AKIRA

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Air Conditioner Service Manual

Model:
AC-S19CG

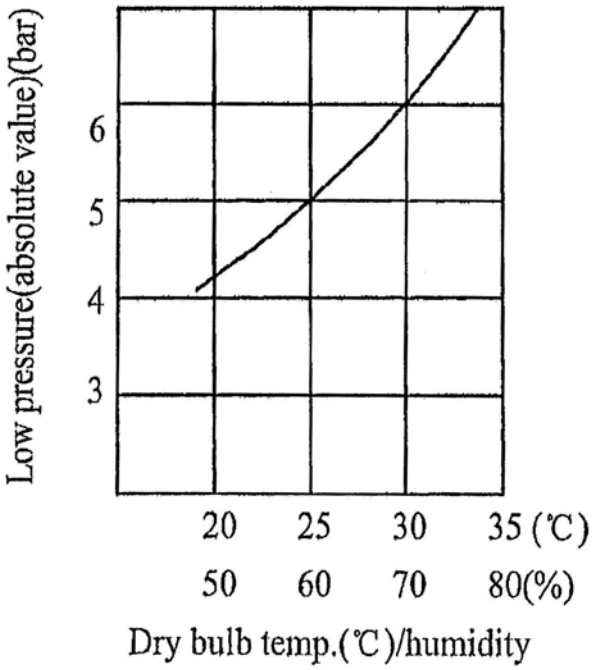
Content

TECHNICAL SPECIFICATION

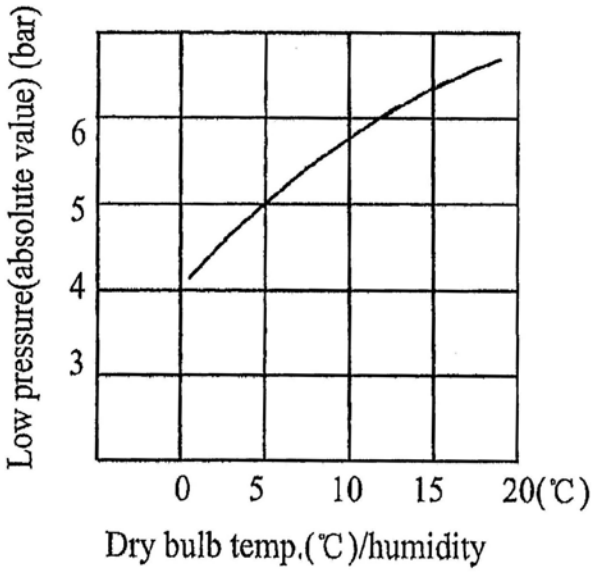
Content			AC-S19CG
Function			Cooling
Power supply			1Ph 220~230V-50Hz
Capacity (W)			4500
Capacity (BTU/h)			15500
Rated input (W)			1700
Rated current (A)			7.73
Air flow (m^3/h)			650
Dehumidifying volume (L/h)			2.0
EER(W/W)			2.6
Indoor unit	Motor fan speed(r/min)		1250/1150/1050
	Output power(w)		20
	Fan type/piece		Cross flow fan-1
	Diameter-length(mm)		91mm x 616
	Evaporator		Aluminum fin-copper tube
	Row-fin distance(mm)		2-1.4
	Working area(m^2)		0.18
	Swing motor		MP24GA
	Input/Power(W)		2
	Fuse(A)		Controller 3.15A Transformer 0.2A
	Working capacitor(uF)		1
	Noise(dB(A))		< 46 / = 46
	Dimension (width-height-depth)(mm)		830 x 285 x 189
	Net weight(Kg)		11
Outdoor unit	Input power	W	1669
	Current	A	7.6
	L.R.A.	A	35
	Throttling method		Capillary
	Compressor		RH290 x 2C-4FT1
	Starting method		Capacitor Starting
	Working temp.		<115°C / =115°C
	Condenser		Aluminum fan-copper tube
	Pipe-diameter		9.52
	Row-fin distance (mm)		2-1.4
	Working area		0.4
	Fan motor speed(rpm)		36/880
	Type-piece		Axial fan-1
	Diameter(mm)		400
	Defrosting method		Auto defrost
	Noise(dB(A))		57
	Dimension (width-height-depth) (mm)		848 x 540 x 320
	Net weight(Kg)		40
	Refrigerant charge(kg)		R22/1.3kg
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

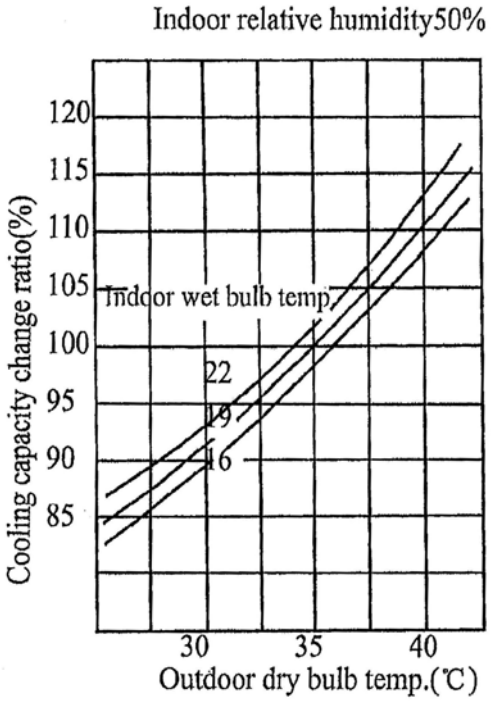
The change relation between low pressure, operation current and temp.
Cooling operation condition: In testing, indoor and outdoor have same work condition.



