TOSOT

Mini Service Manual

Split Wall Mounted Air Conditioner
Split Type Floor-standing Air Conditioner

Error Code List

Display method of indoor unit				Malfunction name	AC status	Possible causes
Error code	Indicator display					
	Power indicator	Cool indicator	Heat indicator			
C5	OFF 3s and flash 15 times			Malfunction of jumper cap	The complete unit stops operation	See P26 “Troubleshooting for jumper cap”
E6	OFF 3s and flash 6 times			Communication malfunction between indoor unit and outdoor unit	Cool: compressor stops operation, while indoor unit operates; Heat: all loads stops operation.	See P27 “Communication malfunction”
H5			OFF 3s and flash 5 times	IPM protection	Cool/Dry: compressor stops operation, while indoor fan operates. Heat: all loads stops operation.	See P28 “IPM protection, over-phase current of compressor”
L3 LA				Malfunction of outdoor fan/ malfunction of DC motor	Cool/Dry: all loads stops operation except indoor fan. Heat: all loads stops operation.	1. Outdoor condenser, air inlet and air outlet are blocked by filth or dirt; 2.Blade is blocked or loosened; 3.Motor or connection wire of motor is damaged; 4.Main board of outdoor unit is damaged; (As for dual-outdoor fan, L3 indicates fan 1; LA indicates fan 2)
H3			OFF 3s and flash 3 times	Overload protection of compressor	Cool/Dry: compressor stops operation, while indoor fan operates. Heat: all loads stops operation.	1. Overload wire of compressor is loose; 2. The overload protector is damaged. Under normal circumstances, the resistance between both ends of terminal is less than 1ohm. 3.See P29 “Overload protection of compressor , High discharge temperature protection of compressor”
F0				Refrigerant insufficient protection, cut-off protection of refrigerant	Cool: compressor and outdoor unit stops operation, while indoor fan operates; Heat: Compressor, outdoor fan and indoor fan stops operation.	1. Is refrigerant leaking? 2. Check whether the gas valve and the liquid valve of outdoor unit are opened completely; 3. Are the capillary and the electronic expansion valve blocked? 4. Is the temperature sensor of evaporator of indoor unit fallen off? 5. Has the temperature sensor of evaporator of indoor unit fallen off? 6. Whether the system for cooling is under high humidity environment, which caused small temperature difference for heat exchange.
F1		OFF 3s and flash once		Indoor ambient temperature sensor is open/ short-circuited	Cool/Dry: indoor fan operates, while compressor stops operation; Heat: all loads stops operation.	1. The connection between the room temperature sensor and the control board AP1 of indoor unit is not good (please refer to the wiring diagram of indoor unit); 2. The room temperature sensor is damaged (See P38 “Table 1. Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units(15K)”)
F2		OFF 3s and flash twice		Indoor evaporator temperature sensor is open/ short-circuited	Cool/Dry: indoor fan operates, while all other loads stops operation; Heat: all loads stops operation.	1. The connection between the room temperature sensor and the control board AP1 of indoor unit is not good (please refer to the wiring diagram of indoor unit); 2. The room temperature sensor is damaged (See P39 “Table 2. Resistance Table of Outdoor/Indoor Tube Temperature Sensor (20K)”)
H6	OFF 3s and flash 11 times			No feedback from indoor unit's motor	The complete unit stops operation	1. Is he motor terminal loose? 2. Is the motor damaged? 3. Is the wire connected with the motor damaged? 4. Is the control board AP1 of indoor unit damaged? 5. Is the fan blocked?
LP				Indoor unit and outdoor can be matched with each other	Heat: compressor, outdoor unit and indoor fan stops operation.	Capacity of indoor unit and outdoor unit can't be matched.
C4				Malfunction of jumper cap of outdoor unit	Heat: all loads are stopped; other modes: outdoor unit stops operation.	Jumper cap of outdoor unit hasn't been installed.
E1	OFF 3s and flash once			High pressure protection of system	Cool/Dry: all loads stops operation except indoor fan; Heat: all loads stops operation.	The possible causes for high system pressure: 1. Too much refrigerant; 2. Heat exchange of unit is bad (including heat exchanger is dirty or the radiation environment for the unit is not good); 3. Ambient temperature is too high; 4. High-pressure switch is damaged.

