GD Midea Refrigeration Equipment Co. Ltd

MULTI SPLIT TYPE, HEAT PUMP AIR CONDITIONERS

Technical service manual 2007

R410a X series multi units

Indoor Models

MSXI-09HRN1

MSXI-12HRN1

Outdoor Models

M2OA-18HRN1 **M2OA-21HRN1**

M3OA-27HRN1 **M3OA-30HRN1**

Multi SERIES

1. Features
2. Function
3. Specification
4. Dimensions
5. Refrigeration cycle diagram
6. Wiring diagram
7. Troubleshooting
8. Electronic function
9. Characteristic of temp. sensor

1. Features

1.1 Universal outdoor unit and indoor unit design

1.2 R410a refrigerant; Cooling & heating units

1.3 The indoor unit combination is as follow list:

OUTDOOR UNIT MODEL	INDOOR UNIT COMBINATION
M2OA-18HRN1	9K×2
M2OA-21HRN1	9K+12K
M3OA-27HRN1	9K×3
M3OA-30HRN1	9K×2+12K

1.4 Working Temperature Range

Models	Cooling				Heating			
	Indoor Low	Indoor Hi	Outdoor Lov	Outdoor Hi	Indoor Lov	Indoor H	Outdoor Low	Outdoor Hi
multi on/off	17	/	5	43	/	30	-7	24

2.Function

Indoor unit

Operation ON/OFF by remote controller

Sensing by room temperature

Room temperature sensor.
Pipe temperature sensor.

Room temperature control

Maintain the room temperature in accordance with the setting temperature.

Starting temperature control

Indoor fan is delayed for 5 sec at the starting.

Indoor fan speed control

high, med, low, breeze.

Operation indication Lamps (VLED)

Light up in the VLED for each operation mode.

Two-direction air vane

The unit will decide the louver direction according to operation mode.

Sleep mode auto control

The fan is turn to low speed (cooling/heating).
The unit will be turn off at the seventh hour.

Independent dehumidification

The function is usually used in rainy days in springtime or damp areas.

Turbo mode

Anti-cold function

Prevent the cold wind at the beginning of unit start.

Defrost mode

Auto-restart function

Air flow Direction control

Self-diag. function

Outdoor unit

Power relay control

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

Check point

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.

Discharge pipe temperature protect

Anti-rust cabinet

3. Specification

3.1 Indoor unit

Model			MSXI-09HRN1	MSXI-12HRN1
Power supply		Ph-V-Hz	1Ph, 220-240V~,50Hz	1PH, 220-240V~,50Hz
Cooling	Capacity	Btu/h	9000	12000
	Input	W	36.5	51.5
	Rated current	A	0.17	0.24
Heating	Capacity	Btu/h	10000	13000
	Input	W	37	51.5
	Rated current	A	0.17	0.24
Indoor fan motor	Model		RPG13H	RPG20D
	Brand		Welling	Welling
	Input	W	33	38
	Capacitor	uF	1.2UF/450VAC	1.5UF/450V
	Cooling Speed(turbo/hi/mi/lo)		1300/1200/1100/850	1270/1220/1050/950
	Heating Speed(hi/mi/lo)	r/min	1250/1100/880	1220/1050/950
Indoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	21x13.37	21x13.37
	c.Fin spacing	mm	1.3	1.3
	d.Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	e.Tube outside dia.and type	mm	φ7 INNEGROOVE TUBE	φ7 INNEGROOVE TUBE
	f.Coil length x height x width	mm	538x252x26.74	637x294x26.74
	g.Number of circuits		2	2
Indoor air flow (Hi/Mi/Lo)		m3/h	480/440/320	650/570/490
Indoor noise level (Hi/Mi/Lo)		dB(A)	39/37/29	41/36/34
Indoor unit	Dimension (W*H*D)	mm	710x250x194	790x265x198
	Packing (W*H*D)	mm	800x340x270	875x375x285
	Net/Gross weight	Kg	7.5/10	9/12
	Liquid side/ Gas side	mm	Φ6.35/Φ9.53	Φ6.35/Φ12.7

3.2 Outdoor unit

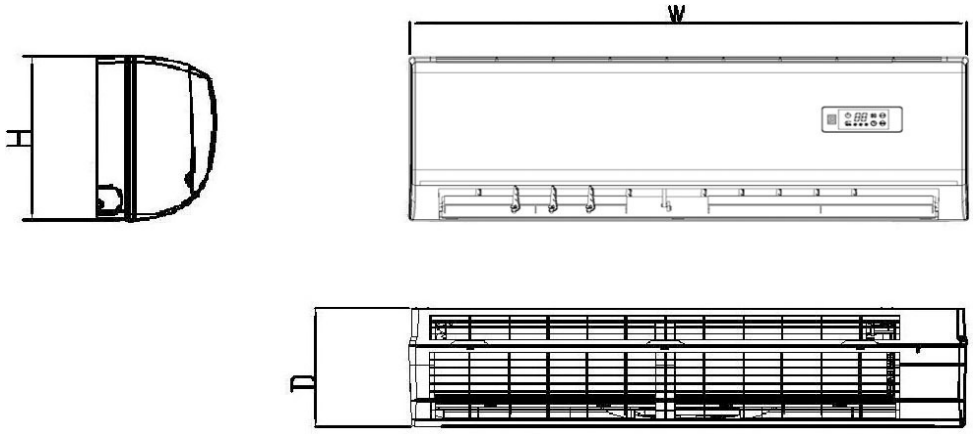
Outdoor Model			M2OA-18HRN1	M2OA-21HRN1
Power supply		Ph-V-Hz	1Ph,220-240V~,50Hz	1Ph,220-240V~,50Hz
Cooling	Capacity	Btu/h	18000	21000
	Capacity	W	5275	6155
	Input	W	1680	2000
	Rated current	A	8.0	9.7
	EER	w/w	3.1	3.04
Heating	Capacity	Btu/h	20000	24000
	Capacity	W	5862	7034
	Input	W	1680	2050
	Rated current	A	8.0	9.8
	EER	w/w	3.45	3.42
Max. input power		W	2280	2520
Max. current		A	9.8	12.0
Starting current		A	21.7	21.7
Compressor	Model		PA108X1C-4FTDE ; PA108X1C-4FTDE	PA108X1C-4FTDE ; PA145X2C-4FT
	Type		ROTARY	ROTARY
	Brand		GD TOSHIBA	GD TOSHIBA
	Capacity	Btu/h	8769 X 2	8769+12014
	Input	W	885X2	885+1200
	Rated current(RLA)	A	4.15X2	4.15+5.6
	Locked rotor Amp(LRA)	A	40X2	40+57
	Thermal protector		Internal	Internal
	Capacitor	uF	25uF/370VAC X 2	25+35uF/370VAC
	Refrigerant oil	ml	350X2	350+480
Outdoor fan motor	Model		YDK60-6	YDK60-6
	Brand		Welling	Welling
	Input	W	111	111
	Capacitor	uF	4uFx2	4uFx2
	Speed	r/min	830/650	830/650
Outdoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	25.4x24	25.4x24
	c.Fin spacing	mm	1.7	1.7
	d.Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	e.Tube outside dia.and type	mm	Φ9.53, Innergroove tube	Φ9.53, Innergroove tube
	f.Coil length x height x width	mm	810X610X44	810X610X44
	g.Number of circuits		2/2	2/2
Outdoor air flow		m3/h	2200	2200
Outdoor noise level		dB(A)	56	56
Outdoor unit	Dimension(W*H*D)	mm	895X655X345	895X655X345
	Packing (W*H*D)	mm	1050X780X470	1050X780X470
	Net/Gross weight	Kg	76/82	76/82
Refrigerant type		R410A g	980X2	900+1100
Design pressure(Hi/Lo)		MPa	4.4/2.0	4.4/2.0
Refrigerant piping	Liquid side/ Gas side	mm(inch)	Φ6.35/Φ9.53	Φ6.35/Φ9.53; Φ6.35/Φ12.7
	Max. refrigerant pipe length	m	15	15
	Max. difference in level	m	10	10
Connection wiring			No	
Plug type			No	
Thermostat type			Electronic control	
Operation temp		℃	17-30	
Ambient temp		℃	18~43(cooling); -7~24(heating)	

