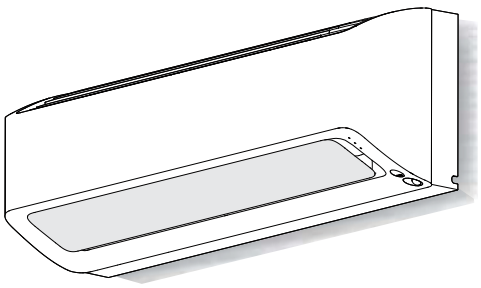
SHARP SERVICE MANUAL

S9504AYXPC2CUT

SPLIT TYPE ROOM HEAT PUMP



	INDOOR UNIT	OUTDOOR UNIT
12K Btu/h models	AY-XPC12CU	AE-X12CU
	AY-XPC12CQ	AE-X12CU
	AY-XP12CHU	AE-X12CHU
	AY-XP12CHU-B	AE-X12CHU
15K Btu/h models	AY-XP15CU	AE-X15CU
	AY-XP15CU-B	AE-X15CU
18K Btu/h models	AY-XPC18CU	AE-X18CU
	AY-XPC18CU-B	AE-X18CU
	AY-XP18CHU	AE-X18CHU
24K Btu/h models	AY-XP24CU	AE-X24CU

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

CONTENTS

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

"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.

REVISION RECORD

No.	Date	Page	Change contents	Reason

CHAPTER 1. PRODUCT SPECIFICATION

[1] SPECIFICATION

ITEMS \ MODEL				INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT	OUTDOOR UNIT
				AY-XPC12CU	AE-X12CU	AY-XPC12CQ	AE-X12CU
Rated cooling capacity (Min. - Max.)			Btu/h	12000 (2800 - 13600)		12000 (2800 - 13600)	
Rated heating capacity (Min. - Max.)			Btu/h	14000 (3200 - 19000)		14000 (3200 - 18100)	
Moisture removal (at cooling)			Pt/h	3.2		3.2	
Electrical data							
Phase				1		1	
Rated frequency			Hz	60		60	
Rated voltage			V	208 / 230		208 / 230	
Rated input		Cool	W	960		960	
		Heat	W	1030		1030	
ECO input		Cool	W	600		600	
		Heat	W	650		650	
Circuit Breaker			A	15		15	
Compressor		Type		Hermetically sealed single rotary type		Hermetically sealed single rotary type	
		Model		KSN98D42UFZA		KSN98D42UFZA	
		Oil charge		ESTEL OIL VG74 300cc		ESTEL OIL VG74 300cc	
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		Expansion valve		Expansion valve	
		Refrigerant(R32)		33.2 oz(940 g)		33.2 oz(940 g)	
		De-Ice system		Micro computer controlled reversed systems		Micro computer controlled reversed systems	
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	42	-	42	-
		High	dB(A)	39	49	39	49
		Low	dB(A)	34	-	34	-
		Soft	dB(A)	27	-	27	-
		Silent	dB(A)	23	-	23	-
	Heating	Full power	dB(A)	43	-	43	-
		High	dB(A)	40	50	40	50
		Low	dB(A)	35	-	35	-
		Soft	dB(A)	28	-	28	-
		Silent	dB(A)	23	-	23	-
Fan system							
Drive				Direct drive		Direct drive	
Air flow quantity	Cooling	Full power	CFM(m^3/min)	438(12.4)	-	438(12.4)	-
		High	CFM(m^3/min)	385(10.9)	1102(31.2)	385(10.9)	1102(31.2)
		Low	CFM(m^3/min)	307(8.7)	-	307(8.7)	-
		Soft	CFM(m^3/min)	219(6.2)	-	219(6.2)	-
		Silent	CFM(m^3/min)	145(4.1)	-	145(4.1)	-
	Heating	Full power	CFM(m^3/min)	438(12.4)	-	438(12.4)	-
		High	CFM(m^3/min)	385(10.9)	1102(31.2)	385(10.9)	1102(31.2)
		Low	CFM(m^3/min)	318(9.0)	-	318(9.0)	-
		Soft	CFM(m^3/min)	254(7.2)	-	254(7.2)	-
		Silent	CFM(m^3/min)	145(4.1)	-	145(4.1)	-
Fan revolution	Cooling	Full power	rpm	1050	-	1050	-
		High	rpm	950	860	950	860
		Low	rpm	800	-	800	-
		Soft	rpm	640	-	640	-
		Silent	rpm	500	-	500	-
	Heating	Full power	rpm	1050	-	1050	-
		High	rpm	950	860	950	860
		Low	rpm	820	-	820	-
		Soft	rpm	700	-	700	-
		Silent	rpm	500	-	500	-
Fan				Cross flow fan	Propeller fan	Cross flow fan	Propeller fan

ITEMS / MODEL		INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT	OUTDOOR UNIT
		AY-XPC12CU	AE-X12CU	AY-XPC12CQ	AE-X12CU
Connections					
Refrigerant coupling		Flare type			
Refrigerant tube size Gas, Liquid	inch (mm)	3/8”(9.52), 1/4”(6.35)			
Drain piping O.D.	inch (mm)	φ0.7 and φ0.8 (φ17 and φ20)			
Minimum - Maximum length (per unit)	ft (m)	9.8-65.6 (3-20)			
Maximum charge-less length	ft (m)	25 (7.6)			
Maximum height difference(IDU&ODU)	ft (m)	32.8 (10)			
Additional charge	oz./ft (g/m)	0.16 (15)			
Others					
Safety device		Compressor: Thermal protector		Compressor: Thermal protector	
		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	34 39/64(879)	30 23/32(780)	34 39/64(879)	30 23/32(780)
	Height	11 3/8(289)	21 1/4(540)	11 3/8(289)	21 1/4(540)
	Depth	9 1/64(229)	10 19/32(269)	9 1/64(229)	10 19/32(269)
Net weight	lbs(kg)	22(10)	67(30)	22(10)	67(30)

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

AY-XP12CU

ITEMS \ MODEL				INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT	OUTDOOR UNIT
				AY-XP12CHU(-B)	AE-X12CHU	AY-XP15CU(-B)	AE-X15CU
Rated cooling capacity (Min. - Max.)			Btu/h	12000 (3500 - 14000)		15000 (5000 - 17000)	
Rated heating capacity (Min. - Max.)			Btu/h	16000 (3100 - 22850)		18000 (4500 - 21800)	
Moisture removal (at cooling)			Pt/h	1.9		3.2	
Electrical data							
Phase				1		1	
Rated frequency			Hz	60		60	
Rated voltage			V	208 / 230		208 / 230	
Rated input		Cool	W	750		1120	
		Heat	W	1100		1300	
ECO input		Cool	W	600		800	
		Heat	W	1300		1400	
Circuit Breaker			A	15		15	
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		Expansion valve		Expansion valve	
		Refrigerant(R32)		36.0 oz(1020 g)		36.0 oz(1020 g)	
		De-Ice system		Micro computer controlled reversed systems		Micro computer controlled reversed systems	
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	43	-	46	-
		High	dB(A)	40	49	42	49
		Low	dB(A)	36	-	38	-
		Soft	dB(A)	28	-	30	-
		Silent	dB(A)	24	-	26	-
	Heating	Full power	dB(A)	44	-	46	-
		High	dB(A)	40	50	42	50
		Low	dB(A)	35	-	36	-
		Soft	dB(A)	29	-	30	-
		Silent	dB(A)	22	-	23	-
Fan system							
Drive				Direct drive		Direct drive	
Air flow quantity	Cooling	Full power	CFM(m^3/min)	597(16.9)	-	636(18.0)	-
		High	CFM(m^3/min)	519(14.7)	1013(28.7)	558(15.8)	1102(31.2)
		Low	CFM(m^3/min)	403(11.4)	-	441(12.5)	-
		Soft	CFM(m^3/min)	290(8.2)	-	328(9.3)	-
		Silent	CFM(m^3/min)	212(6.0)	-	251(7.1)	-
	Heating	Full power	CFM(m^3/min)	636(18.0)	-	674(19.1)	-
		High	CFM(m^3/min)	558(15.8)	1013(28.7)	597(16.9)	1102(31.2)
		Low	CFM(m^3/min)	466(13.2)	-	505(14.3)	-
		Soft	CFM(m^3/min)	374(10.6)	-	413(11.7)	-
		Silent	CFM(m^3/min)	212(6.0)	-	251(7.1)	-
Fan revolution	Cooling	Full power	rpm	1000	-	1050	-
		High	rpm	900	800	950	860
		Low	rpm	750	-	800	-
		Soft	rpm	600	-	650	-
		Silent	rpm	500	-	550	-
	Heating	Full power	rpm	1050	-	1100	-
		High	rpm	950	800	1000	860
		Low	rpm	830	-	880	-
		Soft	rpm	710	-	760	-
		Silent	rpm	500	-	550	-
Fan				Cross flow fan	Propeller fan	Cross flow fan	Propeller fan

ITEMS \ MODEL		INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT	OUTDOOR UNIT
		AY-XP12CHU(-B)	AE-X12CHU	AY-XP15CU(-B)	AE-X15CU
Connections					
Refrigerant coupling		Flare type			
Refrigerant tube size Gas, Liquid	inch (mm)	3/8”(9.52), 1/4”(6.35)			
Drain piping O.D.	inch (mm)	φ0.7 and φ0.8 (φ17 and φ20)			
Minimum - Maximum length (per unit)	ft (m)	9.8-65.6 (3-20)			
Maximum charge-less length	ft (m)	25 (7.6)			
Maximum height difference(IDU&ODU)	ft (m)	32.8 (10)			
Additional charge	oz./ft (g/m)	0.16 (15)			
Others					
Safety device		Compressor: Thermal protector		Compressor: Thermal protector	
		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	41 27/64(1052)	30 23/32(780)	41 27/64(1052)	30 23/32(780)
	Height	12 7/16(316)	21 1/4(540)	12 7/16(316)	21 1/4(540)
	Depth	9 51/64(249)	10 19/32(269)	9 51/64(249)	10 19/32(269)
Net weight	lbs(kg)	31(14)	67(30)	31(14)	67(30)

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

AY-XP12CU

ITEMS \ MODEL				INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT	OUTDOOR UNIT
				AY-XPC18CU(-B)	AE-X18CU	AY-XP18CHU	AE-X18CHU
Rated cooling capacity (Min. - Max.)			Btu/h	18000 (6000 - 21600)		18000 (6000 - 21600)	
Rated heating capacity (Min. - Max.)			Btu/h	21600 (5500 - 27000)		21600 (5500 - 30000)	
Moisture removal (at cooling)			Pt/h	5.1		5.9	
Electrical data							
Phase				1		1	
Rated frequency			Hz	60		60	
Rated voltage			V	208 / 230		208 / 230	
Rated input		Cool	W	1380		1380	
		Heat	W	1500		1500	
ECO input		Cool	W	950		920	
		Heat	W	1300		1500	
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		Expansion valve		Expansion valve	
		Refrigerant(R32)		49.0 oz(1390 g)		49.0 oz(1390 g)	
		De-Ice system		Micro computer controlled reversed systems		Micro computer controlled reversed systems	
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	45	-	45	-
		High	dB(A)	43	52	43	52
		Low	dB(A)	38	-	38	-
		Soft	dB(A)	31	-	31	-
		Silent	dB(A)	28	-	28	-
	Heating	Full power	dB(A)	49	-	49	-
		High	dB(A)	47	52	47	52
		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(m^3/min)	636(18.0)	-	636(18.0)	-
		High	CFM(m^3/min)	597(16.9)	1723(48.8)	597(16.9)	1723(48.8)
		Low	CFM(m^3/min)	480(13.6)	-	480(13.6)	-
		Soft	CFM(m^3/min)	328(9.3)	-	328(9.3)	-
		Silent	CFM(m^3/min)	251(7.1)	-	251(7.1)	-
	Heating	Full power	CFM(m^3/min)	752(21.3)	-	752(21.3)	-
		High	CFM(m^3/min)	713(20.2)	1723(48.8)	713(20.2)	1723(48.8)
		Low	CFM(m^3/min)	558(15.8)	-	558(15.8)	-
		Soft	CFM(m^3/min)	403(11.4)	-	403(11.4)	-
		Silent	CFM(m^3/min)	290(8.2)	-	290(8.2)	-
Fan revolution	Cooling	Full power	rpm	1050	-	1050	-
		High	rpm	1000	850	1000	850
		Low	rpm	850	-	850	-
		Soft	rpm	650	-	650	-
		Silent	rpm	550	-	550	-
	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

ITEMS / MODEL		INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT	OUTDOOR UNIT
		AY-XPC18CU(-B)	AE-X18CU	AY-XP18CHU	AE-X18CHU
Connections					
Refrigerant coupling		Flare type			
Refrigerant tube size Gas, Liquid	inch (mm)	3/8”(9.52), 1/4”(6.35)			
Drain piping O.D.	inch (mm)	φ0.7 and φ0.8 (φ17 and φ20)			
Minimum - Maximum length (per unit)	ft (m)	9.8-65.6 (3-20)			
Maximum charge-less length	ft (m)	25 (7.6)			
Maximum height difference(IDU&ODU)	ft (m)	32.8 (10)			
Additional charge	oz./ft (g/m)	0.16 (15)			
Others					
Safety device		Compressor: Thermal protector		Compressor: Thermal protector	
		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	41 27/64(1052)	33 15/32(850)	41 27/64(1052)	33 15/32(850)
	Height	12 7/16(316)	27 15/16(710)	12 7/16(316)	27 15/16(710)
	Depth	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])

ITEMS \ MODEL				INDOOR UNIT	OUTDOOR UNIT
				AY-XP24CU	AE-X24CU
Rated cooling capacity (Min. - Max.)			Btu/h	22000 (6000 - 24000)	
Rated heating capacity (Min. - Max.)			Btu/h	24000 (5500 - 27100)	
Moisture removal (at cooling)			Pt/h	6.8	
Electrical data					
Phase				1	
Rated frequency			Hz	60	
Rated voltage			V	208 / 230	
Rated input		Cool	W	2200	
		Heat	W	1820	
ECO input		Cool	W	1320	
		Heat	W	1300	
Circuit Breaker			A	20	
Compressor		Type		Hermetically sealed twin rotary type	
		Model		KTN150D63UFZR3	
		Oil charge		ESTEL OIL VG75r 420cc	
Refrigerant system		Evaporator		Slit Fin and Grooved tube type	
		Condenser		Corrugate Fin and Grooved tube type	
		Control		Expansion valve	
		Refrigerant(R32)		49.0 oz(1390 g)	
		De-Ice system		Micro computer controlled reversed systems	
Noise level (Sound Pressure)	Cooling	Full power	dB(A)	47	-
		High	dB(A)	45	53
		Low	dB(A)	40	-
		Soft	dB(A)	33	-
		Silent	dB(A)	30	-
	Heating	Full power	dB(A)	49	-
		High	dB(A)	47	54
		Low	dB(A)	41	-
		Soft	dB(A)	31	-
		Silent	dB(A)	25	-
Fan system					
Drive				Direct drive	
Air flow quantity	Cooling	Full power	CFM(m^3/min)	674(19.1)	-
		High	CFM(m^3/min)	636(18.0)	1723(48.8)
		Low	CFM(m^3/min)	519(14.7)	-
		Soft	CFM(m^3/min)	367(10.4)	-
		Silent	CFM(m^3/min)	290(8.2)	-
	Heating	Full power	CFM(m^3/min)	752(21.3)	-
		High	CFM(m^3/min)	713(20.2)	1723(48.8)
		Low	CFM(m^3/min)	558(15.8)	-
		Soft	CFM(m^3/min)	403(11.4)	-
		Silent	CFM(m^3/min)	290(8.2)	-
Fan revolution	Cooling	Full power	rpm	1100	-
		High	rpm	1050	850
		Low	rpm	900	-
		Soft	rpm	700	-
		Silent	rpm	600	-
	Heating	Full power	rpm	1200	-
		High	rpm	1150	850
		Low	rpm	950	-
		Soft	rpm	750	-
		Silent	rpm	600	-
Fan				Cross flow fan	Propeller fan

ITEMS \ MODEL		INDOOR UNIT	OUTDOOR UNIT
		AY-XP24CU	AE-X24CU
Connections			
Refrigerant coupling		Flare type	
Refrigerant tube size Gas, Liquid	inch (mm)	3/8”(9.52), 1/4”(6.35)	
Drain piping O.D.	inch (mm)	φ0.7 and φ0.8 (φ17 and φ20)	
Minimum - Maximum length (per unit)	ft (m)	9.8-65.6 (3-20)	
Maximum charge-less length	ft (m)	25 (7.6)	
Maximum height difference(IDU&ODU)	ft (m)	32.8 (10)	
Additional charge	oz./ft (g/m)	0.16 (15)	
Others			
Safety device		Compressor: Thermal protector	
		Fan motors: Inherent thermistor	
		Fuse, Micro computer control	
Air filters		Polypropylene net (Washable)	
Net dimensions	Width	41 27/64(1052)	33 15/32(850)
	Height	12 7/16(316)	27 15/16(710)
	Depth	9 51/64(249)	13(330)
Net weight	lbs(kg)	31(14)	95(43)

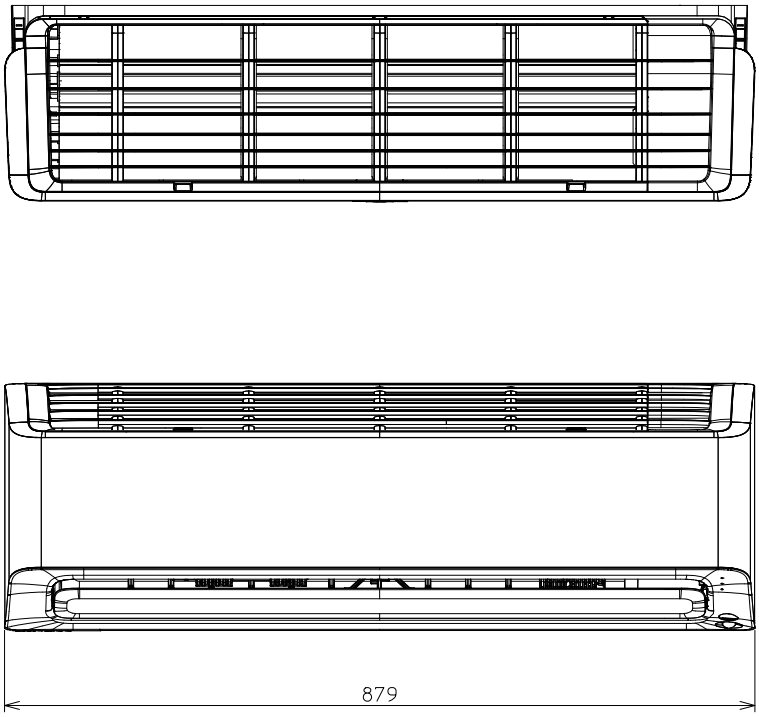
NOTE: Test conditions are based on AHRI 210/240. (Piping length : 25ft [7.6m])

[2] EXTERNAL DIMENSION

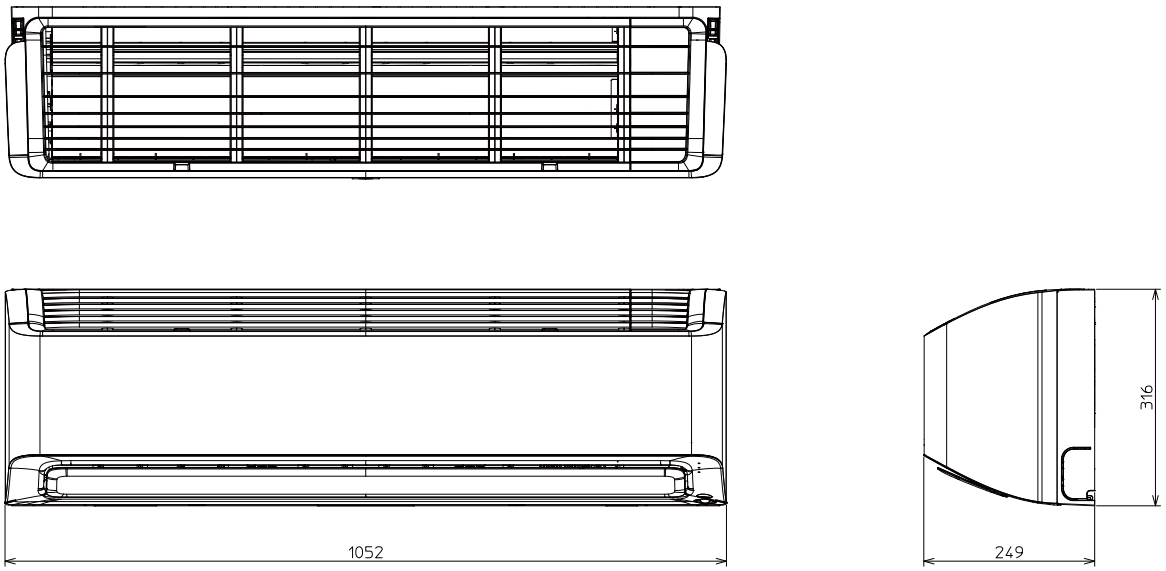
1. Indoor unit

Length unit: mm

AY-XPC12CU, AY-XPC12CQ



AY-XP12CHU(-B), AY-XP15CU(-B), AY-XPC18CU(-B), AY-XP18CHU, AY-XP24CU

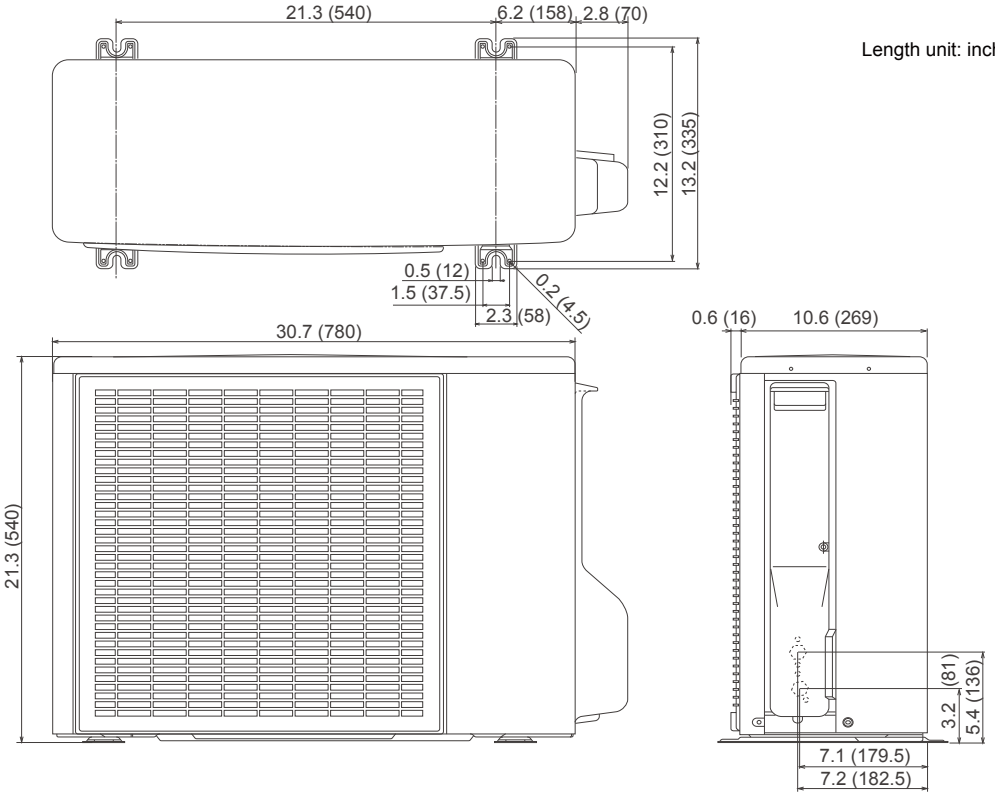


2. Outdoor unit

Length unit: mm

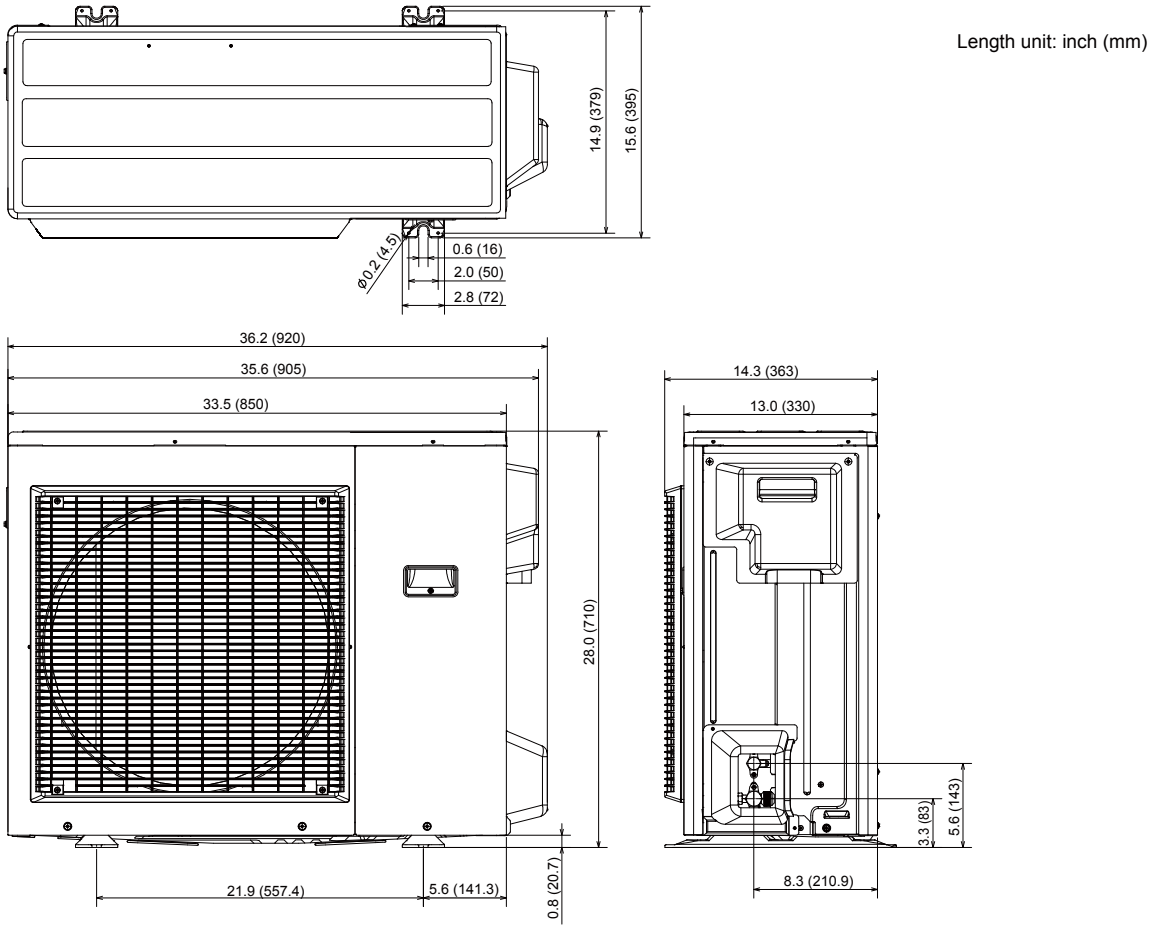
AE-X12CU, AE-X12CHU, AE-X15CU

Length unit: inch (mm)



AE-X18CU, AE-X18CHU, AE-X24CU

Length unit: inch (mm)



[3] WIRING DIAGRAM

1. Indoor unit

AY-XPC12CU, AY-XPC12CQ, AY-XP12CHU(-B), AY-XP15CU(-B), AY-XP18CHU, AY-XPC18CU(-B), AY-XP24CU

LED INDICATION FOR SELF-DIAGNOSIS 〈Indication of the abnormal condition〉

LED indicator will blink, if the set is in abnormal condition.

Definition for only Main No. code(Please refer to the service manual for more detail)

Press down ON/OFF button for 5 seconds while the sets is standing by.

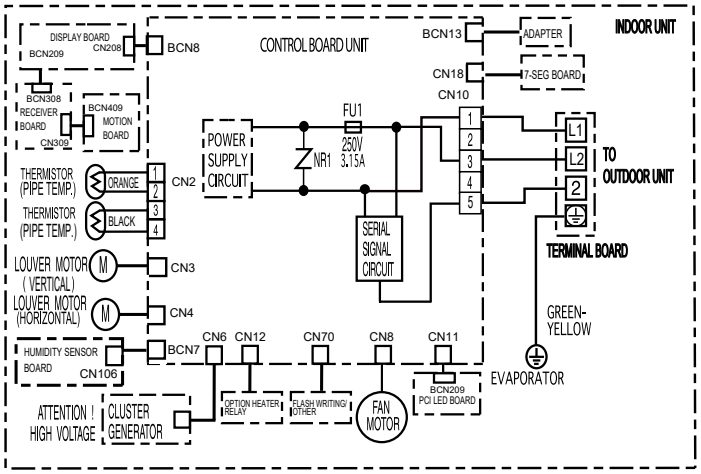
Definition for error code:
Operation Lamp(Gr): Main No.(tens digit)
Timer Lamp(Ye): Main No.(units digit)
WIFI Lamp/Error Lamp(Gr): Sub No.

Example:

Lamp	Main No.		Sub No.	Error code
	Gr	Ye	Gr	
Times of blinking	1	4	2	14-2
	0	9	4	9-4

1	Short circuit of outdoor unit thermistor
2	Overheat error (compressor or cycle)
3	Temporary stop due to dehumidifying operation
5	Open circuit of outdoor unit thermistor
6	DC over current error
7	AC over current error/AC current abnormal
8	Abnormal wire check
9	Thermistor installation error/4 way valve error or gas leak error
10	EEPROM/CPU error of outdoor unit
11	Abnormal outdoor fan motor
12	Thermal fuse error of terminal board
13	Abnormal compressor rotation
14	DC voltage/power supply voltage error
17	Open-circuit of serial signal line/erroneous wiring
18	Short-circuit of serial signal line/erroneous wiring
19	Abnormal indoor fan motor
20	EEPROM error of indoor unit
24	Abnormal Wireless LAN(Wireless adapter is optional)
26	Open-circuit/short-circuit of indoor thermistor

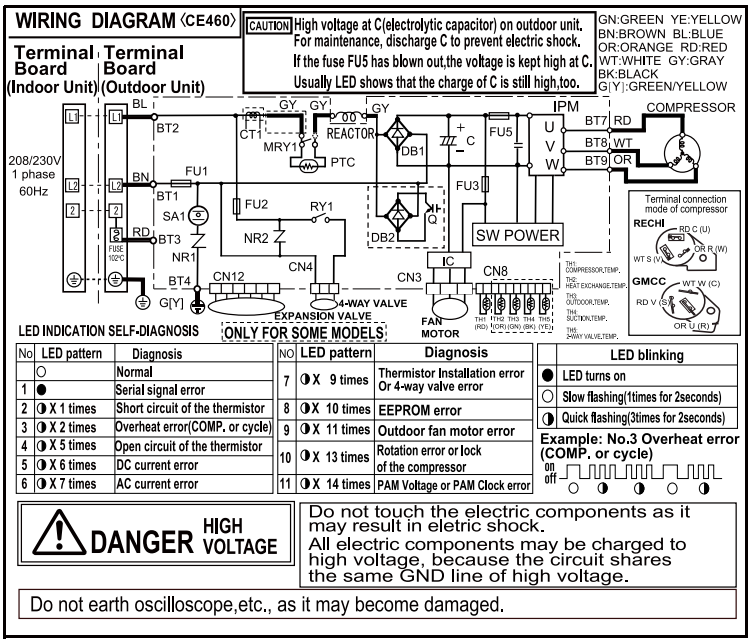
WIRING DIAGRAM



SOME FUNCTIONS ARE OPTIONAL DEPENDING ON DIFFERENT MODELS.

