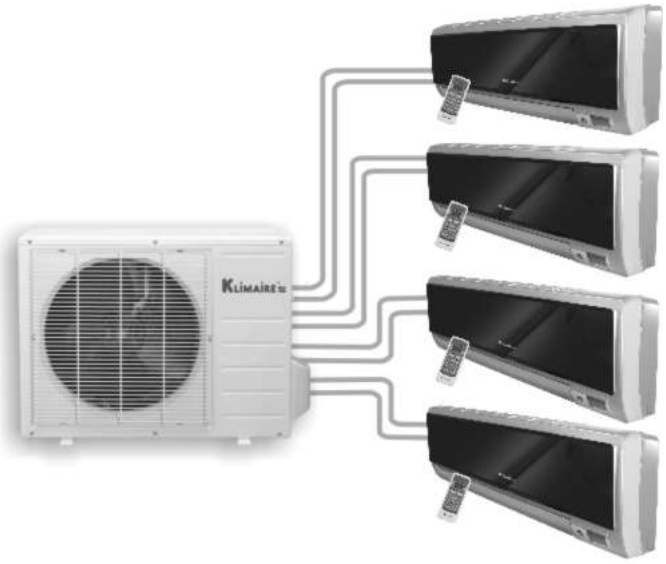
KLIMAIRE®

MULTI SPLIT TYPE, HEAT PUMP AIR CONDITIONERS



Technical service manual 2009

KSIM MULTI ZONE SERIES

R410A DC Inverter multi Series

Models

KSIM20912-H216

KSIM30912-H216

KSIM40912-H216

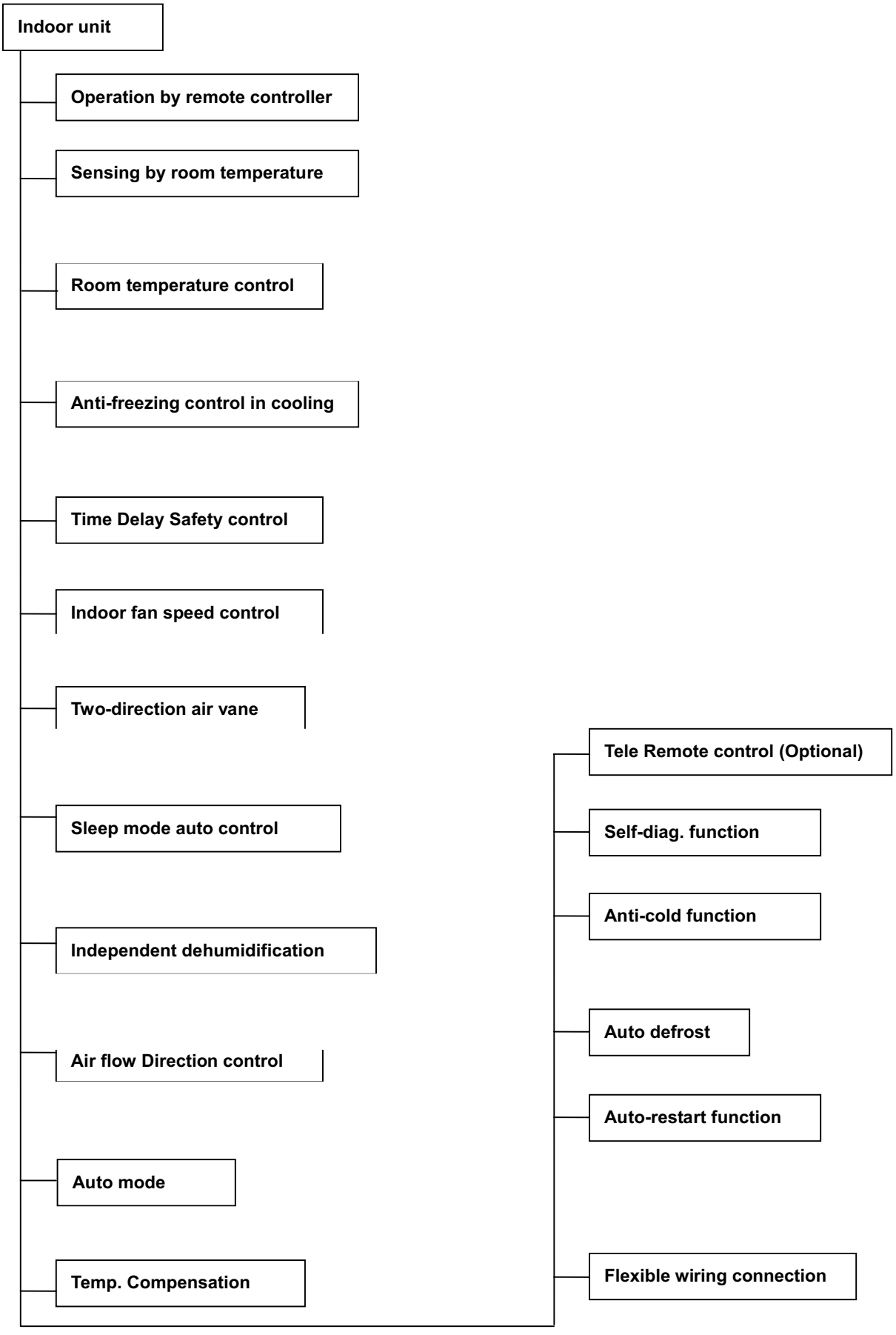
CONTENT

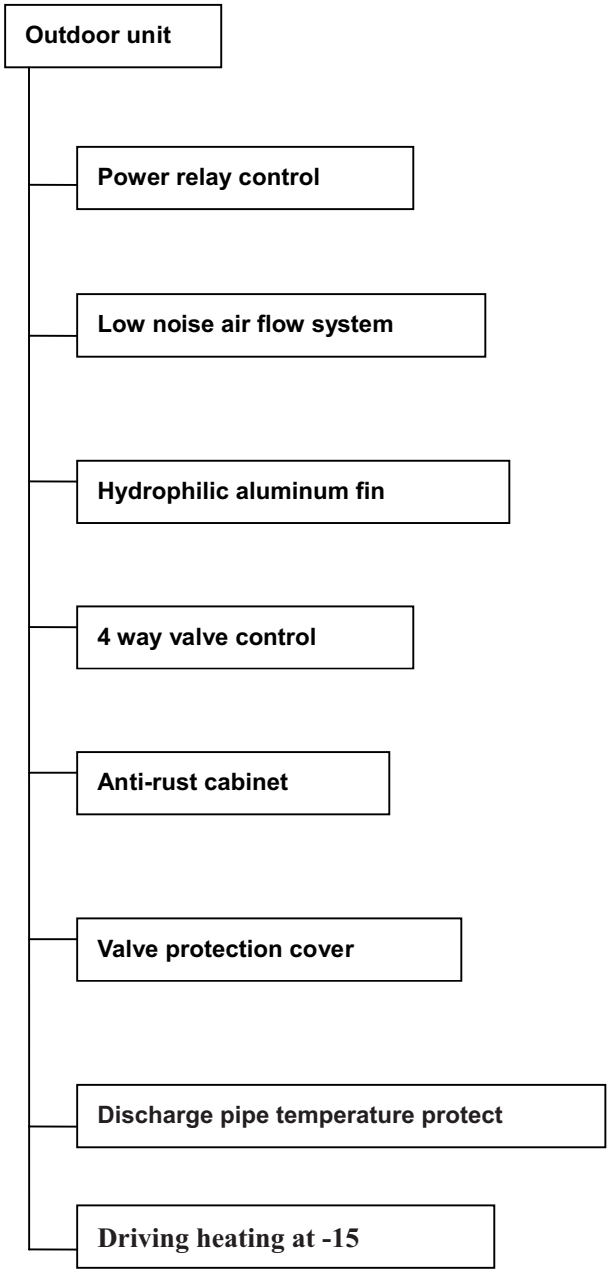
1. Product features
2. Dimensions
3. Refrigeration cycle diagram
4. Operation limits
5. Indoor unit combination
6. Wiring diagram
7. Electric control functions
8. Troubleshooting

Annex 1 Characteristic of temp. sensor

Annex 2 Reference data

1. Product features

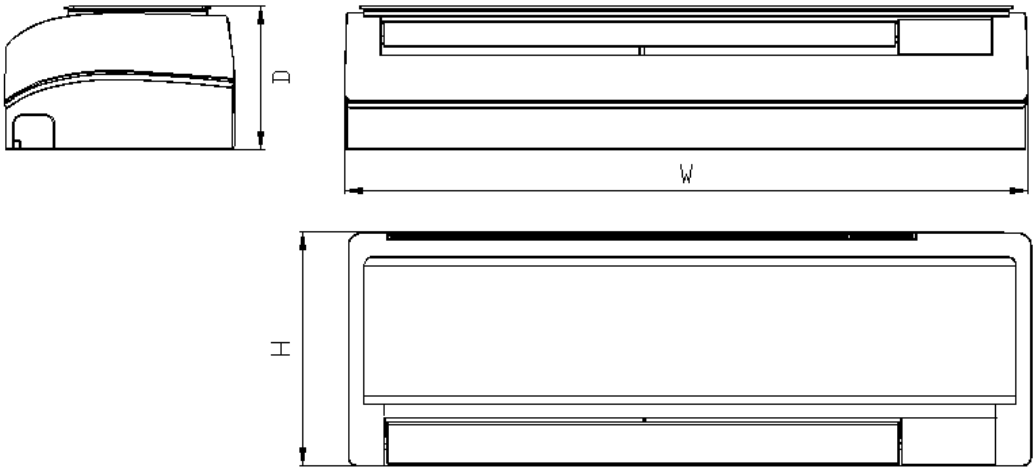



Outdoor unit
Power relay control
Low noise air flow system
Hydrophilic aluminum fin
4 way valve control
Anti-rust cabinet
Valve protection cover
Discharge pipe temperature protect
Driving heating at -15

