AKIRA

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Air Conditioner

Service Manual

MODEL:
AC-S13CGA

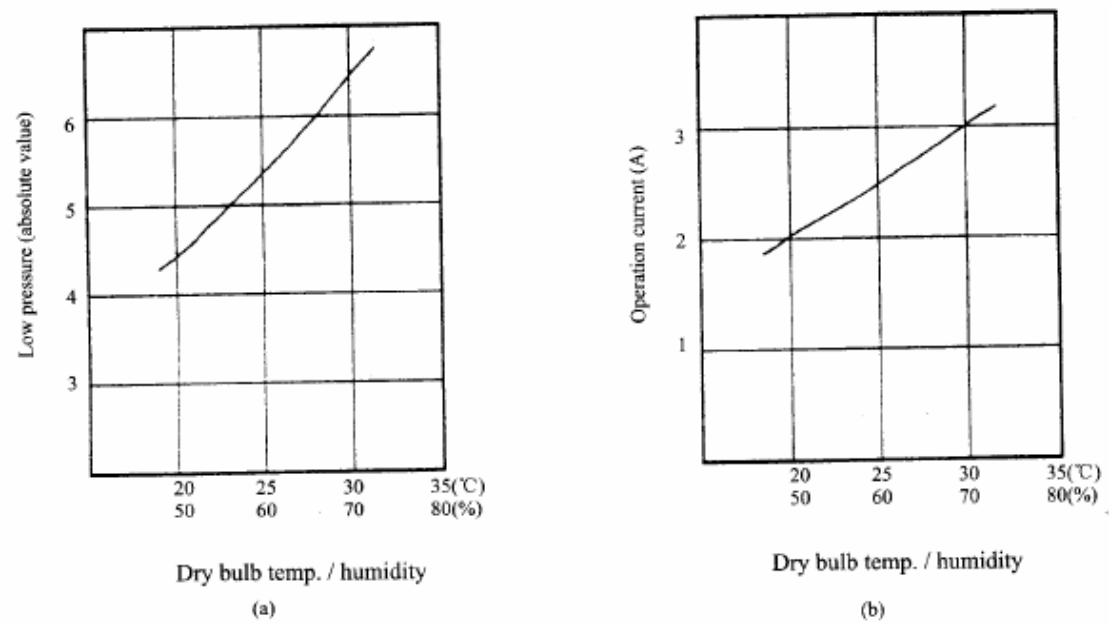
CONTENTS

TECHNICAL SPECIFICATION

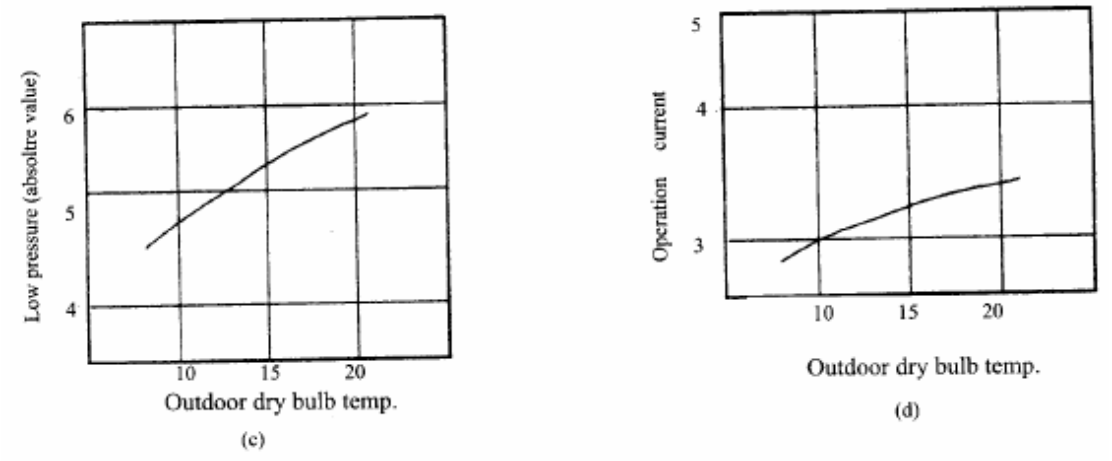
Content			AC-S13CGA
Function			Cooling
Power supply			1Ph 220~230V-50Hz
Capacity (BTU/h)			12000
Rated input (W)			1195
Rated current (A)			5.33
Air flow (m^3/h)			480
Dehumidifying volume (L/h)			1.4
EER(W/W)			2.5
Indoor unit	Motor fan speed(r/min)		1190/1090/990
	Output power(w)		14
	Fan type/piece		Cross flow fan-1
	Diameter-length(mm)		97mm x 583
	Evaporator		Aluminum fin-copper tube
	Row-fin distance(mm)		2-1.4
	Working area(m^2)		0.14
	Swing motor		MP24GA
	Input/Power(W)		2
	Fuse(A)		Controller 3.15A Transformer 0.2A
	Working capacitor(uF)		1
	Noise(dB(A))		< 40 / = 40
	Dimension (width-height-depth)(mm)		770 x 250 x 180
	Net weight(Kg)		8.5
Outdoor unit	Input power	W	1179
	Current	A	5.33
	L.R.A.	A	29
	Throttling method		Capillary
	Compressor		RH207VHKC
	Starting method		Capacitor Starting
	Working temp.		<115°C / =115°C
	Condenser		Aluminum fan-copper tube
	Pipe-diameter		9.52
	Row-fin distance (mm)		1-1.6
	Working area		0.4
	Fan motor speed(rpm)		48/880
	Type-piece		Axial fan-1
	Diameter(mm)		400
	Defrosting method		Auto defrost
	Noise(dB(A))		56
	Dimension (width-height-depth)(mm)		848 x 540 x 320
	Net weight(Kg)		40
	Refrigerant charge(kg)		R22/0.8
Connecting pipe	Length (m)		4
	Outer diameter	Liquid pipe	6(1/4")
		Gas pipe	12(1/2")
	Max distance	Height(m)	5
		Length(m)	10

