



Air Conditional Service Manual

Model: AC-F50HG

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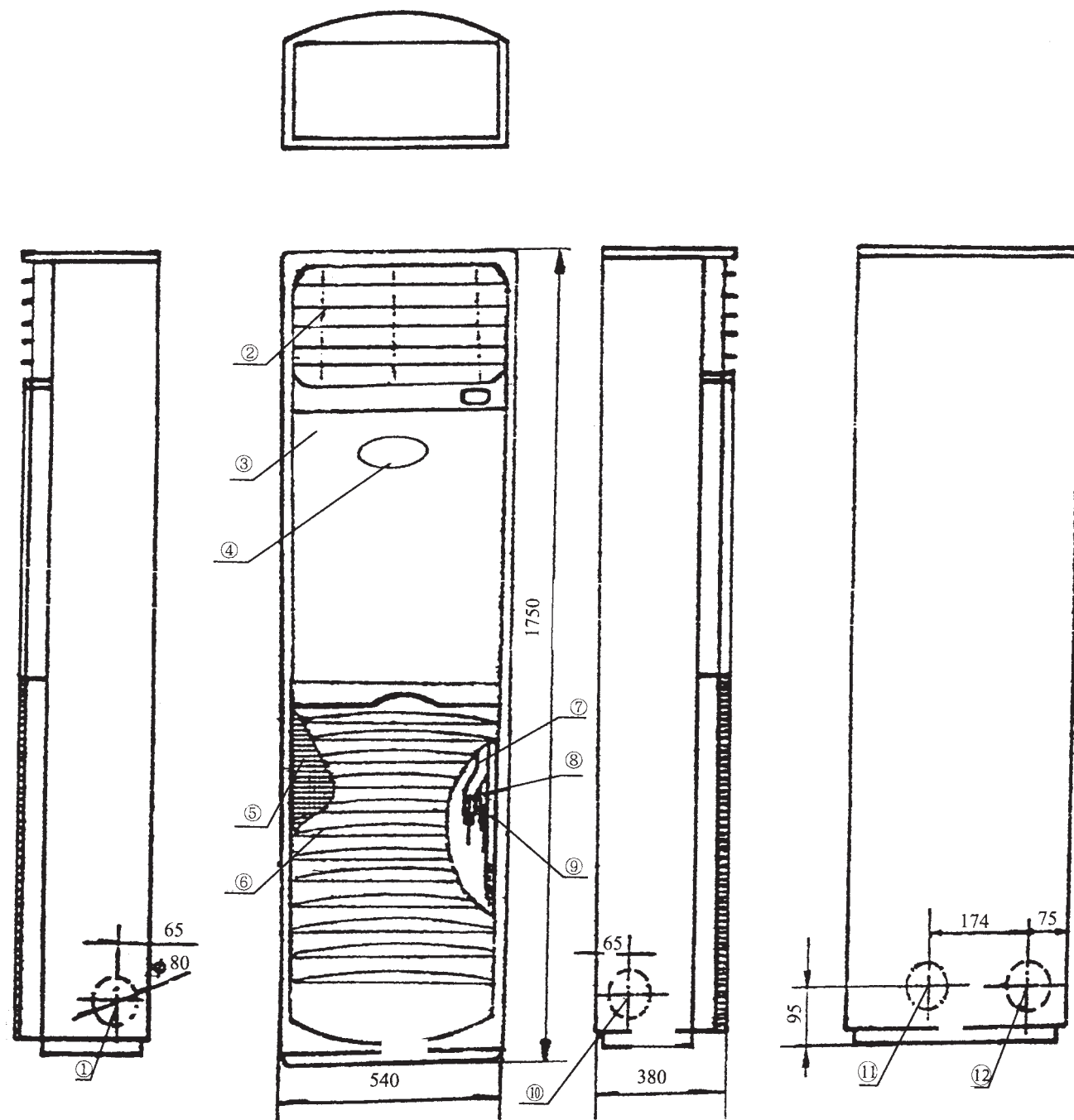
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SPECIFICATION

Function		Cooling	Heating
Power supply		3Ph 380V 50Hz	
Capacity	W	12000	12000(15500)
Rated input	W	4900	4300(7800)
Rated current	A	8.5	7.4(12.8)
Air flow	M ³ /h	1500	
Dehumidifying volume(L/h)	L/h	4.8	
EER (W/W)		2.45	2.79
Indoor unit	Model Model	LN100B	
	Motor fan speed(r/min)	530/490/460	
	Output power(W)	100	
	Working capacitor(Mui F)	4.5	
	Fan type/piece	Centrifugal fan-1	
	Diameter-length(mm)	378-180	
	evaporator	Aluminum fin-copper tube	
	Row-fin distance(mm)	2-1.4	
	Working area(mm X mm)	838 X 430	
	Swing motor	SM016	
	Input power(W)-speed(r/min)	5-5	
	Fuse(A)	Controllor 3.15A	Transformer 0.2A
	Noise(dB(A))	57	
	Dimension(width-depth-height)mm	540 x 380 x 1750	
	Net weight(kg)	58	