Display method of indoor unit				Malfunction name	AC status	Possible causes
Error code	Indicator display					
	Power indicator	Cool indicator	Heat indicator			
E3	OFF 3s and flash 3 times			Low pressure/ low system pressure protection/ compressor low pressure protection	Cool: compressor, outdoor fan and indoor fan stop operation; Heat: compressor and outdoor fan stop operation at first. About 1min later, indoor fan stops operation; 2mins later, the 4-way valve stop operation.	1. Low pressure switch is damaged; 2. Refrigerant inside the system is insufficient.
E4	OFF 3s and flash 4 times			High discharge temperature protection of compressor	Cool/Dry: compressor and outdoor fan stops operation, while indoor fan operates.	See P29 "Overload protection of compressor , High discharge temperature protection of compressor"
E5	OFF 3s and flash 5 times			AC overcurrent protection	Cool/Dry: compressor and outdoor fan stops operation, while indoor fan operates; Heat: all loads stops operation.	1. Power voltage is unstable; 2. Power voltage is too low; 3. Current is too high because the system load is too big.
E7	OFF 3s and flash 7 times			Mode shock/ sysmte mode shock	Load of indoor unit stops operation (indoor fan, E-heater, swing)	Malfunction of one-to-more system; there may be two indoor units which has set the shock mode, such as one is cooling only unit and the other is heat pump unit.
E8	OFF 3s and flash 8 times			High temperature prevention protection	Cool: compressor stops operation while indoor unit operates; Heat: all loads stops operation.	See P31 "High temperature prevention protection,High power protection,System is abnormal"
EE			OFF 3s and flash 15 times	EEPROM	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	Replace outdoor control board
Fo		OFF 3s and flash 3 times		Malfunction	Cool/Dry: compressor and outdoor fan stops operation, while indoor fan operates.	Refrigerant recovery. The maintenance personnel operate it when he is maintaining the unit.
F3		OFF 3s and flash 4 times		Outdoor ambient temperature is open/short-circuited	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	1.Outdoor temperature sensor is not connected well or damaged. (See P38 "Table 1. Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units(15K)") 2.Temperature sensor wire of outdoor unit is damaged; short circuit between the temperature sensor or copper pipe or outer case 3.Main board of outdoor unit is damaged;
F4		OFF 4s and flash 5 times		Outdoor condenser temperature sensor is open/ short-circuited	Cool/Dry: after operating for about 3mins, compressor stops operation, while indoor unit operates; Heat: after operating for 3mins, all loads stops operation.	1. Exhaust temperature sensor is not connected well or damaged. (See P39 "Table 2. Resistance Table of Outdoor/ Indoor Tube Temperature Sensor (20K)") 2. The head of temperature sensor hasn't been inserted into the copper pipe. 3.Temperature sensor wire of outdoor unit is damaged; short circuit between the temperature sensor or copper pipe or outer case 4.Main board of outdoor unit is damaged;
F5				Outdoor air discharge temperature is open/short-circuited	Complete unit stops operation; motor of sliding door is cut off power.	1. The sliding door is blocked; (See P40 "Table 3. Resistance Table of Outdoor Discharge Temperature Sensor(50K)") 2.Temperature sensor wire of outdoor unit is damaged; short circuit between the temperature sensor or copper pipe or outer case 3.Main board of outdoor unit is damaged;
FC			OFF 3s and flash 4 times	Malfunction of micro switch	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	1. The sliding door is blocked; 2. Malfunction of the photoelectric inspection panel of sliding door;
H4	OFF 3s and flash once			System is abnormal	Cool/Dry: all loads stops operation except indoor fan; Heat: all loads stops operation.	See P31 "High temperature prevention protection,High power protection,System is abnormal"
H7			OFF 3s and flash 7 times	Desynchronizing of compressor	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	See P32 "Desynchronization diagnosis for compressor"

Display method of indoor unit						
Error code	Indicator display			Malfunction name	AC status	Possible causes
	Power indicator	Cool indicator	Heat indicator			
HC			OFF 3s and flash 6 times	PFC protection	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	Replace the control board of outdoor unit or the reactor.
HE			OFF 3s and flash 14 times	Demagnetization protection of compressor	Cool: compressor and outdoor fan stop operation; Heat: compressor and outdoor fan stop operation at first; about 1min later, indoor fan stops operation.	1. The main board of outdoor unit is damaged; 2. Compressor is damaged;
JF				Communication malfunction between indoor unit and inspection board	Normal operation	1. The main board of indoor unit is damaged; 2. The inspection board is damaged; 3. Poor connection between the indoor unit and the inspection board.
L1				Malfunction of humidity sensor	Compressor, outdoor fan and indoor fan stop operation;	The inspection board is damaged.
L9				High power protection	Cool: compressor and outdoor fan stops operation, while indoor fan operates.	See P31 “High temperature prevention protection,High power protection,System is abnormal”
Lc			OFF 3s and flash 11 times	Start-up failed	Cool/Dry: compressor stops, while indoor fan operates; Heat: all loads stops operation.	Refer to the flow chart of troubleshooting.
Ld				Lost phase	Cool: compressor and outdoor fan stop operation; Heat: compressor and outdoor fan stop operation at first; about 1min later, indoor fan stops operation.	1. The main board of outdoor unit is damaged; 2. The compressor is damaged; 3. The connection wire of compressor is not connected well;
oE				Undefined outdoor unit error	Cool: compressor and outdoor fan stops operation, while indoor fan operates; Heat: compressor, outdoor fan and indoor fan stops operation.	1. Outdoor ambient temperature exceeds the operation range of unit (eg: less than-20℃ or more than 60℃ for cooling; more than 30℃ for heating); 2. Failure startup of compressor; 3. Compressor wires are not connected tightly; 4. Compressor is damaged; 5. Main board is damaged;
P5		OFF 3s and flash 15 times		Over-phase current protection of compressor	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	See P29 “Overload protection of compressor , High discharge temperature protection of compressor”
P6	OFF 3s and flash 16 times			Communication malfunction between the drive board and the main board	Cool: compressor and outdoor fan stops operation; Heat: compressor and outdoor fan stop at first; about 1min later, indoor fan stops operation;	1. The drive board is damaged; 2. The main board is damaged; 3. The driven board and the main board is not connected well;
P7			OFF 3s and flash 18 times	Circuit malfunction of module temperature sensor	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	Replace outdoor control board
P8			OFF 3s and flash 19 times	Module overheating Prot.	Cool: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	1. Air inlet and air outlet of outdoor unit is blocked by filth or dirt; 2. Condenser of outdoor unit is blocked by filth or dirt; 3. IPM screw of main board is not tightened; 4. Main board of outdoor unit is damaged;
PF				Malfunction of the ambient temperature of drive board	Cool: compressor, outdoor fan and indoor fan stop operation; Heat: compressor and outdoor fan stop operation at first; about 1min later, indoor fan stops operation.	1. The ambient temperature sensor of the drive board is not connected well; 2. Malfunction of the ambient temperature of drive board.
PH		OFF 3s and flash 11 times		DC bus voltage is too high	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	1. Measure the voltage between position L and position N on the wiring board (XT). If it’s higher than 265 VAC, please turn on the unit until the power voltage is decreased to the normal range; 2. If the AC input is normal, please replace the outdoor control board.

