



## **Technical service manual 2010**

### **R410A 9A DC Inverter multi Series**

#### **Indoor Models**

**ATM-021DCIMX05**

**ATM-026DCIMX05**

**ATM035DCIMX05**

**ATM-053DCIMX05**

#### **Outdoor Models**

**ATE-053DCIMX05**

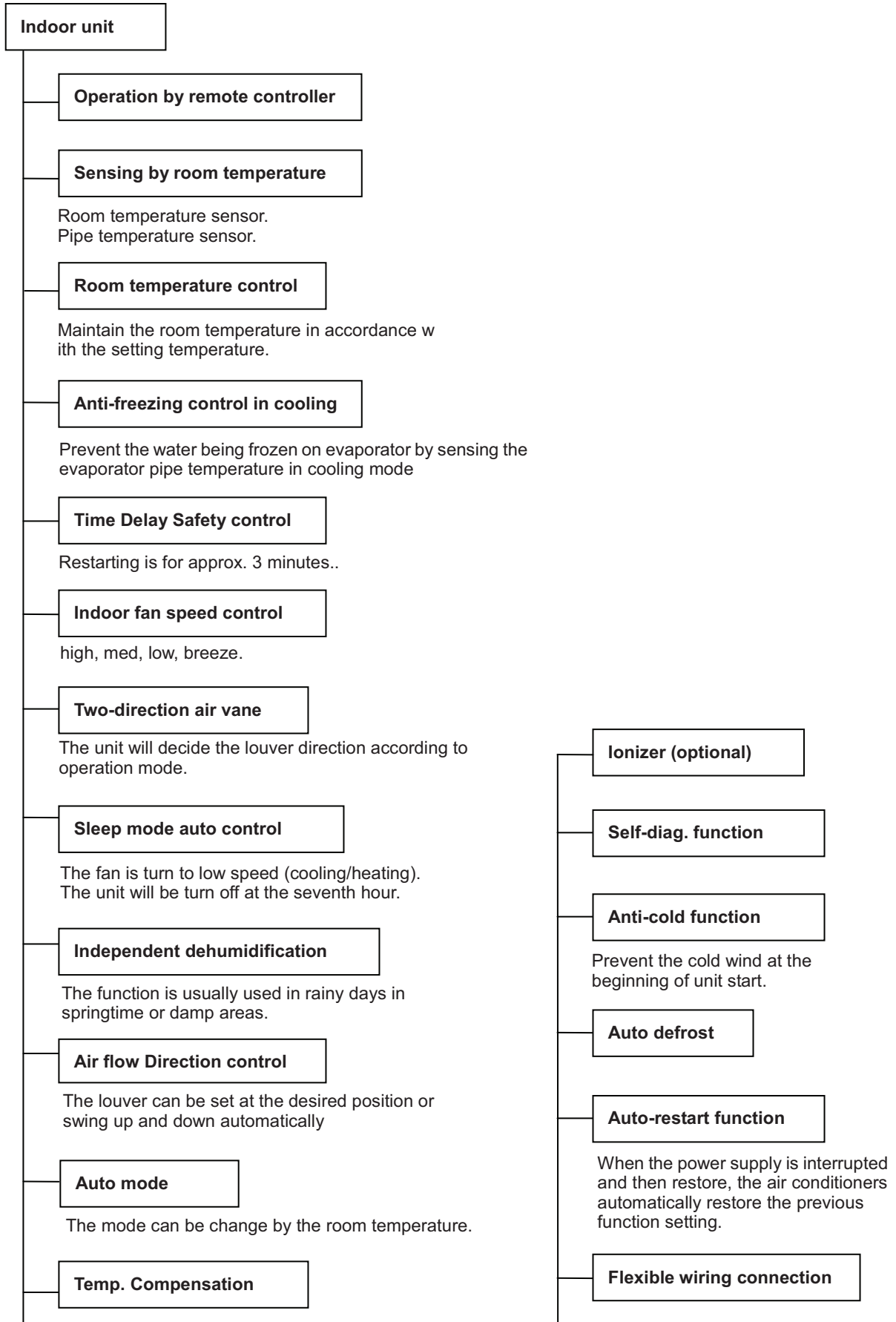
**ATE-079DCIMX05**

**ATE-081DCIMX05**

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  3. Refrigeration cycle diagram
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# 1. Product features



## Outdoor unit

### Power relay control

The unit has 3 mins delay between continuously ON/OFF operations.

### Low noise air flow system

Bird tail propeller fan makes the outdoor unit run more quietly.

### Hydrophilic aluminum fin

The hydrophilic fin can improve the heating efficiency at operation mode.

### 4 way valve control

It is only operated in the heating operation mode except defrosting operation.

### Anti-rust cabinet

Made from electrolytic zinc steel sheet and anti-rust coated components.

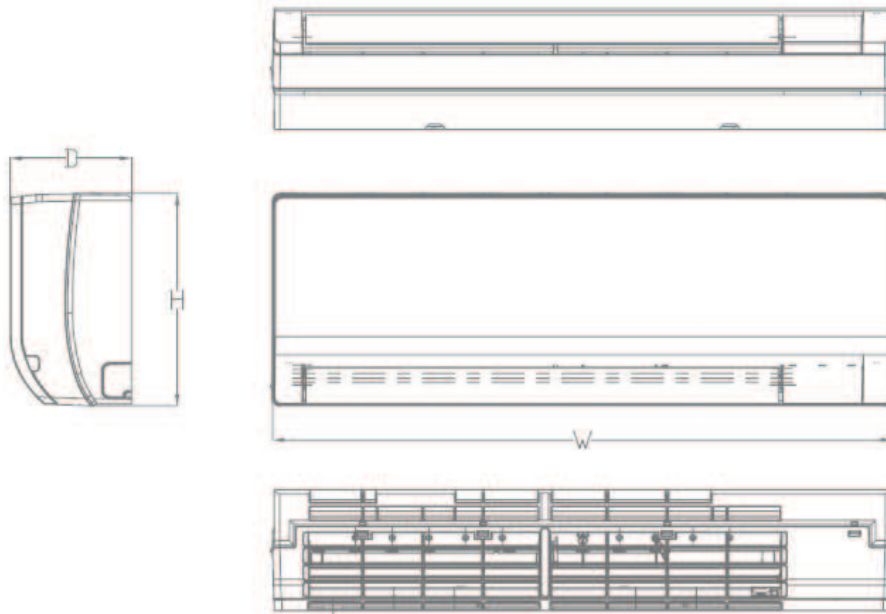
### Valve protection cover

It protects the valves and prevents water from dripping.