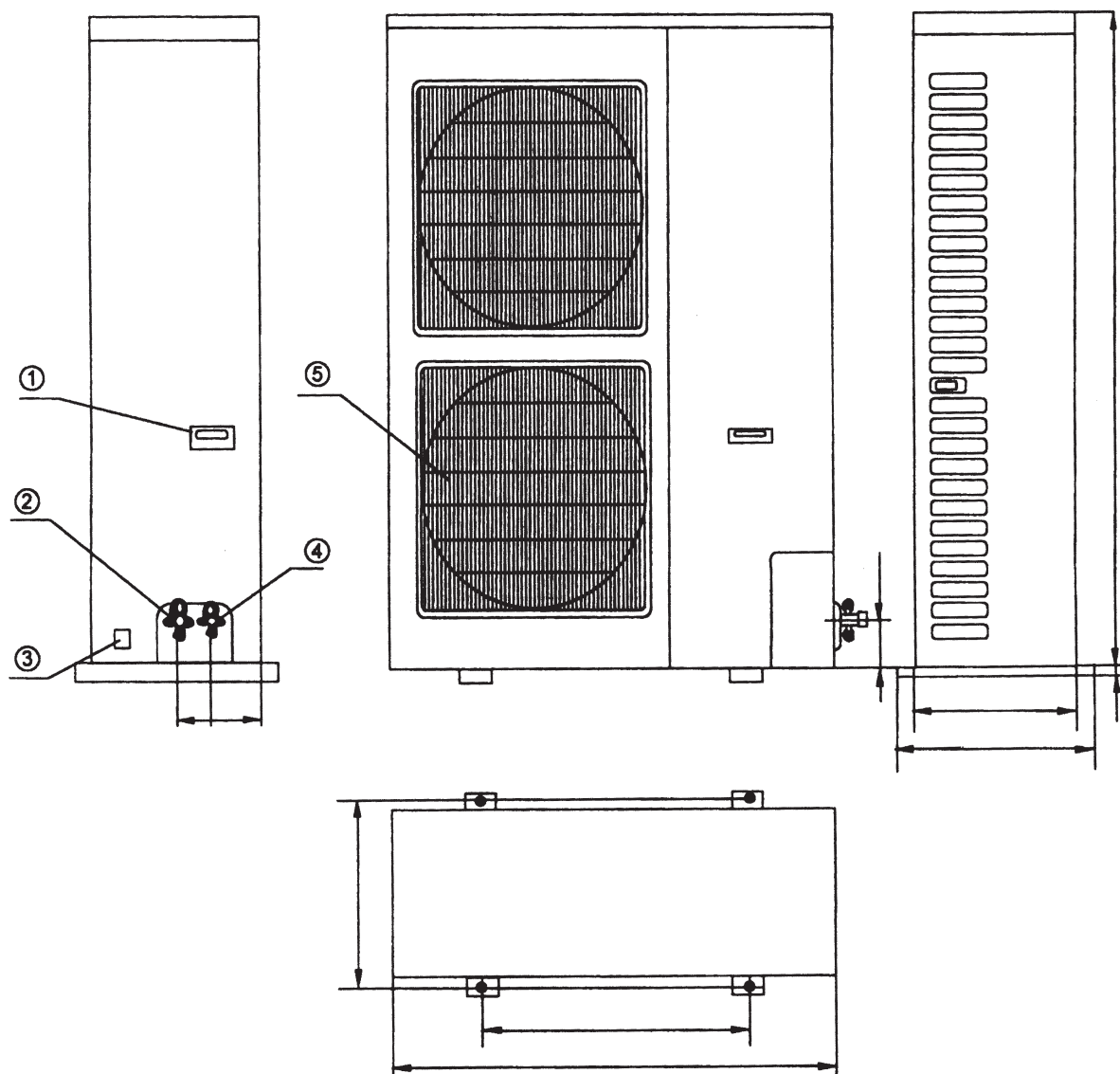
Outdoor unit	Compressor	type	reciprocating compressor	
		Model	C-SB373H8A	
		Input power (W)	5200	
		Overload protector	out set	
		L.R.A. (A)	62	
		Working temp.	Exhaust temperature ≤ 115°C	
		Starting method	1R	
	Condenser	Condenser	Aluminum-copper	
		Pipe-diameter	9.52	
		Row-fin distance	3-1.8	
		Wiring area (mm x mm)	1218 x 683	
	Fan	Fan motor model	LW68A	
		Output power	68	
		Fan motor speed(rpm)	840	
		Capacitor μF	3.5	
		Fan Diameter (mm)	455	
	High pressure switch	Model	HZOPS-B3.0/2.4Mpa or YK-3.0/2.4Mpa	
		Cutoff pressure	3.0 ± 0.15MPa	
		Restart pressure	2.4 ± 0.15MPa	
	Throttling method		Capillary	
	Defrosting method		Auto defrost	
	Noise dB(A)		61	
	Dimension(mm)(Width-height-depth)		950 x 1250 x 412	
	Net weight(kg)		112	
	Refrigerant charge(kg)		R22 3.8	
Connecting pipe	Outer diameter	Liquid pipe	mm	3/4"
		Gas pipe	mm	1/2"
	Standard length		m	5
	Max distance	height	m	15
		Length	m	40

OUTLINE AND DIMENSION OF INDOOR UNIT



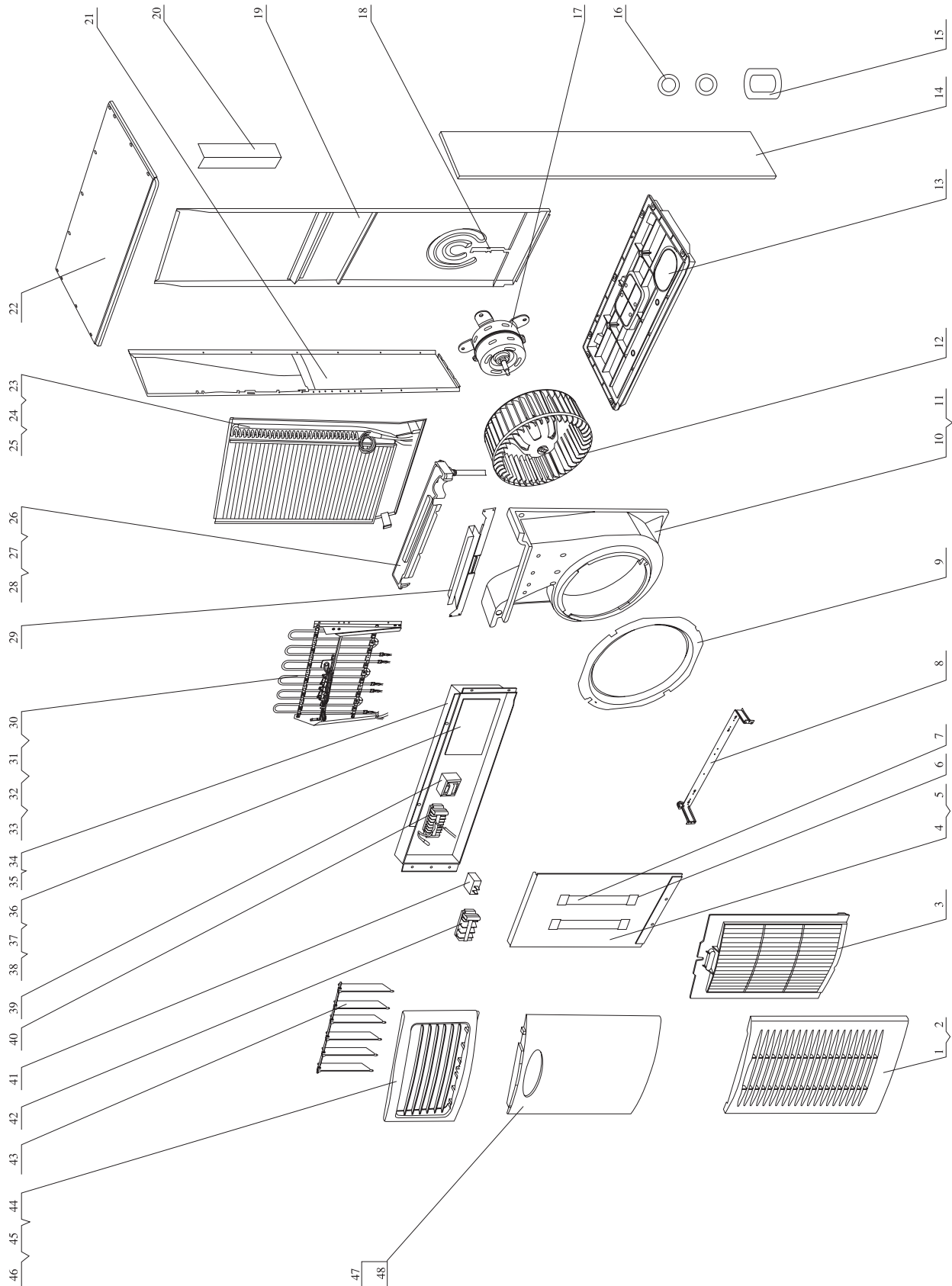
1	Right knock-out hole	2	Grille
3	Front panel	4	Controller
5	Filter	6	Air intake
7	Gas pipe	8	Liquid pipe
9	Drainage hose	10	Left knock-out hole
11	Rear right knock-out hole	12	Rear left knock-out hole

