TECHNICAL SERVICE MANUAL

—— Feng Xia Series

GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI
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Introduction

In this technical service manual, you will find rich references to Feng Xia Series products, including photos, technical specifications, explosive views, spare parts lists and circuit diagrams. Service people and engineers of Gree's customers and distributors would find it a very handy source of technical information of our products.

Technical Support Department
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2. Feng Xia Inverter Type

2.1 Summary

Fig. 2.1

MODEL	NOTE
KFR-70GW/A1F	SAA STANDARD 1Ph 240V 50Hz R22

2.2 Technical specification

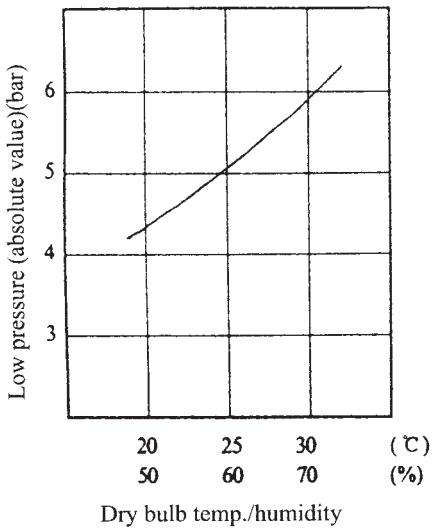
Table 2-1

Model			KFR-70GW/A1F	
Function			Cooling	Heating
Power supply			1Ph-240V-50Hz	
Capacity (W)			7000(3000~7000)	8500(4000~8600)
Rated input (W)			2820(1200~3450)	2830(1200~2928)
Rated current (A)			12(5~15)	12.1(5~13.6)
Air flow (M^3/h)			1080	
Dehumidifying volume (L/h)			2.3	
EER/C.O.P(W/W)			2.48	3.0
Indoor unit	Model		KFR-70G/A1F	
	Motor fan speed(r/min)		1420	
	Output power(W)		28	
	Fan type/piece		Cross flow fan-1	
	Diameter-length(mm)		ϕ 108 × 954	
	Evaporator		Aluminum fin-copper tube	
	Row-fin distance(mm)		3-1.5	
	Working area(m^2)		0.28	
	Swing motor		MP35EA	
	Input power(W)		4	
	Fuse(A)		Controllor 3.15A Transformer 0.2A	
	Working capacitor(μF)		3.5	
	Noise(dB(A))		⩽ 51	
	Dimension(width-height-depth)mm		1220 × 360 × 206	
	Net weight(kg)		27	
Outdoor unit	Model		KFR-70W/A1F	
	Input power (W)		2792(1172~3422)	2802(1172~2900)
	Current (A)		11.9(4.9~14.9)	12.0(4.9~13.5)
	L.R.A. (A)		76	
	Throttling method		Capillary	
	Compressor		QXBS-26(F)	
	Power (W)		1780	
	Protector		External overload protection	
	Starting method		By capacitor	
	Working temp.		Exhaust temperature ⩽ 115℃	
	Condenser		Aluminum-copper	
	Pipe-diameter		ϕ 9.52/	
	Working area(m^2)		0.6	
	Fan motor speed(rpm)		780	
	Type-piece		Axial fan-1	
	Diameter(mm)		ϕ 455	
	Defrosting method		Auto defrost	
	Noise dB(A)		58	
	Dimension(mm)(width-height-depth)		950 × 840 × 412	
	Net weight(kg)		75	
	Refrigerant charge (kg)		R22 2.4	
Connecting pipe	Outer diameter	Liquid pipe(mm)	ϕ 9.52(3/8")	
		Gas pipe(mm)	ϕ 16(5/8")	
	Max distance	Height(m)	5	
		Length(m)	10	

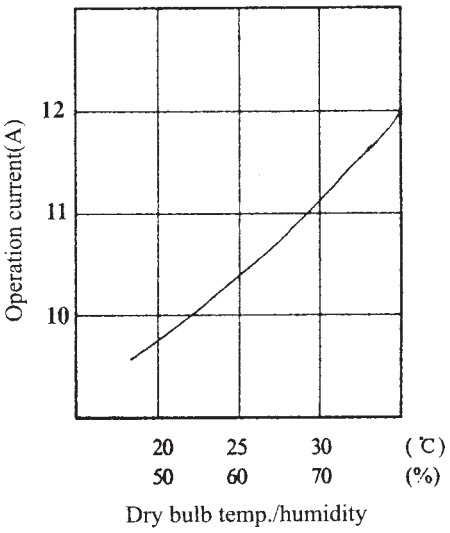
The technical data are subject to change without notice .Please refer to the nameplate of the unit.

2.3 Performance curves

Cooling operation
Condition:In testing , indoor and outdoor have same work condition

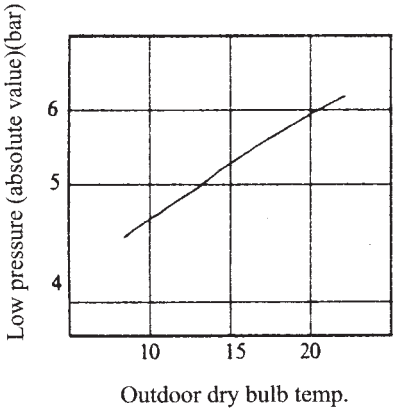


(a)

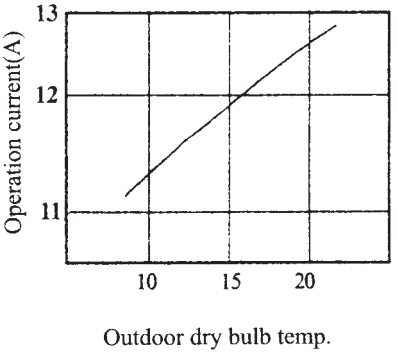


(b)

Heating operation
Indoor work condition:dry bulb temp.21,wet bulb temp.15.5



(c)



(d)