Display method of indoor unit				Malfunction name	AC status	Possible causes
Error code	Indicator display					
	Power indicator	Cool indicator	Heat indicator			
PL			OFF 3s and flash 21 times	DC bus voltage is too low	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	1. Measure the voltage between position L and position N on the wiring board (XT). If it's lower than 150 VAC, please turn on the unit until the power voltage is increased to the normal range; 2. If the AC input is normal, please replace the outdoor control board.
PU			OFF 3s and flash 17 times	Charging malfunction of capacitor	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	See P34 "Charging malfunction of capacitor"
rF				Malfunction of RF module	Cool: compressor and outdoor fan stop operation; Heat: compressor and outdoor fan stop operation at first; about 1min later, indoor fan stops operation.	1. Malfunction of RF module; 2. The connection wire of RF module is not connected well.
U1			OFF 3s and flash 13 times	Phase current detection circuit malfunction of	Cool: compressor and outdoor fan stops operation, while indoor fan operates; Heat: compressor, outdoor fan and indoor fan stops operation.	The control board is damaged. Please replace the control board.
U2			OFF 3s and flash 12 times	Lost phase protection of compressor	Cool: compressor and outdoor fan stop operation; Heat: compressor and outdoor fan stop operation at first; about 1min later, indoor fan stops operation.	1. The main board of outdoor unit is damaged; 2. The compressor is damaged; 3. The connection wire of compressor is not connected well.
U3			OFF 3s and flash 20 times	DC bus voltage drop malfunction	Cool/Dry: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	The power voltage is unstable.
U5				Current detection malfunction of unit	Cool: compressor and outdoor fan stops operation, while indoor fan operates; Heat: compressor, outdoor fan and indoor fan stops operation.	1. Is the complete unit lacking of refrigerant? 2. There's malfunction for the circuit of control board of outdoor unit. Replace control board of outdoor unit.
U7				4-way valve is abnormal	This malfunction occurs when the unit is heating. All loads stops operation.	1. Power voltage is lower than AC175V; 2. Wiring terminal of 4-way valve is loose or broken;3. 4-way valve is damaged. Replace the 4-way valve.
U8	OFF 3s and flash 17 times			Malfunction of zero-crossing signal of indoor unit	Compressor, outdoor fan and indoor fan stop operation.	1. The power is abnormal; 2. The main board is damaged.
U9				Zero-crossing malfunction of outdoor unit	Cool: compressor stops operation, while indoor fan operates; Heat: all loads stops operation.	Replace the control board of outdoor unit.

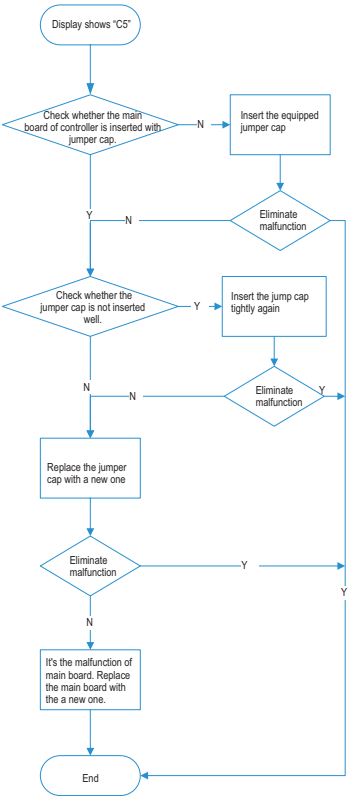
Note:

1. As for the models marked by "88", when there's malfunction, the dual-8 nixie tube displays the error code, while the indicator may not flash.
2. The AC status may be different for different models. Please refer to the corresponding manual for the model.

Flow Chart of Troubleshooting for Main Malfunctions

1. Troubleshooting for jumper cap C5

Main check points:
(1) jumper cap (2) control board of indoor unit



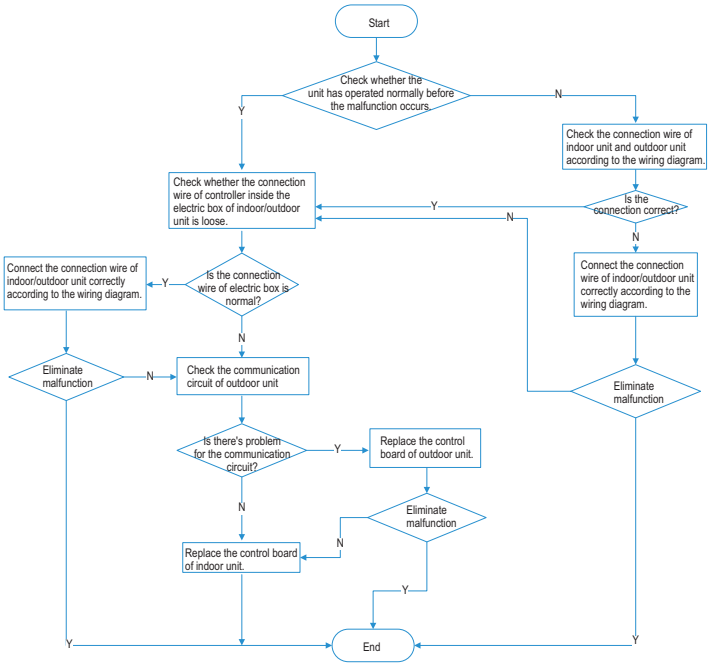
2. Communication malfunction E6

Main check points:

(1) Connection wire between indoor unit and outdoor unit (2) Wiring inside the unit

(3) Communication circuit of control board AP1 of indoor unit

(4) Communication circuit of control board of outdoor unit



Note: method for checking the communication circuit of outdoor unit: cut off the communication wires of indoor/outdoor unit, and then measure the voltage between COM and N of the control board of outdoor unit (DC notch, about 56V)