### Discharge pipe temperature protect

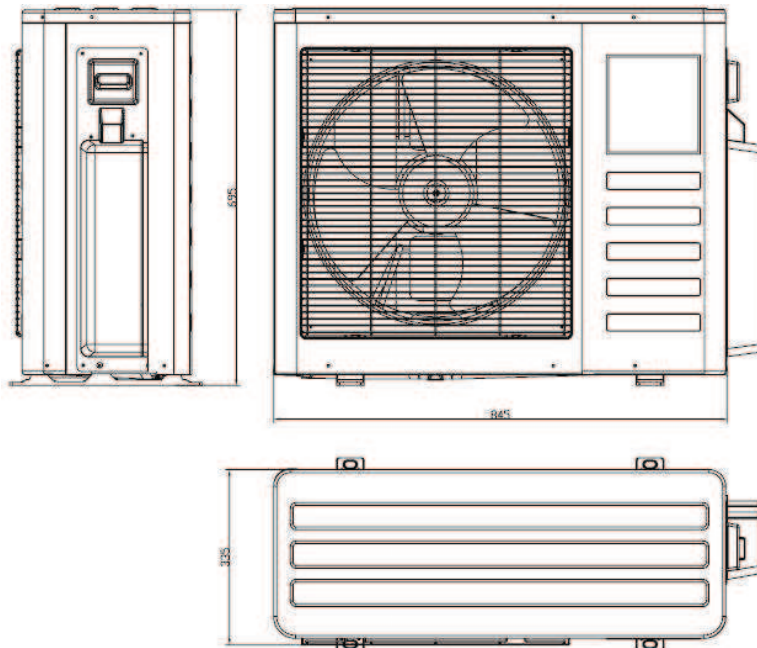
### Driving heating at -15℃

**2 Dimensions**  
**2.1 Indoor unit**

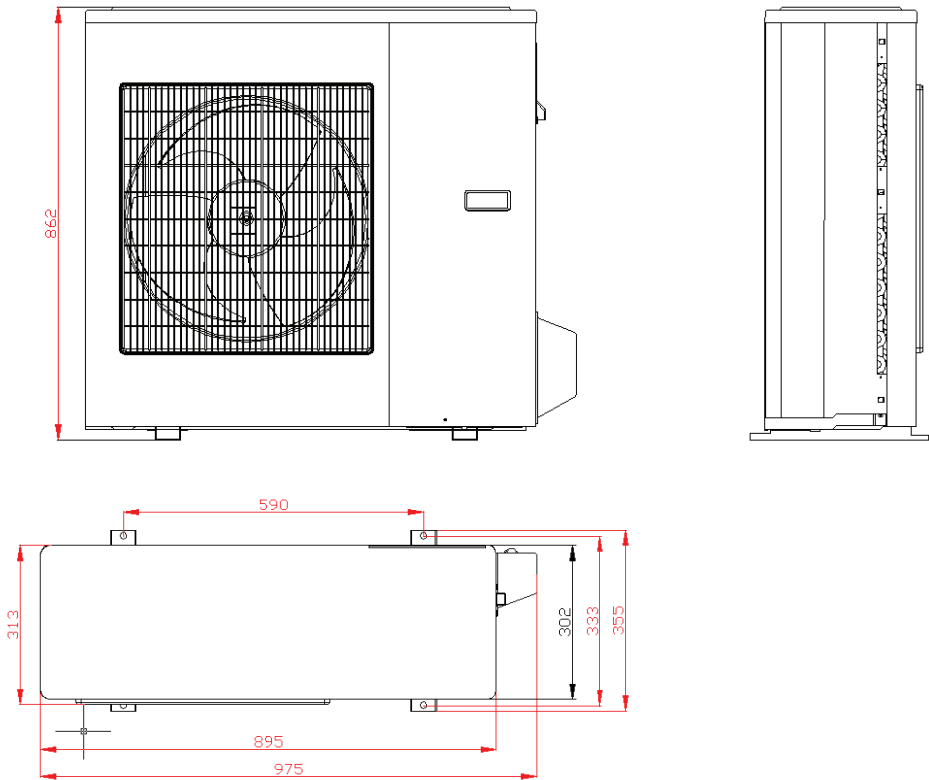


Model	W(mm)	H(mm)	D(mm)
21/26/35	845	290	165
53	995	292	200

**2.2 Outdoor unit**  
**b) ATE-053DCIM2X05 / ATE-078DCIM3X05**

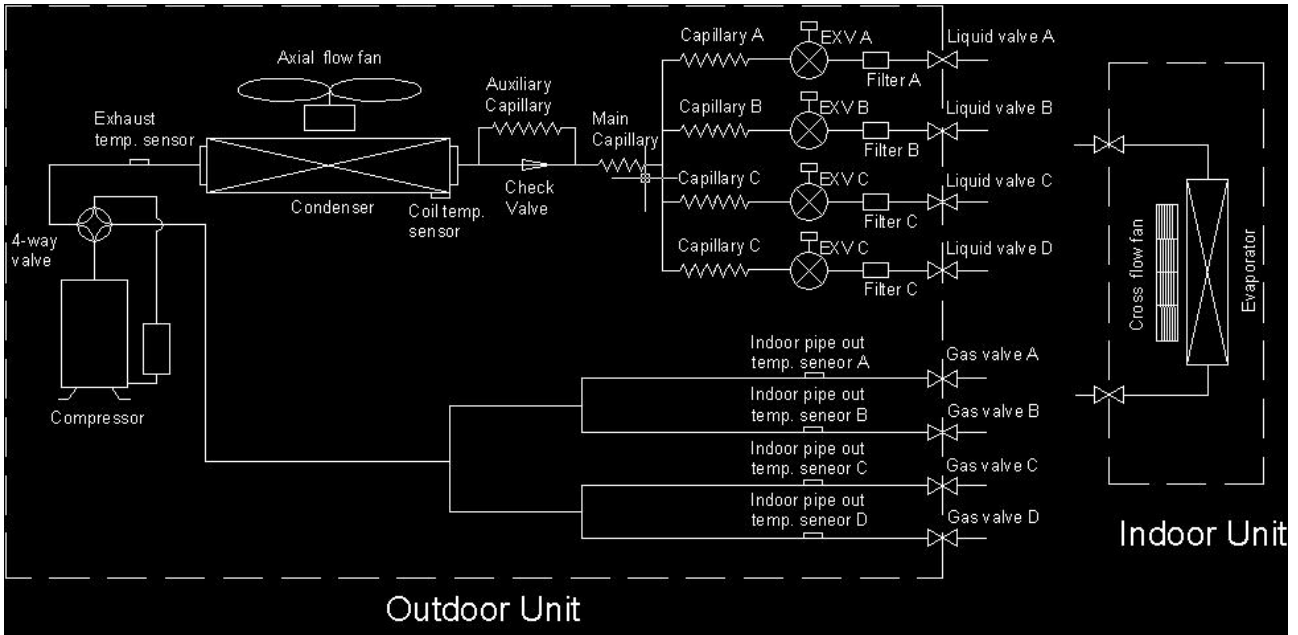


c) ATE-081DCIM4X05

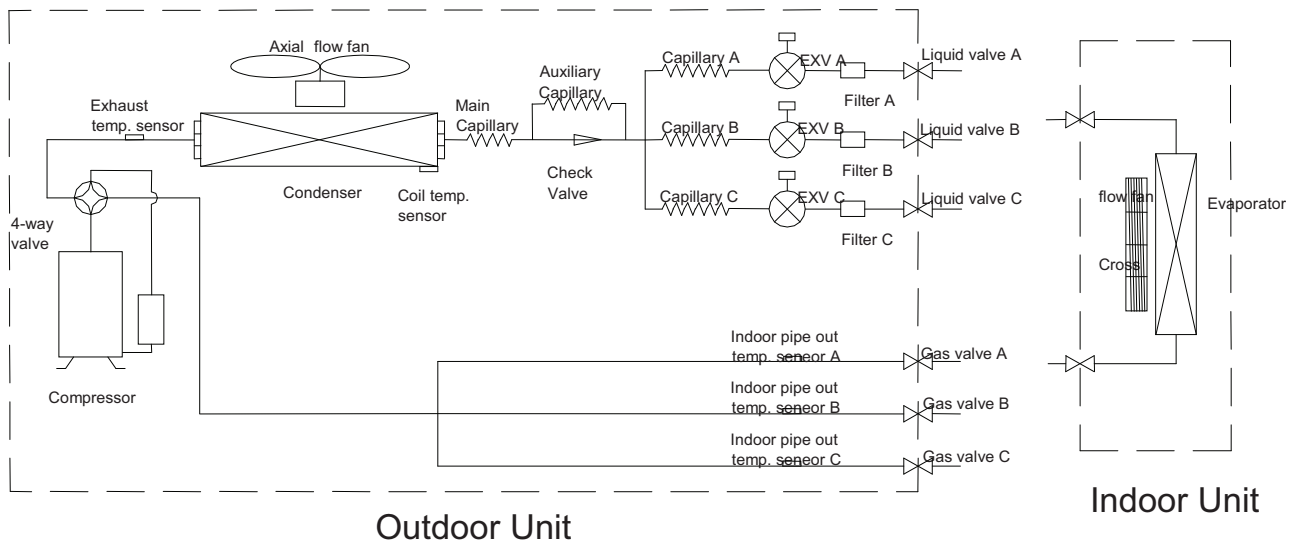


### 3 Refrigeration Cycle Diagram

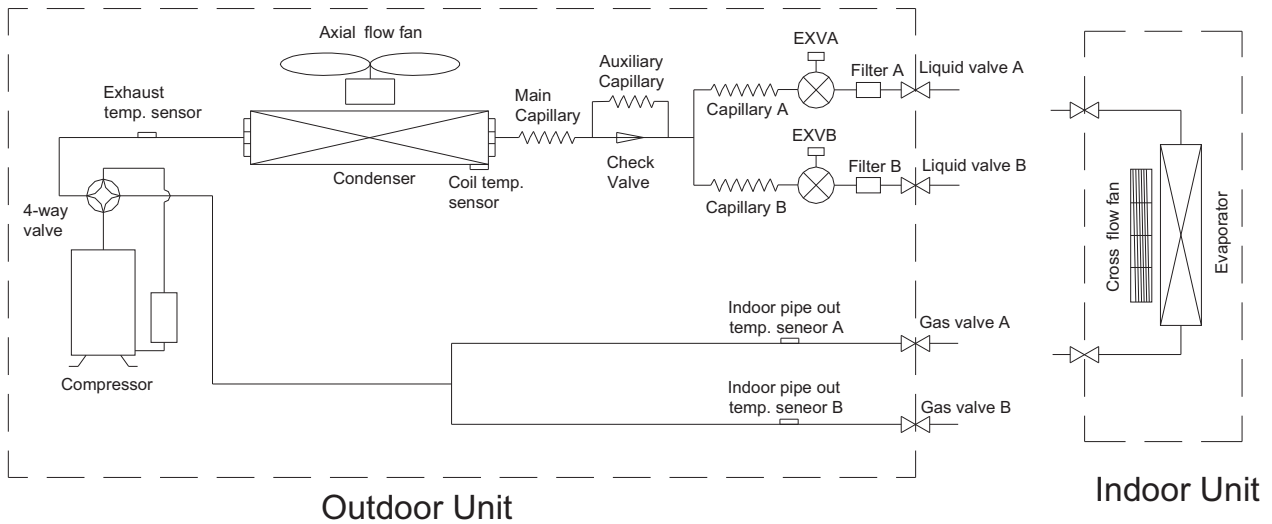
#### 3.1 Refrigeration circuit drawing of inverter quadplex type



#### 3.2 Refrigeration circuit drawing of inverter trinary type



#### 3.3 Refrigeration circuit drawing of inverter binary type



#### 4 Temperature Operation range

Cooling mode	Indoor temperature	$\geq 17^{\circ}\text{C}$
	Outdoor temperature	$50^{\circ}\text{C}$
Heating mode	Indoor temperature	$\leq 30$
	Outdoor temperature	$-15 \text{ } 24$
Dry mode	Indoor temperature	10
	Outdoor temperature	$0^{\circ}\text{C } 50^{\circ}\text{C}$

#### 5. Indoor units combination

##### 5.2 Indoor unit combination for ATE-053DCIM2X05

One unit	Two unit	
7	7+7	9+9
9	7+9	9+12
12	7+12	12+12
18	7+18	

##### 5.4 Indoor unit combination for ATE-079DCIM3X05

One unit	Two unit			Three unit		
7	7+7	9+9	12+12	7+7+7	7+9+9	9+9+9
9	7+9	9+12	12+18	7+7+9	7+9+12	9+9+12
12	7+12			7+7+12	7+12+12	9+12+12
18	7+18			7+7+18		