Fig. 2.2

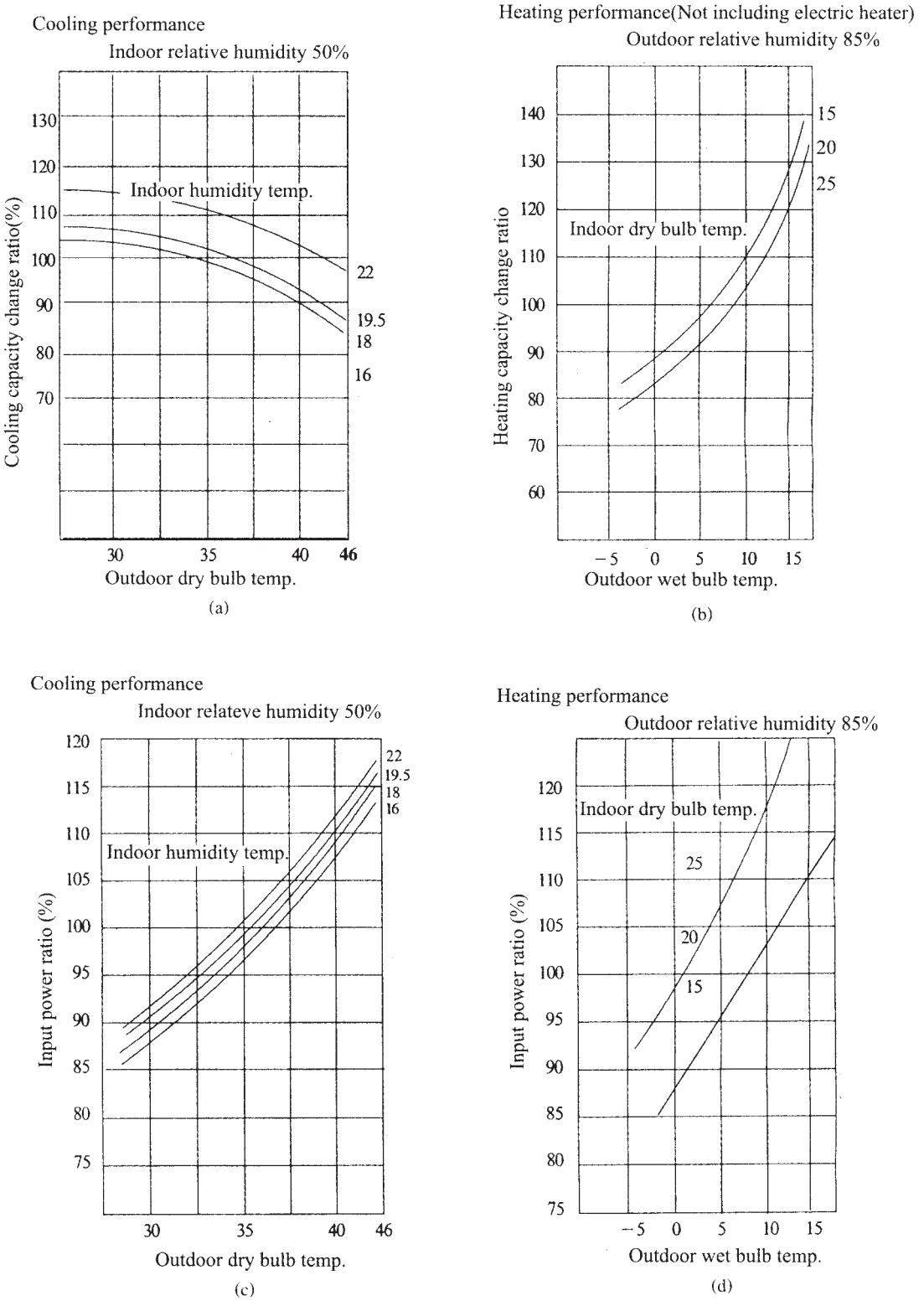
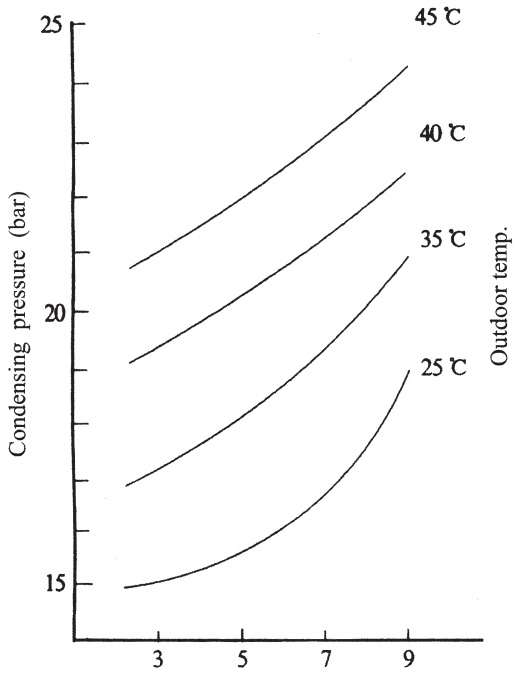
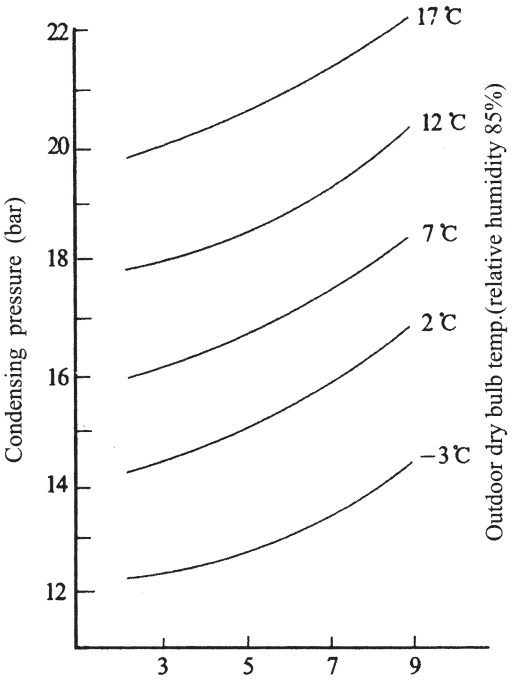

Cooling performance
Indoor relative humidity 50%
Indoor humidity temp.
22
19.5
18
16
Cooling capacity change ratio(%)
130
120
110
100
90
80
70
30
35
40
46
Outdoor dry bulb temp.
(a)
Heating performance(Not including electric heater)
Outdoor relative humidity 85%
Indoor dry bulb temp.
15
20
25
Heating capacity change ratio
140
130
120
110
100
90
80
70
60
−5
0
5
10
15
Outdoor wet bulb temp.
(b)
Cooling performance
Indoor relateve humidity 50%
Indoor humidity temp.
22
19.5
18
16
Input power ratio (%)
120
115
110
105
100
95
90
85
80
75
30
35
40
46
Outdoor dry bulb temp.
(c)
Heating performance
Outdoor relative humidity 85%
Indoor dry bulb temp.
25
20
15
Input power ratio (%)
120
115
110
105
100
95
90
85
80
75
−5
0
5
10
15
Outdoor wet bulb temp.
(d)