Outdoor Model			M3OA-27HRN1	M3OA-30HRN1
Power supply		Ph-V-Hz	1Ph,220-240V~,50Hz	1Ph,220-240V~,50Hz
Cooling	Capacity	Btu/h	27000	30000
	Capacity	W	7913	8792
	Input	W	2570	2880
	Rated current	A	13.1	13.7
	EER	w/w	3.03	3.02
Heating	Capacity	Btu/h	30000	34000
	Capacity	W	8792	9965
	Input	W	2700	3070
	Rated current	A	13.3	14.2
	EER	w/w	3.22	3.22
Max. input power		W	3600	3600
Max. current		A	16.6	16.6
Starting current		A	31.8	31.8
Compressor	Model		PA200X2CS-4KU1；PA145X2C-4FT	PA200X2CS-4KU1；PA145X2C-4FT
	Type		ROTARY	ROTARY
	Brand		GD TOSHIBA	GD TOSHIBA
	Capacity	Btu/h	16791+12014	16791+12014
	Input	W	1670+1200	1670+1200
	Rated current(RLA)	A	7.81+5.6	7.81+5.6
	Locked rotor Amp(LRA)	A	57+57	57+57
	Thermal protector		Internal	Internal
	Capacitor	uF	45+35uF/370VAC	45+35uF/370VAC
	Refrigerant oil	ml	750+480	750+480
Outdoor fan motor	Model		YDK50-4G1	YDK50-4G1
	Brand		Welling	Welling
	Input	W	200	200
	Capacitor	uF	4uFx2	4uFx2
	Speed	r/min	1150	1150
Outdoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	25.4x24	25.4x24
	c.Fin spacing	mm	1.7	1.7
	d.Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	e.Tube outside dia.and type	mm	Φ9.53, Innergroove tube	Φ9.53, Innergroove tube
	f.Coil length x height x width	mm	813X812X44	813X812X44
	g.Number of circuits		3/3	3/3
Outdoor air flow		m3/h	3200	3200
Outdoor noise level		dB(A)	58	58
Outdoor unit	Dimension(W*H*D)	mm	860X830X330	860X830X330
	Packing (W*H*D)	mm	1000X985X425	1000X985X425
	Net/Gross weight	Kg	81/90	81/90
Refrigerant type		R410A g	1550+1150	1550+1150
Design pressure(Hi/Lo)		MPa	4.4/2.0	4.4/2.0
Refrigerant piping	Liquid side/ Gas side	mm(inch)	Φ6.35/Φ9.53	Φ6.35/Φ9.53; Φ6.35/Φ12.7
	Max. refrigerant pipe length	m	15	15
	Max. difference in level	m	10	10
Connection wiring			No	
Plug type			No	
Thermostat type			Electronic control	
Operation temp		℃	17-30	
Ambient temp		℃	18~43(cooling); -7~24(heating)	

