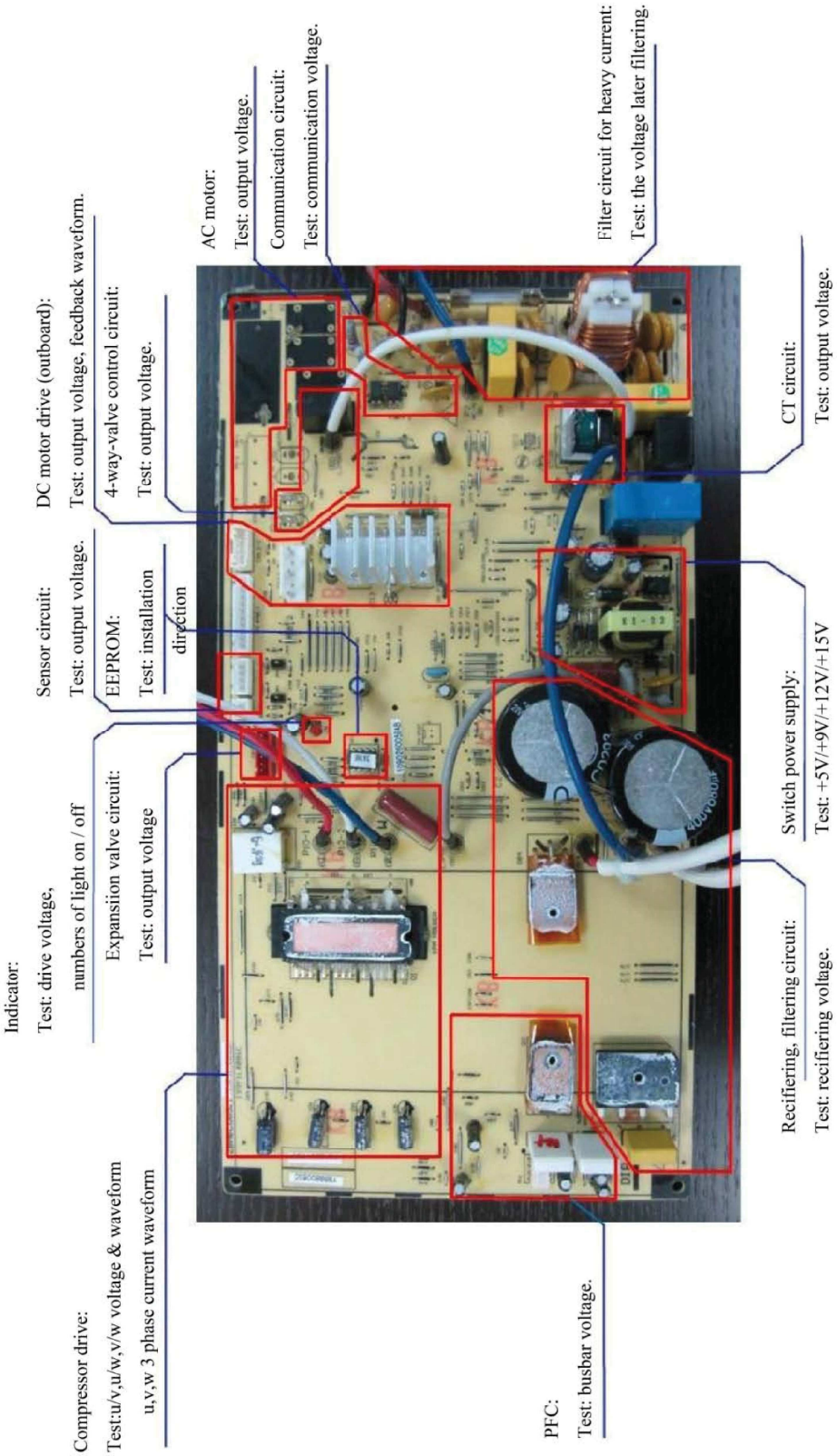
CONTENTS

Ⅰ. Introduction of New control board for outdoor unit

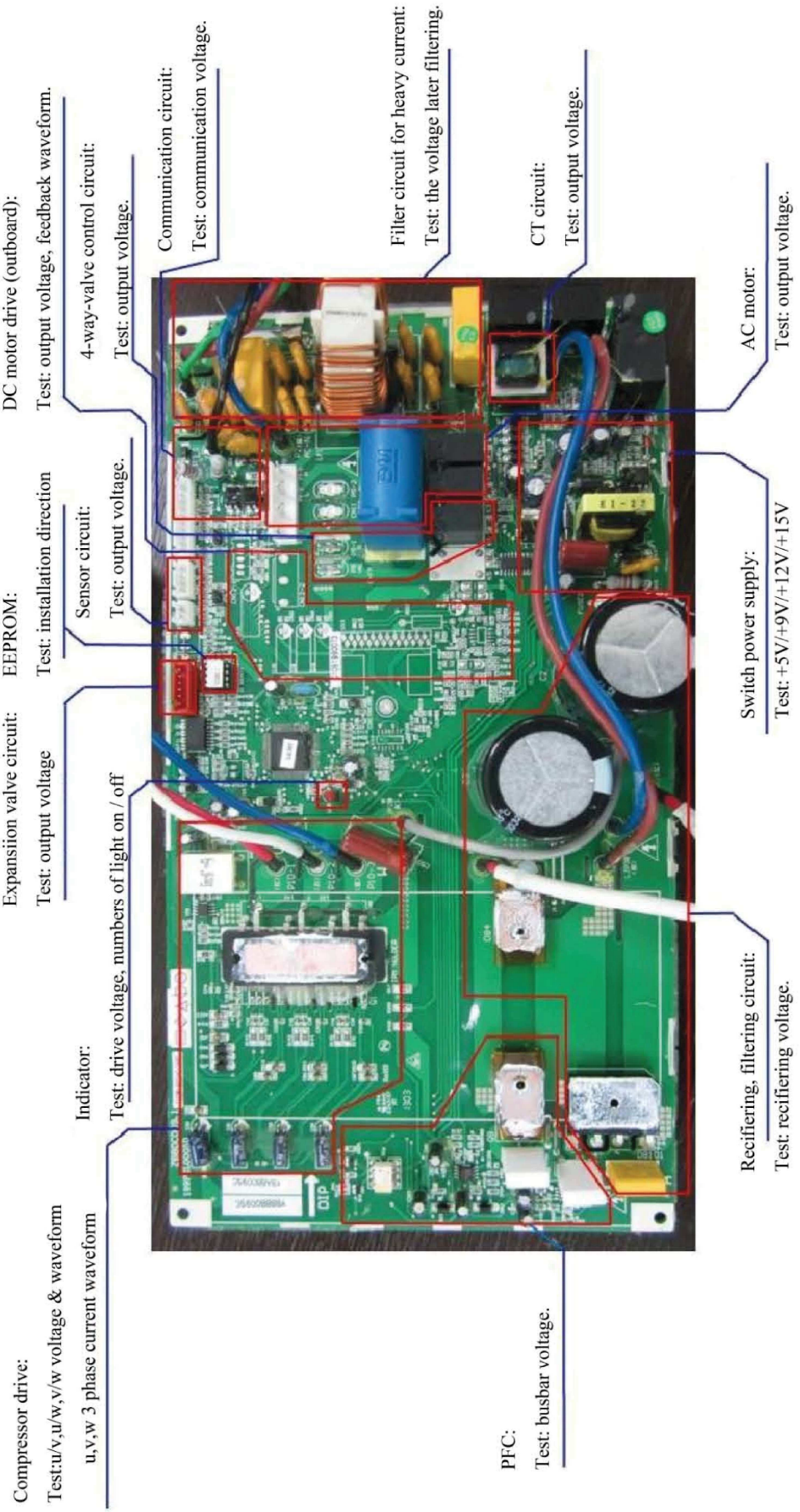
1. The structure of control board.

There are indoor unit PCB and outdoor unit PCB for inverter air conditioner. For the outdoor control board, the main function shown as follow:

1）1.0HP、1.5HP－－S.H.

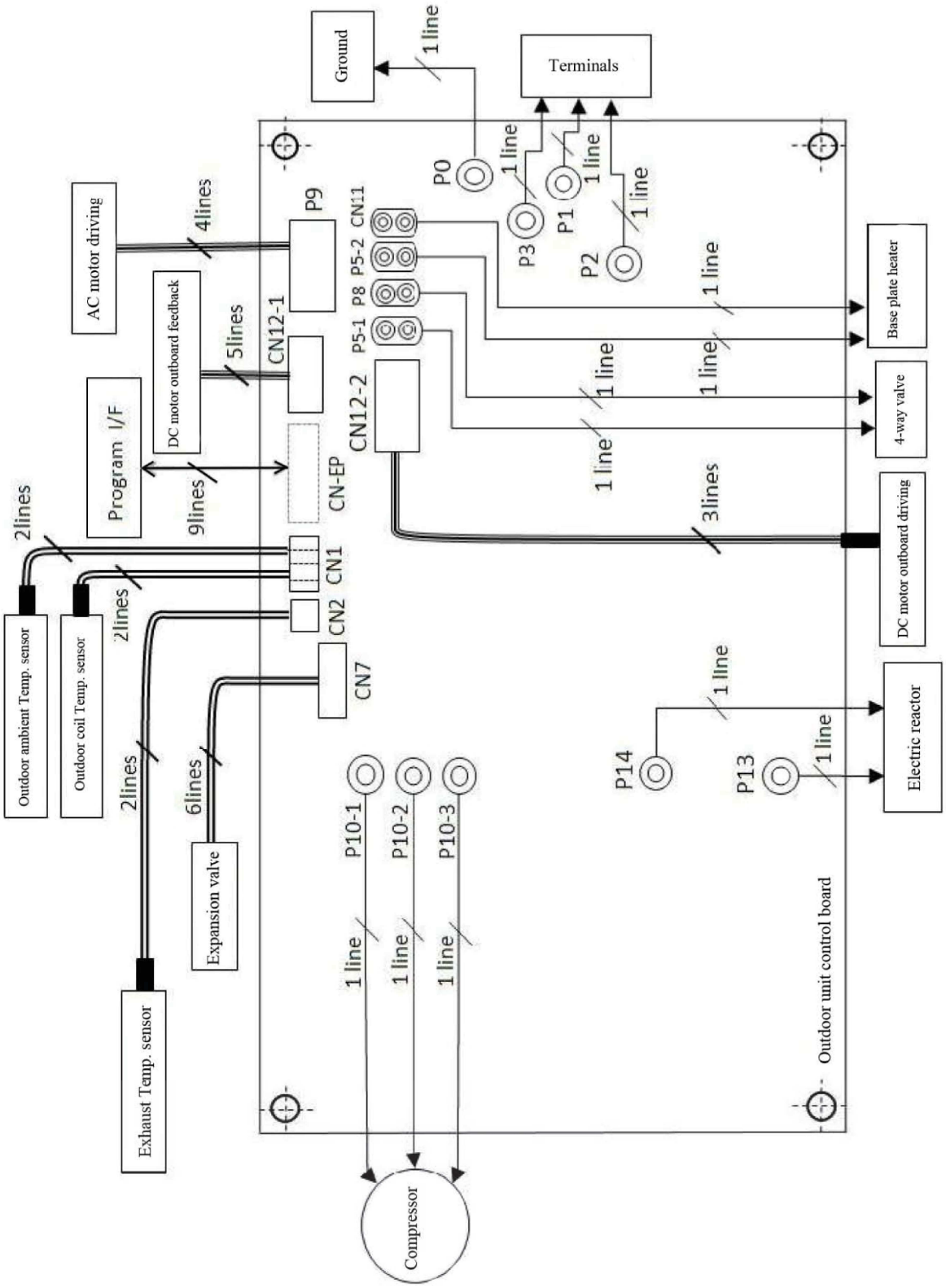


2）2.0HP、3.0HP—S.H.