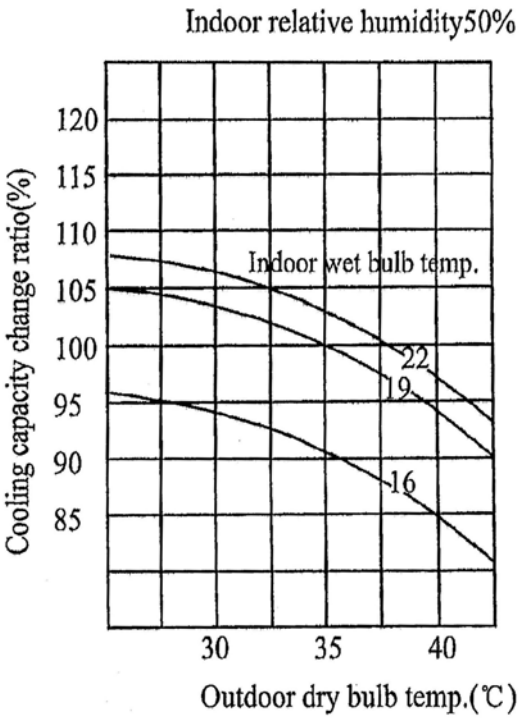
Heating operation
Indoor work condition: dry bulb temp.21 , wet bulb temp. 15.5 ^{o}C .

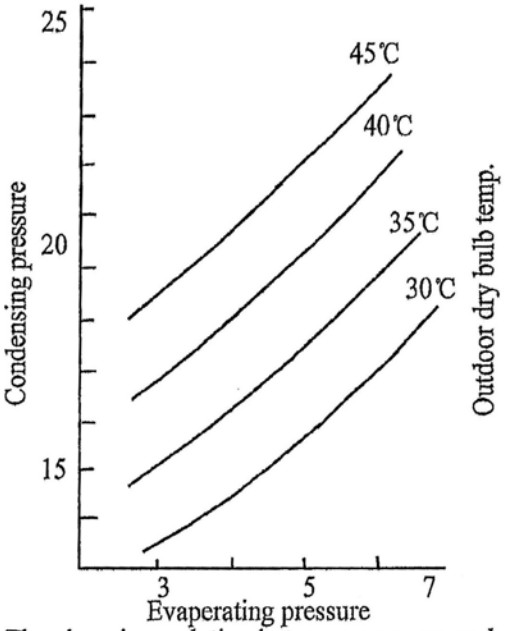


Cooling performance

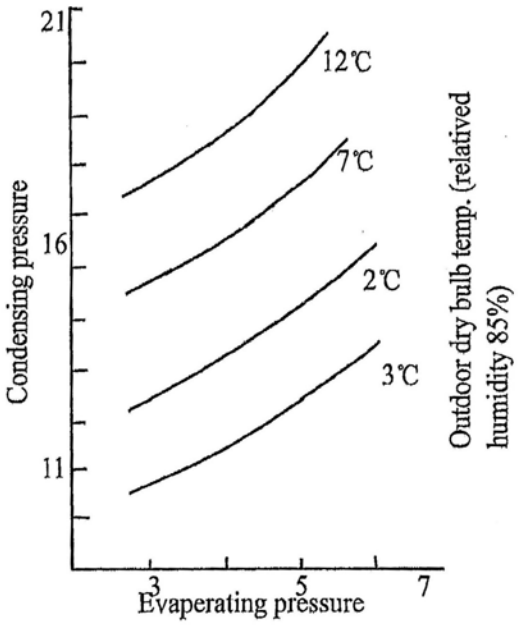


Cooling performance

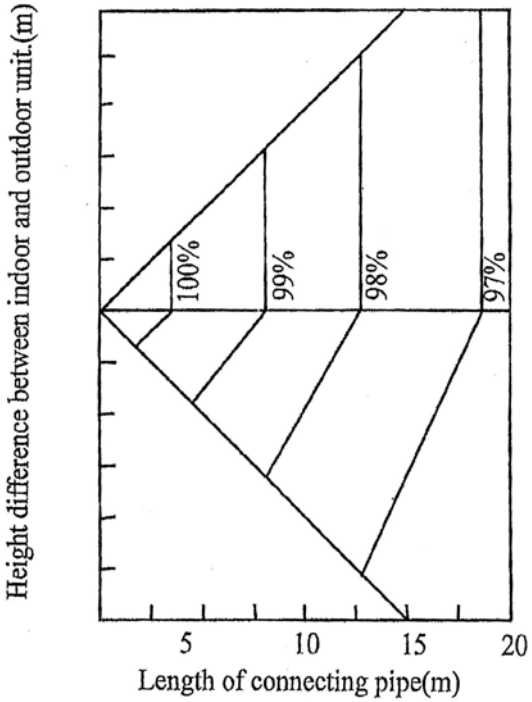




The changing relation between pressure and temp. in cooling work condition(Indoor work condition:Dry bulb 27℃, Wet bulb 19℃)