CE518

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

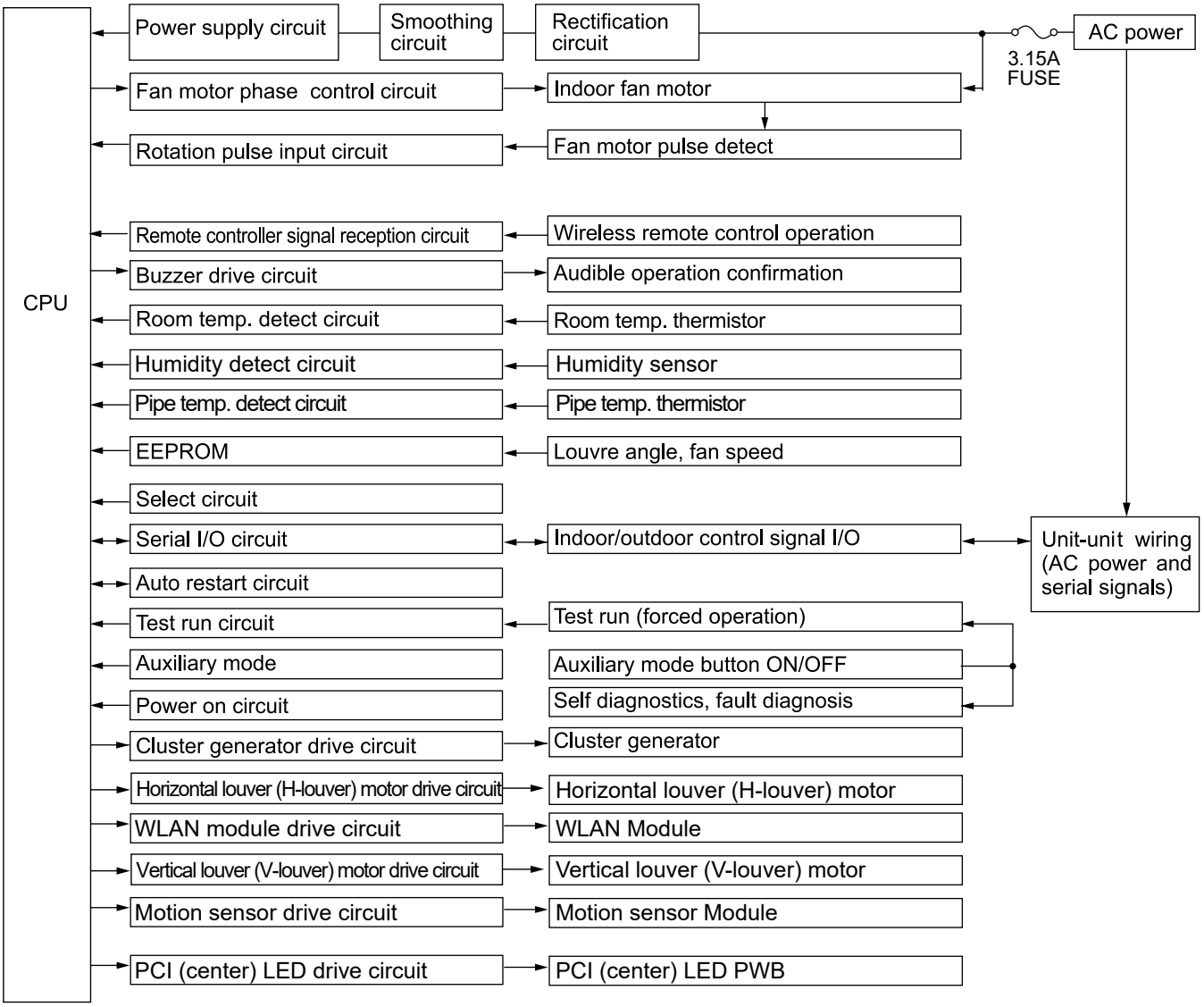
2. Outdoor unit

DESCRIPTION	MODEL	REMARKS
Compressor	KSN98D42UFZA (For AE-X12CU)	
	KTN150D63UFZR3 (For AE-X12CHU, AE-X18CHU, AE-X15CU, AE-X18CU, AE-X24CU)	
Outdoor fan motor	DBI445P-L041A-AL01-1	280V 41W 8P
Fu5, Fu1	-	250V 20A
Fu2	-	250V 3.15A
Fu3	-	250V 2A

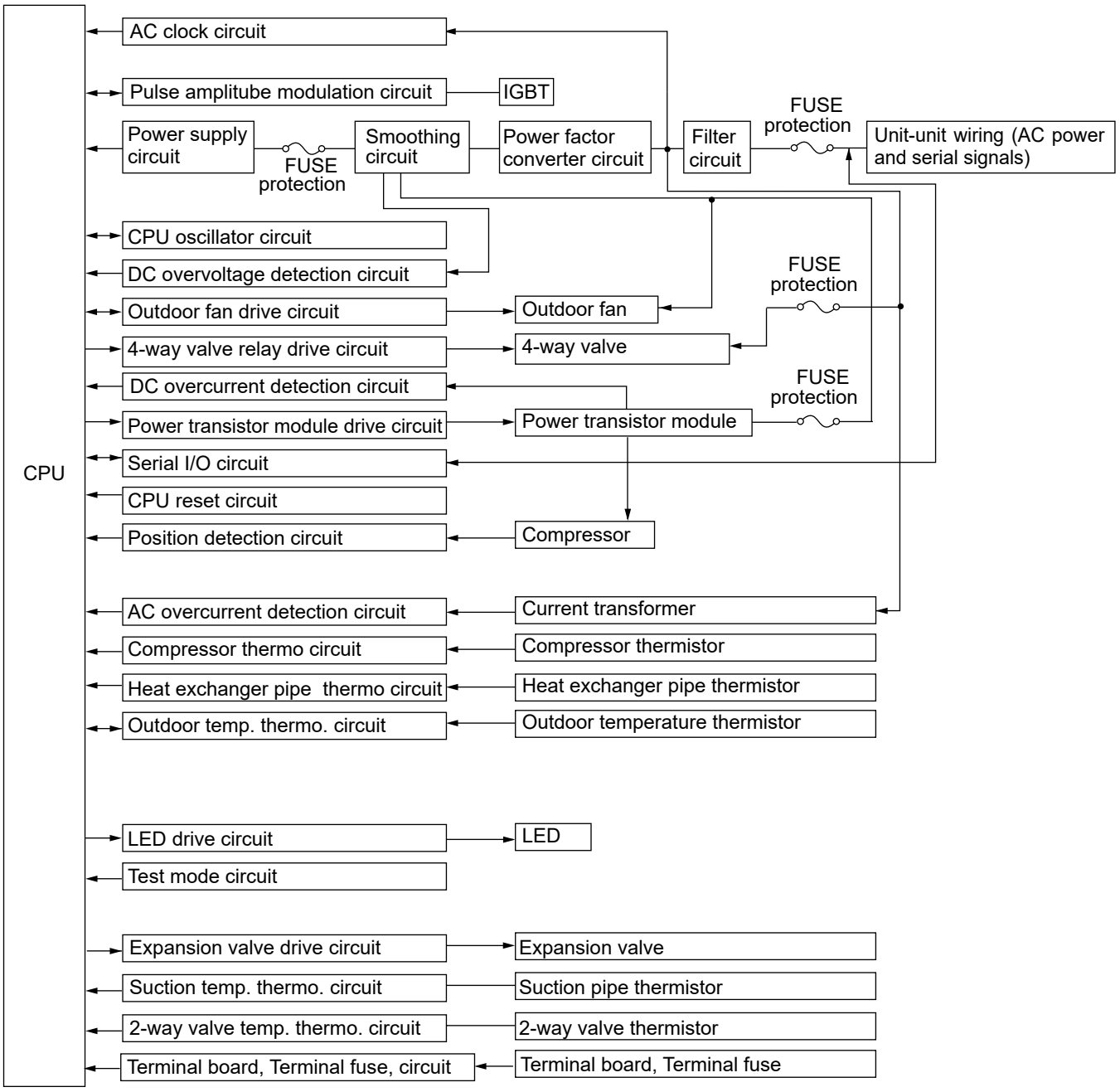
CHAPTER 2. EXPLANATION OF CIRCUIT AND OPERATION

[1] BLOCK DIAGRAMS

1. Indoor unit



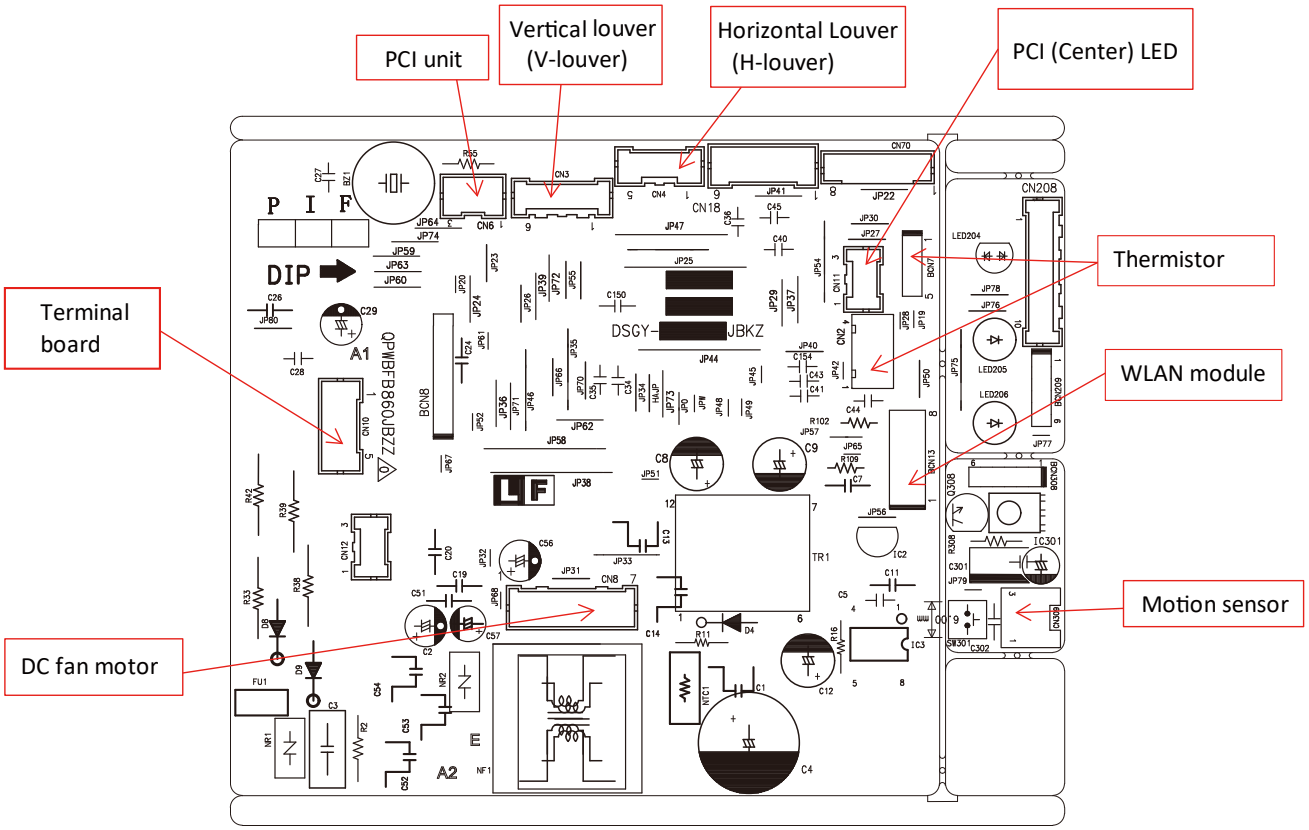
2. Outdoor unit



[2] MICROCOMPUTER CONTROL SYSTEM

1.Indoor unit

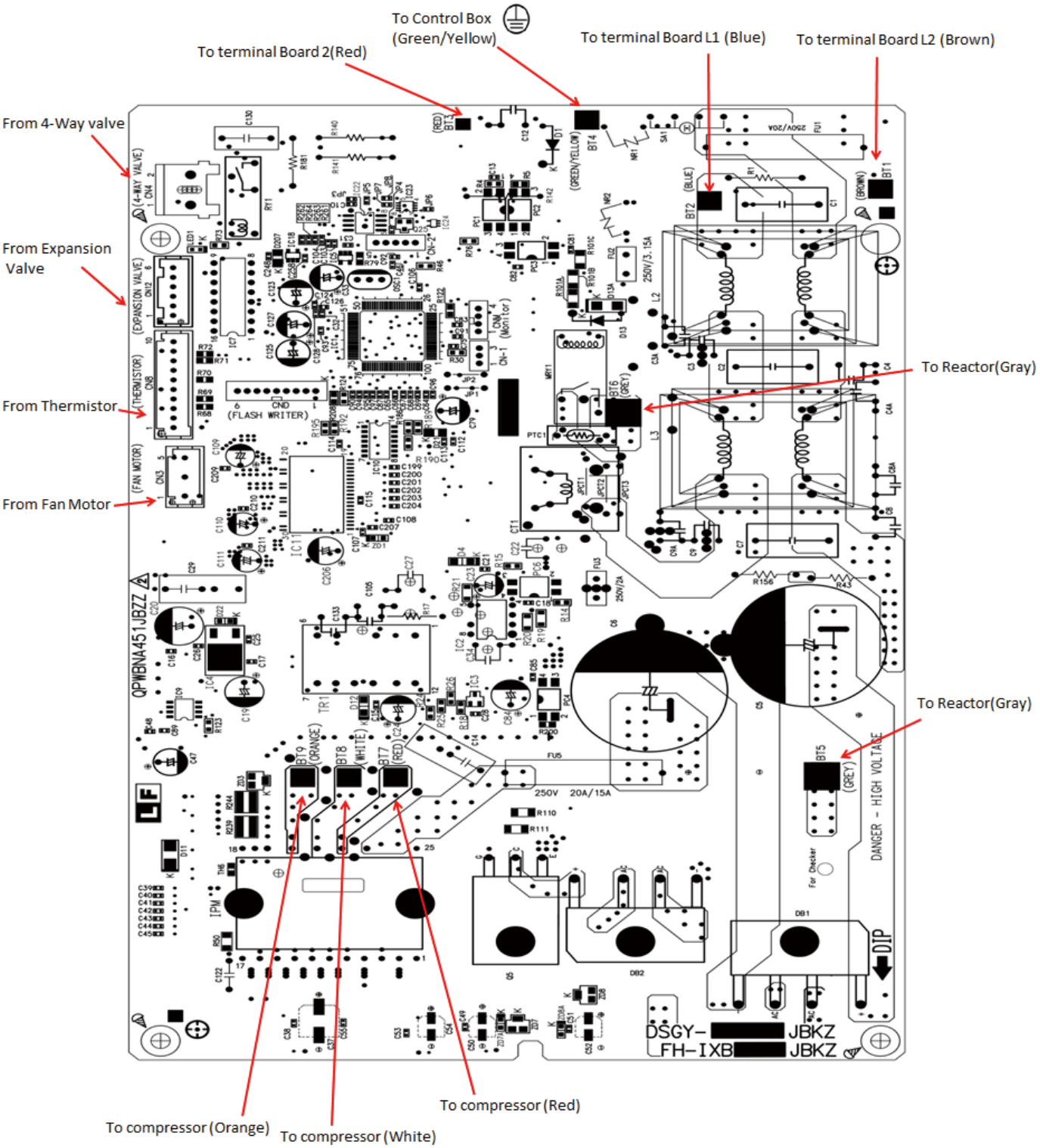
Printed wiring board



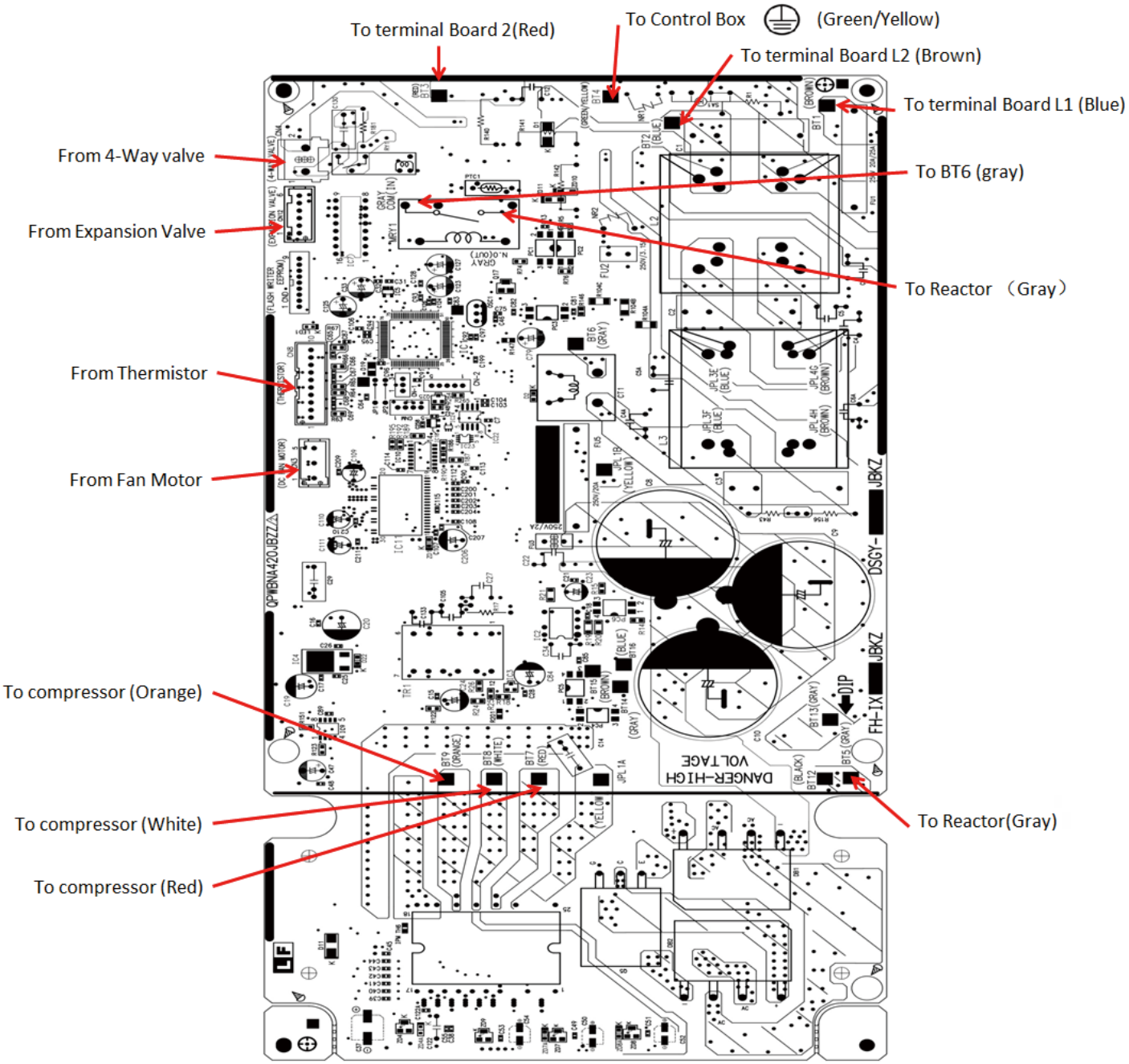
2.Outdoor unit

2.1. Printed wiring board

12K,15K Btu/h models



18K,24K Btu/h models



CHAPTER 3. FUNCTION

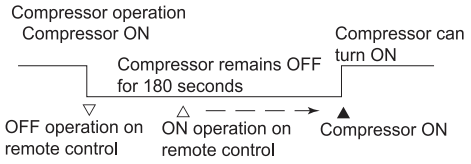
[1]Indoor unit function

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. Startup control

The compressor always runs at its maximum frequency at the start of:
-cooling mode and when the room temperature is 3°C higher than the set temperature.
-heating mode and when the room temperature is 3°C lower than the set temperature.

When the room temperature reaches to the set temperature, the compressor runs at an inverter-controlled frequency.

3. Indoor unit heat exchanger freeze prevention control

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

4 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.

5. 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.

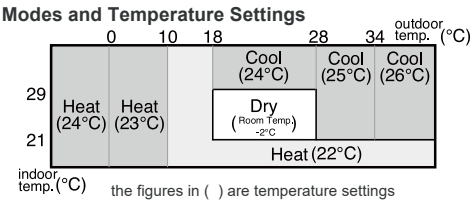
6. Power ON start

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

7. AUTO MODE

1) AUTO mode of ON/OFF button

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.

2) AUTO mode of remote control

In the AUTO mode, the unit selects operating mode (Heating/ Cooling) according to temperature setting which set by user and room temperature.

Additionally, the Auto Change Over function will switch between cooling and heating if the compressor stays off for a long time(11-15 minutes).

8. Difference of operation in Auto and Manual modes

In the Auto mode of ON/OFF button, the temperature setting is automatically determined based on the outside air temperature.

8.1 Difference relating to set temperature

		Temperature setting method
Auto mode (by pressing ON/OFF button)	Heat	Automatic temperature setting based on outside air temperature.
	Cooling	
Auto mode (set by remote control)	Heat	Can be changed between 16~30℃ using remote control.
	Cooling	
Manual mode	Heat	Can be changed between 16~30℃ using remote control.
	Cooling	

9. Operating temperature range

The built-in protective device may prevent the unit from operating when used out of this range.

lowest operating temperature for HEAT	
-17°F(-27°C)	For AY-XPC12CU/CQ
-22°F(-30°C)	Except for AY-XPC12CU/CQ

If outdoor temperature can drop below lowest operating temperature for HEAT in your area, we recommend you to have another heating source.

When outdoor temperature actually drops below lowest operating temperature for HEAT, OPERATION indicator (green), TIMER indicator (orange), and WLAN indicator (green) on the unit will blink continuously. Turn off the unit to prevent any damages, as well as inefficient performance.

You can activate AUTO cut off at lowest operating temperature for HEAT by cutting jump wire (JP1).

10. Dehumidifying operation control

DRY mode are available through Sharp Air App.

The setting temperature is determined by outdoor temperature and room temperature at the start of operation.

Room temperature at the start of operation is under 26°C	
outdoor temperature (°C)	Setting temperature
under 22	room temperature+0.3°C
22~25	room temperature±0°C
25~28	room temperature -1°C
over 28	room temperature -1.7°C

Room temperature at the start of operation is over 26°C	
outdoor temperature (°C)	Setting temperature
under 18	23°C
18~28	24°C
28~31	25°C
31~34	26°C
34~37	27°C
over 37	28°C

11. Full Power Operation

In this operation, the air/air heat pump works at the maximum power and optimum louver direction to make the room cool or warm rapidly.

During operation,press the FULL POWER button.

• The remote control will display “ ”

TO CANCEL
Press the FULL POWER button again.
• The FULL POWER operation will also be cancelled when the operation mode is changed, or when the unit is turned off.

NOTE:
• The air/air heat pump will operate at “Extra HIGH” fan speed, the vertical adjustment louver will be set obliquely downward during full power operation. The full power operation will stop after 15 minutes.
• You can not set the temperature or fan speed during the FULL POWER operation.
• If the set temperature is close to the room temperature, the power may not be at maximum.

12. After Care (Auto and Manual)

Heating or Fan operation and Cluster operation are performed simultaneously.

The heating will be operated after the fan operation.

If the outside temperature or room temperature is high, heating operation may not be performed.

The operation time is 70-90 minutes.

When fan is operated, the louver will move horizontally.

When heating is operated, the louvers move above horizontal position.

13. Plasmacluster Ion funtion

Plasmacluster ion generator is set to ON by default and Plasmacluster ions are released during any mode of operation. (You can change the ion setting from Menu.)

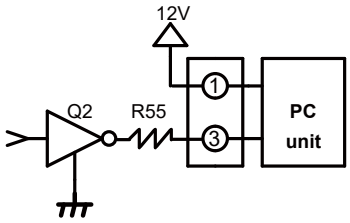
• “Plasmacluster operation” generates about equal amounts of (+)ions and (-)ions from the cluster unit to provide clean air.

If the Plasmacluster Ion generation function is operated together with the heat pump operation, the indoor unit fan speed and louver direction are in accordance with the heat pump settings.

14. Explanation of cluster circuit

The cluster unit generates cluster ions, which are circulated throughout the room by the air flow created by the blower fan (indoor unit fan motor) in the heat pump unit.

1) When microcomputer output turns “H,” the Q2 output changes to “Lo,” applying 12 V voltage to the cluster unit for the generation of cluster ions (positive and negative ions).



15. Auto restart

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

1) Setting memorized

- Operating mode (COOL, HEAT, AUTO, FAN, DRY)
- Temperature setting
- Fan setting
- Air flow direction
- Power ON/OFF
- Automatic operation mode setting
- Plasmacluster Ions setting
- SPOT setting
- ECO setting
- OD silent setting

2) Setting not memorized

- Timer setting
- Full power setting
- After care operation
- Multi Space setting

3) Disabling auto restart function

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

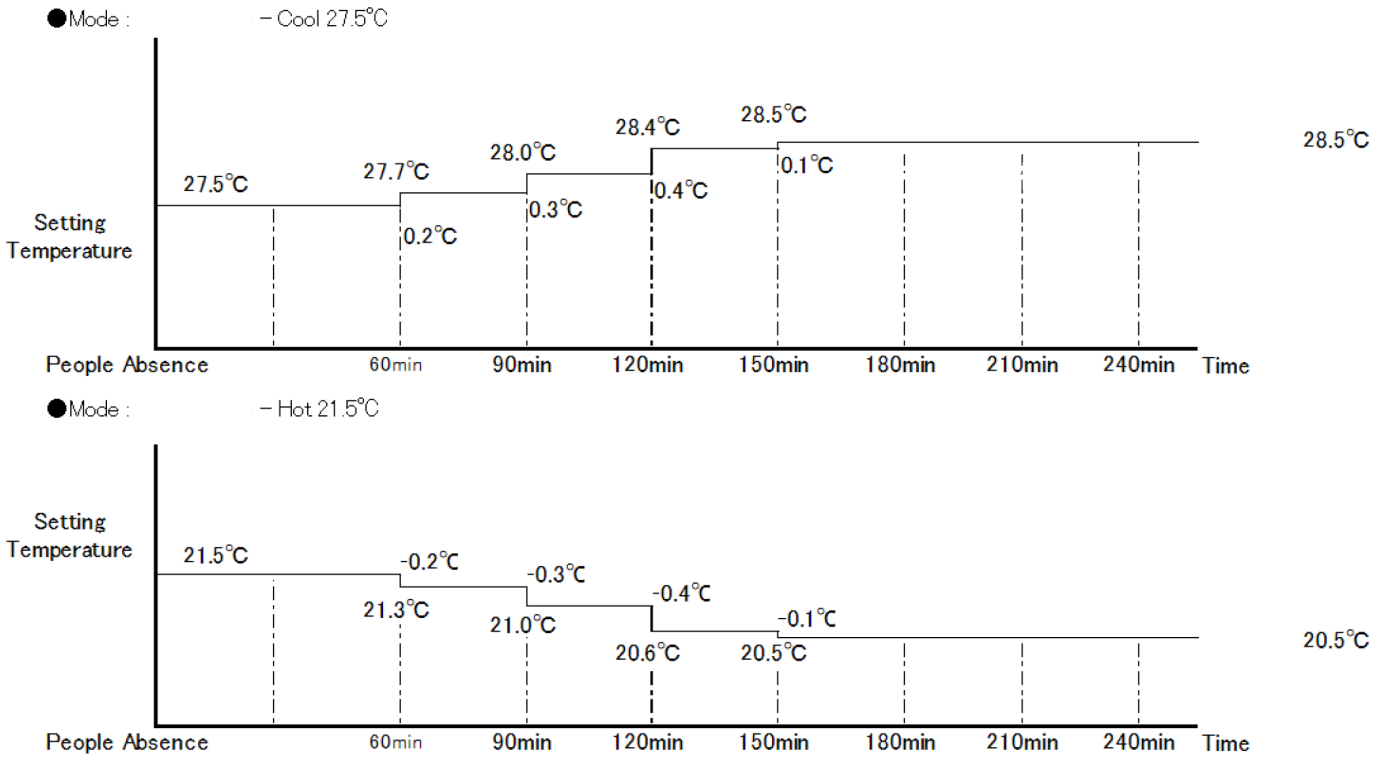
15. Save operation (Only for the CHU Series)

This control is valid only in ECO mode.
If there is no person for 1 hour, the heat pump will arise setting temperature.
If a person is detected, correction temperature will be restored.

Limit of Temperature

Cool	
Correction Temperature Limit	+1.0℃
Heat	
Correction Temperature Limit	−1.0℃

e.g.



16. Activity Detection (Only for the CHU Series)

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	2.5
	26~28	1	1.5	2
	24~26	0.5	1	1.5
	22~24	0.25	0.75	1.25
	17~22	0.25	0.5	0.75
	~17	0	0	0

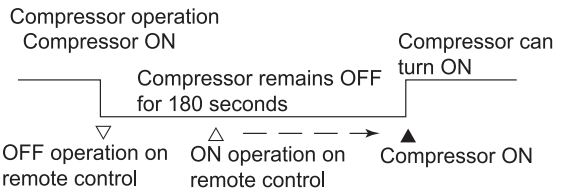
[2]Outdoor unit function

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. Outdoor unit 2-way valve freeze prevention control

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

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

3. Outdoor unit overheat prevention control

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

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

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

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 (120 sec : outdoor temperature≥ 40°C·60sec : outdoor temperature < 40°C) at minimum operating frequency, the compressor stops operating and then restarts after about 180 seconds, and the above mentioned control is repeated.

5. Peak control

If the current flowing in the heat pump 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.

	Peak Control Current(A)	
Mode / Model	Cooling	Heating
AE-X12CU	7.0	9.1
AE-X15CU	8.2	11.8
AE-X18CU	10.5	13.0
AE-X24CU	13.5	13.0
AE-X12CHU	6.2	12.0
AE-X18CHU	10.5	13.0

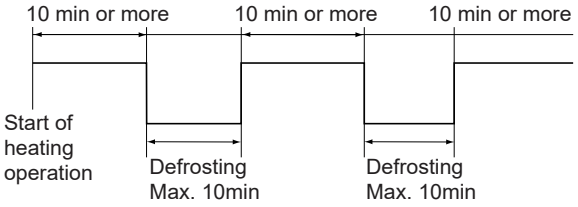
6. Outdoor unit fan delay control

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

7. Defrosting

7.1 Reverse defrosting

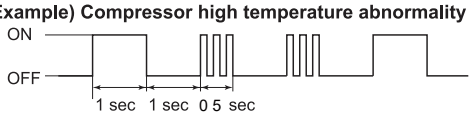
The defrost operation starts when the compressor operating time exceeds 10 minutes during heating operation, as shown below,and the outside air temperature and the outdoor unit heat exchanger temperature meet certain conditions. When the defrost operation starts, the indoor unit fan stops. The defrost operation stops when the out- door unit heat exchanger temperature rises to about 8C or higher or the defrosting time exceeds 10 minutes.



8. Self-diagnostic malfunction code display of Outdoor unit

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

(Example) Compressor high temperature abnormality



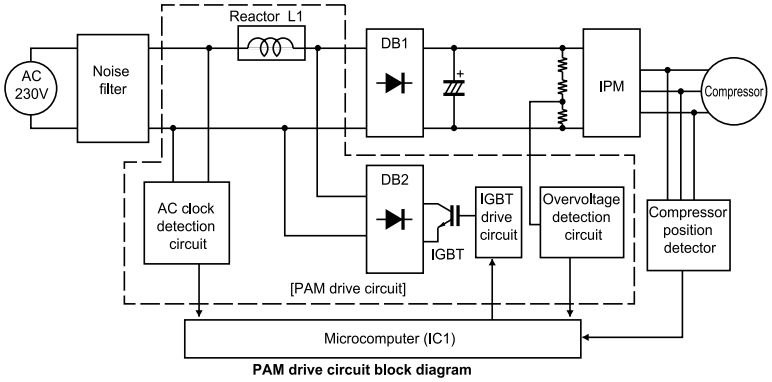
When reading the result of self-diagnosis, you shall combine it with indoor unit indication in order to get a correct conclusion.

For details, please refer to the troubleshooting section.

[3] PAM Circuit

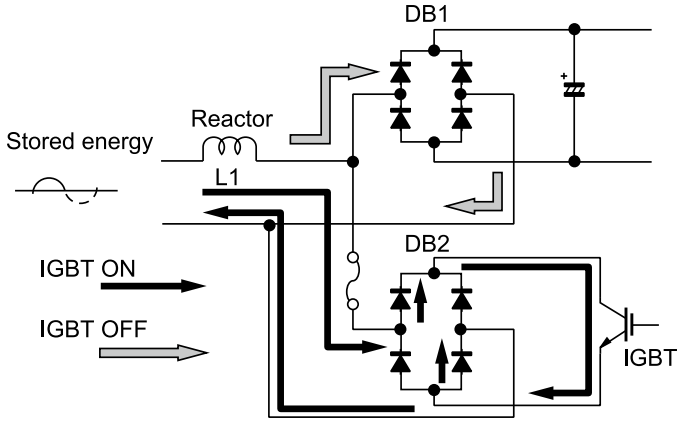
1. PAM (Pulse Amplitude Modulation)

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.



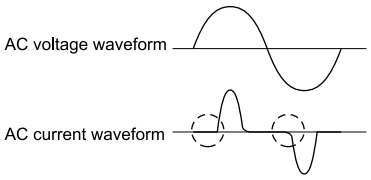
PAM drive circuit block diagram

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

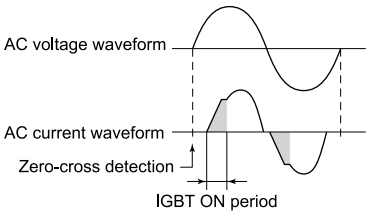


2.High power factor control circuit

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.

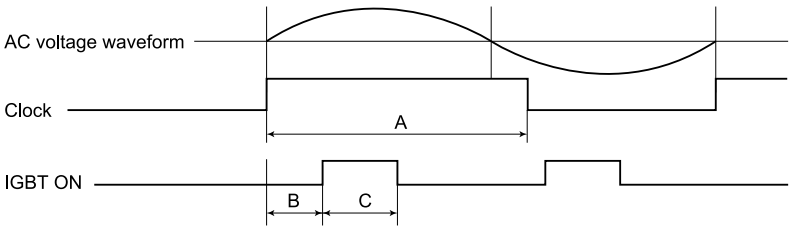


AC voltage and current waveforms when PAM is OFF



AC voltage and current waveform when PAM is ON

1) Detailed explanation of PAM drive circuit sequence



	60 Hz
A	about 9 mS
B	about1.3 mS
C	0.004~1.7 mS

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.

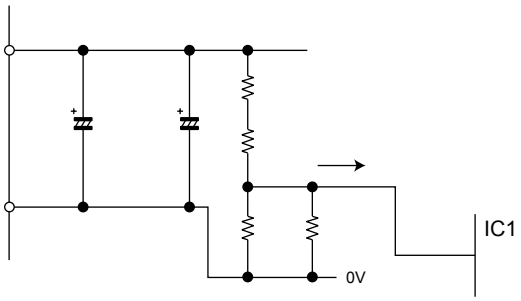
3) IGBT ON start time (delay time B)

- 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

(1) When the DC voltage detection circuit sends a signal exceeding the specified voltage to the microcomputer
DC voltage of 400 V or higher (detection circuit input voltage of about 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.

(2) When the outdoor unit clock waveform differs from the specified value immediately before the PAM IGBT turns ON
When there is no clock waveform input
When a clock signal of other than specified power source frequency (60Hz) is input
– When 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

[4] 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.

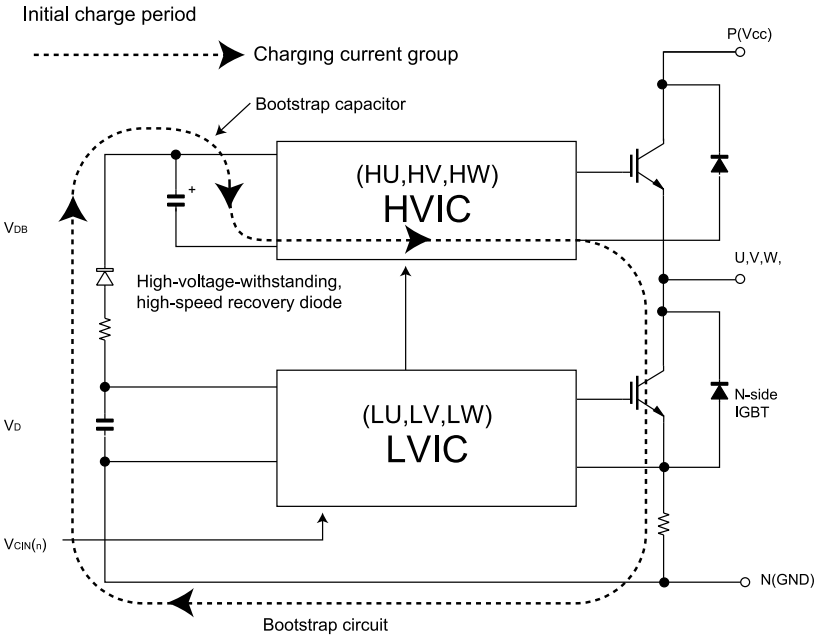
The 15-V power supply for the lower-phase IC is provided by the control printed wiring board (PWB).

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).

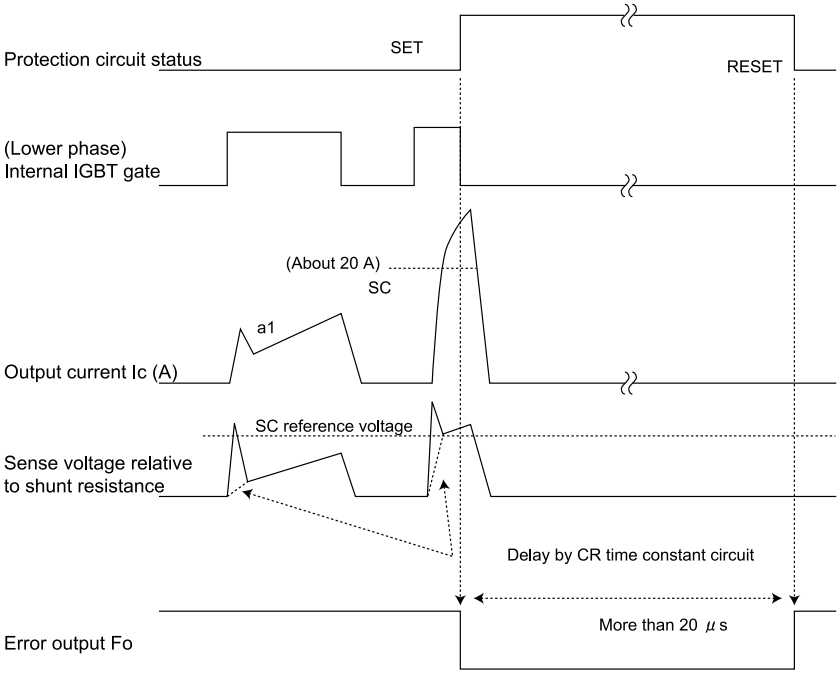
This results in a charging current that flows to the electrolytic capacitor of each upper-phase IC input and charges the bootstrap capacitor with a 15V current.

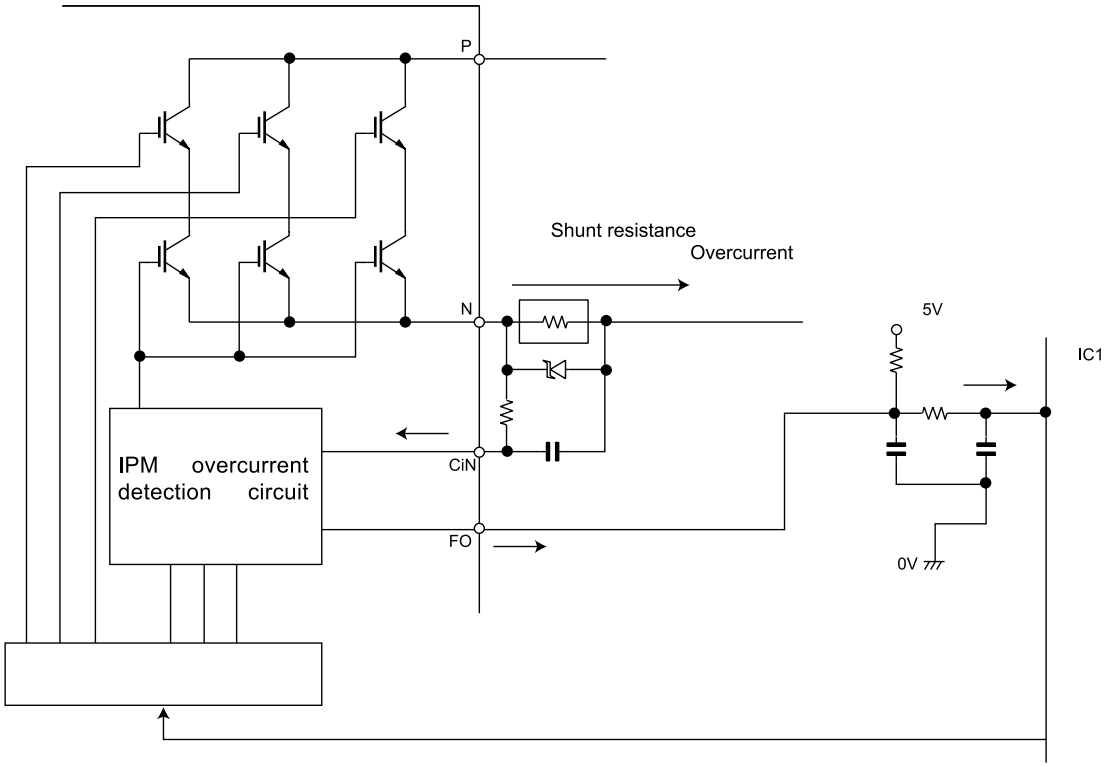
The power supply for the subsequent stages is charged while the lower-phase IGBT is ON in ordinary compressor drive control.