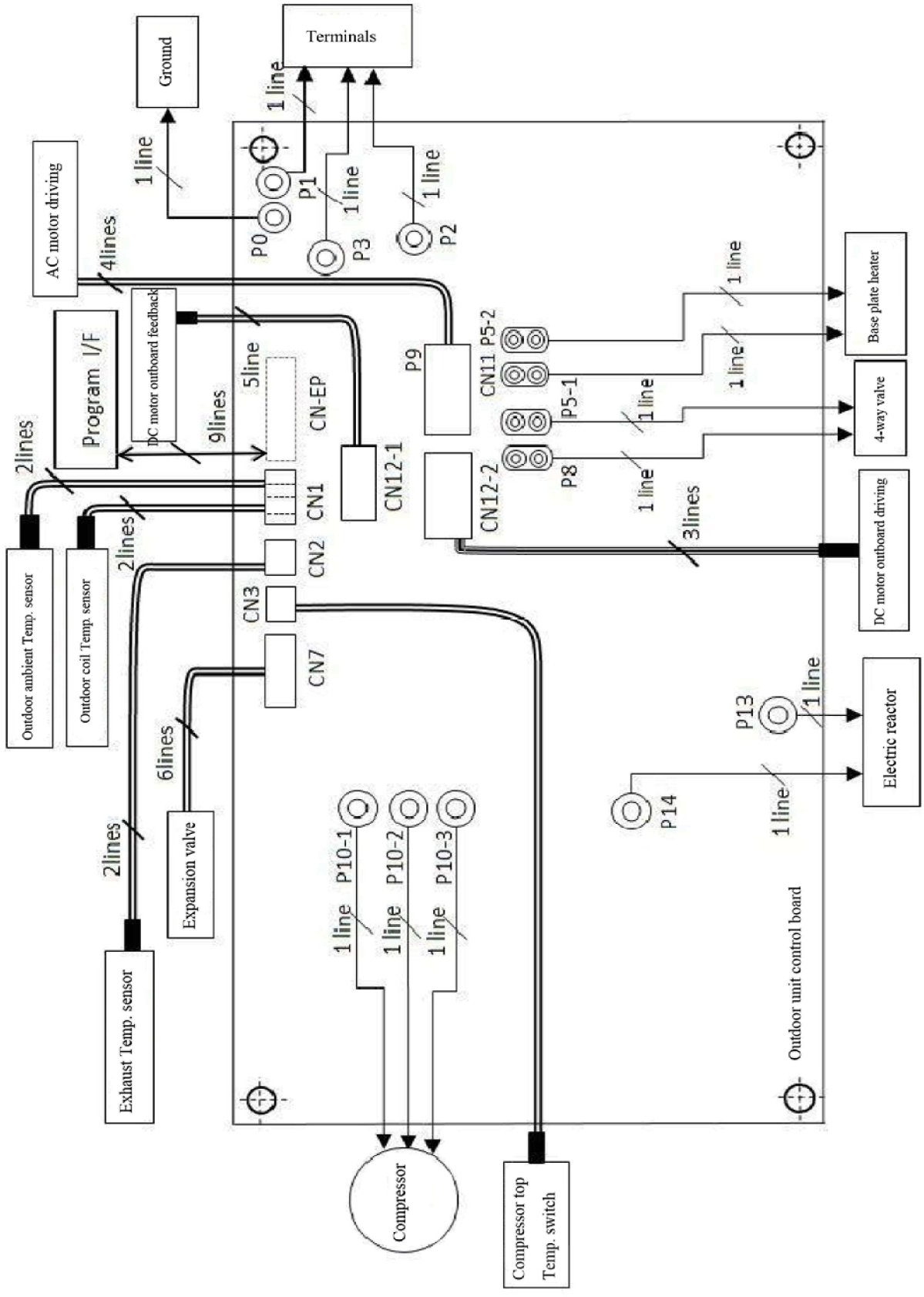


2. Diagram of outdoor unit.

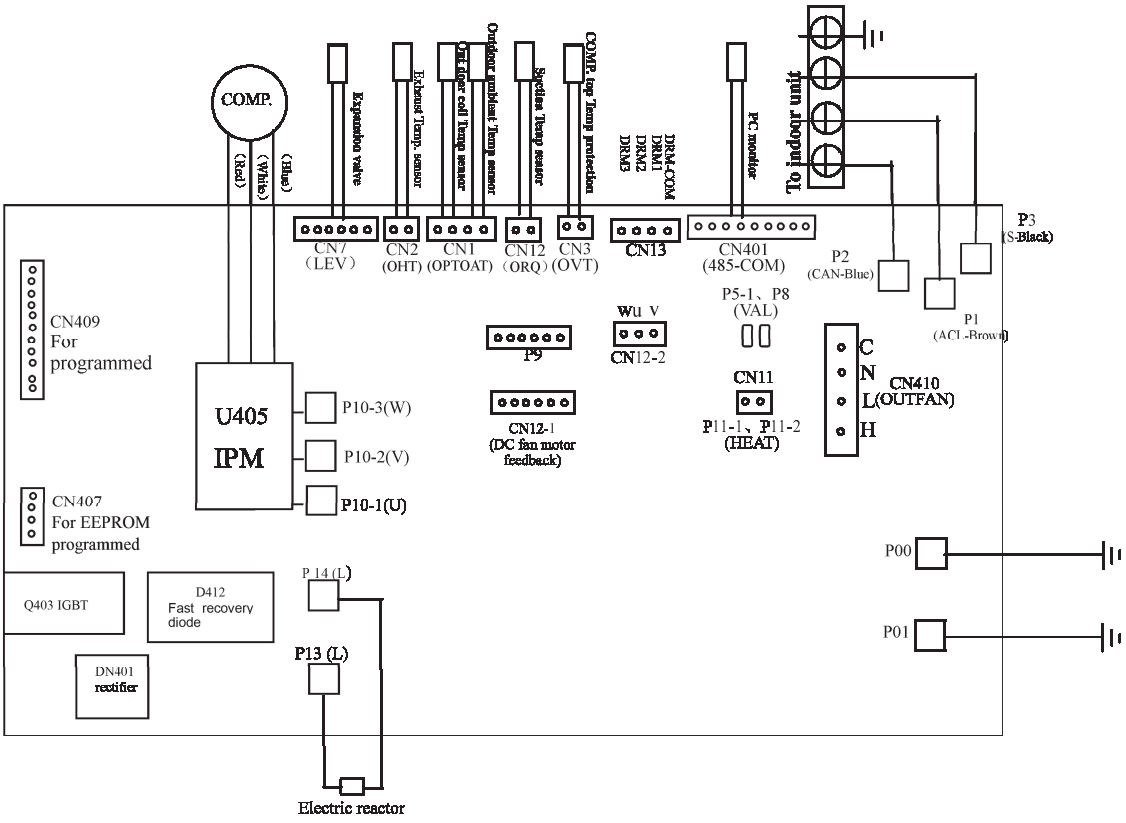
1）1.0HP、1.5HP—S.H.



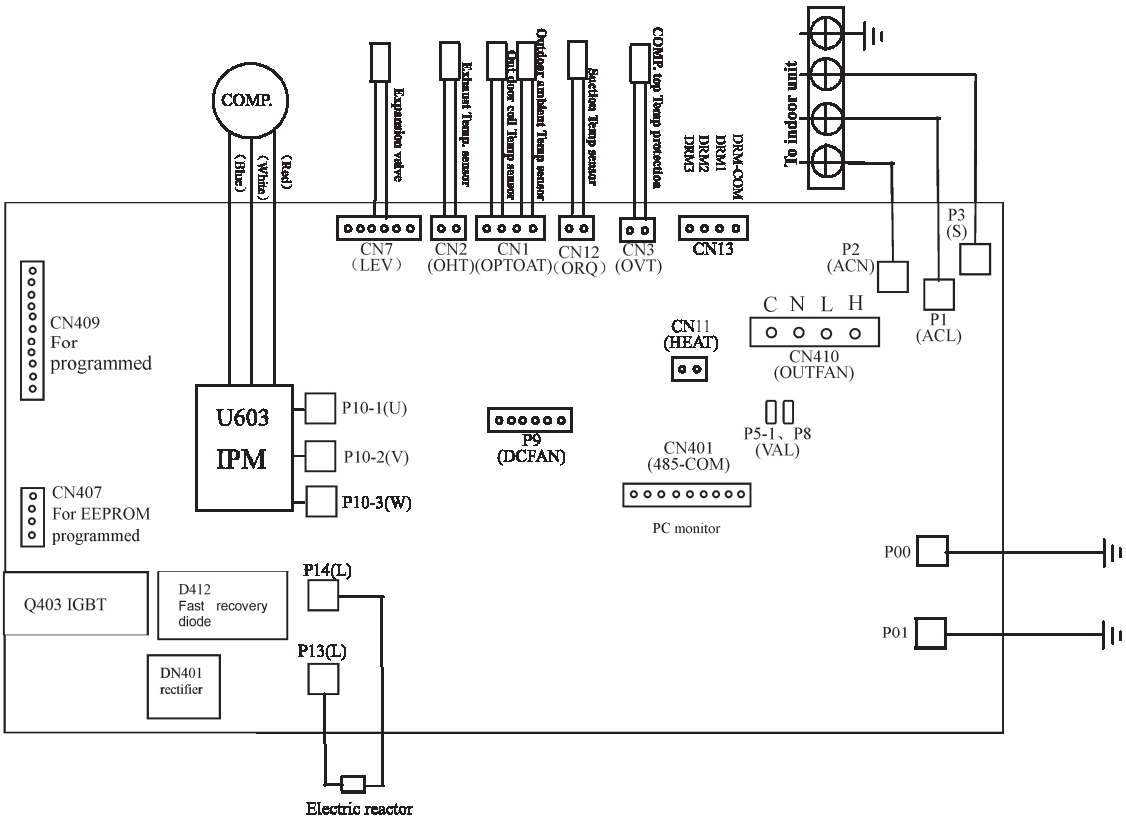
2）2.0HP、3.0HP—S.H.



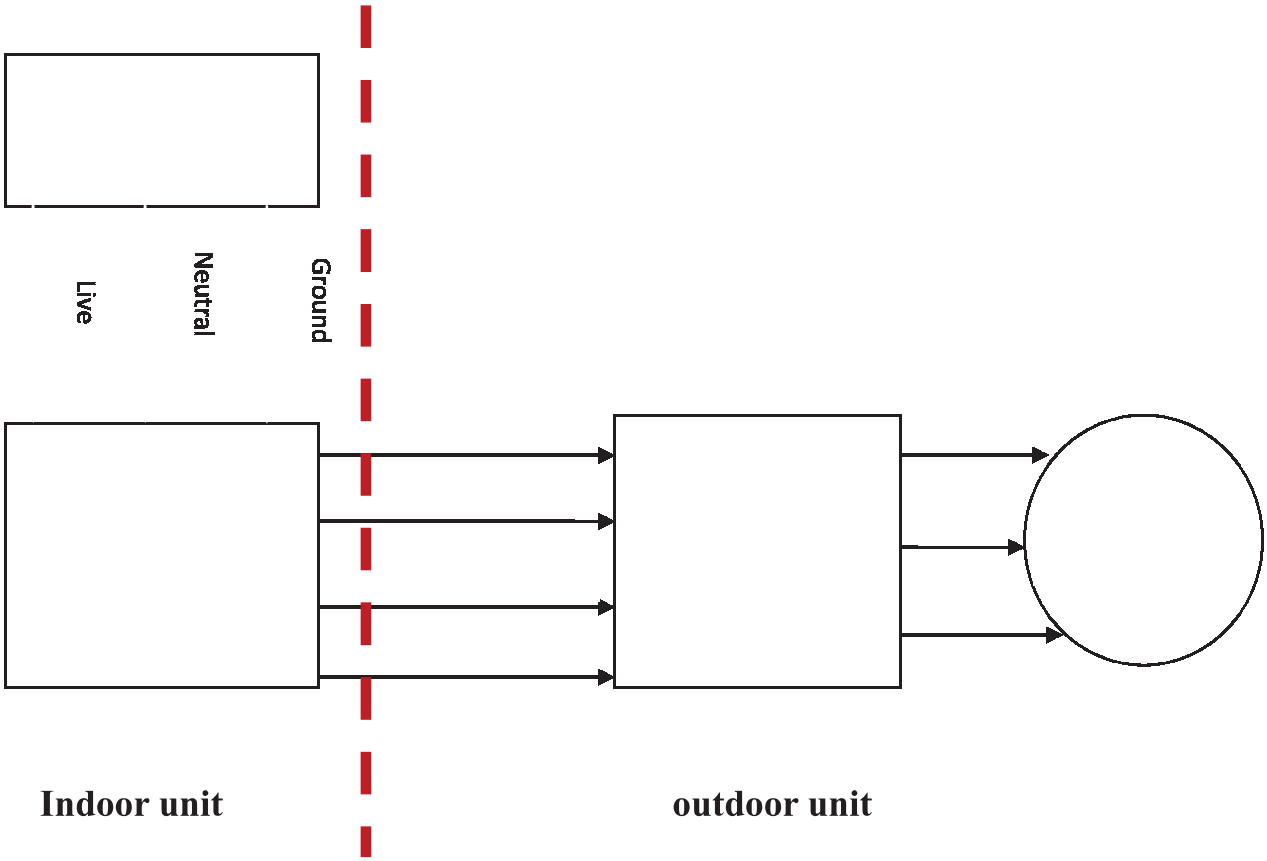
3）1.0HP、1.5HP—R.J.