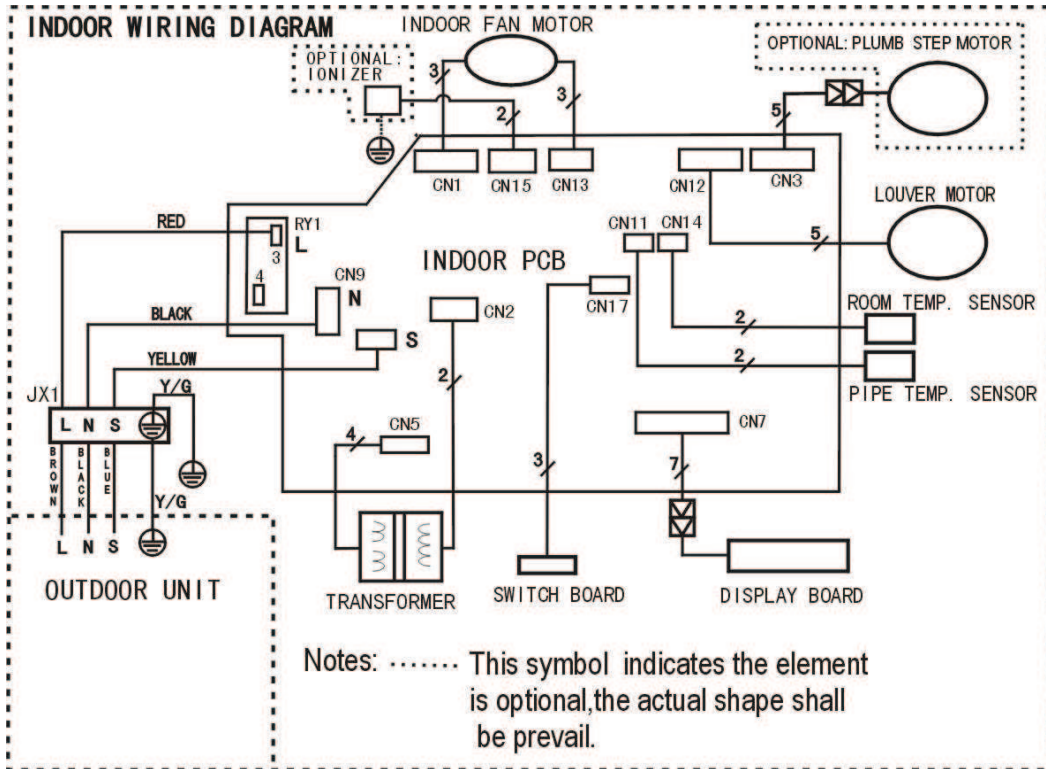


### 5.6 Indoor unit combination ATE-081DCIM4X05

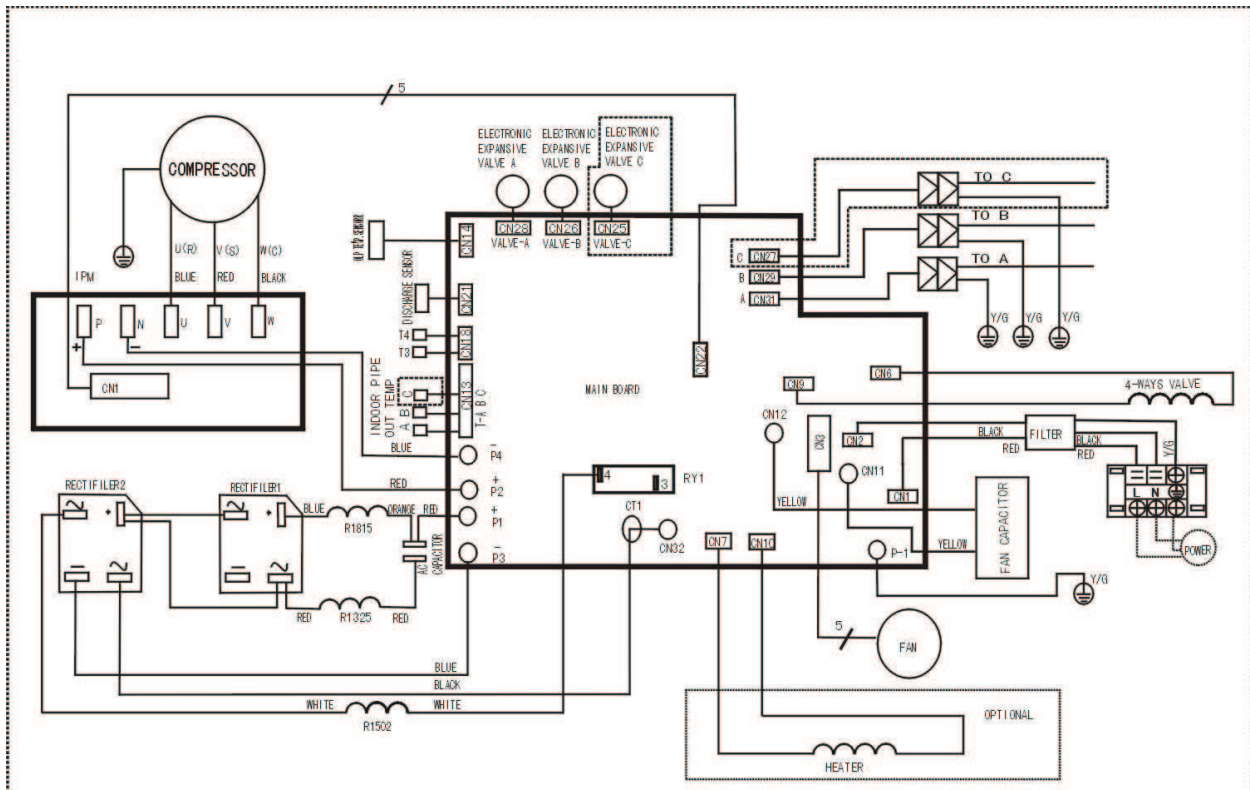
One unit	Two unit			Three unit			Four unit		
7	7+7	9+9	12+12	7+7+7	7+9+12	9+9+9	7+7+7+7	7+7+9+9	9+9+9+9
9	7+9	9+12	12+18	7+7+9	7+9+18	9+9+12	7+7+7+9	7+7+9+12	9+9+9+12
12	7+12	9+18	18+18	7+7+12	7+12+12	9+9+18	7+7+7+12	7+9+9+9	
18	7+18			7+7+18	7+12+18	9+12+12	7+7+7+18	7+9+9+12	
				7+9+9	12+12+12	9+12+18			

## 6. Wiring Diagram

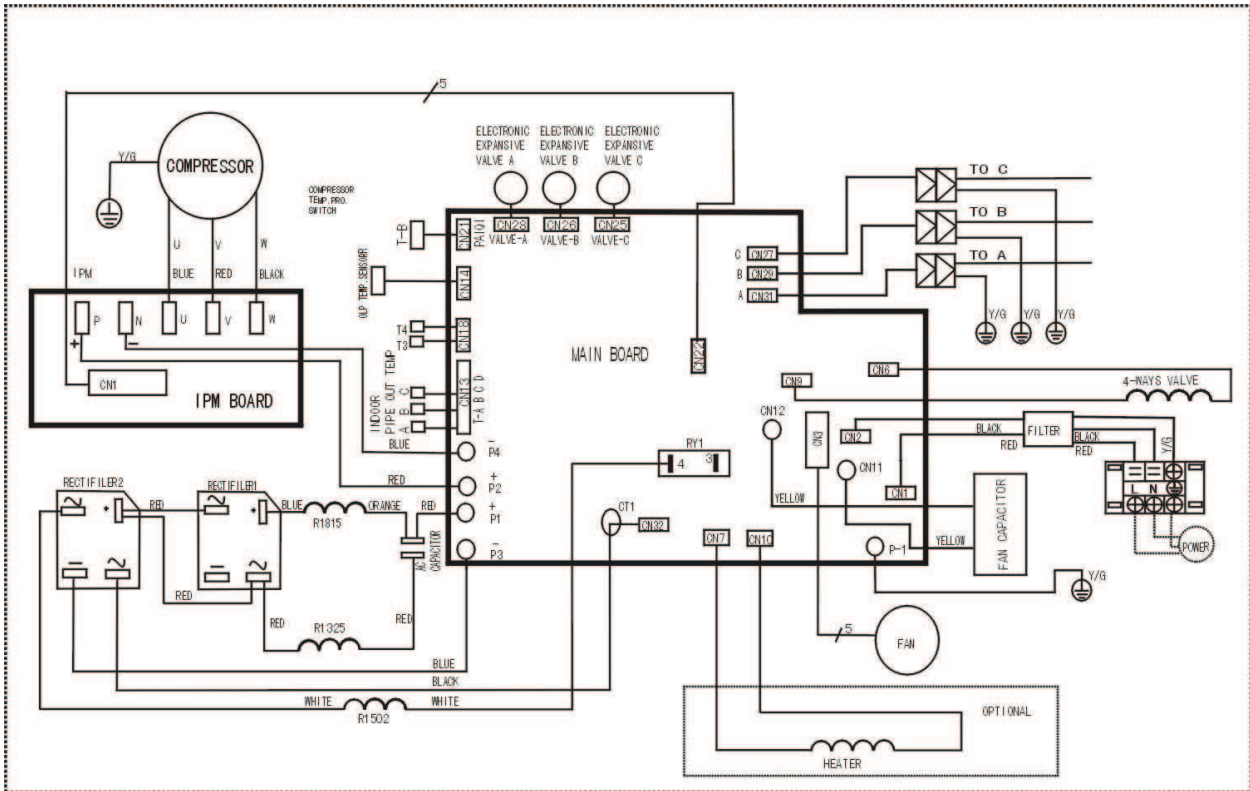
### 6.1 Indoor unit TAILLE 021/026/035/053



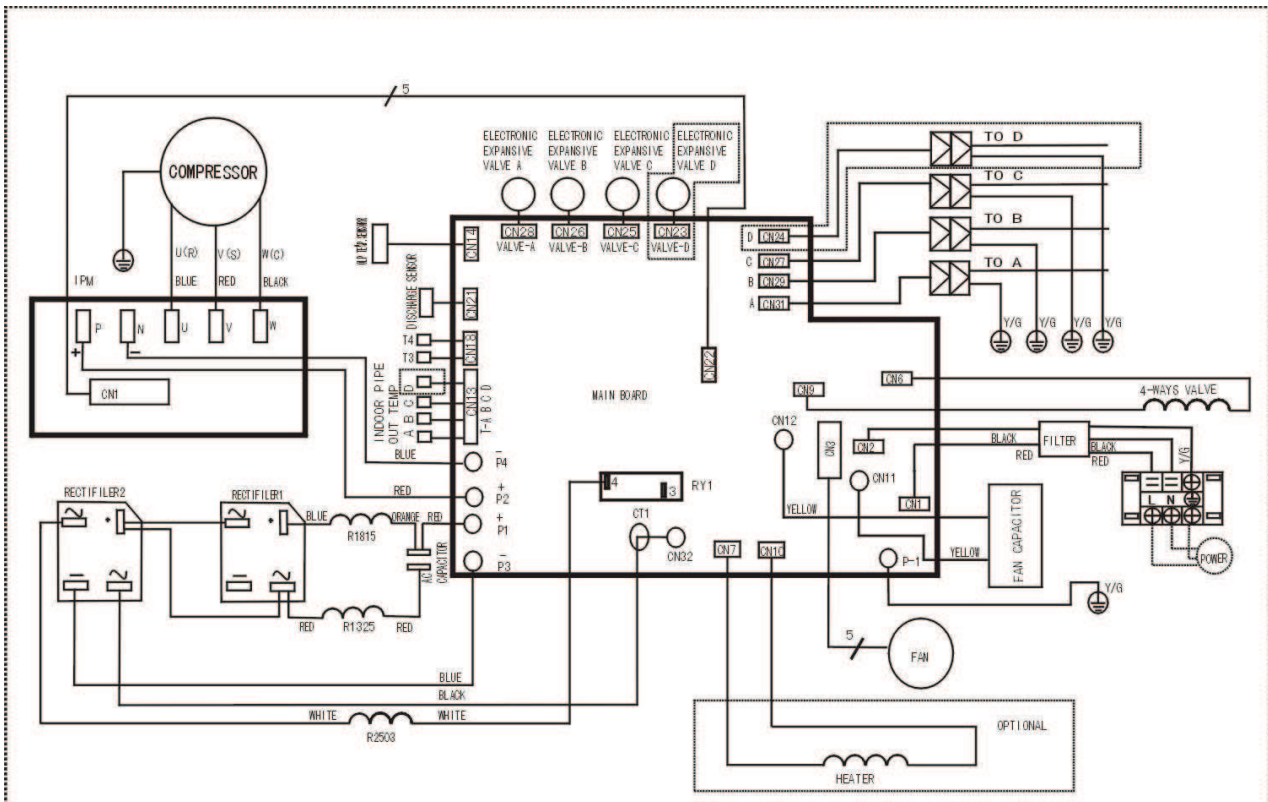
### 6.3 Outdoor unit ATE-053DC12X05



### 6.4 Outdoor unit ATE-079DCI3X05



### 6.6 Outdoor unit ATE-081DCI4X05



## 7 Electronic control function

### 7.1 Electric Control working environment.

7.1.1 Input voltage: 175~253V.

7.1.2 Input power frequency:50Hz.

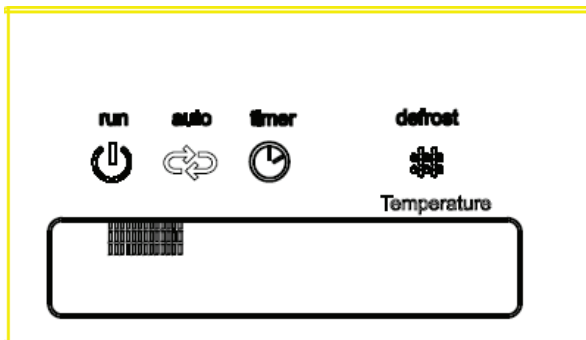
7.1.3 Indoor fan normal working amp. is less than 1A.

7.1.4 Outdoor fan. Normal working amp. is less than 1.5A.

7.1.5 Four-way valve normal working amp. is less than 1A.

7.1.6 Swing motor: DC12V.

### 7.2 Icon explanation on indoor display board.



#### 7.2.1 Run indicator

Flash at 0.5Hz when the unit is standby. Illuminate when the unit is turned on.

#### 7.2.2 Auto indicator

Illuminates when the air conditioner is in AUTO operation.

#### 7.2.3 Timer indicator

Illuminate when TIMER is set ON/OFF.

#### 7.2.4 Defrost Indicator

Illuminate when the air conditioner starts defrosting automatically or when the warm air control feature is activated in heating mode.

#### 7.2.5 TEMPERATURE indicator

Usually it displays the temperature settings. When change the setting temperature, this indicator begins to flash, and stops 20 seconds later. It displays the room temperature when the air conditioner is in FAN only operation, and the range of that is 0~50℃. It will also display the error codes when malfunction or protection happen.