Fig. 2.3



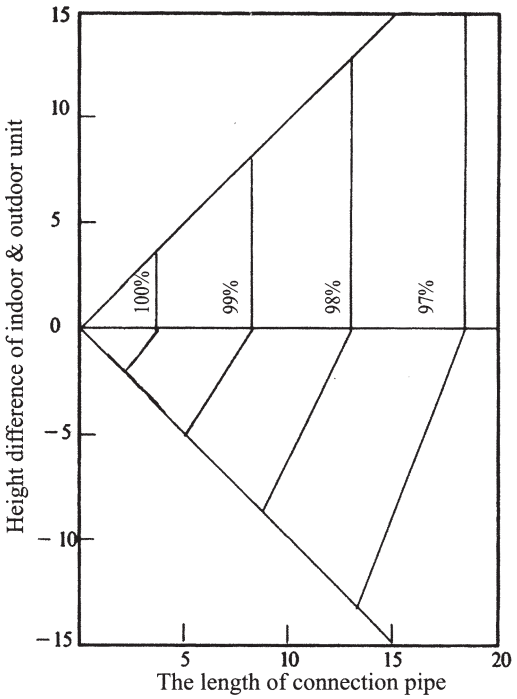
The affection to the charging quantity by pressure under cooling work condition.
Indoor work condition:27℃ dry bulb , 19.5℃ wet bulb

(e)



The affection to the charging quantity by pressure under heating work condition.
Indoor work condition:21℃ dry bulb temp.21

(f)



Cooling capacity vary with the length of connection pipe

(g)

Fig. 2.4

2.4 Outlines and dimensions of indoor unit

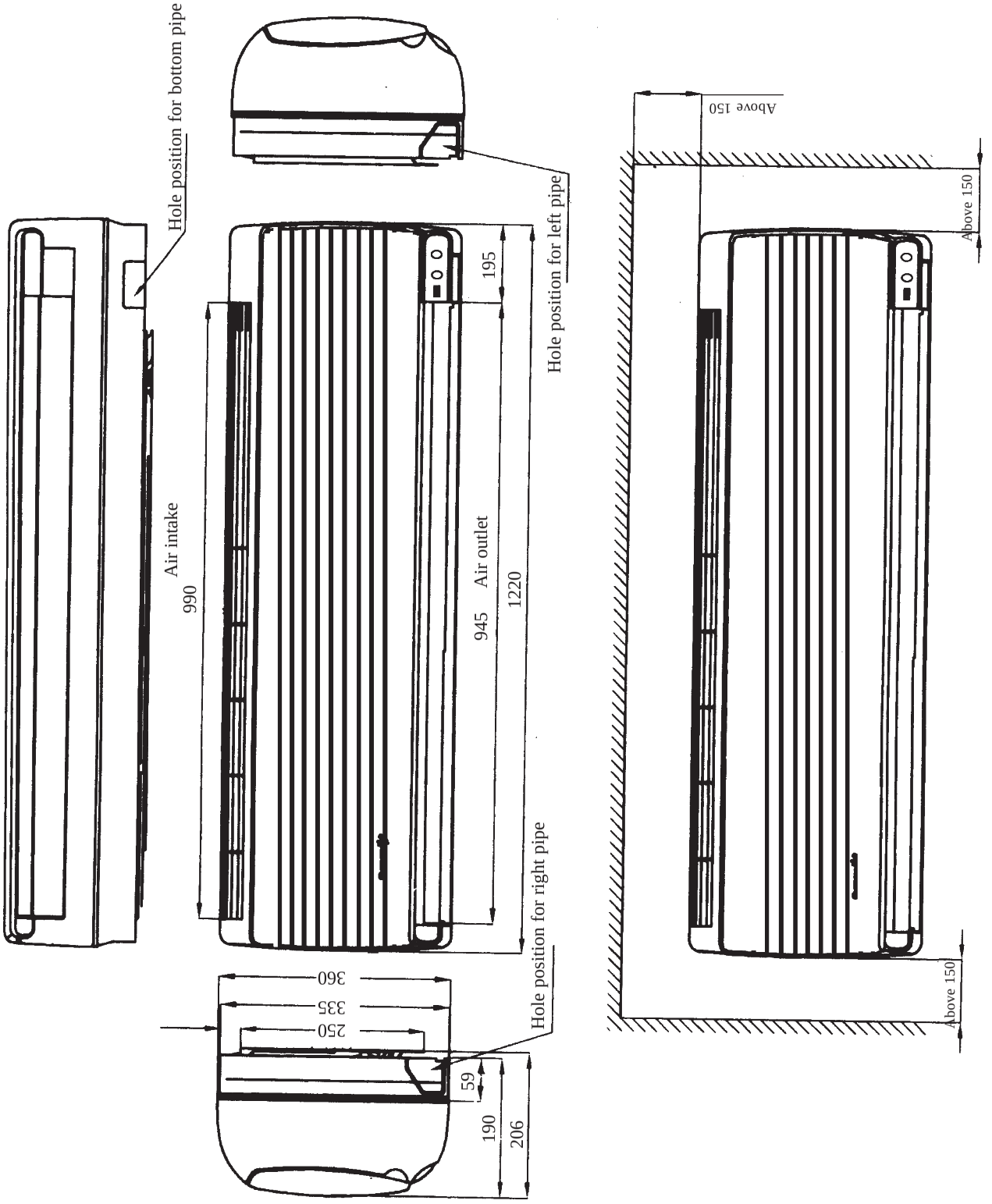
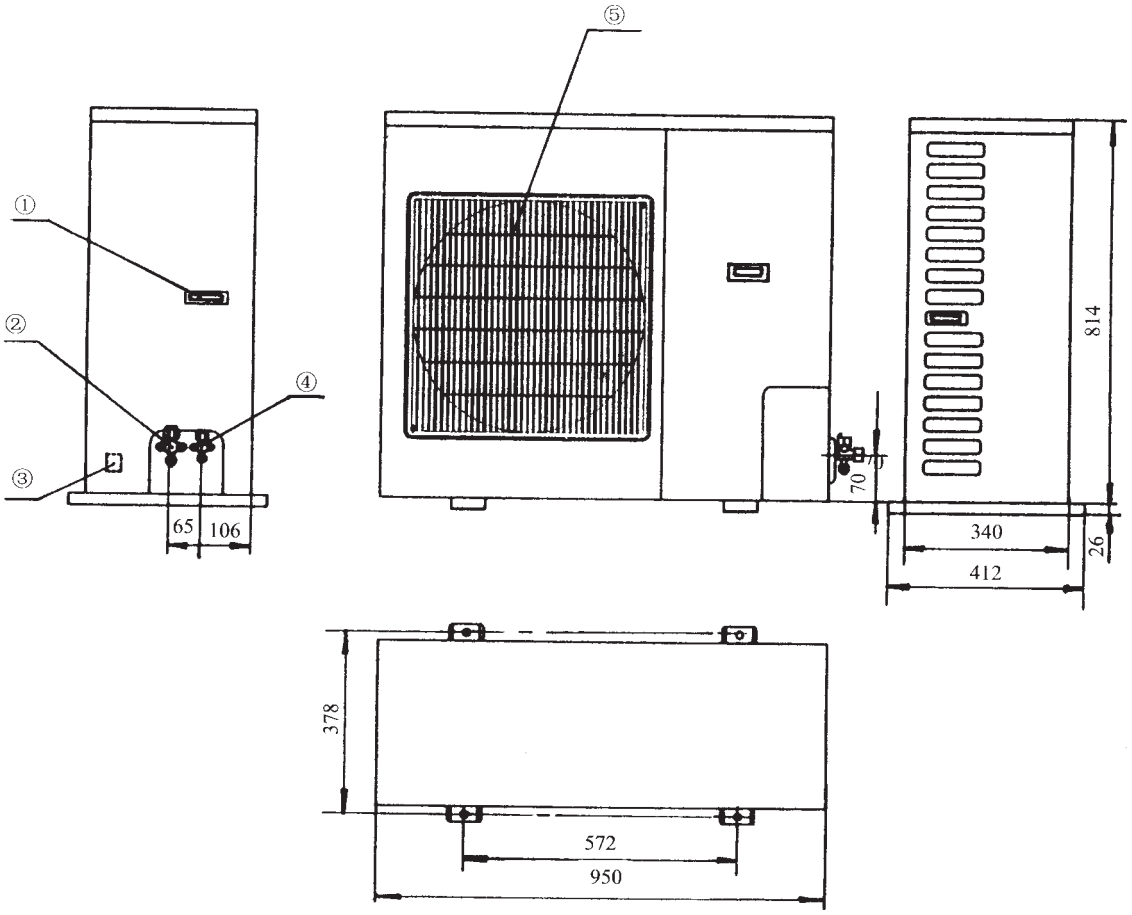