2 Dimensions

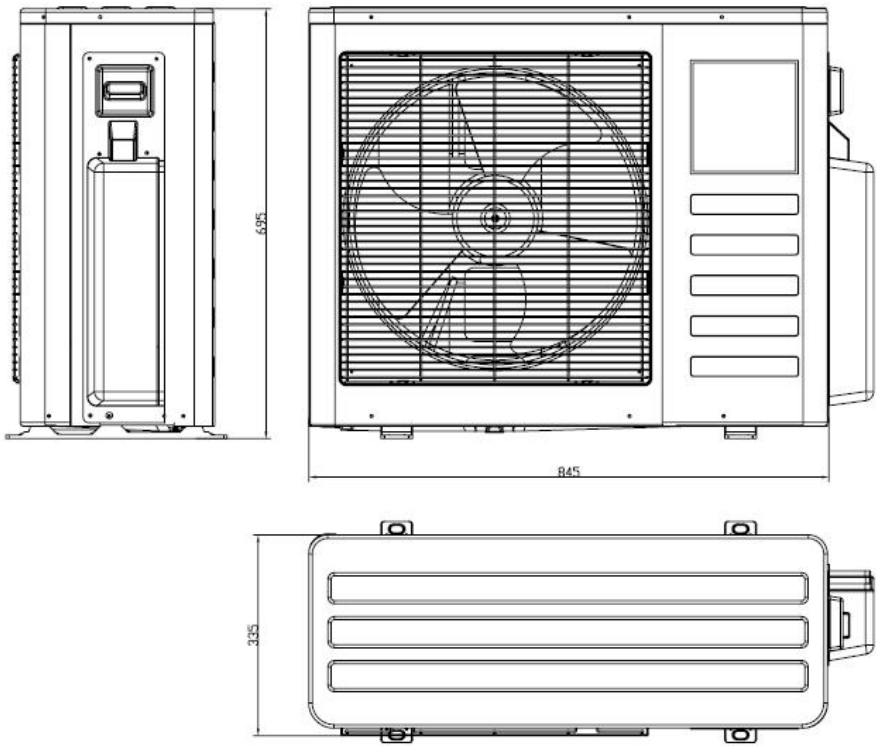
2.1 KSIM MULTIZONE Series

Indoor unit 9K&12K

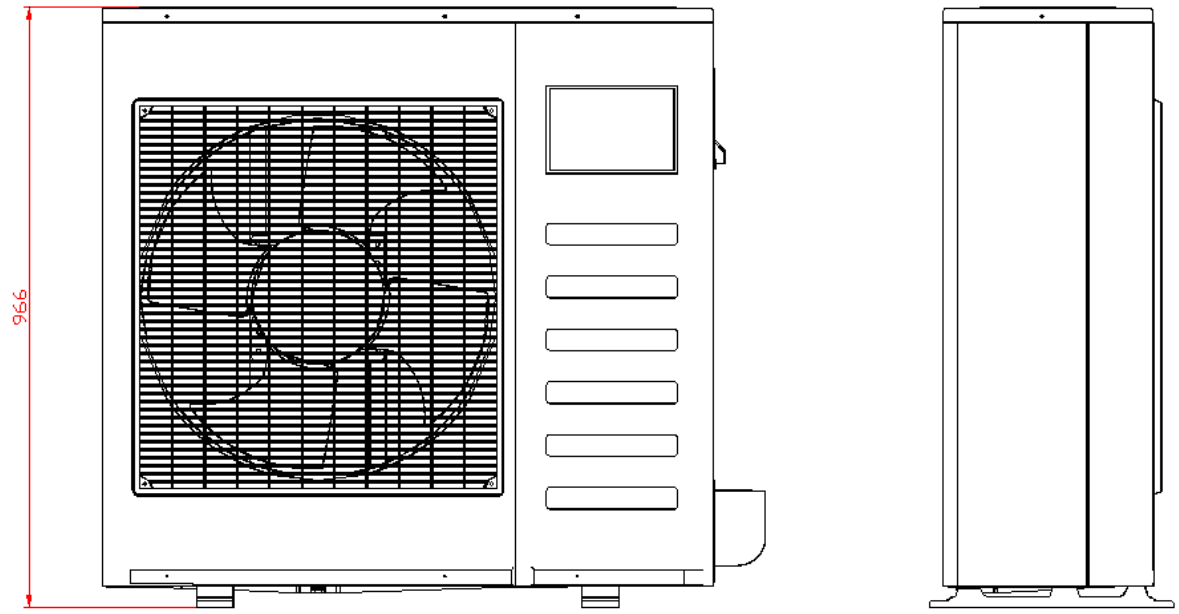


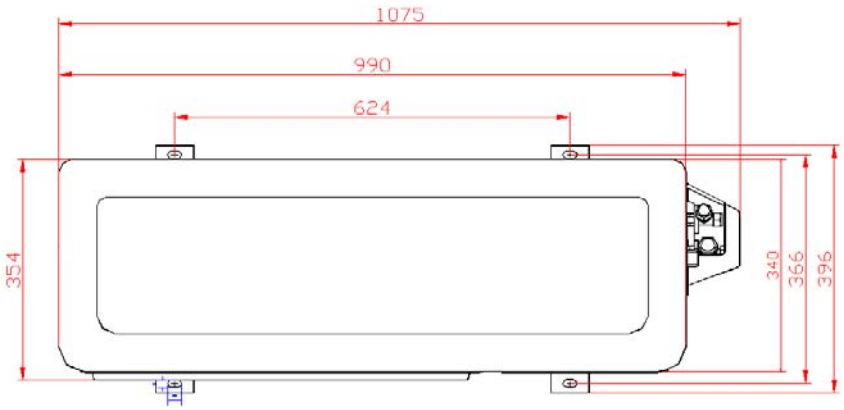
Mode \ Dimension	W	H	D
9K	795	270	165
12K	845	286	165

2.2 Outdoor unit KSIM20912-H216 , KSIM30912-H216



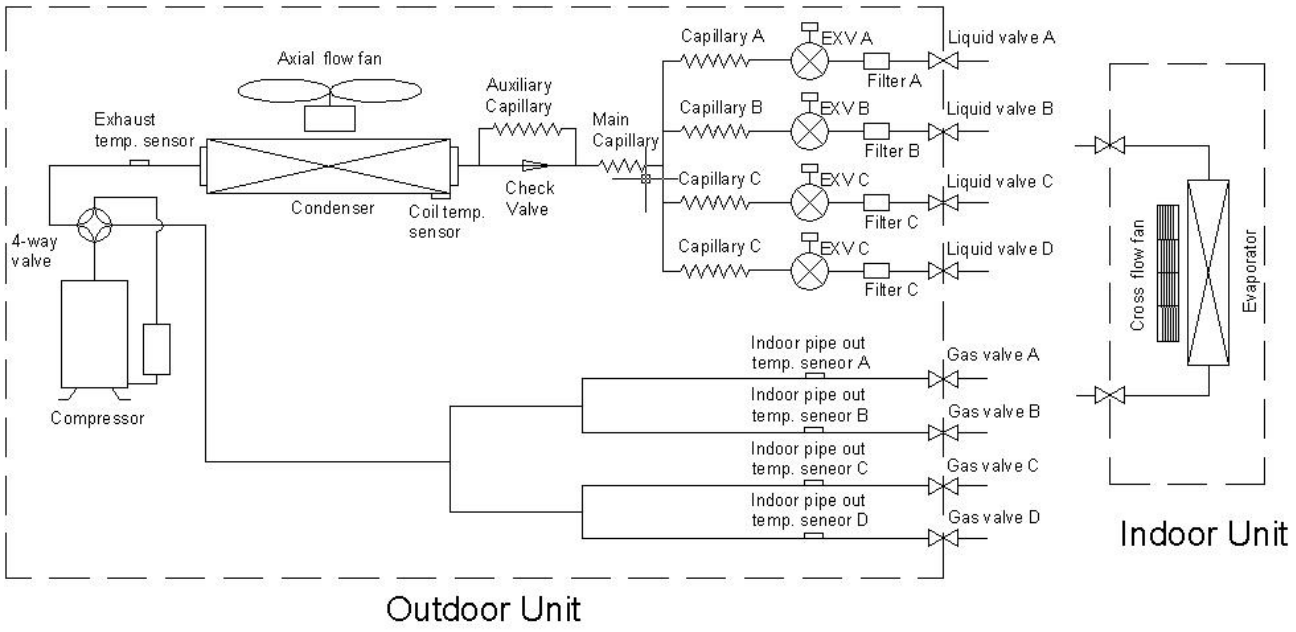
b) KSIM40912-H216



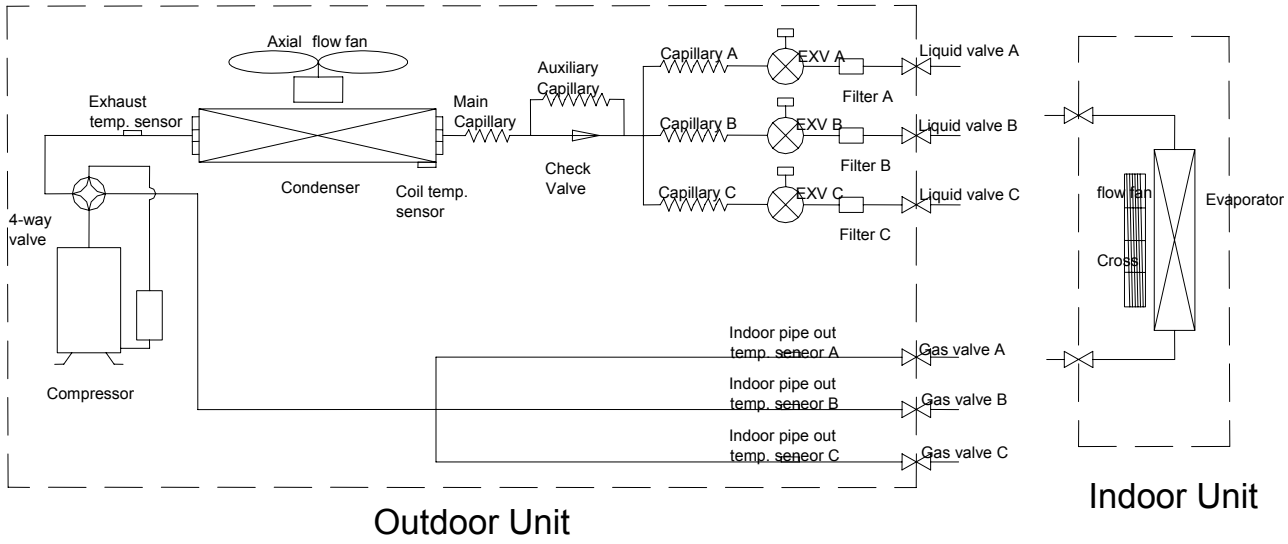


3 Refrigeration Cycle Diagram

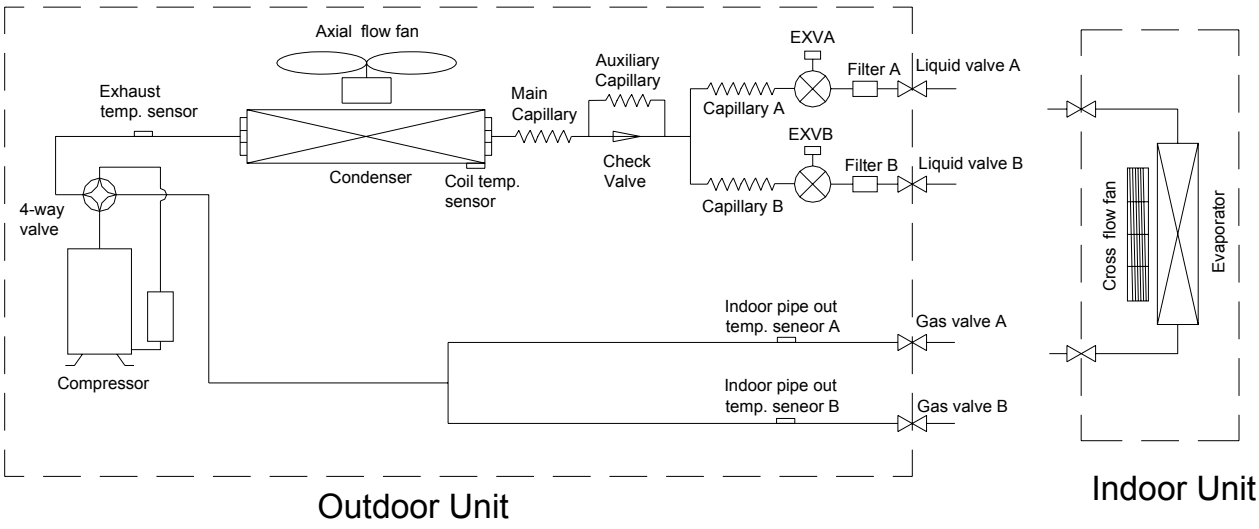
3.1 Refrigeration circuit drawing of inverter quadplex type



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	≥17□
	Outdoor temperature	0□□50□
Heating mode	Indoor temperature	≤30
	Outdoor temperature	-15□□24□
Dry mode	Indoor temperature	□10□
	Outdoor temperature	0□□43□