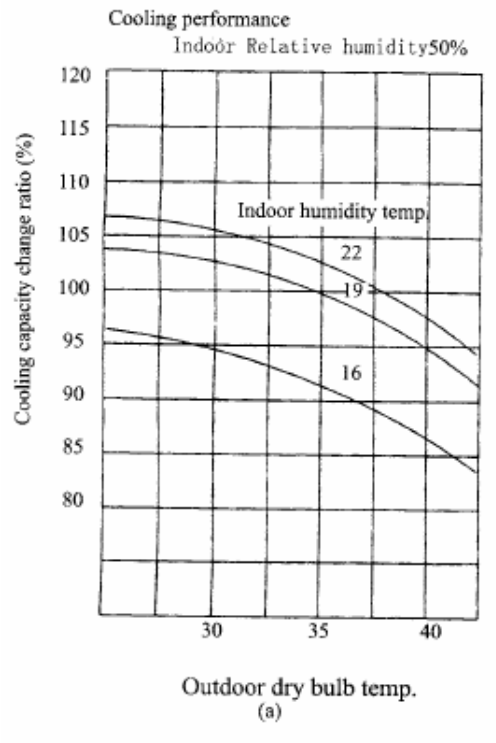
PERFORMANCE CURVE

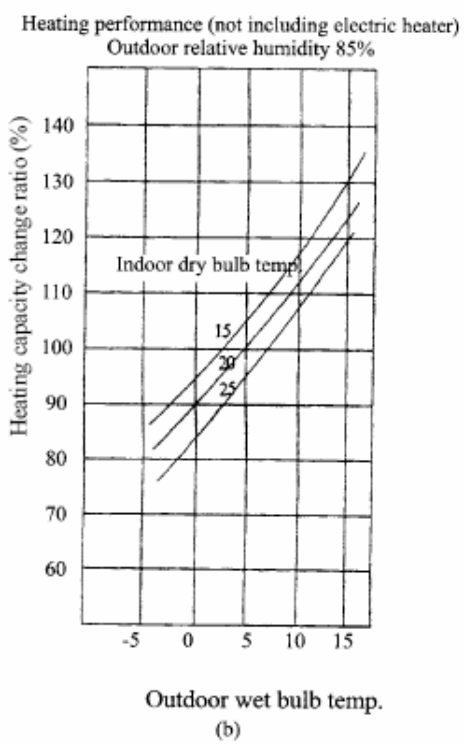
The change relation between low pressure, operation current and temp.
Cooling operation condition: In testing, indoor and outdoor have same work condition.

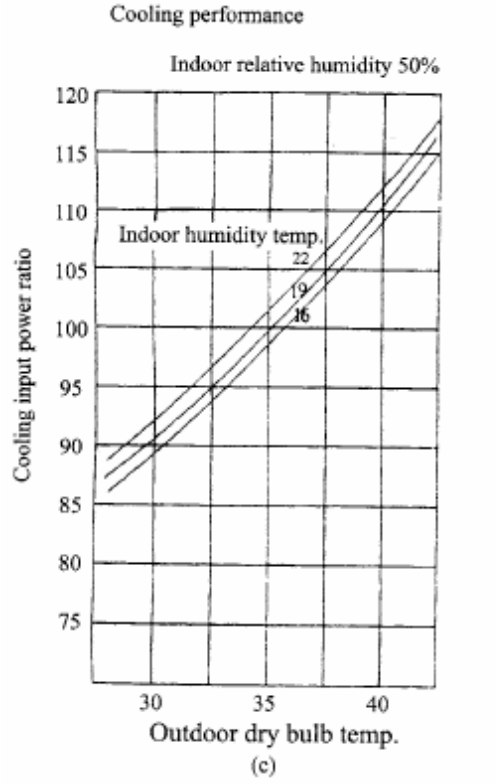


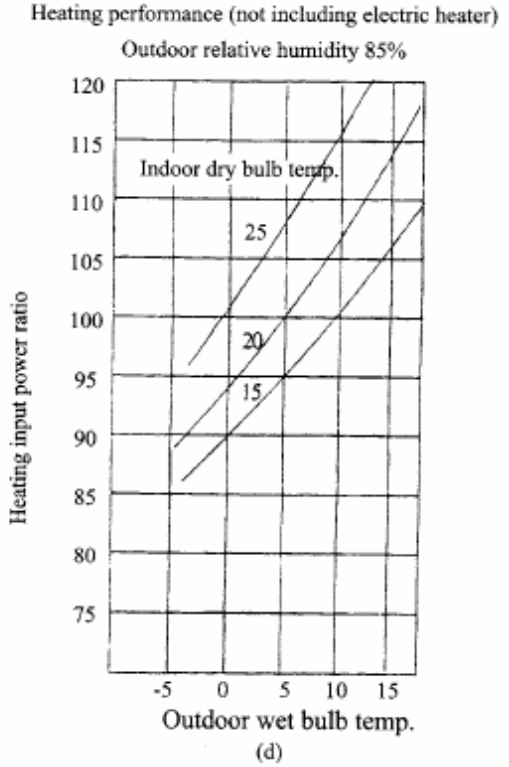
Heating operation
Indoor work condition: dry bulb temp.21, wet bulb temp. 15.5 ^{o}C.