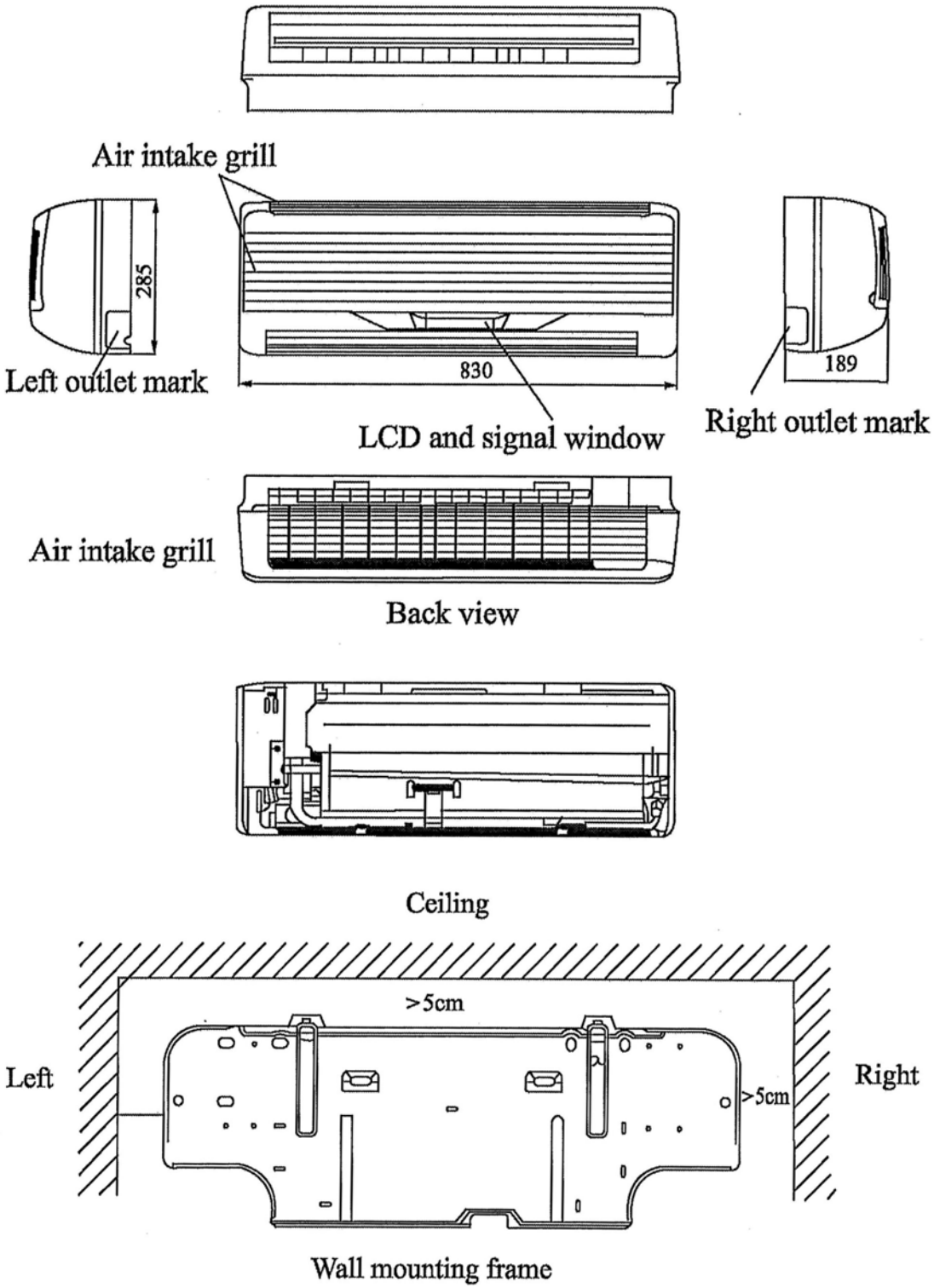


The changing relation between pressure and temp. in heating work condition (Indoor work condition:Dry bulb 20℃)