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.




P
N
Shunt resistance
Overcurrent
5V
IC1
IPM overcurrent detection circuit
CiN
FO
0V

CHAPTER 4. FUNCTION AND OPERATION OF PROTECTIVE PROCEDURES

[1] PROTECTION DEVICE FUNCTIONS AND OPERATIONS

* These models have following thermistors

Model	INDOOR UNIT
AY-XP12CHU(-B), AY-XP18CHU	TH1, TH2
AY-XPC12CU, AY-XPC12CQ, AY-XP15CU(-B), AY-XPC18CU(-B), AY-XP24CU	TH1, TH2, TH3

OUTDOOR UNIT
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] HEAT PUMP OPERATION IN THERMISTOR ERROR

* These models have following thermistors

Model	INDOOR UNIT
AY-XP12CHU(-B), AY-XP18CHU	TH1, TH2
AY-XPC12CU, AY-XPC12CQ, AY-XP15CU(-B), AY-XPC18CU(-B), AY-XP24CU	TH1, TH2, TH3

OUTDOOR UNIT
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 heat pump 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.	Heat pump 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.

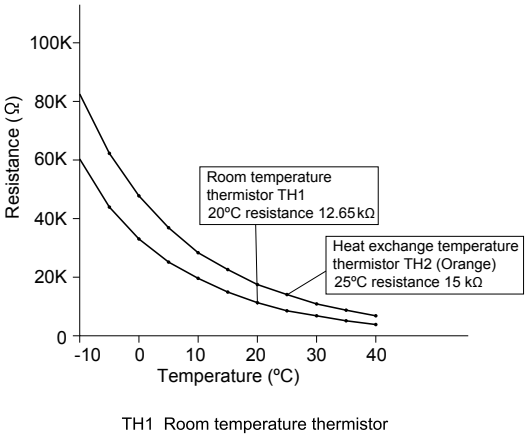
Item	Mode	Control operation	When resistance is low (temperature judged higher than actual)	Short-circuit	When resistance is high (temperature judged lower than actual)	Open-circuit
Outside air temperature thermistor (TH3)	Auto	Operation mode judgment	Cooling mode is activated even if room temperature 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

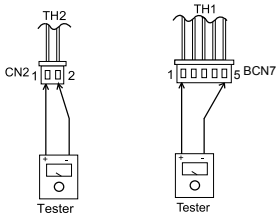
1.Indoor unit

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

AY-XP12CHU(-B), AY-XP18CHU



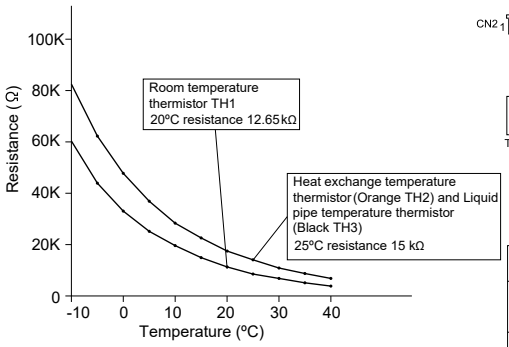
TH1 Room temperature thermistor

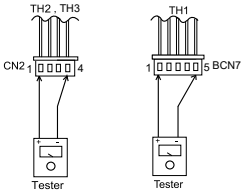


Thermistor	Symbol	Connector	Color
Room temperature	TH1 (BCN7)	① - ⑤	–
Heat exchange temperature	TH2 (CN2)	① - ②	Orange

Before measuring resistance, disconnect connectors as shown above

AY-XPC12CU, AY-XPC12CQ, AY-XP15CU(-B), AY-XPC18CU(-B), AY-XP24CU





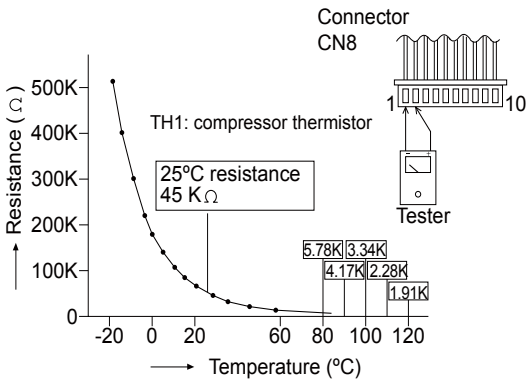
Thermistor	Symbol	Connector	Color
Room temperature	TH1 (BCN7)	① - ⑤	–
Heat exchange temperature	TH2 (CN2)	① - ②	Orange
Liquid pipe temperature	TH3 (CN2)	③ - ④	Black

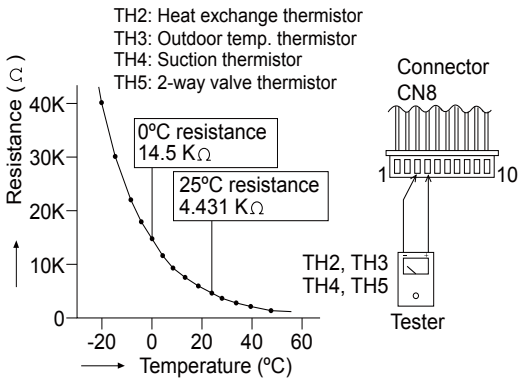
Before measuring resistance, disconnect connectors as shown above

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



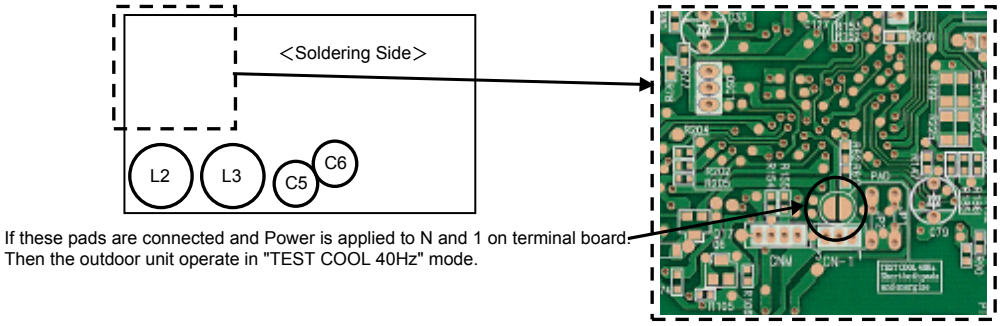


[4] HOW TO OPERATE THE OUTDOOR UNIT INDEPENDENTLY

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:

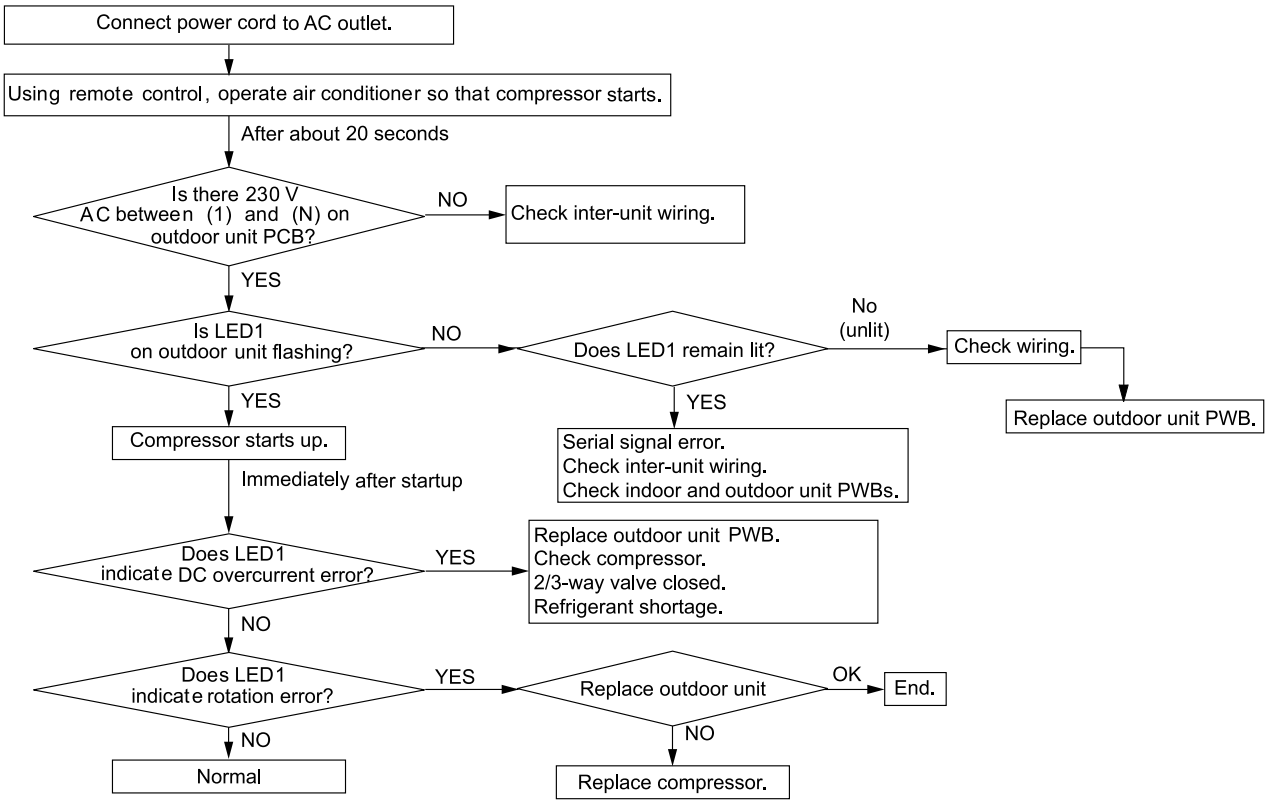
If fuse FU1/FU5 (outdoor unit control circuit board) is blown, be careful of charging voltage in inverter electrolytic capacitor C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models.

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

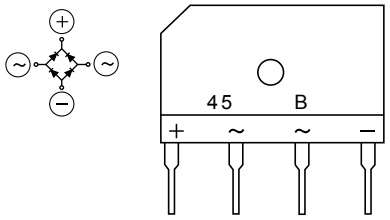
1.Procedure for determining defective outdoor unit IPM/compressor

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.



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

Value in ( ) is for digital tester.

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

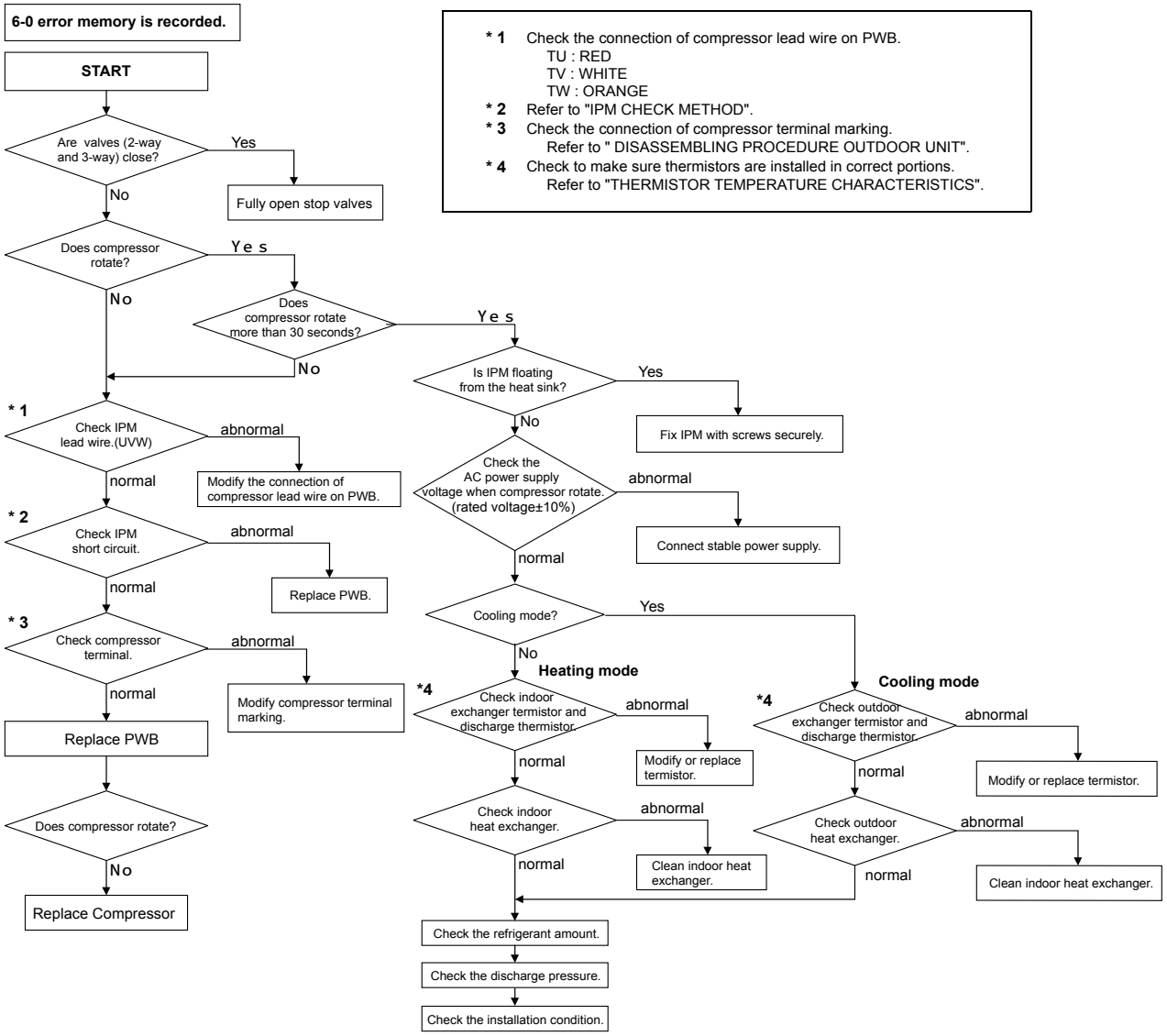
Turn off the power, let the large capacity electrolytic capacitor (C5,C6: For 12K,15K Btu/h models; C8,C9: For 18K,24K Btu/h models) discharge completely, and dismount the IPM. Then, using a tester, check leak current between C and E.
When using a digital tester, the (+) and (-) tester lead wires in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

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

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

Values in ( ) are for digital tester.

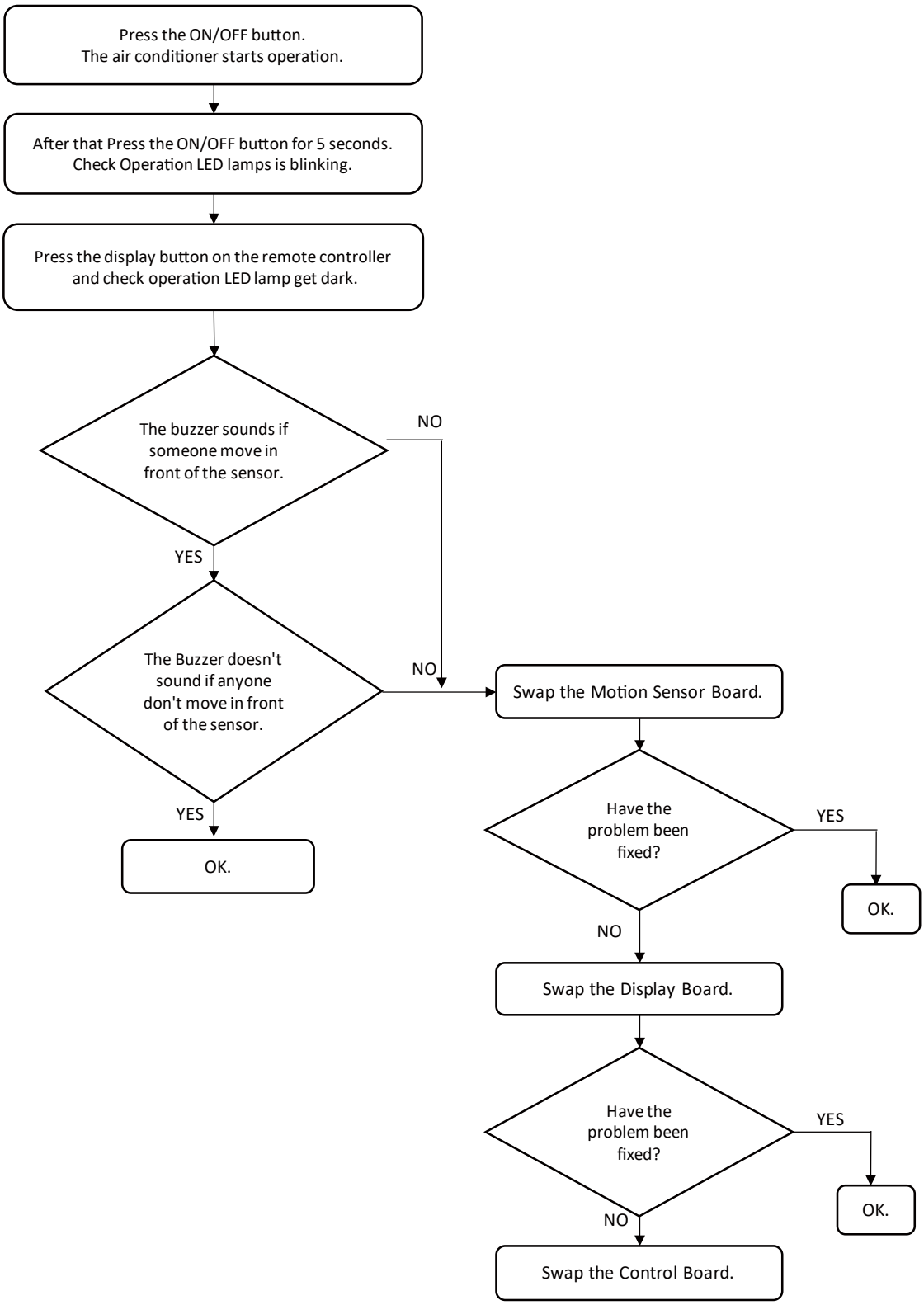
5.DC Over Current Error (6-0 error)



6.Motion sensor trouble-shooting

! CAUTION !

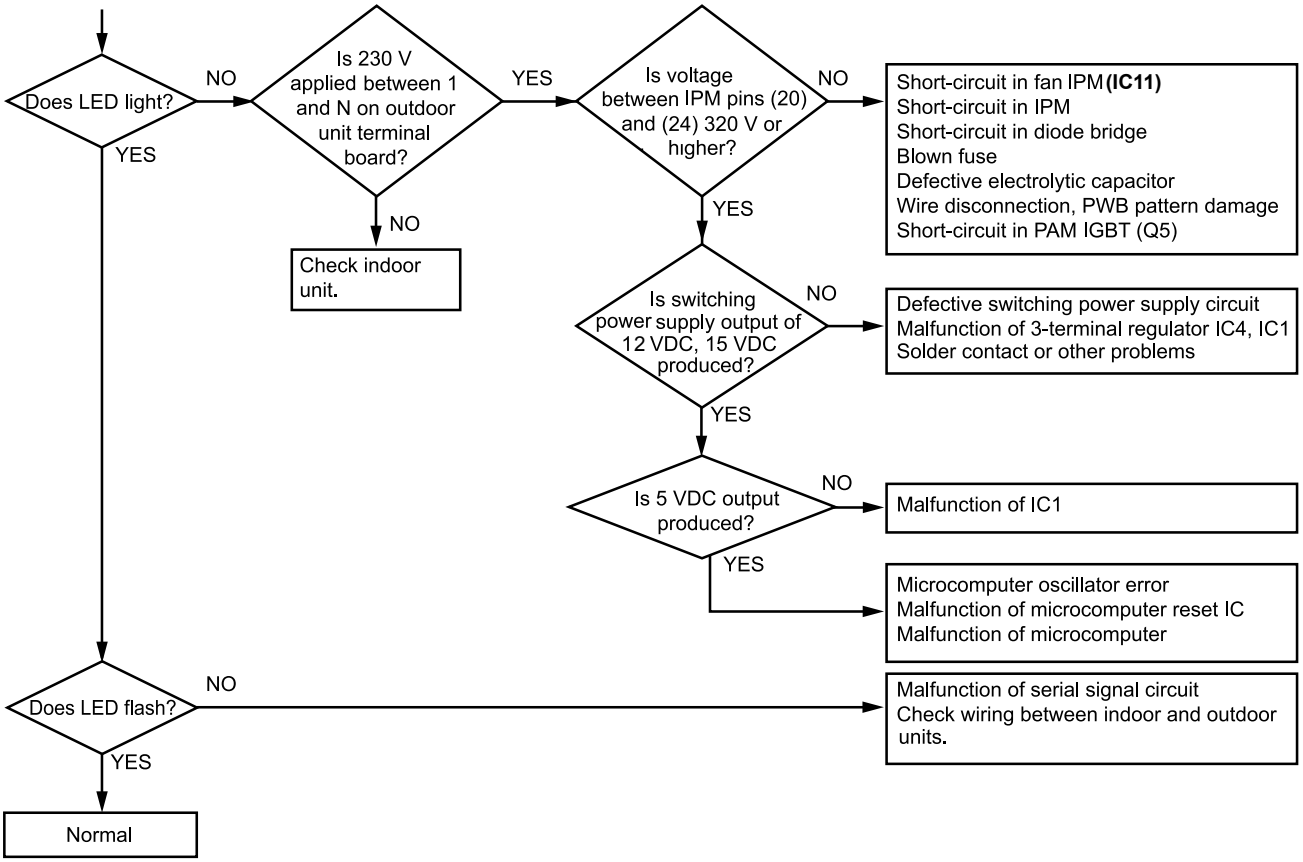
• Sometimes, the buzzer sound is not stable for 3 minutes at just after pluging the power supply.
• Sometimes, the buzzer sound lags behind movement.



[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



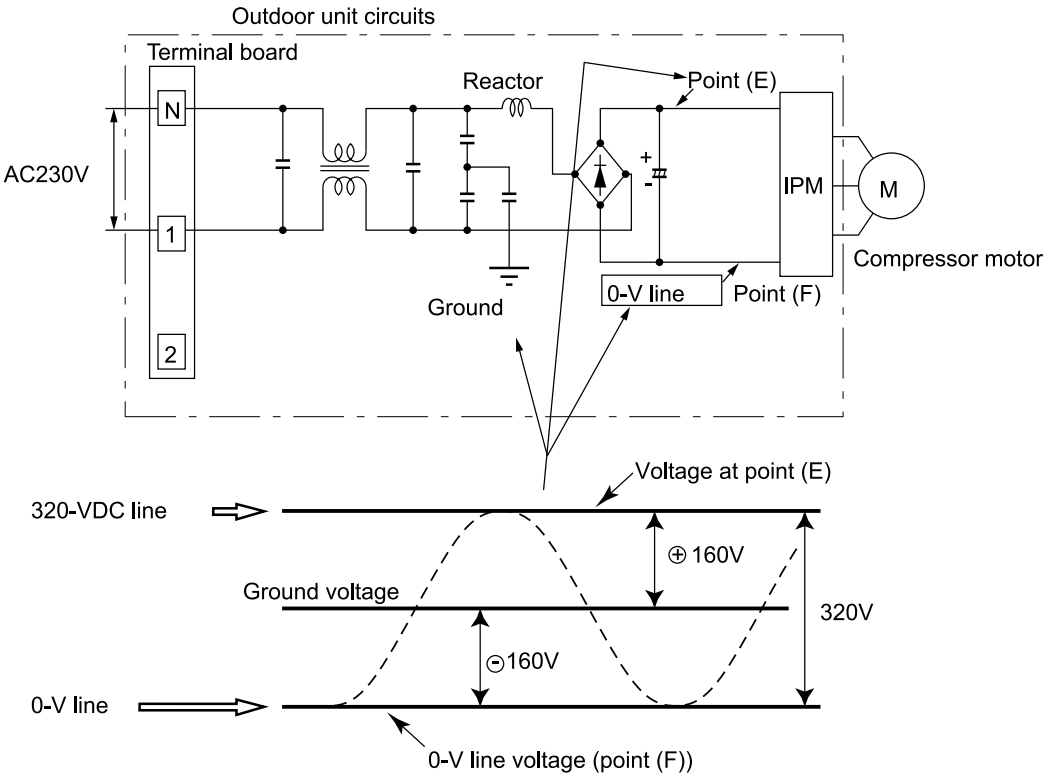
2. Caution in checking printed circuit boards (PWB)

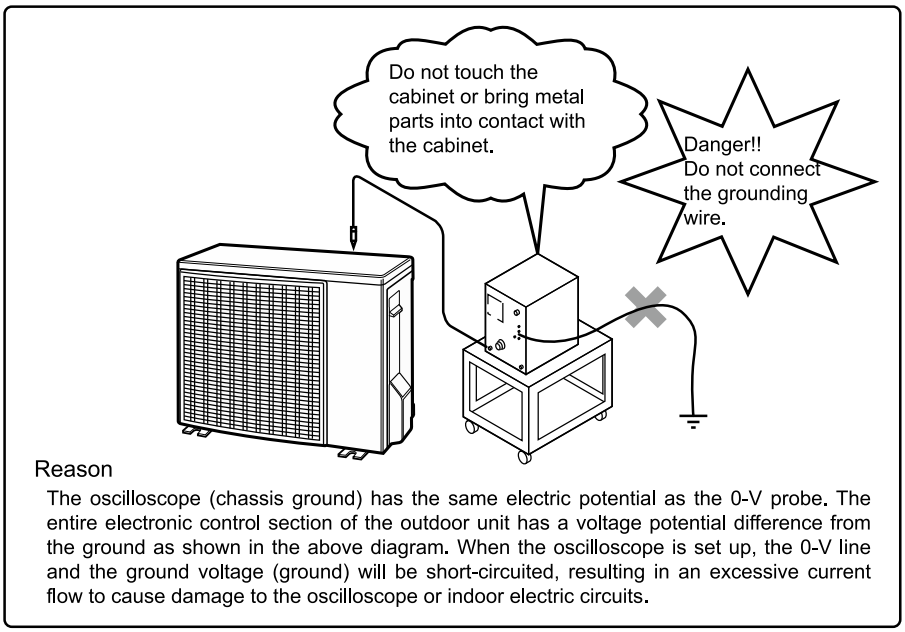
2.1. Non-insulated control circuit

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.





Reason

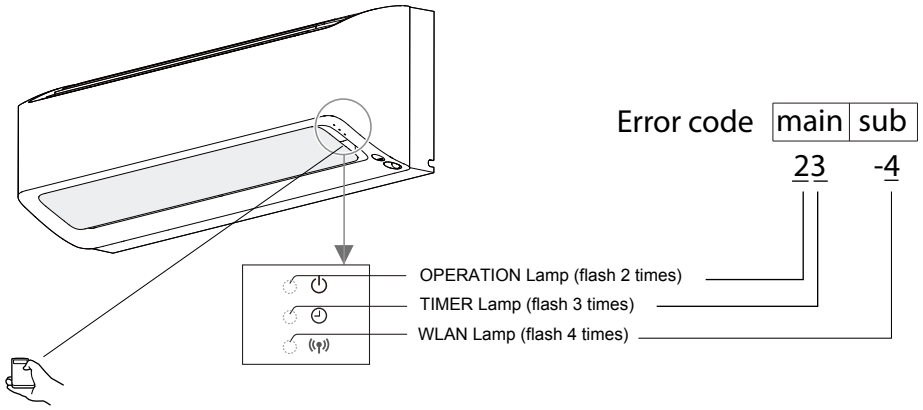
The oscilloscope (chassis ground) has the same electric potential as the 0-V probe. The entire electronic control section of the outdoor unit has a voltage potential difference from the ground as shown in the above diagram. When the oscilloscope is set up, the 0-V line and the ground voltage (ground)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

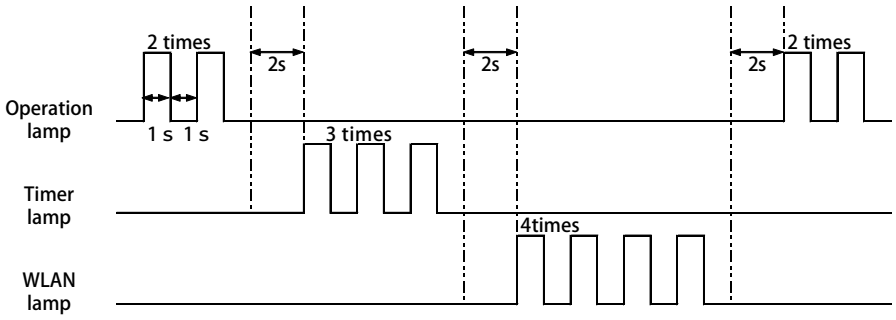
[8] TROUBLESHOOTING GUIDE

1. Self-Diagnosis Function

1.1 Indoor unit

• 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 '  ' 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	Hold down the ON/OFF button for over 5 seconds on the indoor unit when the indoor unit is not operating.	Bip (when hold the button) Bip Bip Bip (after 5 seconds)	Indicate the newest error information
Step 2	Hold down the ON/OFF button for over 5 seconds again.	Bip (when hold the button) Bip Bip (after 5 seconds)	Indeicate the second newest error information
Step 3	Hold down the ON/OFF button for over 5 seconds again.	Bip (when hold the button) Bip Bip Bip (after 5 seconds)	Indeicate the third newest error information
Step 4	Hold down the ON/OFF button for over 5 seconds again.	Bip (when hold the button) Bip Bip Bip Bip(after 5 seconds)	Indeicate the fourth newest error information
Step 5	Hold down the ON/OFF button for over 10 seconds.	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 benifit to distingwish new error and old error.**

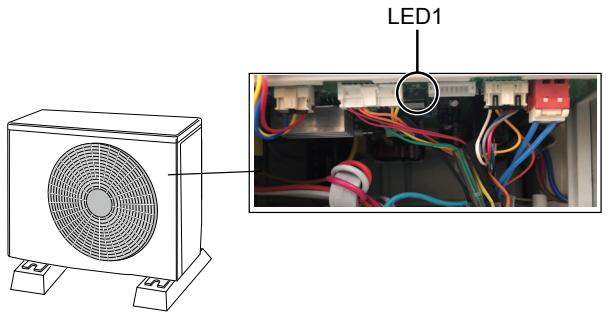
•The indication on unit will stop,

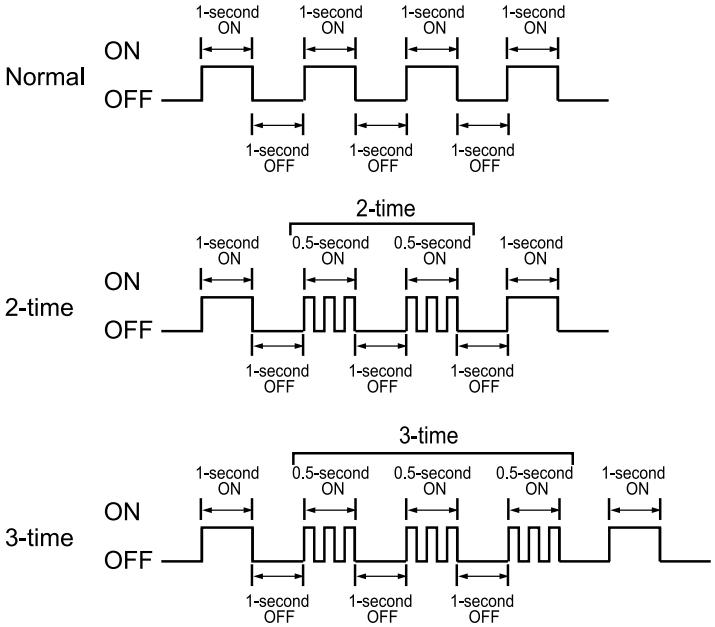
- after indicate for 3 minutes (only at the situation of 2), 3)).
- after indicate for 5 minutes (only at the situation of 4)).
- unit received signal of operation start.
- unit received signal of operation stop.

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".

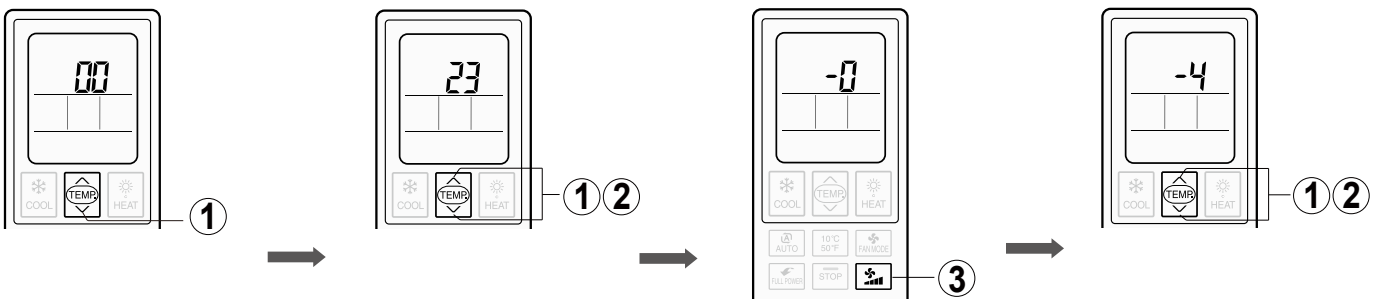
STEP4

• 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

Depending on the model, some errors may not occur.

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.	1) Replace the outdoor unit thermistor assembly. 2) Replace the outdoor unit thermistor assembly.
			1		Outdoor temperature thermistor short circuit error	3) No abnormality found in above inspections 1) and 2).	3) Replace the outdoor unit control PWB assembly.
			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 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.
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.		-
			4		IPM high temperature error	Measure resistance of the heat-sink thermistor.	-
Indoor and outdoor units do not operate.			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 clogging	(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.	1) Ensure unobstructed air flow from the outdoor unit air outlet.
						2) Check the outdoor unit fan for proper rotation.	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.	1) Ensure unobstructed air flow from the outdoor unit air outlet.
						2) Check the outdoor unit fan for proper rotation.	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.	1) Replace the outdoor unit control PWB assembly.
						2) Check if the refrigerant volume is abnormally low.	2) Charge the specified amount of refrigerant.
						3) Check if the refrigerant flows properly.	3) Correct refrigerant clogs. (Stop valve, pipe, expansion valve).

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.	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) Replace the outdoor unit thermistor assembly.
						3) Check the 4-way valve for proper operation.	3) Replace the 4- way valve.
						4) No abnormality found in above inspections (1), through(3).	4) Replace the outdoor unit control PWB assembly.
Indoor and outdoor units do not operate.			4		4 way valve error or Gas leak error.	1) Check the indoor/ outdoor heat exchanger thermistors are installed in correct positions.	1) Correct the installation.
						2) Check if the refrigerant volume is abnormally low.	2) Change the specified amount of refrigerant.
						3) Check the 4-way valve for proper operation.	3) Replace the 4-way valve.
			5		2-way valve and 3-way valve close error	1) Check the 2-way valve and 3-way valve. 2) Check the thermistor (heat exchanger) are installed in correct positions. 3) Check the expansion valve operation.	1) Open the 2-way valve and 3-way valve. 2) Correct the installation. 3) Replace Expansion valve coil or Expansion valve or the outdoor unit control PWB assembly.
Indoor and outdoor units do not operate.	10-time	10	0	EEPROM error	EEPROM (outdoor) data error	-	1) Replace the outdoor unit control PWB assembly.
			1		EEPROM (outdoor) data error		
			2		CPU(outdoor) RAM data error		
			3		CPU error		
			4	EEPROM Mutual memory error	Indoor or outdoor EEPROM data error	-	Rewrite EEPROM data of indoor unit or outdoor unit.
			5	EEPROM Mutual memory error	Indoor or outdoor EEPROM data error 2	-	Rewrite EEPROM data of indoor unit or outdoor unit.