4）2.0HP-3.0HP —R.J.



3. Current flow.



4. Protection and fault codes

Fault code:

Fault type	Function indicator(flash)	Digital display(LED)
Indoor unit/ outdoor unit communication fault	RUN,TIMER: blink	E0
Indoor room temp. sensor(IRT)	RUN-1 /8 sec.	E1
Indoor pipe temp. sensor (IPT)	RUN-2 /8 sec.	E2
Outdoor pipe temp. sensor (OPT)	RUN-3 /8 sec.	E3
System abnormal	RUN-4 /8 sec.	E4
Indoor fan motor fault	RUN-6 /8 sec.	E6
Outdoor temp. sensor	RUN-7 /8 sec.	E7
Exhaust temp. sensor	RUN-8 /8 sec.	E8
IPM drive and module fault	RUN-9 /8 sec.	E9
Outdoor fan motor fault (DC motor)	RUN-10 /8 sec.	EF
Current sensor fault	RUN-11 /8 sec.	EA
Indoor unit EEPROM fault	RUN-12 /8 sec.	EE
Temp. switch fault (on top of the compressor)	RUN-13 /8 sec.	EP
Voltage sensor fault	RUN-14 /8 sec.	EU

Display on outdoor PCB:

The indicator alerts the fault in a cycle as such that it is bright for 0.5 seconds, dark for 0.5 seconds, blinks “n” times and then dark for 3 seconds.

Blink times(n)	Fault Message	Indoor unit display(LED)
3	Over current	
4	Exhaust overtemperature protection	
5	Outdoor coil (pipe) overtemperature protection	
7	Communication fault with indoor unit	E0
8	Compressor overheat fault (compressor top switch)	EP
9	Short-circuit / open-circuit fault of outdoor temperature sensor	E7
10	Short circuit / open-circuit fault of outdoor heat exchanger temperature sensor	E3
11	Short-circuit / open-circuit fault of exhaust temperature sensor	E8
12	Voltage sensor fault	EU
13	Current sensor fault	EA
16	No feedback from DC fan motor(outdoor unit)	EF
17	Defrost state	
19	Outdoor PCB EEPROM fault	
23	System in shortage of Freon	E4
25	Indoor unit room temp. sensor fault	E1
26	Indoor unit pipe temp. sensor fault	E2
27	Indoor PCB EEPROM fault	EE
28	Indoor fan motor fault	E6
32	Indoor coil defrost prevention	
33	Indoor coil overheating protection	
37	Drive abnormal（current sampling circuit fault）	E9（P9）
39	Drive abnormal（over voltage）	E9（P9）
40	Drive abnormal（under voltage）	E9（P9）
41	Drive abnormal（IPM protection、DC peak）	E9（P9）
44	Drive abnormal（over current of phase current）	E9（P9）
45	Drive abnormal（compressor phase failure protection）	E9（P9）
47	Drive abnormal（compressor high frequency protection）	E9（P9）
48	Drive abnormal（compressor frequency fluctuation abnormal）	E9（P9）

Remark: Temperature —Temp.

Ⅱ. Troubleshooting

1. Voltage test and inspection.

When air conditioner has problem, first we need to test the key point voltage on the PCB.

1）.Switch on the air conditioner normally.

2）.Use a digital multimeter to measure the AC power supply (L, N) shown as picture **①AC-L, ②AC-N.**

3). Measuring the busbar voltage between point **③ (DC+)** and point **④ (DC-)** as shown below, normally it should be DC 310V.

4). Test voltage **+5V**(⑤ ⑨), **+9V**(⑥ ⑨), **+12V**(⑦ ⑨) and **+15V** (⑧ ⑨) .

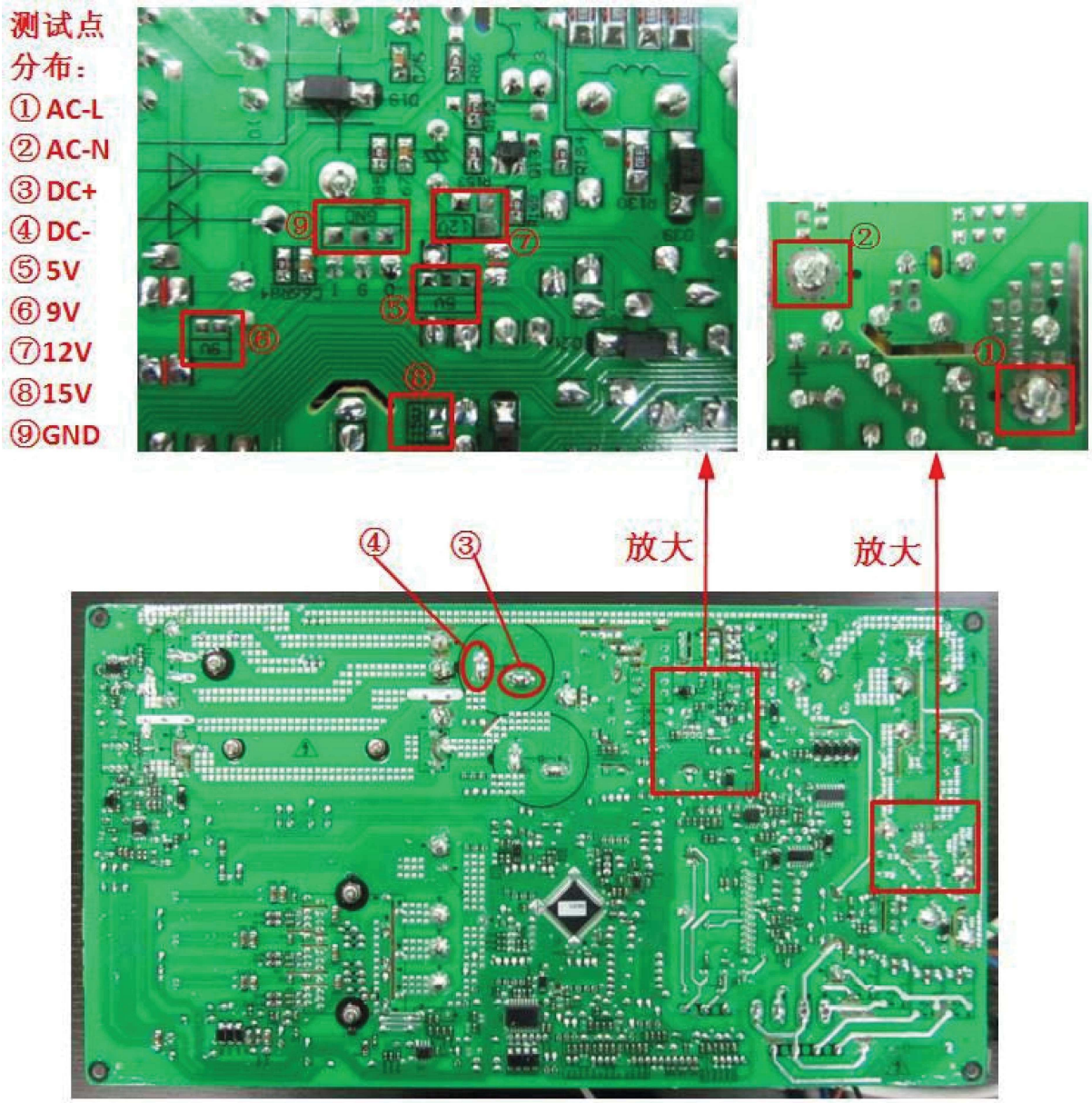
Analysis:

1) If AC power input normal but without DC output 310V, please check FUSE1 and/or rectifier DB101.
2) If DC 310V ok, but without **+15V/+12V/+9V/+5V** , inspect IC5 and/or transformer T1.
3) If **+15V/+12V/+9V** normal but without **+5V**, please check IC6 (7805) broken or not.

   If the air conditioner still can't work after inspection as above, replace the outdoor PCB please.

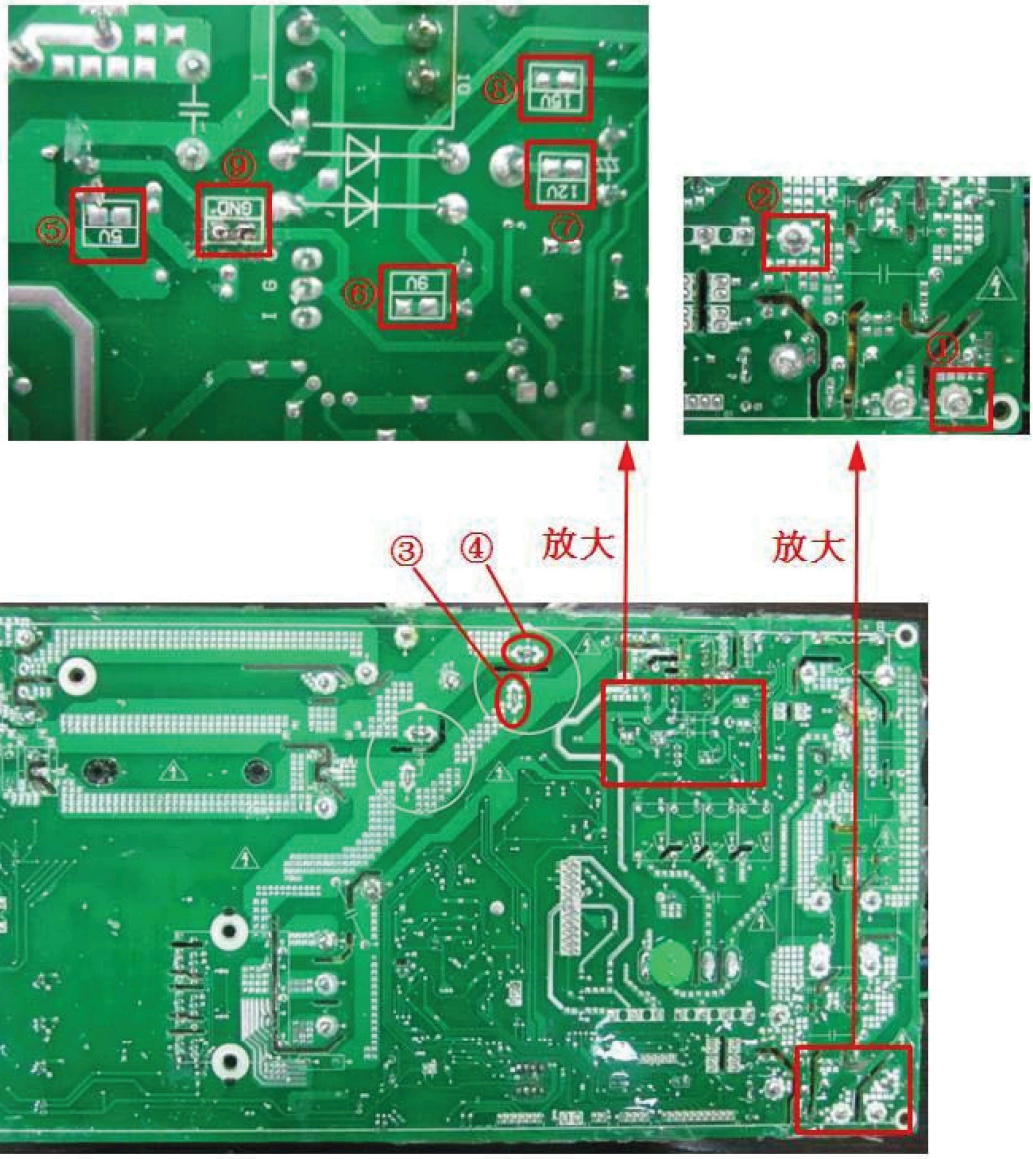
Voltage TEST POINT (examples)：

1) ：Single side printed board ---1.0HP、1.5HP—S.H.