#### 7.2.6 Frequency indicator

This indicator appears only when the compressor is in operation and indicates the current operating frequency.

### 7.3 Outdoor unit's digital display tube

There is a digital display tube in outdoor PCB.

#### 7.3.1 Digital display tube display function

- In standby , the LED displays “- -”
- In compressor operation, the LED display the running frequency,
- In defrosting mode, The LED displays “dF” or alternative displays between running frequency and “dF”(each displays 2s)
- In compressor pre-heating, The LED displays “- -”
- In protection or malfunction, the LED displays error code or protection code.
-

## 7.4 Outdoor unit point check function

There is a check switch in outdoor PCB.

Push the switch SW1 to check the states of unit when the unit is running. The digital display tube will display the follow procedure when push SW1 each time:

	Display	Remark
1	Indoor unit capacity demand code	
2	Outdoor unit running mode code	Off:0, Cooling:1, Heating:2
3	Amendatory capacity demand code	
4	Outdoor unit fan motor state	Off:0, Low speed:1, High speed:2
5	Evaporator outlet temp. for 1# indoor unit	Actual data
6	Evaporator outlet temp. for 2# indoor unit	Actual data
7	Evaporator outlet temp. for 3# indoor unit	Actual data
8	Evaporator outlet temp. for 4# indoor unit	Actual data
9	Condenser pipe temp.	Actual data
10	Ambient temp.	Actual data
11	Compressor discharge temp.	Actual data
12	Inverter current	Actual data
13	EXV open angle for 1# indoor unit	Actual data×8
14	EXV open angle for 2# indoor unit	Actual data×8
15	EXV open angle for 3# indoor unit	Actual data×8
16	EXV open angle for 4# indoor unit	Actual data×8
17	DC voltage for outdoor unit	Actual data
18	Indoor unit number	The indoor unit can communicate with outdoor unit well.
19	The last error or protection code	00 means no malfunction
20	Frequency sent from chip 0034 to chip 341	Actual data
21	Indoor room temp. for 1# indoor unit	Actual data
22	Indoor pipe temp. for 1# indoor unit	Actual data
23	Indoor room temp. for 2# indoor unit	Actual data
24	Indoor pipe temp. for 2# indoor unit	Actual data
25	Indoor room temp. for 3# indoor unit	Actual data
26	Indoor pipe temp. for 3# indoor unit	Actual data
27	Indoor room temp. for 4# indoor unit	Actual data
28	Indoor pipe temp. for 4# indoor unit	Actual data
29	---	Check point over

### 7.4.1 Frequency of compressor:

Display	Frequency of compressor (Hz)
30	30
--	Stand by
60	60

7.4.2 Running mode:

Display	Corresponding mode
0	Off
1	Cooling mode
2	Heating mode

7.4.3 Capacity demand:

Cooling mode

Capacity	2000-2500	2000-2500	3000-3800	4500-5000	5000-5500	5500-6100	6100-7000	7000-7500	7500-8000	7500-8000
Corresponding Code	1	2	3	4	5	6	7	8	9	>=10

Heating mode

Capacity	2000-2500	2000-2500	3000-3800	4500-5000	5500-6100	6100-7000	6100-7000	7000-7500	7500-8000	8000-8900
Corresponding Code	1	2	3	4	5	6	7	8	9-10	>=11

Note:

The capacity is just for reference.

7.4.4 Number of indoor unit

Display	Number of indoor unit
1	1
2	2
3	3

7.4.5 Outdoor ambient temp:

Display	Corresponding temp.	Display	Corresponding temp.	Display	Corresponding temp.
15	-7.5	50	10	80	25
16	-7	51	10.5	81	25.5
17	-6.5	52	11	82	26
18	-6	53	11.5	83	26.5
19	-5.5	53	11.5	84	27
20	-5	54	12	85	27.5
21	-4.5	55	12.5	86	28
22	-4	56	13	87	28.5
23	-3.5	57	13.5	88	29
24	-3	58	14	89	29.5
26	-2	59	14.5	90	30
27	-1.5	60	15	91	30.5
28	-1	61	15.5	92	31
29	-0.5	62	16	93	31.5
30	0	63	16.5	93	31.5

31	0.5	63	16.5	94	32
32	1	64	17	95	32.5
33	1.5	65	17.5	96	33
34	2	65	17.5	97	33.5
35	2.5	66	18	98	34
36	3	67	18.5	99	34.5
37	3.5	68	19	10.	35~40
38	4	69	19.5	11.	40~45
39	4.5	70	20	12.	45~50
40	5	71	20.5	13.	50~55
41	5.5	72	21	14.	55~60
42	6	73	21.5	15.	60~65
43	6.5	74	22	16.	65~70
44	7	75	22.5		
45	7.5	75	22.5		
46	8	76	23		
47	8.5	77	23.5		
48	9	78	24		
49	9.5	79	24.5		

#### 7.4.6 Current of outdoor unit

Display	Corresponding mode
44	6.0 A
46	6.2 A
54	7.4 A
55	7.6 A
58	7.6 A
62	8.0 A
66	8.6 A
67	8.8 A
68	9.0 A
70	9.2 A
72	9.5 A
76	10.0 A
78	10.2 A
80	10.4 A
82	10.6 A
84	11.0 A
88	11.6 A
92	12.0 A
94	12.2 A

7.4.7 No. 1 opening degree of electronic expansion valve:

Opening degree equals the display data times 8

7.4.8 No. 2 opening degree of electronic expansion valve:

Opening degree equals the display data times 8

7.4.9 No. 3 opening degree of electronic expansion valve:

Opening degree equals the display data times 8

## **7.5 Protection**

7.5.1 3 minutes delay at restart for compressor.

7.5.2 Discharge temperature protection of compressor, compressor stops when the temp. of discharge is more than 115℃ and lasts for 10 s. Compressor runs when the temp. of discharge is less than 90℃.

7.5.3 Temperature protection of compressor top, compressor stops when the temp. of top of compressor is more than 120℃, compressor runs when the temp. of top of compressor is less than 105℃.

7.5.4 When AC voltage  $\geq$  265V for 30 seconds, Outdoor Unit stops operation and alarms. When AC voltage  $\leq$  265V for 30 seconds, Outdoor Unit resumes operation.

7.5.5 Inverter module Protection, Inverter module Protection itself has a protection function against current, voltage and temperature.

7.5.6 Sensor protection at open circuit and breaking disconnection

7.5.7 Fan Speed is out of control. When Indoor Fan Speed is too high (higher than High Fan+300RPM) or too low (lower than 400RPM), the unit stops and LED displays failure information and can't return to normal operation automatically.

7.5.8 Cross Zero signal error warning. If there is no Cross Zero signals in 4 minutes, the unit stops and LED displays failure information and can't return to normal operation automatically.

7.5.9 Current protection: When the current is more than 'X' A, the compressor stops.

(X is 7A for 14K 1x2 unit, is 14A for 18K 1x2 unit, is 13.5A for 21 1x3 unit, is 15A for 27K 1x3 unit, is 16A for 27K 1x4 unit and is 21.5A for 36K 1x4 unit. )

7.5.10 Outdoor condenser high temperature protection: Under cooling mode, if  $T_3 > 65^\circ\text{C}$  for 3 minutes, the compressor will stop. When  $T_3 < 52^\circ\text{C}$ , the protection is not valid.

7.5.11 Pressure protection (just be available for 27K and 36K 1x4 unit): If low pressure is lower 0.03MPa, the compressor will stop and when low pressure is higher than 0.10MPa, the compressor will restart. If high pressure is higher than 3.3MPa, the compressor will stop and when high pressure is lower than 2.4MPa, the compressor will restart.

7.5.12 Compressor pre-heating function: When the outdoor temperature is lower than 3℃ and the compressor stops operation for more than 3 hours, or the outdoor temperature is lower than 3℃ and the power is just put on, the compressor enters into pre-heating condition. When outdoor temp. is more than 5℃ or user operate it, pre-heating condition will finish.

## **7.6 Fan-only mode**

Fan speed is high/mid/low/ Auto



## 7.7 Cooling mode

7.7.1 Indoor fan keeps running, fan speed can be set in high/mid/low/ Auto:

7.7.2 Auto fan at cooling mode: (T=Indoor Temp.-Setting Temp.)

	Condition	Indoor fan speed
Room temp. up	$T < 1.5 \square$	Low
	$1.5 \square < T < 4 \square$	Mid.
	$T > 4 \square$	High
Room temp. down	$T > 3 \square$	High
	$1 \square < T < 3 \square$	Mid.
	$T < 1 \square$	Low

7.7.3 Anti-freezing control to indoor evaporator at cooling mode( T: evaporator temp. )

	Evaporator Temp.	Compressor
	$T < 4 \square$	Off
	$T > 8 \square$	On

## 7.8 Dehumidifying mode

7.8.1 the indoor fan is fixed in low speed

7.8.2 Low room temperature protection:

When room temperature decreases to below  $10 \square$ , indoor fan stop, when room temperature restores to over  $12 \square$ , indoor fan start.

7.8.3 At dehumidifying mode, the anti-freezing function of the indoor heat exchanger is the same as that of cooling mode.

## 7.9 Heating mode

7.9.1 Indoor Fan actions at heating mode

Indoor Fan can be set at HIGH/MID/LOW/AUTO by using a remote controller, but Anti-cold wind function prevails.

Anti-cold wind control function at heating mode

	Condition T= Indoor exchanger temp.	Indoor fan speed
Indoor exchanger temp. up	$T < 34 \square$	Off
	$34 \square < T < 37 \square$	Breeze
	$37 \square < T < 44 \square$	Low speed
	$T > 44 \square$	Setting fan speed
Indoor exchanger temp. down	$T > 38 \square$	Setting fan speed
	$33 \square < T < 38 \square$	Low speed
	$24 \square < T < 33 \square$	Breeze
	$T < 24 \square$	Off

7.9.2 Auto wind at heating mode

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed

Room temp. up	$T < 1.5 \square$	High
	$1.5 \square < T < 2.5 \square$	Mid.
	$T > 2.5 \square$	Low
Room temp. down	$T < 1.0 \square$	High
	$1.0 \square < T < 2.0 \square$	Mid.
	$T > 2.0 \square$	Low

### 7.9.3 Indoor evaporator high-temperature protection at heating mode

Condition	Compressor
T = Indoor exchanger temp.	
$T < 48 \square$	On
$53 \square < T < 63 \square$	Decrease frequency of compressor
$T > 63 \square$	Off

Defrosting operation (Available for heating only).

## 7.10 Defrost

### 7.10.1 Defrosting condition:

The temperature of outdoor heat exchanger remains consecutively lower than  $-2^{\circ}\text{C}$  for more than 40 minutes,

### 7.10.2 Ending condition of defrosting

If one of following conditions is satisfied, end the defrost and turn into heating mode:

- The defrost time has reached to 10 minutes.
- When the temperature of outdoor heat exchanger rises up to  $15^{\circ}\text{C}$

### 7.10.3 Defrosting Actions:

- Compressor runs.
- 4 way valve switches off,
- Outdoor fan switches off
- Indoor fan running according to anti-cold wind function in heating mode.

## 7.11 Automatic operation mode

The air conditioner automatically selects one of the following operation modes: cooling, heating or fan only according to the temp. difference between room temp. (TA) and set temp. (TS).