5. Indoor units combination

5.1 Indoor unit combination for KSIM20912-H216

One unit	Two unit	
9	9+9	9+12
12		

5.2 Indoor unit combination for KSIM30912-H216

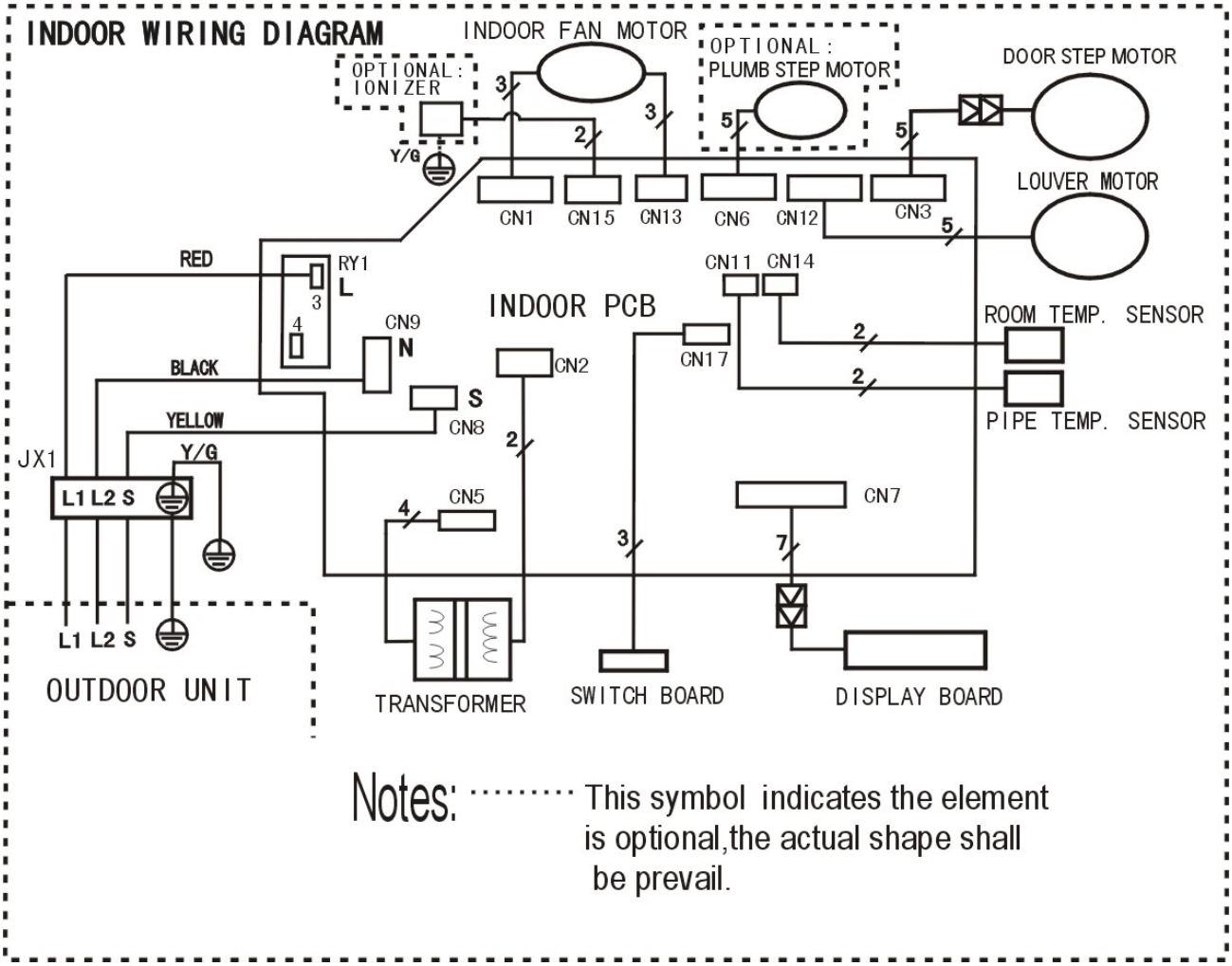
One unit	Two unit		Three unit	
9	9+9	9+12	9+9+9	9+9+12
12	12+12			

5.3 Indoor unit combination for KSIM40912-H216

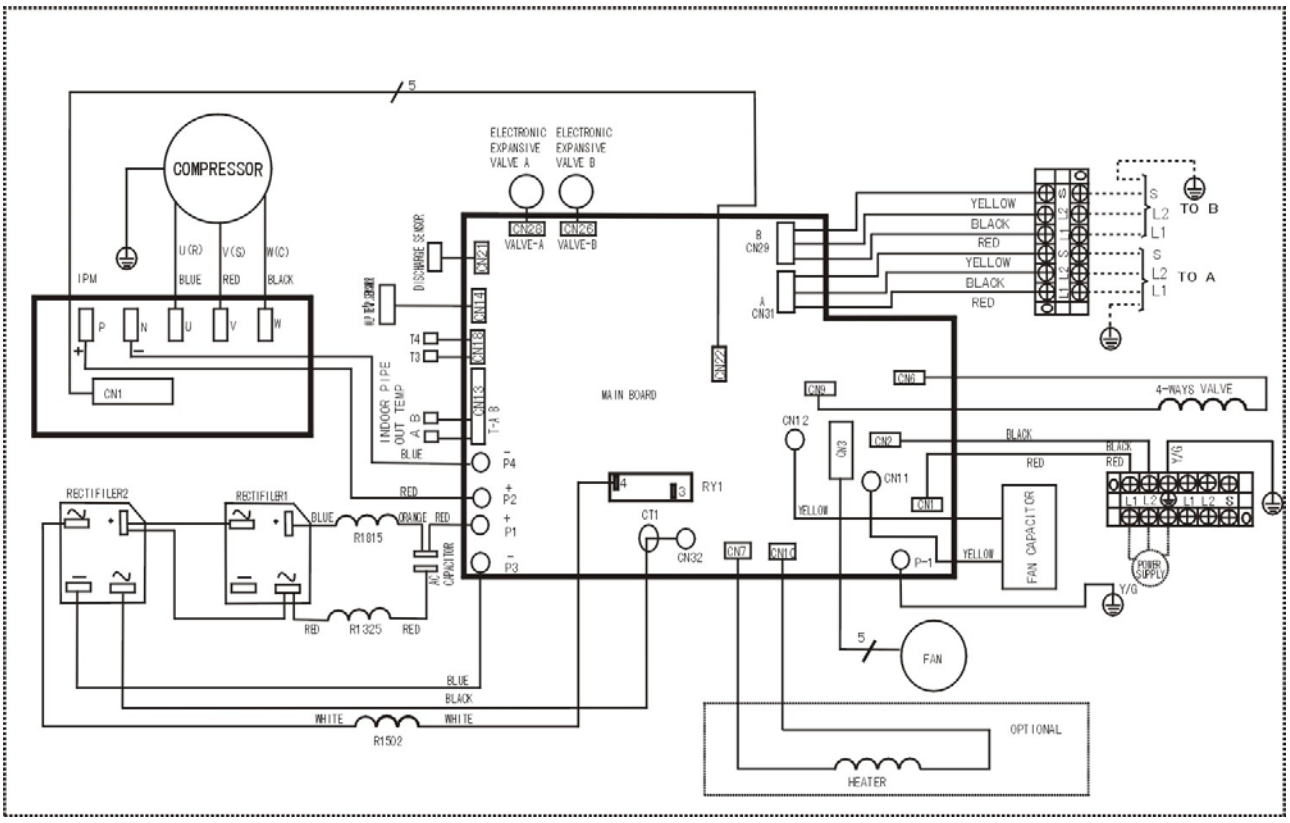
One unit	Two unit		Three unit		Four unit		
9	9+9	9+12	9+9+9	9+9+12	9+9+9+9	9+9+9+12	9+9+12+12
12	12+12		9+12+12	12+12+12			

6. Wiring Diagram

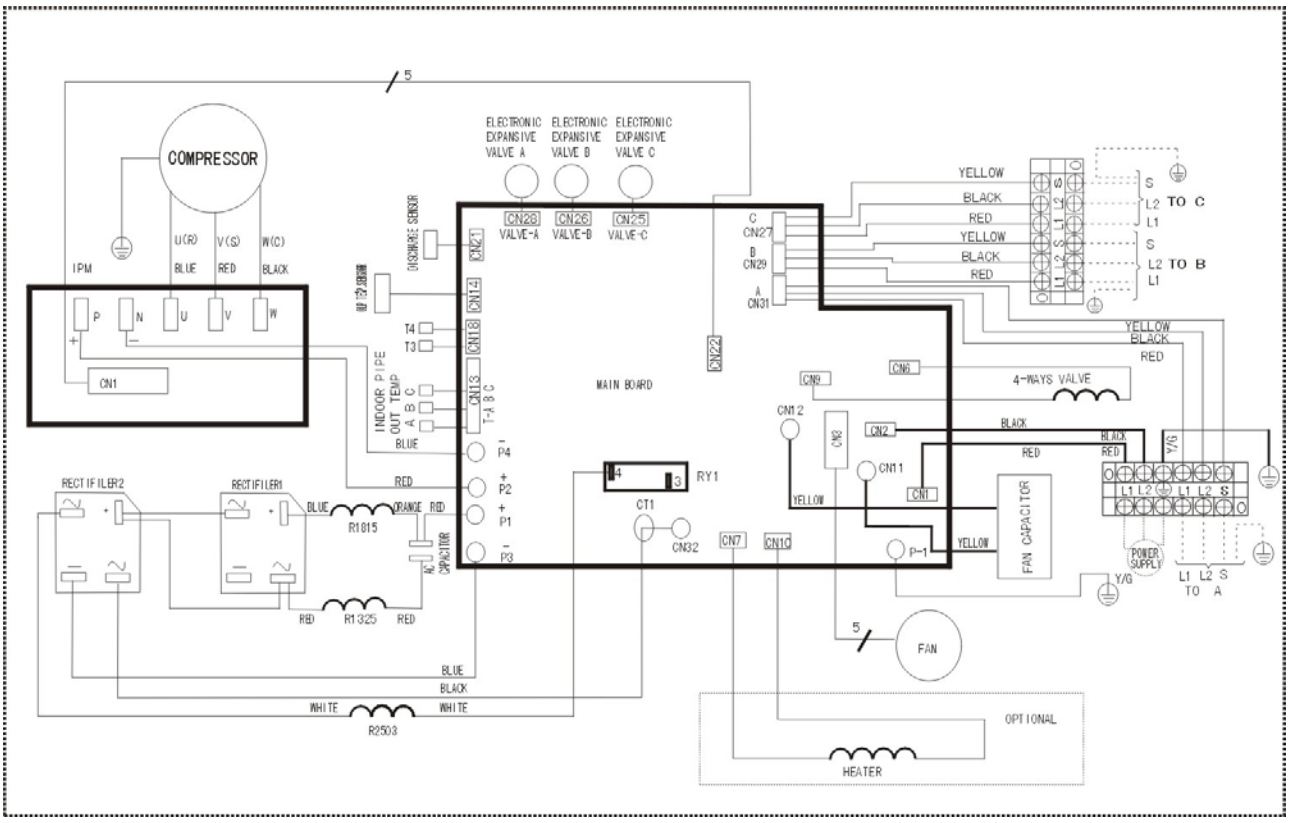
6.1 Indoor unit (9k/12k)