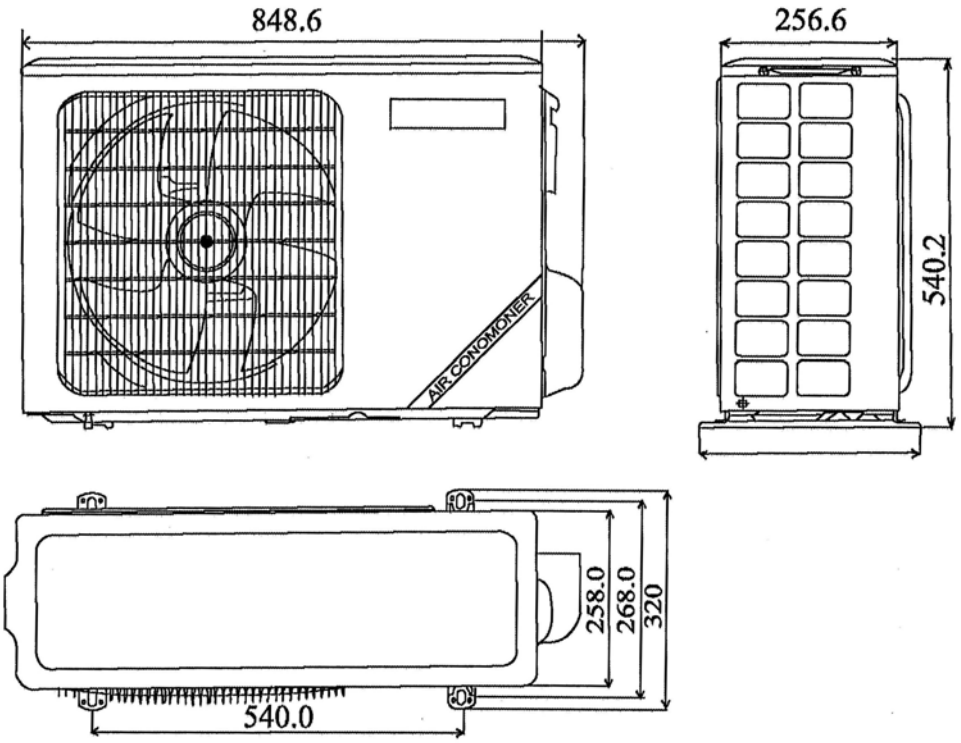


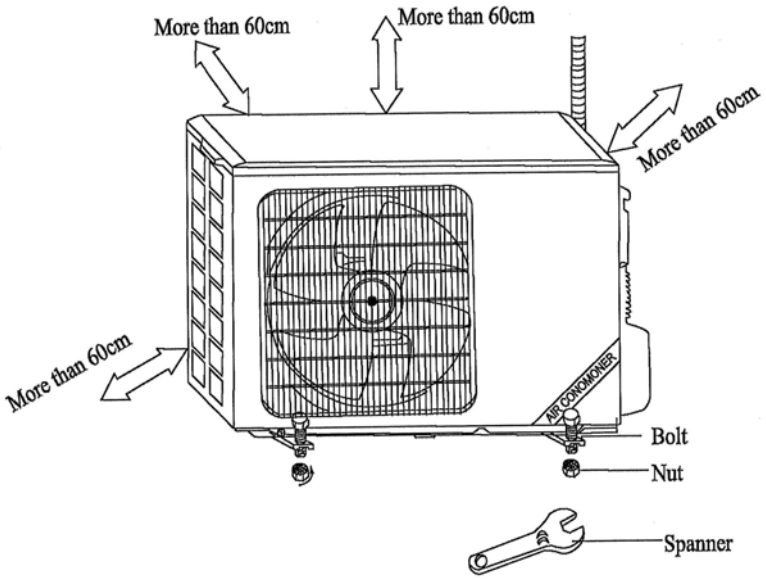
The changing relation between cooling capacity and length of connecting pipe.