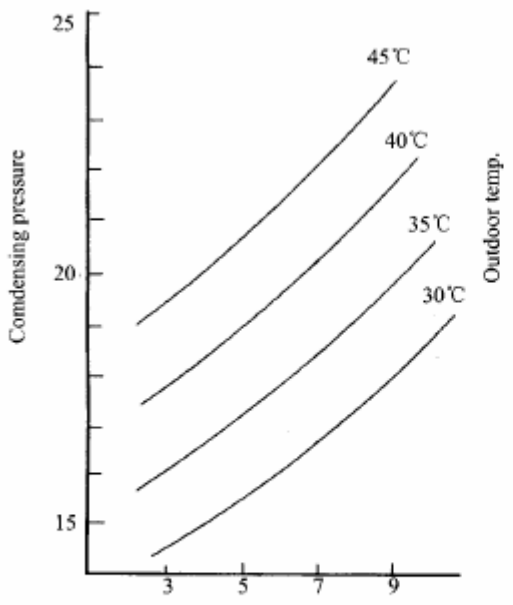




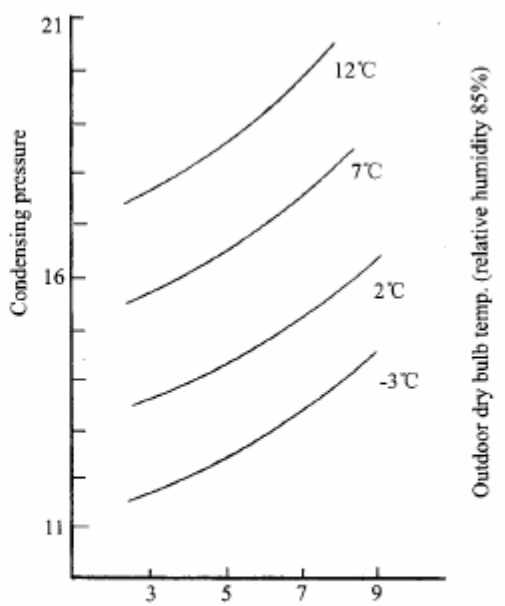




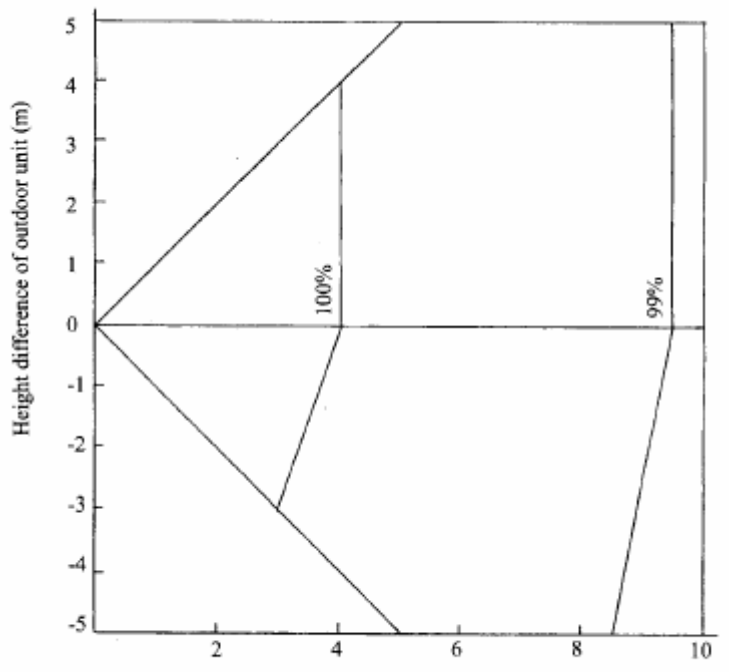




The affection to the charging quantity by pressure under cooling work condition.
(Indoor work condition:dry bulb 27℃,wet bulb 19.5℃)
(e)

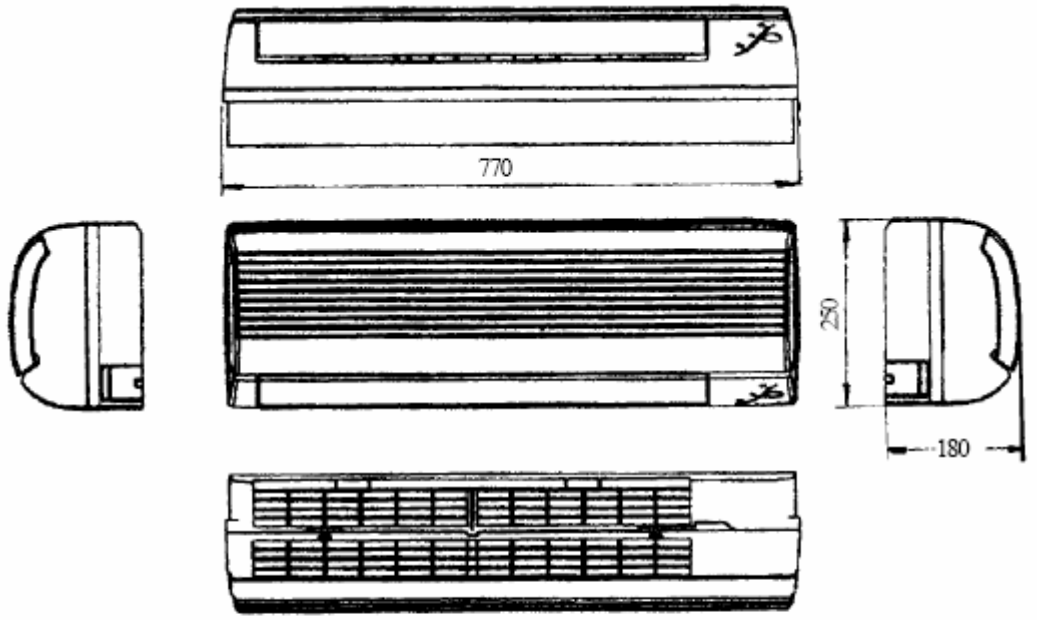


The affection to the charging quantity by pressure under cooling work condition.
(Indoor work condition:dry bulb 21℃)
(f)