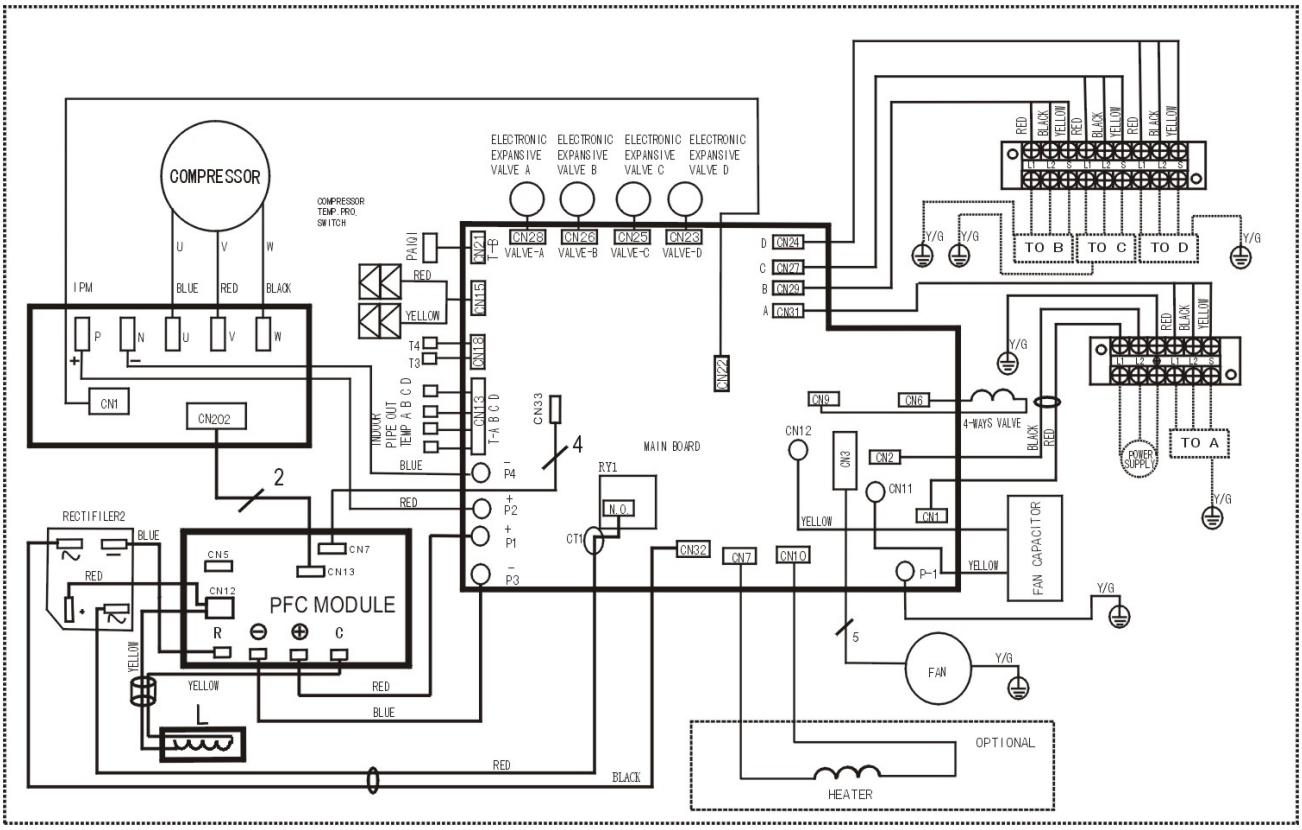
6.2 Outdoor unit (2 ZONE)



6.3 Outdoor unit (3 ZONE)



6.4 Outdoor unit (4 ZONE)

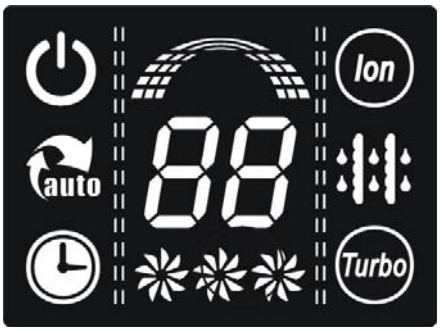


7 Electronic control function

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.



OPERRATION indicator

This indicator flashes after power is on and illuminates when the unit is in operation.

AUTO indicator

This indicator illuminates when the air conditioner is in AUTO operation.

TIMER indicator

This indicator illuminates when TIMER is set ON/OFF.

IONIZER (CLEAN AIR) indication lamp

Lights up when CLEAN AIR feature is activated and Ionizer can generate abundant anions to fill the room with refreshing and natural air.

PRE-DEF. indicator

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

TURBO indication lamp

Lights up when select TURBO function on cooling operation or on heating operation.

FREQUENCY indicator

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

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. When the unit stops operation, it returns to

original factory settings. The temperature indicator area will display “SC” when the self clean function is started.

It also displays the malfunction code or protection code.

FAN SPEED indication lamp

Displays the selected fan speed: AUTO (nothing) and three fan speed levels: LOW, MED and HIGH.

LED display control function.

Pressing “LED display” button on remote controller will turn off all displays on indoor unit, while pressing once again, all displays will resume.

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 frequency,
- In defrosting mode, The LED displays the frequency or “dF” each other for 2 seconds,
- 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	Outdoor unit DC Voltage	AD *472/255=Actual Voltage
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	The Compressor's running frequency	
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

7.4.3Number of indoor unit

Display	Number of indoor unit
1	1
2	2
3	3

7.4.4Outdoor 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		

7.4.5Current of outdoor unit

Display	Corresponding mode
60	8.0A
65	8.5A
70	9.1A
75	9.6A
80	10.1A
85	10.7A
90	11.2A
100	12.3A
110	13.4A
120	14.5A
130	15.6A
140	16.7A
150	17.9A
200	24A

7.4.6 No. 1 opening degree of electronic expansion valve:
Opening degree equals the display data times 8
7.4.7No. 2 opening degree of electronic expansion valve:
Opening degree equals the display data times 8

7.4.8No. 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 last out 10 s. compressor runs when the temp. of discharge is less than 90□.
7.5.3 When AC voltage ≤ 80V, Outdoor Unit stops operation and Outdoor LED displays "E5",. When AC voltage ≥ 100V, Outdoor Unit resumes operation.
7.5.4 Inverter module Protection , Inverter module Protection itself has a protection function against current, voltage and temperature, and Indoor LED displays "P0".
7.5.5 Sensor protection at open circuit and breaking disconnection
7.5.6 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 Indoor LED displays "E3", and can't return to normal operation automatically.
7.5.7 Cross Zero signal error warning. For If there is no Cross Zero signals in 4 minutes, the unit stops and Indoor LED displays "E2", and can't return to normal operation automatically.
7.5.8 Current protection: when the current is more than 'X' A, the compressor stops. and Outdoor LED diaplays "P3" for 30 seconds, and the unit will restart after 3 minutes.
(X is 12.5A for 18K 1x2 unit, is 14.5A for 27K 1x3 unit and is 20A for 36K 1x4 unit.)
7.5.9 Outdoor condenser high temperature protection: Under cooling mode, if T3>65□ for 3 seconds, the compressor will stop. When T3<52□, the protection is not valid. And the unit will restart after 3 minutes.
7.5.10 Pressure protection (just be available for 36K 1x4 unit): If low pressure is lower 21Psig, the compressor will stop and when low pressure is higher than 44Psig, the compressor will restart. If high pressure is higher than 630Psig, the compressor will stop and when high pressure is lower than 460Psig, the compressor will restart.
7.5.11 Compressor pre-heating function: When the outdoor temperature is lower than 3□ and the compressor stops operation, 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:
7.7.2Auto fan at cooling mode: (T=Indoor Temp.-Setting Temp.)

	Condition	Indoor fan speed
Room temp. up	T<1.5□	Low
	1.5□<T<3.5□	Mid.
	T>3.5□	High
Room temp. down	T> 3□	High

	1□<T<3□	Mid.
	T<1□	Low

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

	Evaporator Temp.	Compressor
	T< 4□	Off
	T > 8□	On

7.8 Dehumidifying mode

7.8.1the indoor fan is fixed in low speed

7.8.2Low room temperature protection:

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

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

7.9Heating mode

7.9.1Indoor 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□	Off
	34□<T<37□	Breeze
	37□<T<44□	Low speed
	T> 44□	Setting fan speed
Indoor exchanger temp. down	T> 38□	Setting fan speed
	33□<T<38□	Low speed
	24□<T<33□	Breeze
	T<24□	Off

7.9.2Auto wind at heating mode

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Room temp. up	T<1.5□	High
	1.5□<T<2.5□	Mid.
	T>2.5□	Low
Room temp. down	T<1.0□	High
	1.0□<T<2.0□	Mid.
	T>2.0□	Low

7.9.3Indoor evaporator high-temperature protection at heating mode

Condition T= Indoor exchanger temp.	Compressor
T>63□	Off
T<48□	On

.

Defrosting operation (Available for heating only)

7.10 Defrost

7.10.1Defrosting condition:

The temperature of outdoor heat exchanger remains consecutively lower than -2°c for more than 40 minutes,

7.10.2Ending condition of defrosting

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

a. The defrost time has reached to 10 minutes.

b. When the temperature of outdoor heat exchanger rises up to 15°C

7.10.3Defrosting Actions:

a. Compressor runs.

b. 4 way valve switches off,

c. Outdoor fan switches off

d. Indoor fan running according to anti-cold wind function in heating mode.

7.11Automatic 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). The temp. can be adjusted between 17-30°C by remote controller.

TA—TS	Operation mode
TA—TS>1□	Cooling
-1□≤TA-TS≤+1□	Fan-only
TA-TS<-1□	Heating

7.12Manual switch

7.12.1Mode changes when push this button .

Cooing mode→ Auto mode→Unit off→ Cooing mode

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

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

7.13Timer Function

7.13.1The maximum length of timer is 24 hours.

7.13.2Timer on: the A/C will be automatically on at the set time.

7.13.3Timer off: the A/C will be automatically off at the set time

7.13.4Timer on/off function: if Timer on & Timer off functions have been set at the same time, the A/C will act on which the timer achieves earlier.

.

7.14Sleep mode

7.14.1It 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, and the unit turns off.

7.14.6 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.

7.15 Mode conflict

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

Heating mode has a priority.