OUTLINE DIMENSIONS OF OUTDOOR UNIT



1	Handle	2	Gas valve assy	3	Wire hole	4	Liquid valve assy	5	Grille
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EXPLOSIVE VIEW OF INDOOR UNIT

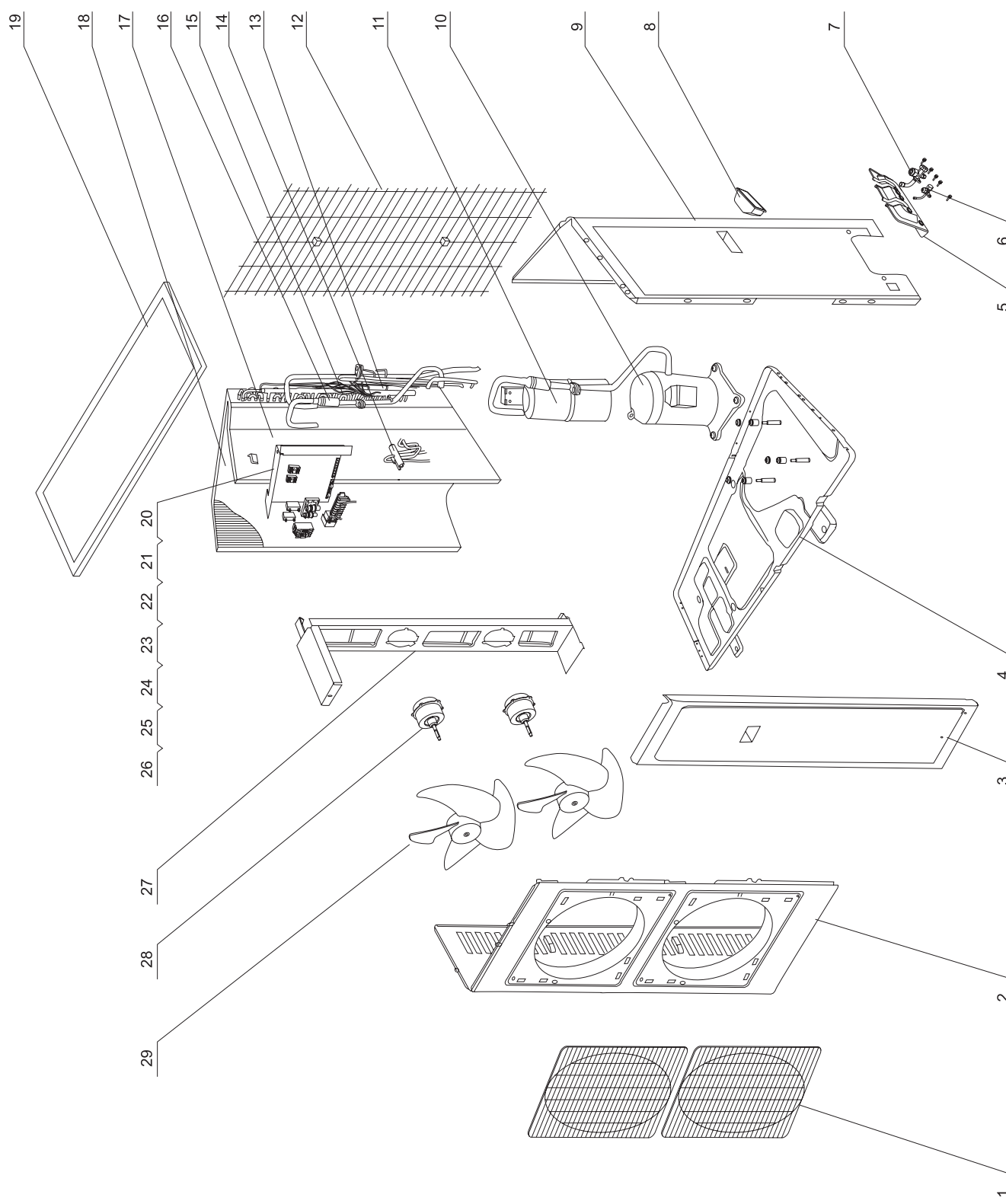


SPARE PARTS LIST OF INDOOR UNIT

No.	Description	Part No.	Qty
1	Air Intake Assy	20004202	1
2	Chain	70814001	1
3	Filter Assy	11124071	1
4	Air Guard Assy	01364241	1
5	Lamp	\	0
6	Rectifier	\	0
7	Lamp Seat	\	0
8	Lower Baffle	01384216	1
9	Diversion Circle	10374202	1
10	Propeller House	12104441	1
11	Foam Fixed Screw	70110003	9
12	Centrifugal Fan	10314401	1
13	Underpan	22224431	1
14	Right Side Plate	01304434	1
15	Pipe-crossing Loop	76514421	1
16	Cable-crossing Loop	76514425	2
17	Fan Motor LN100B	15014402	1
	Fan Motor LN100C	\	0
18	Cable-pressed Plate	01384201	1
19	Rear Plate	01304441	1
20	Protective Cover	22244231	1
21	Left Side Plate	01304433	1
22	Top Cover Assy	01254431	1
23	Evaporator Assy	01004301	1
24	Seal Ring	76514415	1
25	Sensor Insert	42020063	1
26	Water Tray Assy	12414210	1
27	Drainage Pipe	05235433	1
28	Breakwater	01364431	1
29	Water Tray Support	01274210	1
30	Assistant Heater Assy	32004401	1
31	Temperature Limiter 65	46010505	1
32	Fuse 100 15A	46010351	2
33	Electric Heater 1167W	32014003	3
34	Electric Box Assy	01404422	1