Fig. 2.5

2.5 Outlines and dimensions of outdoor unit



① Handle for moving ② Liguid valve assy. ③ Wire hole ④ Gas valve assy. ⑤ Front panel

Fig. 2.6

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2.6 Explosive view and spare parts list of indoor unit

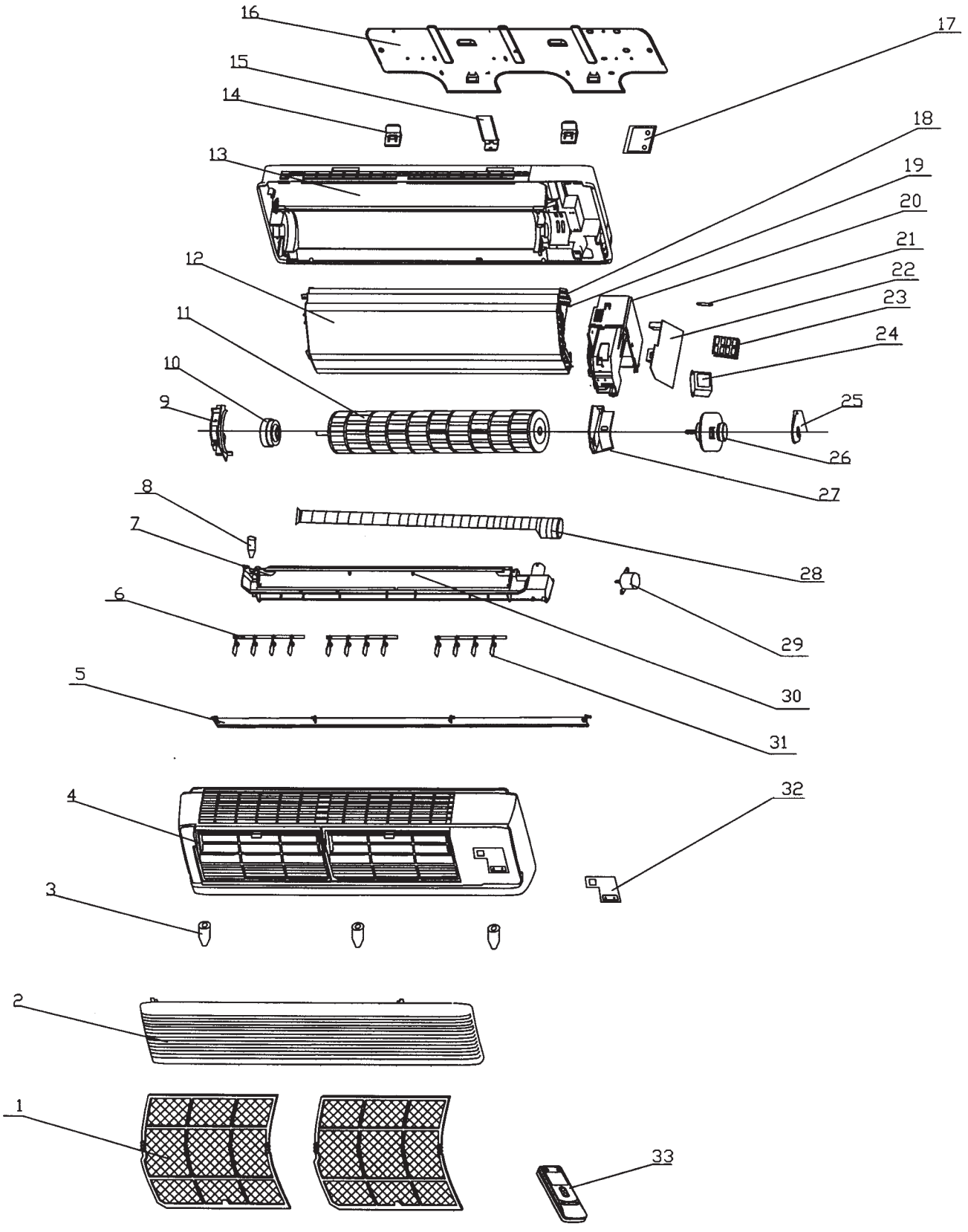

Fig. 2.7

Table 2-2

No.	Description		Part No. KFR-70G/A1F	Qty
1	Filter	过滤网	11122005	2
2	Front Panel	面板	20002020	1
3	Screw cover	螺钉盖	24252002	3
4	Front Case	面板体	20002021	1
5	Guide Louver	导风板	10512009	1
6	Connecting Lever	导风连杆	10582005	3
7	Water Tray	接水盘	12412061	1
8	Drain Stem	排水口堵头	06812061	1
9	Left Evap Supporter	蒸发器左支撑	01072435	1
10	Ring of Bearing	贯流风叶轴承胶圈	76512044	1
11	Cross Fan Assy	贯流风叶部件	10352397	1
12	Evaporator Assy	蒸发器组件	01002018	1
13	Rear Case	底座	26152440	1
14	Fixing Hook	底座固定扣	26152442	2
15	Rear Pipe Clamp	压管夹	02142204	1
16	Wall Mounting Plate	壁挂板	01252205	1
17	Pipe Clamp	管夹	02142440	1
18	Sensor Supporter	感温头支架	24211121	1
19	Sensor Holder	感温头插片 B	42020063	1
20	Electric Box	电器盒	20102006	1
21	Wire Clamp	电线夹	71010103	1
22	Mainboard	主板 15F-1F	30031501	1
	Mainboard	主板 25F-2F	30031502	1
	LED Board JD	接收板 JD	30046057	1
	LED Board K	接收板 K	30042016	1
23	Termincal board	接线板 GT4B4A2	42011146	1
24	Transformer SC28B5	电源变压器	43110204	1
25	Motor Clamp	电机固定卡	02112001	2
26	Motor FN25D	电机 FN25D	15012105	1
27	Right Evap Supporter	蒸发器右支撑	01072436	1
28	Drainage Pipe	排水管	05232411	1
29	Motor MP35EA	步进电机 MP35EA	15210104	1
30	Tray Supporter	接水盘中支撑	12122245	2
31	Swing Louver	导风叶片	10512006	12
32	Electric Box Cover	接线盖板	22242201	1
33	Remote Controller	遥控器 Y512	30512506	1
34	Power Cord	电源线	40020333	1
35	Connecting Cable	电源连接线	40020427	1

The data are subject to change without notice.