TA—TS	Operation mode
$TA - TS > 2 \square$	Cooling
$-1 \square \leq TA - TS \leq +2 \square$	Fan-only
$TA - TS < -1 \square$	Heating (air-only for cooling only type)

## 7.12 Manual switch

### 7.12.1 Mode changes when push this button .

Cooling mode → Auto mode → Unit off → Cooling mode

7.12.2 At Cooling mode, after 30 minutes cooling operation whose fan speed is set as low, the A/C operates with a setting temp. of  $24 \square$ .

7.12.3 At auto mode, the A/C operates with a set temp. of  $24 \square$

## 7.13 Timer Function

7.13.1 The maximum length of timer is 24 hours and the minimum resolving power is 15 minutes.

7.13.2 Timer on: first turn off the A/C, the A/C will be automatically on at the set time.

7.13.3 Timer off: first turn on the A/C, the A/C will be automatically off at the set time

7.13.4 Timer on/off function( on time is earlier than off time): first turn off the A/C, it will be automatically on at set time, and later be off at the set time, then unit turns on at set time.

7.13.5 Timer off/on function( off time is earlier than on time): first turn on the A/C, it will be automatically off at set time, and later be on at the set time, then unit turns off at set time.

## 7.14 Sleep mode

7.14.1 It is available at cooling, heating or auto mode.

7.14.2 Cooling:

The set temperature rise 1□ per hour. Two hours later, the set temperature will maintain as a constant and the fan speed is kept at low speed.

7.14.3 Heating:

The set temperature decrease 1□ per hour. Two hours later, the set temperature will maintain as a constant and the air circulation is kept at low speed (Cold air proof function takes precedence over all).

7.14.4 Auto:

The Sleep Mode running function operates in accordance with selected running mode by auto mode.

7.14.5 After 7 hours, unit cancels this mode automatically.

## 7.15 Auto restart function

In case of a sudden power failure, this function automatically sets the unit to previous settings before the power failure when power returns.

## 7.16 Mode conflict

The indoor units cannot work cooling mode and heating at same time.

Heating mode has a priority.

7.16.1 Definition

	Cooling mode	Heating Mode	Fan	Off
Cooling mode	No	Yes	No	No
Heating Mode	Yes	No	Yes	No
Fan	No	Yes	No	No
Off	No	No	No	No

No: No mode conflict;

Yes: Mode conflict

7.16.2 Unit action

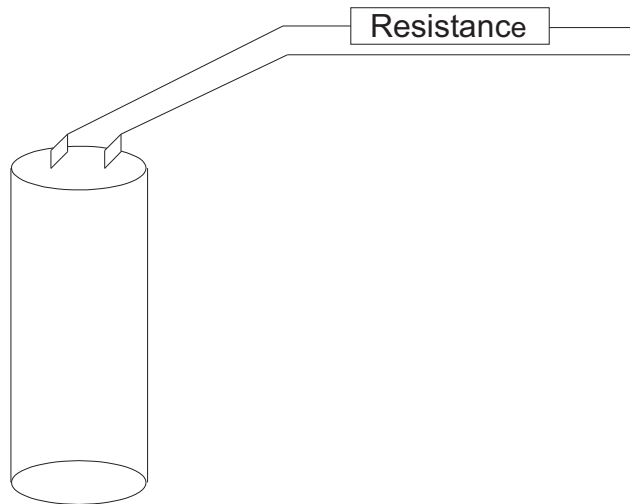
- In case of one Indoor unit working in cooling mode or fan mode, and another indoor unit is set to heating mode, the indoor unit working in cooling mode or fan mode will change to stand by. The outdoor unit will work in heating mode.
- In case of one Indoor unit working in heating mode, and another indoor unit is set to cooling mode or fan mode, the indoor unit setting to cooling mode or fan mode will change to stand by.

## 8.Troubleshooting

### 8.1 Safety

Because of there are capacitors in PCB and relative circuit in outdoor unit, even shut down the power supply, electricity power still are kept in capacitors, do not forget to discharge the electricity power in capacitor.

The value of resistance is about 1500 ohms to 2000 ohms



The voltage in P3 and P4 in outdoor PCB is high voltage about 310V

The voltage in P6 in outdoor PCB is high voltage about 310V

## 8.2 Troubleshooting for indoor unit

Display	LED STATUS
E0	EEPROM error
E1	Communication error between indoor and outdoor unit
E2	Zero-crossing examination error
E3	Fan speed beyond control
E5	Outdoor units temp. sensor or connector of temp. sensor is defective
E6	Indoor units temp. sensor or connector of temp. sensor is defective
P0	Inverter module protection
P1	Outdoor voltage protection
P2	Compressor temp. protection
P3	Compressor current protection

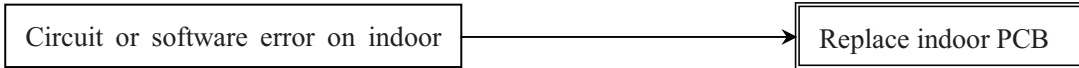
## 8.3 LED error code display for outdoor unit

Display	LED STATUS
E0	EEPROM error
E1	#1 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective
E2	#2 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective
E3	#3 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective
E6	#4 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective
E4	Outdoor temp. sensor or connector of temp. sensor is defective
E5	Compressor voltage protection
E7	Communication error between outdoor IC and DSP
P0	Compressor temp. protection
P1	High pressure protection (just for 27K and 36K 1x4 units.)
P2	Low pressure protection (just for 27K and 36K 1x4 units.)
P3	Compressor current protection
P4	Inverter module protection
P6	Condenser high-temperature protection
P7	Compressor driving protection

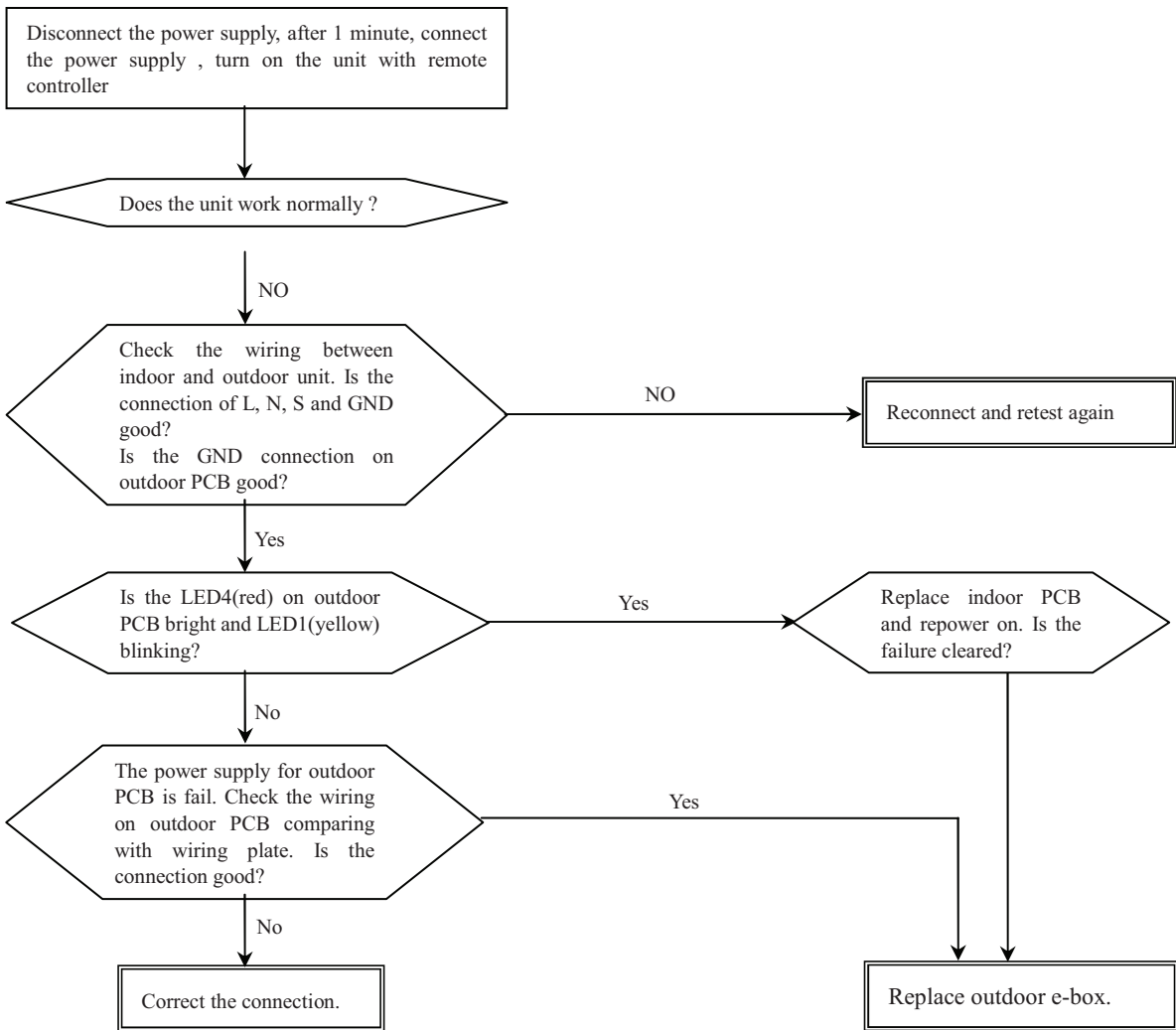
## 8.4 Troubleshooting

### 8.4.1 Indoor unit trouble shooting

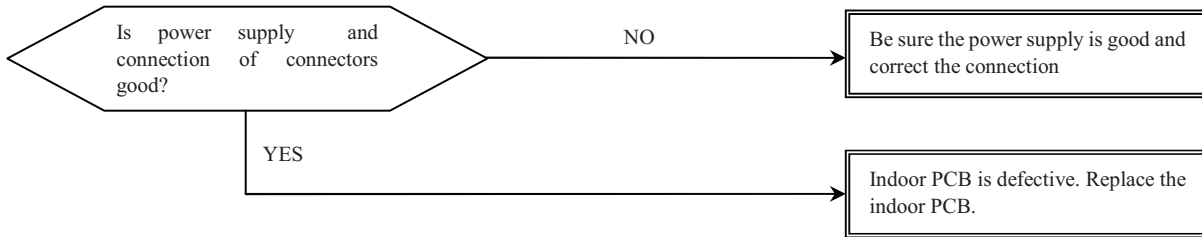
Indoor unit display	LED STATUS
E0	EEPROM error



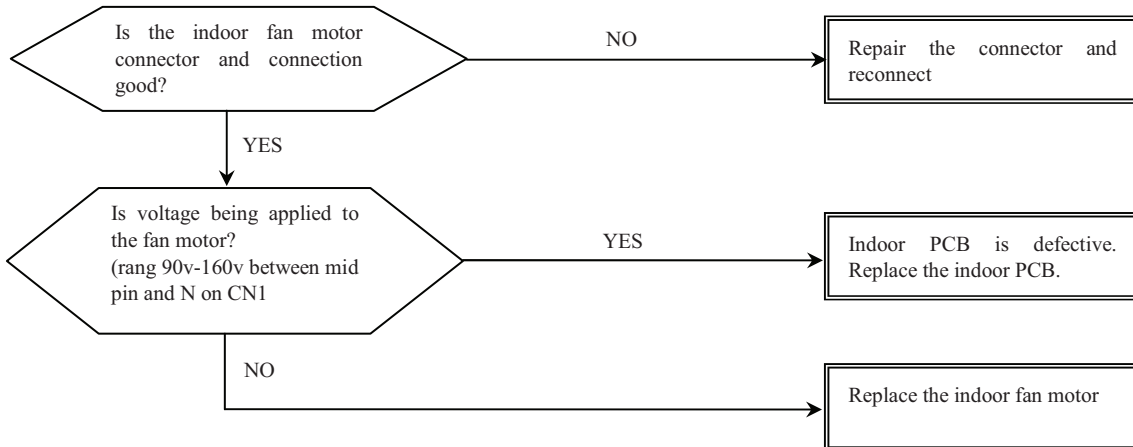
Indoor unit display	LED STATUS
E1	outdoor communication error