35	Electric Box Cover	01404217	1
	Electric Box Cover	01404214	1
36	PCB 3453F	30023048	1
	PCB 3R53F	30023063	1
37	Switch Board 3343	30044305	1
38	Receive Board 3153	30044304	1
39	Transformer SC25A	43110168	1
40	AC Contactor FMC-O	44010220	1
	AC Contactor LC1K0910M7	44010199	1
41	Capacitor 4.5uF/450VAC	33010012	1
4 2	Terminal Board GT8G0A1	42010187	1
43	Air Louver	10514212	6
44	Air Outlet Assy	20004201	1
45	Air Guider	10514213	6
46	Swing Motor	15214215	1
47	Panel Assy	20004424	1
48	Light Picture	\	0
49	Plastic Pipe	05230022	1
50	Remote Controler Y512	30512501	1
51	Power Cable	40020350	1
52	Connect Cable	40020234	1
53	Signal	40032127	1
54	Signal	40032128	1
55	Room Sensor	\	0
56	Tube Sensor	\	0
57	4 Core Sensor	39000171	1
58	17 Core Connect Cable	40030056	1

EXPLOSIVE VIEW OF OUTDOOR UNIT



PARTS LIST OF OUTDOOR UNIT

No.	Description	No.	Qty
1	Front Grill	22265250	2
2	Front Plate	01435433	1
3	Front Side Plate	01305431	1
4	Metal Base	01205432	1
5	Valve Support	01715256	1
6	Liquid Valve Assy	07103701	1
7	Gas Valve Assy	07105435	1
8	Handle	26235251	1
9	Rear Side Plate	01305434	1
10	Compressor C-SB373H8A	00100330	1
11	Gas-liquid Separator	07225433	1
12	Rear Grill Assy	01475431	1
13	Low Pressure Switch	46020007	1
14	4 Way Valve	43000317	1
	4 Way Valve Fittings	430004013	1
15	Pressure Protect Switch	46020003	1
16	Silencer	07245434	1
17	Isolation Sheet Assy	01235440	1
18	Condenser Assy	01105431	1
19	Top Cover Assy	01255262	1
20	Electric Box	01415201	1
21	Capacitor	33010010	2
22	Terminal Board	42011210	1
	Terminal Board	\	1
23	AC Contactor 3TF4211	44010224	1
	or LC1D1801M7C	44010211	1
24	Over Current Protector	46020102	1
	UO-10- 13.2A		
	or HD-13.2-22	46020112	1
25	Phase Reverse Protector	46020052	1
26	Terminal Board 2-8	42011103	1
27	Motor Support	01705433	1
28	Motor	15015421	2
29	Axial Flow Fan	10335253	2
30	Ambient Sensor	39000129	1
31	Discharge Temperature Sensor	39000163	1
32	Tube Sensor	39000121	1

INSTALLATION GUIDE

1. PLACE FOR INSTALLATION

1. Indoor unit

Avoid:

- Where inflammable gas may leak.
- Where there is excessive oily air.
- Where it is liable to be affected by in-coming air.
- Where there is direct sunlight.
- Where there is heat source nearby.
- Where free air flow may be blocked.
- Where there is high-frequency equipment (eg. High-frequency electric welder).
- Where acid solutions are frequently used.
- Where it is possible for the unit to get wet or damp.
- Installing fire alarm near the air outlet (in HEAT mode, the fire alarm may be wrongly activated when detecting the warm air breezing out of the unit).

Please:

- Choose a suitable place so that conditioned air can reach every corner of the room.
- Install the unit on a solid and even ground that can bear the weight of the unit.
- Choose a place where the distance between the connecting pipe, drainage pipe and the outside is as short as possible.
- Leave enough space around the unit for air going in/out and maintenance. (See Fig. 11)

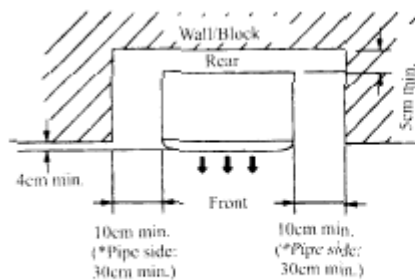


Fig. 11

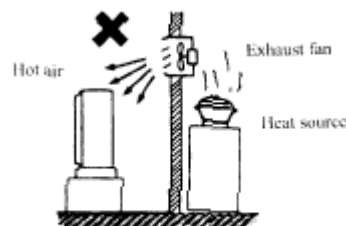
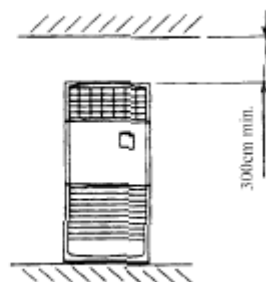


Fig. 12

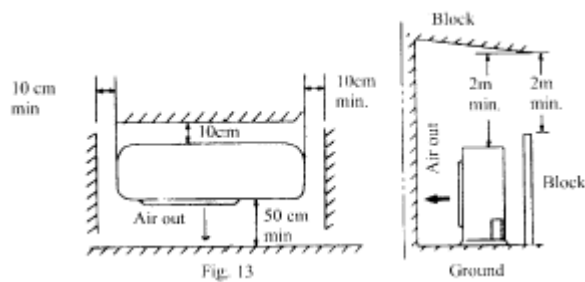
2. Outdoor unit

Avoid:

- Damp or uneven places.
- Heat source and exhaust fan, etc (see Fig. 12)

Please choose a suitable installation place:

- Where it is as cool as possible and free of direct sunshine.
- Where there is good ventilation and outdoor temperature will not be higher than 43°C.
- Where noise coming from the unit will not annoy your neighbors.
- Where the hot air released by the unit will not reach passers-by.
- Where inflammable gas is unlikely to generate flow in, stay or leak.
- Where there leaves enough space around the unit for free air flow and maintenance. (See Fig. 13).



- Have a base which is strong enough (eg. Cement bricks, etc) at least 15 cm above the ground, so as to reduce dampness and protect the unit from water corrosion, hence prolong its service life. (See Fig. 14).

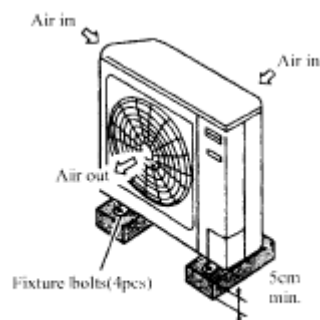
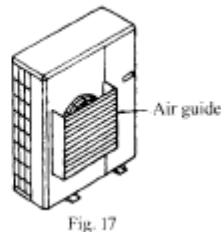
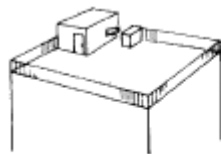
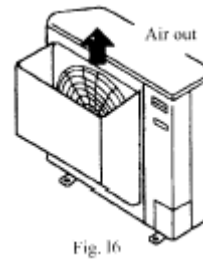
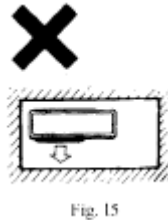


Fig. 14

- For cooling / heating type units, there will be water coming out of the unit while heating. Please also take this into consideration while choosing installation place.