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.	11-time	11	0	Outdoor unit DC fan	Outdoor unit DC fan rotation error	1) Check connector CN3 of the outdoor unit DC fan motor for secure installation. 2) Check the outdoor unit fan motor for proper rotation. 3) Check fuse FUSE5. 4) Outdoor unit control PWB	1) Correct the installation. 2) Replace the outdoor unit fan motor. 3) Replace the outdoor unit control PWB assembly. 4) Replace the outdoor unit control PWB assembly.
			1		Outdoor unit DC fan driver IC error	1) Check if the fan IPM terminal resistance values are uniform.	1) Replace the outdoor unit control PWB assembly.
						2) Outdoor unit fan motor continuity check.	2) Replace the outdoor unit fan.
			2		Outdoor unit DC fan lock error	1) Check if the fan IPM terminal resistance values are uniform.	1) Replace the outdoor unit control PWB assembly.
						2) 1): Normal	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)	-
			4		Detection error of inverter current for DC fan	-	1) Replace the outdoor unit control PWB assembly.
			5		Outdoor unit DC fan open connector error	1) Check connector CN3 of the outdoor unit DC fan motor for secure installation.	1) Correct the installation.
						2) No abnormality found in above inspection 1).	2) Replace the outdoor unit control PWB assembly.
Indoor and outdoor units do not operate.	12-time	12	0	Thermal fuse in terminal board	Thermal fuse error in terminal board (for power supply)	1) Check the thermal fuse in terminal board (for Power supply) 2) Check connector CN5 of the outdoor unit. 3) 1) 2): Normal	1) Replace terminal board for Power supply. 2) Correct the installation. 3) Replace the outdoor unit control PCB 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		
Indoor units operate.			3		over current pause	(pause to protect the outdoor unit control PWB)	-
Indoor and outdoor units do not operate.	14-time	14	0	Outdoor unit PAM	PAM over voltage error	1) Check the AC power supply voltage for fluctuation.	1) Correct the installation.
						2) No abnormality found in above inspection.	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.	1) Correct the installation.
						2) No abnormality found in above inspection.	2) Replace the PWB assembly.
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.	1) Connect stable power supply. Correct the wiring.
						2) Check voltage between N and 1 the indoor/outdoor unit terminal boards.	2) Replace the outdoor unit control PWB assembly.
						3) Check the outdoor unit fuse.	3) Replace the fuse/ outdoor unit control PWB assembly.
						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.	4) Replace the outdoor unit control PWB assembly.
						5) No abnormality found in above inspections 1) through 4).	5) Replace the outdoor unit control PWB board.
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.
Indoor and outdoor units do not operate.			1		Serial erroneous wiring	1) Check the wiring between units.	1) Correct the wiring.
Indoor and outdoor units can operate.			2	High speed serial error	-	Check the wiring between unit.	1) Correct the wiring. 2) Replace the outdoor unit control PWB board. 3) Replace the indoor unit control PWB board.

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
			4	EEPROM Mutual memory error	Indoor or outdoor EEPROM data error	-	Rewrite EEPROM data of indoor unit or outdoor unit.
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.
			1		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.
			2		Internet communication error		
			3		communication with server error		
Indoor and outdoor units operate	Normal blinking or OFF	25	1	AC clock error	-	Check the circuit of making AC clock	Replace the indoor unit control PWB
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.
			2	Indoor unit heat exchanger thermistor	Indoor unit heat exchanger thermistor		
			3	Indoor unit liquid pipe thermistor	Indoor unit liquid pipe 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					Notes
	OPERATION (BLUE)	OPERATION (GREEN)	TIMER (ORANGE)	WLAN (GREEN)	PLASMACLUSTER (BLUE)	
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-XP12CHU, AY-XP18CHU)
					☼	
	Blinking for 1 minute at a start of any operation mode.					Cumulative operation hours over 19,000 hours(※ 2) (Only for following models: AY-XP12CHU, AY-XP18CHU)
					☼	
Filter Cleaning Recommendation	Operation LED lamp blinks blue and green alternately.					Cumulative operation hours over 720 hours. Press ON/OFF button for 2 seconds to reset hours.
	☼	☼				
-27°C(-17°F) Auto OFF	Continuous blinking.					The unit turns off automatically when outside temperature is below -27°C (-17°F) and prevent damages to the outdoor unit.
		☼	☼	☼		

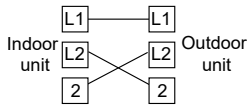
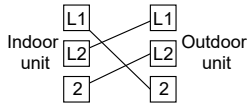
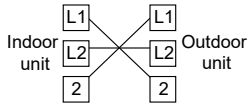
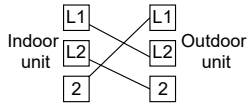
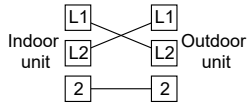
※ 1 : If PLASMACLUSTER operates over 17,500 hours, the PLASMACLUSTER lamp will blink 10 seconds then turns off.
The LED lamp will blink as above when the unit starts PLASMACLUSTER operation again.
In this case, although the PLASMACLUSTER lamp turns off, PLASMACLUSTER ions are still released.
Other operations (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

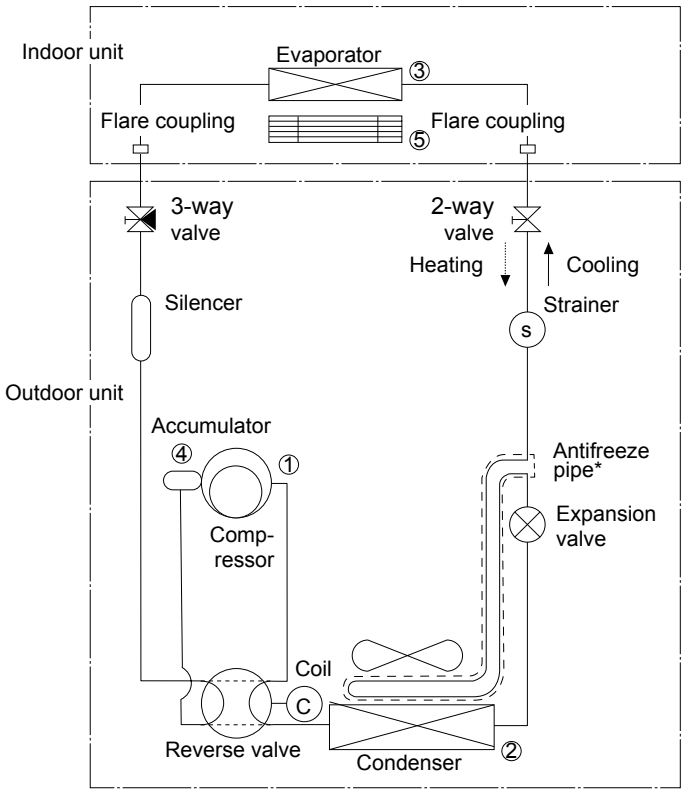
When EEPROM data has errors/problems at power supply connection, buzzer will beep continuously and all LED lamps remain OFF.

Malfunction indications due to wiring error during installation.

	Inter-unit wiring error mode	Symptoms
1		The unit stops operation. Malfunction diagnosis displays nothing. (Remote control also displays nothing when malfunction code is called out.)
2		The unit stops operation. Malfunction diagnosis displays nothing. (Remote control also displays nothing when malfunction code is called out.)
3		The unit stops operation. Malfunction diagnosis displays “18-1”. (Remote control also displays “18-1” when malfunction code is called out.)
4		The unit stops operation. Malfunction diagnosis displays nothing. (Remote control also displays nothing when malfunction code is called out.)
5		The unit stops operation. Malfunction diagnosis displays “18-1”. (Remote control also displays “18-1” when malfunction code is called out.)

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-XPC12CU, AY-XPC12CQ				AY-XP12CHU			
	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(℃)	13	16	49	33	15	15	46	33
Temp. on (1) °F(℃)	87	69	94	65	85	82	103	72
Temp. on (2) °F(℃)	40	40	2	3	40	40	0	0
Temp. on (3) °F(℃)	10	14	44	27	15	15	37	25
Temp. on (4) °F(℃)	10	15	1	5	16	16	-3	3

Model	**AY-XP15CU(-B)**			
	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(℃)	14	15	44	33
Temp. on (1) °F(℃)	95	82	99	71
Temp. on (2) °F(℃)	40	40	0	1
Temp. on (3) °F(℃)	15	16	33	25
Temp. on (4) °F(℃)	14	16	-1	4

Model	**AY-XPC18CU(-B)**				**AY-XP18CHU**			
	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(℃)	12	15	43	33	12	15	45	33
Temp. on (1) °F(℃)	96	59	94	65	96	59	99	65
Temp. on (2) °F(℃)	38	38	3	3	38	38	3	3
Temp. on (3) °F(℃)	14	16	25	22	14	16	27	22
Temp. on (4) °F(℃)	4	12	0	3	4	12	-1	3

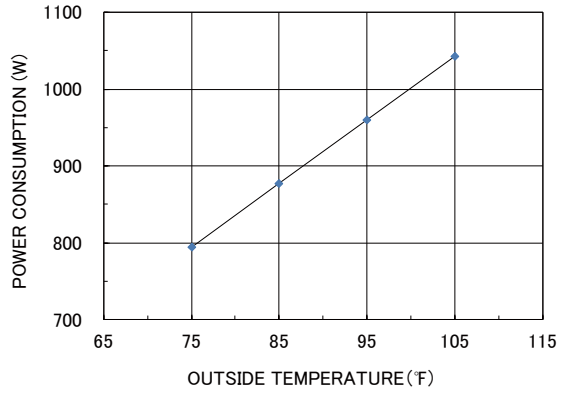
Model	**AY-XP24CU**			
	Cooling		Heating	
Mode	Max *1	Test Run *2	Max *1	Test Run *2
AC Current (A)	12.8	4.3	11.7	3.9
3-way valve pressure (MPaG)	0.7	1.1	3.1	2.2
Outlet Air Temp. on (5) °F(℃)	12	16	45	33
Temp. on (1) °F(℃)	99	61	99	65
Temp. on (2) °F(℃)	39	37	3	3
Temp. on (3) °F(℃)	15	16	27	22
Temp. on (4) °F(℃)	2	12	-1	3

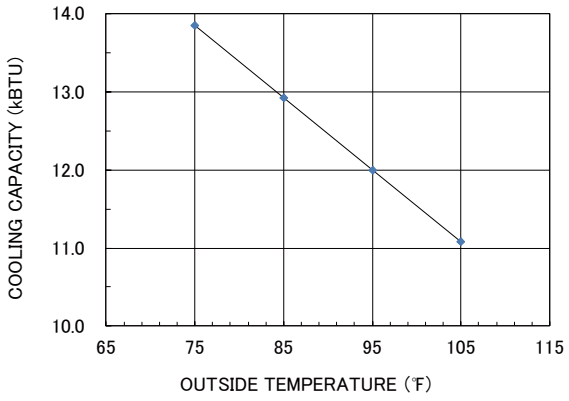
[4] PERFORMANCE CURVES

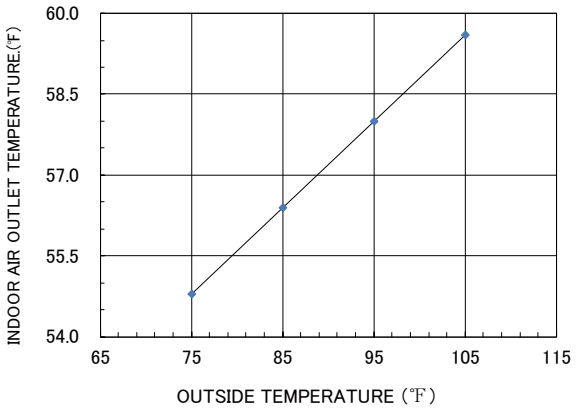
NOTE
1) Indoor fan speed: High
2) Indoor air temp.: Cooling 80°F
3) Power source: 230V, 60Hz

AY-XPC12CU, AY-XPC12CQ

COOLING







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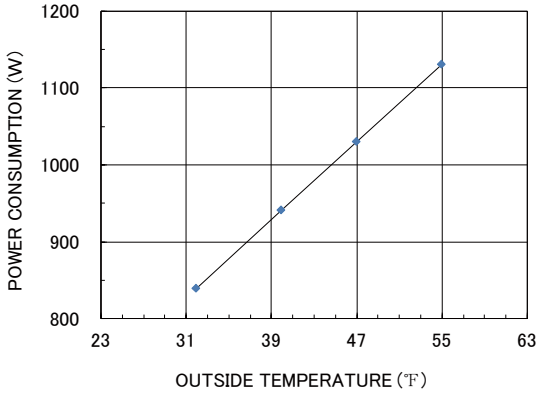
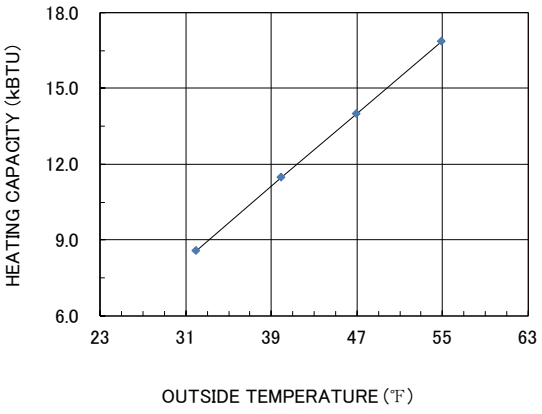
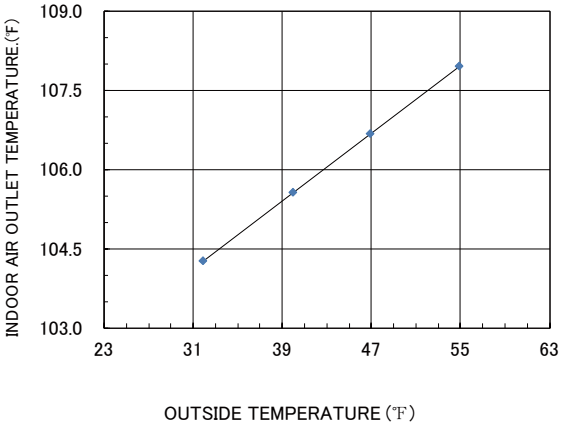
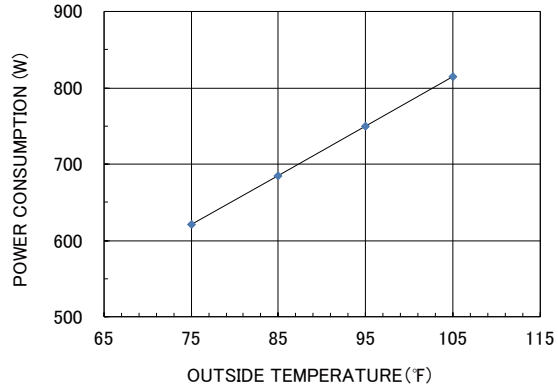


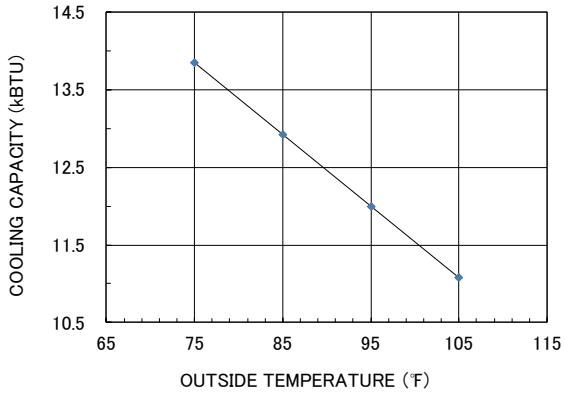


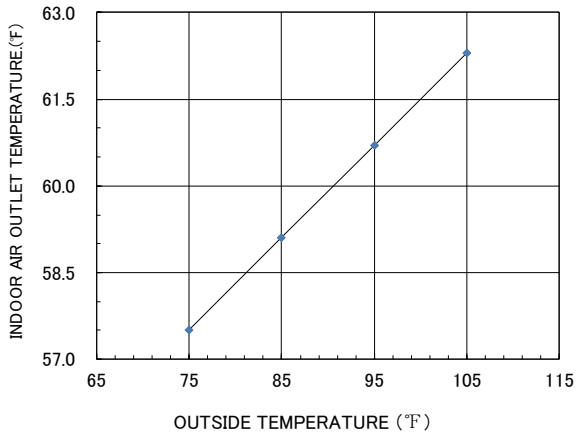


AY-XP12CHU

COOLING







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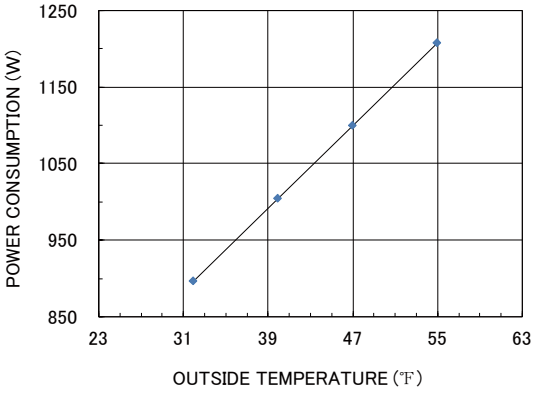
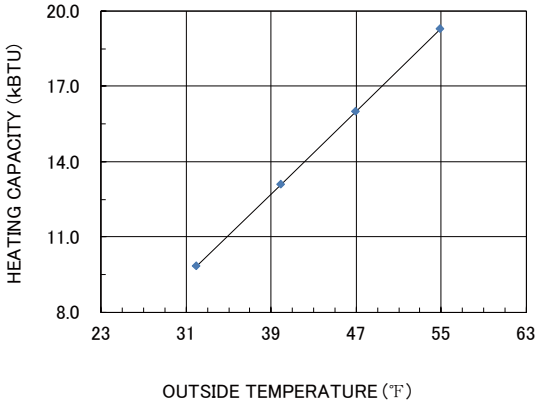
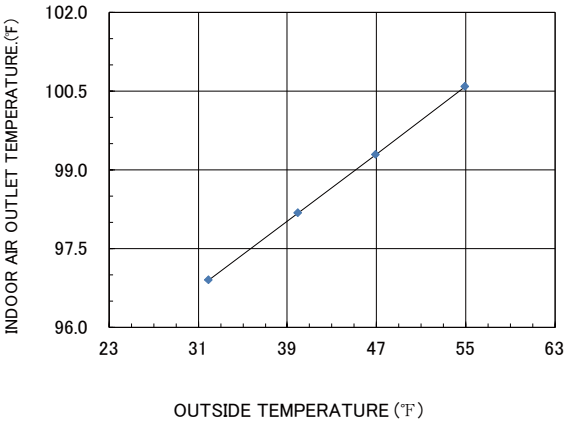
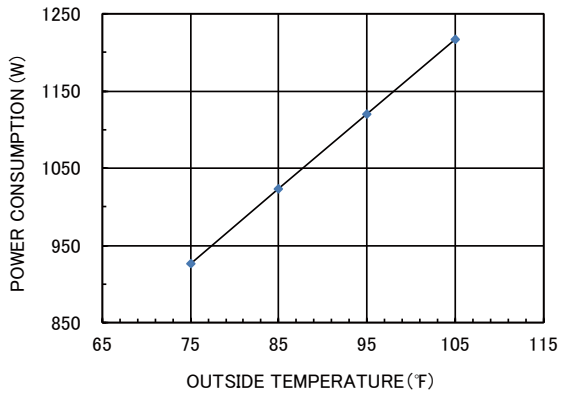


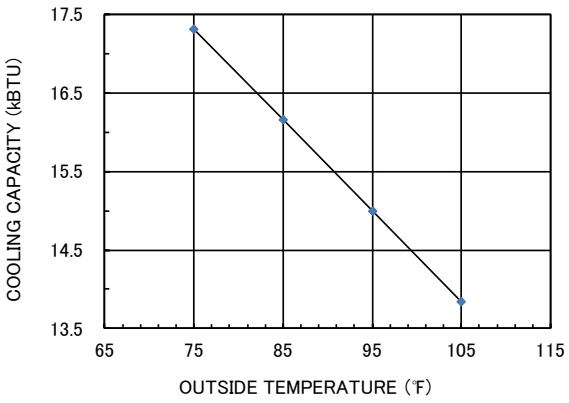


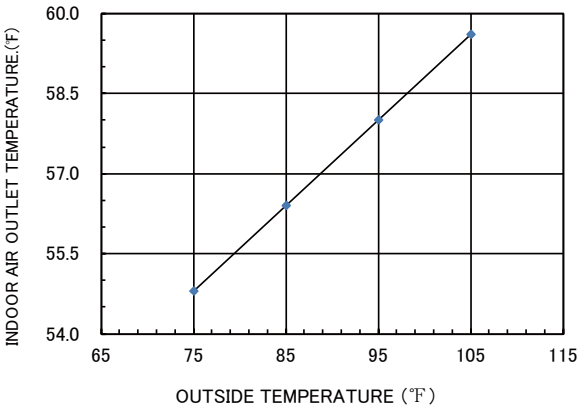


AY-XP15CU(-B)

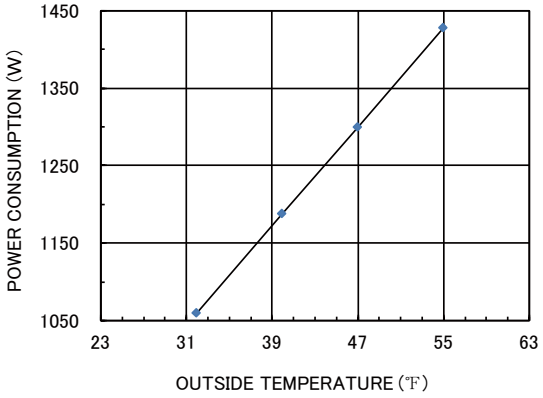
COOLING

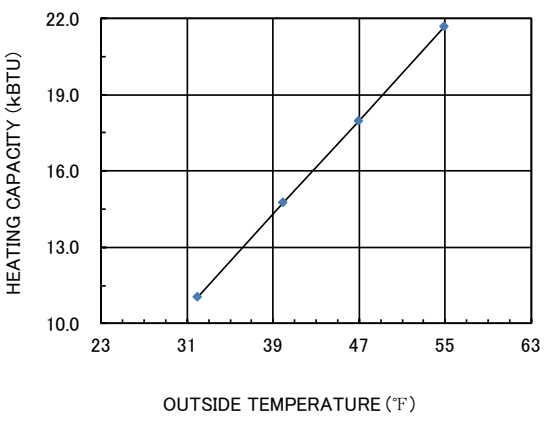


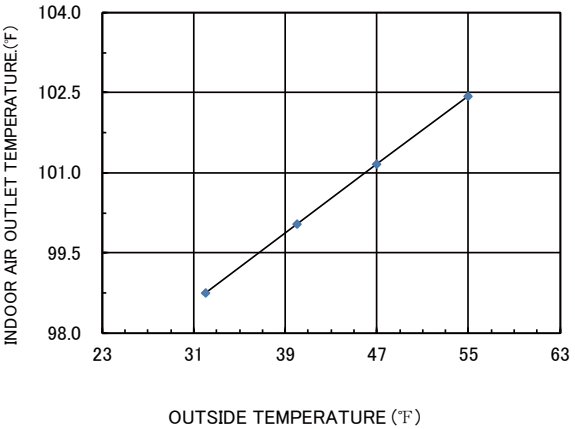




HEATING

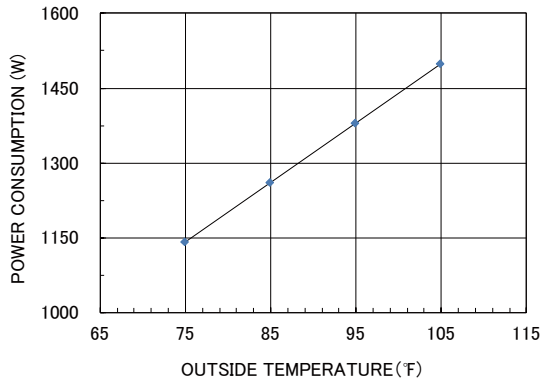


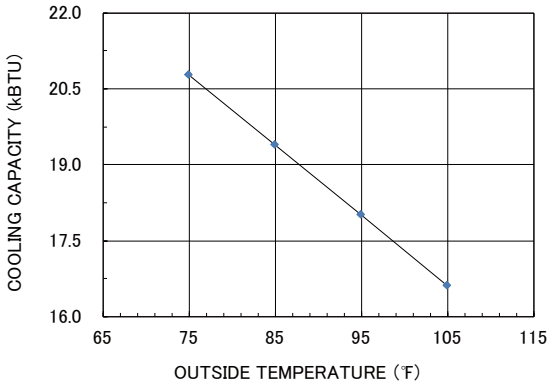


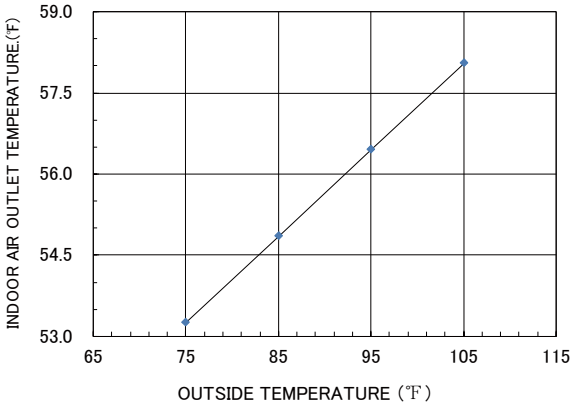


AY-XPC18CU(-B)

COOLING







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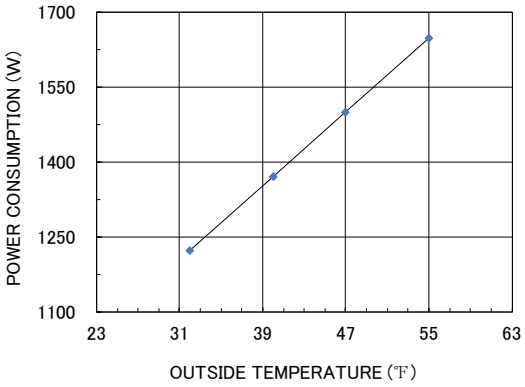
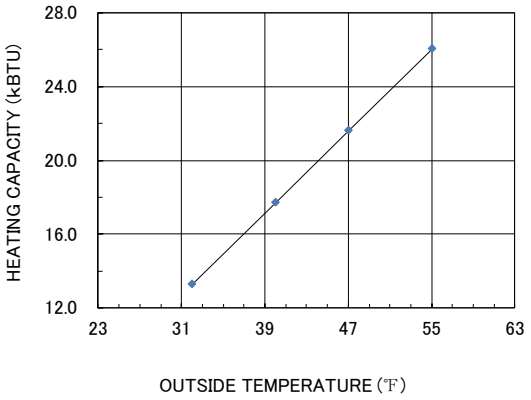
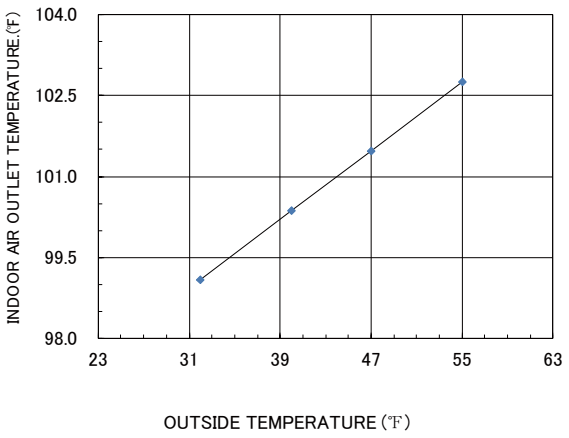
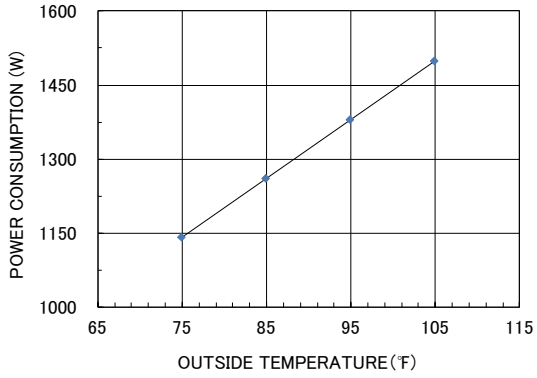


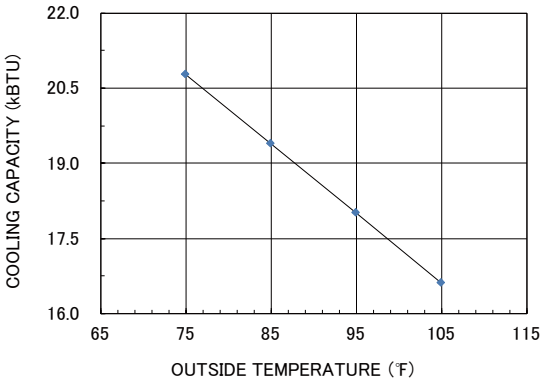


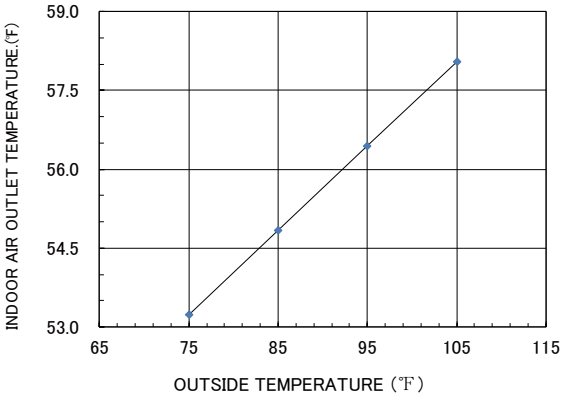


AY-XP18CHU

COOLING







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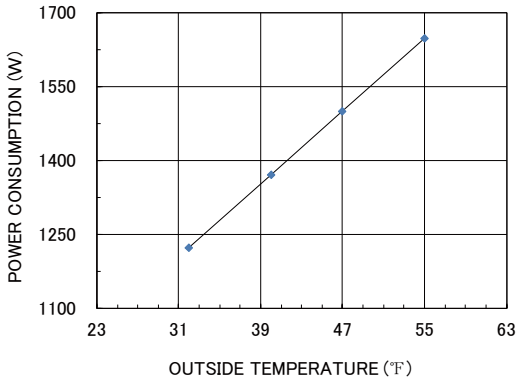
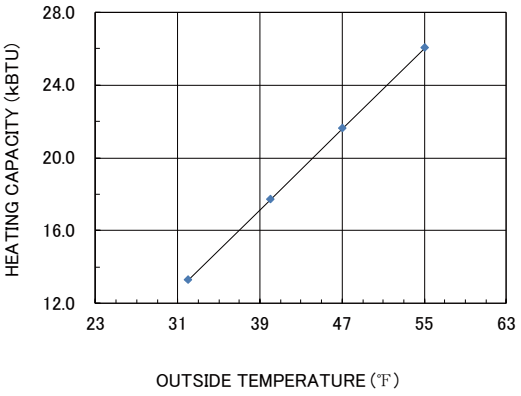
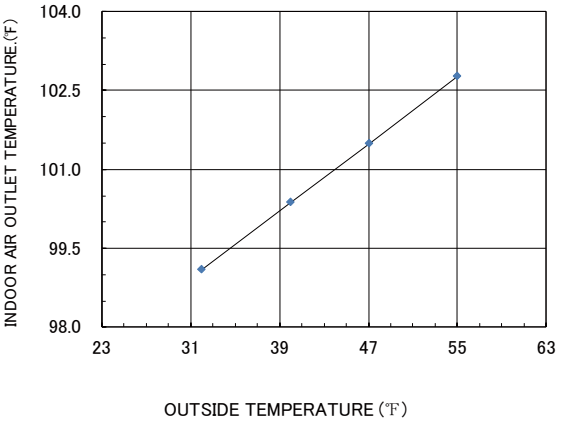
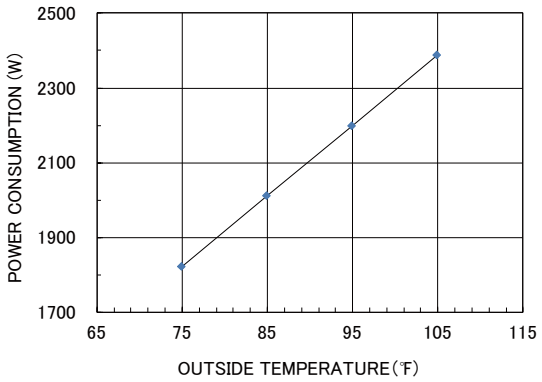


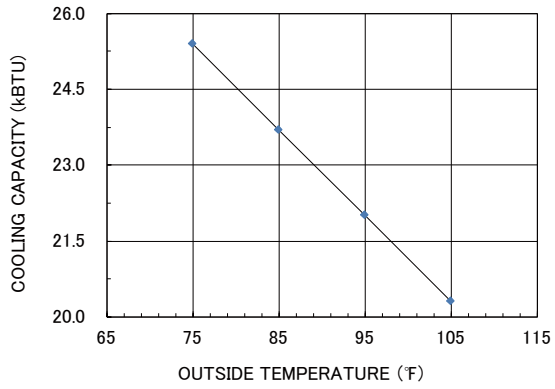


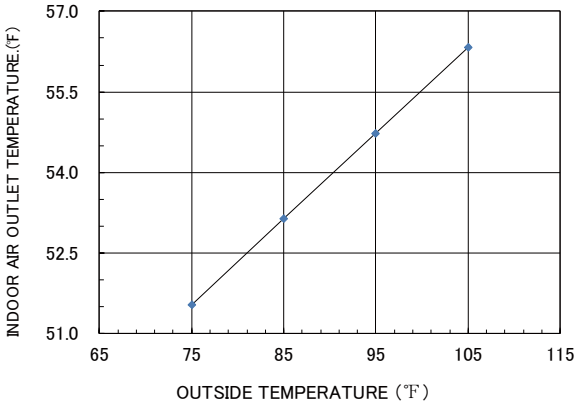


AY-XP24CU

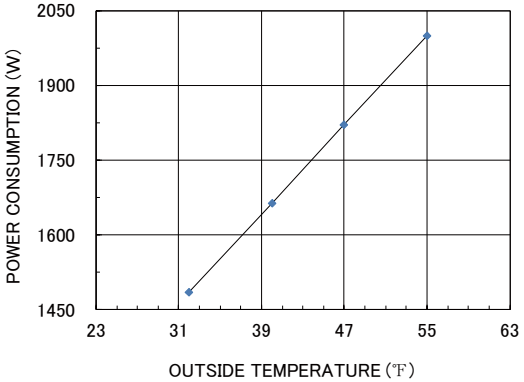
COOLING

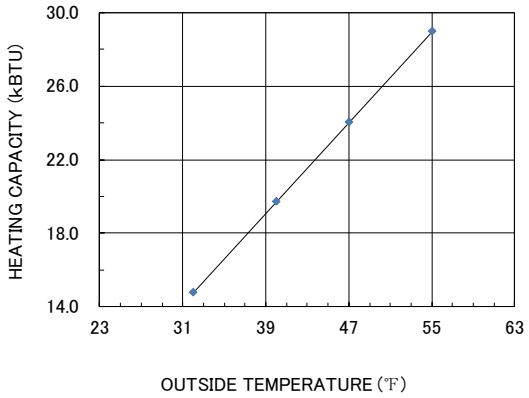


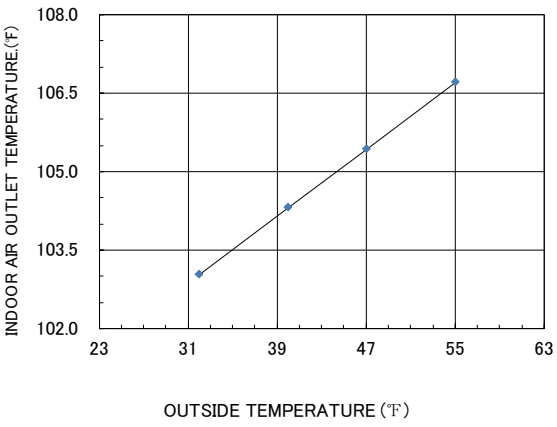




HEATING







CHAPTER 6. DISASSEMBLY PROCEDURE

When carrying out repairs and modifications that require the use of arc- and flame-producing equipment such as welding, brazing, and soldering apparatus, ensure the work area is thoroughly ventilated before beginning. During the work, keep any mechanical ventilation systems in constant operation and all windows and doors open. For repairs involving parts of the refrigerant circuit, not only the technician, but also an additional observer must be present to monitor and assist with the procedure.

Necessary protective equipment must be available. When working with open flames or arcs, keep fire extinguishing equipment readily accessible. Only qualified technicians may perform welding and brazing operations.

Always disconnect the power cord from the AC power outlet before starting disassembly procedures. When reassembling the unit after repairs, reinstall all screws in their original positions. Note that screws may differ in specifications including corrosion-resistant treatment, tip shape, and length.