4 Dimension

4.1 Indoor unit dimension

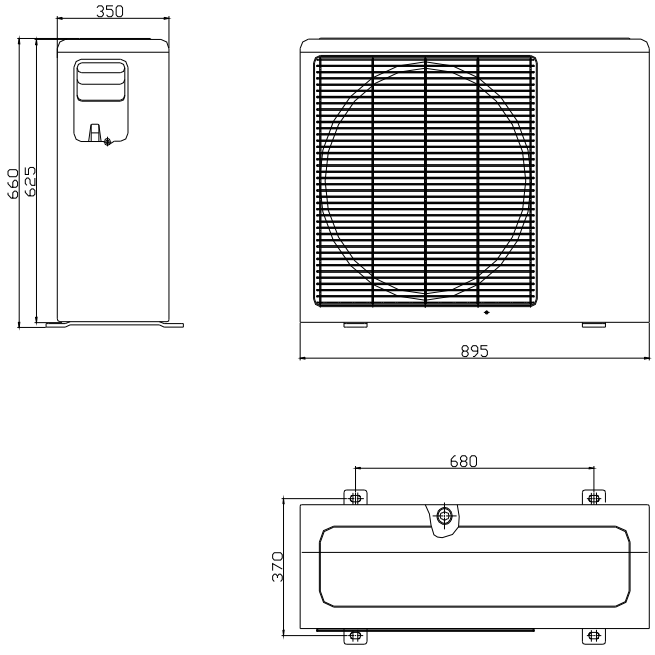
a) Indoor unit 9



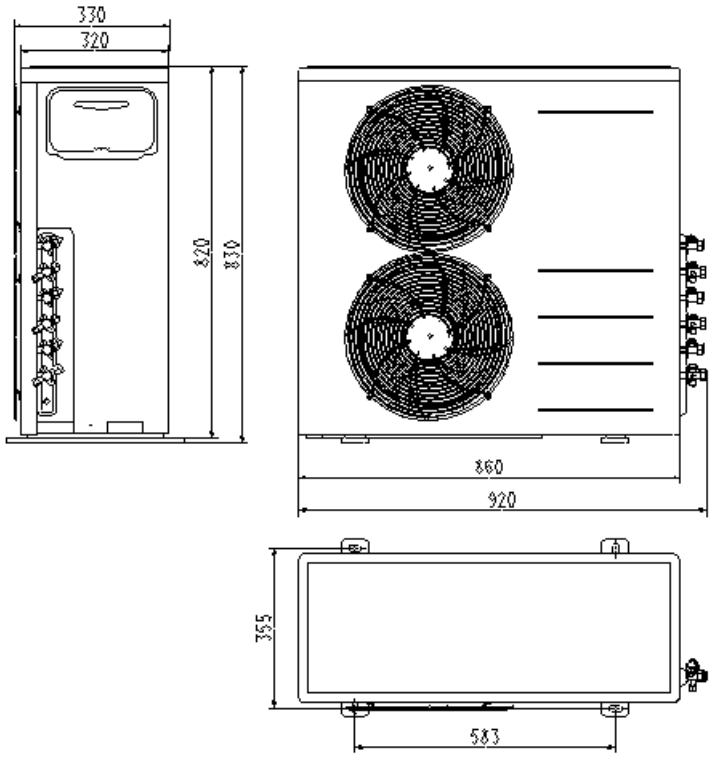
Dimension / Mode	W	H	D
9K	710	250	194
12K	790	265	198

4.2 Outdoor unit dimension

a) Outdoor unit 18K/21K

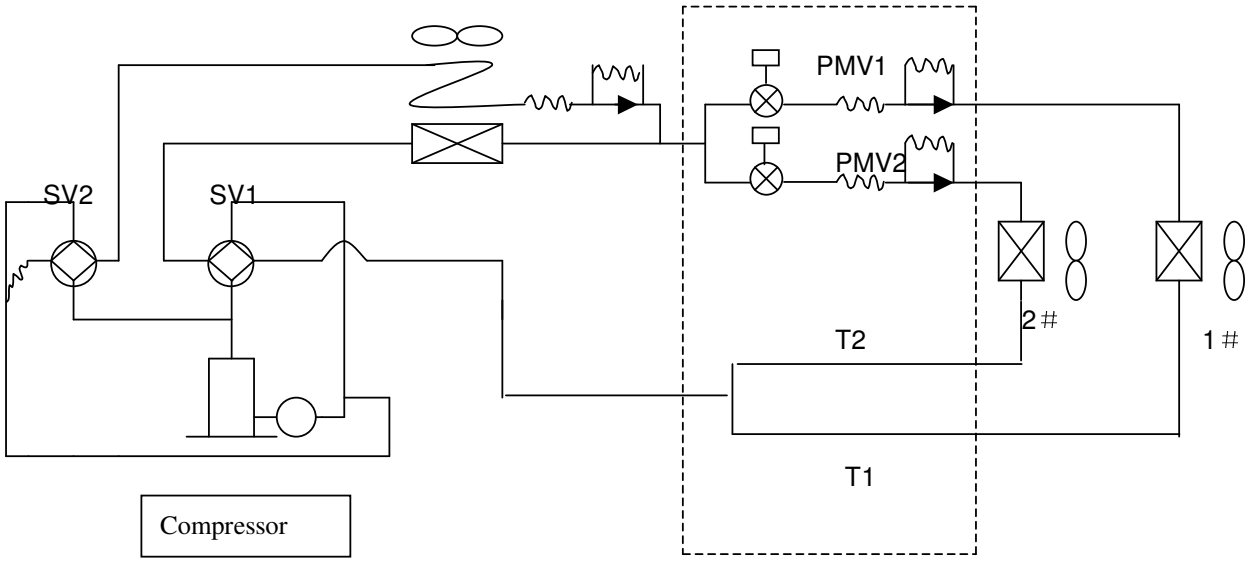


b) Outdoor unit 27K/30K



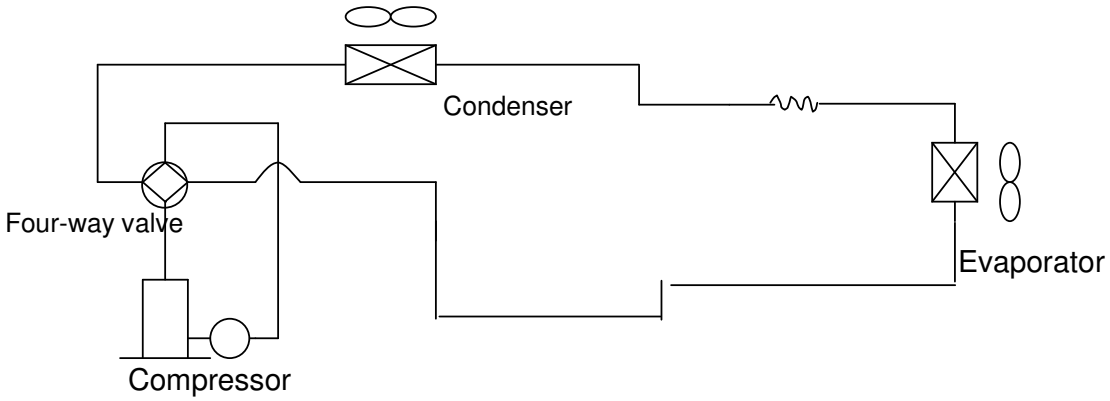
5. Refrigeration cycle diagram

"1 drives 3 system" is made up of one "1 drive 1 system" and one "1 drive 2 system".