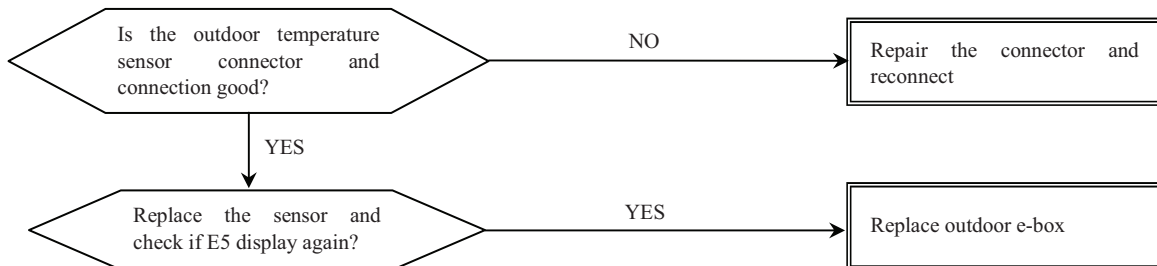
Indoor unit display	LED STATUS
E2	Zero-crossing examination error



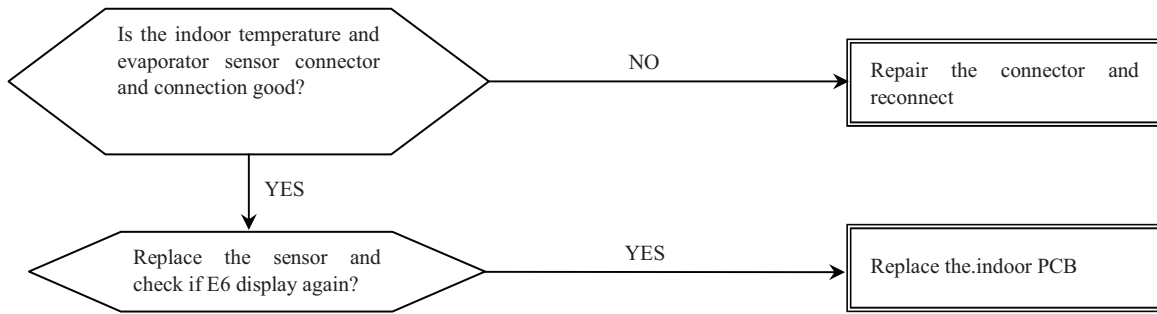
Indoor unit display	LED STATUS
E3	Fan speed beyond control



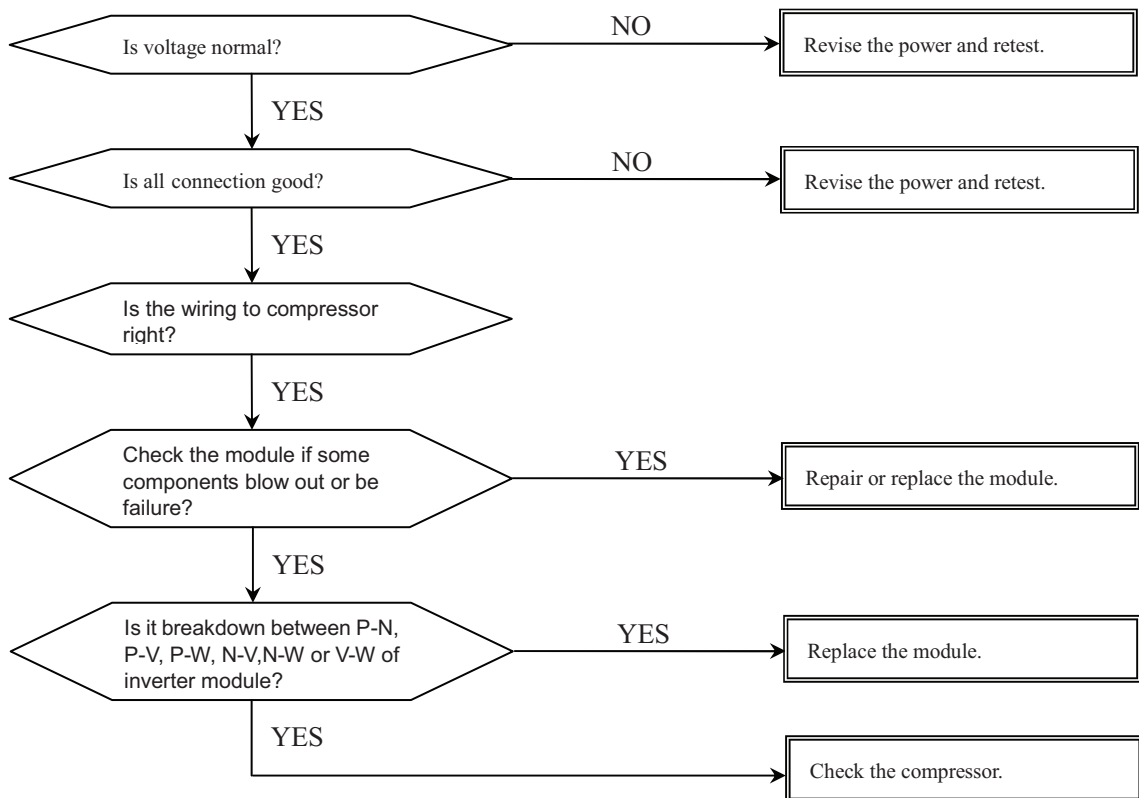
Indoor unit display	LED STATUS
E5	Outdoor units temp. sensor or connector of temp. sensor is defective



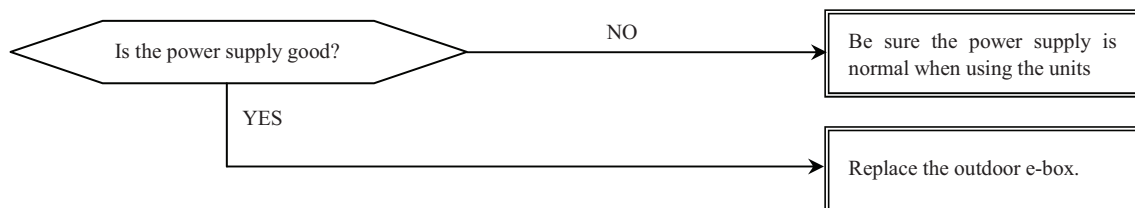
Indoor unit display	LED STATUS
E6	Indoor units temp. sensor or connector of temp. sensor is defective



Indoor unit display	LED STATUS
P0	Inverter module protection

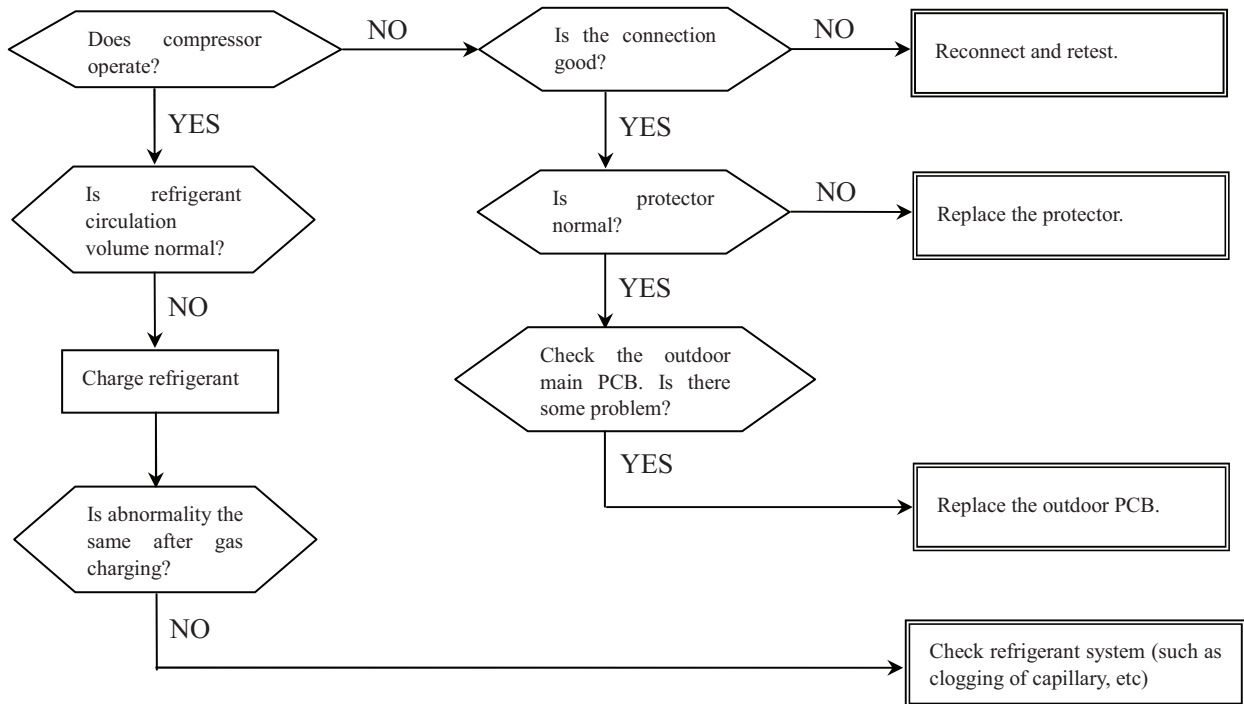


Indoor unit display	LED STATUS
P1	Outdoor voltage protection





Indoor unit display	LED STATUS
P2	Compressor top protection against temperature

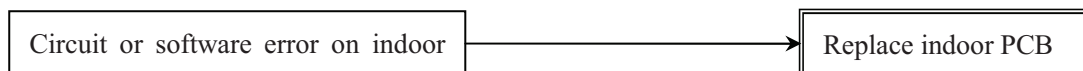


Indoor unit display	LED STATUS
P3	Compressor current protection

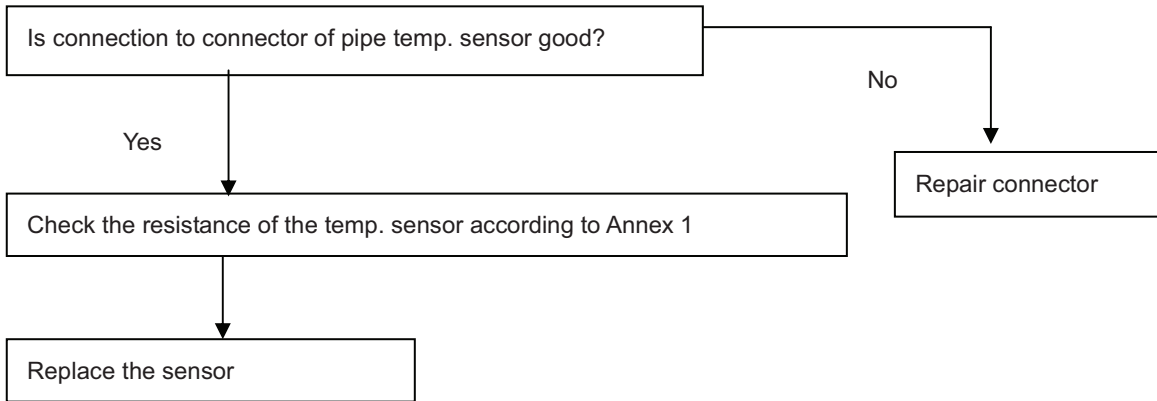
The trouble shooting is same with one of outdoor unit P3 protection.