2) ： **Dual side printed board--2.0HP、3.0HP—S.H.**

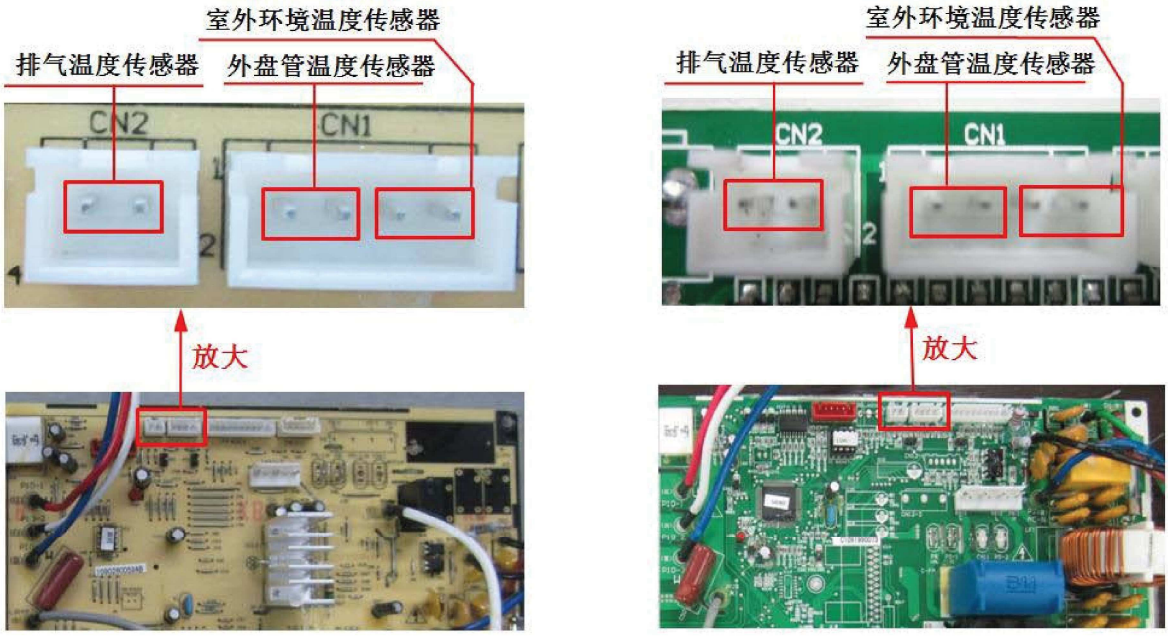
测试点
分布：
①AC-L
②AC-N
③DC+
④DC-
⑤5V
⑥9V
⑦12V
⑧15V
⑨GND



2. According to the fault code *(outdoor PCB blink times (n) or indoor unit LED display E*)*

1）、Blink 10 times (E3)、9times（E7）、11times（E8）、4times、5times

Symptom		Blink 10、9、11、4 or 5times	
cause		Outdoor pipe sensor fault(10 times), outdoor temp. sensor fault (9times)、exhaust temp. sensor (11times)、Exhaust overtemperature protection (4times)、Outdoor coil overtemperature protection (5times)	
S/N	Inspection	Solve	Remark
1	Check connector CN1 and CN2 on outdoor board,	Insert again if it loose	PIC 1
2	Measure the resistance of the outdoor temp. sensor： CN1--（25℃ / 5KΩ）test outdoor ambient /pipe temp. sensor value； CN2 --（25℃ / 20KΩ）test outdoor exhaust temp. sensor value； (for the other resistance value, please refer to the TEMP--Resistance sheet.)	Replace the temperature sensor assembly if the resistance is not in standard level.	PIC 1 & Appendix 2
3	If the above testing is normal	Replace outdoor PCB	

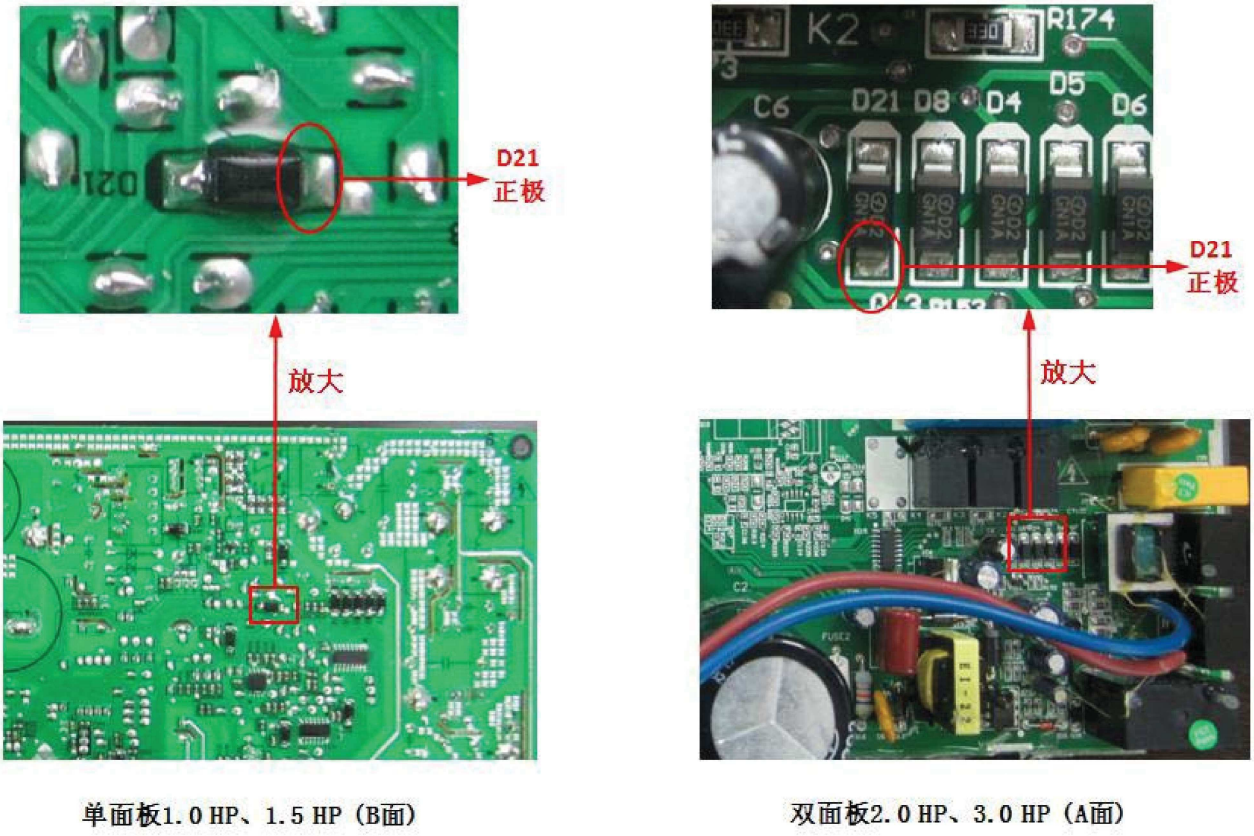


单面板1.0 HP、1.5 HP　　双面板2.0 HP、3.0 HP

PIC 1：Position of sensor connector CN1、CN2

2）、Blink 13 times（EA）、3times

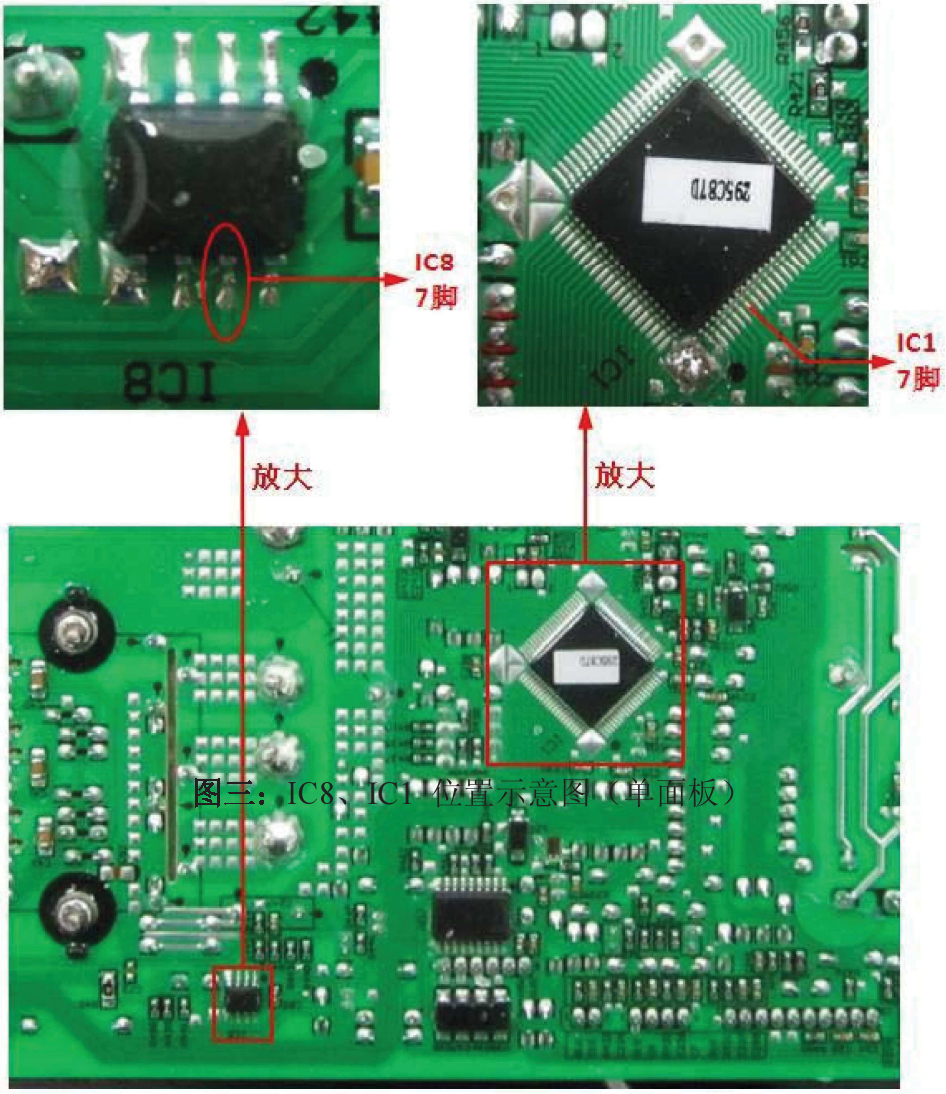
Symptom		**Blink 13 times（EA）、3times**	
Cause		Current sensor fault（CT）(13times); Over current protection (3times)	
S/N	Inspection	Solve	Remark
1	Check if refrigerant leakage	Find and repair the leakage problem and recharge refrigerant	
2	Switch on air conditioner, measure the voltage between “D21 +” and “GND” with a digital multimeter	If the voltage is **+ 5V** or **0V**，replace the outdoor PCB	PIC 2