1 drive 2 system

SV1：Primary four-way valve SV2：Secondary four-way valve PMV1，PMV2：Electronic expansive valve
T1，T2：Indoor pipe temperature sensor



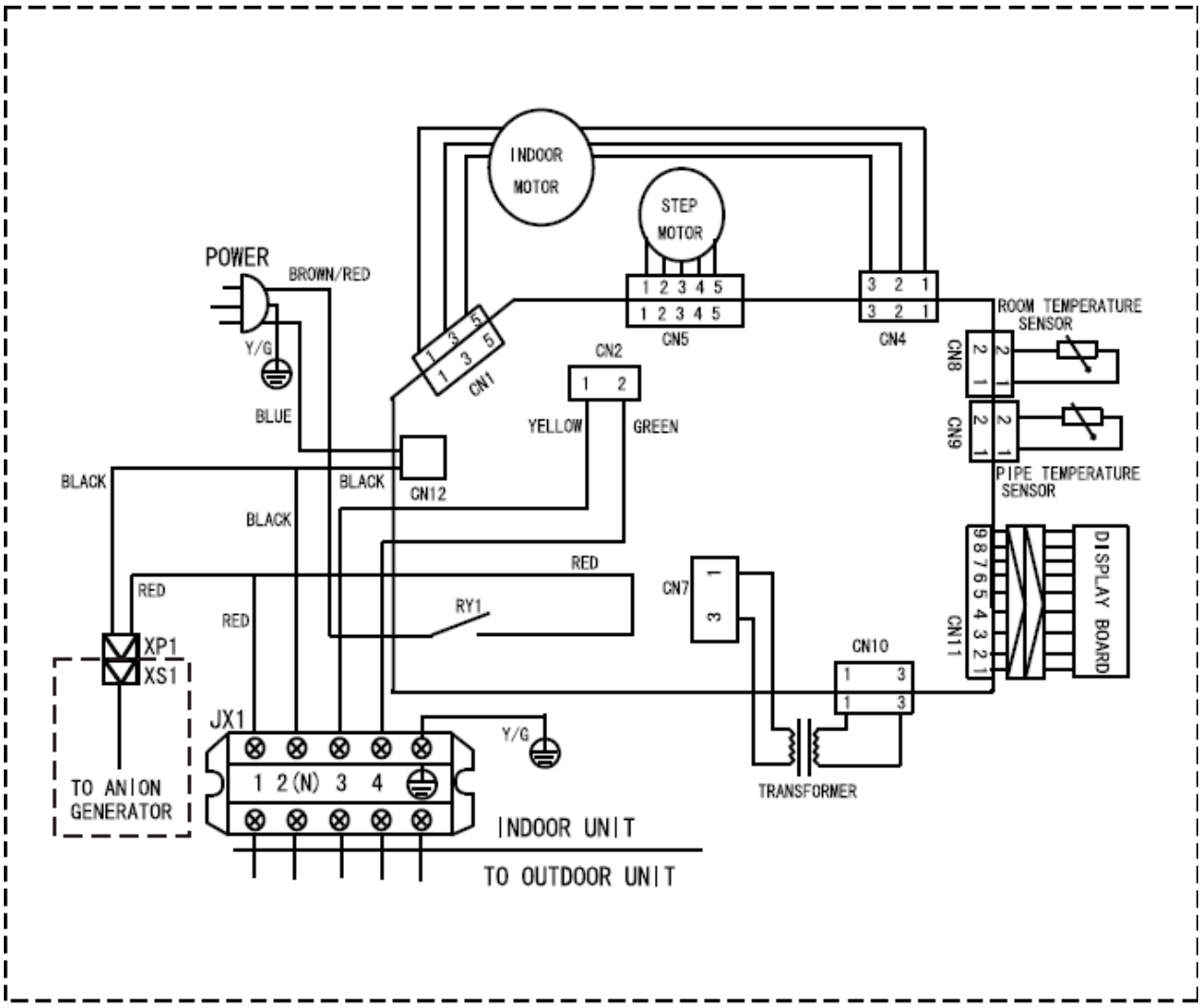
1 drive 1 system

Notice：For 1 drives 2 system, there are two individual refrigerant circuit and two compressors, but for the 1drive 2 system in the 1 drive 3 system, there is only one refrigerant circuit and only one compressor.