### 8.4.1 Outdoor unit trouble shooting

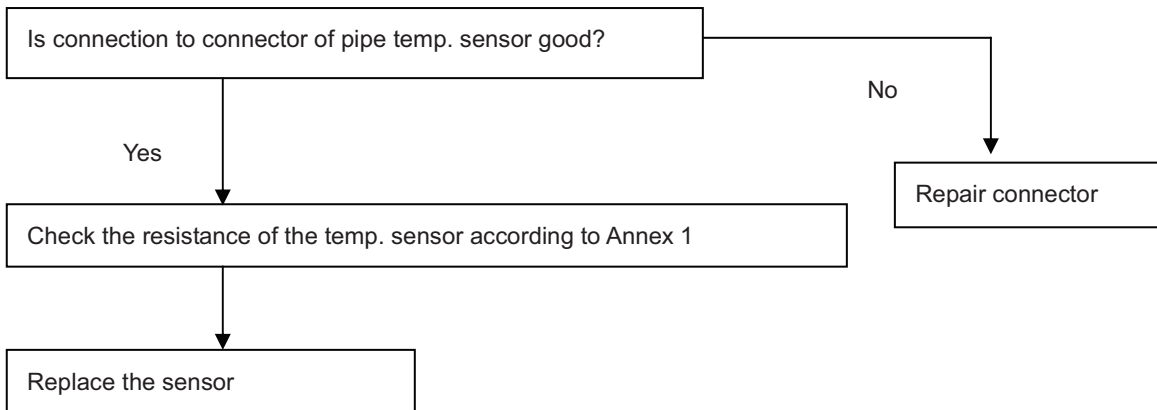
Outdoor unit display	LED STATUS
E0	EEPROM error



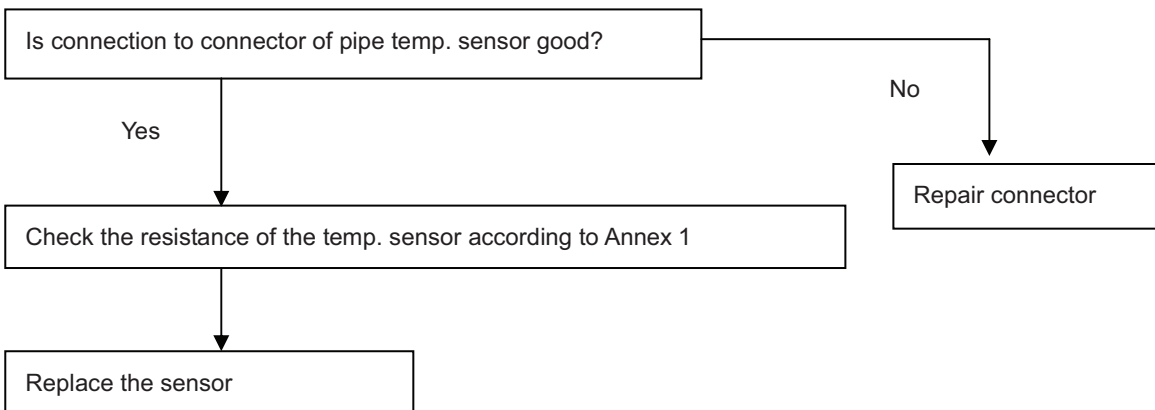
Outdoor unit display	LED STATUS
E1	#1 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective



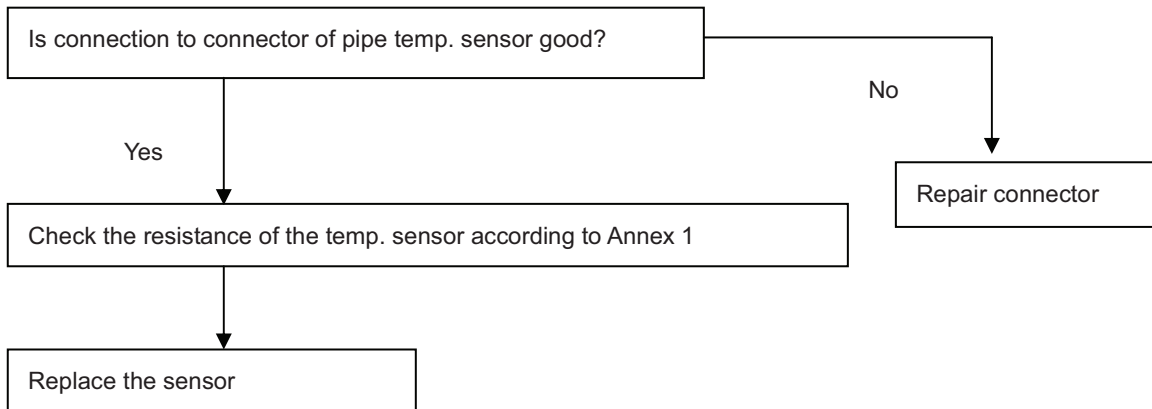
Outdoor unit display	LED STATUS
E2	#2 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective



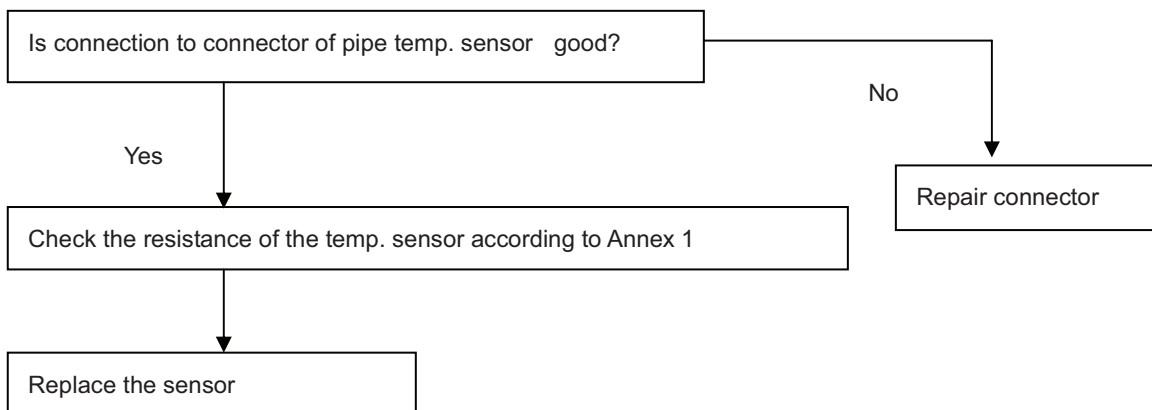
Outdoor unit display	LED STATUS
E3	#3 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective



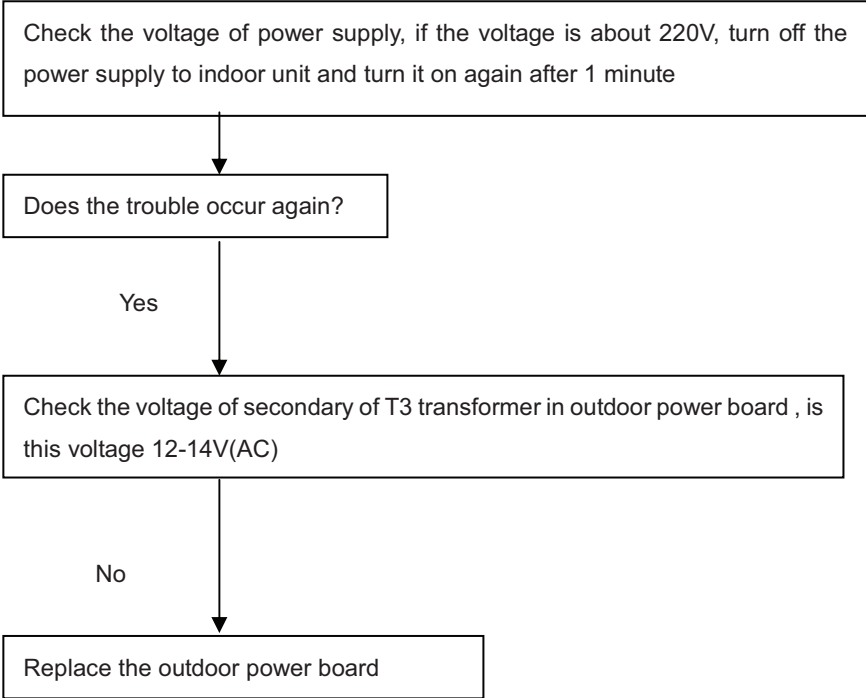
Outdoor unit display	LED STATUS
E6	#4 evaporator outlet pipe temp. sensor or connector of pipe temp. sensor is defective



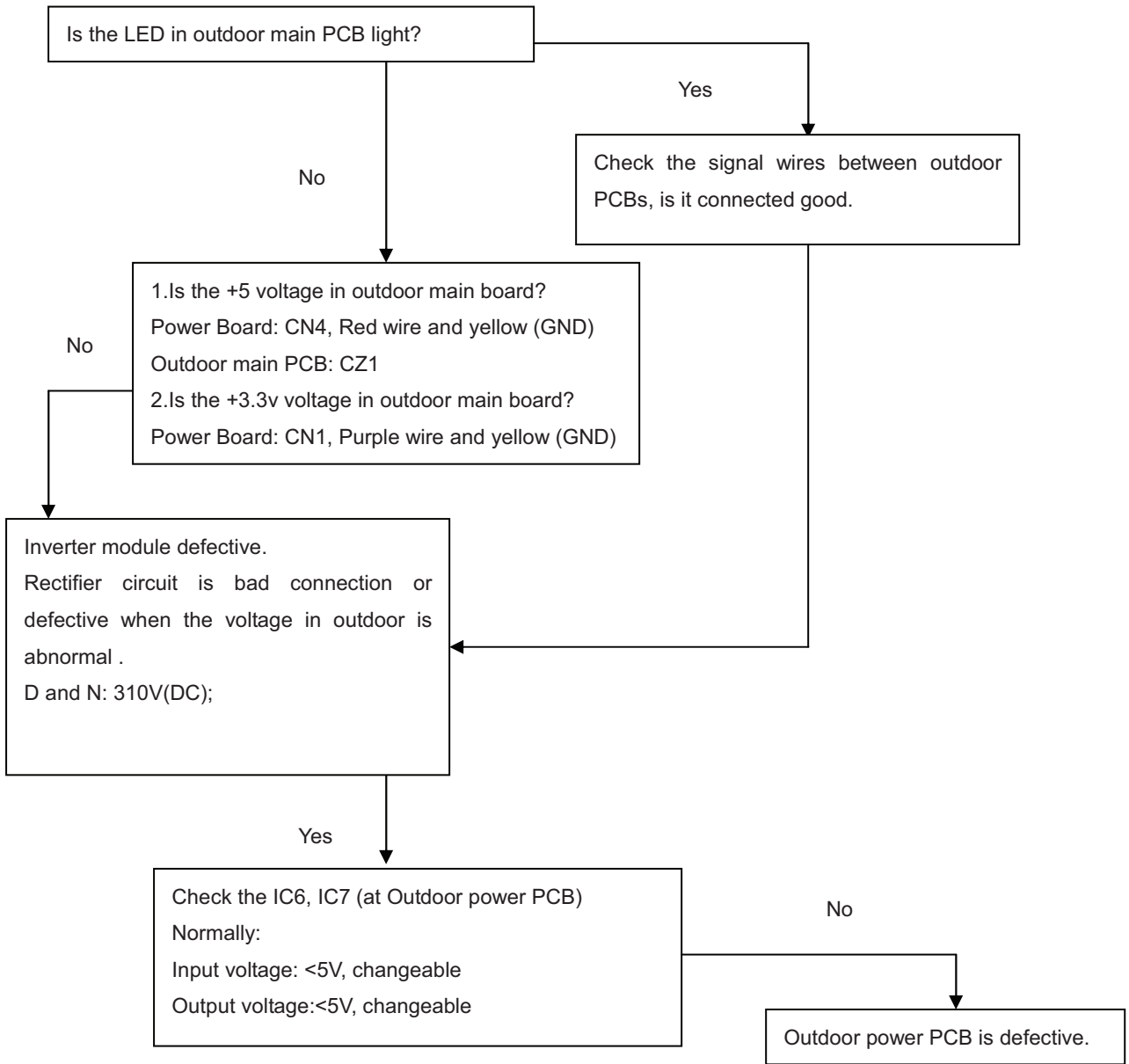
Outdoor unit display	LED STATUS
E4	Outdoor units temp. sensor or connector of temp. sensor is defective