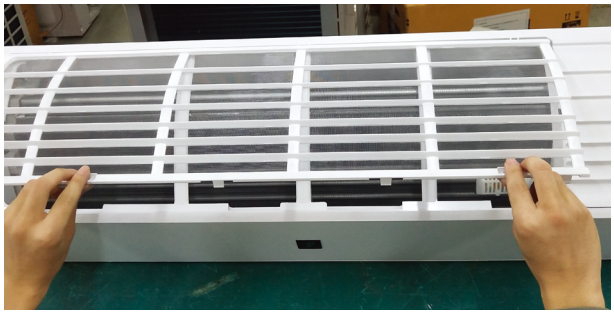
The screws used are not the same in specifications such as corrosion-resisstant treatment, tip shape and length.

After completing heat pump repairs or part replacements, measure the insulation resistance of the equipment using an insulation resistance meter. If the measured resistance is below 1 MΩ, inspect all components and repair or replace any defective parts.

[1] INDOOR UNIT

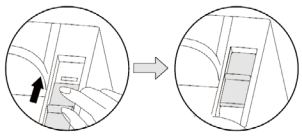
1. MAIN UNIT (For AY-XPC12CU, AY-XPC12CQ models)

1) Lift Top Grille by the handles and remove it.

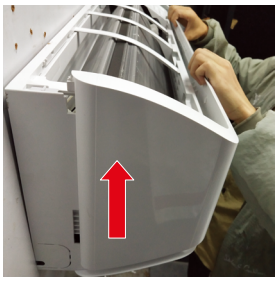


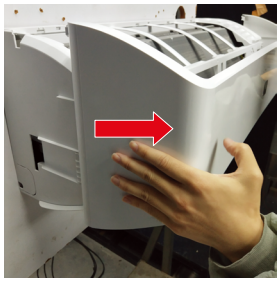
2) Remove Open Panel as below step.

- Unlock Panel Lock (Right and left side).



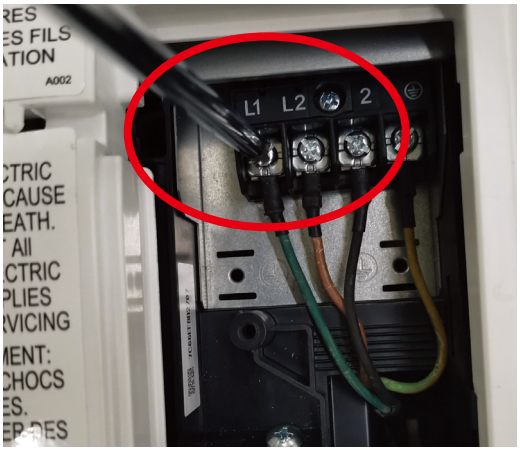
- Lift the Open Panel, then slide the Open Panel's Hook along the guides on both sides to remove it.





3) Remove a scerw fixing the Cord Holder, then pry open the Cord Holder and remove it.

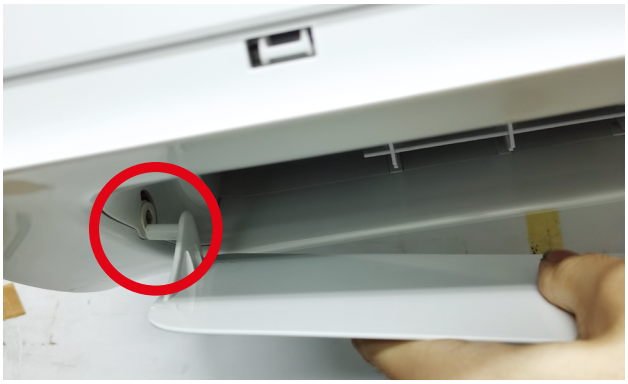
4) Loose the screw on Terminal Board to remove unit-to-unit wiring.



5) Remove the Horizontal louver.

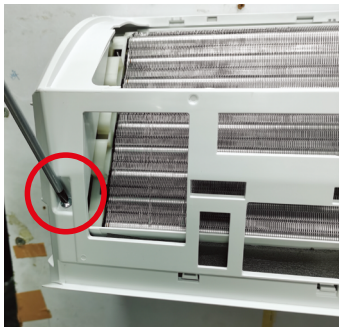
- Lift and remove the central shaft of the Horizontal louver.

- Take it out from the left side by shaking the Horizontal louver.

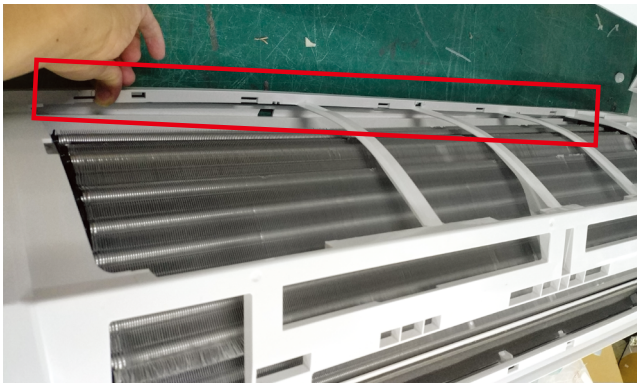


- Take it out by moving the Horizontal louver to left side.

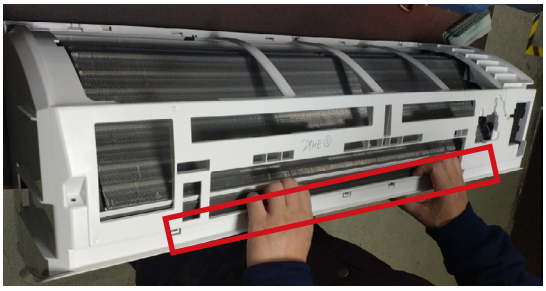
6) Remove two screws fixing the Front Panel.



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

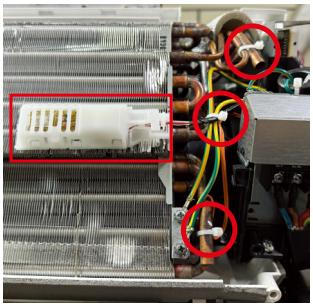


- Pull the bottom side to release these hooks.

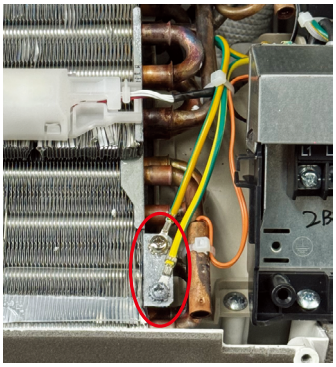


- Press below areas to release the Front Panel from inside hooks, then pull the Front Panel out.

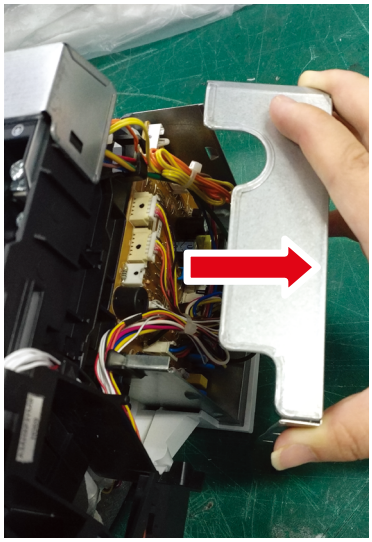
7) Cut the wire fixing bands and remove Thermistor.



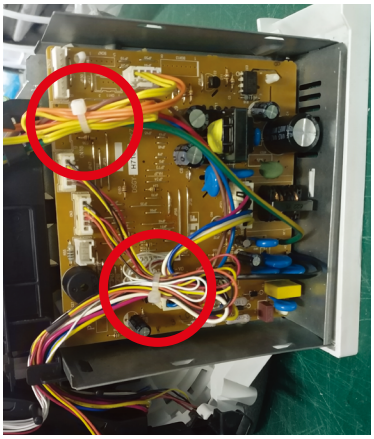
8) Remove two screws fixing the earth wire.



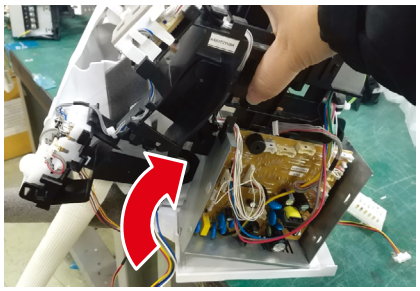
9) Remove the Contorl Box Cover.



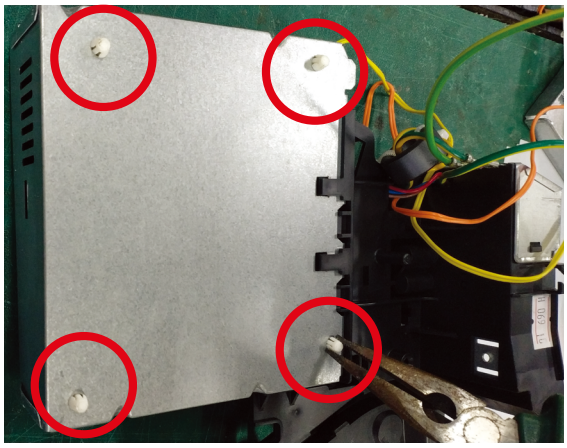
10) Cut two bands and remove all the connectors.



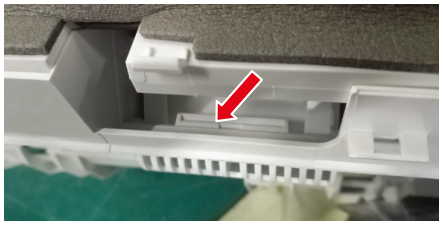
11) Remove one screw near Terminal Board as below, then rotate the Terminal Holder to take it out.

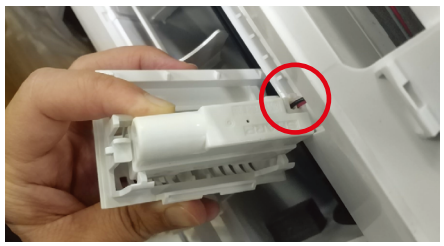


12) Use a pincer to press four spacers into the Control Angle to remove the PWB.



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

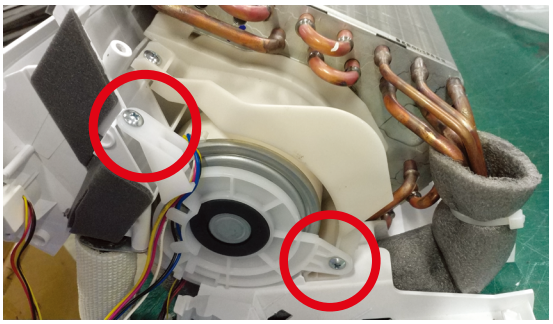




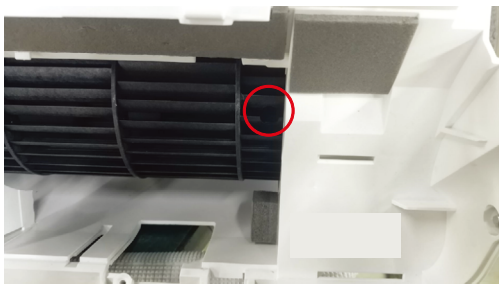
14) Remove the screw of Louver Motor, then take the Louver Motor out.

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

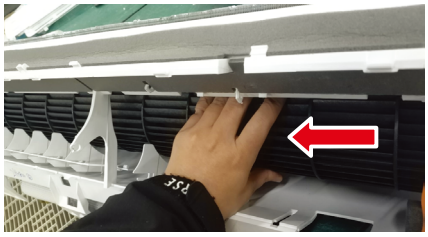
16) Remove two screws, then remove Motor Cover.

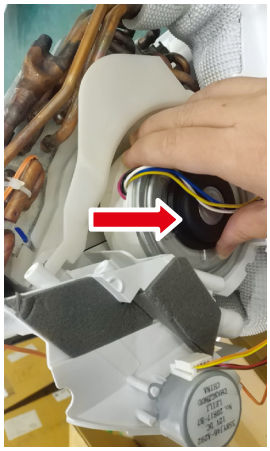


17) Remove one screw between Cross Flow Fan and Fan Motor.



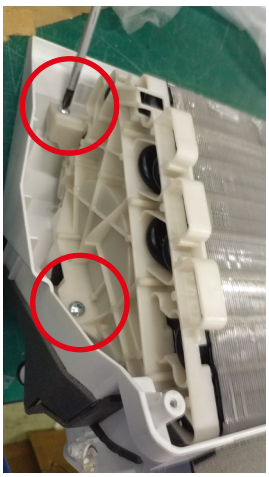
18) Take Fan Motor out by holding and pressing the Cross Flow Fan to left side as much as possible.





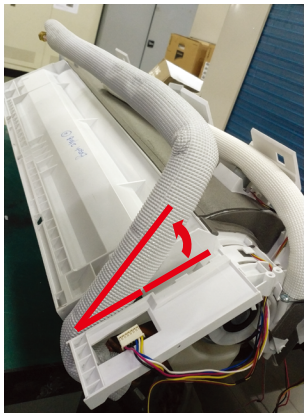
19) Remove one screw on Side Cover R.

20) Remove two screws on Side Cover L.



21) Push the Pipe Holder to remove it.

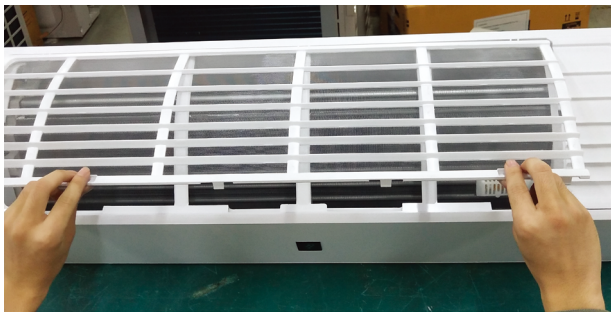
22) Widen the angle between Pipe Dan-S and Cabinet Sub. Then take the Evaporator out.



23) Take Corss Flow Fan out.

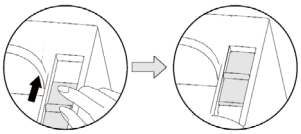
2. MAIN UNIT (For AY-XP15CU(-B), AY-XPC18CU(-B), AY-XP24CU models)

1) Lift Top Grille by the handles and remove it.



2) Remove Open Panel as below step.

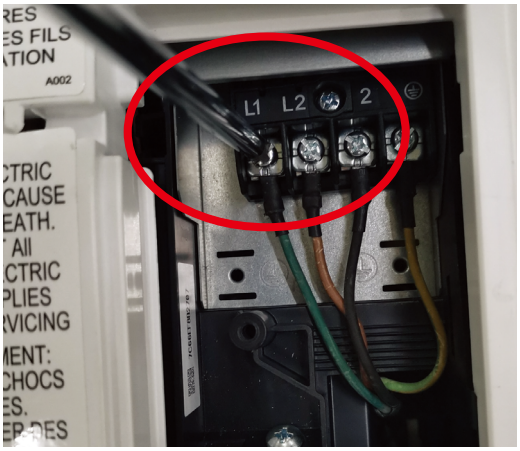
- Unlock Panel Lock (Right and left side).



- Lift the Open Panel, then slide the Open Panel's Hook along the guides on both sides to remove it.

3) Remove a scerw fixing the Cord Holder, then pry open the Cord Holder and remove it.

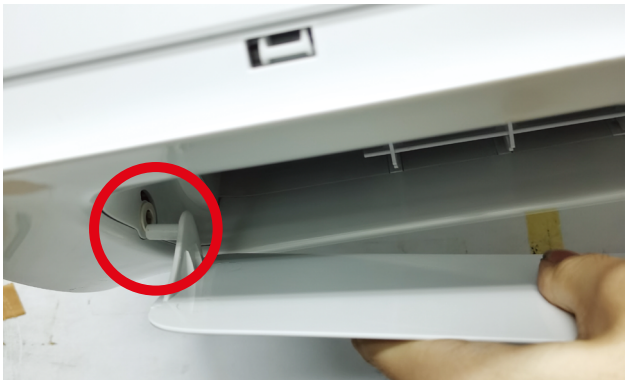
4) Loose the screw on Terminal Board to remove unit-to-unit wiring.



5) Remove the Horizontal louver.

- Lift and remove the central shaft of the Horizontal louver.

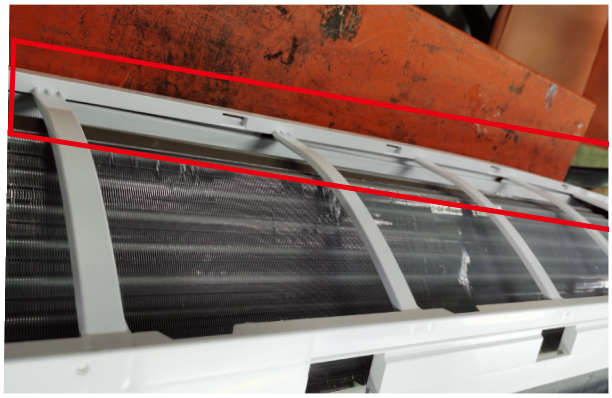
- Take it out from the left side by shaking the Horizontal louver.



- Take it out by moving the Horizontal louver to left side.

6) Remove two screws fixing the Front Panel.

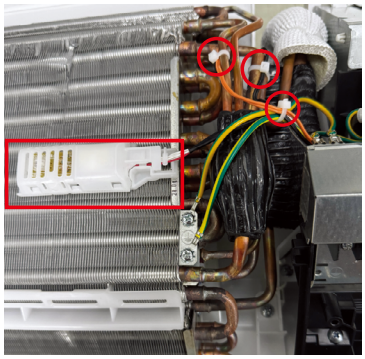
- Pull the top side of Front Panel to release the hooks.



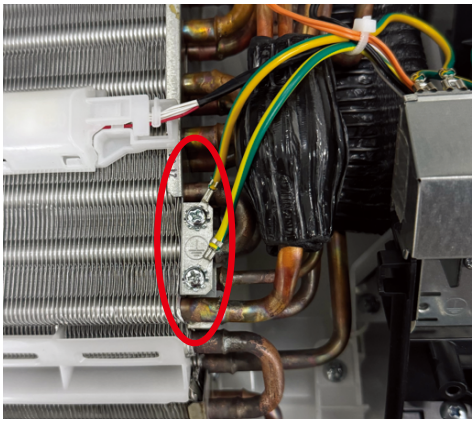
- Pull the bottom side to release these hooks.

- Press below areas to release the Front Panel from inside hooks, then pull the Front Panel out.

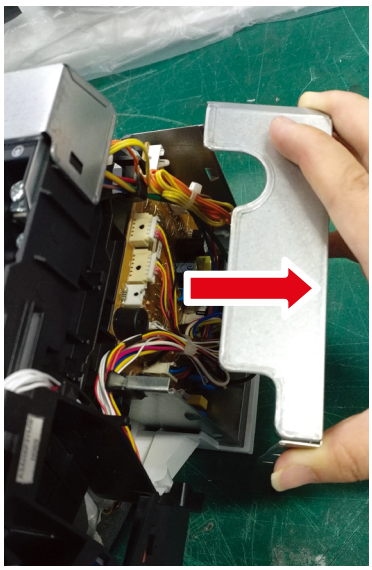
7) Cut the wire fixing bands and remove Thermistor.



8) Remove two screws fixing the earth wire.

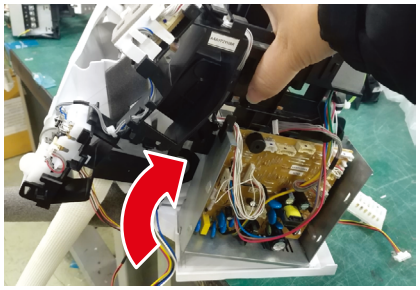


9) Remove the Contorl Box Cover.

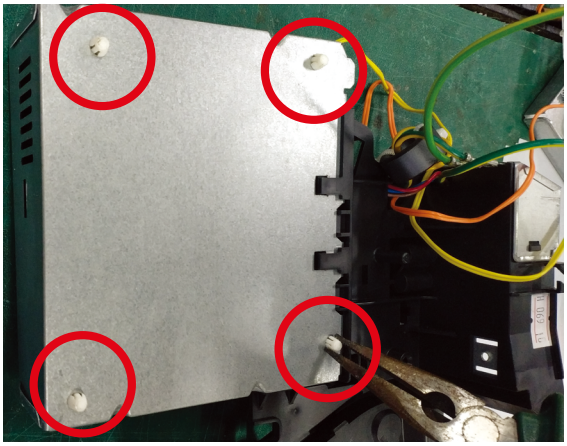


10) Cut two bands and remove all the connectors.

11) Remove one screw near Terminal Board as below, then rotate the Terminal Holder to take it out.

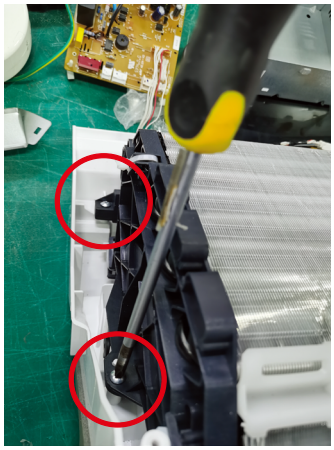


12) Use a pincer to press four spacers into the Control Angle to remove the PWB.



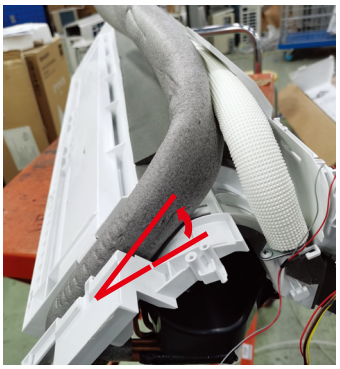
13) Remove one screw on Side Cover R.

14) Remove two screws on Side Cover L.

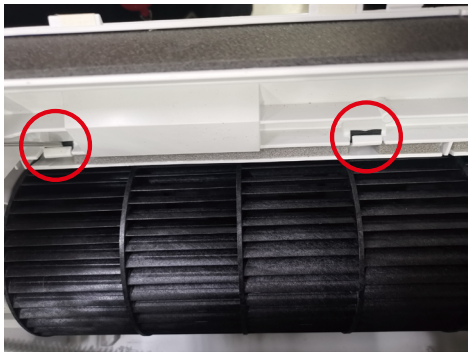


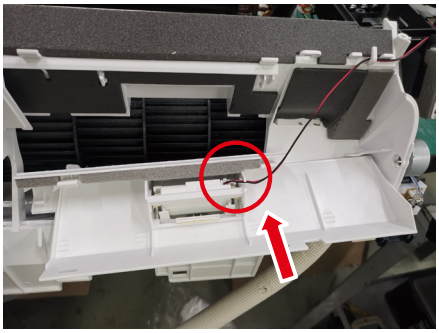
15) Push the Pipe Holder to remove it.

16) Widen the angle between Pipe Dan-S and Cabinet Sub. Then take the Evaporator out.

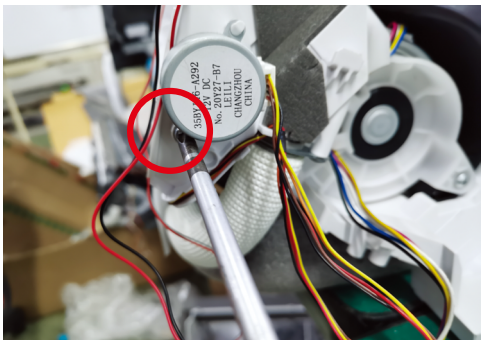


17) Release two hooks of Stabilizer R, and take Stabilizer R out.
Unlock the connector to remove the PLASMACLUSTER Unit.



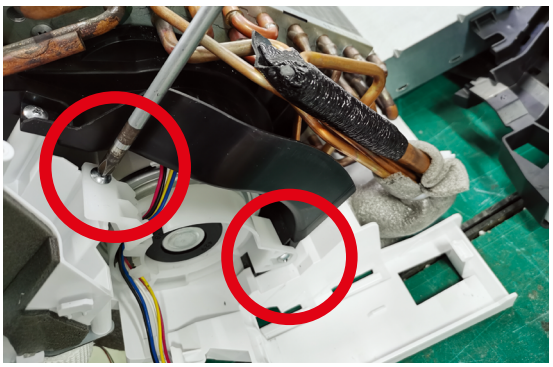


18) Remove the screw of Louver Motor, then take the Louver Motor out.

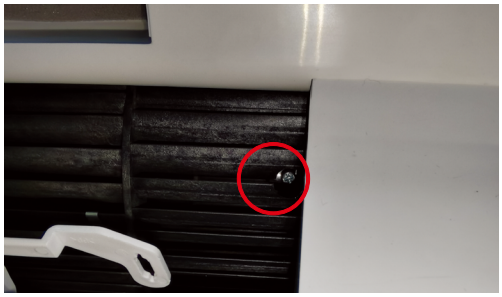


19) Release Arm Auto/Manual from Louver Link R.

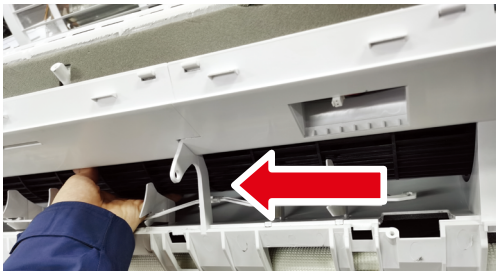
20) Remove two screws, then remove Motor Cover.

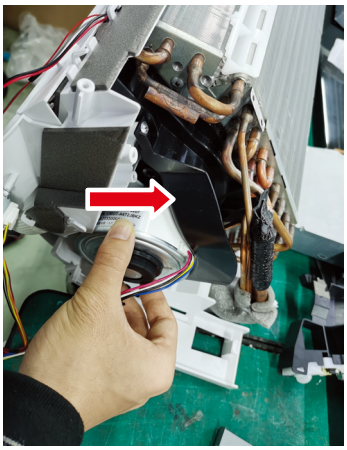


21) Remove one screw between Cross Flow Fan and Fan Motor.



22) Take Fan Motor out by holding and pressing the Cross Flow Fan to left side as much as possible.

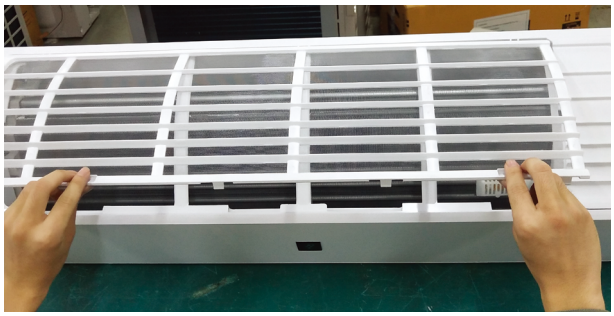




23) Take Corss Flow Fan out.

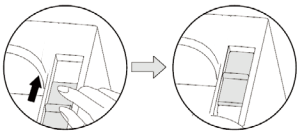
3. MAIN UNIT (For AY-XP12CHU(-B), AY-XP18CHU models)

1) Lift Top Grille by the handles and remove it.



2) Remove Open Panel as below step.

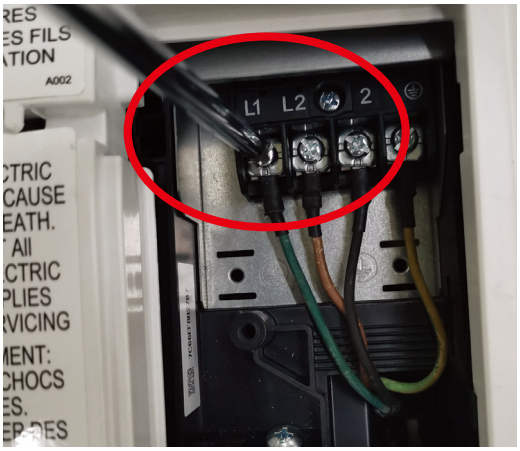
- Unlock Panel Lock (Right and left side).



- Lift the Open Panel, then slide the Open Panel's Hook along the guides on both sides to remove it.

3) Remove a scerw fixing the Cord Holder, then pry open the Cord Holder and remove it.

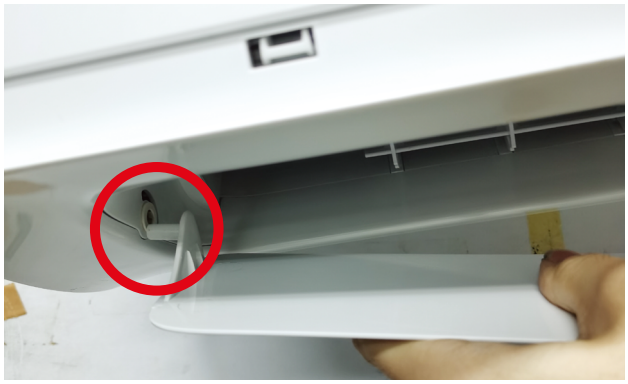
4) Loose the screw on Terminal Board to remove unit-to-unit wiring.



5) Remove the Horizontal louver.

- Lift and remove the central shaft of the Horizontal louver.

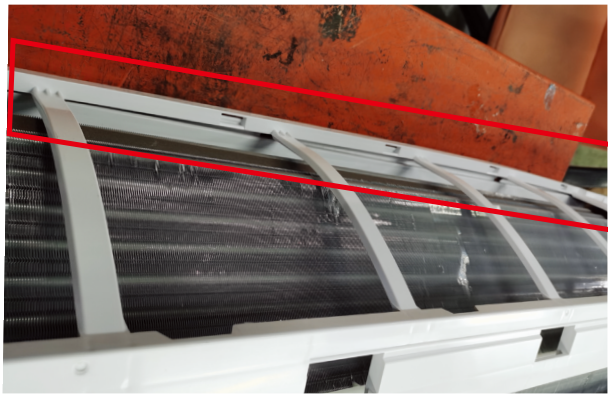
- Take it out from the left side by shaking the Horizontal louver.



- Take it out by moving the Horizontal louver to left side.

6) Remove two screws fixing the Front Panel.

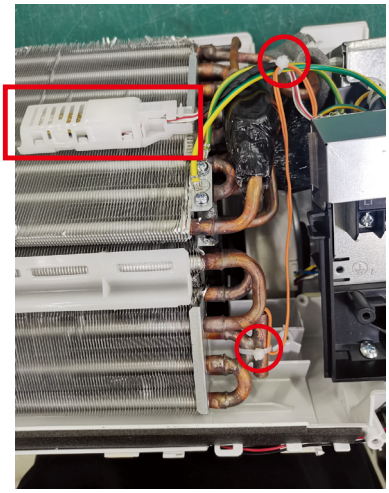
- Pull the top side of Front Panel to release the hooks.



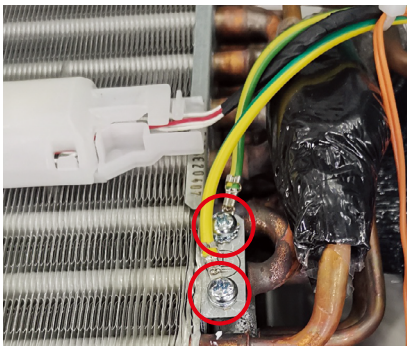
- Pull the bottom side to release these hooks.

- Press below areas to release the Front Panel from inside hooks, then take the Front Panel out.

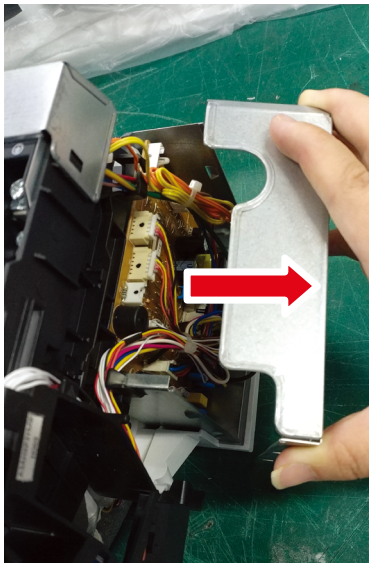
7) Cut the wire fixing band and remove the Thermistor.



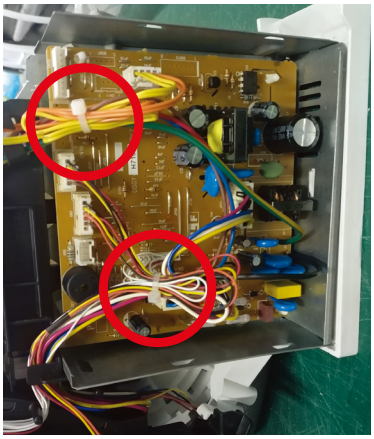
8) Remove two screws fixing the earth wire.



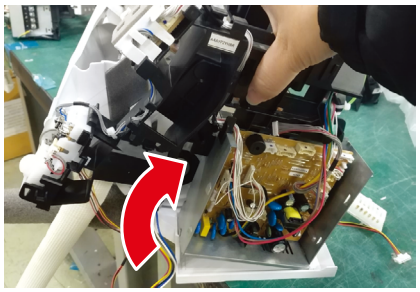
9) Remove the Contorl Box Cover.



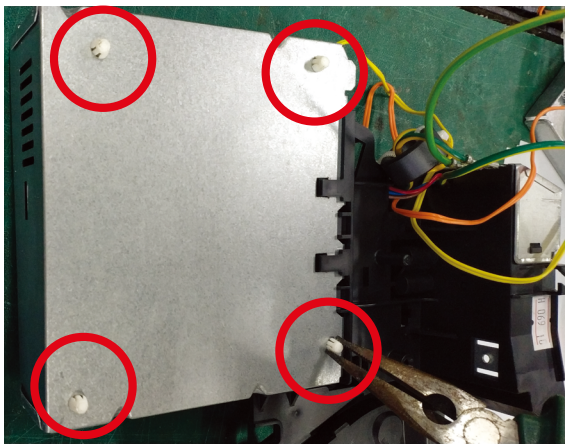
10) Cut two bands and remove all the connectors.



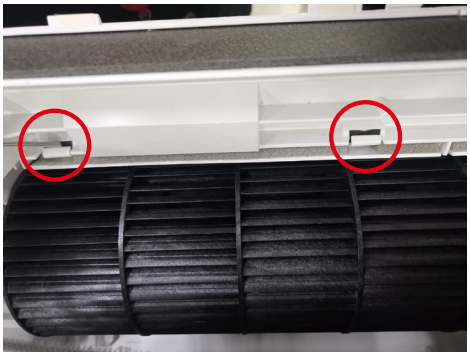
11) Remove one screw near Terminal Board as below, then rotate the Terminal Holder to take it out.

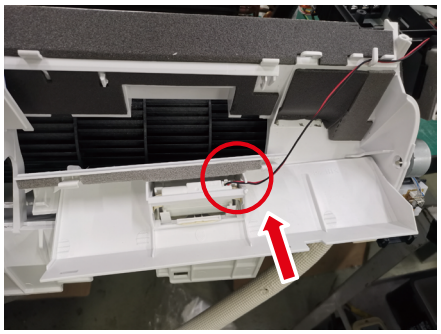


12) Use a pincer to press four spacers into the Control Angle to remove the PWB.



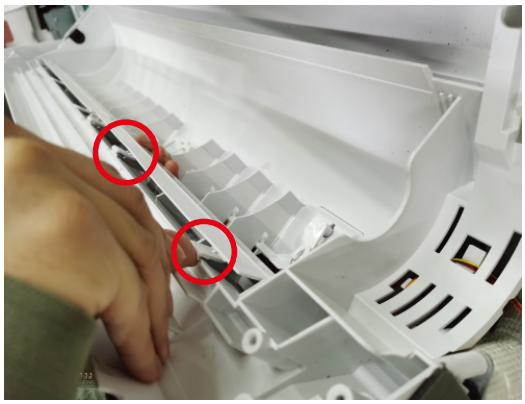
13) Release two hooks of Stabilizer R, and take Stabilizer R out. Unlock the connector to remove the PLASMACLUSTER Unit.



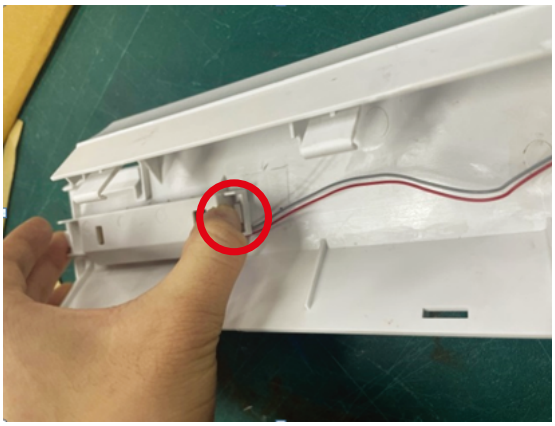


Remove Center LED UNIT.

- Unlock the hook of Stabilizer C Ass'Y, rolate Stabilizer C Ass'Y out.

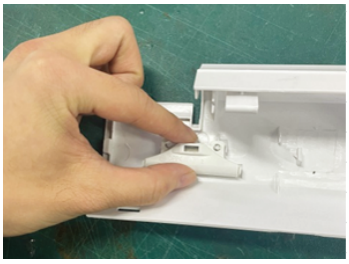


- Unlock a hook, take out the LED Case, then take the center LED Case out.