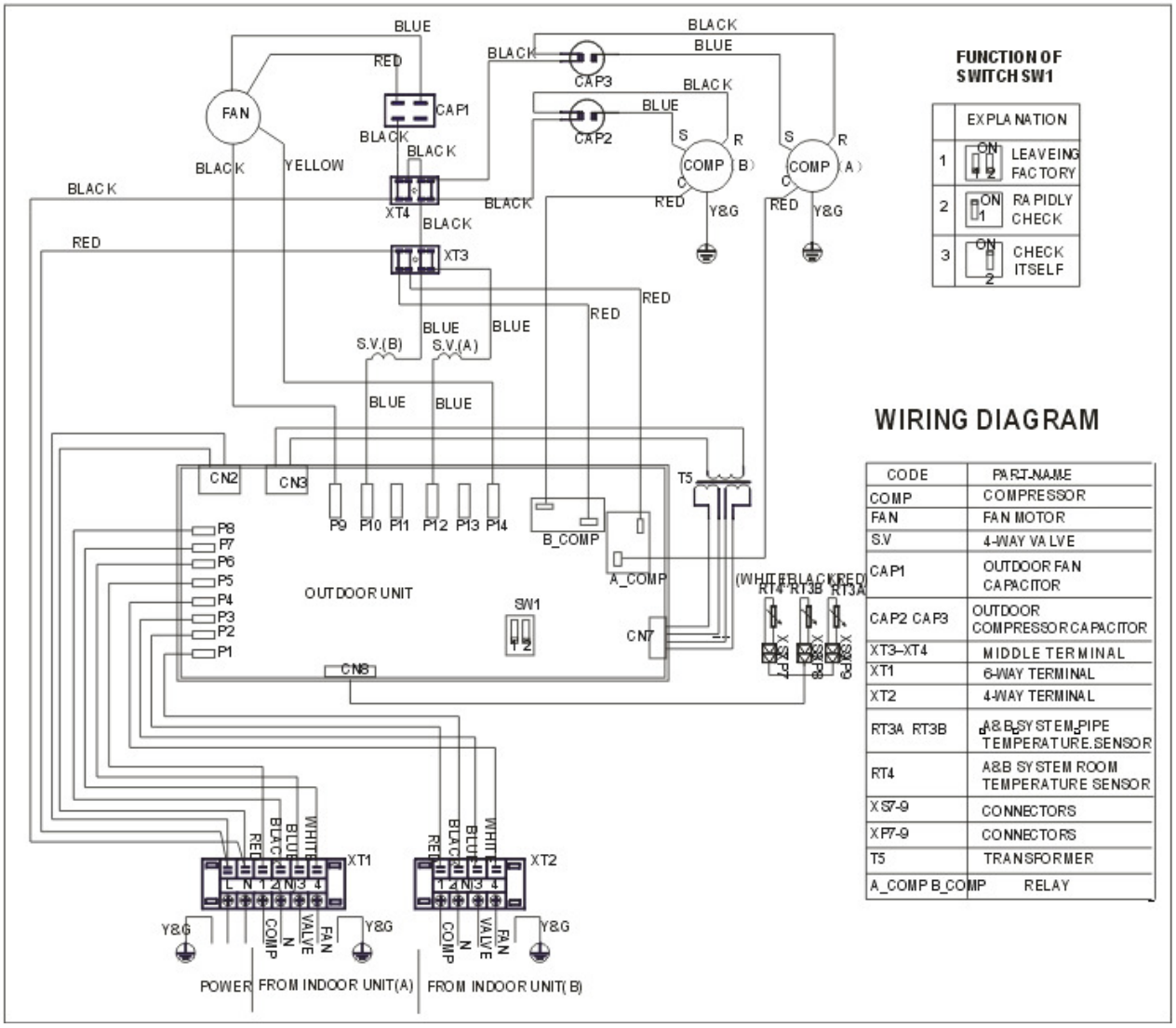
6. Wiring diagram

6.1 Indoor unit

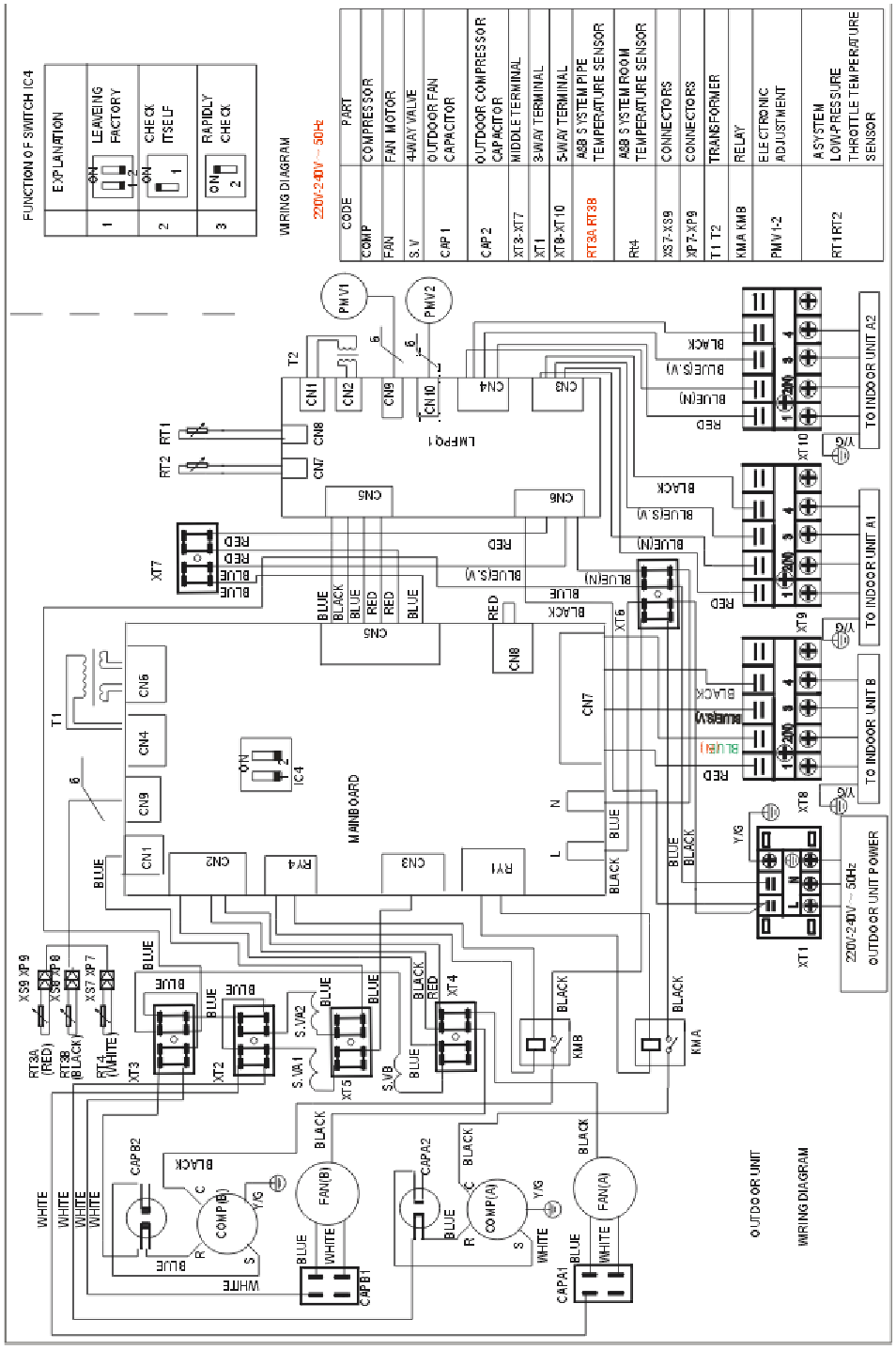
Indoor unit



6.2 Outdoor unit



For 1 drive 2 outdoor unit



For 1 drive 3 outdoor unit

7. Troubleshooting

7.1 Indoor unit

Display	STATUS
E1	EEPROM error
E2	Zero-crossing examination error
E3	Fan speed beyond control
E4	Over current protection of the compressor occurs 4 times
E5	Open or short circuit of Room temperature sensor
E6	evaporator temperature sensor open or short circuit of