7.15.1Definition

	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

7.15.2 Unit action

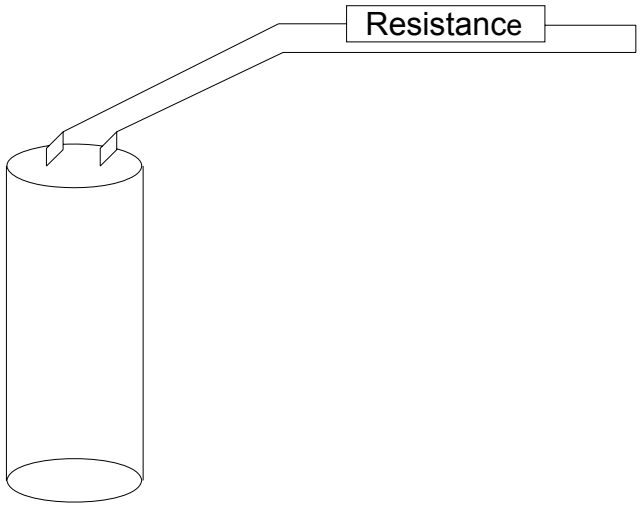
- In case of one Indoor unit working in cooling mode or fan mode, and another indoor unit is set to heating mode, the indoor unit working in cooling mode or fan mode will change to stand by. The outdoor unit will work in heating mode.
- In case of one Indoor unit working in heating mode, and another 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 too low protection
P2	Compressor discharge temp. protection
P3	Outdoor temp. too low protection
P4	Compressor driving protection

8.3 LED error code display for outdoor unit

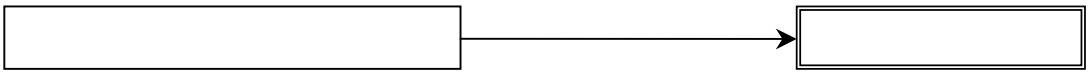
Display	LED STATUS
E0	EEPROM error
E1	No 1 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective

E2	No 2 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective
E3	No 3 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective
E6	No 4 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective
E4	Outdoor temp. sensor or connector of temp. sensor is defective
E5	Compressor volt protection
E7	Communication error between outdoor IC and DSP
P0	Compressor discharge temp. protection
P1	High pressure protection (just for 36K 1x4 units.)
P2	Low pressure protection (just for 36K 1x4 units.)
P3	Compressor current protection
P4	Inverter module protection
P5	Outdoor temp. too low protection
P6	Condenser high-temperature protection
P7	Compressor driving protection
PF	PFC protection

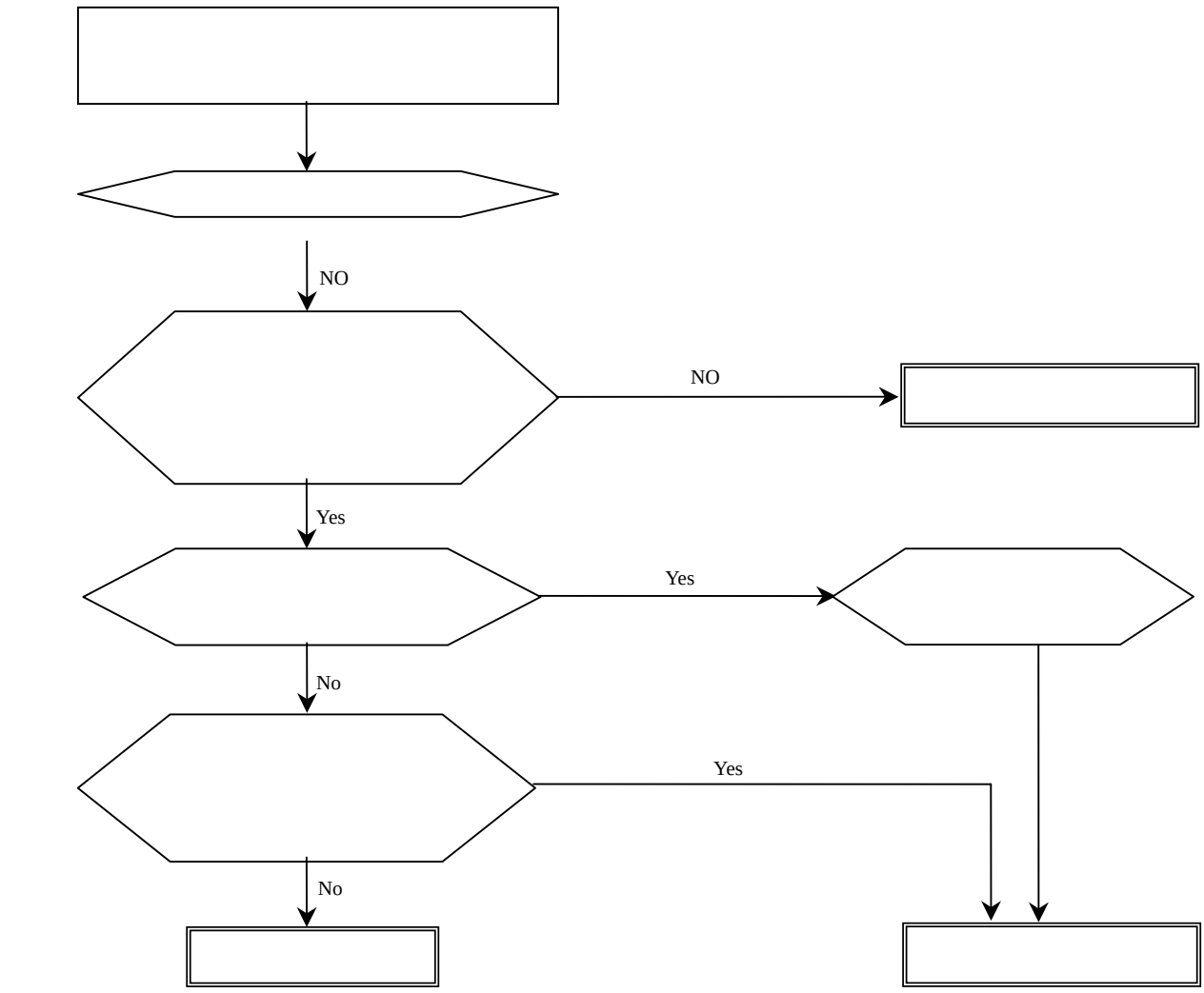
8.4 Troubleshooting

8.4.1 Indoor unit trouble shooting

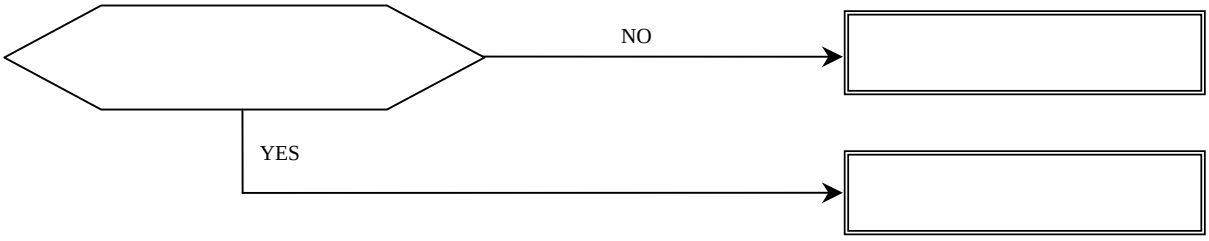
Indoor unit display	LED STATUS
E0	EEPROM error



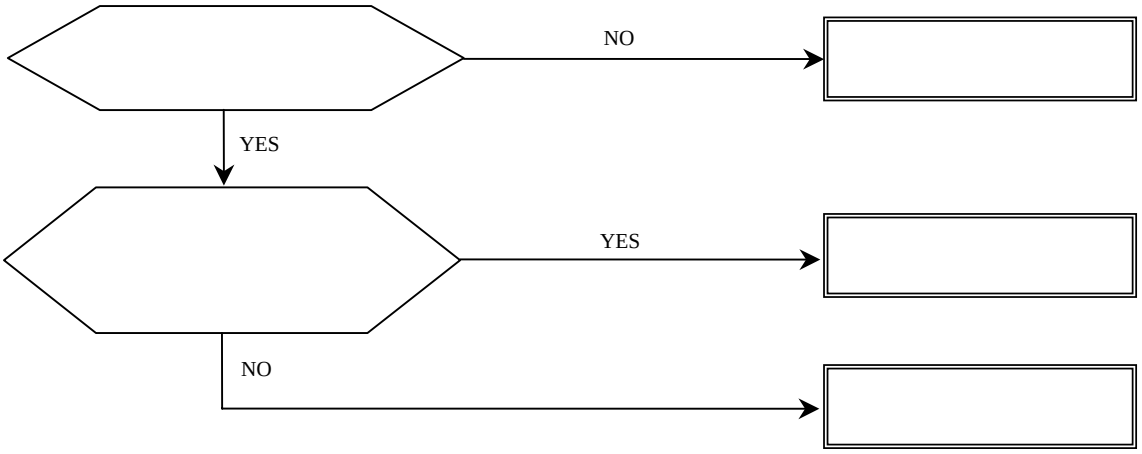
Indoor unit display	LED STATUS
E1	outdoor communication error



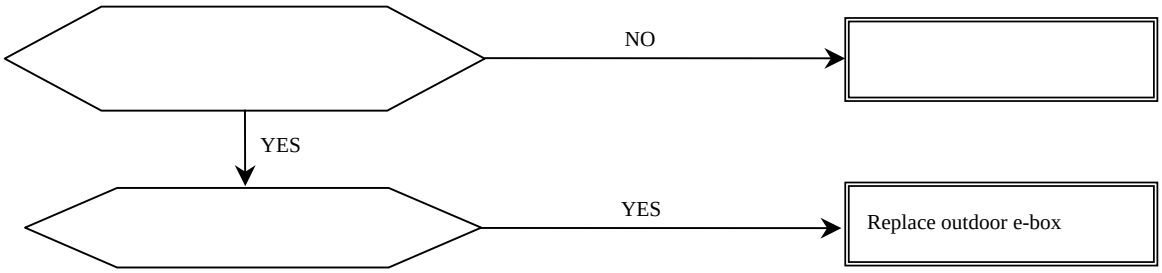
Indoor unit display	LED STATUS
E2	Zero-crossing examination error



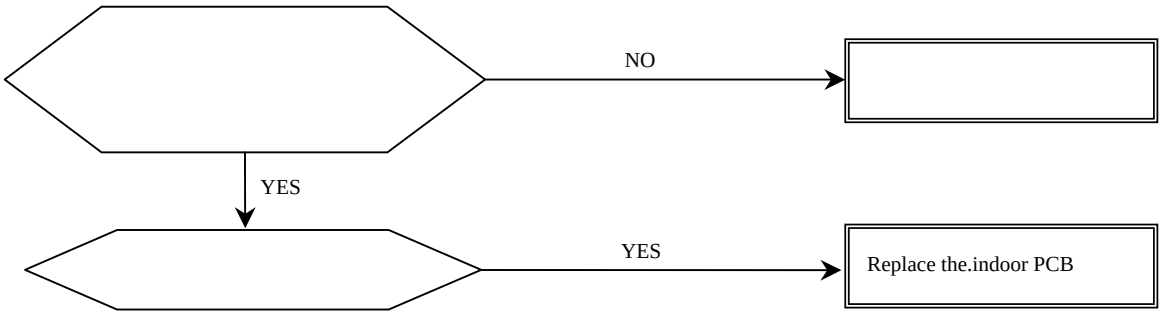
Indoor unit display	LED STATUS
E3	Fan speed beyond control



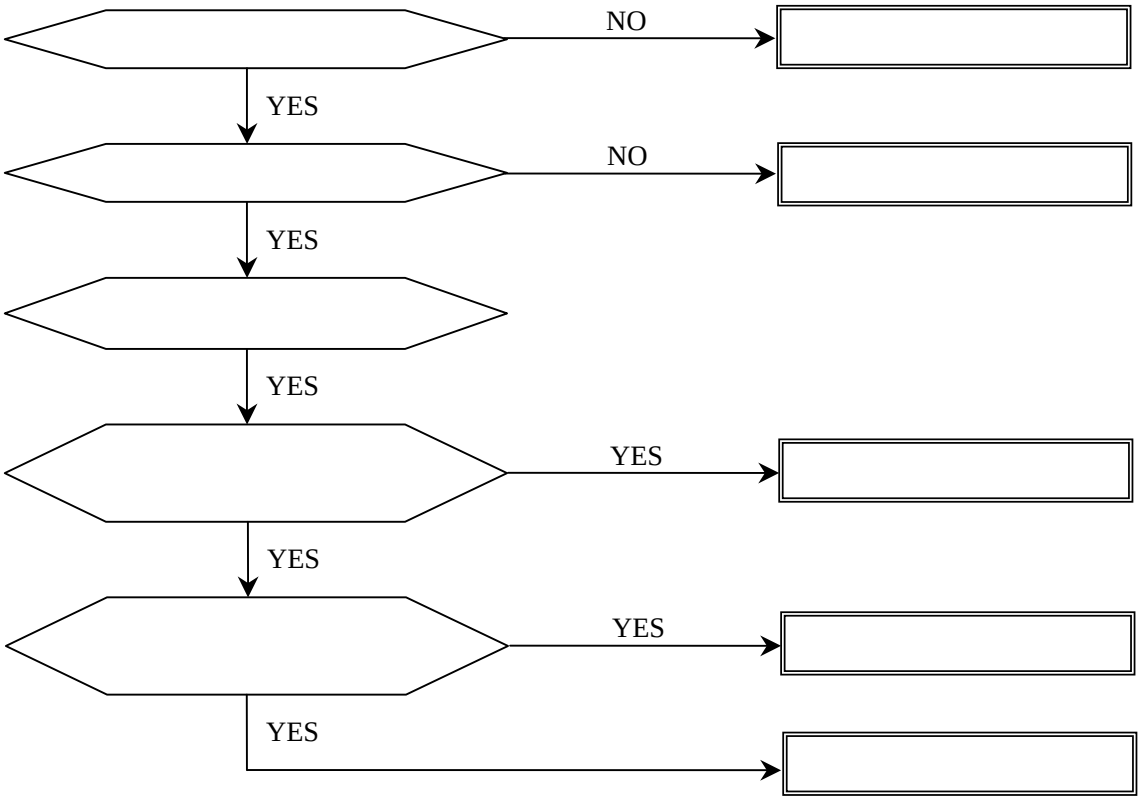
Indoor unit display	LED STATUS
E5	Outdoor units temp. sensor or connector of temp. sensor is defective