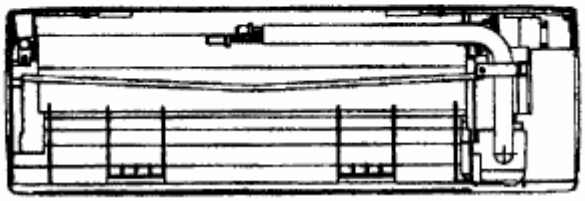


Cooling capacity vary with the length of connection pipe

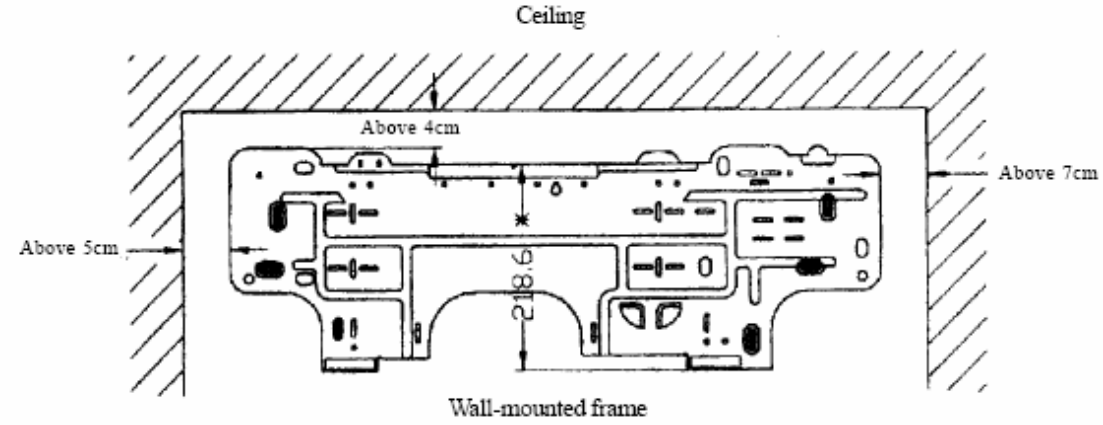
OUTLINES AND DIMENSIONS OF INDOOR UNIT



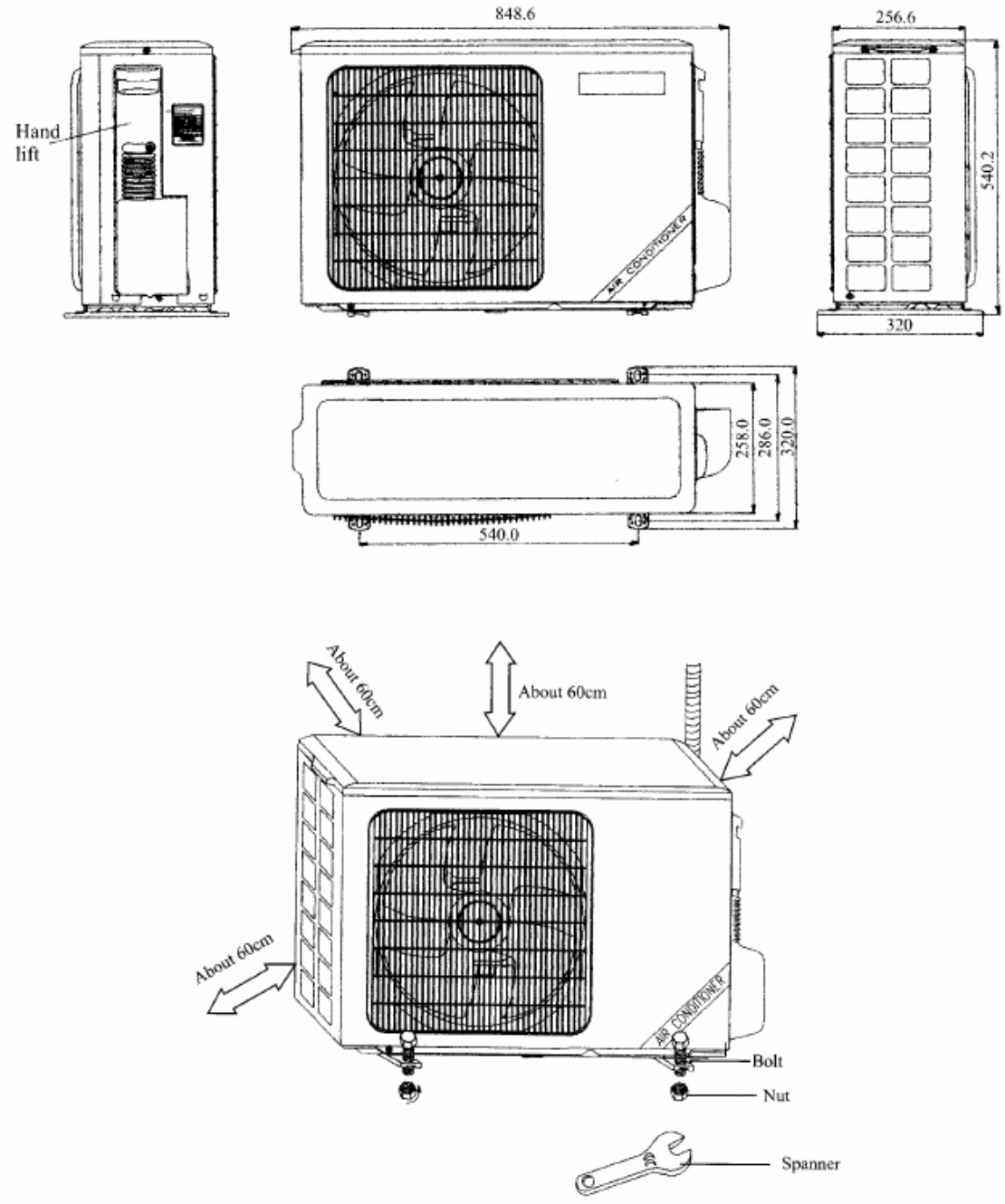
Back view



Unit:mm

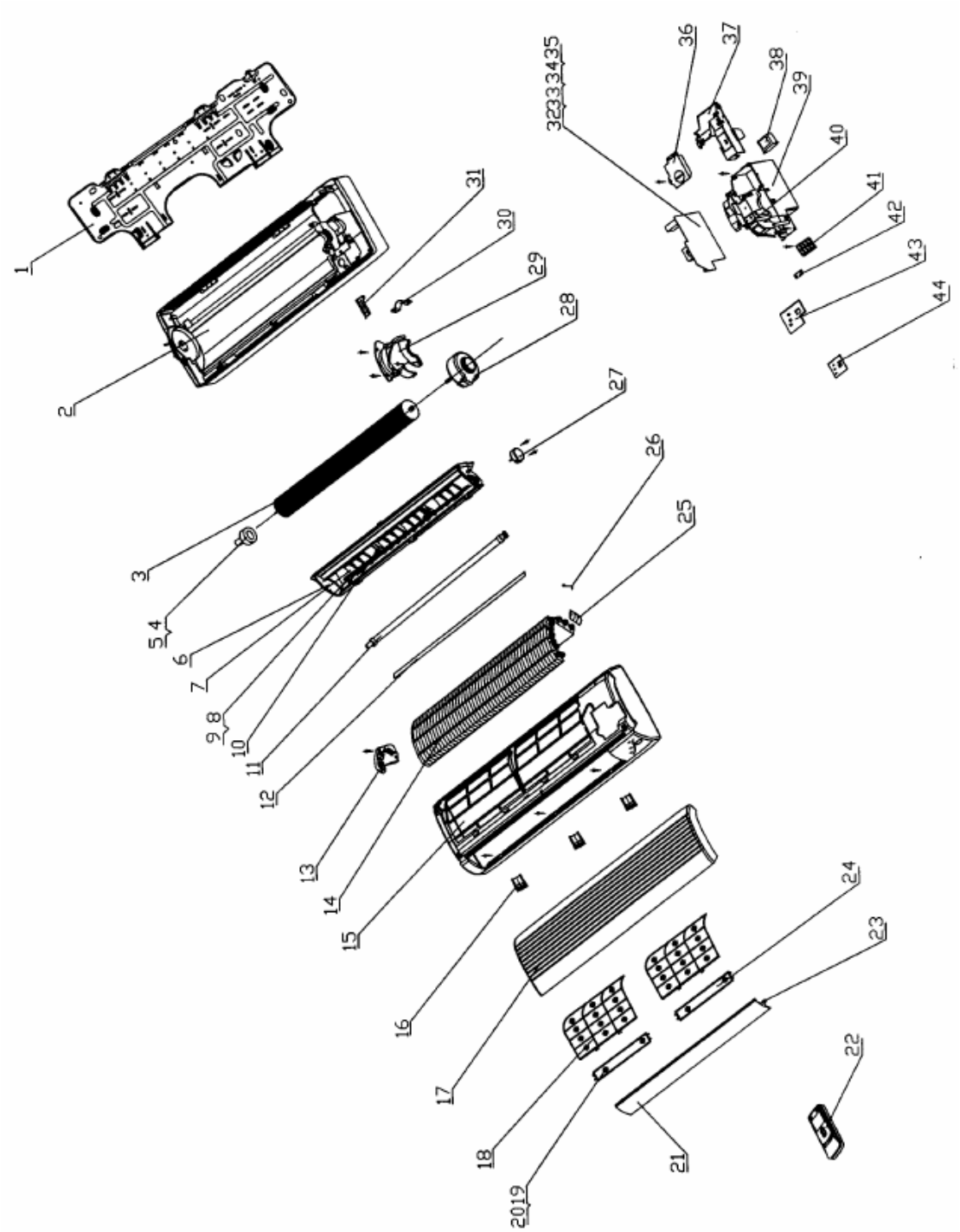


OUTLINES AND DIMENSIONS OF OUTDOOR UNIT



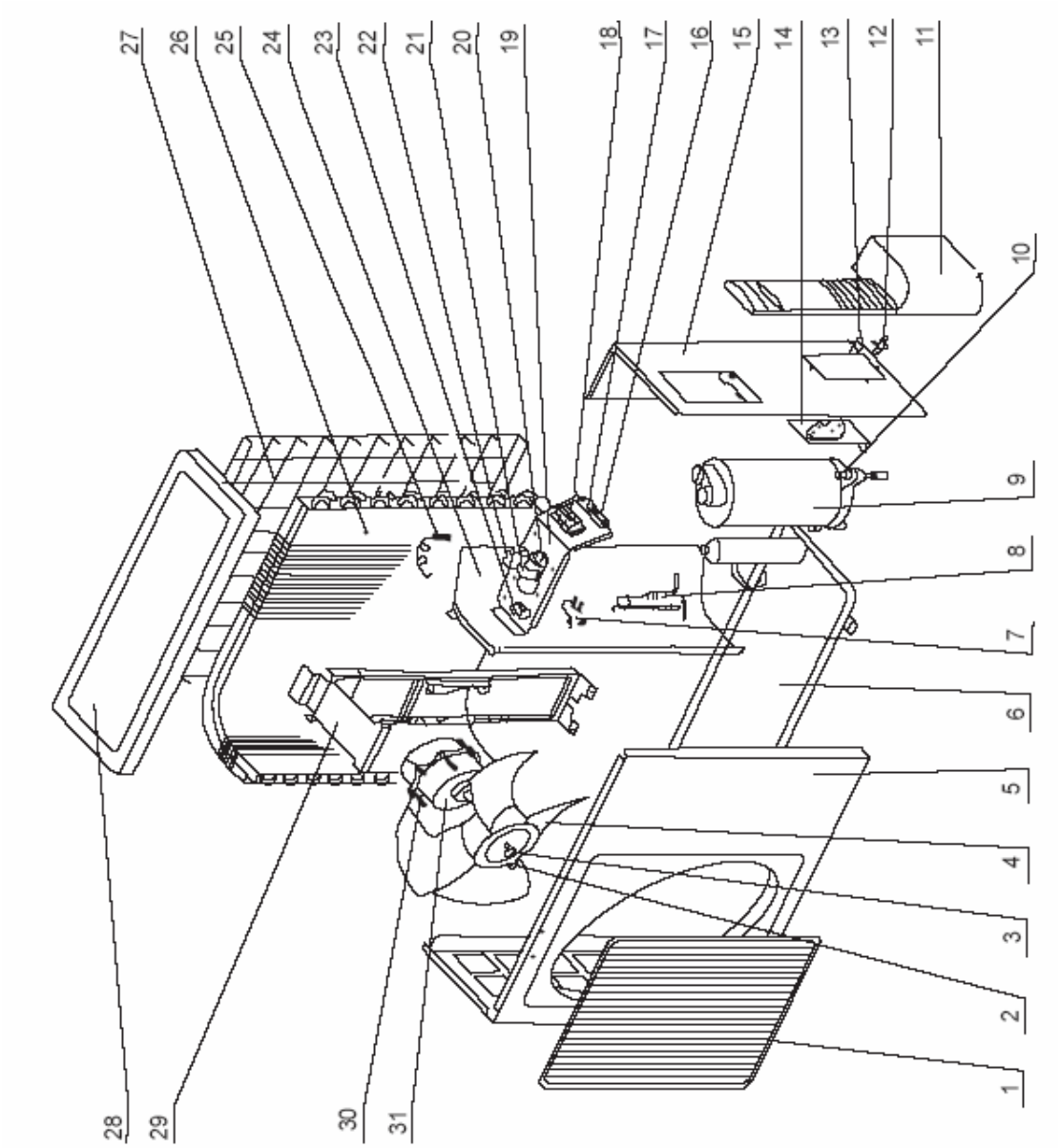
EXPLODED VIEW & PART LIST

INDOOR UNIT



No	Description	Qty