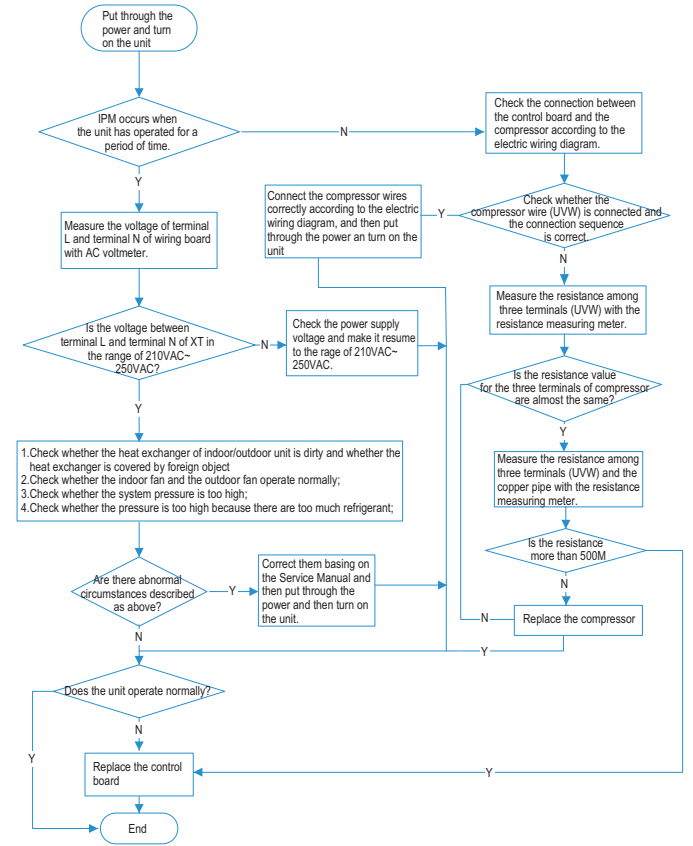
3. IPM protection H5, over-phase current of compressor P5

Main check points:

(1) compressor COMP terminal (2) power supply voltage (3) Compressor

(4) charging amount of refrigerant (5) air inlet and air outlet of indoor/outdoor unit

NOTE:The control board as below means the control board of outdoor unit.

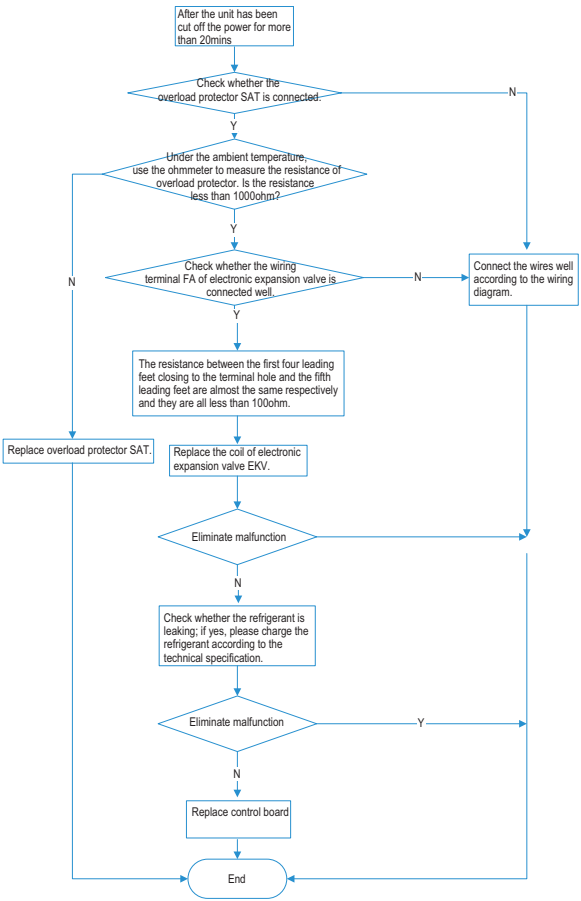


4. Overload protection of compressor H3, High discharge temperature protection of compressor E4

Main check point:

(1) electronic expansion valve (2) expansion valve terminal (3) charging amount of refrigerant (4) overload protector

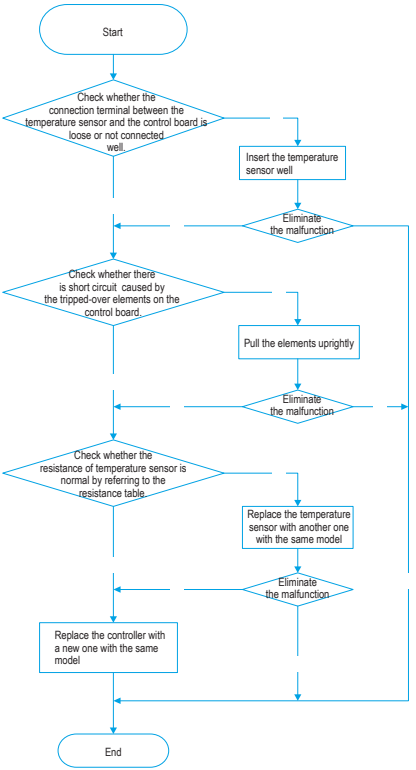
NOTE:The control board as below means the control board of outdoor unit.



5.Troubleshooting for temperature sensor F1、F2、F3、F4、F5

Main check points:

(1) connection terminal (2) temperature sensor (3) main board

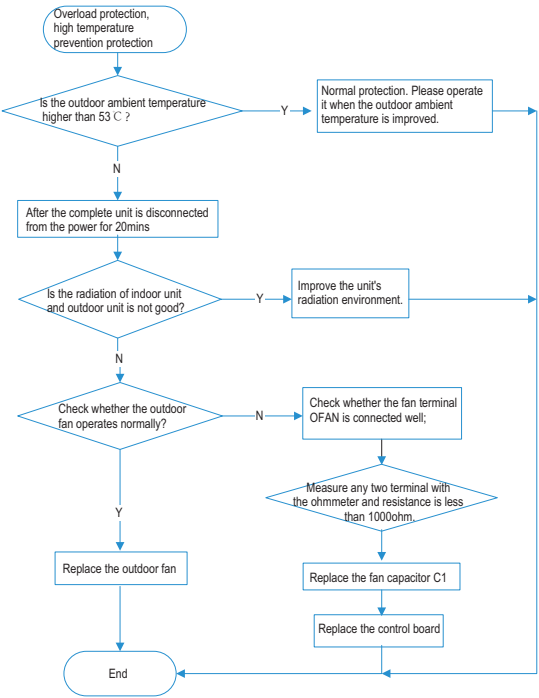


6.High temperature prevention protection E8,High power protection L9, System is abnormal H4

Main check points:

(1) outdoor temperature (2) blade (3)air inlet and air outlet of indoor/outdoor unit

NOTE:The control board as below means the control board of outdoor unit.