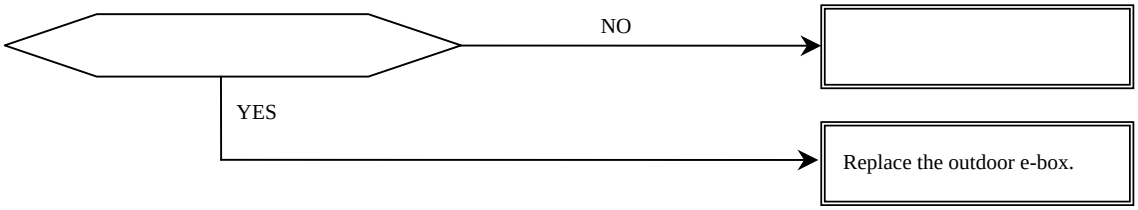
Indoor unit display	LED STATUS
E6	Indoor units temp. sensor or connector of temp. sensor is defective



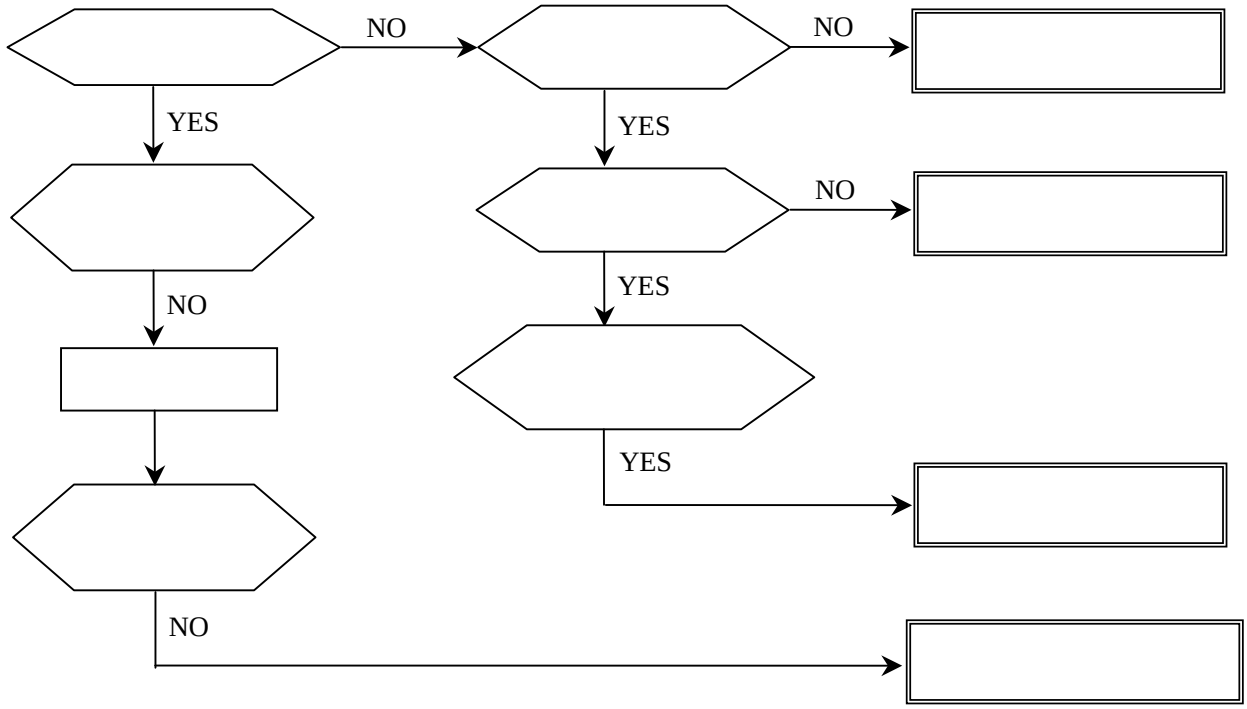
Indoor unit display	LED STATUS
P0	Inverter module protection



Indoor unit display	LED STATUS
P1	Outdoor voltage protection



Indoor unit display	LED STATUS
P2	Compressor top protection against temperature

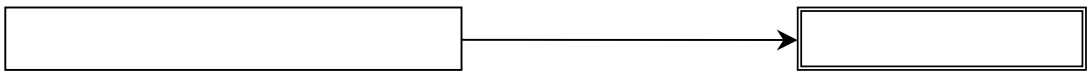


Indoor unit display	LED STATUS
P3	Compressor current protection

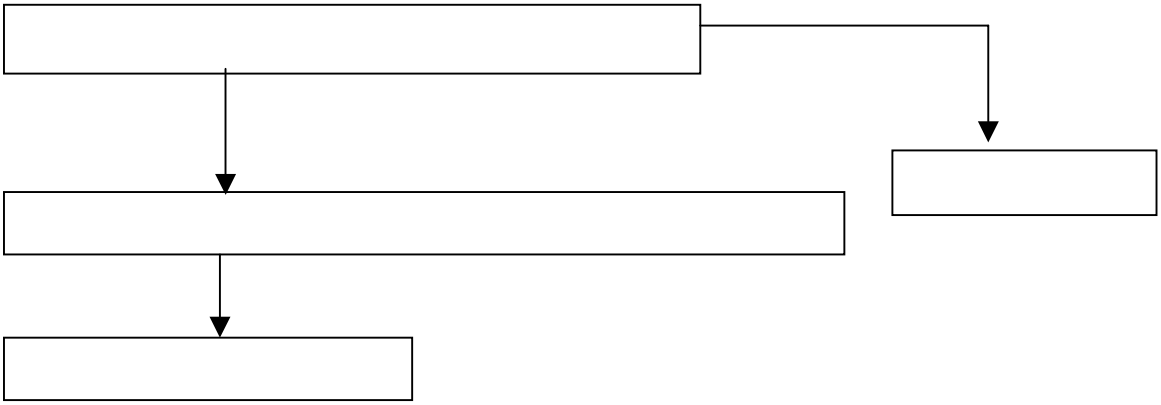
The trouble shooting is same with one of outdoor unit P3 protection.

8.4.1 Outdoor unit trouble shooting

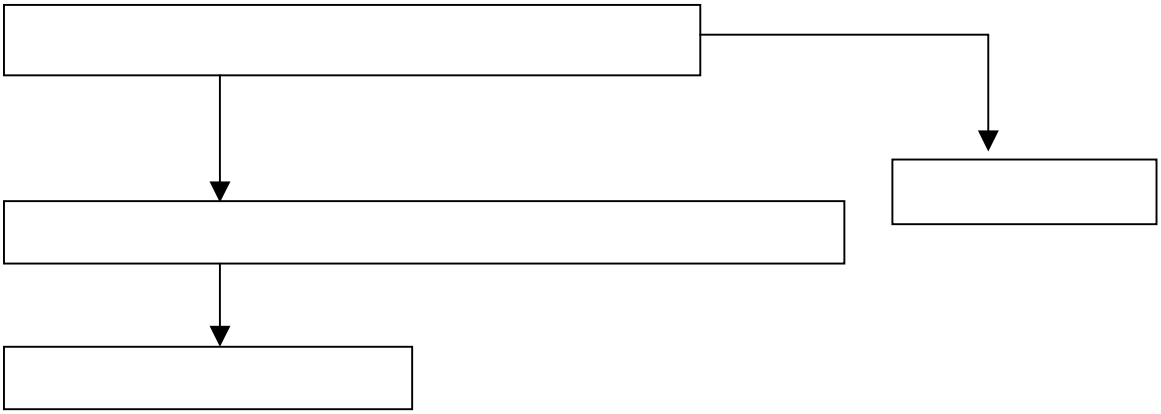
Outdoor unit display	LED STATUS
E0	EEPROM error



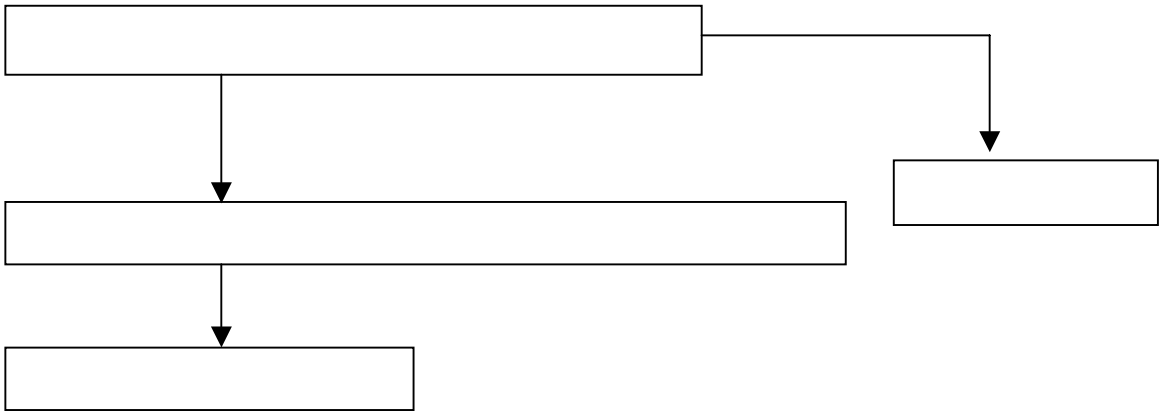
Outdoor unit display	LED STATUS
E1	No 1 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective



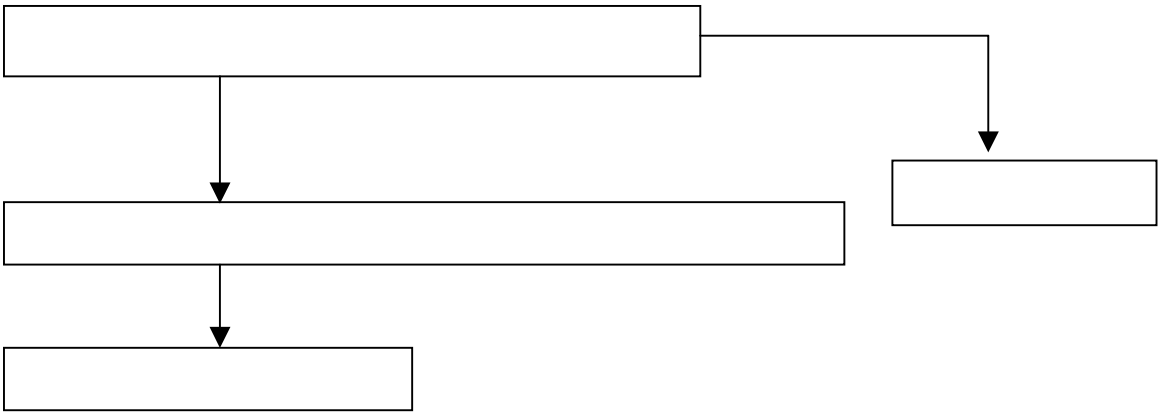
Outdoor unit display	LED STATUS
E2	No 2 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective