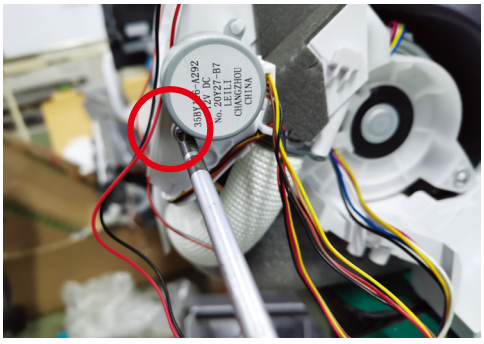


- Press the hook, take out the PCI LED Unit.

- Unfold the Light Guide Cover, take out the Light Guide.



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



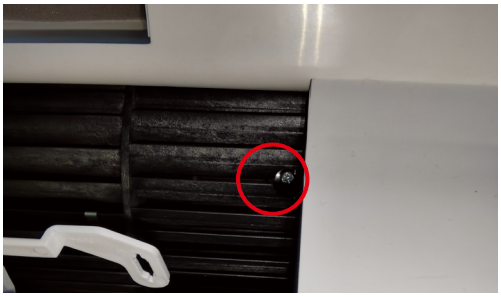
15) Release Arm Auto/Manual from Louver Link R.

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

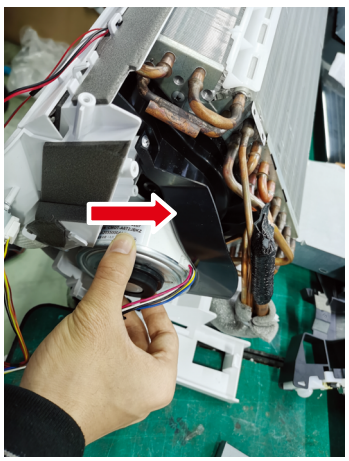
17) Remove two screws of Louver Motor V to take the Louver Motor out.

18) Remove two screws, then remove Motor Cover.

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



20) Take Fan Motor out by holding and pressing the Cross Flow Fan to left side as much as possible.

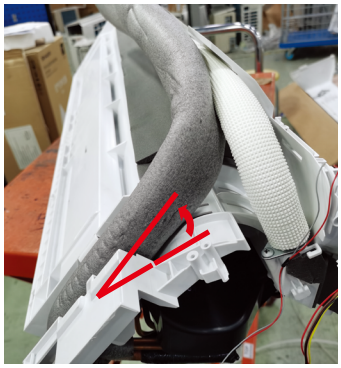


21) Remove one screw on Side Cover R.

22) Remove two screws on Side Cover L.

23) Push the Pipe Holder to remove it.

24) Widen the angle between Pipe Dan-S and Cabinet Sub. Then take the Evaporator out.

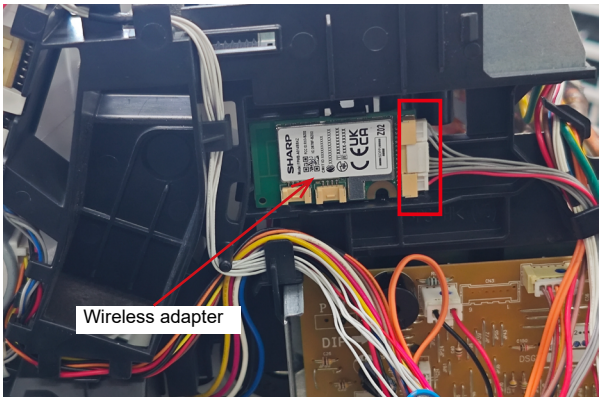


25) Take Corss Flow Fan out.

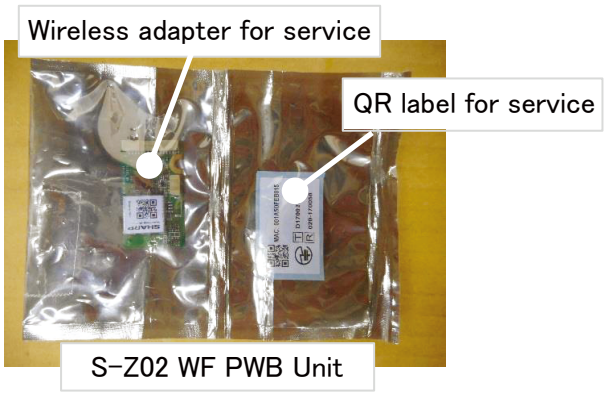
4. REPLACE WIRELESS ADAPTER

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-Z02 WF PWB Unit.
Note: The S-Z02 WF PWB Unit contains a wireless adapter and a QR label for service.



3) Patse 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 heat pump.

[2] OUTDOOR UNIT

Be sure to disconnect the power cord from the AC power outlet before starting the disassembly procedure. When reassembling the unit after repair, ensure all screws are reinstalled in their original positions.

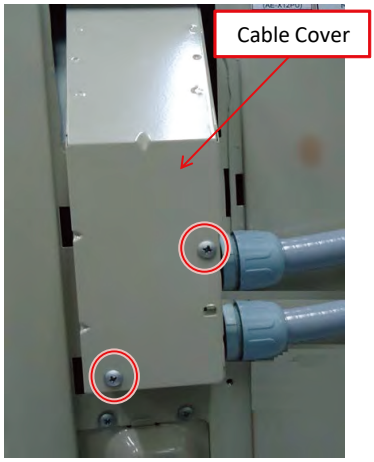
The screws used vary in specifications, such as corrosion-resistant treatment, tip shape and length.

After completing heat pump repairs or part replacements, measure the insulation resistance of the equipment using an insulation resistance meter. If the measured resistance is below 1 MΩ, inspect all components and repair or replace any defective parts.

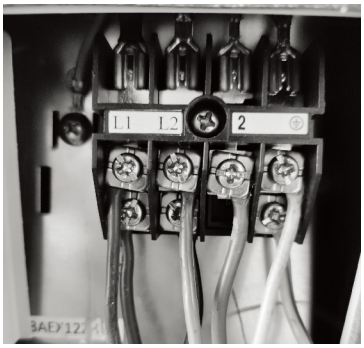
1. MAIN UNIT (12K/15K Btu/h models)

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

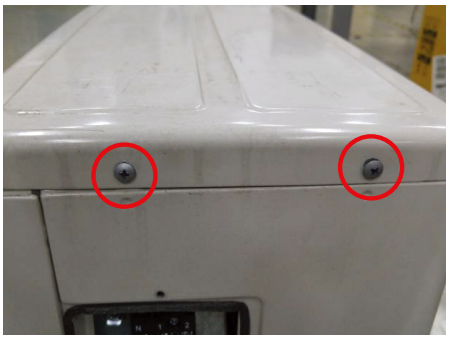
2) Remove the screw fixing Cable Cover and Cable Holder, then take them out.

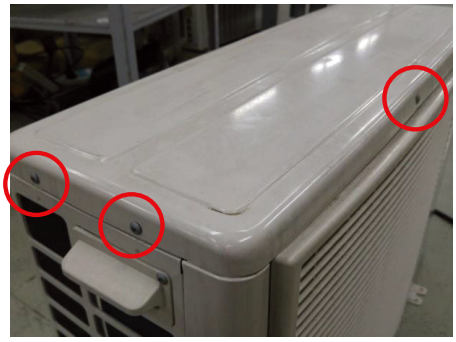


3) Loose the screws, remove the connecting cable from Terminal Board.

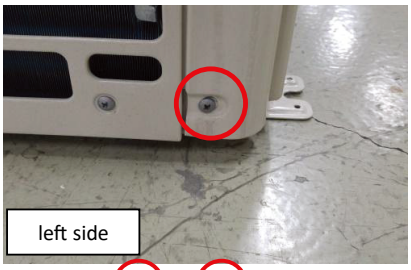


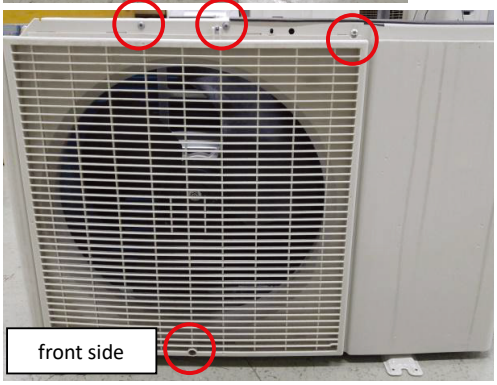
4) Remove five screws, lift the Top Cover to take it out.

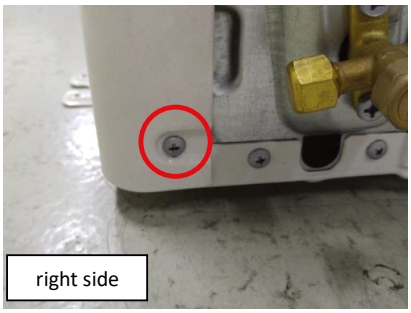




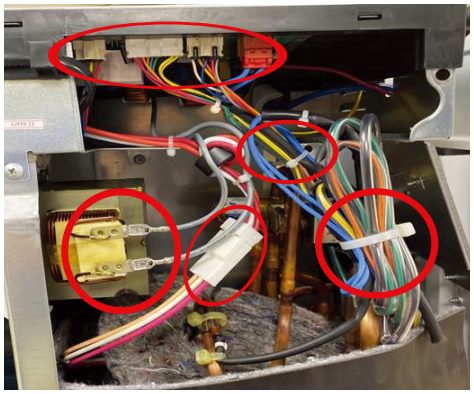
5) Remove six screws fixing the Front Panel, and then remove the Front Panel.



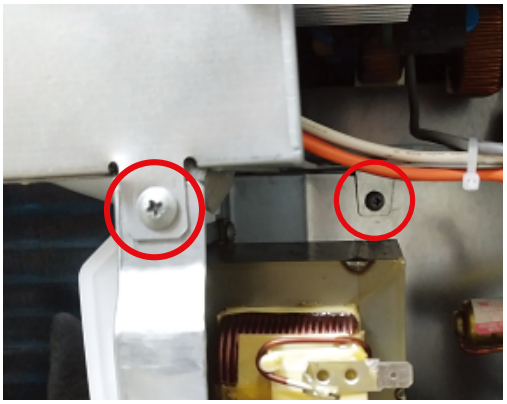


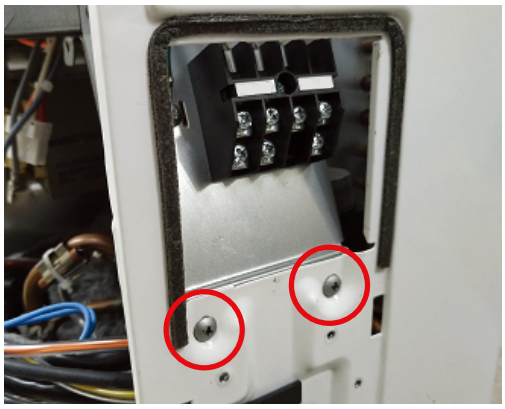


6) Cut the wire fixing band. Pull out two terminals from the Reator and unlock all the connectors on the Control Board Unit, then remove the compressor connector.

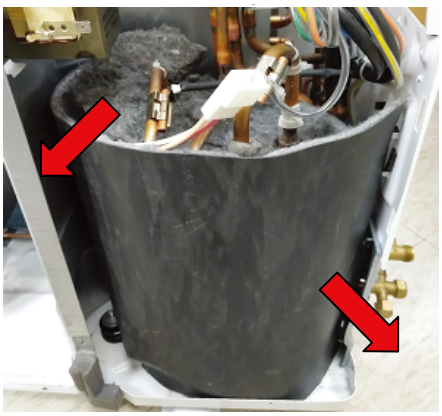


7) Remove four screws fixing the Control Box, then take out the Control Box.

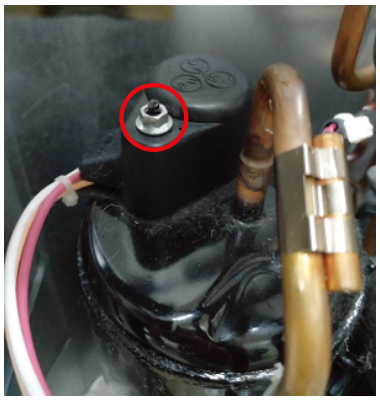




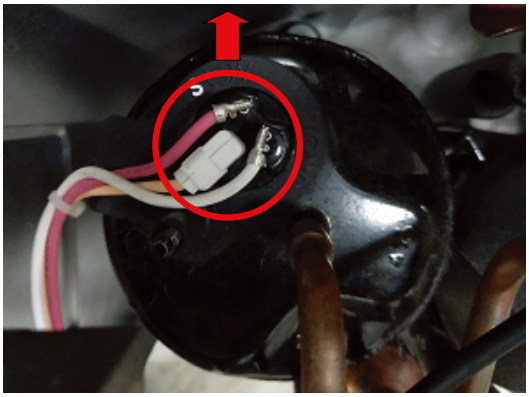
8) Remove the Compressor Cover(2pcs).



9) Remove the nut, then take Terminal Cover out.

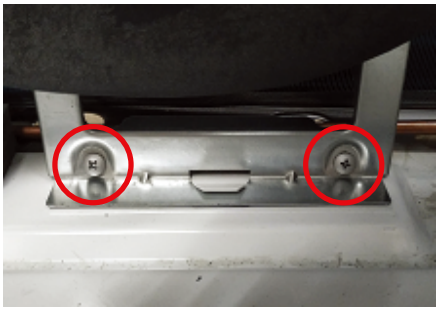


10) Pull out three terminals on the Compressor. (Orange, white, red)



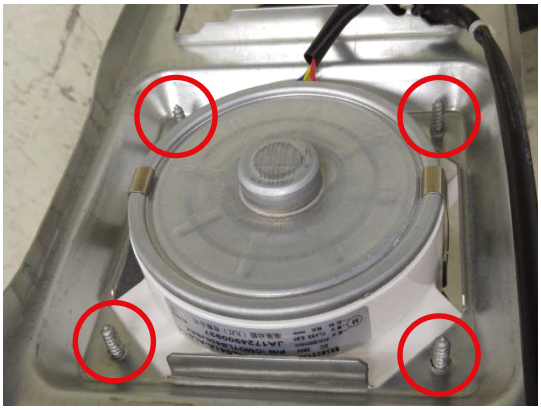
11) Remove two screws fixing the Bulkhead, and remove the Bulkhead.

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



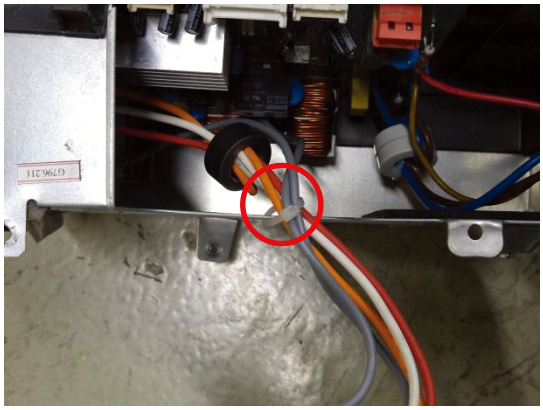
13) Unscrew the nut, take out the Propeller Fan carefully.

14) Remove all screws, take out the Fan Motor.

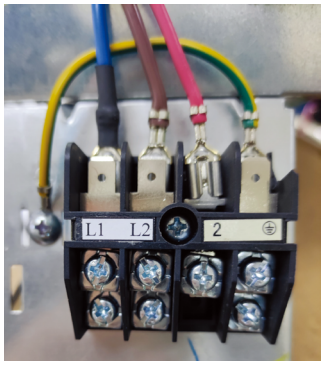


Control Unit

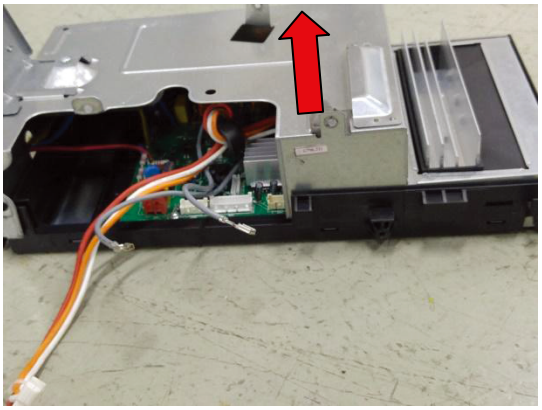
1) Cut the fixing band.



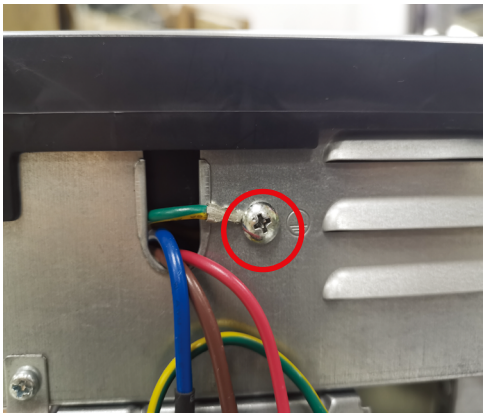
2) Remove the screw, then remove the Terminal Board.



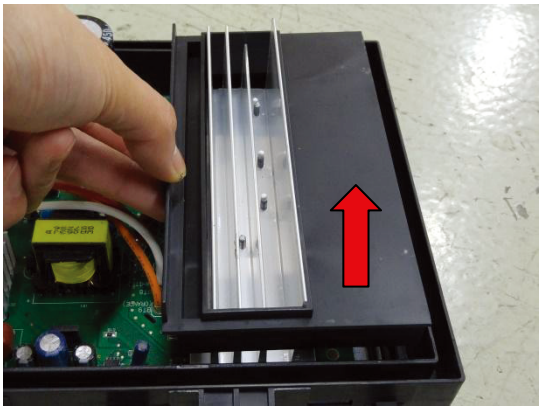
3) Lift up to remove the metal cover.



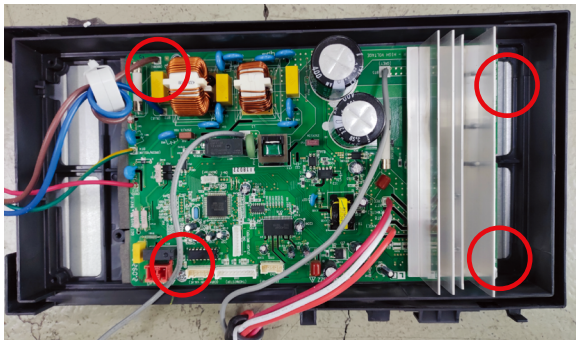
4) Remove the screw fixing the earth wire.



5) Remove the heat sink holder.



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

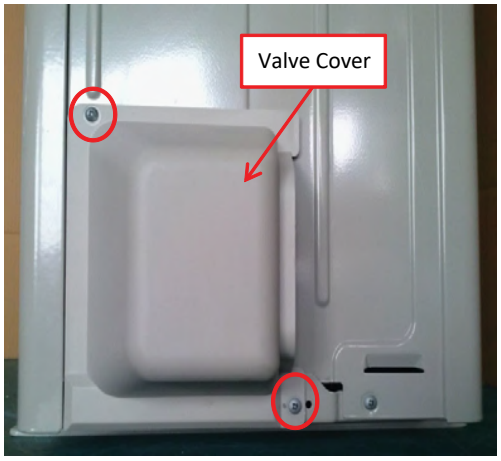


Note: Before replacing control board, the workmen should wear anti-eletrostatic gloves.

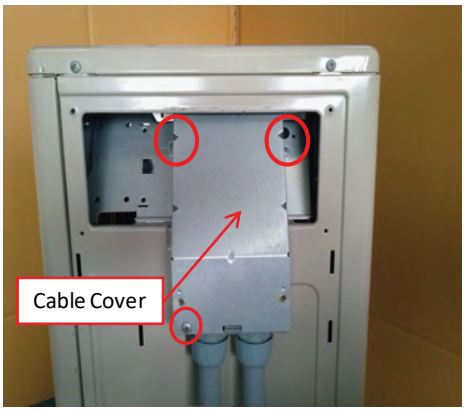
2. MAIN UNIT (18K/24K Btu/h models)

1) Remove two screws fixing the Side Cover, then take out the Side Cover.

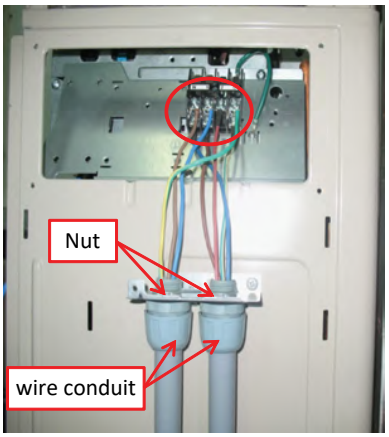
2) Remove two screws fixing the Valve Cover, then take out the Valve Cover.



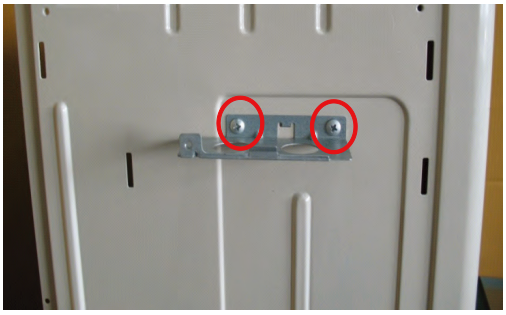
3) Remove three screws fixing the Cable Cover and remove it.



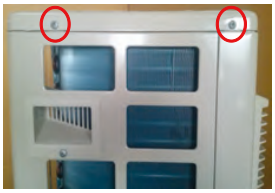
4) Loose the screws fixing the connecting cable on the Terminal Board and unscrew the Nut, remove the wire conduit.



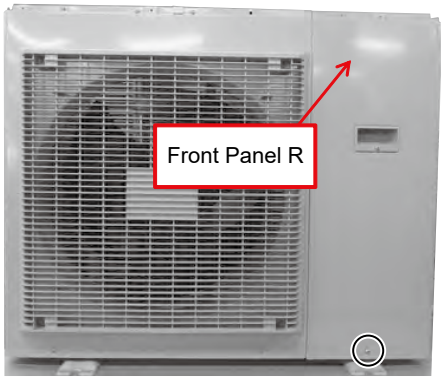
5) Remove two screws fixing the Cable Holder, then take it out.



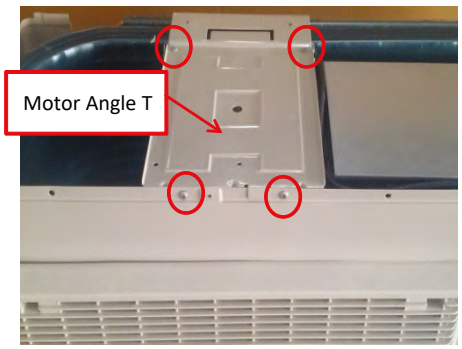
6) Remove six screws fixing the Top Plate, then take it out.



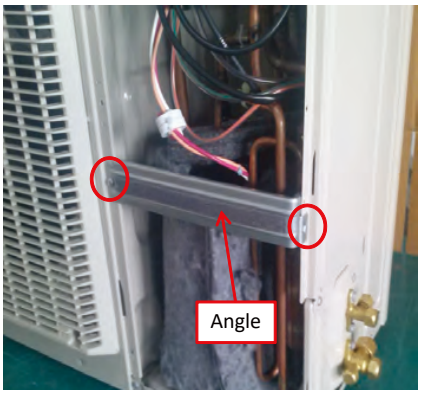
7) Remove the screw fixing the Front Panel R, then slide the Front Panel R downward and remove it.



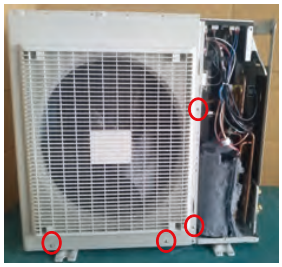
8) Remove four screws fixing the Motor Angle T, then take it out.



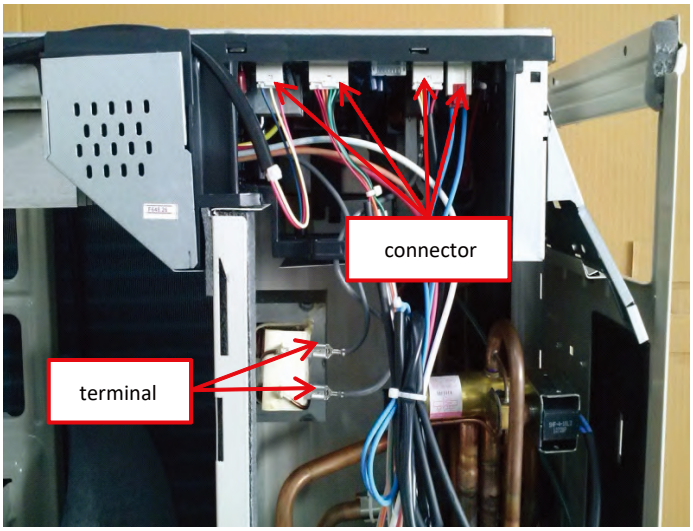
9) Remove two screws fixing the Angle, then take it out.



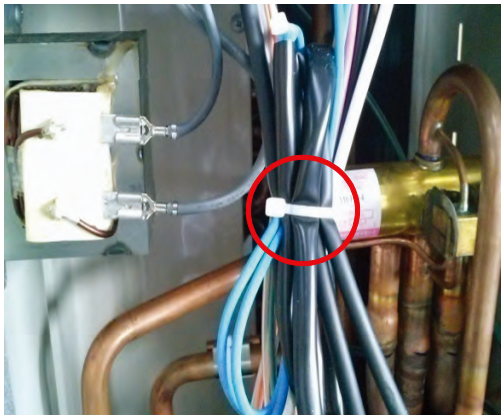
10) Remove four screws fixing the Front Panel L, then remove the Front Panel L.



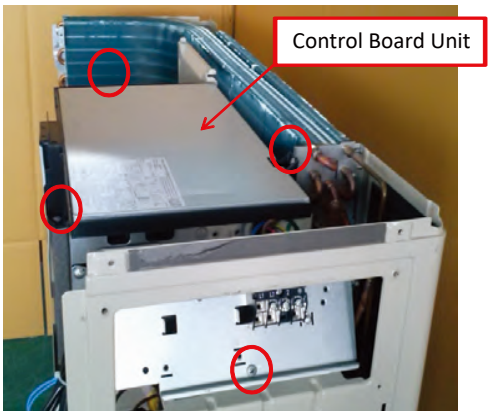
11) Remove two terminals from the Reactor and four connectors on the Control Board Unit.



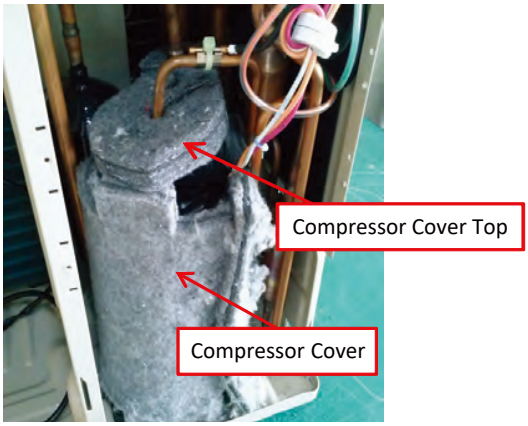
12) Cut the fixing band.



13) Cut 1pcs Fixing Band.
Remove three screws fixing the Control Board Unit, then take it out.



14) Remove the Compressor Cover and Compressor Cover Top.



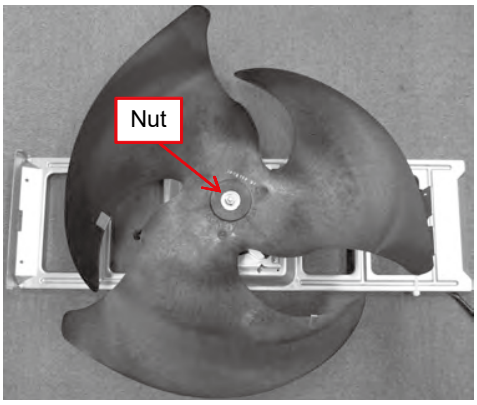
15) Remove the nut, then take Terminal Cover out.

16) Disconnect three terminals on Compressor. (Orange, white, red)

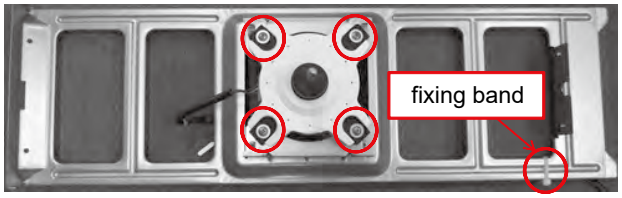
17) Remove two screws fixing the Bulkhead, and remove the Bulkhead.

18) Remove two screws fixing Motor Angle. then take it out.

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



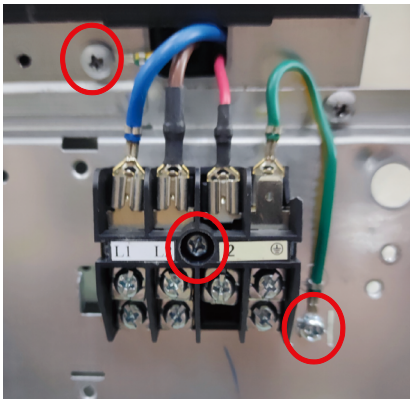
20) Remove all screws fixing the Fan Motor and cut the fixing band, and then take out the Fan Motor.



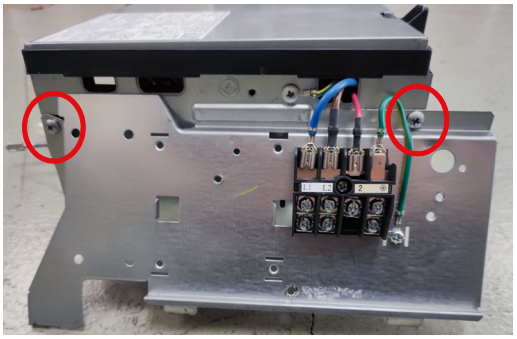
3. DISASSEMBLY OF CONTROL BOARD UNIT

If the outdoor main board is replaced with a service board, be sure to perform a wire check.

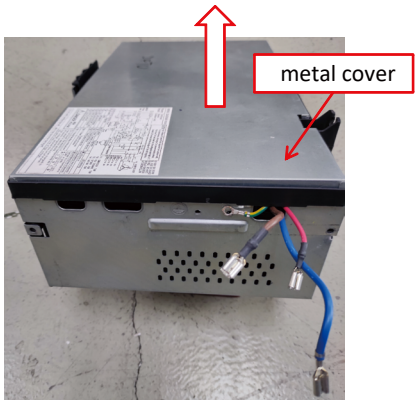
1) Remove three screws, then remove the Terminal Board.



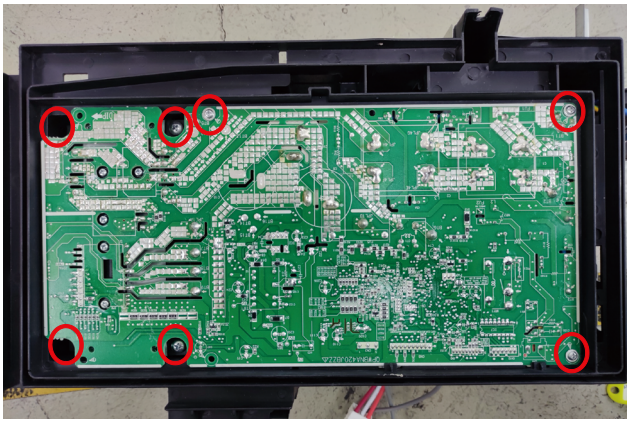
2) Remove two screws fixing the Terminal Angle and take it out.



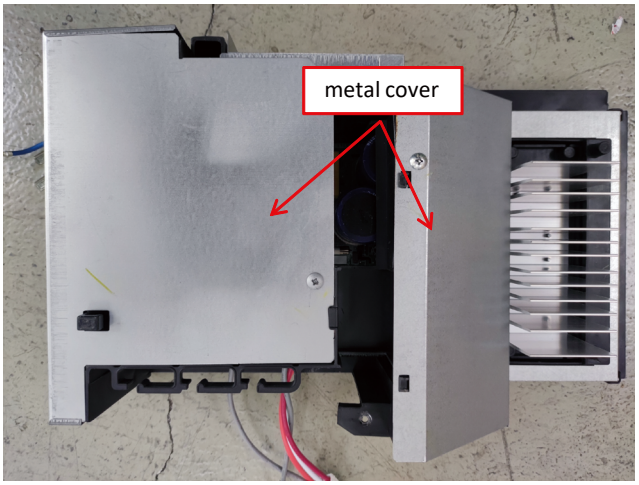
3) Lift up to remove the metal cover.



4) Remove all seven screws to remove Control Board from Holder.



5) Remove two screws and Control Box (three metal covers).



Failure diagnosis flowchart

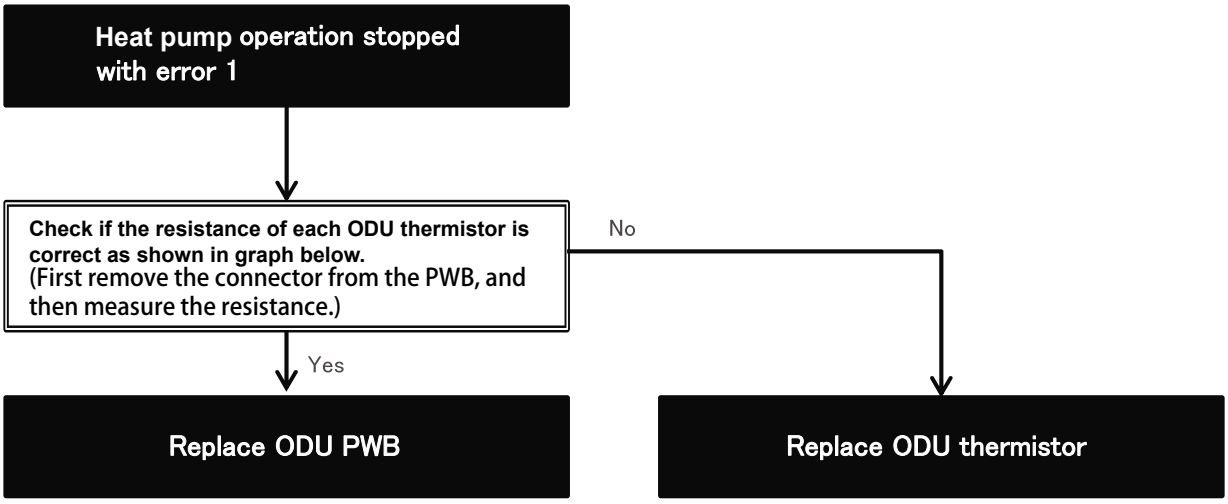
Table of contents

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 1-5 Discharge thermistor short-circuit error

☆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.