Note:

1. If there are blocks around the unit, then the place is not suitable for installation (see Fig. 15).
 2. If it is hard to find a space of 50cm min. between the air outlet and block near it, or if the air outlet is facing the road and may blow hot air to passers-by, please install an air guide to let the air comes out upwards. (See Fig. 16)
 3. When the outdoor unit is installed on the roof or a place where there isn't other buildings around, please do as illustrated below. (See Fig. 17) to avoid strong wind blowing the air outlet directly, which may cause troubles to the unit.
- When there are walls around, please put the air outlet facing the wall (leaving a distance of 50 cm between unit and wall).
 - When the air outlet may be affected by strong winds as typhoon, please install an air guide (optional part provided per order).



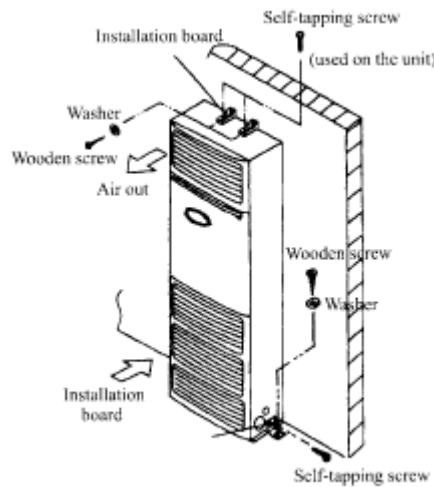


Fig. 18

2. INSTALLATION OF THE INDOOR / OUTDOOR UNITS

Installation of the indoor unit:

1. Choose a place for indoor unit installation as described.
2. Use attached installation boards to fix the unit firmly to the wall and the ground. (See Fig. 18).
3. Drill a passing hole through the wall (if the connecting pipe and wires are to go through the wall).
4. Choose one of the four hole-positions (2 in the side and 2 on the rear) according to installation place (see Fig. 19), break it through and fit in passing hole cover for the passing of connecting pipe, drainage pipe and wires.

Installation of the outdoor unit:

1. Choose a place for outdoor unit installation as described.
2. Cushion the unit with bricks or strong base at least 15 cm thick. (See Fig. 20).
3. Use four bolts to fix the unit firmly to the bricks or base.

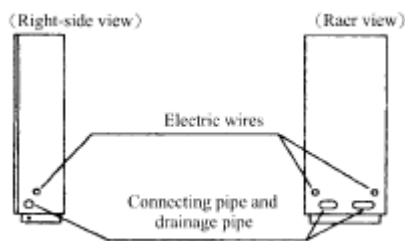


Fig. 19

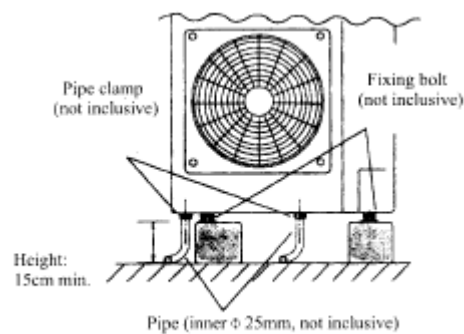


Fig. 20

3. INSTALLATION OF THE CONNECTING PIPE:

Cautions before installation:

1. The connecting pipe is coiled into its package and must be loose and straighten before installation.
2. When doing this, let it go loose coil by coil naturally and do not pull it by force, or the pipe may be twisted (See. Fig. 21)

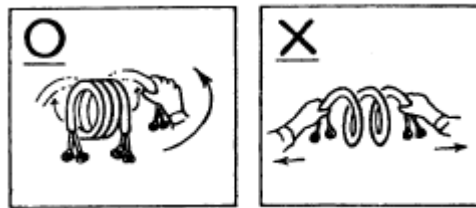


Fig. 21

3. When bending the pipe, make sure that radius of the bend must be at least 10 cm, or pipe may get flat; once the pipe is bent, do not bend it back and forth repeatedly, or it may get twisted or crack. (See Fig. 22).

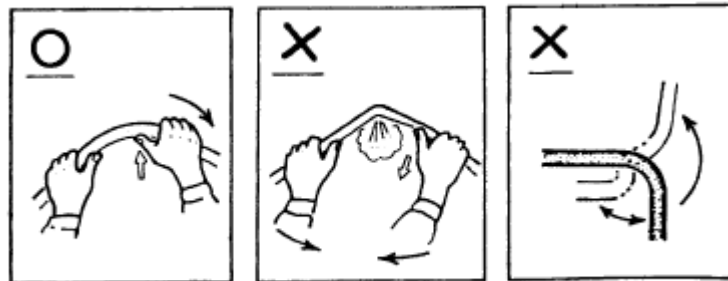
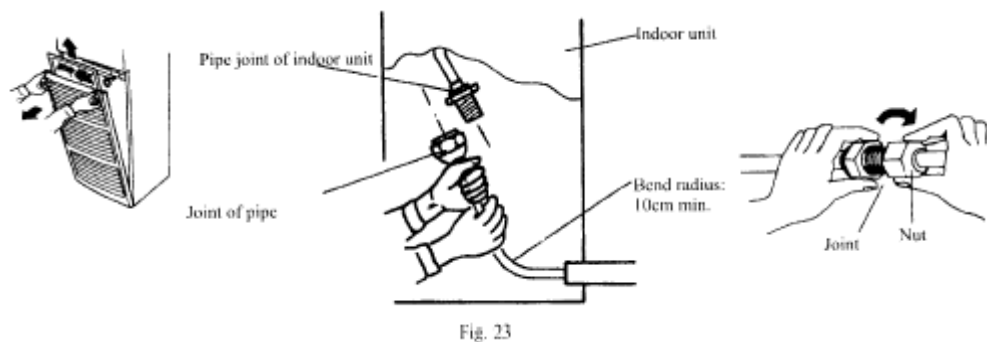


Fig. 22

Connection of the pipe for indoor unit:

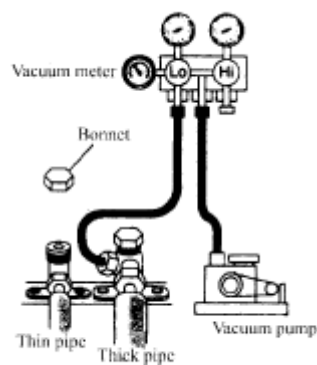
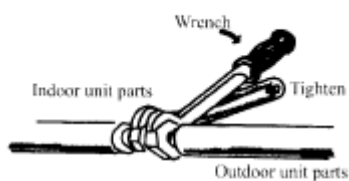
1. Remove air intake grille and lower front panel.
2. Thread the connecting pipe through the passing hold of indoor unit, and fit it with the indoor unit pipe joint.
3. Readjust shape of the pipe to make it easy for the joint, match center of both pipe joints and screw with hand for 3 ~ 5 circles. (See Fig. 23).



