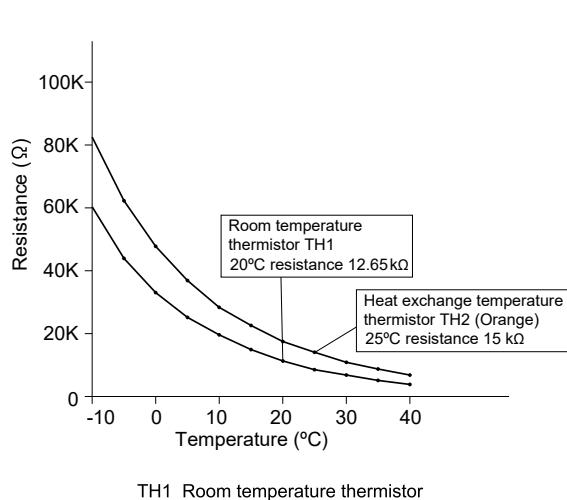
APPENDIX

③ Compressor check



④ IDU thermistor

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



Thermistor	Symbol	Connector	Color
Room temperature	TH1 (BCN7)	① - ⑤	-
Heat exchange temperature	TH2 (CN2)	① - ②	Orange

Before measuring resistance,
disconnect connectors as
shown above

⑤ Indoor fan

AY-XP12ZU1	DC FAN
AY-XP15ZU1	
AY-XP18ZU1	
AY-XP24ZU1	
AY-XP12ZHU1	
AY-XP18ZHU1	