1	Wall-Mounting Frame	1
2	Rear Case	1
3	Cross Flow Fan	1
4	Fan Bearing	1
5	Ring of Bearing	1
6	Water Tray Assy	1
7	Swing Louver	12
8	Connecting Lever 1	1
9	Connecting Lever 2	1
10	Manual Lever	2
11	Drainage Pipe	1
12	Evaporator Gate	1
13	Evaporator Supporter	1
14	Evaporator Assy	1
15	Front Case Assy	1
16	Screw Cover	3
17	Front Panel	1
18	Filter	2
19	Air Cleaner holder	2
20	Air Cleaner A	1
21	Guide Louver	1
22	Remote Controller	1
23	Guide Louver Bearing	3
24	Air Cleaner B	1
25	Evaporator Pipe Cover	1
26	Sensor Insert	1
27	Stepping Motor MP24GA	1
28	Motor FN14A	1
29	Motor Clamp	1
30	Wire Clamp	1
31	Pipe Clamp	1
32	PCB 5K512	1
33	Tube Sensor	1
34	Room Sensor	1
35	Fuse 3.15A 250VAC	1
36	Electric Box Cover 2	1
37	Electric Box Cover	1
38	Transformer	1
39	Electric Box	1
40	Cable Clamp	1
41	Terminal Board T4A3A7377	1
42	Wire Clip	1
43	LED Holder	1
44	LED Board	1
45	Connection Cable	1
46	Power Cord	1