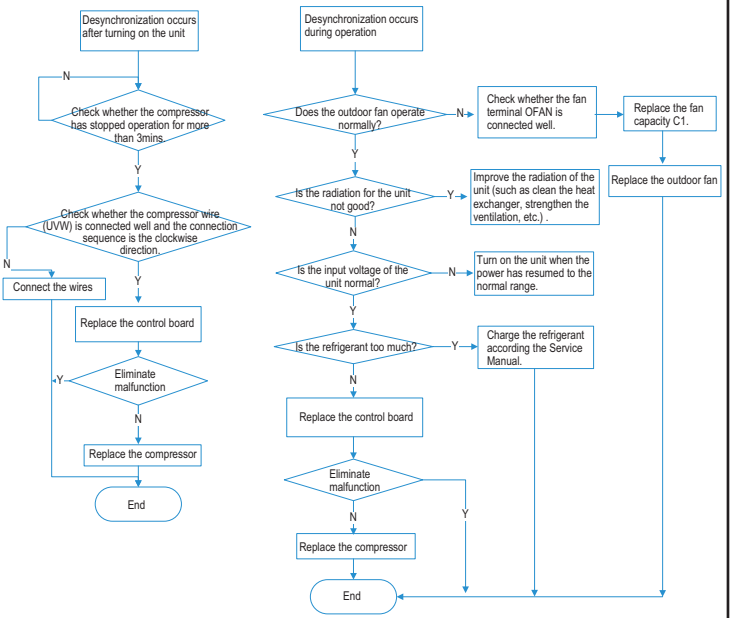


7.Desynchronization diagnosis for compressor H7

Main check point:

(1) system pressure (2) power supply voltage

NOTE:The control board as below means the control board of outdoor unit.

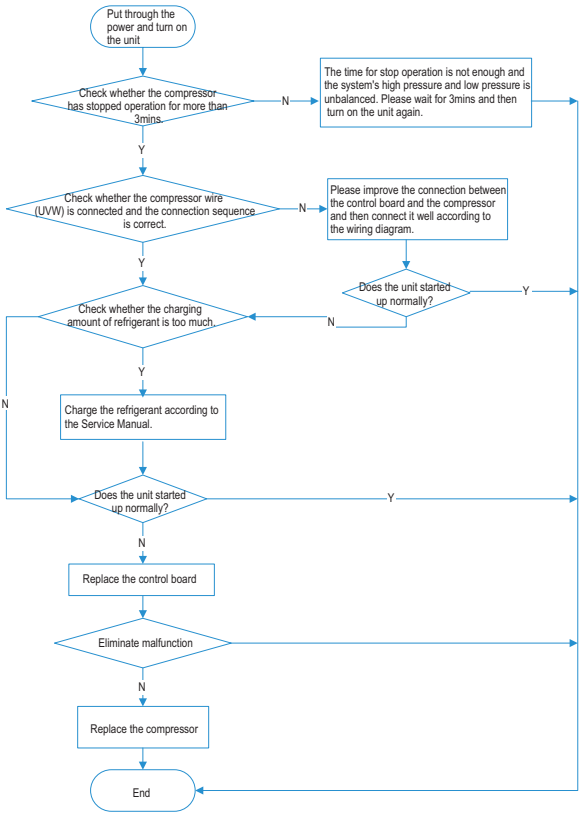


8.Malfunction diagnosis for failure startup

Main check points:

(1) compressor wire (2) compressor (3) charging amount of refrigerant

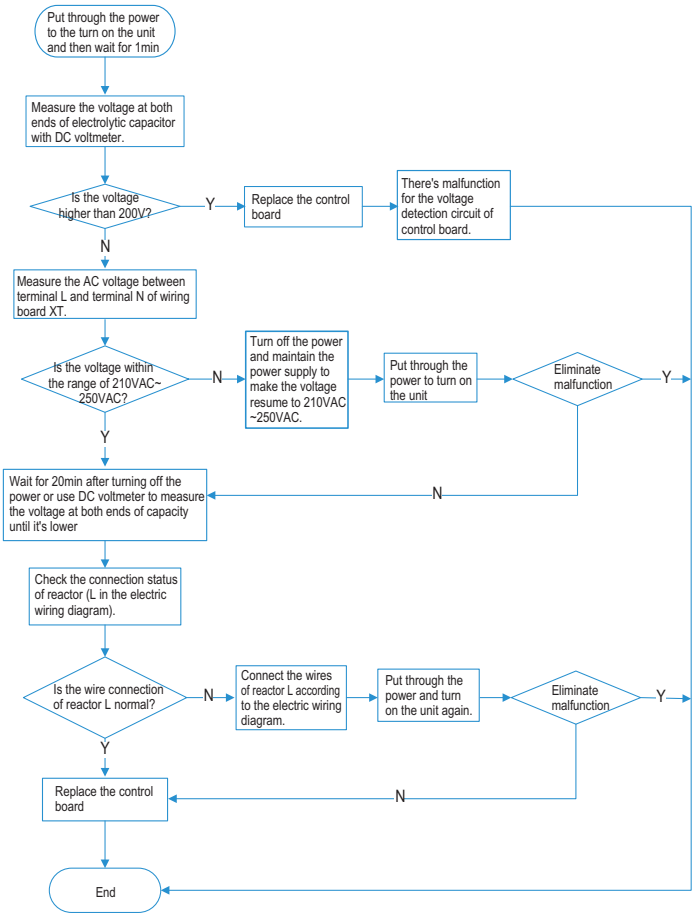
NOTE:The control board as below means the control board of outdoor unit.



9. Charging malfunction of capacitor PU

Main check points:
(1) wiring board XT (2) reactor

NOTE:The control board as below means the control board of outdoor unit.