2.7 Explosive view and spare parts list of outdoor unit

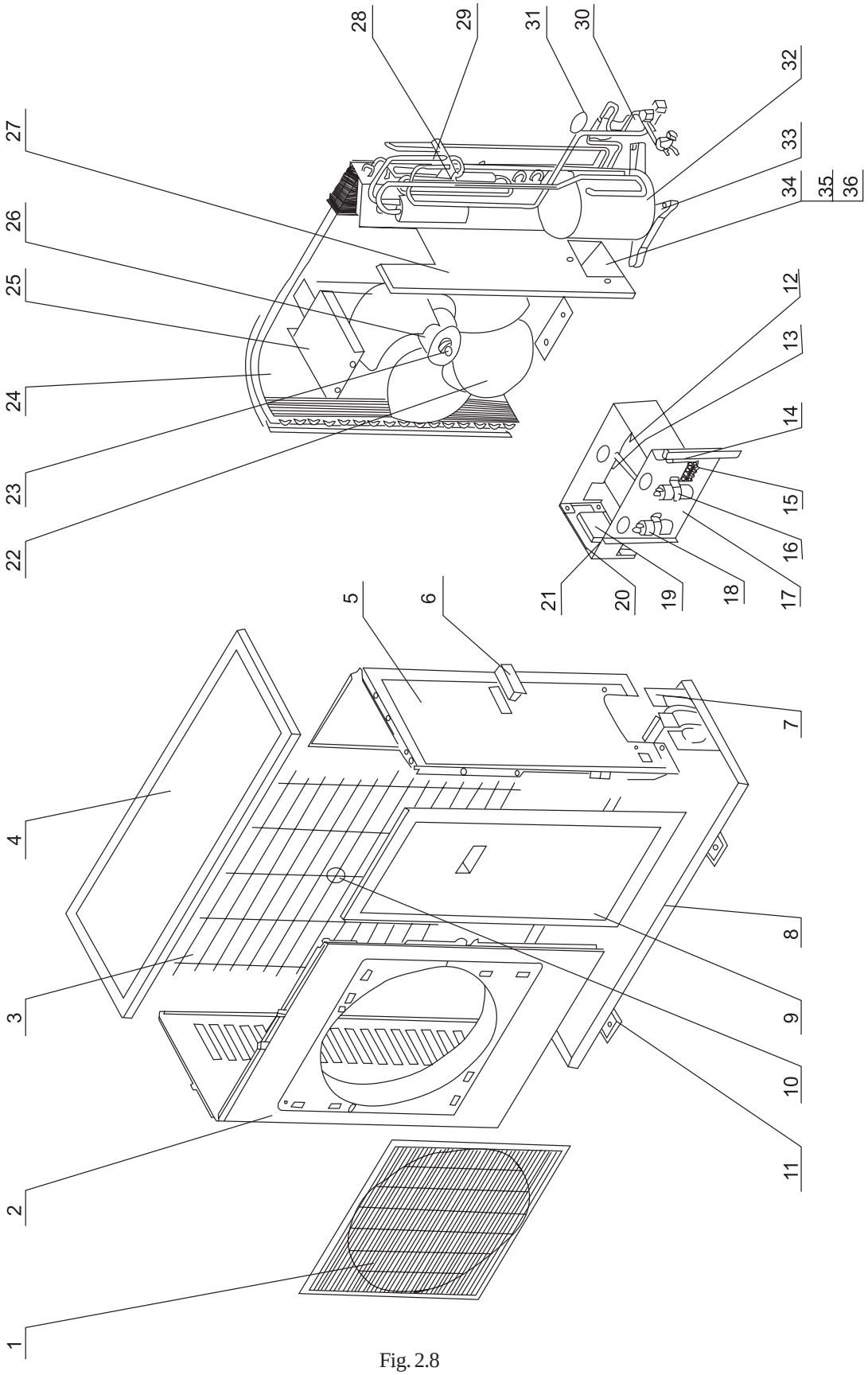

Fig. 2.8

Table 2-3

No.	Description		Part No. KFR-70W/A1F	Qty
1	Front Grill	面罩组件	22265250	1
2	Front Plate	外罩	01435254	1
3	Rear Grill Assy	网罩(白色)	01475251	1
4	Top Cover Assy	顶盖组件	01255260	1
5	Rear Side Plate	后侧板	01305260	1
6	Handle	把手	26235253	3
7	Valve Supporter	阀门支架组件	01715001	1
8	Metal Base	底盘组件	01205121	1
9	Front Side Plate	前侧板组件	01305018	1
10	Underlay	网罩垫块	76315251	1
11	Holder	支脚	01795251	2
12	Filter Plate	滤波板 W402	30034009	1
13	Mainboard W932	主板 W932	30039060	1
14	Screw Assy	螺钉组合件 M4X12	70110225	5
15	Terminal Board 2-8	接线板 T360E	42011236	1
16	Capacitor 100uF/400V ± 10%	电解电容100uF/400V±10%	33310054	1
17	Electric Box	电器盒(铆接)	01415020	1
18	Capacitor	电容 20uF/200VAC	33010701	1
19	Electrical Source Module	电源模块 50A/600V	32210094	1
20	Radiator	模块散热器	49015501	1
21	Commutated Bridge	整流桥 S25VB60	46010602	2
22	Axial Flow Fan	轴流风叶	10335253	1
23	Gasket	垫圈 10 #	70410303	1
24	Condenser Assy	冷凝器部件	01103514	1
25	Motor Supporter	电机支架	01705253	1
26	Motor LW80B	电机 LW80B	15015053	1
27	Isolation Sheet Assy	中间隔板组件	01235503	1
28	4-way Valve	四通阀(2 匹)	43000403	1
29	4-way Valve Fittings	四通阀配件	430004002	1
30	Gas Valve Assy	大阀门组件	07105251	1
31	Liquid Valve Assy	小阀门组件 3/8"	07103702	1
32	Compressor	压缩机及其配件QXBS-26(F)	00100411	1
33	Nut with Washer M8	带垫螺母 M8	70310014	3
34	Damping Block	电抗器橡胶减振块	76315501	4
35	Nut with Washer	带垫螺母	70413501	4
36	Reactor R2285 6.2mH/22A	电抗器 R2285 6.2mH/22A	43130158	1

The data are subject to change without notice.

2.8 Circuit diagram