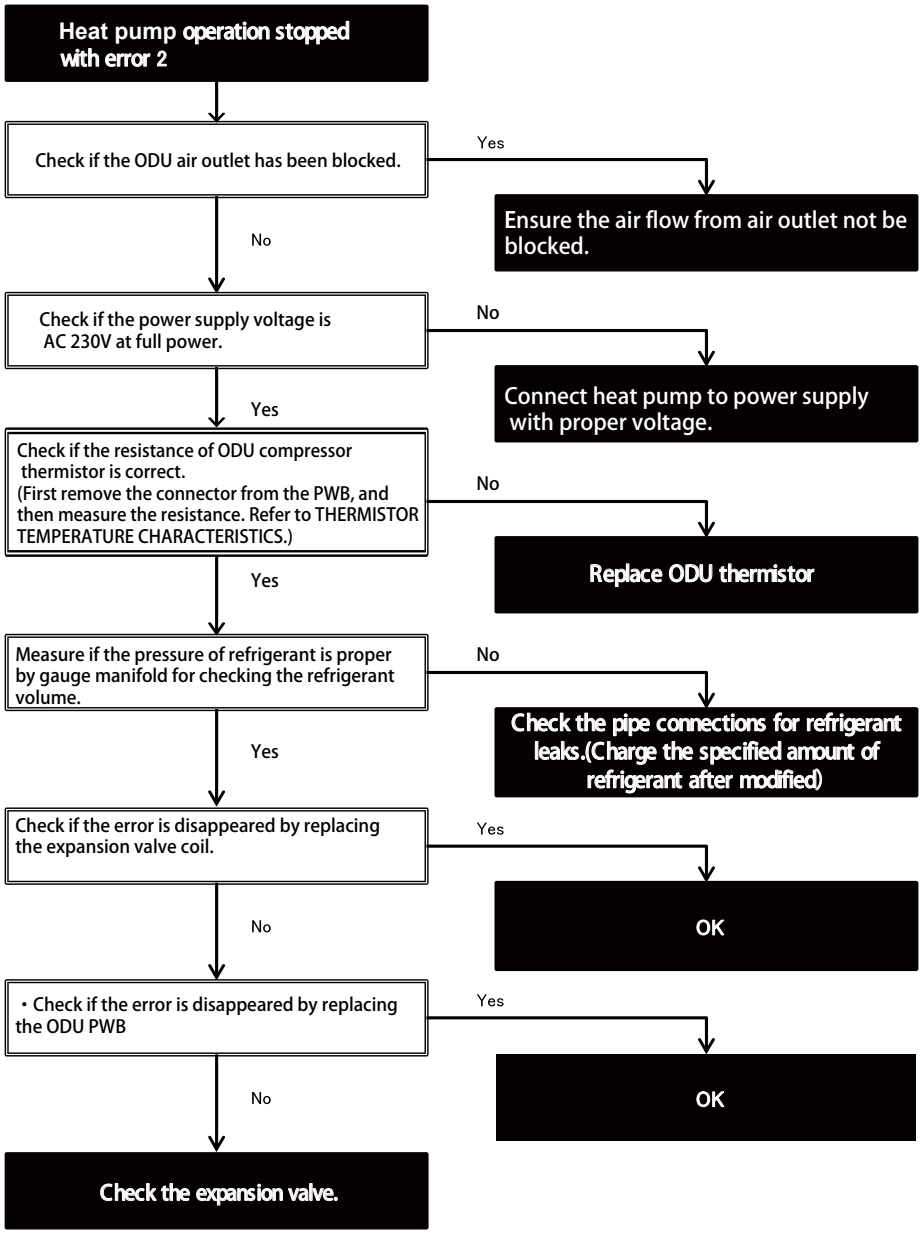
Please see Appendix ① (ODU thermistor R-T)

Error Code 2	Overheat error (Compressor or cycle)	2-0 Compressor high temperature error 2-1 Compressor discharge overheat 2-2 Outdoor unit pipe overheat 2-3 Indoor unit pipe overheat 2-5 IPM high temperature error

☆Check the failure of compressor

◇ Main cause

・Temperature of compressor or cycle parts becomes too high.



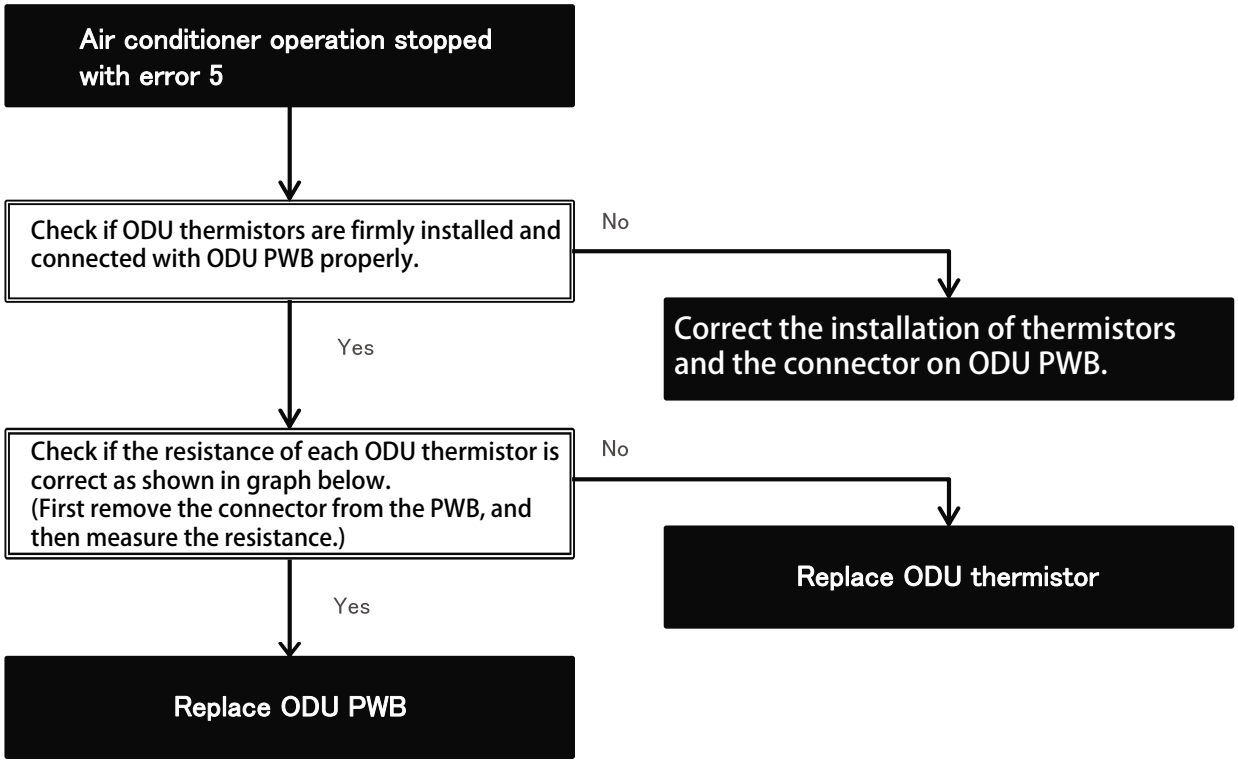
Please see Appendix ② (expansion valve check)

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

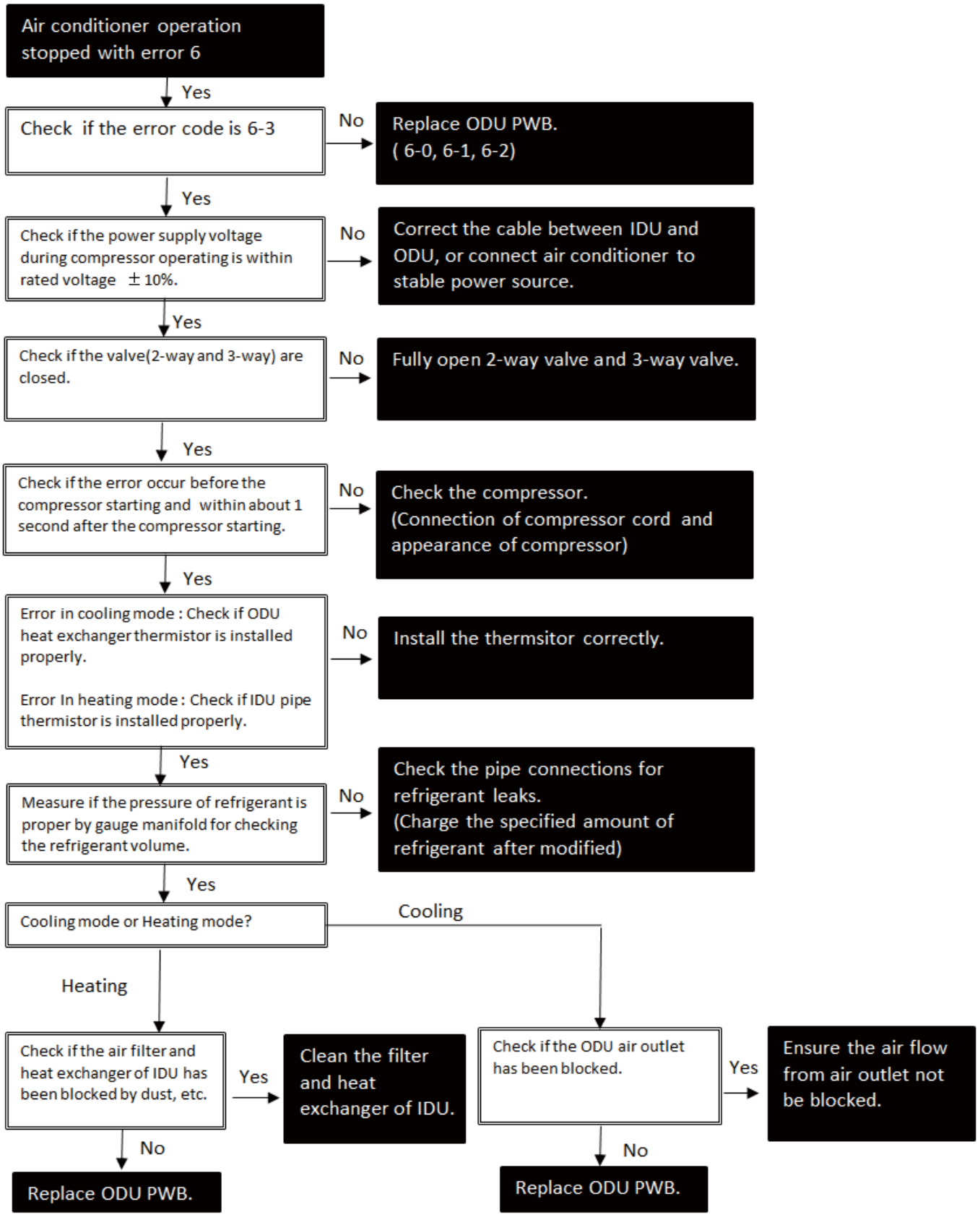
- **The lead wire of ODU thermistor has torn due to the edge or vibration.**
- **The attachment of connector has damaged by inside tension due to unsuitable wiring process.**



Please see Appendix ① (ODU thermistor R-T)

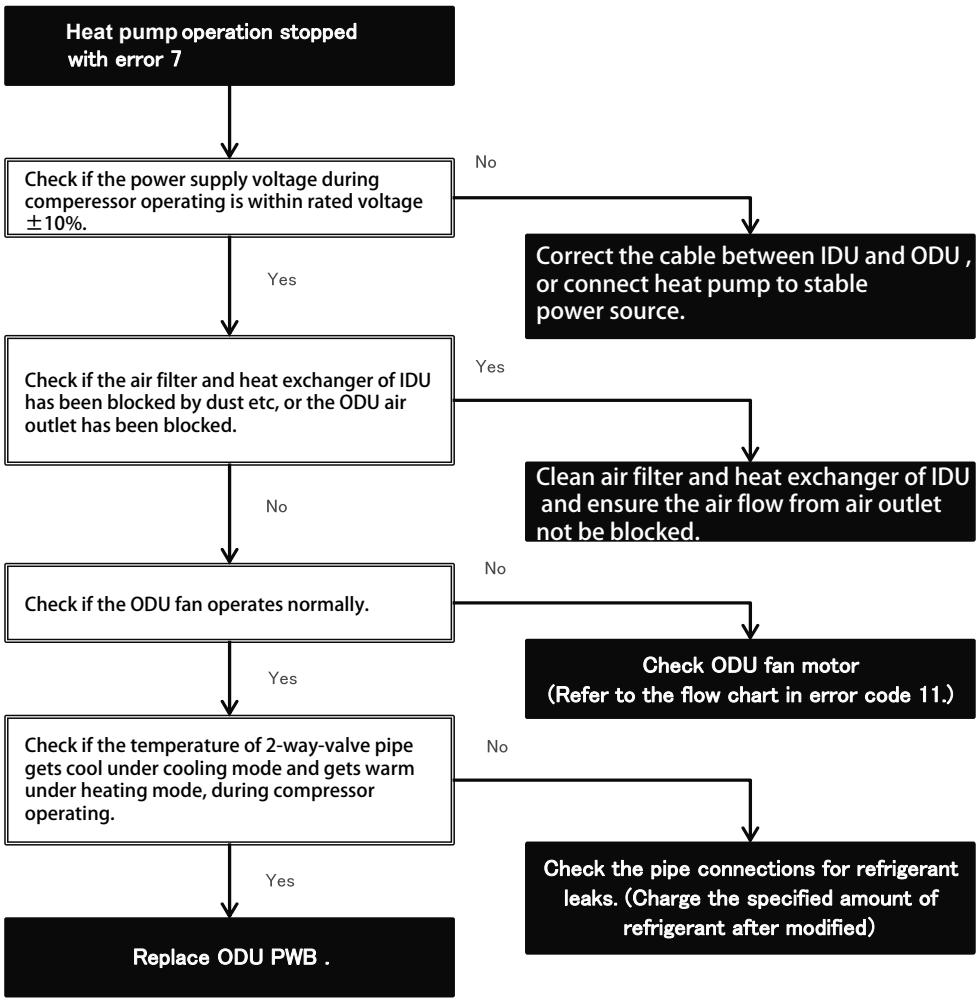
Error Code 6	DC current error	6-0 DC current error 6-1 DC current error 1 6-2 DC current error 2 6-3 DC current error 3

☆Check the cause due to compressor or PWB.



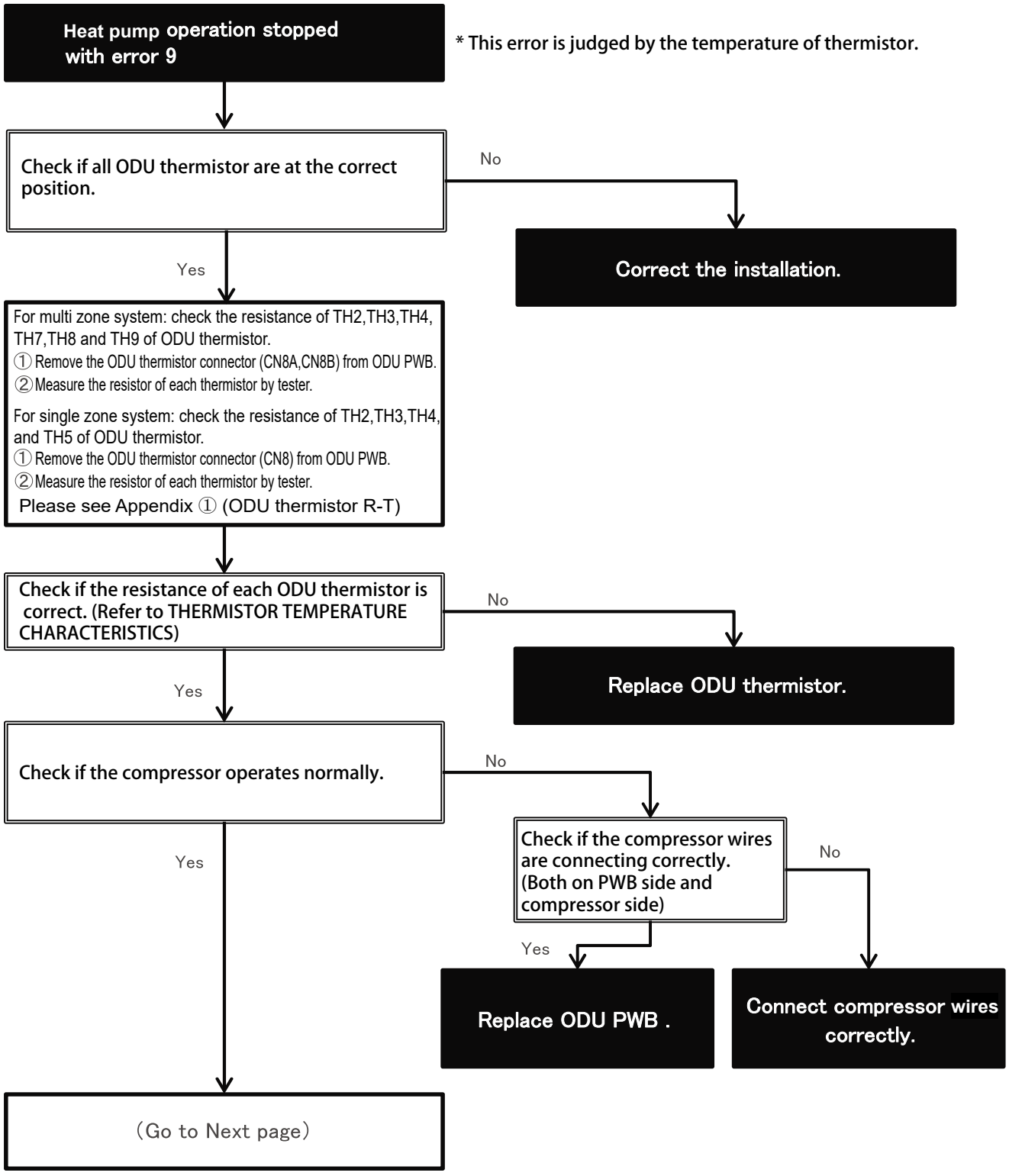
Error Code 7	AC current error	7-0 AC over current error 7-1 AC current error when compressor OFF 7-2 AC maximum current error 7-3 AC current deficiency error

☆Check the cause due to PWB or another parts.



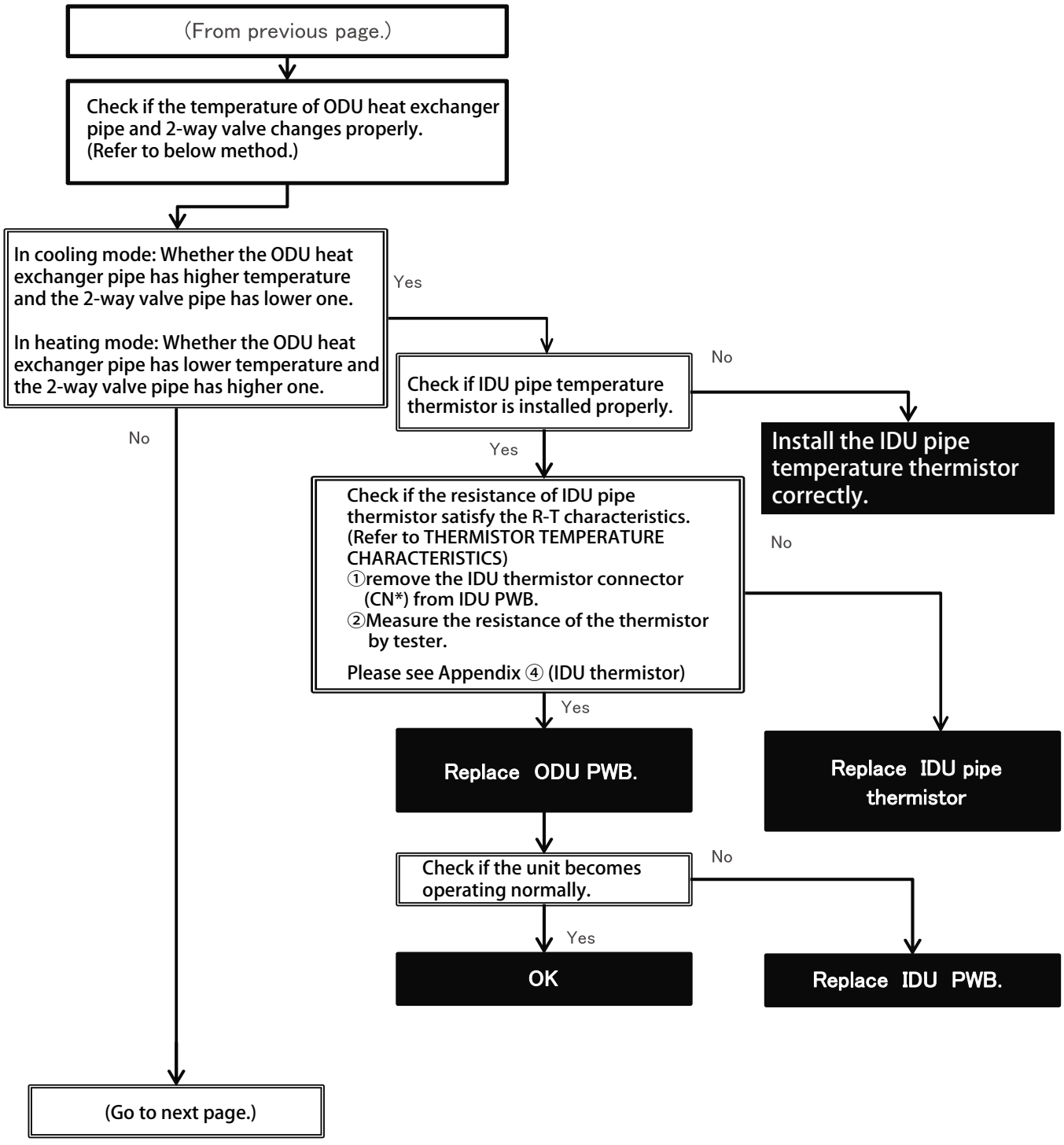
Error Code 9	Cycle error (1/3)	9-0 cycle temperature error 9-4 gas leak error

☆Check the cause due to PWB or another parts.



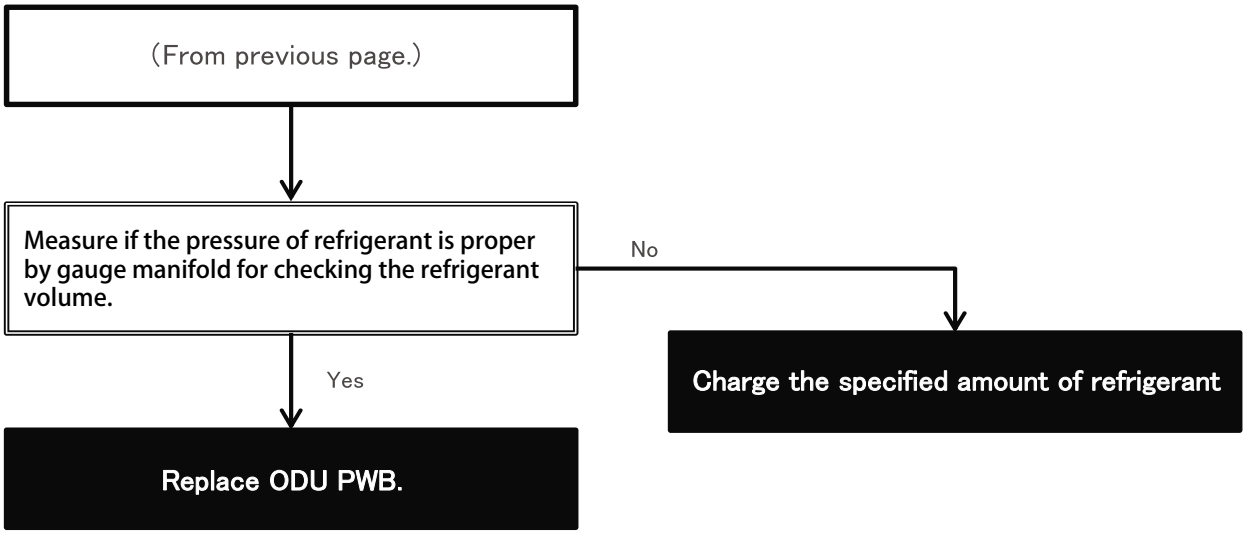
Error Code 9	Cycle error (2/3)	9-0 cycle temperature error 9-4 gas leak error

☆Check the cause due to PWB or another parts.



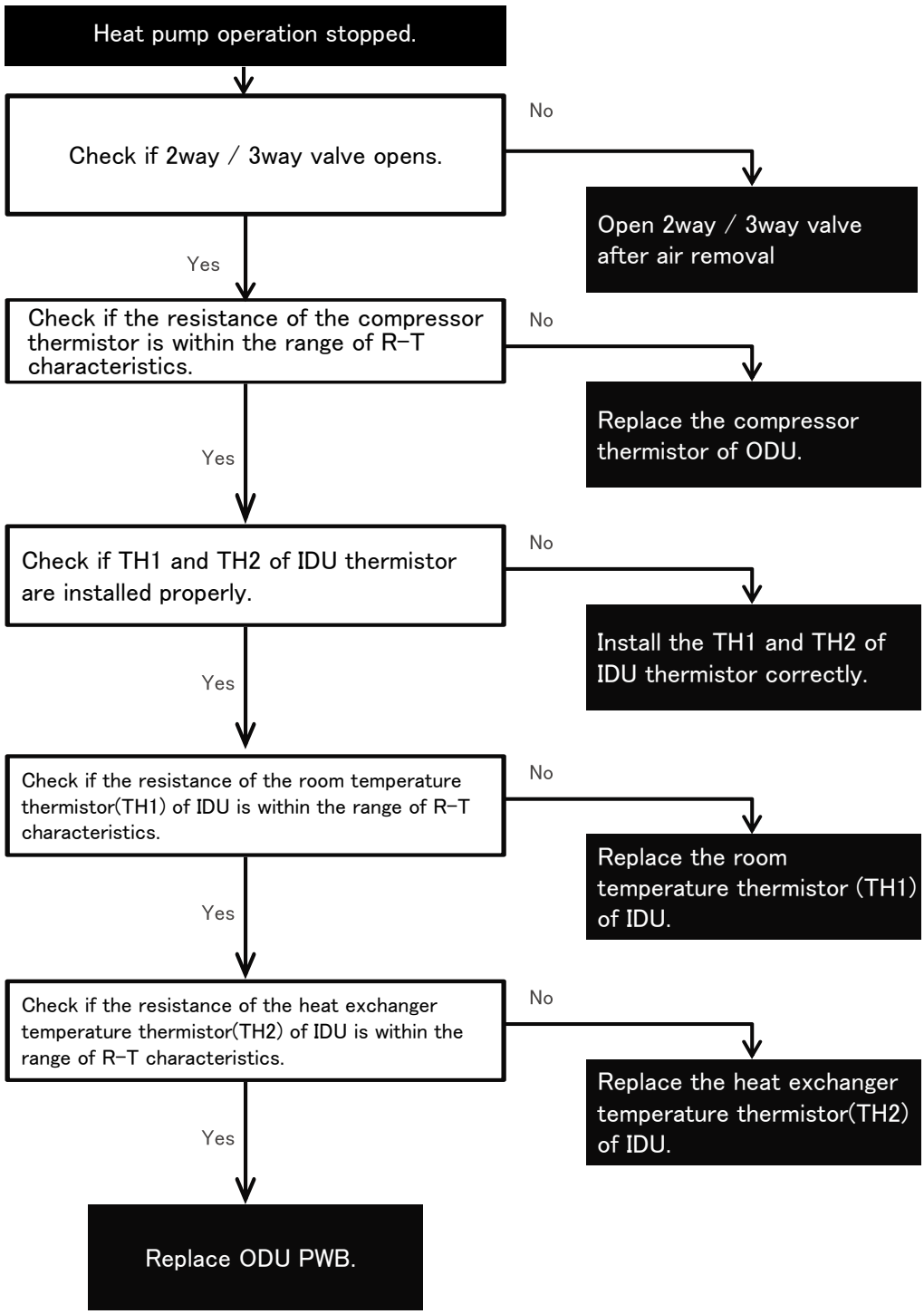
Error Code 9	Cycle error(3/3)	9-0 cycle temperature error 9-4 gas leak error

☆Check the cause due to PWB or another parts.



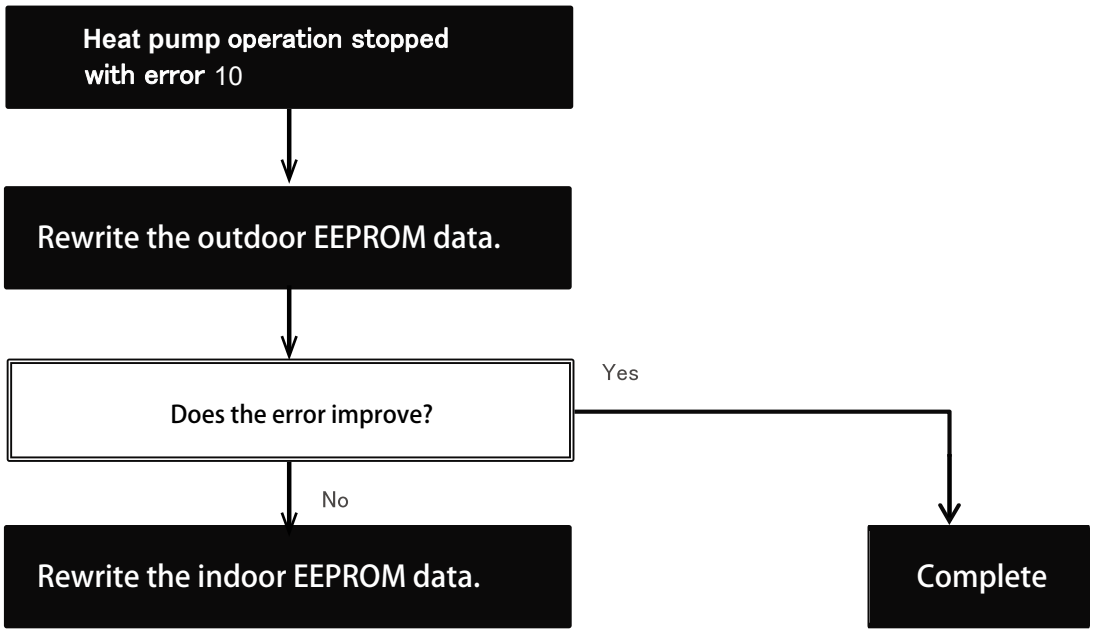
Error Code 9-5	2 way/ 3 way valve close error	

☆Check the cause Installation or other parts.



Error Code 10	EEPROM mutual memory Error	10-4 EEPROM Mutual memory error 10-5 EEPROM Mutual memory error (data error 2)

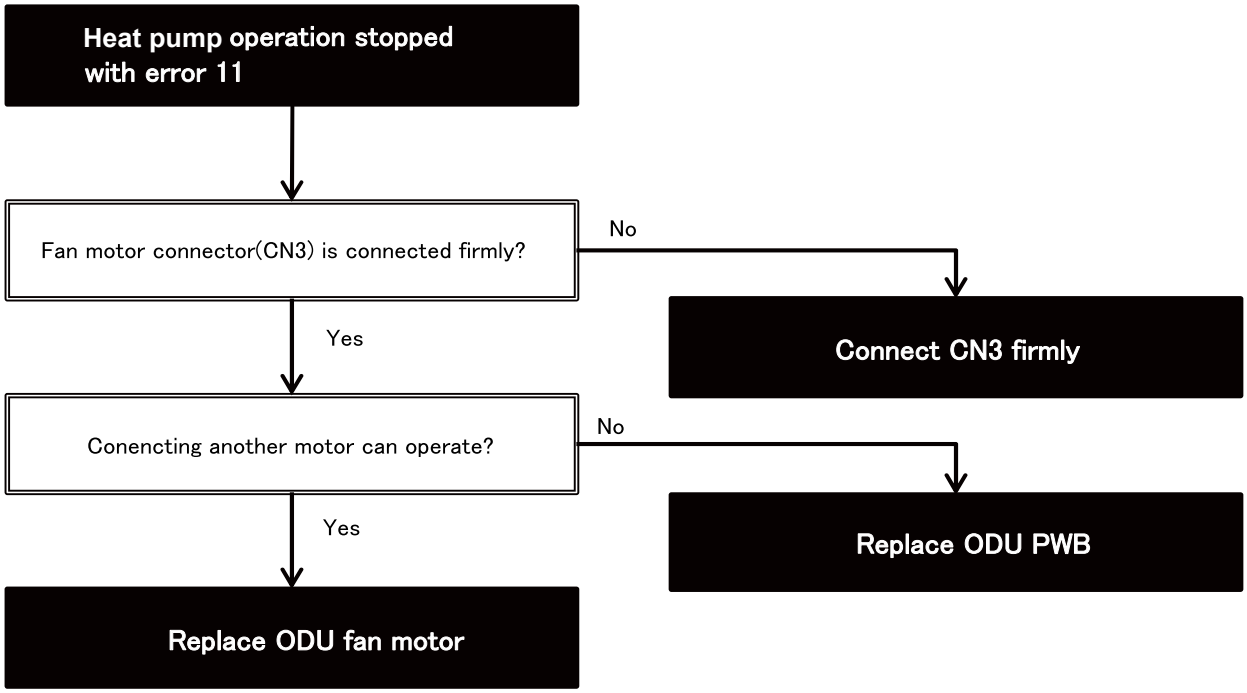
☆ Identify whether the cause is outdoor unit data error or indoor unit data error.



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

☆Check the cause due to PWB or DC fan motor.

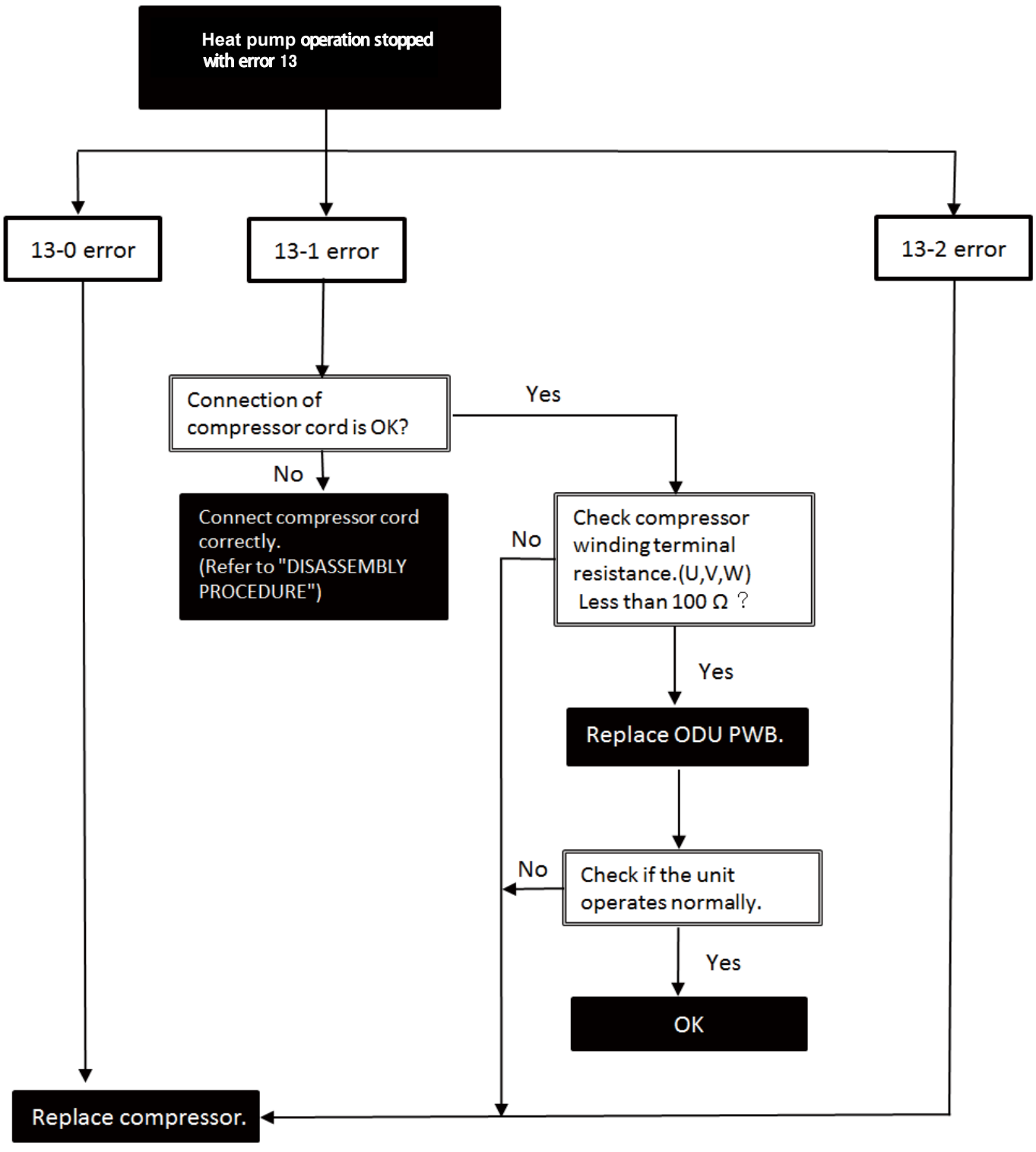


Error Code 13	Compressor rotation error	13-0 compressor motor short error 13-1 compressor motor open or PWB short error 13-2 compressor motor lock error

☆Check the cause due to compressor.