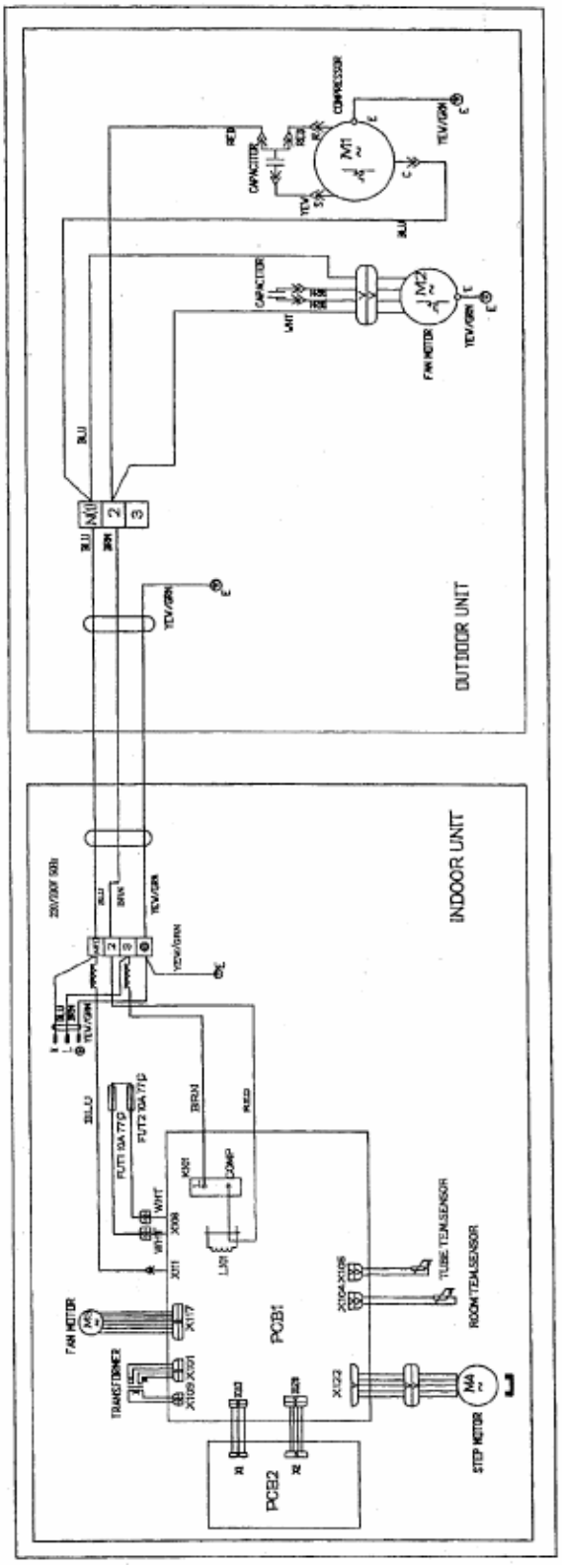
OUTDOOR UNIT



No	Description	Qty
1	Front Grill	1
2	Nut M6	1
3	Washer 6	1
4	Axial Flow Fan	1
5	Front Plate	1
6	Metal Base	1
7	4-way Valve	1
8	Capillary Assy	1
9	Compressor RH207VHKC	1
10	Nut with Washer M8	3
11	Handle	1
12	Valve 1/2"	1
13	Valve 1/4"	1
14	Valve Support	1
15	Right Side Plate Assy	1
16	Wire Clamp	2
17	Insulation Gasket	1
18	Terminal Board T386A	1
19	Electric Plate	1
20	Comp Capacitor 30uF/450V	1
21	Capacitor clamp	1
22	Fan Capacitor 3uF/450V	1
23	Terminal Board 2-8	1
24	Isolation Sheet Assy	1
25	Tube Sensor	1
26	Condenser Assy	1
27	Rear grill Assy	1
28	Top cover Assy	1
29	Motor Support	1
30	Self-tapping Screw	4
31	Motor FW48A	1

CIRCUIT DIAGRAM

These circuit diagrams are subject to change without notice. Please refer to the ones stuck on the machines.



PCB FUNCTION MANUAL

3 In 1 PCB Function manual

A. Running mode

1. Cooling
2. Dehumidifying
3. Heating
4. Auto

B. Input parameters

1. Indoor ambient temp. T in
2. Evaporator tube temp. T eva
3. Setting temp. T set
4. Condenser tube temp. T con

C. Targets

1. Indoor motor (motor)
2. Swing motor
3. Outdoor motor (single speed motor)
4. Compressor
5. Four-way reversing valve
6. Cooling, dehumidifying indicator; running indicator
7. Digital tube setting temp. indicator or timer indicator

D. Fundamental functions

<u>Cooling mode</u>

1 The running conditions and control measures
   a. If T in > or = T set + 1°C, the machine runs at the cooling mode. Compressor runs, outdoor motor runs at low speed, indoor fan runs at the set fan speed.
   b. If T in < or = T set –1°C, the machine stops. Compressor stops first, outdoor motor stops after 15 seconds, indoor motor runs at the set fan speed.
   c. If T set –1°C < T in < T set +1°C, keep the previous state.
2 In this mode, the reversing valve is inactive, the temp. setting range is from 16~30°C.
3 Protect function
   a. Anti-freezing function.
      i. If compressor have run 6 minutes , and detect T eva < 0°C for continuous 3 minutes, then the compressor, outdoor fan stopped , indoor fan run at the set fan speed. After 3 minutes later, it will run at the original state if T eva > or = 10°C.
   b. Compressor protection
      i. Compressor's starting interval should be more than 3 minutes no matter in whatever modes and conditions. If it's plugged in first time, the compressor does not have 3 minutes delay. When compressor is started, it will not stop within 5 minutes unless it is plugged out.
   c. Overload protection
      i. If it detect the system current surpass the designed 13 A for continuous 3 minutes, the machine go into fan mode, when 3 minutes passed and it detect the current no more than 13 A, it will back to original state. If it detects overloading states for 6 consecutive times, the machine stops, and must be restarted by remote controller.

Dehumidifying mode

1 The working conditions and control measures
   a. If T in > T set + 2°C, it is in cooling running, the indoor motor speed can be selected, and outdoor motor run at low speed.
   b. If T set – 2°C < or = T in < or = T set + 2°C, it goes into dehumidifying running, the indoor motor run at the low speed, 6 minutes later the compressor stops, another 15 seconds later the outdoor fan stops and another 30 seconds later, the indoor motor stops, 3 and a half minutes later, compressor and outdoor fan run again, indoor motor runs at the low speed, then the machine cycle the above procedures repeatedly. Outdoor motor runs at the low speed.
   c. If T in > T set – 2°C, compressor, outdoor motor and indoor motor stop.
2 In this mode, the reversing valve is inactive, the temp. setting range is 16~30°C.
3 Anti-freezing protection.
   a. If T indoor > T set + 2°C, it goes into cooling running, anti-freezing function is same with cooling mode, but the compressor must stops for 4 minutes when it goes into dehumidifying mode, compressor runs 6 minutes, if it detects T eva < 0°C, compressor and outdoor motor stop, indoor motor runs at low speed, after 3 minutes delay, and T eva > or = 10°C, it will be back to its original state.