PIC 2：Position of D21 and it’s polarity mark

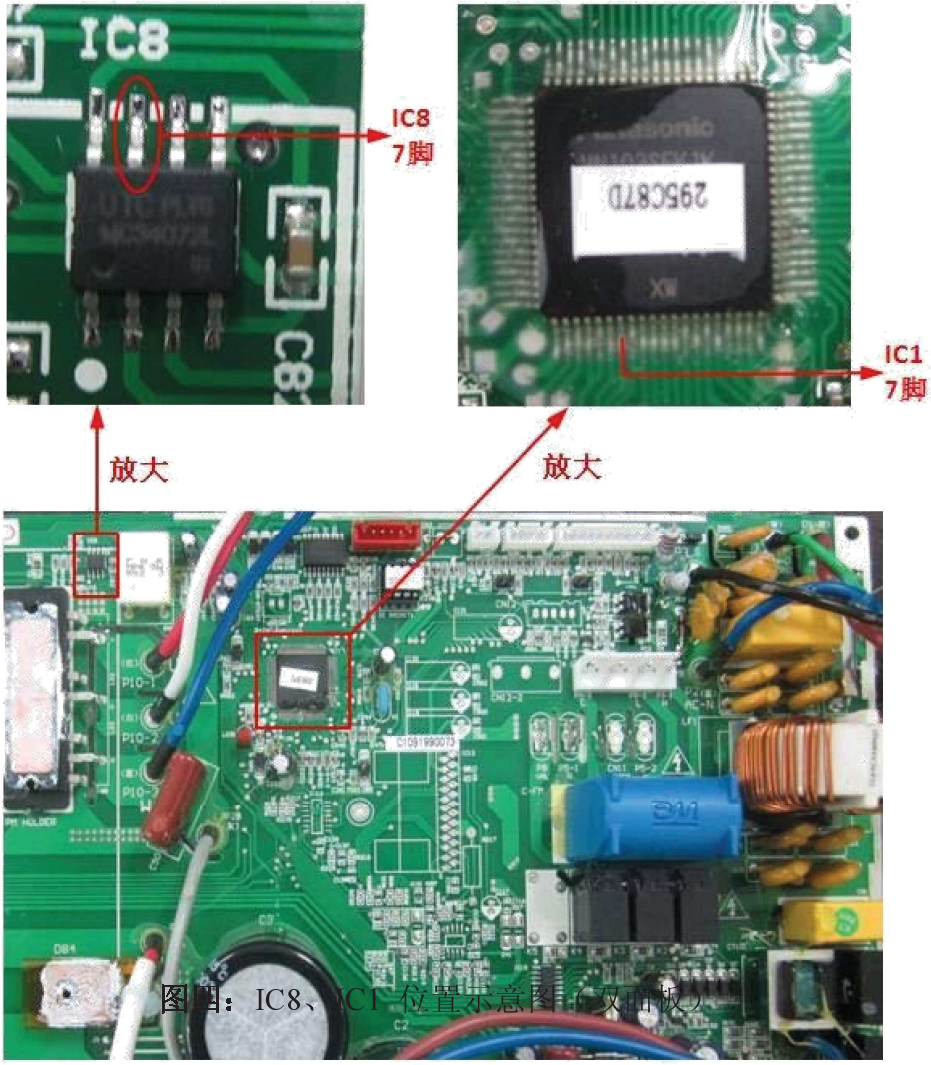
3）、Blink 37~ 48 times（E9）

<table>
<tr><td colspan="3">Symptom</td><td colspan="2">Blink 37~ 48times (E9)</td></tr>
<tr><td colspan="3">Cause</td><td colspan="2">IPM drive fault or IPM module itself fault</td></tr>
<tr><td>S/N</td><td colspan="2">Inspection</td><td>Solve</td><td>Remark</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring connection inspection</td><td colspan="2">①.Check the sequence of wiring connection to U(red), V(white), W(blue) on the compressor</td><td>Make sure the phase sequence of wiring connection to compressor correct.</td><td></td></tr>
<tr><td colspan="2">②.The wiring connection tightly?</td><td>Insert again if loose.</td><td></td></tr>
<tr><td rowspan="8">2</td><td rowspan="8">Power off and then, power on again, check the protection code.</td><td colspan="2">①If this code E9(P9) is displayed when the compressor is started for several seconds or even not started, check the compressor connection for correctness</td><td>To be sure the wiring connection on compressor correct.</td><td></td></tr>
<tr><td rowspan="6">② Cooling/ heating normally in the beginning, but for some time it shows E9(P9), based on LED1 blink times on outdoor unit for further analysis</td><td>Blink 37 times: current sampling circuit fault</td><td>Test voltage of IC8 pin-7, it should be: 2.5V±0.25V； if no, replace outdoor PCB</td><td>PIC 3 and PIC 4</td></tr>
<tr><td>Blink 39 times: over voltage protection</td><td>Test voltage between IC1 pin-7 and GND, it should be more than + 4.6V； if no, replace outdoor PCB</td><td>PIC 3 and PIC 4</td></tr>
<tr><td>Blink 41 times：IPM protection、DC peak over current protection</td><td>1） Inspect the resistance R49：check whether its broken?
2） Check whether IPM (Q1) broken.</td><td>PIC 5</td></tr>
<tr><td>Blink 44 times: over current protection for Phase Current</td><td rowspan="3">Inspect the resistance R49: check whether its broken?</td><td rowspan="3">PIC 5</td></tr>
<tr><td>Blink 47 times: compressor high frequency protection</td></tr>
<tr><td>Blink 48 times: compressor frequency fluctuation abnormal</td></tr>
<tr><td>Blink 45 times: compressor phase failure protection</td><td>To be sure the wiring connection on compressor correct.</td><td>For factory test only</td></tr>
<tr><td colspan="2">③.No cooling or no heating: Check the wiring connection to compressor.</td><td>To be sure there is no false connection</td><td></td></tr>
<tr><td colspan="2">④. The compressor restart immediately after stopped, this might also cause E9(P9) protection because the cooling system is not stable.</td><td>Try to start the air conditioner again after a longer period of stop</td><td></td></tr>
</table>



图三：IC8、IC1 位置示意图（单面板）

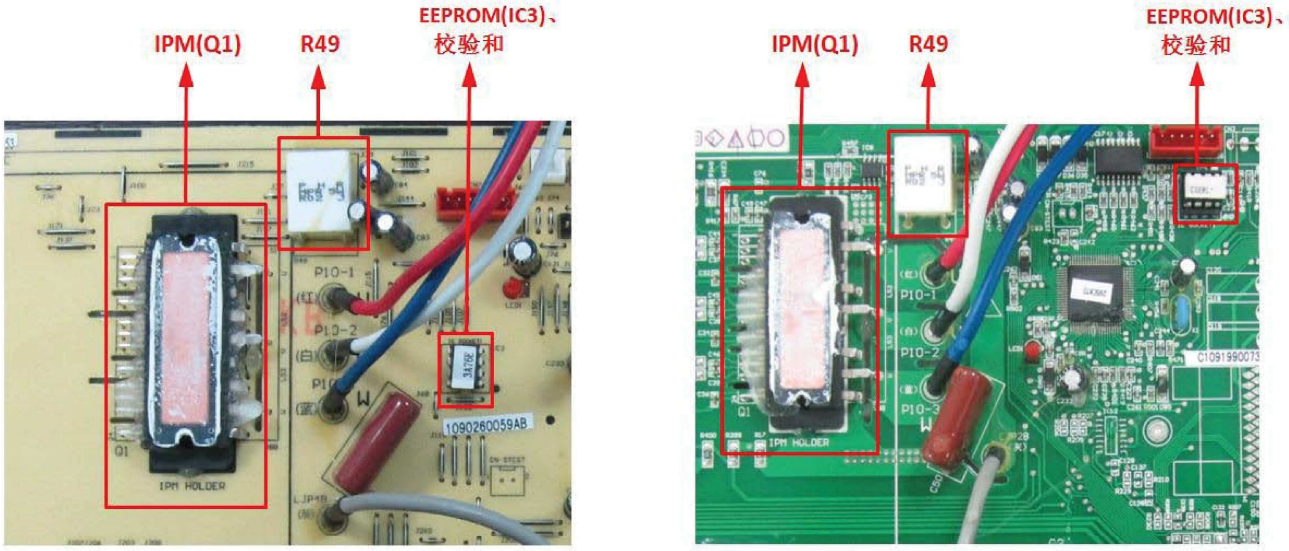
PIC 3： Position of IC8、IC1（Single printed board）