7.2 Outdoor unit (on mainboard)

7.2.1 1 drive 2

Failure phenomenon	LED1	LED2	LED3
Stand by	☆	☆	☆
High temp. protect of condenser		☆	☆
Temp. sensor in condenser 1 is open circuit or short circuit	☆		
Temp. sensor in condenser 2 is open circuit or short circuit		☆	

☆ Flash at 2Hz

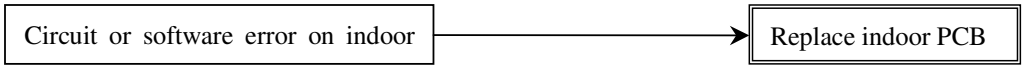
7.2.2 1 drive 3

Failure phenomenon	LED1	LED2	LED3	Sensor in outdoor unit
High temp. protect of condenser		☆	☆	RT3B or RT3A
RT3A sensor is open circuit or short circuit	☆			RT3A
RT4 sensor is open circuit or short circuit			☆	RT4
RT3B sensor is open circuit or short circuit		☆		RT3B

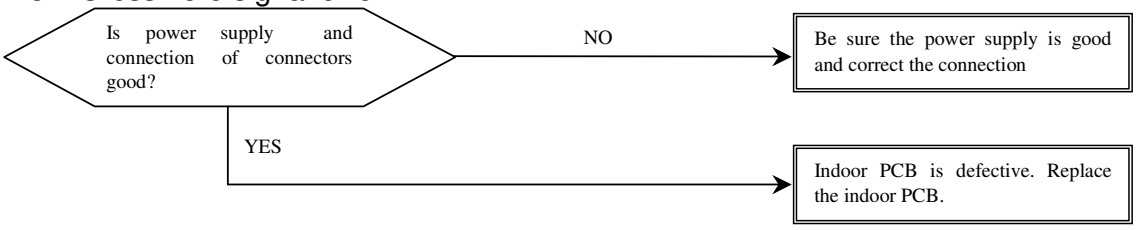
☆ Flash at 2Hz

7.3 Diagnostic chart

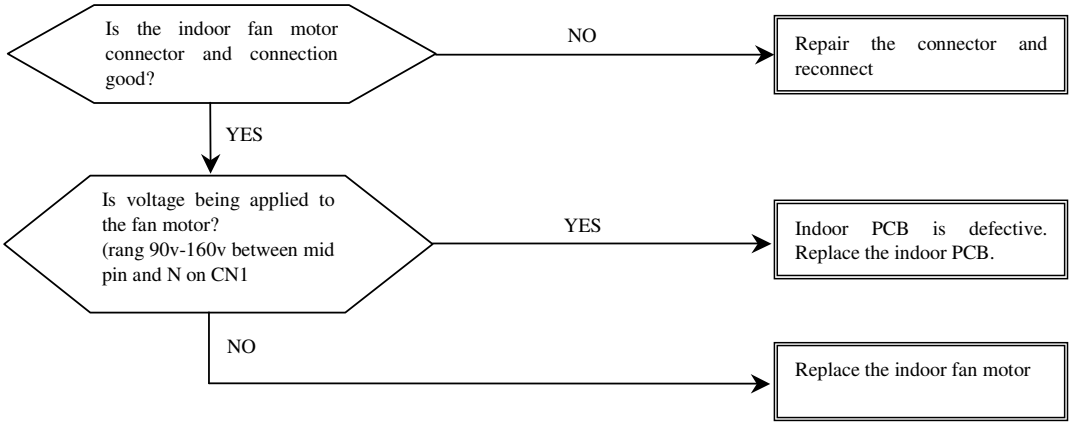
7.3.1 EEPROM error



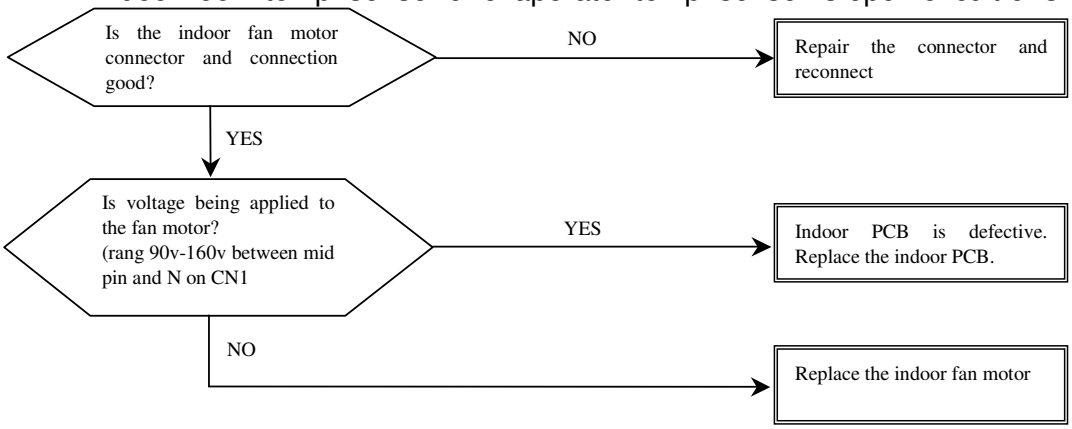
7.3.2 Cross zero signal error



7.2.3 Indoor fan speed has been out of control for over 1 minute

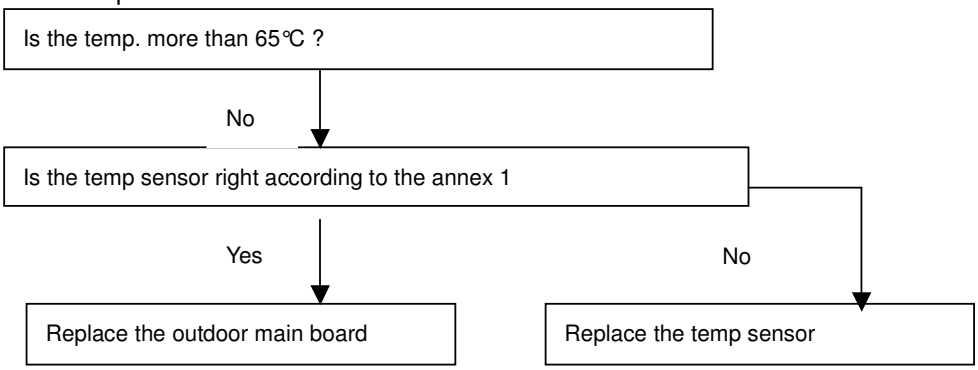


7.2.4 Indoor room temp. sensor or evaporator temp. sensor is open circuit or short circuit

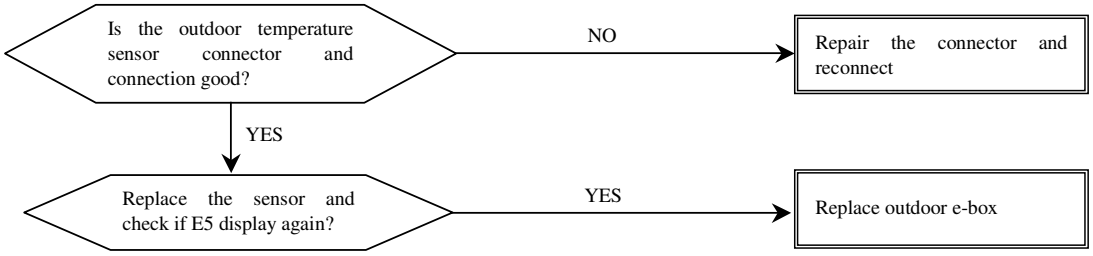


7.2.5 High temp. Protect of condenser

When outdoor pipe temp. is more than 65℃, the unit will stop, and unit runs again when outdoor pipe temp. less than 52℃.



7.2.6 Temp. Sensor in condenser is open circuit or short circuit



8 Electronic functions

8.1 Electric Control working environment

8.1.1 Input voltage: 175~253V

8.1.2 Input power frequency: 50Hz/60Hz

8.1.3 Ambient temperature: -7°C~+43°C

8.1.4 Indoor fan normal working amp is less than 1A,

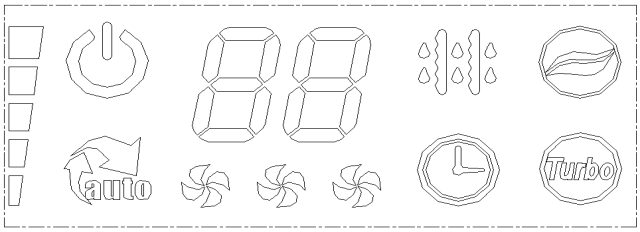
8.1.5 Outdoors fan normal working amp is less than 1.5A

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

8.1.7 Swing motor: DC12V.

8.1.8 Display board

10.1 Display board



ON/OFF indicator

This indicator illuminates when the air conditioner is in operation.

PRE.-DEF. Indicator (For Cooling & Heating models only)

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

Auto Mode

This indicator illuminates when the air conditioner is in Auto Mode.

Turbo indicator

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

TEMPERATURE indicator

Usually it displays the temperature settings.

TIMER indicator

This indicator illuminates when TIMER is set ON/OFF.

FAN SPEED indicator

This indicator illuminates when change the fan speed.

Ionizer (Plasma) function indicator

This indicator illuminates when Ionizer (Plasma) function is on.

8.2 Proper symbols and their meanings

TA: Indoor ambient temperature
TE: Indoor evaporator temperature
TS: Setting temperature through the remote controller
TE1: Anti-cold wind, from Fan Off to Breeze temperature