This circuit diagram is subject to change Without notice.
Please refer to the one stuck on the machine.

KFR-70GW/A1F

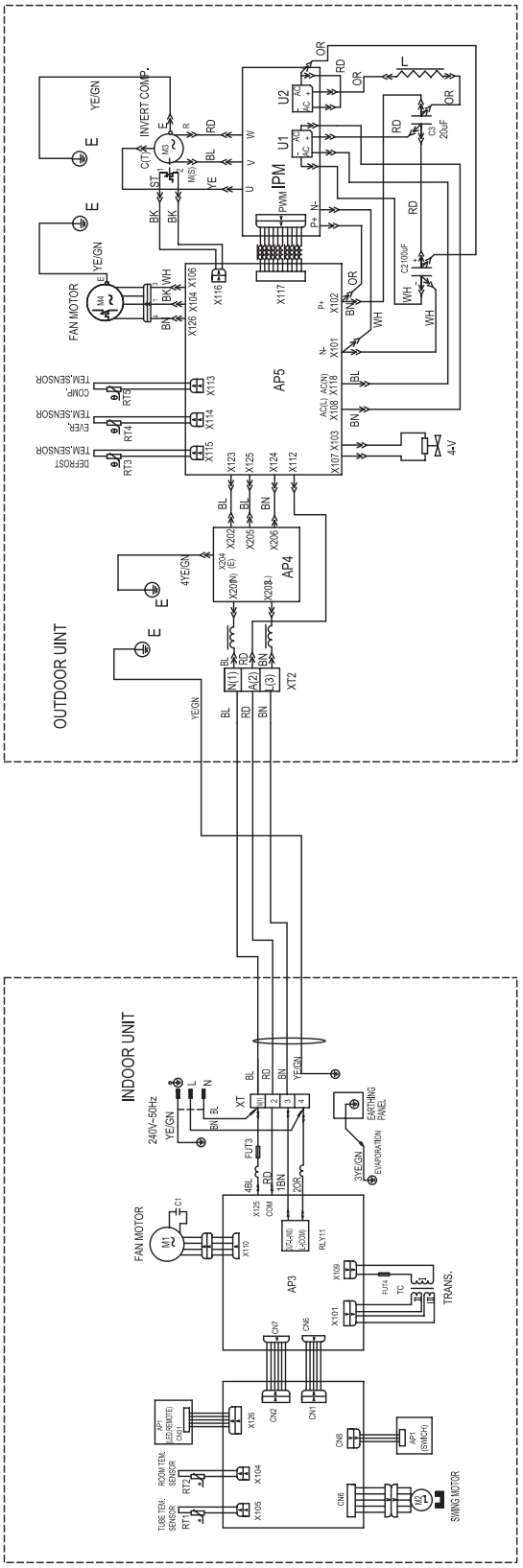

Fig. 2.9

2.9 PCB function manual

The PCB function manual of Feng Xia Inverter air conditioner

A. Function description of PCB

1. Cooling
2. Heating
3. Fan
4. Dehumidifying
5. Auto
6. Manual operation

B. Operation category of PCB

1. Indoor fan motor
2. Outdoor fan motor
3. Compressor
4. Guide louver
5. Beeper
6. Led (indoor and outdoor)
7. Electric heater
8. 4-way valve
9. Outdoor supply
10. Pre-heat belt

C. Parameter setting of PCB

1. Operation mode
2. Set temp. T_{set}
3. Fan speed
4. Timer mode
5. Time
6. Guide louver situation
7. T_{sur}: Surrounding temp. of indoor and outdoor environment
8. T_{tb1}: Surface temp. of outdoor heat exchange copper tubes
9. T_{tb2}: Surface temp. of indoor heat exchange copper tubes
10. Compressor temp.
11. Gross current I_t
12. Sleep mode

13. Compressor overload protecting signal
14. Module capacity protecting signal

D. Fundamental functions

1. Cooling mode

(1) Working conditions and procedure under cooling mode

a. $T_{sur} \geqslant T_{set}$

The unit changes to cooling mode. Indoor fan motor, outdoor fan motor and compressor start to run, indoor fan motor operates at the set fan speed.

b. $T_{sur} \leqslant T_{set}$-2℃

Compressor stops running, after 30 seconds delay, outdoor fan motor will stop running. Outdoor fan motor keeps on running at the set speed.

c. T_{set}-2℃< T_{sur}< T_{set}

Unit remains current operation mode.