图四：IC8、IC1 位置示意图（双面板）

双面板2.0 HP、3.0 HP（A面）

PIC 4: Position of IC8、IC1（Dual printed board）



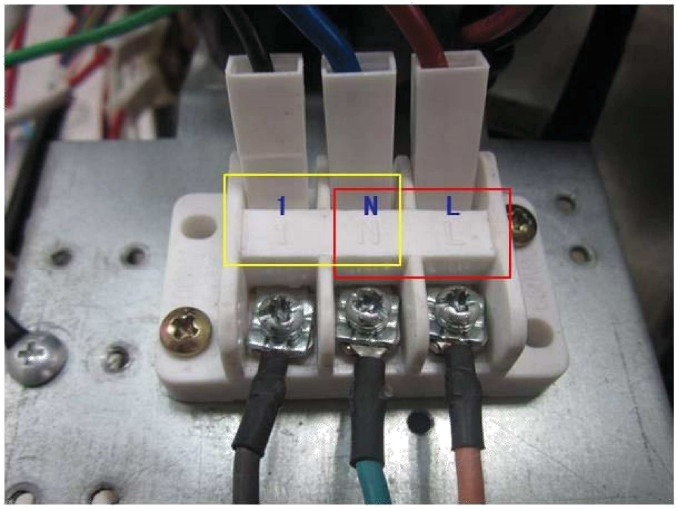
单面板1.0 HP、1.5 HP

双面板2.0 HP、3.0 HP

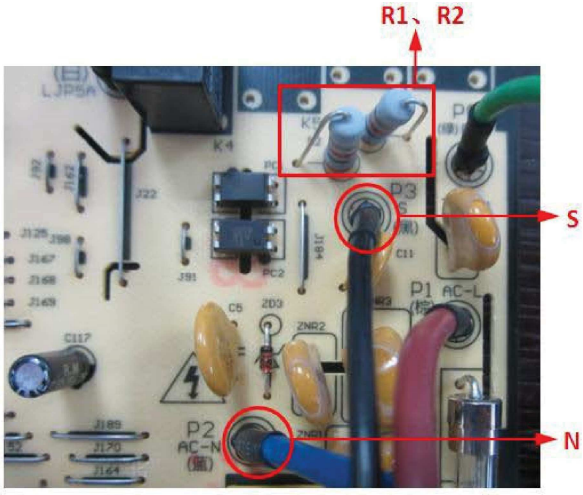
PIC 5： Position of R49, IC3 and Q1

4）、Blink 7 times（E0）

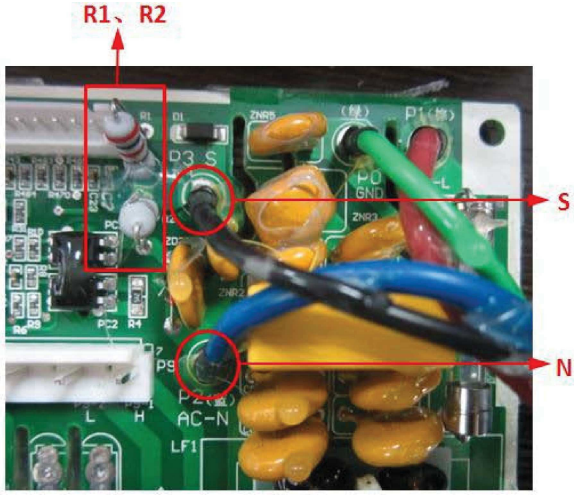
<table>
<tr><td colspan="3">Symptom</td><td colspan="2">Blink 7 times (E0)</td></tr>
<tr><td colspan="3">Cause</td><td colspan="2">Communication fault of indoor / outdoor unit</td></tr>
<tr><td>S/N</td><td colspan="2">Inspection</td><td>Solve</td><td>Remark</td></tr>
<tr><td rowspan="8">1</td><td rowspan="8">Energize and observe for approx. 10 minutes. If E0 is always displayed</td><td colspan="2">① Check if the indoor and outdoor wiring connections are correct. The terminal L, N and S(1) shall correspond to each other on indoor and outdoor units. Measure the voltage on outdoor terminal L and N (before display of E0 fault). If the voltage is “0”:</td><td>Replace the indoor main PCB</td><td>PIC 6
（Red circle）</td></tr>
<tr><td colspan="2">②If the L & N voltage is normal, measure the voltage between the outdoor terminal N and S. If the voltage change occurs between 0~24V (pulsating voltage)</td><td>Replace the indoor main PCB</td><td rowspan="3">PIC 6
（Yellow circle）</td></tr>
<tr><td colspan="2">③If the L & N voltage is normal, measure the voltage between the outdoor terminal N and S. If the voltage change occurs between 0~12V (pulsating voltage), but there is no 24V</td><td>Replace the outdoor PCB</td></tr>
<tr><td colspan="2">④If the L & N voltage is normal, measure the voltage between the outdoor terminal N and S. If the voltage has no change</td><td>Firstly replace the indoor main PCB. If the fault remains unsolved, replace the outdoor PCB.</td></tr>
<tr><td rowspan="3">⑤ Indicator on outdoor PCB</td><td>1).The indicator is dark, and+5V is normal, test voltage between N and S, if there is no 0~24V pulsating voltage, please check R1,R2 whether it’s opened or shorted after switch off the air conditioner.</td><td>If yes, replace the resistance or replace outdoor PCB</td><td>PIC 7</td></tr>
<tr><td>2).The indicator is dark, and also without +5V power supply:
Switch off air conditioner, and inspect components as rectifier bridge---DB101, fast recovery diode—D84, IGBT(Q9) and IPM(Q1), check whether it broken or not</td><td>If yes, replace the Component(s) or replace outdoor PCB</td><td rowspan="2">PIC 8</td></tr>
<tr><td>3).if no damage as above 1) and 2),test voltage between DC+ and DC-, if the voltage is 0V</td><td>Replace outdoor PCB</td></tr>
<tr><td></td><td></td><td colspan="2">⑥, if the problem cannot be solved by using the methods as above</td><td>1). Replace outdoor PCB firstly,
2). if still has problem, replace the indoor PCB</td><td></td></tr>
</table>



PIC 6: L、N、S（1）on outdoor unit terminal

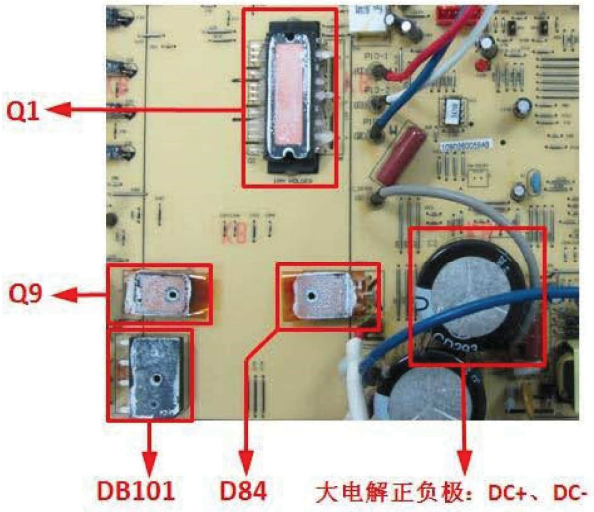


单面板1.0 HP、1.5 HP

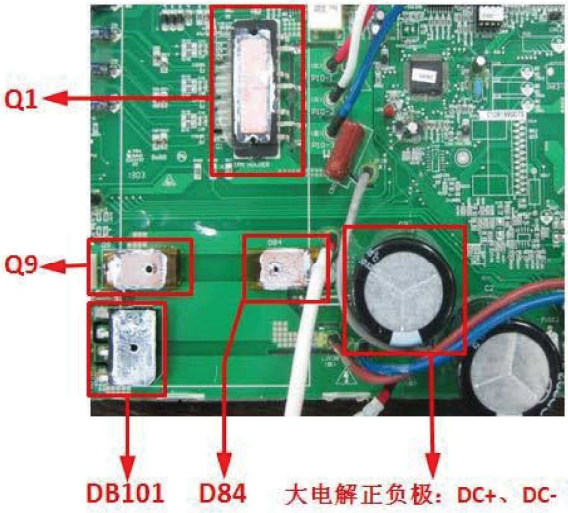


双面板2.0 HP、3.0 HP

PIC 7: Position of N、S、R1、R2 on outdoor unit



单面板1.0 HP、1.5 HP

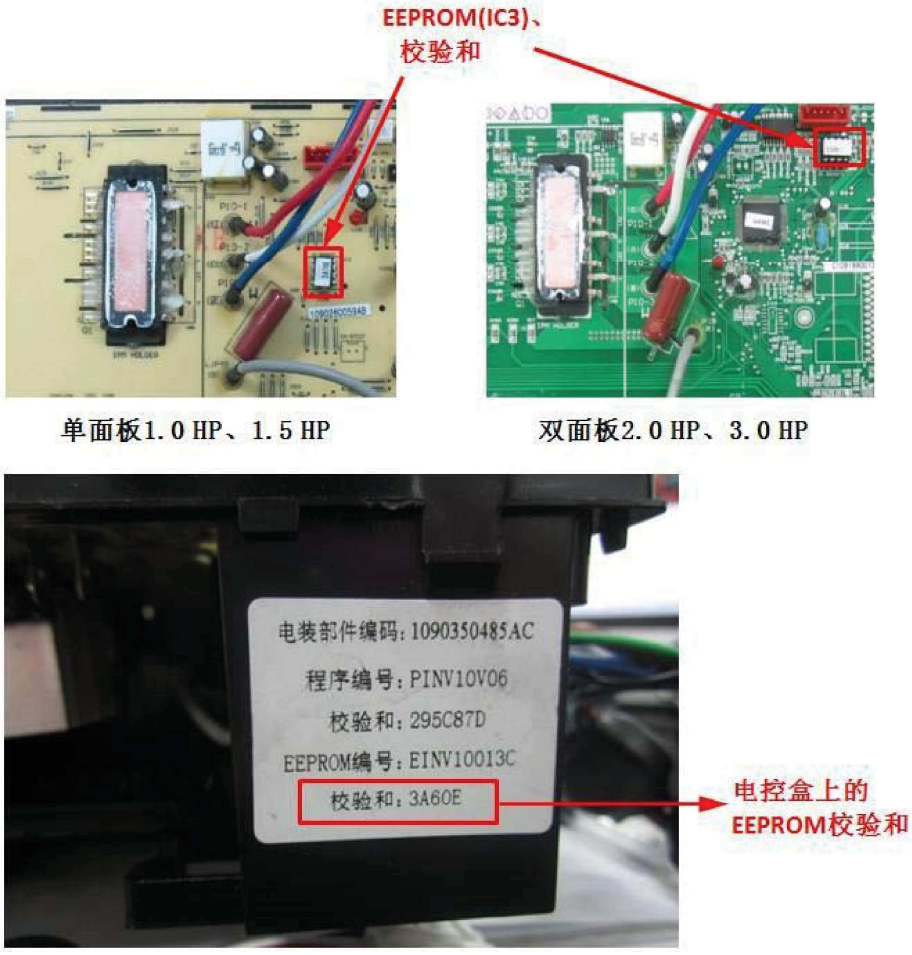


双面板2.0 HP、3.0 HP

PIC 8: Position of DB101、D84、Q9、Q1、DC+、DC-

5）、Blink 27 times（EE）

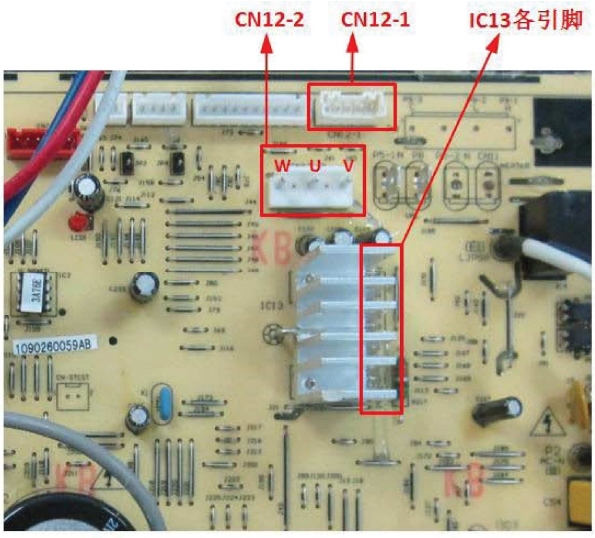
Symptom		Blink 27 times (EE)	
Cause		EEPROM fault（indoor、outdoor）	
S/N	Inspection	Solve	Remark
1	Power off and then power on, if the fault remains, it is needed to check if the indoor EEPROM installation is loose or improper.	Install again	
2	Power off and then power on, if the fault remains, it is needed to check if the outdoor EEPROM installation is loose or improper.	Install again	
3	If the installation is good, check whether there is component(s) pseudo soldering on board	Soldering again	
4	If the fault remains unsolved after replacement of the indoor control board	Test outdoor unit PCB or replace it	
5	Check up the Checksum on outdoor PCB --EEPROM（IC3）, it should be correspond to the Checksum on Control Box shown as PIC 9	If no, replace outdoor PCB	PIC 9



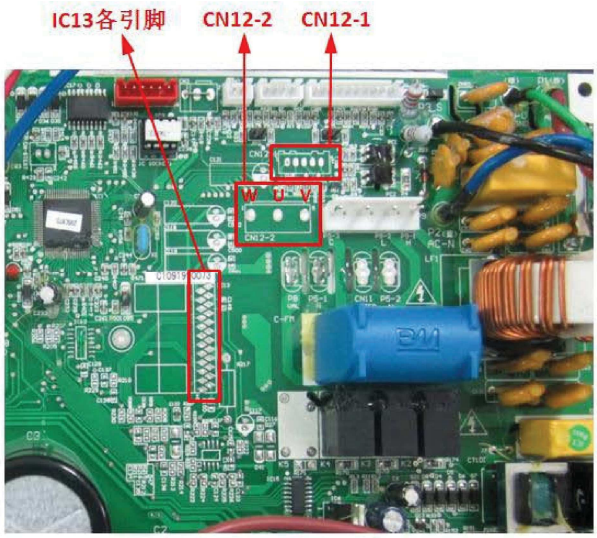
PIC 9：EEPROM and Checksum on PCB and Control Box.