4. Tighten nuts with wrench until the wrench gives a crack (be careful don't make it too tight, or screw thread and nut of the joint may be damaged and cause leakage of refrigerant. (See Fig. 24.)

Connection of the pipe for outdoor unit:

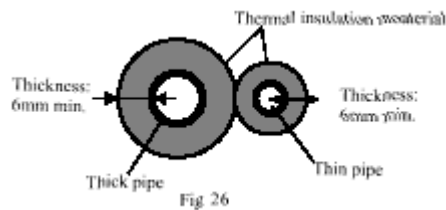
1. Put the outdoor pipe in order, if there is surplus pipe length, you can wind it around the unit and fix it properly.
2. Remove bonnet of the stop valve.
3. Match center of pipe with center of check valve joint, screw the joint nut with hand for several circles, and then tighten the cone nut properly with wrench.



4. Exhaust air in the unit from the check valve with a vacuum pump. (See Fig. 105).
 - a. Remove check valve bonnet of thick pipe.
 - b. Connect vacuum meter pipe to check valve joint of thick pipe.
 - c. Connect vacuum meter pipe to one end of pressure-resistant pipe, and connect its other end to vacuum pump.
 - d. Tighten high-pressure meter and open low pressure meter, then plug vacuum pump to power source.
 - e. When arm of vacuum meter points to about 15 mm Hg, tighten low pressure meter and turn off power, then remove pressure-resistant pipe that is connected to check valve of the pipe gas valve and fasten the bonnet.

Wrapping the connecting pipe

1. To avoid condensation dew and leakage of water, the thick pipe and thin pipe should be wrapped with thermal insulation material and gummed tape for insulation. (See Fig. 26).

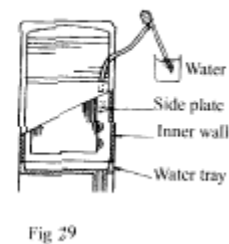
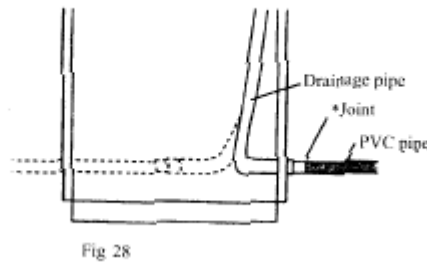
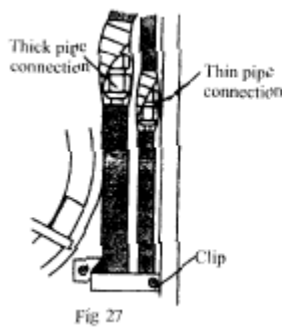


2. Wrap the nut connecting the thick pipe and thin pipe with thermal insulation material and gummed tape, and then fix the thick pipe and thin pipe with clip.

4. DRAINAGE PIPE CONNECTING

1. Use PVC pipe and thread it through one of the four passing holes of the indoor unit and connect it to drainage pipe joint. Use binder to bind the joint tightly to avoid leaking.
2. The drainage pipe must be sloped downwards to prevent water from accumulating in the pipe.
3. Use thermal insulating tape to wrap the joint (See Fig. 28) tightly.
4. After finishing connection, insert water pipe to the right side of air outlet (See Fig. 29) and charge water gently to side plate of heat exchanger or inner wall of the unit. Charge 1000 ml of water to check if the drainage is OK or if there is leakage.

Note: Please operate this step with care while the indoor unit is with electric heater so that the electric heater will not get wet.



5. WIRE CONNECTING

- Before connecting the wires, please pay attention to the voltage listed on the name plate and then connect the wires according to the circuit diagram.
- Special power supply plug and switch must be used for the unit, and electricity switch and air switch must be included to deal with situation of an overload.
- Use a proper earth wire for the unit to prevent danger caused by possible ineffective insulation. All wire connecting must be done strictly according to the circuit diagram. Incorrect wiring may abnormal operation of or damage to the unit.
- Do not let the wires touch the connecting pipe and moving parts such as compressor and motor. Altering the interior wiring could be very DANGEROUS, and the manufacturer shall not be held responsible for property loss or malfunctioning caused by such alterations.

- If the unit is installed at a place liable to be affected by electric / electromagnetic interference, it is advisable to use shielded / double-wrung wires.
- Before connecting, please check thoroughly the control wire of indoor unit and power supply, etc.
- The wire connection must be done by qualified electricians.

Indoor/ outdoor wire connecting (See Fig. 30 and Fig. 31)

- Remove screws from electric box to reveal the electric box.
- L1 and N1 are indoor power supply wires, A and N2 are outdoor power supply wires.

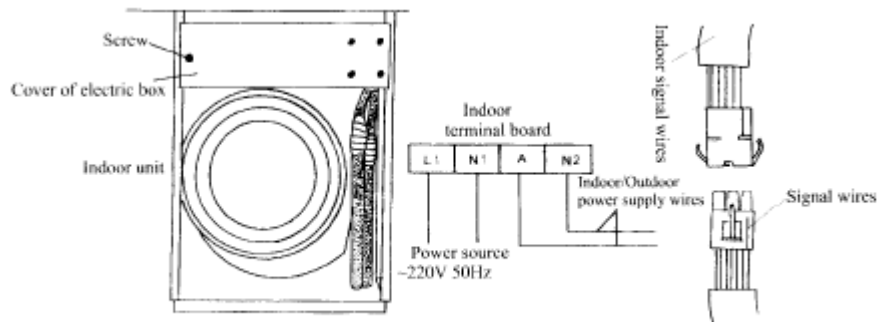
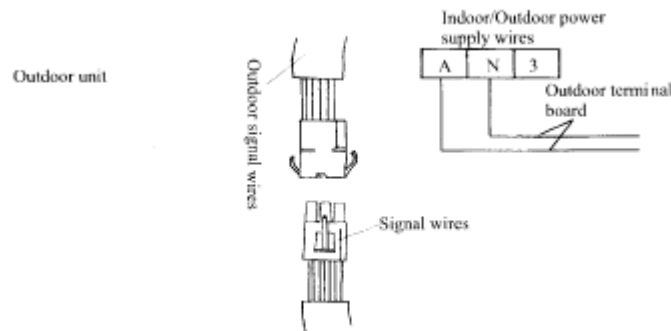


Fig. 30

- Remove front plate.
- Break through the passing hole and put on the square passing ring.
- Pull out the wires from terminal board of the outdoor unit, thread them through the outdoor passing hole and indoor passing hole, and connect them to the terminal board of the indoor unit.