OUTLINES AND DIMENSIONS OF INDOOR UNIT

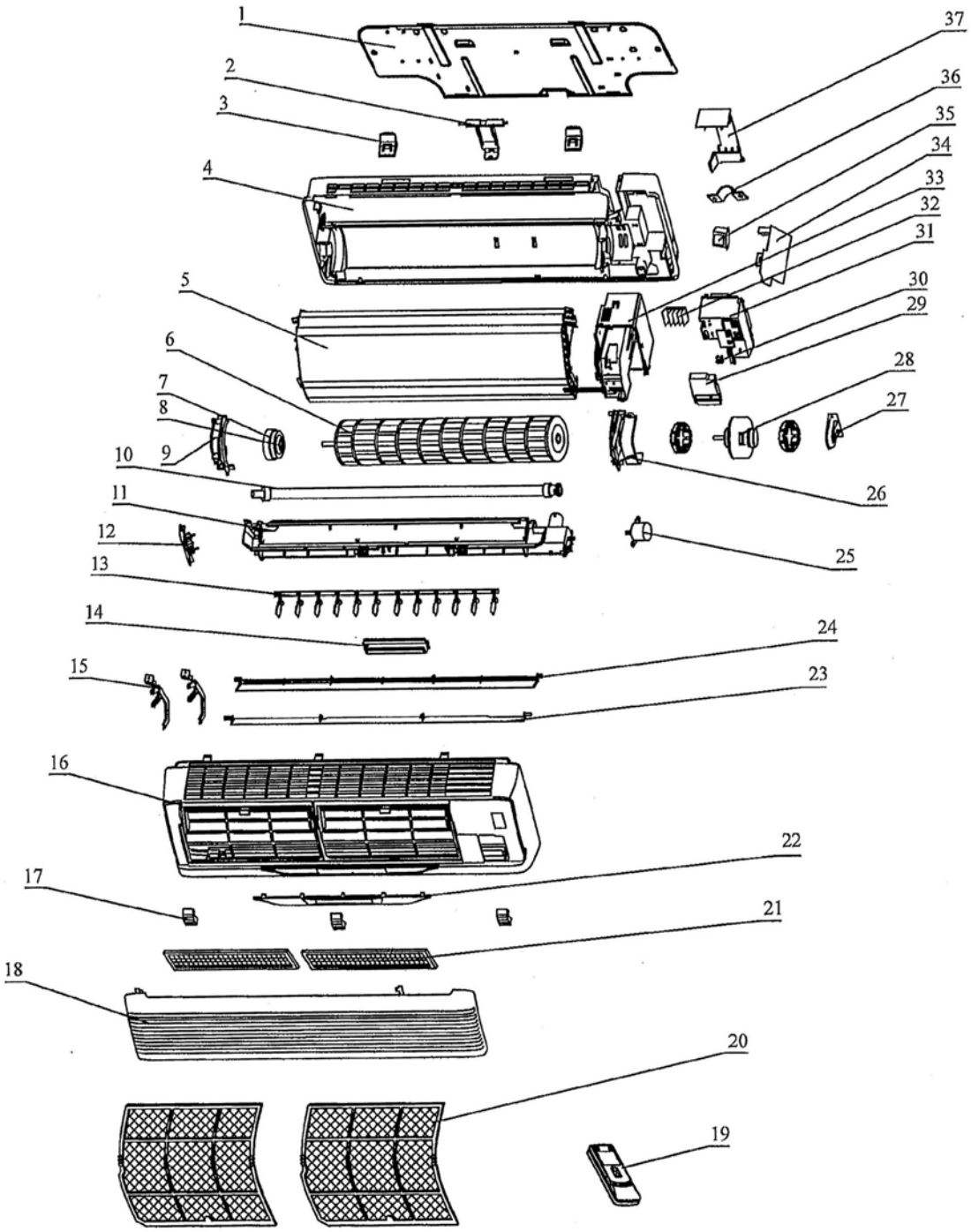


OUTLINES AND DIMENSIONS OF OUTDOOR UNIT





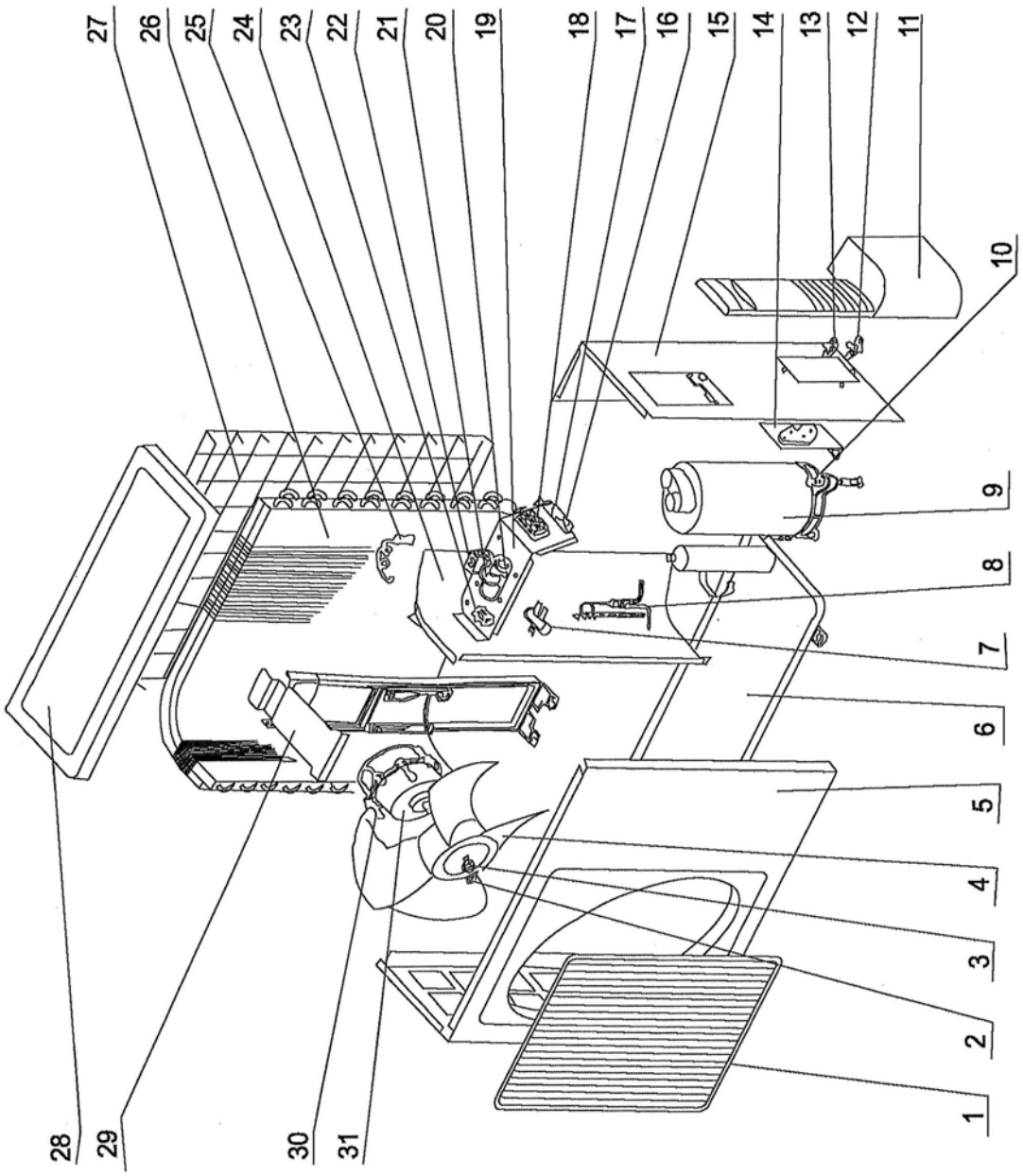
EXPLODED VIEW OF INDOOR UNIT



SPARE PARTS LIST OF INDOOR UNIT

No	Description	Part No.	Qty
1	Wall-Mounting Frame	01252381	1
2	Pipe clamp	26112425	1
3	Hook	26272421	2
4	Rear Case	22202013	1
5	Evaporator Assy	01002017	1
6	Cross Flow Fan	10352405	1
7	Ring of Bearing	26712015	1
8	Fan Bearing	76512210	1
9	Left clamp of motor	26112428	1
10	Drainage Pipe	05232411	1
11	Water Tray	20182439	1
12	Stepping Motor Gear	10592001	1
13	Swing Assy	10102001	1
14	LCD display assy	22242007	1
15	Guide Louver Holder	24212429	2
16	Front Case Assy	20002407	1
17	Screw Cover	24252440	3
18	Front Panel	20002404	1
19	Remote control	30512505	1
20	Filter	11122443	2
21	Filter	11012422	2
22	LCD Panel	22432439	1
23	Guide Louver	10512428	1
24	Guide Louver	10512427	1
25	SteppingMotorMP24GA	15212102	1
26	Right clamp of motor	26112429	1
27	Bearing holder	26152423	1
28	MotorFN20G-PG	15012022	1
29	Covering plate	22242411	1
30	Switching plate	26272422	1
31	Cover of electric box	20102430	1
32	Terminal board T4B3A	42011233	1
33	Electric box	20102429	1
34	PCB 5151E2ATB	30025215	1
35	Transformer SC21C (130°C)	43110161	1
36	Wire clamp A	71010103	1
37	Rear clamp	26112430	1
38	Power cable	40020389	1
39	Inter connecting cable	40020427	1
40	Room sensor	39000155	1
41	Tube sensor	39000116	1