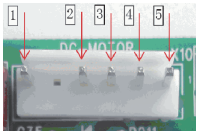


10. Troubleshooting-motor(indoor fan) doesn't operate H6

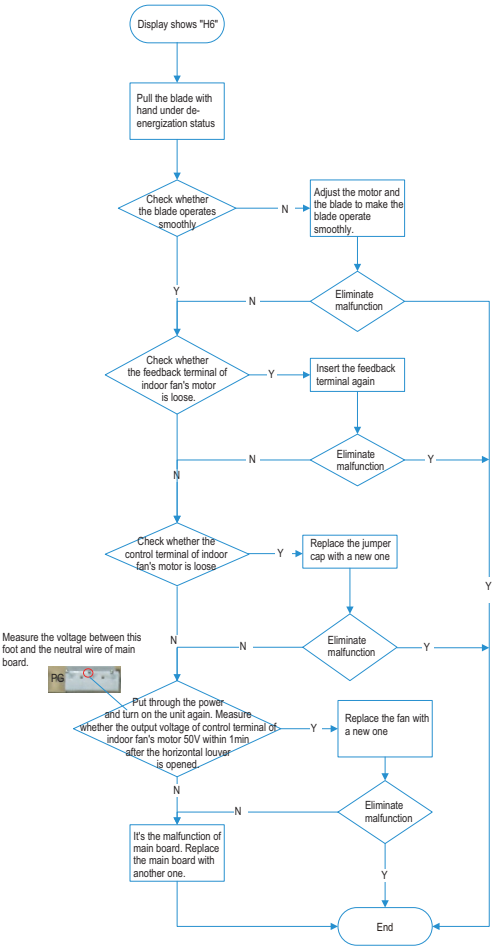
Main check points:

(1) connection terminal (2) motor (3) control board AP1 of indoor unit (4) blade

10.1 DC motor



10.2 PG motor


Display shows "H6"
Pull the blade with hand under de-energization status
Check whether the blade operates smoothly
N
Adjust the motor and the blade to make the blade operate smoothly.
Y
N
Eliminate malfunction
Check whether the feedback terminal of indoor fan's motor is loose.
Y
Insert the feedback terminal again
N
Eliminate malfunction
Y
N
Check whether the control terminal of indoor fan's motor is loose
Y
Replace the jumper cap with a new one
Y
Measure the voltage between this foot and the neutral wire of main board.
N
N
Eliminate malfunction
Y
PG
Put through the power and turn on the unit again. Measure whether the output voltage of control terminal of indoor fan's motor 50V within 1min after the horizontal louver is opened.
Y
Replace the fan with a new one
N
N
Eliminate malfunction
It's the malfunction of main board. Replace the main board with another one.
Y
End

11. AC overcurrent protection E5

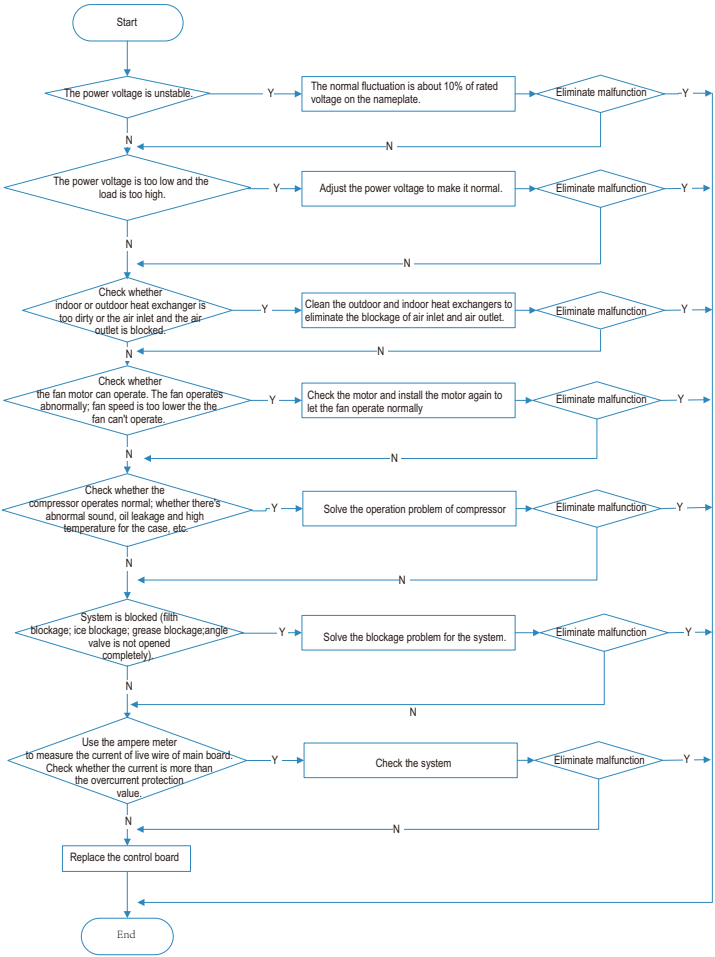


Table 1. Resistance Table of Ambient Temperature Sensor for Indoor and Outdoor Units(15K)