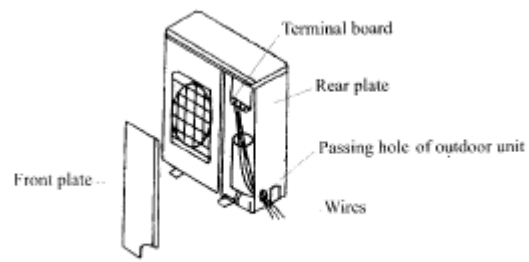
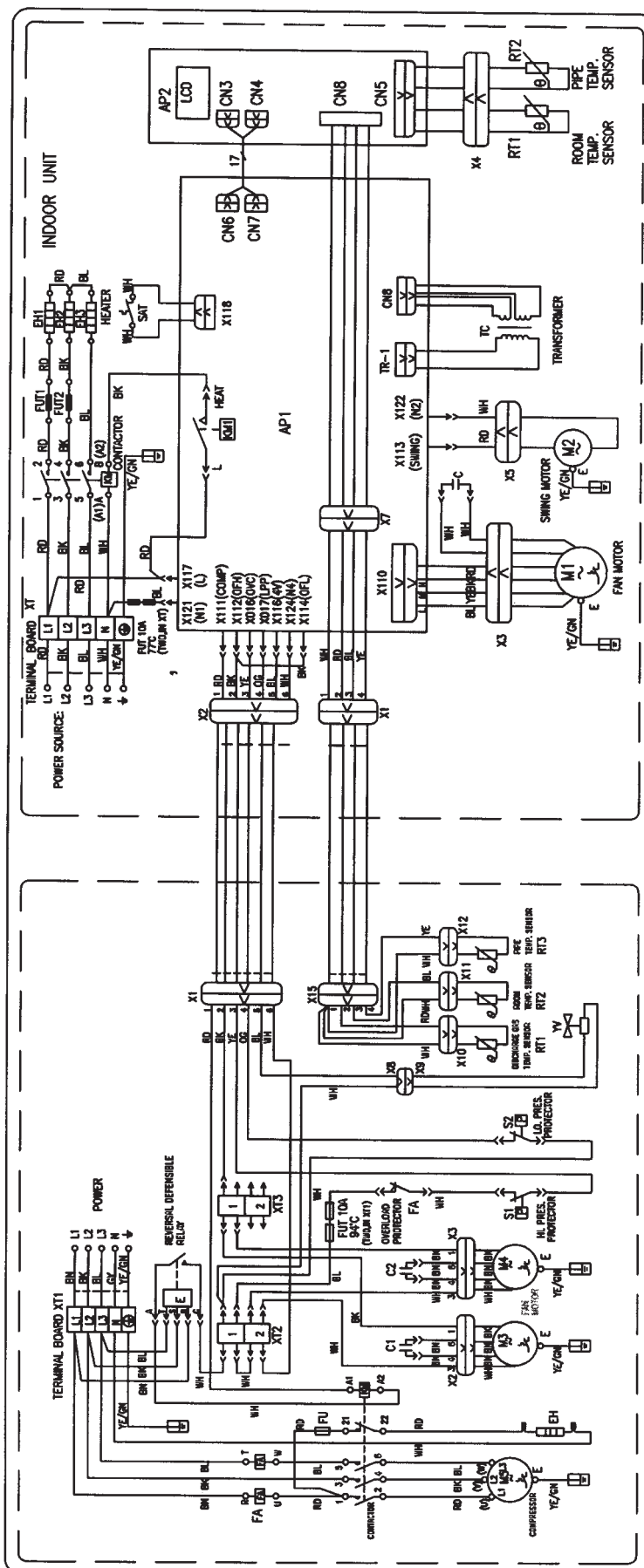


Fig. 31

CIRCUIT DIAGRAM



PCB FUNCTION MANUAL

1. RUNNING MODE

- a. Cool
- b. Dry
- c. Fan
- d. Heat
- e. Auto

2. CONTROLLING CONTENTS

- a. Indoor unit fan motor (high, middle and low speed)
- b. Sweep fan motor
- c. Electrical heater
- d. Outdoor unit fan motor (high and low)
- e. Reversing valve
- f. Compressor
- g. Light (only for the models having light)
- h. Fresh air fan motor
- i. Anion creator

3. THE PARAMETER TO BE INPUT

- a. The ambient temperature of the indoor unit (shorten form is T_{in});
- b. The evaporator temperature of the indoor unit (shorten form is T_{eva});
- c. The condenser temperature of the outdoor unit (shorten form is T_{con});
- d. The ambient temperature of the outdoor unit (shorten form is T_{out});
- e. The temperature of the gas output from the compressor (shorten form is T_{output}).

4. THE DIFFERENT CONTROLLING MODE FOR THE DIFFERENT FUNCTION MODE

Under all of the modes, the compressor will continue work for 6 min once it starts. And it will be restart in 3min after it stops. At the beginning, the indoor unit fan motor runs for 8sec in high speed then change to the set fan speed; and it is same in the outdoor unit.

- a. Cooling mode:

If $T_{in} \geq T_{set} - 1^{\circ}\text{C}$, cooling mode act, compressor and outdoor unit run, and indoor unit run in the set speed;

If $T_{in} \geq T_{set} - 1^{\circ}\text{C}$, the unit will be stop from cooling mode, compressor and outdoor unit stop, and indoor unit still run in the set speed;

If $T_{set} - 1^{\circ}\text{C} < T_{in} < T_{set} + 1^{\circ}\text{C}$, keep running in the old mode;

In the cooling mode, the range of T_{set} is $16^{\circ}\text{C} \sim 30^{\circ}\text{C}$, the initialize is 25°C .

b. Drying mode:

If $T_{in} > T_{set} + 2^{\circ}\text{C}$, drying mode act, compressor, indoor unit fan motor and outdoor unit fan motor run, The indoor unit fan motor runs in low speed;

If $T_{set} - 2^{\circ}\text{C} \leq T_{in} \leq T_{set} + 2^{\circ}\text{C}$, compressor, indoor unit fan motor and outdoor unit fan motor run for min, then stop for 4min, then run by this cycle. The indoor unit fan motor runs in low speed;

If $T_{in} < T_{set} - 2^{\circ}\text{C}$, compressor, outdoor unit fan motor and indoor unit fan motor stop.