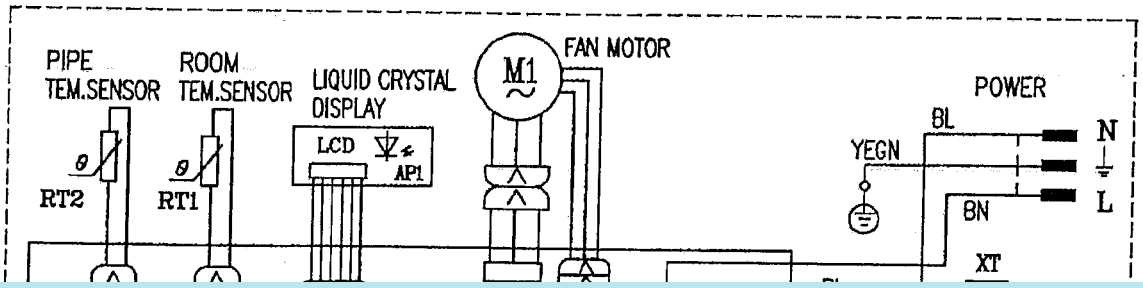
EXPLODED VIEW OF OUTDOOR UNIT

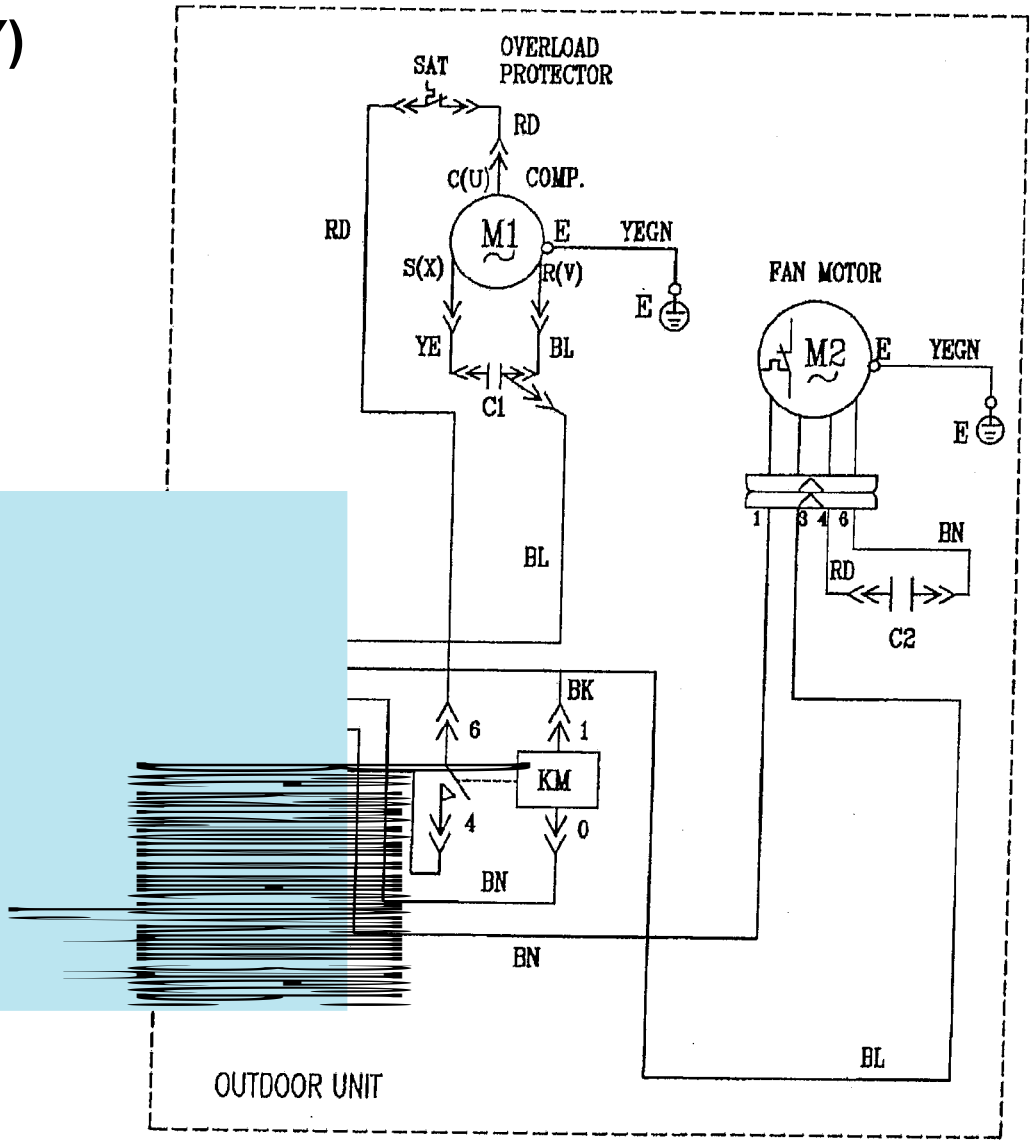


SPARE PARTS LIST OF OUTDOOR UNIT

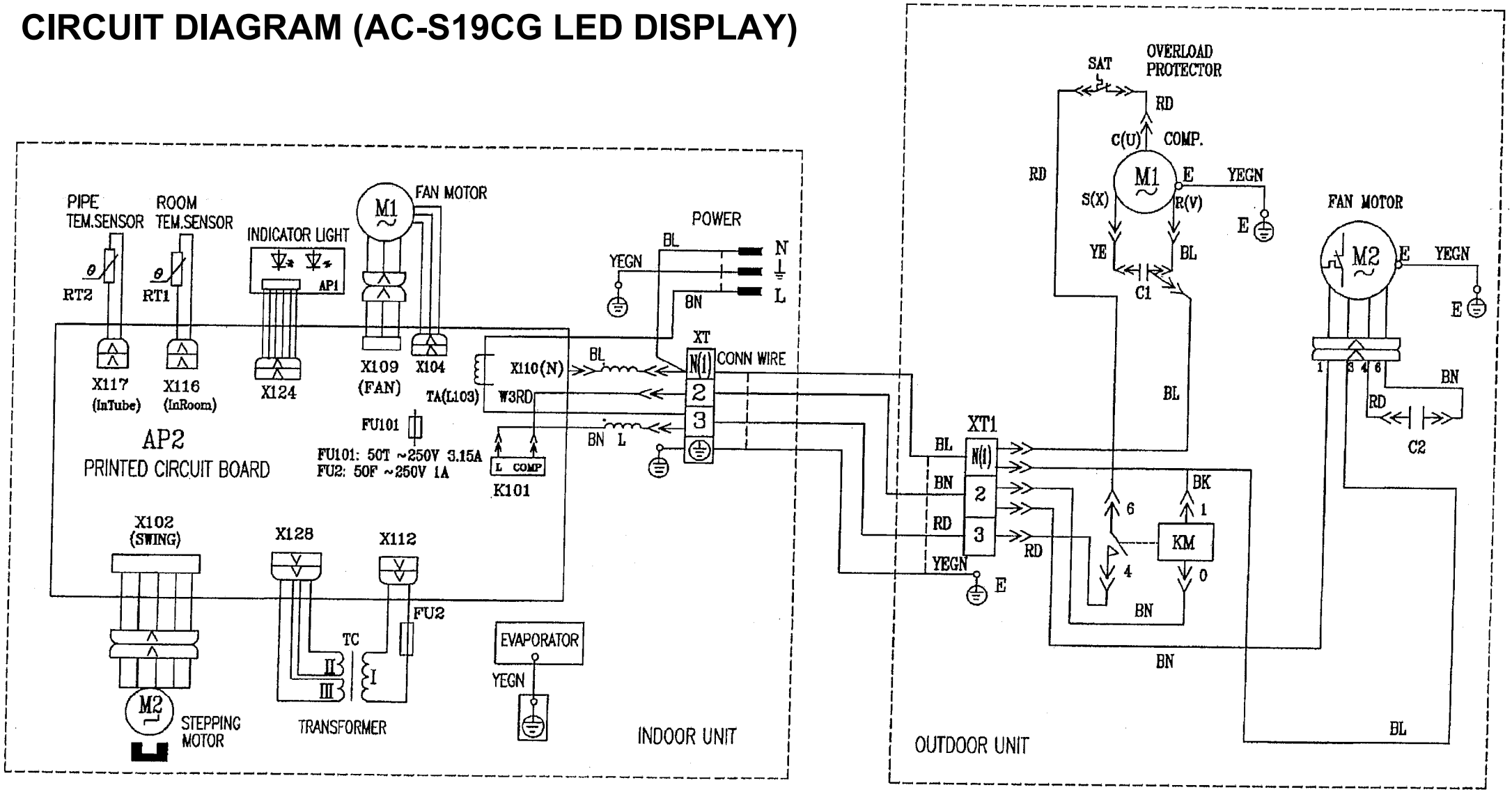
No.	Description	Part No.	Qty
1	Front Grill	22413431	1
2	Nut M6	70310131	1
3	Washer 6	70410252	1
4	Axial Flow Fan	10333412	1
5	Front Plate	01533428	1
6	Metal Base	01203338	1
7	4-way Valve	\	1
8	Capillary Assy	03003139	1
9	Compressor PH290X2C-4FT1	00100073	1
10	Nut with Washer M8	70310014	3
11	Handle	26233021	1
12	Valve 1/4"	07100115	1
13	Valve 1/2"	07100142	1
14	Valve Support	01713424	1
15	Right Side Plate Assy	01302000	1
16	Wire Clamp	71010103	2
17	Insulation Gasket C	70410525	1
18	Terminal Board A	42011113	1
19	Electric Plate	01413425	1
20	Comp Capacitor 35uF/450V	33000027	1
21	Capacitor clamp	02141375	1
22	Fan Capacitor 2.5uF/450V	33010026	1
23	Relay G7L-1A-T	44020311	1
24	Isolation Sheet Assy	01233417	1
25	Tube Sensor	\	1
26	Condenser Assy	01103435	1
27	Rear grill Assy	11123402	1
28	Top cover Assy	01253261	1
29	Motor Support	01703391	1
30	Self-tapping Screw	10140165	4
31	Motor FW48A	15013036	1