(2) Under this mode, temperature setting scope is 16~30℃ when reversing valve is out of supply.

(3) Protecting functions

a. Evaporator anti-freezing protection

Under cooling and dehumidifying modes, compressor keeps on running for 6 minutes:

◇ $T_{eva} \leqslant$ 2℃: Capacity decent function starts to work.

◇ If $T_{eva} \leqslant$-1℃ lasts for 3 minutes, the compressor stops running and after 30 seconds delay, outdoor fan motor stops. Under cooling mode, indoor fan motor and stepping motor retain existing modes. Under dehumidifying mode, indoor fan motor runs at low speed and stepping motor retains existing mode.

◇ $T_{eva} \geqslant$ 6℃: Unit restarts and gets into the previous operation mode.

b. The capacity descends when cross current rises.

◇ Cross current $I_t \geqslant$ B, capacity upswing is forbidden.

◇ Cross current $I_t \geqslant$C, capacity descends falls down a certain degree at once. If the current keeps on rising, the capacity will descends for another time.

◇ $I_t \geqslant$ D, compressor stops running immediately and after 30 seconds delay, outdoor fan motor stops.

◇ For 3200W units: B=8A, C=9A, D=10A

For 2500W units: B=6A, C=7A, D=8A

2. Dehumidifying mode

(1) Working conditions and procedure under dehumidifying mode

a. $T_{sur} \geqslant T_{set}$

Dehumidifying function starts up. Indoor, outdoor fan motor and compressor begin to run. Indoor motor runs at low speed.

b. T_{set}-2℃≤ T_{sur} ≤ T_{set}

Unit retains dehumidifying mode.

c. T_{sur}< T_{set}-2℃

Compressor stops operation, 30 seconds later outdoor fan motor stops. Indoor motor keeps on running at low speed.

(2) Temporary setting range: 16~30℃.

(3) Protecting function

Please refer to cooling mode.

3. Fan mode

(1) Indoor fan motor can operate at any speed rate (high, medium, low or automatically) under fan mode. Compressor and outdoor fan motor keep still.

(2) Control conditions of automatic speed rate

a. T_{sur}> T_{set}+4℃

The unit switches to high speed automatically.

b. T_{set}+2℃≤ T_{sur} ≤ T_{set}+4℃

The unit switches to medium speed automatically.

c. T_{sur}< T_{set}+2℃

The unit switches to low speed automatically.

(3) Temperature setting range: 16~30℃.

4. Heating mode

(1) Working conditions and procedure under heating mode

a. T_{sur} ≤ T_{set}+2℃

Heating function starts up. Compressor, outdoor motor and 4-way valve operate at the same time. Indoor fan motor operates at the set speed rate under anti-cool air condition.

b. T_{set}+2℃< T_{sur}< T_{set}+5℃

The unit retains heating mode.

c. T_{sur} ≥ T_{set}+5℃

Compressor stops running. Outdoor motor stops 30 seconds later. Indoor fan motor operates under blowing surplus heat condition with compressor indicator turning off.

d. 0> T_{out}> -3℃; -7℃≤ T_{out} ≤ -3℃; T_{out}< -7℃

The compressor's operation rates are F1; F2; F3.

(2) Working conditions and procedure of condensing

Condensing function starts up when heating time lasts 45 minutes and any of the following conditions lasts 3 minutes:

a. T_{out} ≥ 5℃, T_{tb1} ≤ -4℃;

b. 0℃≤ T_{out}< 5℃, T_{tb1} ≤ -8℃;

c. -5℃≤ T_{out}< 0℃, T_{tb1} ≤ -12℃;

d. T_{out}< 5℃, T_{tb1} ≤ -16℃

Under above situations, compressor and indoor fan motor stop at once, 30 seconds later, the outdoor motor and 4-way valve stop. The compressor will restart after another 15 seconds delay with the operation rate F1. The indoor operation indicator flashes when condensing.

After running for 5 minutes or when T_{tb} ≥ 10℃, compressor stops running. After 30 seconds delay 4-way valve turns on. Another 60 seconds later compressor and the outdoor motor switch back to operation status with the indicator flashing. Indoor fan motor operates under anti-cool air condition.

(3) Temperature setting range: 16~30℃.

(4) Under anti-cool air condition, compressor starts operation. 2 minutes later or when T_{tb} ≥ 41℃, indoor fan motor starts up at the set speed rate.

(5) Blowing surplus heat function

After keeping running for 90 seconds, indoor fan motor stops.

(6) Working conditions of auxiliary electric heater

Under heating mode, indoor motor runs at high and medium speed. If it detects indoor temperature T_{sur} ≤ 22℃ or indoor heat exchanger temperature T_{tb2} ≤ 48℃, auxiliary electric heater starts to work.

Auxiliary electric heater will stop running if compressor stops running and indoor motor runs at low speed (or stops). The situation will be the same if T_{sur} ≥ 25℃ or T_{tb2} ≥ 54℃.

When being switched off, auxiliary electric heat can be switched on only after 2 minutes delay.

(7) The capacity descends when cross current rises.

a. When cross current exceeds the stated current (I_t ≥ X), capacity upswing is forbidden. When I_t ≥ Y, capacity falls down a certain degree. If the current goes on rising, capacity will fall down another certain degree until the real current is lower than stated cross current.