TE2: Anti-cold wind, from Breeze to Setting Fan Speed temperature
TE3: Anti-cold wind, from Setting Fan Speed to Breeze temperature
TE4: Anti-cold wind, from Breeze to Fan Off temperature
TE5: Evaporator low temperature protection entering temperature
TE6: Evaporator low temperature protection restoring temperature
TE7: Evaporator high temperature protection, compressor off temperature
TE8: Evaporator high temperature protection, fan off temperature
TE9: Evaporator high temperature protection, restoring temperature
T3: Outdoor unit pipe sensor
T4: Outdoors temperature sensor

8.3 Systematic functions.

Remote receiving.
Testing and forced run.
Position set for indoor unit wind vane.
LED display and alarm.
On or off Timer.
Protection for the compressor.
High temperature protection of indoor heat exchanger in heating mode.
Auto defrosting and heating recovery under heating mode.
Anti cold air under heating mode.
Anti frozen under cooling mode.

8.4 Protection

8.4.1 The compressor functions protection with a delay of three minutes.
8.4.2 High temp. protection of condenser.
8.4.3 Sensor protection at open circuit and breaking disconnection
8.4.4 Temperature Fuse break protection
8.4.5 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 entire unit stops and LED displays failure information and can't returns to normal operation automatically.

8.5 Fan-only mode

Fan speed is high/mid/low/ Auto

8.6 Cooling mode

The 4-way valve is closed under cooling mode.
The action of the compressor and the outdoor fan:

	Condition	Compressor	Outdoor fan
Temp. up	TA> Ts+1	On	On
	TA<Ts+1	Off	Off
Temp. down	TA> Ts	On	On
	TA<Ts	Off	Off

TA: Indoor ambient temperature

TS: Setting temperature through the remote controller

Auto fan under cooling mode:

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Temp. up	T<3□	Low
	3□<T<5□	Med.
	T>5□	High
Temp. down	T> 3□	High
	1□<T<3□	Med.
	T<1□	Low

Anti-freezing control to indoor evaporator under cooling mode

	Condition		Compressor	Outdoor fan
	Temp.	Time		
Temp. up	T> TE6		On	On
	T< TE6	>5 Minutes	Off	Off
Temp. down	T> TE5		On	On
	T< TE5	>5 Minutes	Off	Off

Condenser high-temperature protection under heating mode
T3 >65□,turn off compressor.
TE5: Evaporator low temperature protection entering temperature
TE6: Evaporator low temperature protection restoring temperature

8.7 Dehumidifying mode

8.7.1 The 4-way valve is off in dehumidifying mode

8.7.2 Compressor and Indoor Fan actions in dehumidifying mode
Compressor run 5 minutes, and indoor fan run 5 minutes in low speed, then turn off the compressor, indoor fan run 5 minutes in low speed. And repeat on and off cycle.