Temp (°C)	Temp (°F)	Resistance (kΩ)	Temp (°C)	Temp (°F)	Resistance (kΩ)	Temp (°C)	Temp (°F)	Resistance (kΩ)
-19	-2.2	138.1	33	91.4	10.63	85	185.0	1.594
-18	-0.4	128.6	34	93.2	10.2	86	186.8	1.544
-17	1.4	121.6	35	95.0	9.779	87	188.6	1.497
-16	3.2	115	36	96.8	9.382	88	190.4	1.451
-15	5.0	108.7	37	98.6	9.003	89	192.2	1.408
-14	6.8	102.9	38	100.4	8.642	90	194.0	1.363
-13	8.6	97.4	39	102.2	8.297	91	195.8	1.322
-12	10.4	92.22	40	104.0	7.967	92	197.6	1.282
-11	12.2	87.35	41	105.8	7.653	93	199.4	1.244
-10	14.0	82.75	42	107.6	7.352	94	201.2	1.207
-9	15.8	78.43	43	109.4	7.065	95	203.0	1.171
-8	17.6	74.35	44	111.2	6.791	96	204.8	1.136
-7	19.4	70.5	45	113.0	6.529	97	206.6	1.103
-6	21.2	66.88	46	114.8	6.278	98	208.4	1.071
-5	23.0	63.46	47	116.6	6.038	99	210.2	1.039
-4	24.8	60.23	48	118.4	5.809	100	212.0	1.009
-3	26.6	57.18	49	120.2	5.589	101	213.8	0.98
-2	28.4	54.31	50	122.0	5.379	102	215.6	0.952
-1	30.2	51.59	51	123.8	5.197	103	217.4	0.925
0	32.0	49.02	52	125.6	4.986	104	219.2	0.898
1	33.8	46.6	53	127.4	4.802	105	221.0	0.873
2	35.6	44.31	54	129.2	4.625	106	222.8	0.848
3	37.4	42.14	55	131.0	4.456	107	224.6	0.825
4	39.2	40.09	56	132.8	4.294	108	226.4	0.802
5	41.0	38.15	57	134.6	4.139	109	228.2	0.779
6	42.8	36.32	58	136.4	3.99	110	230.0	0.758
7	44.6	34.58	59	138.2	3.848	111	231.8	0.737
8	46.4	32.94	60	140.0	3.711	112	233.6	0.717
9	48.2	31.38	61	141.8	3.579	113	235.4	0.697
10	50.0	29.9	62	143.6	3.454	114	237.2	0.678
11	51.8	28.51	63	145.4	3.333	115	239.0	0.66
12	53.6	27.18	64	147.2	3.217	116	240.8	0.642
13	55.4	25.92	65	149.0	3.105	117	242.6	0.625
14	57.2	24.73	66	150.8	2.998	118	244.4	0.608
15	59.0	23.6	67	152.6	2.896	119	246.2	0.592
16	60.8	22.53	68	154.4	2.797	120	248.0	0.577
17	62.6	21.51	69	156.2	2.702	121	249.8	0.561
18	64.4	20.54	70	158.0	2.611	122	251.6	0.547
19	66.2	19.63	71	159.8	2.523	123	253.4	0.532
20	68.0	18.75	72	161.6	2.439	124	255.2	0.519
21	69.8	17.93	73	163.4	2.358	125	257.0	0.505
22	71.6	17.14	74	165.2	2.28	126	258.8	0.492
23	73.4	16.39	75	167.0	2.206	127	260.6	0.48
24	75.2	15.68	76	168.8	2.133	128	262.4	0.467
25	77.0	15	77	170.6	2.064	129	264.2	0.456
26	78.8	14.36	78	172.4	1.997	130	266.0	0.44
27	80.6	13.74	79	174.2	1.933	131	267.8	0.433
28	82.4	13.16	80	176.0	1.871	132	269.6	0.422
29	84.2	12.6	81	177.8	1.811	133	271.4	0.412
30	86.0	12.07	82	179.6	1.754	134	273.2	0.401
31	87.8	11.57	83	181.4	1.699	135	275.0	0.391

Table 2. Resistance Table of Outdoor/Indoor Tube Temperature Sensor (20K)

Temp (°C)	Temp (°F)	Resistance (kΩ)	Temp (°C)	Temp (°F)	Resistance (kΩ)	Temp (°C)	Temp (°F)	Resistance (kΩ)
-19	-2.2	181.4	33	91.4	14.18	85	185.0	2.125
-18	-0.4	171.4	34	93.2	13.59	86	186.8	2.059
-17	1.4	162.1	35	95.0	13.04	87	188.6	1.996
-16	3.2	153.3	36	96.8	12.51	88	190.4	1.934
-15	5.0	145	37	98.6	12	89	192.2	1.875
-14	6.8	137.2	38	100.4	11.52	90	194.0	1.818
-13	8.6	129.9	39	102.2	11.06	91	195.8	1.736
-12	10.4	123	40	104.0	10.62	92	197.6	1.71
-11	12.2	116.5	41	105.8	10.2	93	199.4	1.658
-10	14.0	110.3	42	107.6	9.803	94	201.2	1.609
-9	15.8	104.6	43	109.4	9.42	95	203.0	1.561
-8	17.6	99.13	44	111.2	9.054	96	204.8	1.515
-7	19.4	94	45	113.0	8.705	97	206.6	1.47
-6	21.2	89.17	46	114.8	8.37	98	208.4	1.427
-5	23.0	84.61	47	116.6	8.051	99	210.2	1.386
-4	24.8	80.31	48	118.4	7.745	100	212.0	1.346
-3	26.6	76.24	49	120.2	7.453	101	213.8	1.307
-2	28.4	72.41	50	122.0	7.173	102	215.6	1.269
-1	30.2	68.79	51	123.8	6.905	103	217.4	1.233
0	32.0	65.37	52	125.6	6.648	104	219.2	1.198
1	33.8	62.13	53	127.4	6.403	105	221.0	1.164
2	35.6	59.08	54	129.2	6.167	106	222.8	1.131
3	37.4	56.19	55	131.0	5.942	107	224.6	1.099
4	39.2	53.46	56	132.8	5.726	108	226.4	1.069
5	41.0	50.87	57	134.6	5.519	109	228.2	1.039
6	42.8	48.42	58	136.4	5.32	110	230.0	1.01
7	44.6	46.11	59	138.2	5.13	111	231.8	0.983
8	46.4	43.92	60	140.0	4.948	112	233.6	0.956
9	48.2	41.84	61	141.8	4.773	113	235.4	0.93
10	50.0	39.87	62	143.6	4.605	114	237.2	0.904
11	51.8	38.01	63	145.4	4.443	115	239.0	0.88
12	53.6	36.24	64	147.2	4.289	116	240.8	0.856
13	55.4	34.57	65	149.0	4.14	117	242.6	0.833
14	57.2	32.98	66	150.8	3.998	118	244.4	0.811
15	59.0	31.47	67	152.6	3.861	119	246.2	0.77
16	60.8	30.04	68	154.4	3.729	120	248.0	0.769
17	62.6	28.68	69	156.2	3.603	121	249.8	0.746
18	64.4	27.39	70	158.0	3.481	122	251.6	0.729
19	66.2	26.17	71	159.8	3.364	123	253.4	0.71
20	68.0	25.01	72	161.6	3.252	124	255.2	0.692
21	69.8	23.9	73	163.4	3.144	125	257.0	0.674
22	71.6	22.85	74	165.2	3.04	126	258.8	0.658
23	73.4	21.85	75	167.0	2.94	127	260.6	0.64
24	75.2	20.9	76	168.8	2.844	128	262.4	0.623
25	77.0	20	77	170.6	2.752	129	264.2	0.607
26	78.8	19.14	78	172.4	2.663	130	266.0	0.592
27	80.6	18.13	79	174.2	2.577	131	267.8	0.577
28	82.4	17.55	80	176.0	2.495	132	269.6	0.563
29	84.2	16.8	81	177.8	2.415	133	271.4	0.549
30	86.0	16.1	82	179.6	2.339	134	273.2	0.535
31	87.8	15.43	83	181.4	2.265	135	275.0	0.521
32	89.6	14.79	84	183.2	2.194	136	276.8	0.509