6）、Blink 16 times（EF）

Symptom		Blink 16 times (EF)	
Cause		Outdoor fan motor fault（DC fan motor）	
S/N	Inspection	Solve	Remark
1	Power off and then power on, if the fault remains, it's needed to check the connection of CN12-1、CN12-2.	Reconnect again	PIC 10
2	Check the soldering of the connector CN12-1、CN12-2 on the PCB, it should be no pseudo soldering.	If yes, solder again.	
3	Replace the DC motor and check it's action.	Problem has no change, replace outdoor PCB.	
4	Switch off airco, and test U/V; U/W;V/W on CN12-2, there should be no short circuit happened.	If yes, replace outdoor PCB	PIC 10
5	Test between pins of IPM（IC13）,there should be no breakdown or short circuit happened.	If yes, replace outdoor PCB	PIC 10
6	Test voltage of pin 7 on IC14, it should be + 5V	If no, replace outdoor PCB	PIC 11
7	Test voltage of pin 22 (signal F0) on IC13, it should be + 5V	If no, replace outdoor PCB	PIC 11

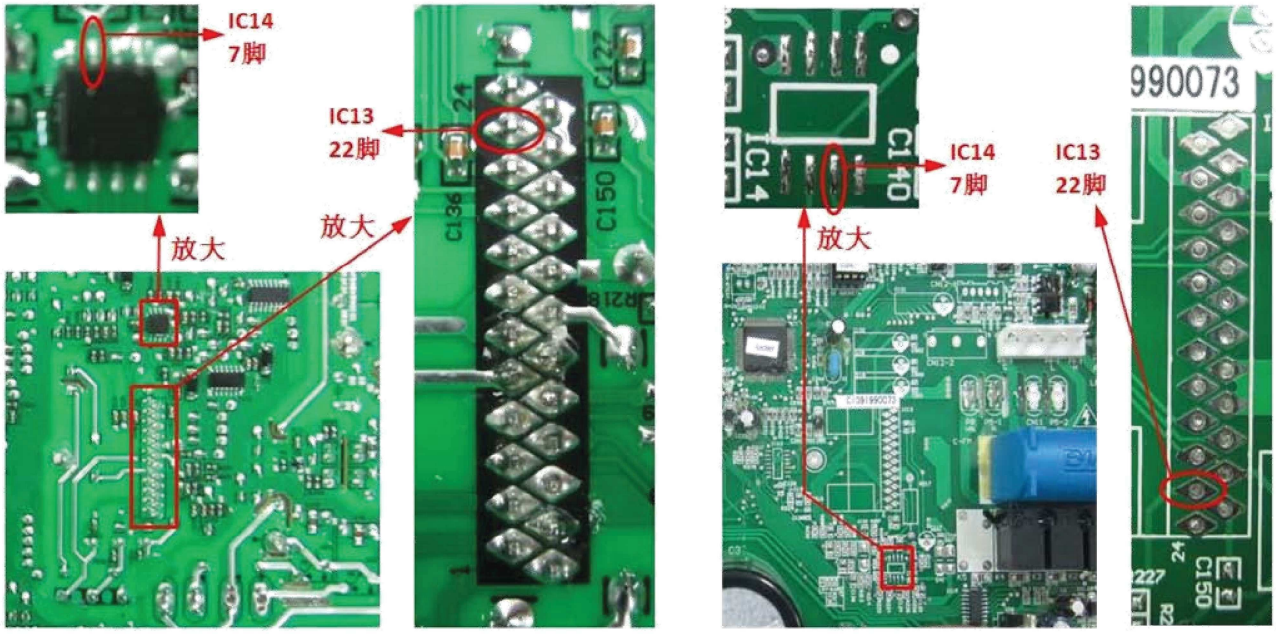


单面板1.0 HP、1.5 HP



双面板2.0 HP、3.0 HP

PIC 10：The position of CN12-1、CN12-2 and IC13



PIC 11：The test pin position of IC14、IC13

3. **Normally inspection**

1).The indoor unit works normally but the outdoor unit does not work.

Cause Analysis:

a). Check if fault code is displayed: If yes, treat according to fault code. If no, check according to the following steps.

b). If the outdoor fan runs normally (The outdoor fan is started 5 seconds before the compressor is started, and it is stopped 15 seconds after the compressor is stopped), the client might make wrong judgment on that the outdoor unit does not work because the compressor working frequency is low or the system is in shortage of refrigerant. Check the system cooling / heating effect and confirm if the system is in shortage of refrigerant.

c).Check if the resistance of each temperature sensor is in standard level. (See appendix for the temperature sensor parameters): If not, replace the temperature sensor.

d).Check if the indoor / outdoor and circuit board wiring. Check if the connection is good. Please tighten the wires.

2) .The outdoor unit is stopped when the air conditioner has run for a period of time

Cause Analysis:

a).If any fault is displayed after stop: If yes, treat according to fault code. If not, check according to Step (b).

b).Check if the supply voltage is normal, including the voltage change when the air condition is started. If the voltage is unstable or changes too heavily, please check the power source. If no problem, check according to Step (c).

c).Check if the temperature sensors are normal (See appendix for the temperature sensor parameters). Check if the

resistance is in standard level. If not, replace the temperature sensor. If normal, check according to Step (d).
d).Check if the indoor / outdoor circuit connection and power connection are in good contact. If no, tighten the connection wires. If yes, check according to Step (e).
e).Check if the refrigerant is too much or too less. If yes, add refrigerant.

3). The air conditioner is tripped when it is started.

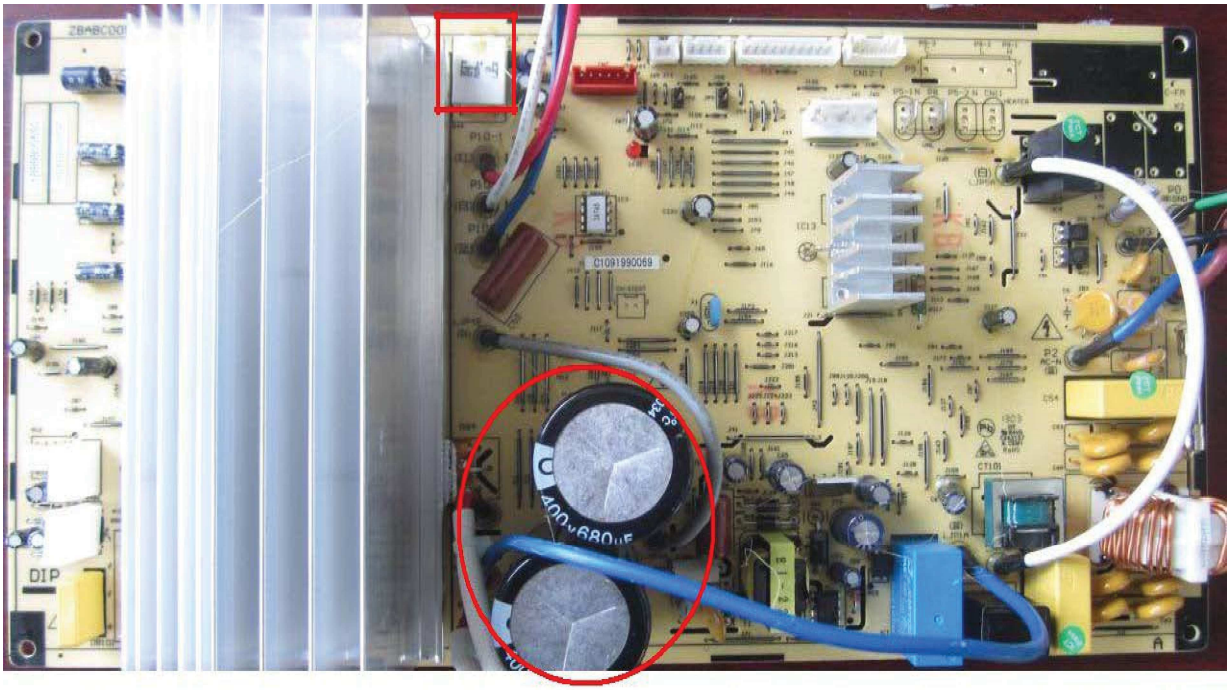
Cause Analysis:
a).Check if the user's power source plug is correctly connected (for example, the ground wire might be wrongly connected as the neutral wire)
b).Check if the indoor / outdoor circuit and the wiring terminal are correctly connected, and if there is short circuiting.
c).Check if the outdoor circuit board, wiring terminal and power connection wires are damaged, and if there is short circuiting to the metal parts.
d).Check if the rectifier bridge of outdoor controller is short circuited (The short circuiting of rectifier bridge will probably cause tripping error).

4). The complete unit does not work

Cause Analysis:
a).If fault code is displayed: If yes, treat according to fault code. If no, check according to Step (2).
b).Check if the power plug has electricity. If no, check the power source. If yes, check if the fuse is good. If no, replace the fuse. If yes, check according to Step (3).
c).Check if the resistance of the sensors on indoor and outdoor units is in standard level. If not, replace the sensor. If yes, check according to Step (4).
d).Check if the indoor and outdoor communication is failed. The step is same as that for check when the indoor unit works normally but the outdoor unit does not work.

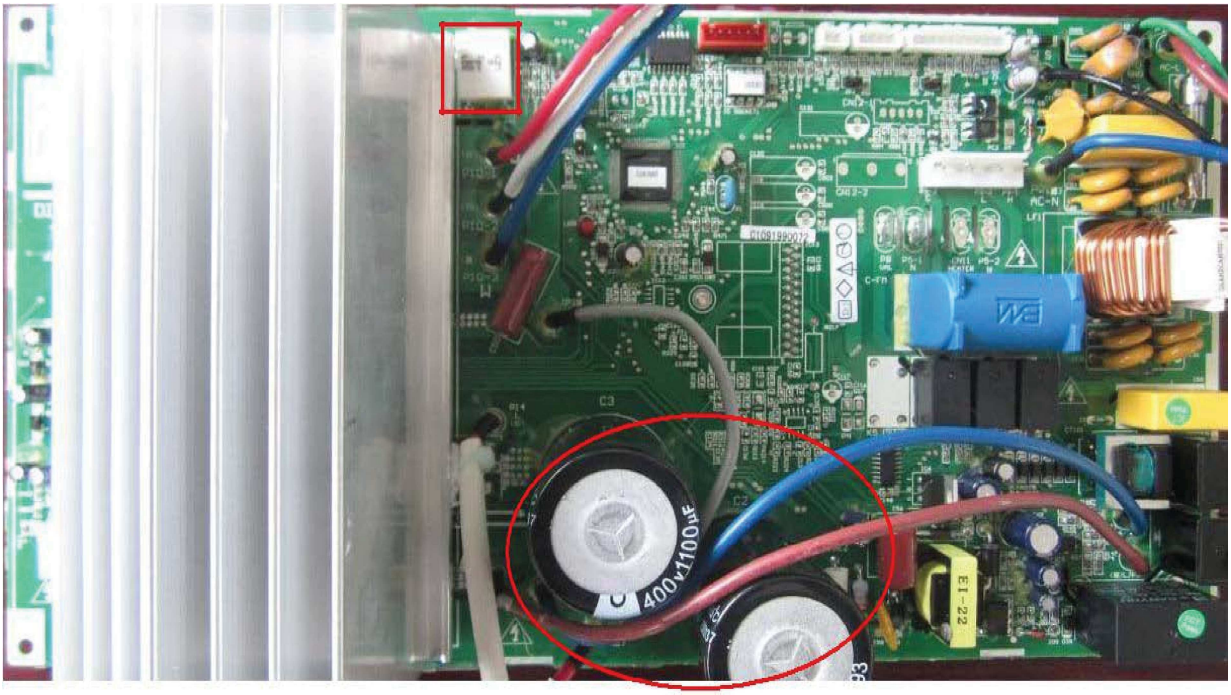
Appendix 1 The PCB difference for 1HP\1.5HP\2HP \3HP (*S.H*)