Under the circumstance, capacity will rise up a certain degree with a comparative lower temperature in the room. In case temperature in the room goes on declining, capacity will increase a certain degree until real current exceeds stated cross current.

b. When I_t ≥ Z, compressor stops and outdoor motor stops.

c. For 3200W units: X=11A, Y=12A, Z=13A

For 2500W units: X=8A, Y=9A, Z=10A

5. Auto mode

(1) Working condition and procedure under auto mode

Standard cooling T_{set}=25℃, standard heating T_{set}=20℃

① T_{sur}> T_{set}+1℃

Select cooling mode, from this time, the set temperature is 25℃.

$T_{sur} \leqslant T_{set}$-2℃

Compressor and outdoor motor stop, indoor motor runs at the set speed.

T_{set}-2℃< T_{sur}< T_{set}+1℃

Keep the original state.

② $T_{sur} \leqslant T_{set}$

Select heating mode, from this time, the set temperature is 20℃.

$T_{sur} \geqslant T_{set}$+3℃

Compressor stops first, outdoor motor stops 30 seconds later, indoor motor runs at low speed as the blowing condition.

T_{set}< T_{sur}< T_{set}+3℃

Keep the original state.

(2) Protection functions

a. The same as the one in cooling mode.

b. The same as the one in heating mode.

c. When surrounding temperature changes, it has no priority mode. Compressor hasn't 6-munite starting limitation.

6. Protecting function and malfunction display (suitable for cooling、heating、dehumidifying and auto mode)

(1) Overload protection

T_{tb}: Outdoor's heat exchanger temperature when cooling. or: Indoor's heat exchanger temperature when heating.

a. 56℃$\leqslant T_{tb}$< 58℃

Indoor motor runs at setting speed rate, compressor runs at rate F5.

b. 58℃$\leqslant T_{tb}$< 62℃

Indoor motor runs at set speed rate, compressor runs at rate F2.

c. $T_{tb} \geqslant$ 62℃

Indoor motor runs at set speed rate, compressor stops running.

d. When temperature descends (56℃$\leqslant T_{tb}$< 60℃)

Indoor motor runs at set speed rate, compressor runs at rate F2.

e. 52℃$\leqslant T_{tb}$< 56℃

Indoor motor runs at set speed rate, compressor runs at rate F5.

f. T_{tb}< 52℃

The unit returns to the previous operation mode.

(2) Compressor delay protection

Compressor can restart 3 minutes delay after the latest stopping.

(3) Compressor exhausting temperature protection

When compressor exhausting temperature $\geqslant$ 103℃, capacity increasing is forbidden. When

the temperature ⩾ 108℃, capacity begins to descend. If temperature goes on rising, capacity will fall down a certain degree. When temperature ⩾ 115℃, compressor stops running. 3 minutes later, if it detects the temperature ⩽ 90℃, compressor will restart.

(4) Energy saving protection

When running under energy saving mode, compressor highest running rate is F_{max}=80Hz (cooling), F_{max}=90Hz (heating).

(5) Stated heating / cooling capacity testing

Select cooling or heating mode, press negative-ion & energy saving button.

(6) Indoor and outdoor malfunction indicators (Appendix Table-1)

(Attention: Outdoor malfunction indicators work only when compressor stops running.)

① Green lamp is on when compressor stops and malfunction occurs.

② Yellow lamp is on when outdoor temperature sensor has problem.

③ Red lamp is on when outdoor tube sensor has problem.

④ Green lamp flashes when module is protected.

⑤ Both red and yellow lamps flash when compressor is over loaded.

⑥ Green, red and yellow lamps are all on when exhausting temperature sensor has problem.

⑦ Indoor D1 is on when compressor runs.

⑧ Indoor D2, the communicate indicator, it flashes if units runs in order.

⑨ Indoor D3, the temperature sensor, it flashes when meeting problems.

Appendix Table-1:

LED1	LED2	LED3	D1	D2	D3	Malfunction Description
Green On						①
		Yellow On				②
	Red On					③
Green Flash						④
	Red Flash	Yellow Flash				⑤
Green On	Red On	Yellow On				⑥
			On			⑦
				Flash		⑧
					Flash	⑨

Addition: LED1, LED2, LED3 are outdoor indicators. D1, D2, D3 are indoor main board indicators. When defrosting, LED indicators flash.

7. Other control categories

(1) Mode selection

Press MODE button constantly to show the mode: AUTO-> COOL-> DRY-> FAN-> HEAT-> AUTO. Select the one you need.

(2) Temperature setting selection

Press TEMP ∧ or TEMP ∨ for one more time, the set temperature will add or deduct 1℃. The working range is 16~30℃. This function is out of operation under AUTO mode.

(3) Emergency control

Control board switching provides auto, testing and stop functions.

a. Auto function

Use auto function when remote controller is lost. Auto model is selected if pressing the button once, indoor motor runs at auto speed and guide louvers work under swing mode. If detecting remote control signals, unit runs according to signals.

b. Testing function

Middle cooling model is selected when pressing button for twice consecutively. If pressing button for three times consecutively, middle heating model is selected. (Middle cooling / heating is for air conditioner testing purpose.) If remote control directives are detected, unit will run with remote control mode.

c. Stop function

If pressing the button for 4 times consecutively, the unit stops running.

(4) Time setting selection

Press the button one more time, the set hour will be up or down 0.5 hour. Working range is 0~24 hours.

(5) Sleep mode control

a. Under cooling or dehumidifying mode, 1 hour after you set the sleep timer, T_{set} will add 1℃, 2 hours later T_{set} adds another 1℃. Unit goes on to run under this status.

b. Under heating mode, if timer is set, T_{set} will lower 1℃ one hour after SLEEP model is selected. T_{set} will lower another 1℃ two hours later. Unit goes on to run under this status.

c. Under fan mode and Auto mode, the set temperature doesn't change.

(6) Indoor fan motor control

Indoor fan motor can be set to run at HIGH, MED, LOW speed by pressing the button. Fan speed can be set as AUTO speed. Compressor running rate determines fan speed. Indoor fan motor runs at low speed under swing mode.

(7) Swing selection

Use the remoter swing button to switch on / off. Louvers works when indoor fan motor operates.

(8) Beeper control

When air conditioner switches on or it receives operative signals from remote controller or buttons are pressed, buzzer will buzz.

(9) ON / OFF button

Press the button constantly to switch on / off.

(10) Auto speed levels

F ⩽ 60Hz:	Low speed
60Hz< F< 80Hz:	Medium speed
F ⩾ 80Hz:	High speed

Switches among above speed levels are affected by different loading. Unit runs at the most suitable speed under blurring control. Under swing mode, auto speed selects low speed automatically.