Heating mode

1 The working conditions and control measures
   a. If T in < or = T set + 2°C, it goes into heating mode, reversing valve, compressor and outdoor motor all work in the same time, indoor fan will run at the same procedures with anti cool air function.
   b. If T in > or = T set + 4°C, compressor stops first, 15 seconds late, outdoor motor stops, but reversing valve keeps working, indoor motor run at the procedures of blowing surplus heat.
   c. If T set + 2°C < T indoor < T set + 4°C, keep the previous running state.
2 In this mode, the temperature setting range is 16~30°C.
3 The working conditions of auxiliary electric heater.
   a. In heating mode, when compressor is working, indoor motor runs at high speed and middle speed. If it detect T eva < 50°C for continuous 8 seconds and T indoor < or = 25°C , electric heater will work, if compressor stop or indoor motor runs at low speed or T eva 54°C or T indoor 28°C or 10 seconds before defrosting, the electric heater will stop.
4 Protections
   a. Anti cool air
      i. When the machine starts heating and T eva > or = 22°C , indoor motor runs at low speed, and swing motor makes the louver at the horizontal position, if T eva > or = 40°C or compressor have run 2 minutes ,indoor motor and swing motor will run at the set speed.
   b. Anti high temp.
      i. In heating mode, if it detect T eva 56°C (58 can be selected), outdoor motor will stop (in this period it will not detect the defrosting temp.). If T eva 52°C, outdoor motor will be back running (it will not detect defrosting temp. in the first 5 seconds).
   c. Blowing surplus heat
      i. In heating mode, when set temp is reached, comp. stops first, 15 seconds later outdoor fan stops, Indoor motor blows 90 seconds (60 seconds can be selected) at low speed ,swing motor makes the louver at the horizontal position.
   d. Compressor's protection is same with the one in cooling mode.
   e. Overload protection
      i. If it detects that the system current surpassed the designed 13 A for continuous 3 seconds, compressor, electric heater and outdoor motor stop , indoor motor runs the same procedures as the blowing surplus heat condition. After 3 minutes and current no more than 13 A, the machine will be back to its original state, indoor motor runs as the anti cool air condition. If it detects overloading state for 3 consecutive times within 30 minutes, the machine stops, and it must be restarted by remote controller.

f. Defrosting conditions and procedures
   i. In heating mode, if compressor has run 44 minutes (in its first 6 minutes it will not detect defrosting temp.) , and it has detected T con < or = -4°C for continuous 1 minutes, it begins to defrost, electric heater will stop for 10 seconds (even if electric heater is not working), then indoor motor stops, reversing valve becomes inactive in another 2 seconds, another 2 seconds later, outdoor motor stops, when T con > or = 10°C or defrosting lasts for 10 minutes, outdoor motor and reversing valve becomes active, indoor motor will run as the anti cool air condition, then it cycles again, recalculates the compressor's running time again. (In this period, if any protection works, and after the machine is back to work, it will re-start defrosting state. it will not detect outdoor tube temp when compressor's in its first 6 minutes running)

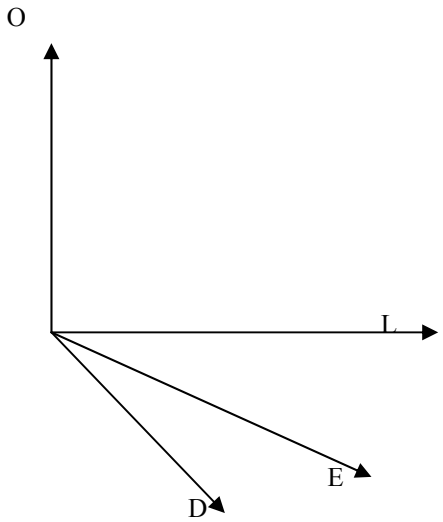
g. Noise eliminated protection
   i. When you use RUN/STOP button to switch off the machine, reversing valve will become inactive in 2 minutes.

AUTO mode

1 In AUTO mode, standard cooling T set = 25°C, standard heating T set = 20°C.
2 Working procedures
   a. If T indoor > or = T set + 1°C , select cooling mode, from this time, the set temp. is 25°C. If T indoor < or = T set – 1°C, compressor and outdoor motor stop, indoor motor runs at the set speed, if T set -1 < T indoor < T set + 1°C, keep the original state.
   b. If T indoor < or = T set + 2°C, select heating mode, from this time, the set temp. is 20°C, if T indoor > or = T set + 4°C, compressor stops first, outdoor motor stops 15 seconds later, reversing valve is always active, indoor motor runs as the blowing surplus heat condition. If T set +2°C < T indoor < T set +4°C, keeps the original state. Cooling only AUTO mode: there is no heating function in this mode.
3 Protections
   a. It is same as the one in cooling or heating mode.

4 Other controls

1 SWING mode
   a. When it is active, the louver returns to position O, close the air outlet.
   b. When machine works, it turns to the max. Air output position D, then returns back to position L to stand by (position L is the horizontal place mentioned before).
   c. In swing state, the louver swings between position L and position D.
   d. When the machine is switched off, it is back to position O.
   e. When the machine is running and the swing is off, the louver stops at position E.



2 Beeper
   a. When PCB becomes active or receives the signal from the remote controller, the beeper will beep.
3 Indication lamps
   a. It flashes when defrosting begin.
4 Press the AUTO button a time, the machine runs in AUTO mode, indoor motor runs in low speed, fresh air function is not active, press again the machine stops.
5 Fresh air function.
   a. There are two fresh air modes.
      Fresh air 2
      i. Fresh air motor will work 1 hour, then rest 1 hour, then cycle again.
      Fresh air 1
      ii. Press the button AIR on the remote controller to select fresh air 1 function, the swing motor keeps running till you give a signal to change it.
6 Automatic fan speed.
   a. In cooling mode, if T indoor > T set + 5°C high speed
      T indoor > or = T set +3°C middle speed
      T indoor > or = T set + 1°C low speed
   b. In dehumidify mode, if T indoor > or = T set + 5°C high speed
      T indoor > or = T set + 2°C low speed

SLEEP mode

1 In cooling or dehumidifying mode, 1 hour after you set the sleep timer, T set will add 1°C automatically, another 1 hour, another 1 will be added.
2 In heating mode, 1 hour after you preset the sleep timer, T set will lower 1°C automatically, another 1 hour, another 1°C will be lowered.