1. Single printed board（the difference of 1HP and 1.5HP)



The difference：① 1HP-C2:1100uF、C3：NG； 1.5HP-C2、C3:680uF；
② 1HP-R49:R025； 1.5HP-R49:R02

2. Dual printed board（the difference of 2HP and 3HP）



The difference: ③ 2HP-C2、C3:850uF； 3HP-C2、C3:1100uF；
④ 2HP-R49:R02； 3HP-R49:R01

Appendix 2 AD value of the sensor

(outdoor Temp. sensor and outdoor pipe temp. sensor)

R25℃=5KΩ±2%					B25℃/50℃=3470±2%			
TEMP.	R(Kohm)	Sensor voltage	TEMP	R(Kohm)	Sensor voltage	TEMP	R(Kohm)	Sensor voltage
-25	48.488	4.534	17	6.863	2.895	59	1.512	1.163
-24	45.985	4.511	18	6.591	2.846	60	1.464	1.134
-23	43.627	4.487	19	6.332	2.796	61	1.418	1.107
-22	41.403	4.462	20	6.084	2.747	62	1.374	1.079
-21	39.305	4.437	21	5.847	2.698	63	1.331	1.053
-20	37.326	4.410	22	5.621	2.649	64	1.290	1.027
-19	35.458	4.383	23	5.404	2.599	65	1.250	1.002
-18	33.695	4.355	24	5.198	2.551	66	1.212	0.977
-17	32.030	4.326	25	5.000	2.503	67	1.175	0.953
-16	30.458	4.296	26	4.811	2.454	68	1.139	0.929
-15	28.972	4.265	27	4.630	2.407	69	1.105	0.906
-14	27.567	4.234	28	4.457	2.359	70	1.072	0.884
-13	26.239	4.201	29	4.292	2.312	71	1.040	0.862
-12	24.984	4.168	30	4.133	2.265	72	1.009	0.841
-11	23.795	4.133	31	3.981	2.219	73	0.979	0.820
-10	22.671	4.098	32	3.836	2.173	74	0.950	0.799
-9	21.606	4.062	33	3.697	2.128	75	0.922	0.780
-8	20.598	4.025	34	3.563	2.083	76	0.895	0.760
-7	19.644	3.987	35	3.435	2.039	77	0.869	0.741
-6	18.732	3.948	36	3.313	1.995	78	0.843	0.723
-5	17.881	3.909	37	3.195	1.952	79	0.819	0.705
-4	17.068	3.869	38	3.082	1.909	80	0.795	0.687
-3	16.297	3.828	39	2.974	1.867	81	0.773	0.670
-2	15.565	3.786	40	2.870	1.826	82	0.751	0.654
-1	14.871	3.744	41	2.770	1.785	83	0.729	0.638
0	14.212	3.701	42	2.674	1.745	84	0.709	0.622
1	13.586	3.657	43	2.583	1.705	85	0.689	0.606
2	12.991	3.612	44	2.494	1.666	86	0.669	0.591
3	12.426	3.567	45	2.410	1.628	87	0.651	0.577
4	11.889	3.522	46	2.328	1.591	88	0.633	0.563
5	11.378	3.476	47	2.250	1.554	89	0.615	0.549
6	10.893	3.429	48	2.174	1.518	90	0.598	0.535
7	10.431	3.382	49	2.102	1.482	91	0.582	0.522
8	9.991	3.335	50	2.032	1.447	92	0.566	0.509
9	9.573	3.287	51	1.965	1.413	93	0.550	0.497
10	9.174	3.239	52	1.901	1.379	94	0.535	0.484
11	8.795	3.190	53	1.839	1.346	95	0.521	0.472
12	8.433	3.141	54	1.779	1.314	96	0.507	0.461
13	8.089	3.092	55	1.721	1.282	97	0.493	0.450
14	7.760	3.043	56	1.666	1.252	98	0.480	0.439
15	7.447	2.994	57	1.613	1.221	99	0.467	0.428
16	7.148	2.945	58	1.561	1.192	100	0.455	0.418

AD value of the sensor （Exhaust Temp. sensor）

R85℃=2.113KΩ±3%					B25℃/85℃=4000±2%			
TEMP.	R(Kohm)	Sensor voltage	TEMP	R(Kohm)	Sensor voltage	TEMP	R(Kohm)	Sensor voltage
-30	322.9	0.0308	25	20	0.4545	80	2.484	2.2302
-29	304.4	0.0326	26	19.14	0.4730	81	2.404	2.2707
-28	287.1	0.0346	27	18.32	0.4921	82	2.327	2.3111
-27	270.9	0.0366	28	17.55	0.5115	83	2.253	2.3513
-26	255.7	0.0388	29	16.81	0.5316	84	2.182	2.3912
-25	241.4	0.0411	30	16.1	0.5525	85	2.113	2.4313
-24	228	0.0435	31	15.43	0.5737	86	2.047	2.4710
-23	215.5	0.0460	32	14.79	0.5956	87	1.983	2.5107
-22	203.6	0.0486	33	14.18	0.6180	88	1.922	2.5497
-21	192.5	0.0514	34	13.6	0.6410	89	1.862	2.5893
-20	182.1	0.0543	35	13.05	0.6645	90	1.805	2.6281
-19	172.3	0.0574	36	12.52	0.6887	91	1.75	2.6667
-18	163.1	0.0606	37	12.01	0.7138	92	1.697	2.7049
-17	154.4	0.0639	38	11.53	0.7391	93	1.646	2.7427
-16	146.2	0.0675	39	11.07	0.7651	94	1.596	2.7809
-15	138.5	0.0712	40	10.63	0.7918	95	1.549	2.8177
-14	131.3	0.0750	41	10.21	0.8190	96	1.502	2.8555
-13	124.4	0.0791	42	9.813	0.8465	97	1.458	2.8918
-12	118	0.0833	43	9.43	0.8749	98	1.415	2.9283
-11	111.9	0.0878	44	9.064	0.9038	99	1.373	2.9647
-10	106.2	0.0924	45	8.714	0.9334	100	1.335	2.9985
-9	100.8	0.0973	46	8.38	0.9634	101	1.296	3.0340
-8	95.68	0.1024	47	8.06	0.9940	102	1.258	3.0694
-7	90.86	0.1077	48	7.754	1.0252	103	1.222	3.1037
-6	86.31	0.1132	49	7.461	1.0570	104	1.187	3.1377
-5	82.01	0.1190	50	7.18	1.0893	105	1.153	3.1716
-4	77.95	0.1251	51	6.912	1.1221	106	1.12	3.2051
-3	74.11	0.1314	52	6.655	1.1554	107	1.089	3.2373
-2	70.48	0.1380	53	6.409	1.1892	108	1.058	3.2701
-1	67.05	0.1448	54	6.173	1.2235	109	1.028	3.3025
0	63.8	0.1520	55	5.947	1.2583	110	0.9997	3.3337
1	60.72	0.1594	56	5.73	1.2937	111	0.9719	3.3649
2	57.81	0.1672	57	5.522	1.3294	112	0.9451	3.3955
3	55.05	0.1753	58	5.323	1.3656	113	0.9191	3.4257
4	52.44	0.1837	59	5.132	1.4021	114	0.894	3.4554
5	49.97	0.1924	60	4.949	1.4391	115	0.8595	3.4971
6	47.62	0.2015	61	4.774	1.4762	116	0.8461	3.5136
7	45.4	0.2110	62	4.605	1.5140	117	0.8233	3.5420
8	43.2	0.2212	63	4.448	1.5509	118	0.8012	3.5699
9	41.29	0.2310	64	4.288	1.5903	119	0.7798	3.5974
10	39.39	0.2416	65	4.139	1.6289	120	—	—
11	37.59	0.2526	66	3.995	1.6681	121	0.7386	3.6515
12	35.87	0.2641	67	3.858	1.7071	122	0.7195	3.6771
13	34.25	0.2759	68	—	—	123	0.7007	3.7027
14	32.71	0.2881	69	—	—	124	0.6824	3.7280
15	31.24	0.3008	70	3.476	1.8262	125	0.6647	3.7528

16	—	—	71	3.359	1.8660	126	0.6476	3.7770
17	—	—	72	3.246	1.9062	127	0.6309	3.8010
18	27.26	0.3418	73	3.138	1.9463	128	0.6148	3.8244
19	26.07	0.3563	74	3.033	1.9869	129	0.5991	3.8475
20	24.93	0.3713	75	2.933	2.0272	130	0.5839	3.8701
21	23.84	0.3870	76	2.836	2.0678			
22	22.81	0.4031	77	2.743	2.1084			
23	21.83	0.4196	78	2.654	2.1487			
24	20.89	0.4369	79	2.567	2.1896			

Appendix 3 Silk-printed label on outdoor PCB

Name of connector	Connector label	description	Relay label	Remark
AC power input-- L	P1	AC-L		
AC power input-- N	P2	AC-N		
Communication wire to indoor unit	P3	S		Black
GND	P0	GND		
Outgoing L after filter	P4	L	K1	
Outgoing N after filter	P5	N		Multi-marked as P5-1、P5-2
4-way valve output	P8	VAL	K4	
Outdoor fan motor control —HIGH speed	P9-1	H	K2	
Outdoor fan motor control —LOW speed	P9-2	L	K3	
Capacitor of fan motor	P9-3	C		
Compressor control—phase **U**	P10-1	U		
Compressor control-- phase **V**	P10-2	V		
Compressor control-- phase **W**	P10-3	W		
Inductance connector for PFC control	P13、P14	L		
DC fan motor connector-1	CN12-1			Fan speed feedback
DC fan motor connector-2	CN12-2			Fan motor (U、V、W) driving
Pipe temp. sensor	CN1			Pin1、Pin2
Outdoor temp. sensor	CN1			Pin3、Pin4
Exhaust temp. sensor	CN2			
Compressor top thermostat	CN3			
Socket of electronic expansion valve	CN7			
Auxiliary heater	CN11	HEATER		

Appendix 4 Cautions on Replacement of PCB Boards

When replace outdoor PCB, caution should be taken as follow.

1). Before replacing the outdoor PCB, it must be confirmed that this is the right and qualified one match to the air conditioner to be repaired.

2). Power off air conditioner first before the process of PCB disassembly and/or installation, while operating personnel must wear **anti-static discharge wrist strap or gloves.** It is prohibited to make any measures directly touching PCB before static discharging.

3) Pay attention to the PCB waterproof, moisture-proof and dust-proof and components fasten, if only to replace the on-board components, you must refill yellow or silicone gel scratched

4) The wire's direction and fixed should be made as it's original alignment after PCB installation. Each wires plug must be inserted in place, to be sure all of the connectors connect/insert to PCB correctly. It is forbidden to pull the ends of the wires too tightly, some looseness required to prevent circuit board broken.

5) The outdoor PCB mostly has strong electrical parts and using some isolated control, but many with strong electrical circuit Common GND, pay attention to personal safety during operation.

6) Because of the short distance between Strong and Weak electrical part, pay attention to security issues as measure GND during maintenance.

7) Due to large outdoor PCB electrolytic capacitor(s), the capacitor(s) still have a lot of electricity needs time to release while power off, and normally fully discharge needs about 30 seconds, please be patient capacitor discharge before you start working, or you can use an external load (such as electric iron, etc.) between DC-, DC+ for fast discharging. After the charge exhausted and tested by Analog Multimeter RX10K, the pointer should refer to 0, and then slowly retreated ∞, otherwise the electrolytic capacitor broken.

8) Before repairs must have some knowledge of the circuit, fully understand "**the Structure of control board"**, and the function of each parts.

9) The cable sequence from indoor to outdoor must correct, otherwise it will be unable to work, besides additional damage maybe happened to PCB. Removing the screws should pay attention to protect against foreign objects such as screws or other solder falling to the board or the electrical control box, if that it must be cleared up.

10) After repairing, first confirm each voltage is normal after power on, then operate the air conditioner to confirm function.