Outdoor unit display	LED STATUS
E5	Compressor voltage protection



<b>Outdoor unit display</b>	<b>LED STATUS</b>
E7	outdoor unit communication protection



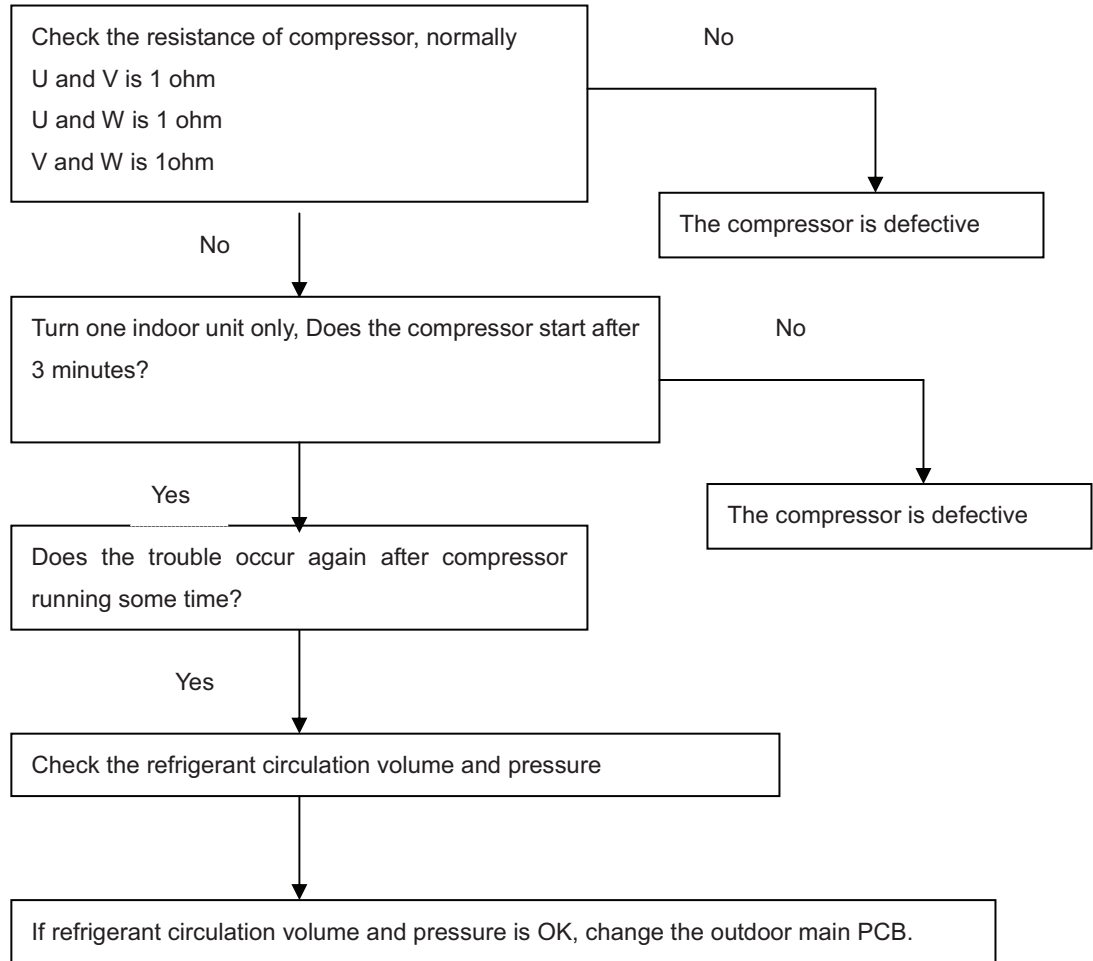
<b>Outdoor unit display</b>	<b>LED STATUS</b>
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P0	Compressor top protection against temperature
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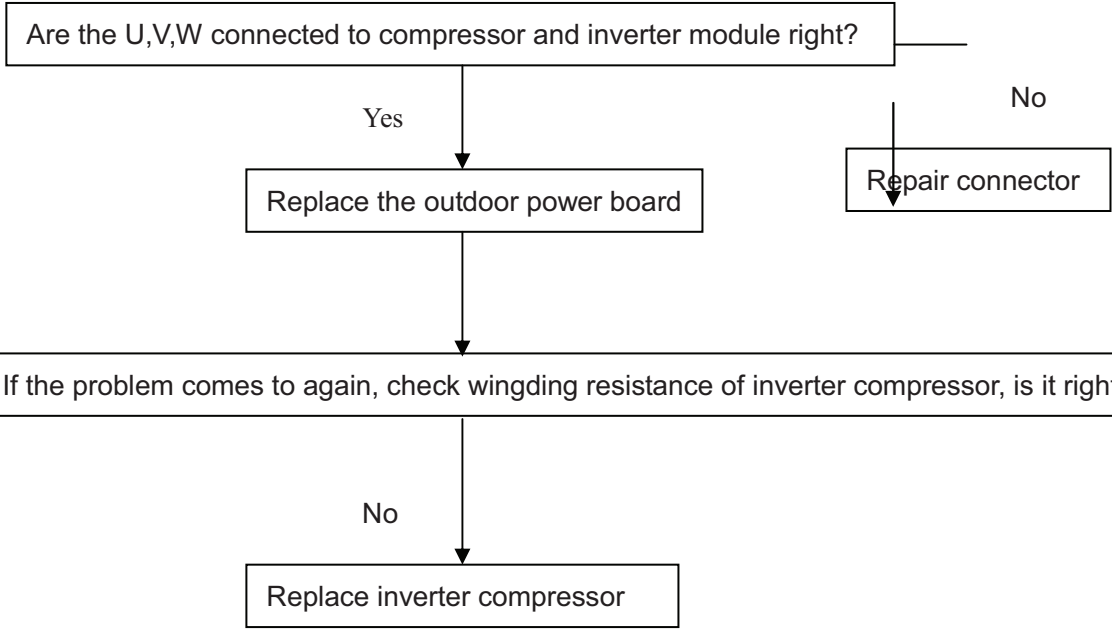
**Off: 105c; On: 90c**

The trouble shooting is same with the one of indoor unit P2 protection.

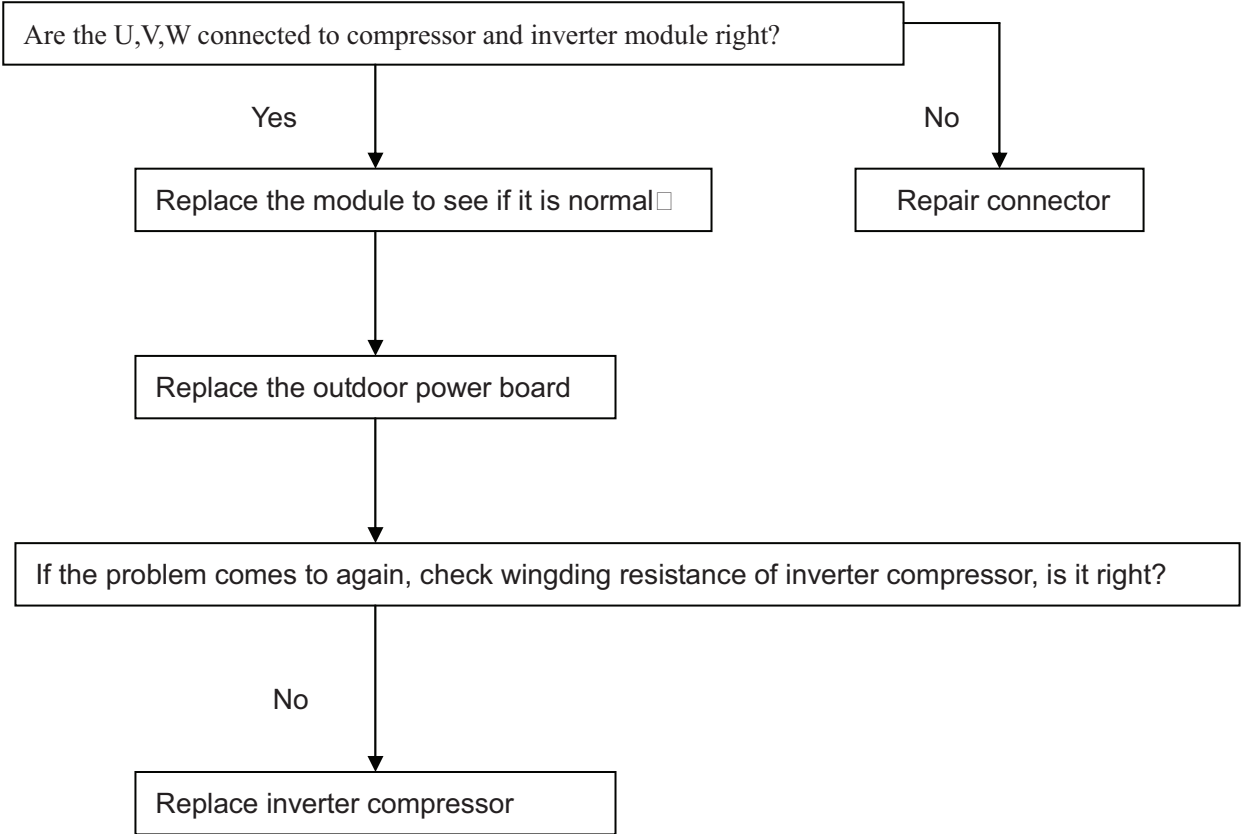
<b>Outdoor unit display</b>	LED STATUS
P3	Compressor current protection



<b>Outdoor unit display</b>	LED STATUS
P4	Compressor drive malfunction □ drive protection arose □



Outdoor unit display	LED STATUS
P4(LED flashes for nine times)	Compressor drive malfunction □ module protection arose □



Outdoor unit display	LED STATUS
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P6	Condenser high-temperature protection
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When outdoor pipe temp. is more than 65°C, the unit will stop, and unit runs again when outdoor pipe temp. less than 52°C.