◇ Main Cause

- Compressor motor winding has abnormality. (Short or open)
- PWB has abnormality. (IPM Shunt resistor is short)

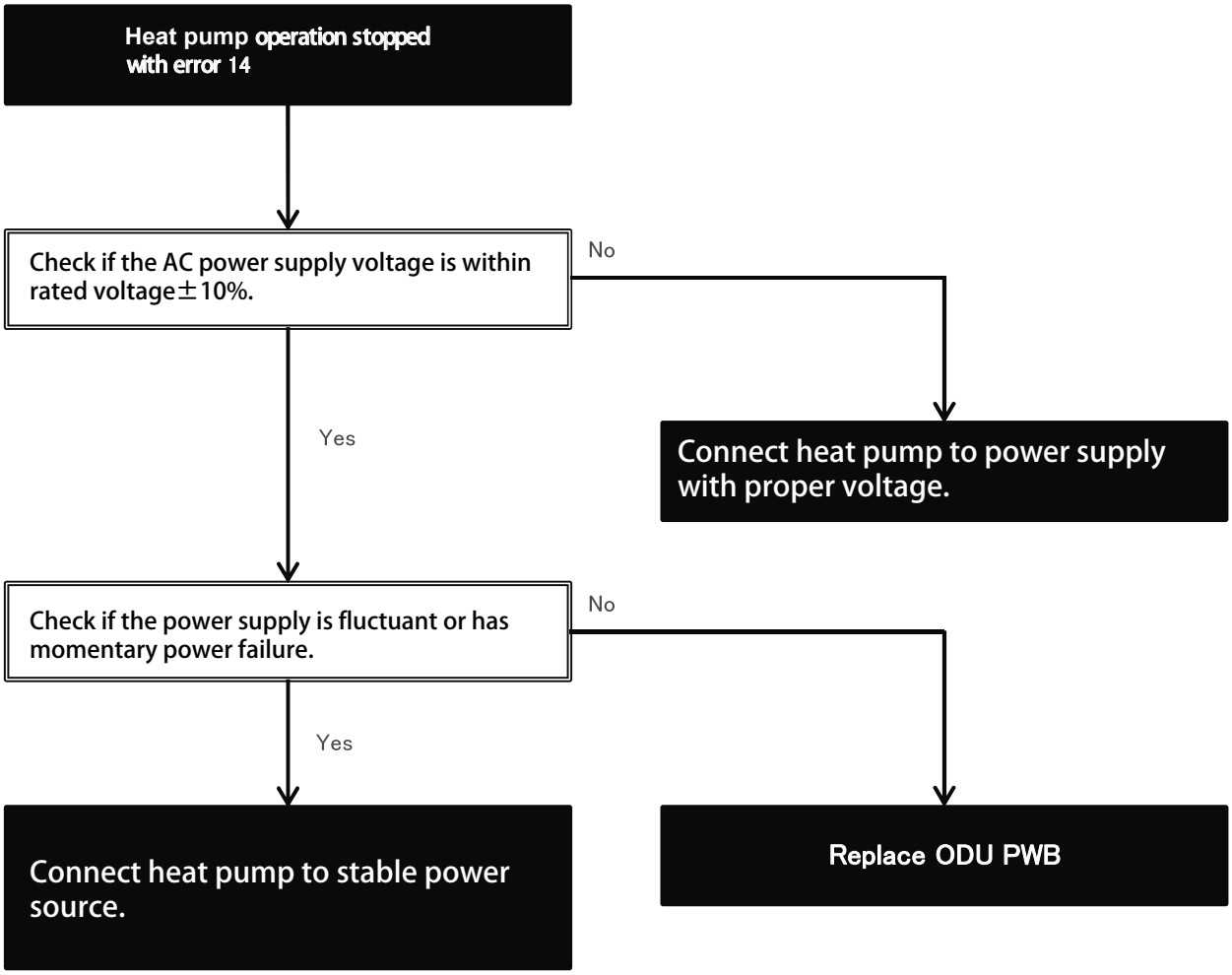


Error Code 14	AC voltage error	14-0 over voltage error 14-1 clock error 14-2 Abnormal AC power supply voltage or DC low voltage error

☆Check AC power supply.

◇ Main cause

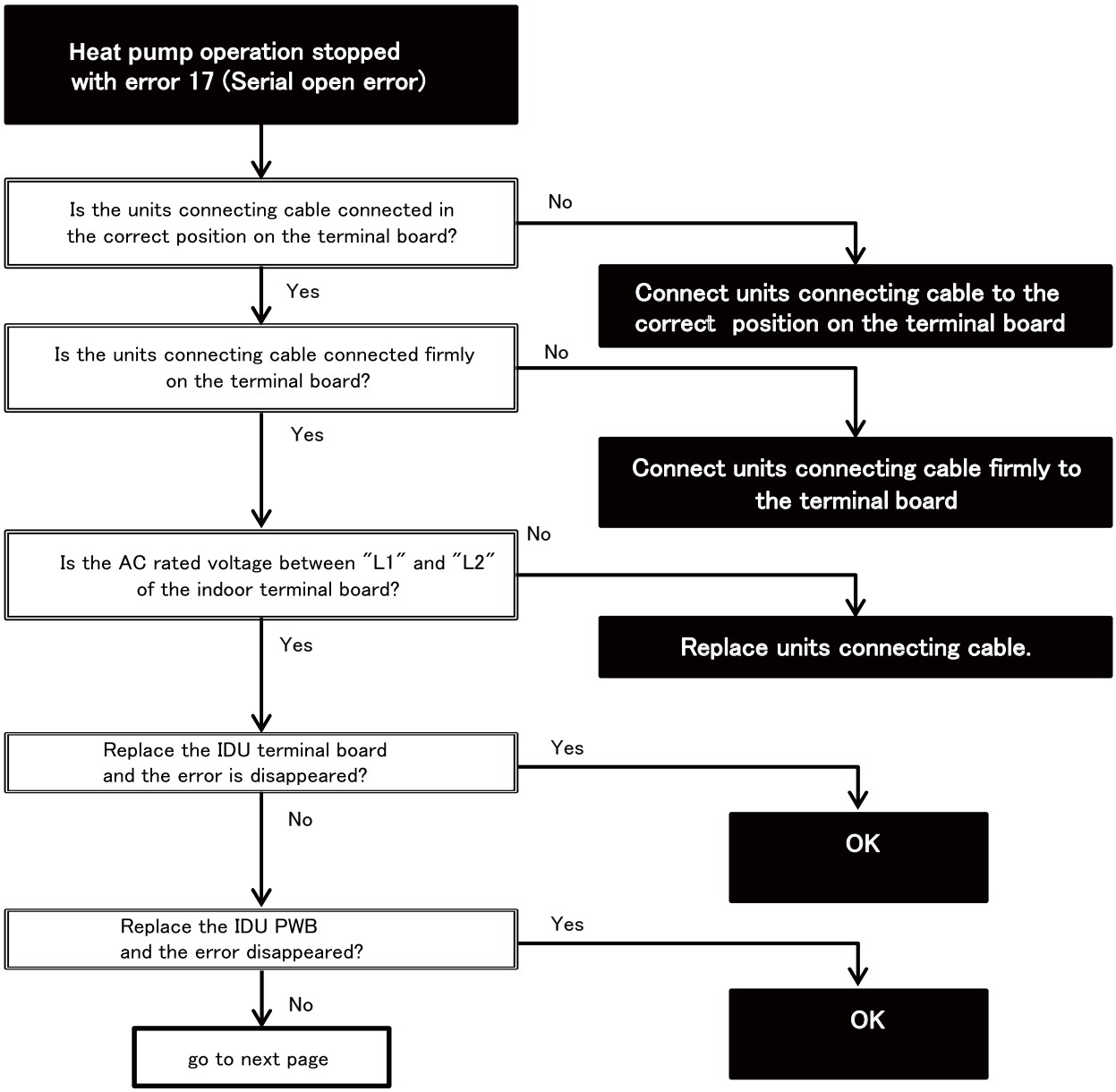
- ・AC power supply voltage is abnormal. (Not within rated voltage±10%)
- ・Big fluctuation of AC power supply voltage
- ・Instantaneous voltage drop



Error Code 17	Serial open error (1/2)	17－0 Serial open error

☆ Determine why serial communication is not possible.

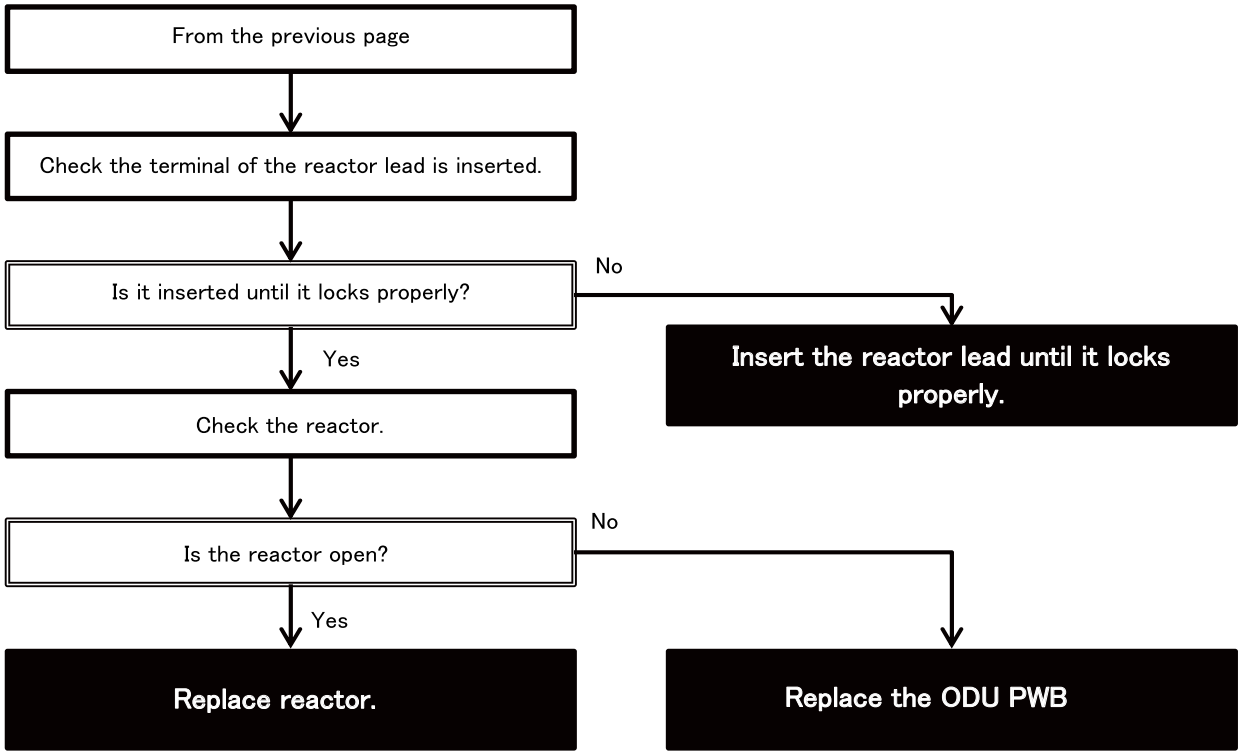
- Defective PWB of IDU (Serial circuit failure, power supply circuit operation failure, etc.)
- Defective PWB of ODU(Serial circuit failure, power supply circuit operation failure, etc.)
- Poor connection of the wiring between the units connecting the IDU and the ODU
- Defective terminal board of IDU.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

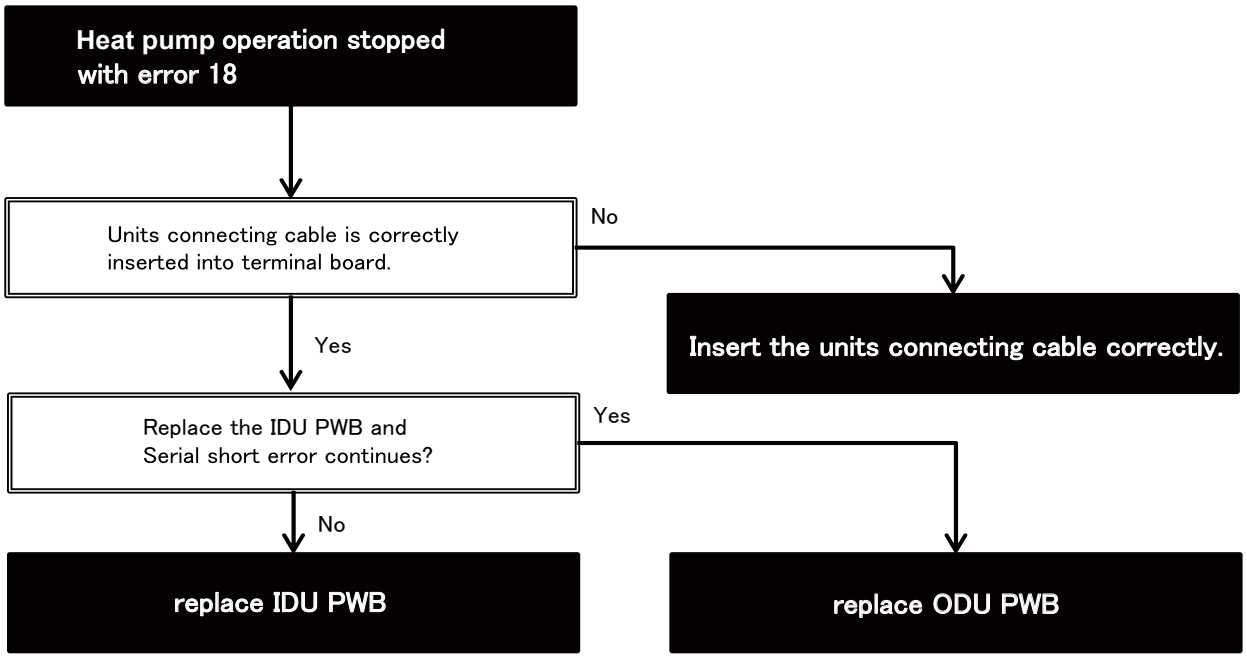


Error Code 18	Serial short error	18-0 Serial short 18-1 Incorrect wiring 18-2 High speed serial error

☆Determine if the units connecting cable is incorrectly inserted or the control board is defective.

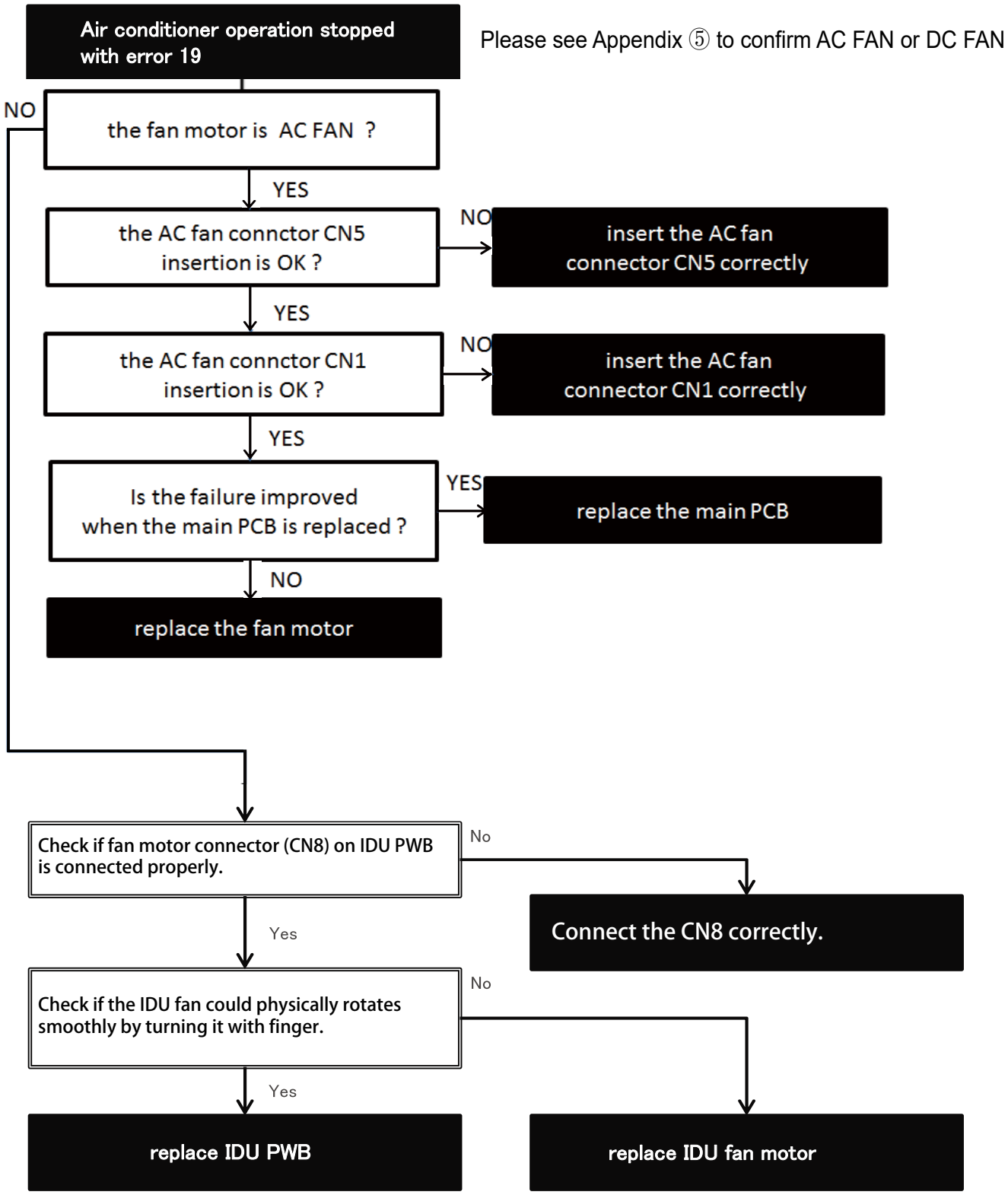
◇ Main causes of serial shorts

- Incorrect insertion of units connecting cable
- Indoor unit serial circuit failure
- Outdoor unit serial circuit failure



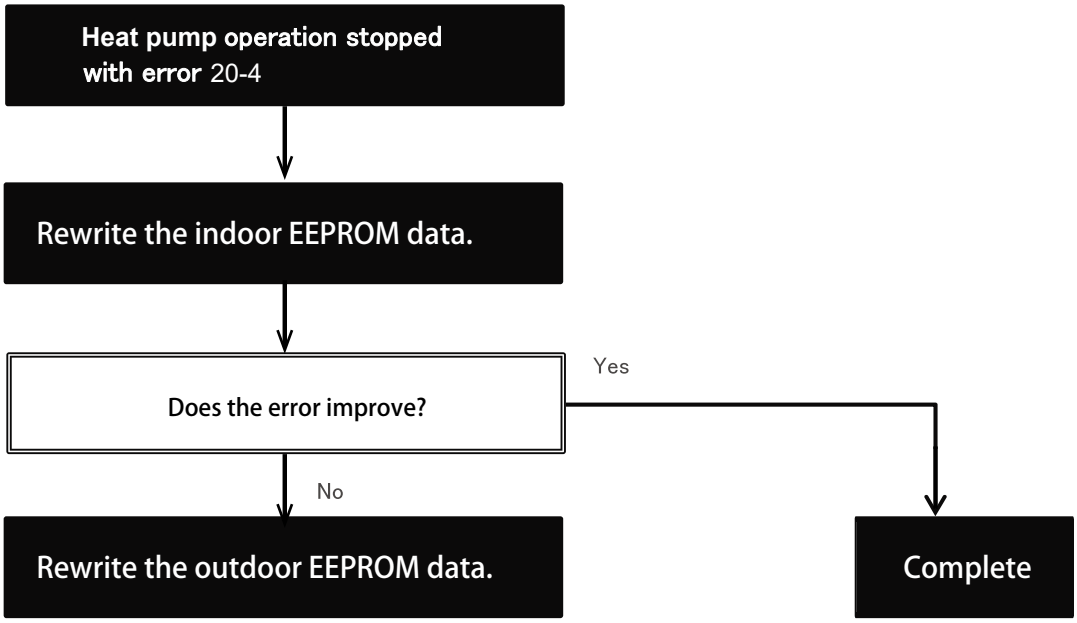
Error Code 19	Indoor fan error	19－0 Indoor fan error

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



Error Code 20-4	EEPROM mutual memory Error	

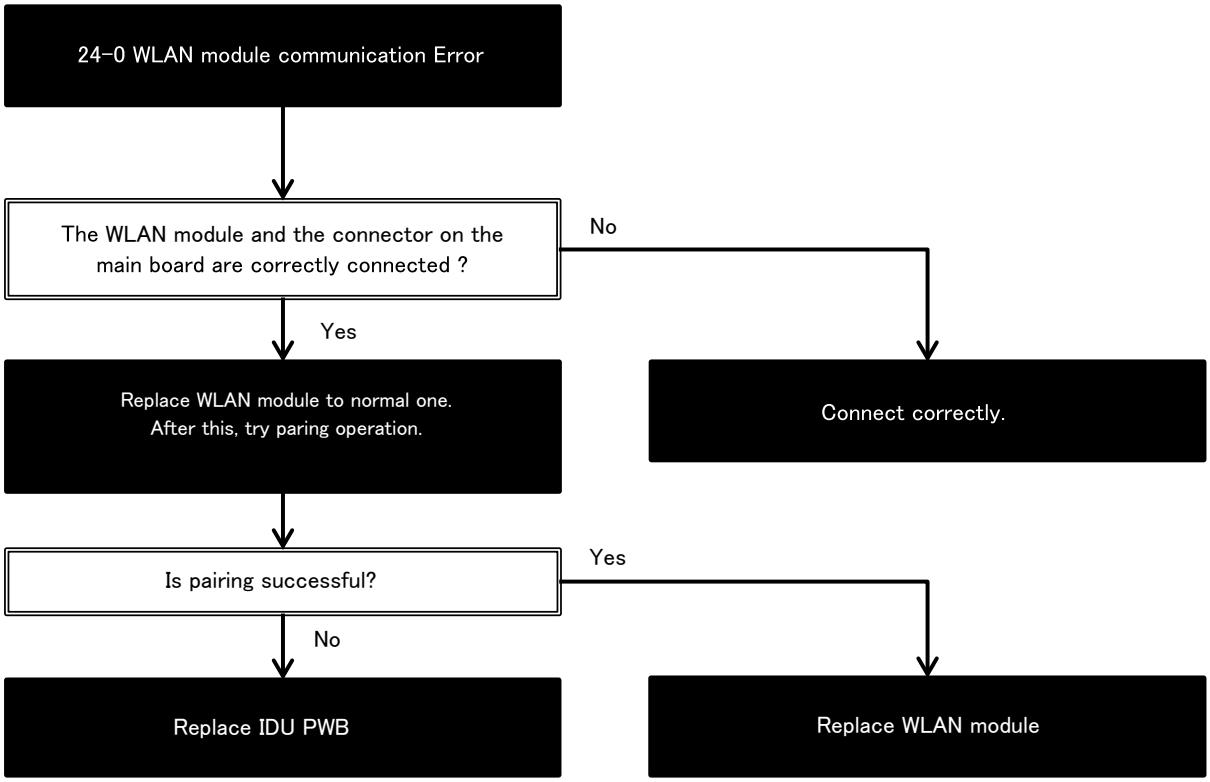
☆ Identify whether the cause is outdoor unit data error or indoor unit data error.



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.

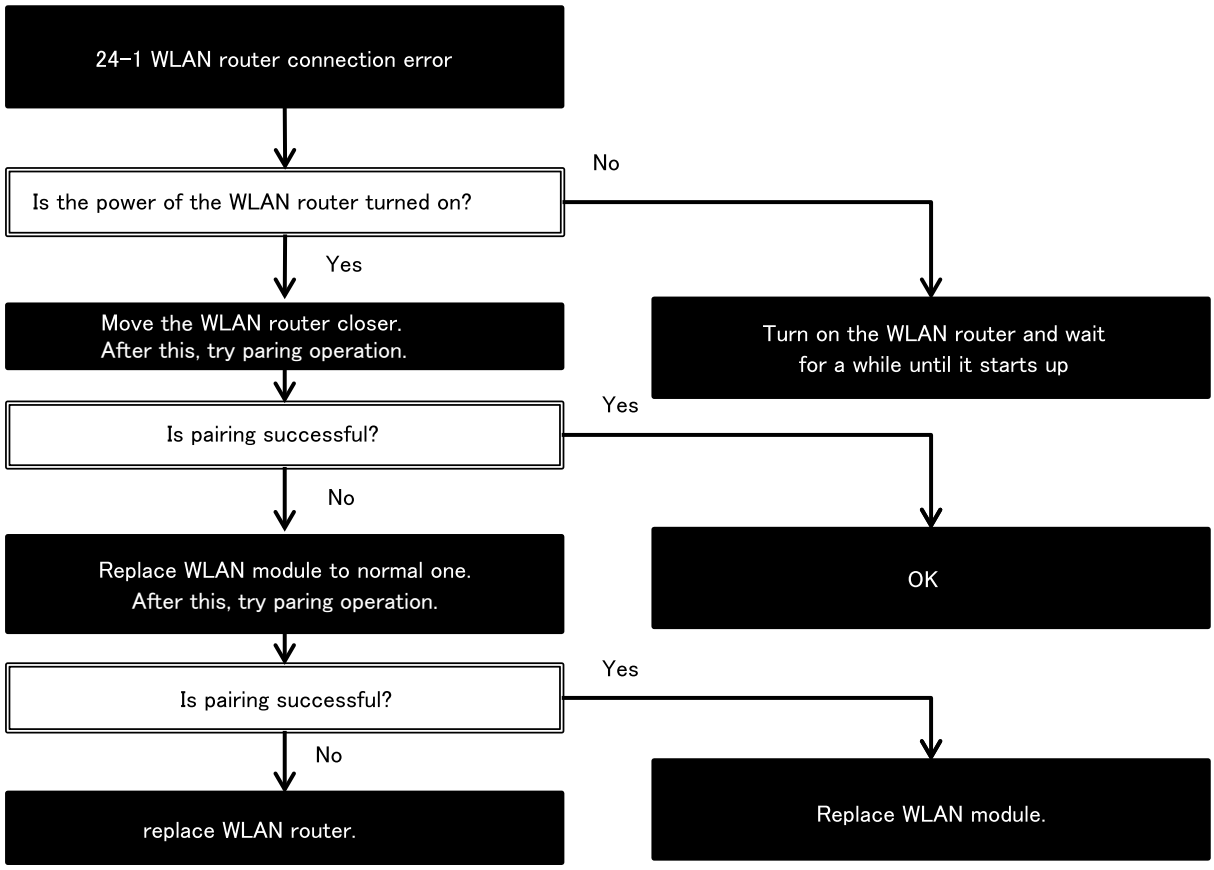
Error Code 24-0	WLAN module communication error	

☆Determine whether the cause is a connector or a board (WLAN module, main board).



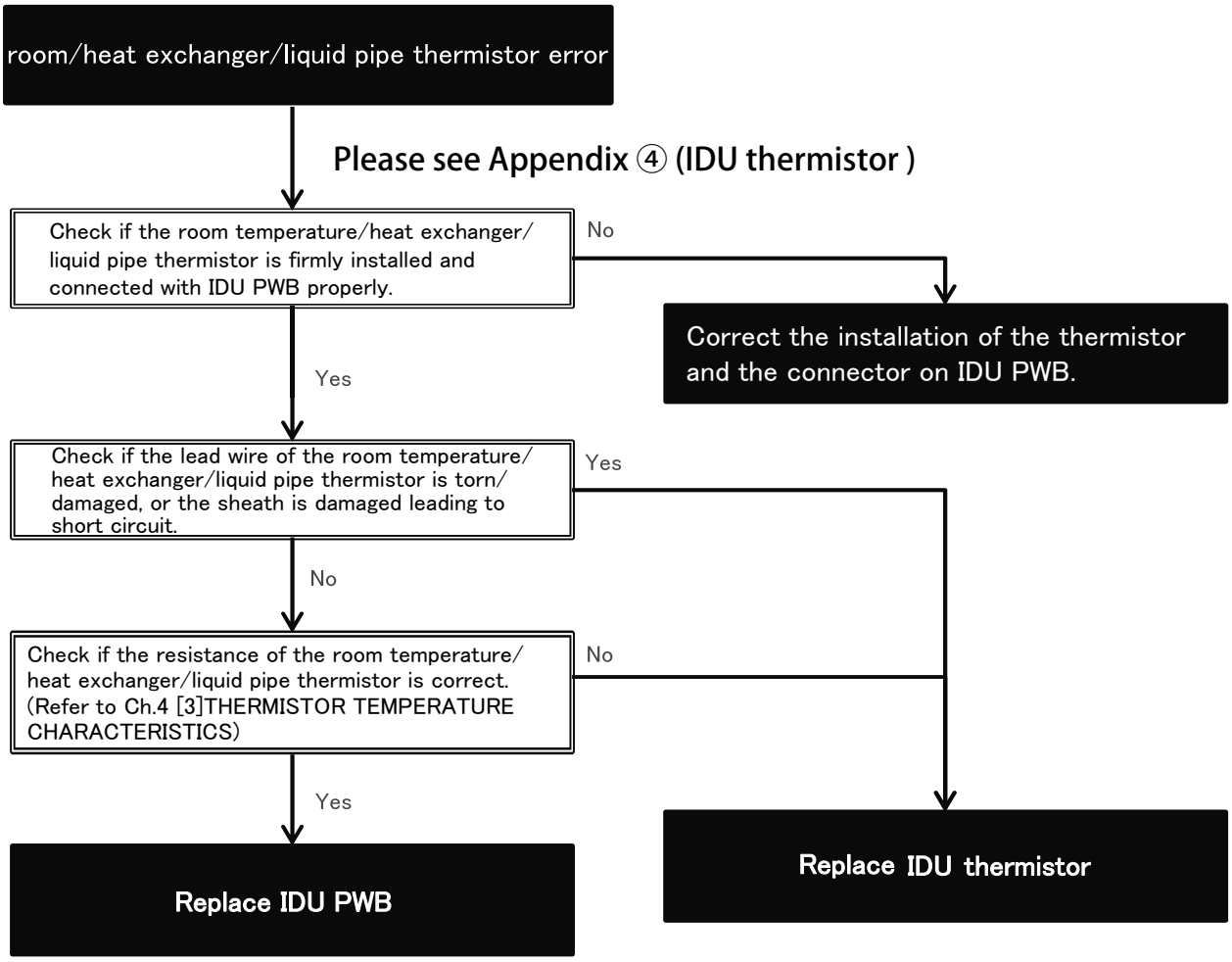
Error Code 24-1	WLAN router connection error	

☆Determine whether the cause is a WLAN module or a WLAN router.



Error Code 26	Indoor unit temperature thermistor error	26－1 Room temperature thermistor error 26－2 Heat exchanger thermistor error 26－3 Liquid pipe thermistor

☆Determine whether the cause is room temperature/heat exchanger/liquid pipe thermistor or IDU PWB.

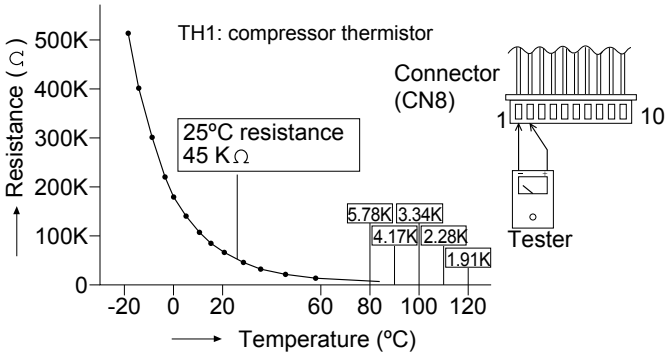


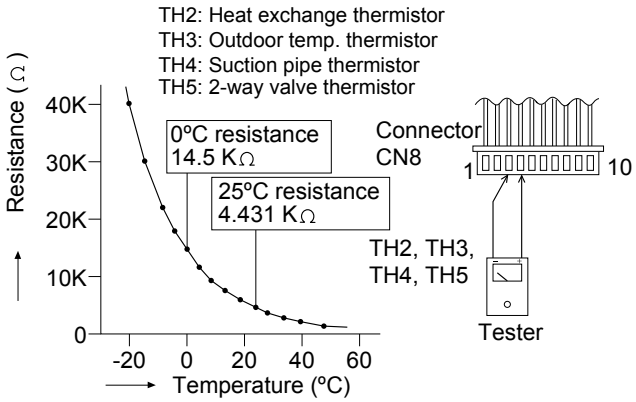
APPENDIX

① ODU thermister

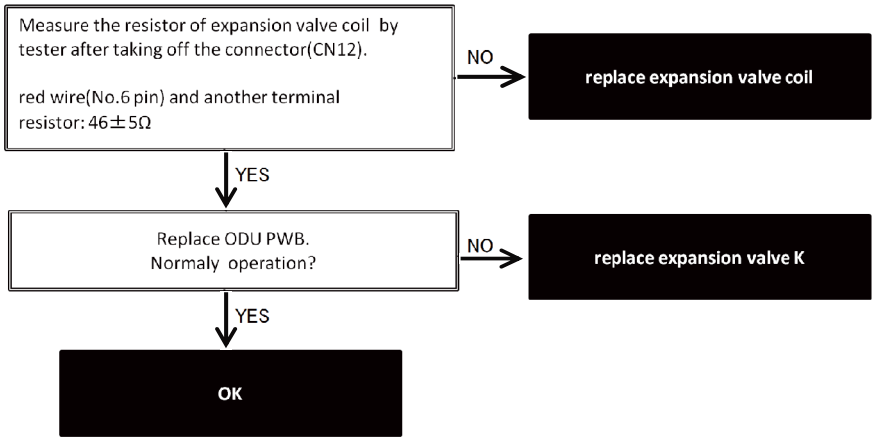
To measure the resistance, first remove the connector from the board.

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



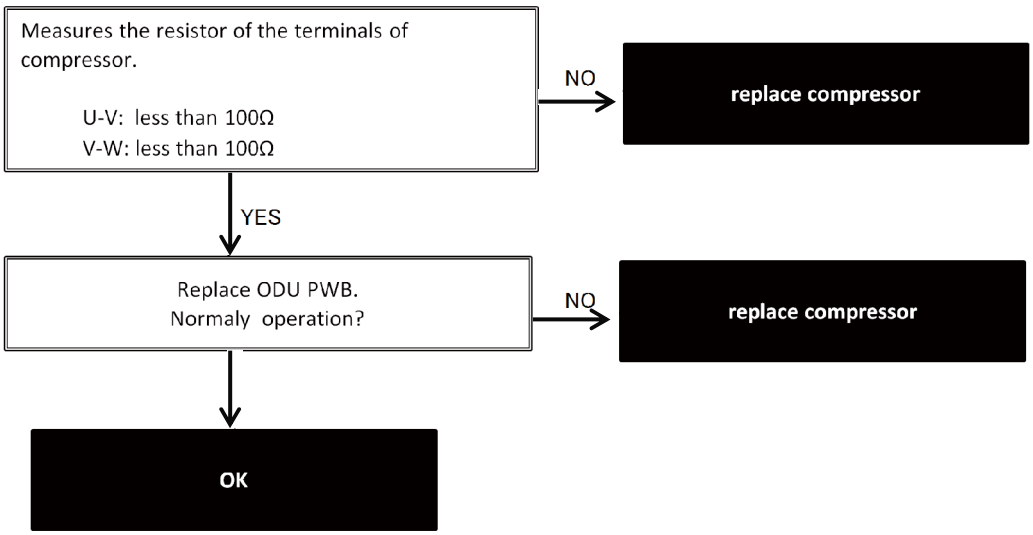


② Expansion valve check



APPENDIX

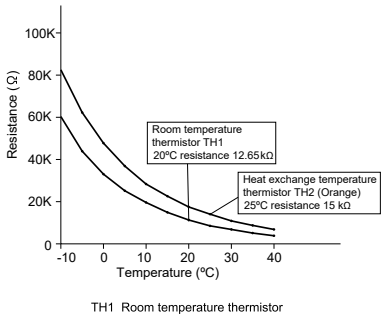
③ Compressor check



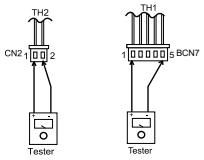
④ IDU thermistor

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

AY-XP12CHU(-B), AY-XP18CHU



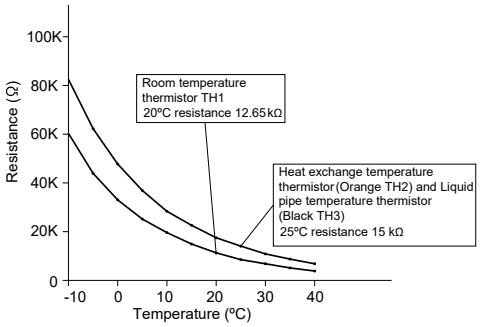
TH1 Room temperature thermistor

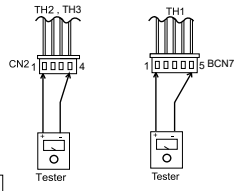


Thermistor	Symbol	Connector	Color
Room temperature	TH1 (BCN7)	① - ⑤	–
Heat exchange temperature	TH2 (CN2)	① - ②	Orange

Before measuring resistance, disconnect connectors as shown above

AY-XPC12CU, AY-XPC12CQ, AY-XP15CU(-B), AY-XPC18CU(-B), AY-XP24CU





Thermistor	Symbol	Connector	Color
Room temperature	TH1 (BCN7)	① - ⑤	–
Heat exchange temperature	TH2 (CN2)	① - ②	Orange
Liquid pipe temperature	TH3 (CN2)	③ - ④	Black

Before measuring resistance, disconnect connectors as shown above

⑤ Indoor fan: DC FAN