Table 3. Resistance Table of Outdoor Discharge Temperature Sensor(50K)

Temp (°C)	Temp (°F)	Resistance (kΩ)	Temp (°C)	Temp (°F)	Resistance (kΩ)	Temp (°C)	Temp (°F)	Resistance (kΩ)
-29	-20.2	853.5	23	73.4	53.74	75	167.0	7.224
-28	-18.4	799.8	24	75.2	51.41	76	168.8	6.998
-27	-16.6	750	25	77.0	49.19	77	170.6	6.761
-26	-14.8	703.8	26	78.8	47.08	78	172.4	6.542
-25	-13.0	660.8	27	80.6	45.07	79	174.2	6.331
-24	-11.2	620.8	28	82.4	43.16	80	176.0	6.129
-23	-9.4	580.6	29	84.2	41.34	81	177.8	5.933
-22	-7.6	548.9	30	86.0	39.61	82	179.6	5.746
-21	-5.8	516.6	31	87.8	37.96	83	181.4	5.565
-20	-4.0	486.5	32	89.6	36.38	84	183.2	5.39
-19	-2.2	458.3	33	91.4	34.88	85	185.0	5.22
-18	-0.4	432	34	93.2	33.45	86	186.8	5.06
-17	1.4	407.4	35	95.0	32.09	87	188.6	4.904
-16	3.2	384.5	36	96.8	30.79	88	190.4	4.754
-15	5.0	362.9	37	98.6	29.54	89	192.2	4.609
-14	6.8	342.8	38	100.4	28.36	90	194.0	4.469
-13	8.6	323.9	39	102.2	27.23	91	195.8	4.334
-12	10.4	306.2	40	104.0	26.15	92	197.6	4.204
-11	12.2	289.6	41	105.8	25.11	93	199.4	4.079
-10	14.0	274	42	107.6	24.13	94	201.2	3.958
-9	15.8	259.3	43	109.4	23.19	95	203.0	3.841
-8	17.6	245.6	44	111.2	22.29	96	204.8	3.728
-7	19.4	232.6	45	113.0	21.43	97	206.6	3.619
-6	21.2	220.5	46	114.8	20.6	98	208.4	3.514
-5	23.0	209	47	116.6	19.81	99	210.2	3.413
-4	24.8	198.3	48	118.4	19.06	100	212.0	3.315
-3	26.6	199.1	49	120.2	18.34	101	213.8	3.22
-2	28.4	178.5	50	122.0	17.65	102	215.6	3.129
-1	30.2	169.5	51	123.8	16.99	103	217.4	3.04
0	32.0	161	52	125.6	16.36	104	219.2	2.955
1	33.8	153	53	127.4	15.75	105	221.0	2.872
2	35.6	145.4	54	129.2	15.17	106	222.8	2.792
3	37.4	138.3	55	131.0	14.62	107	224.6	2.715
4	39.2	131.5	56	132.8	14.09	108	226.4	2.64

Table 4. Calculation method for added refrigerant amount

Added refrigerant amount= extension length of liquid pipe × added refrigerant amount for liquid pipe/meter

Note: When the connection pipe is more than 10m, 5ml refrigeration oil should be added for each 5m extension length

Added refrigerant amount for R22, R407C, R410A and R134a

Diameter of connection pipe		Added amount of refrigerant	
Liquid pipe (mm)	Gas pipe(mm)	Cooling only (g)	Heat pump (g)
Φ6	Φ9.52 or Φ12	15	20
Φ6 or Φ9.52	Φ16 or Φ19	15	50
Φ12	Φ19 or Φ22.2	30	120
Φ16	Φ25.4 or Φ31.8	60	120
Φ19	——	250	250
Φ22.2	——	350	350

Table 5. Torque table of connection pipe:

External diameter(mm)	Torque (N.m)
Φ6(1/4")	15~20
Φ9.52(3/8")	30~40
Φ12(1/2")	45~55
Φ16(5/8")	60~65
Φ19(3/4")	70~75

Table 6. Connection pipe table:

Cooling capacity	Max. length of connection pipe	Max. drop
5000Btu/h（1465W）	15m	5m
7000Btu/h（2051W）	15m	5m
9000Btu/h（2637W）	15m	10m
12000Btu/h（3516W）	20m	10m
18000Btu/h（5274W）	25m	10m
24000Btu/h（7032W）	25m	10m
28000Btu/h（8204W）	30m	10m
36000Btu/h（10548W）	30m	20m
42000Btu/h（12306W）	30m	20m
48000Btu/h（14064W）	30m	20m