8.7.3 Low room temperature protection:
When room temperature decreases to below 10□, the compressor and the outdoor fan will stop(indoor fan is Breeze). Dehumidifying operation will be resumed when room temperature restores to over 13□.

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

8.8 Heating mode

8.8.1 Generally, the 4-way valve is open in heating mode, but it is closed in defrosting mode. 4-way valve must delay 2 minutes compared with compressor if the compressor changed into non-heating mode or turned off. 4-way valve doesn't delay in dehumidifying mode.

8.8.2 Generally, the outdoors fan is turned off with the on-off action of compressor in heating mode, except for the defrosting mode or the end of defrosts.

8.8.3 Action conditions of compressor under heating mode: compressor must run for 7 minutes after starting and then judge temperature. Meanwhile other protections are still valid.

	Condition	Compressor	Outdoor fan
Room temp. up	TA> Ts+3	Off	Off
	TA<Ts+3	On	On
Room temp. down	TA< Ts+2	On	On
	TA>Ts+2	Off	Off

TA: Indoor ambient temperature

TS: Setting temperature through the remote controller

8.8.4 Indoor Fan actions under heating mode

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

Anti-cold wind control function under heating mode

	Condition TE	Indoor fan speed
Indoor exchanger temp. up	TE<TE1	Off
	TE1<TE<TE2	Breeze
	TE>TE2	Setting fan speed
Indoor exchanger temp. down	TE> TE3	Setting fan speed
	TE3<TE<TE4	Breeze
	TE<TE4	Off

TE: Indoor evaporator temperature

TE1: Anti-cold wind, from Fan Off to Breeze temperature

TE2: Anti-cold wind, from Breeze to Setting Fan Speed temperature

TE3: Anti-cold wind, from Setting Fan Speed to Breeze temperature

TE4: Anti-cold wind, from Breeze to Fan Off temperature

8.8.5 Auto wind under heating mode

	Condition T=Indoor Temp.-Setting Temp.	Indoor fan speed
Room temp. up	T<2□	High
	T>2□	Med.
Room temp. down	T> 0□	Med.
	T<0□	High

8.8.6 Indoor evaporator high-temperature protection under heating mode

	Condition	Compressor	Outdoor fan
Indoor exchanger temp. up	TE<TE8	On	On
	TE8<TE<TE7	On	Off
	TE>TE7	Off	Off
Indoor exchanger temp. down	TE>TE9	Off	Off
	TE<TE9	On	On

TE: Indoor evaporator temperature

TE7: Evaporator high temperature protection, compressor off temperature

TE8: Evaporator high temperature protection, fan off temperature

TE9: Evaporator high temperature protection, restoring temperature

8.9 Defrosting operation (Available for heating only).

8.9.1 Defrosting condition:

When T3<0□ and compressor runs 40 minutes.

T3: Temp. of condenser.

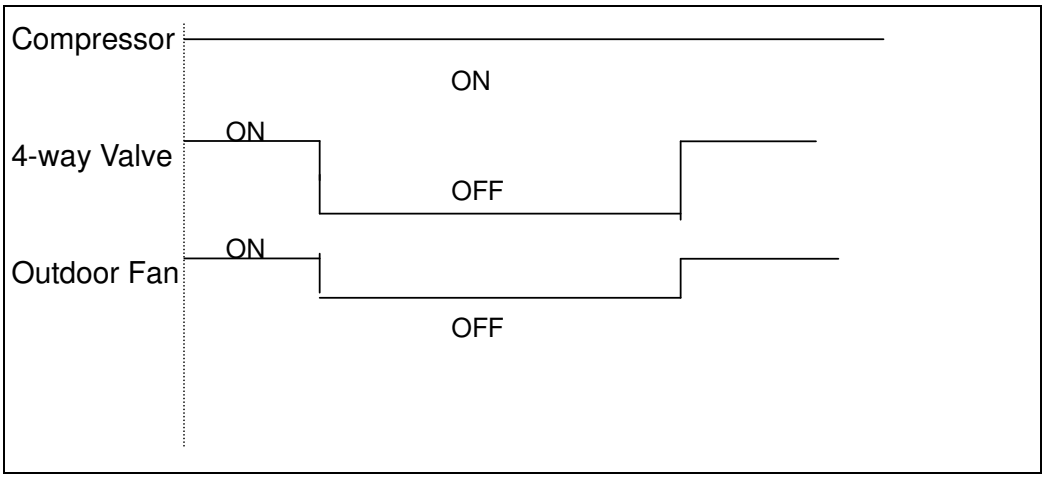
8.9.2 Ending condition of defrost

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

A.The defrost time has reached to 10 minutes.

B.T3>20. □

8.10.3 Time sequence of the whole defrosting procedure is as follows



8.10 Automatic operation mode

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

TA—TS	Operation mode
TA—TS>2□	Cooling
-1□≤TA—TS≤+2□	Fan-only
TA—TS<-1□	Heating (Fan-only for cooling only type)

8.10.2 The indoor fan blows automatically in corresponding selected mode.

8.10.3 The motion of indoor fan's vane should accord with the selected operation mode.

8.10.4 One mode should be carried out for at least 15 minutes once selected. If the compressor cannot start for 15 minutes, reselect the operation mode according to the room temp. and set temp.or reselect when the set temp. varies.

8.11 Forced cooling function

8.11.1 Select forced cooling function with the forced cooling button or the switch.

8.11.2 The compressor is unconditionally turned on, after 30 minutes cooling operation whose fan mode is set as low; the A/C operates under the DRY mode with a set temp. of 24□.

8.11.3 All protections of remote control cooling are available under forced cooling operation.

8.12 Forced Auto function

Select forced auto function with the forced auto button or the switch in the display board.

In forced auto status the A/C operates under remote control mode with a set temp. of 24□.

8.13 Timer Function Requirement

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

8.14 Economic Running

8.14.1 The economic running function is available under cooling, heating or auto mode.

8.14.2 Cooling:

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

8.14.3 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).

8.14.4 Auto:

The economic running function operates in accordance with the selected running mode by the auto mode.

8.15 Mode conflict

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

Heating mode has a priority.

8.16.1Definition

	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

9 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