In drying mode, the range of T_{set} is $16^{\circ}\text{C} \sim 30^{\circ}\text{C}$, the initialize is 25°C , the outdoor fan motor runs in high speed.

c. Heating mode:

If $T_{in} \leq T_{set} - 1^{\circ}\text{C}$, heating mode act, reversing, compressor and outdoor unit fan motor run, indoor unit fan motor runs in the set speed and the condition of avoiding the cold wind;

If $T_{in} \geq T_{set} + 1^{\circ}\text{C}$, compressor and outdoor unit fan motor stop, reserving valve is still electric, the indoor unit fan motor runs in the set speed and flow the rest heat;

If $T_{set} - 1^{\circ}\text{C} < T_{in} < T_{set} + 1^{\circ}\text{C}$, keep running in the old mode;

In the heating mode, the range of T_{set} is $16^{\circ}\text{C} \sim 30^{\circ}\text{C}$, the initialize is 25°C .

In the heating mode, the 4-way valve will be electroless in 2 min after the unit is turned off.

The working condition of the outdoor unit:

If $T_{out} \geq 16^{\circ}\text{C}$, the outdoor unit fan motor runs in low speed;

If $T_{out} \leq 13^{\circ}\text{C}$, the outdoor unit fan motor runs in high speed;

If $13^{\circ}\text{C} > T_{out} > 16^{\circ}\text{C}$, the outdoor unit fan motor runs in the old speed;

The outdoor unit fan motor stop when it is defrosting.

The conditions of avoiding cold wind:

Once the compressor work, either $T_{eva} \geq 30^{\circ}\text{C}$ or the compressor running for over 10sec, the indoor unit fan motor will start.

The conditions of flowing hot wind:

Once the compressor is stop, the indoor unit fan motor runs in low speed and will stop too in 10sec.

The conditions of beginning defrosting:

After the unit continue heating for 44min or if $T_{con} \leq -5^{\circ}\text{C}$, the defrosting mode act, the reversal valve, the indoor and outdoor unit stop.

If there is electrical heater in the unit, then it will be stop first and the reversal valve, the indoor and outdoor unit stop in 1min.

The conditions of stopping defrosting:

After the unit continue defrosting for 10min or if $T_{con} \geq 10^{\circ}\text{C}$, the defrosting stop, the reversal valve, the outdoor unit run, and the indoor unit fan motor will run in the condition of avoiding the cold wind.

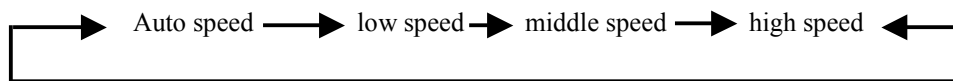
The working condition of electrical heater:

When the indoor unit is running, and $T_{eva} \leq 44^{\circ}\text{C}$ and $T_{in} \leq 23^{\circ}\text{C}$, and $T_{in} \leq T_{set} - 2^{\circ}\text{C}$, the electrical heater act.

When the indoor unit is stop, or $T_{eva} \geq 52^{\circ}\text{C}$ or $T_{in} \geq 26^{\circ}\text{C}$, or $T_{in} \geq T_{set}$, the electrical heater stop and will restart in 2min.

d. Fanning mode

The indoor unit fan motor runs in the set fan speed:



The range of is $16^{\circ}\text{C} \sim 30^{\circ}\text{C}$, the initialize is 25°C .

e. Auto mode

It runs according the T_{in} .

If $T_{in} \geq 6^{\circ}\text{C}$, cooling mode act, the T_{set} is 26°C automatically.

If $20^{\circ}\text{C} \leq T_{in} \leq 26^{\circ}\text{C}$, drying mode act, the T_{set} is 24°C automatically.

If $T_{in} \leq 20^{\circ}\text{C}$, heating mode act, the T_{set} is 20°C automatically till $T_{in} \geq 24^{\circ}\text{C}$.

If the unit is cooling only, if $T_{in} \leq 20^{\circ}\text{C}$, fanning mode act, the T_{set} is 20 automatically till $T_{in} \geq 24^{\circ}\text{C}$.

Once the each mode act, it will be in 30sec to change to the auto mode according the T_{in} .

5. TIMER AND SLEEP MODE

a. Sleep mode:

If it is cooling or drying, in 1hour of the beginning, the T_{set} will be increased 1°C , and it will be increased 1°C after 2 hour, then the unit runs in this temperature.

If it is heating, in 1hour of the beginning, the T_{set} will be decreased 1°C , and it will be decreased 1°C after 2hour, then the unit runs in this temperature.

There is no sleep mode when fanning and auto mode act.

b. Timer for Turn on:

The unit is stop when the timer for turn on is acted, when it time to turn on, the controller will act in the set mode. The distance of setting twice is 0.5hour and the range time is 0.5~24hour.

c. Timer for Turn off:

The unit is run when the timer for turn off is acted, the unit is stop when it time to turn off. He distance of setting twice is 0.5hour and the range time is 0.5~24hour.

6. FRESH AIR AND ANION FUNCTION

- a. Fresh air function:(it's unavailable when it is turned off)

This mode act when the button of “fresh air” is pressed once and the indoor unit fan motor is run (or received the signal of “fresh air” or “fresh air 2” of the remote controller); and it will stopped when the button is pressed once again.

- b. Anion function: (it's unavailable when it is turned off)

This mode act when then button of “anion” is pressed once and the indoor unit fan motor is run.

7. OTHER FUNCTION

- a. Sweeping:

It is controlled by the button of “sweep” on the remote controller. It is available when the indoor unit fan motor is run.

- b. Light (just for the models with light):

It is controlled by the button of “light” on the remote controller. It is available at any moment.

- c. Buzzer function:

It will be act when the controller is turned on or received a right signal.

- d. Auto fan speed of indoor unit:

When heating act:

If $T_{in} \geq T_{set}$, the indoor unit fan motor runs in low fan speed;

If $T_{set}-3^{\circ}\text{C} \leq T_{in} < T_{set}$, it is middle fan speed;

If $T_{in} < T_{set}-3^{\circ}\text{C}$, it is high fan speed.

When cooling act:

If $T_{in} < T_{set}$, it is low fan speed;

If $T_{set} < T_{in} \leq T_{set}+3^{\circ}\text{C}$, it is middle fan speed;

If $T_{in} > T_{set}+3^{\circ}\text{C}$, it is high fan speed.

When fanning act:

If $T_{in} < T_{set}$, it is low fan speed;

If $T_{set} < T_{in} \leq T_{set}+3^{\circ}\text{C}$, it is middle fan speed;

If $T_{in} > T_{set}+3^{\circ}\text{C}$, it is high fan speed.

The indoor unit fan motor will run by the rules till it runs for 30sec after the unit is turned on.

- e. Indicator light:

It flashes once when the unit is turned on and it will be flashing when:

Defrosting, avoiding the cold wind, protecting of the compressor in high-pressure, protecting of the compressor in low-pressure, protecting of the low power supply, protecting of the high-temperature of the compressor outlet pipe, cooling forcibly, heating forcible (just for LCD).