CIRCUIT DIAGRAM (AC-S19CG LCD DISPLAY)





CIRCUIT DIAGRAM (AC-S19CG LED DISPLAY)



PCB FUNCTION MANUAL

5 IN I PCB function manual.

A. Running mode

1. Cooling
2. Dehumidifying
3. Heating
4. Fan
5. 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
5. Outdoor ambient temp. T out

C. Targets

1. Indoor motor (PG motor)
2. Swing motor
3. Outdoor motor (two speeds motor)
4. Compressor
5. Four-way reversing valve
6. Electric heater
7. Fresh motor
8. Air cleaner

D. Fundamental functions

Cooling mode

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 .
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 3 consecutive times within 30 minutes, the machine stops, and must be restarted by remote controller.
d. Locked motor protection
   i. If it detects no feedback from the PG motor for continuous 15 seconds , the machine stops, after 3 minutes delay, the machine backs to original state. If the motor be detected locked for 3 consecutive times, the whole machine stops and can not run again automatically.

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 < 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 < 0oC, 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.
4 Overload is same as the one in cooling mode.

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.
   d. If T outdoor < or = 3°C, outdoor runs at high speed, if T outdoor > or = 5°C, outdoor motor runs at low speed. If 3°C < or = T outdoor 5°C, keep the previous running state.
2 In this mode, the temperature setting range is from 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 25°C, electric heater will work, if compressor stop or indoor motor runs at low speed or T eva > or = 54°C or T indoor > or = 28°C or 10 seconds before defrosting, the electric heater will stop.

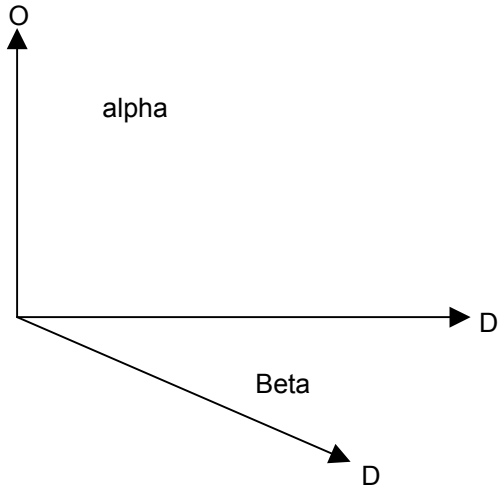
4 Protections
- a. Anti cool air
  - i. When the machine starts heating and T eva > or = 22°C, indoor motor runs at low speed, and swing motor makes the louver at the horizontal position, if T eva > or = 40°C or compressor have run 2 minutes ,indoor motor and swing motor will run at the set speed .
- b. Anti high temp.
  - i. In heating mode, if it detect T eva > or = 56°C (58 can be selected), outdoor motor will stop (in this period it will not detect the defrosting temp.). If T eva < or = 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. Locked motor protection
  - i. If it detects no feedback from the PG motor for continuous 15 seconds , compressor, outdoor motor, indoor motor and electric heater will stop, 3 minutes late, the machine will be back to its original state, indoor motor runs as the anti cool air condition. If the motor was locked for 3 consecutive times, the whole machine stops and can not run again automatically.
- g. 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).
- h. Noise lowering 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°C < 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, there is only one exception, the compressor doesn't have at least 5 minutes protection.

E. 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. For AC-S19CG, alpha = 93, beta = 45.
2 Beeper
   a. When PCB becomes active or receives the signal from the remote controller the beeper will beep.
   b. If thermostat is open-circuited or short-circuited, when you press the TEST button, the beeper will alarm at the frequency 2HZ.
3 Indication lamps
   a. It flashes when defrosting begin.

4 Multi-step switch
   a. If the switch is in AUTO position, the machine will run at the AUTO mode, if there is a signal from remote controller, it will run according to the signal .
   b. If the switch is in TEST position, the machine will run at the COOL mode, indoor motor will run at high speed , swing motor will run according to SWING mode. If there is a signal from remote controller, it will run according to the signal .if the thermostat is open-circuited or short-circuited, the beeper will alarm at the frequency 2 HZ .
   c. If the switch is in RUN position , the machine will run according to the remote signal.
   d. If the switch is in STOP position, the machine will stop.

5 SLEEP mode
   a. 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.
   b. In heating mode, 1 hour after you set the sleep timer, T set will lower 1°C automatically, another 1 hour, another 1°C will be lowered.

6 Automatic fan speed
   a. In cooling mode, if T indoor > T set + 4°C high speed
      T set + 2°C < or = T indoor < or = T set + 4°C middle speed
      T indoor < T set + 2°C low speed

F. Fresh air function

1 There are two fresh air modes.
   a. Fresh air 2
      i. Fresh air motor will work 1 hour, then rest 1 hour, then cycle again.
   b. Fresh air 1
      i. 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.

G. Air cleaning

1 In air cleaning mode, air cleaner works while indoor fan runs and air cleaner stops while indoor fan stops.

2 The speeds of the wind of all types of the air-conditioner are as below:
   000: 900,850, 800, 700 (RPM);
   001: 1000, 900, 850, 700(RPM);
   010: 1050, 950, 900, 700(RPM);
   011: 1100, 1000, 950, 700(RPM);
   100: 1200, 1100, 1000, 700(RPM);
   101: 1250, 1100, 1050, 700(RPM);
   111: 1400, 1200, 1100, 700(RPM);