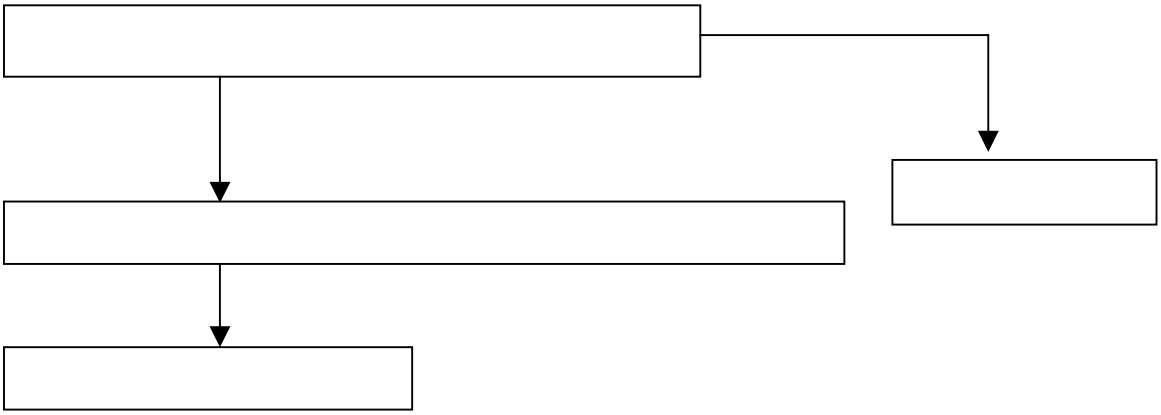
Outdoor unit display	LED STATUS
E3	No 3 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective



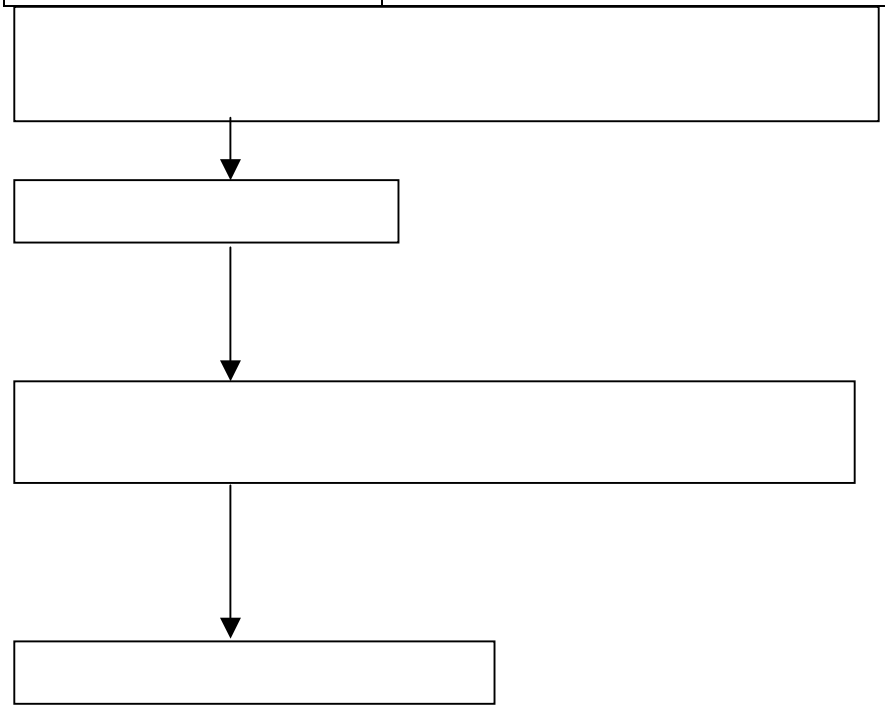
Outdoor unit display	LED STATUS
E6	No 4 Indoor units pipe temp. sensor or connector of pipe temp. sensor is defective



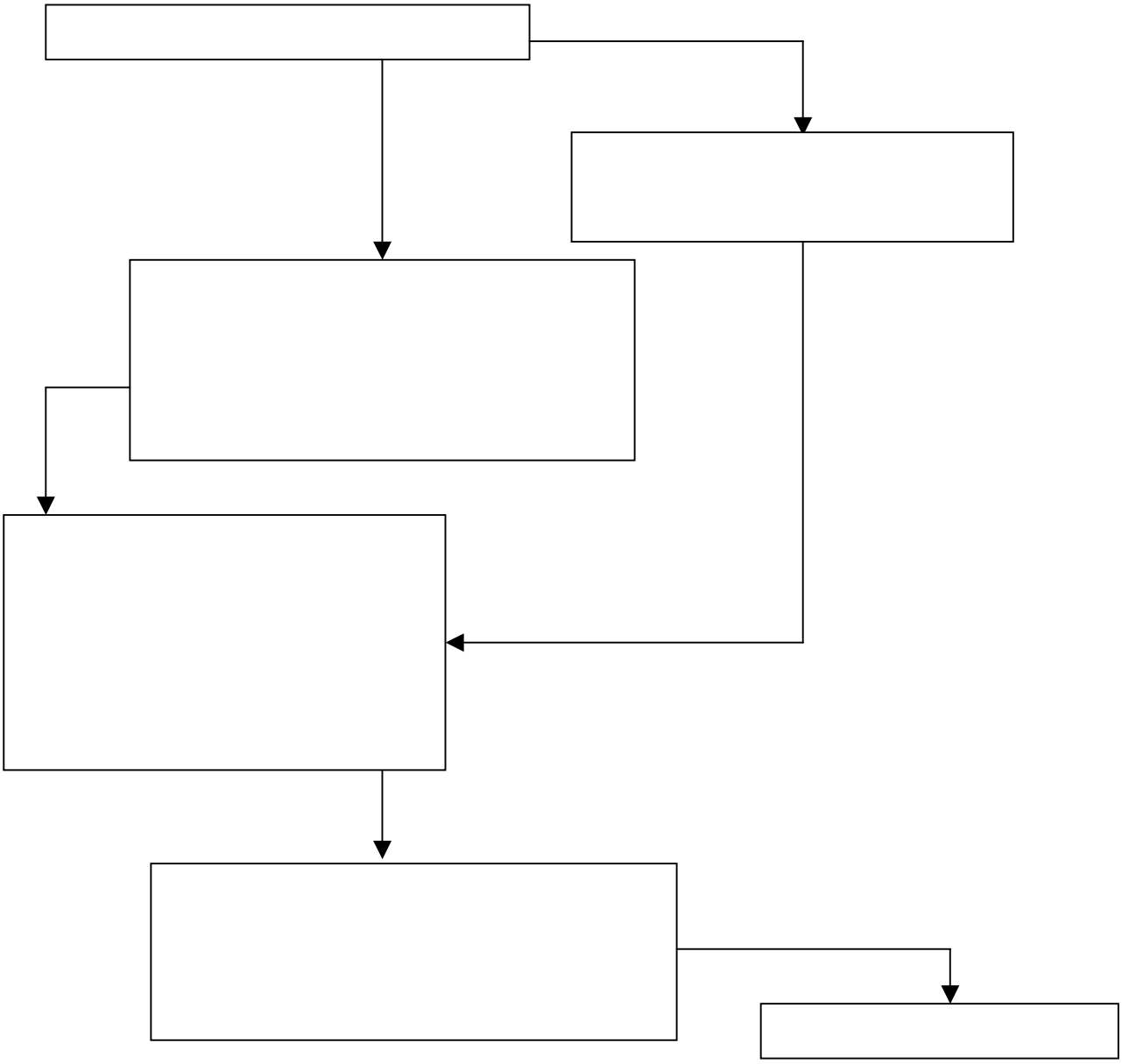
Outdoor unit display	LED STATUS
E4	Outdoor units temp. sensor or connector of temp. sensor is defective



Outdoor unit display	LED STATUS
E5	Compressor volt protection



Outdoor unit display	LED STATUS
E7	outdoor units communication protection

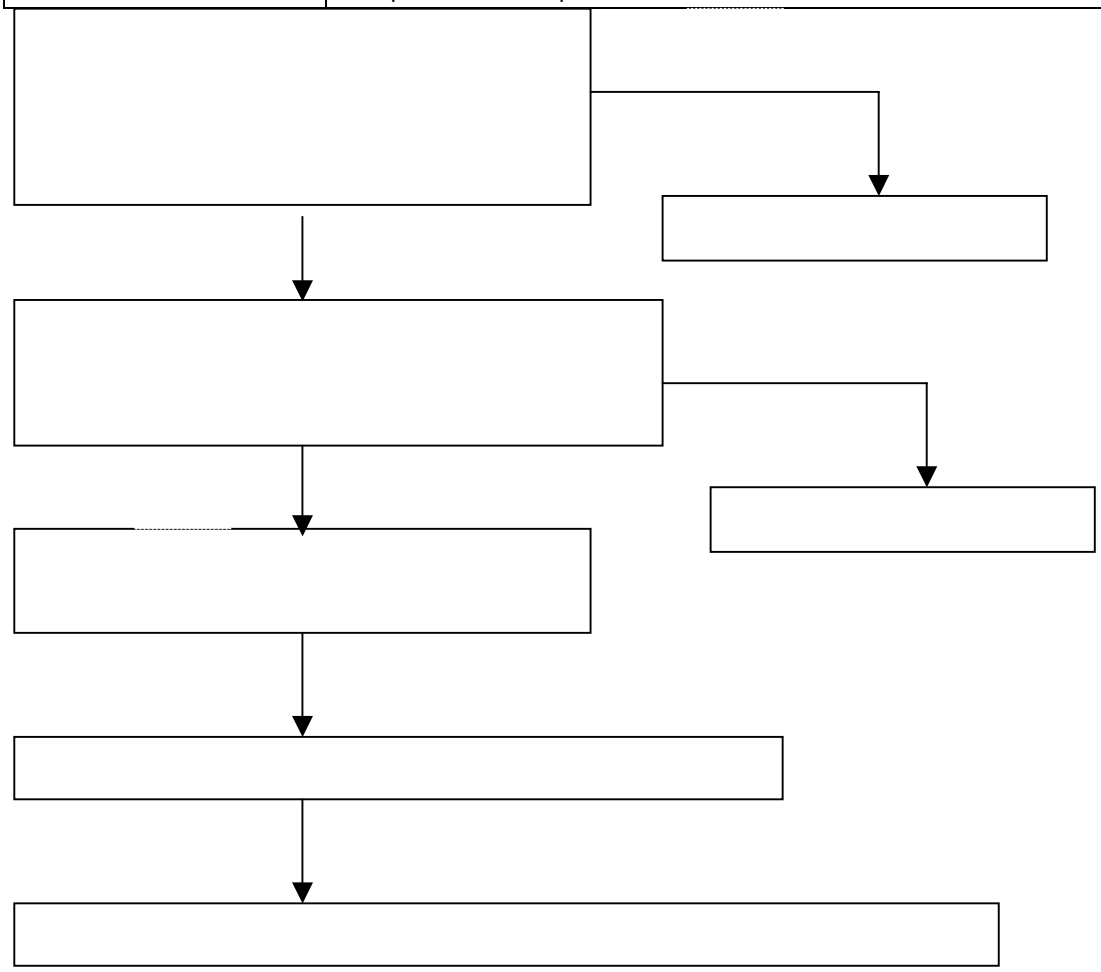


Outdoor unit display	LED STATUS
P0	Compressor top protection against temperature

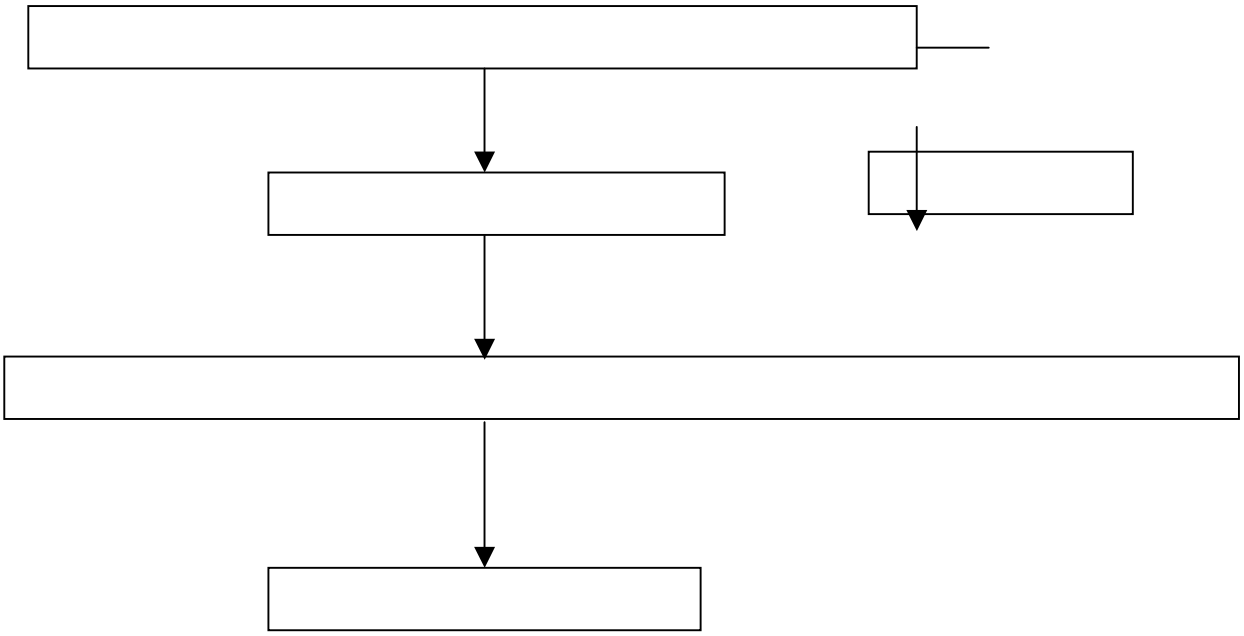
Off: 105c; On: 90c

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

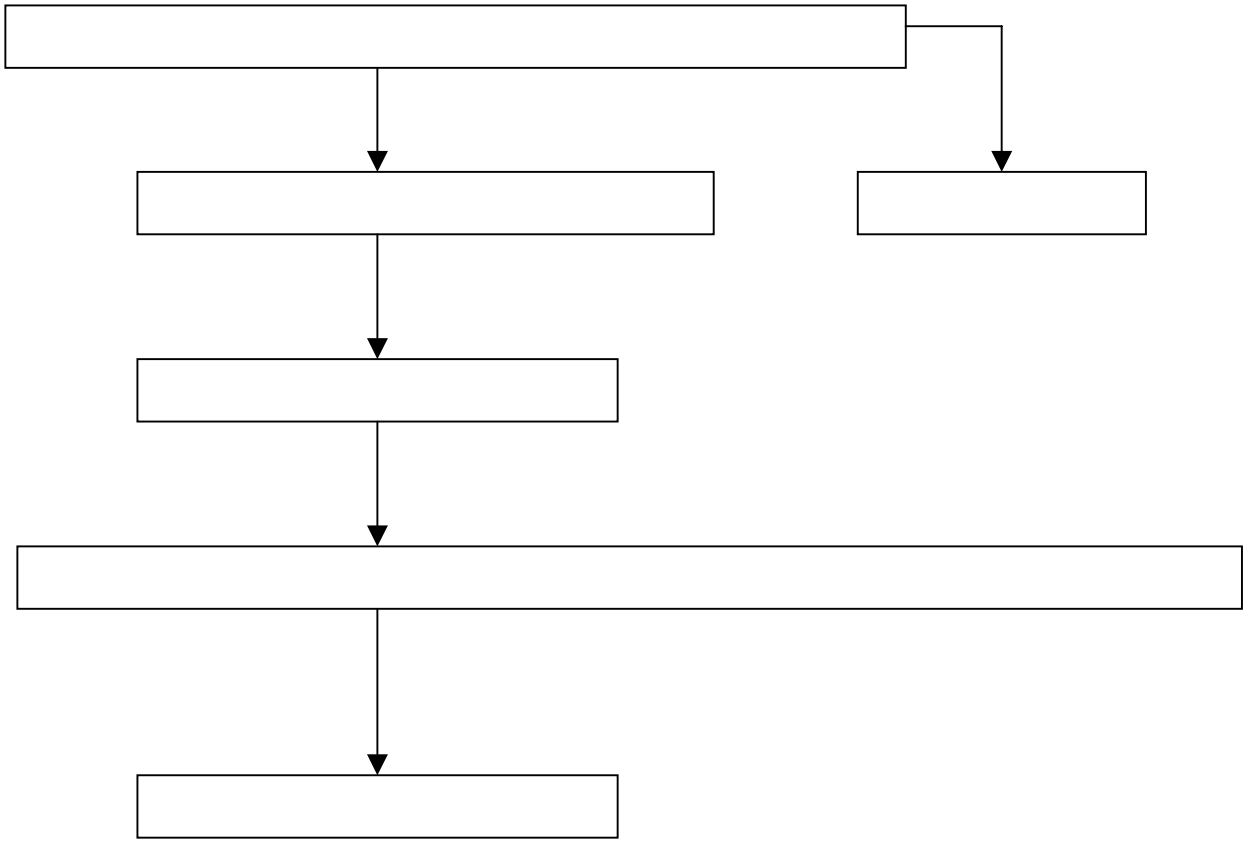
Outdoor unit display	LED STATUS
P3	Compressor current protection



Outdoor unit display	LED STATUS
P4	Compressor drive malfunction□drive protection arose□

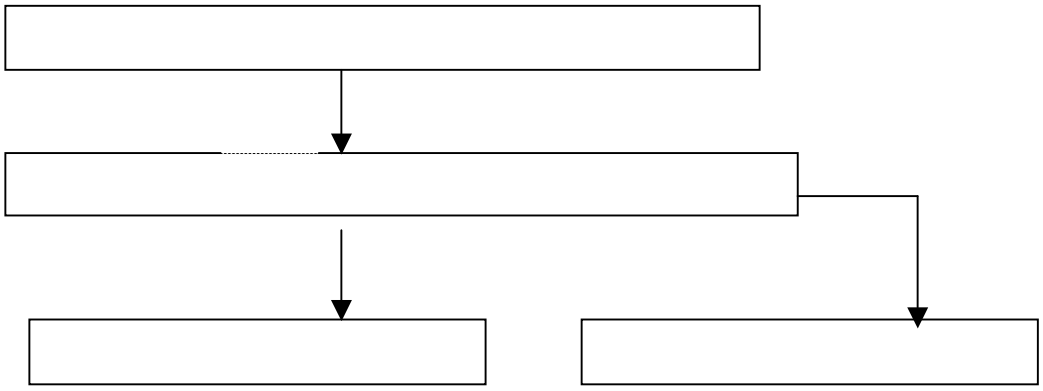


Outdoor unit display	LED STATUS
P4(LED flashes for nine times)	Compressor drive malfunction□module protection arose□



Outdoor unit display	LED STATUS
P6	Condenser high-temperature protection

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.



Annex 1

Characteristic of temp. sensor

Temp.□	Resistance KΩ		Temp.□	Resistance KΩ		Temp.□	Resistance KΩ
-10	62.2756		17	14.6181		44	4.3874
-9	58.7079		18	13.918		45	4.2126
-8	56.3694		19	13.2631		46	4.0459
-7	52.2438		20	12.6431		47	3.8867
-6	49.3161		21	12.0561		48	3.7348
-5	46.5725		22	11.5		49	3.5896
-4	44		23	10.9731		50	3.451
-3	41.5878		24	10.4736		51	3.3185
-2	39.8239		25	10		52	3.1918
-1	37.1988		26	9.5507		53	3.0707
0	35.2024		27	9.1245		54	2.959
1	33.3269		28	8.7198		55	2.8442
2	31.5635		29	8.3357		56	2.7382
3	29.9058		30	7.9708		57	2.6368
4	28.3459		31	7.6241		58	2.5397
5	26.8778		32	7.2946		59	2.4468
6	25.4954		33	6.9814		60	2.3577
7	24.1932		34	6.6835		61	2.2725
8	22.5662		35	6.4002		62	2.1907
9	21.8094		36	6.1306		63	2.1124
10	20.7184		37	5.8736		64	2.0373
11	19.6891		38	5.6296		65	1.9653
12	18.7177		39	5.3969		66	1.8963
13	17.8005		40	5.1752		67	1.830
14	16.9341		41	4.9639		68	1.7665
15	16.1156		42	4.7625		69	1.7055
16	15.3418		43	4.5705		70	1.6469

Annex 2

1. Reference voltage data:

   a) Rectifier : Input :208-230V(AC), output :310V(DC)

   b) Inverter module: U,V, W 3ph.

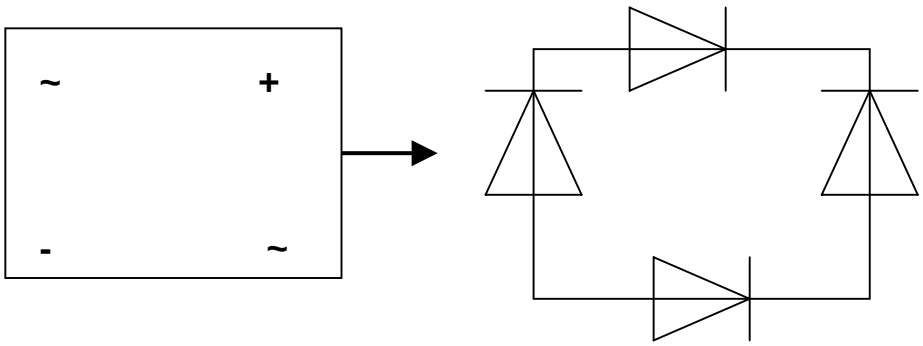
	Result
U-V	60-150V(AC)
U-W	60-150V(AC)
V-W	60-150V(AC)
P-N	DC 310V

   c) Photo-couple PC817, PC851: Control side <+5V, AC side :< 24V(AC)

   d) S terminal and N: changeable from 0-24V

2. Check the Diode Bridge component (In wiring diagram, rectifier)

Remark: If this part is abnormal, the LED will not light.



Multi-meter		Result	
		Forward Resistance	Backward Resistance
+	—	Infinite	Infinite
~		~500 ohm	Infinite
~	+		
-	~	~500 ohm	Infinite
	~		

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