TOYOTOMI

Service Manual

MODEL:

FS1060A

① Introduction and Features

Model	Remarks
FS 1060A	380-415V 3N～ 50Hz R410A

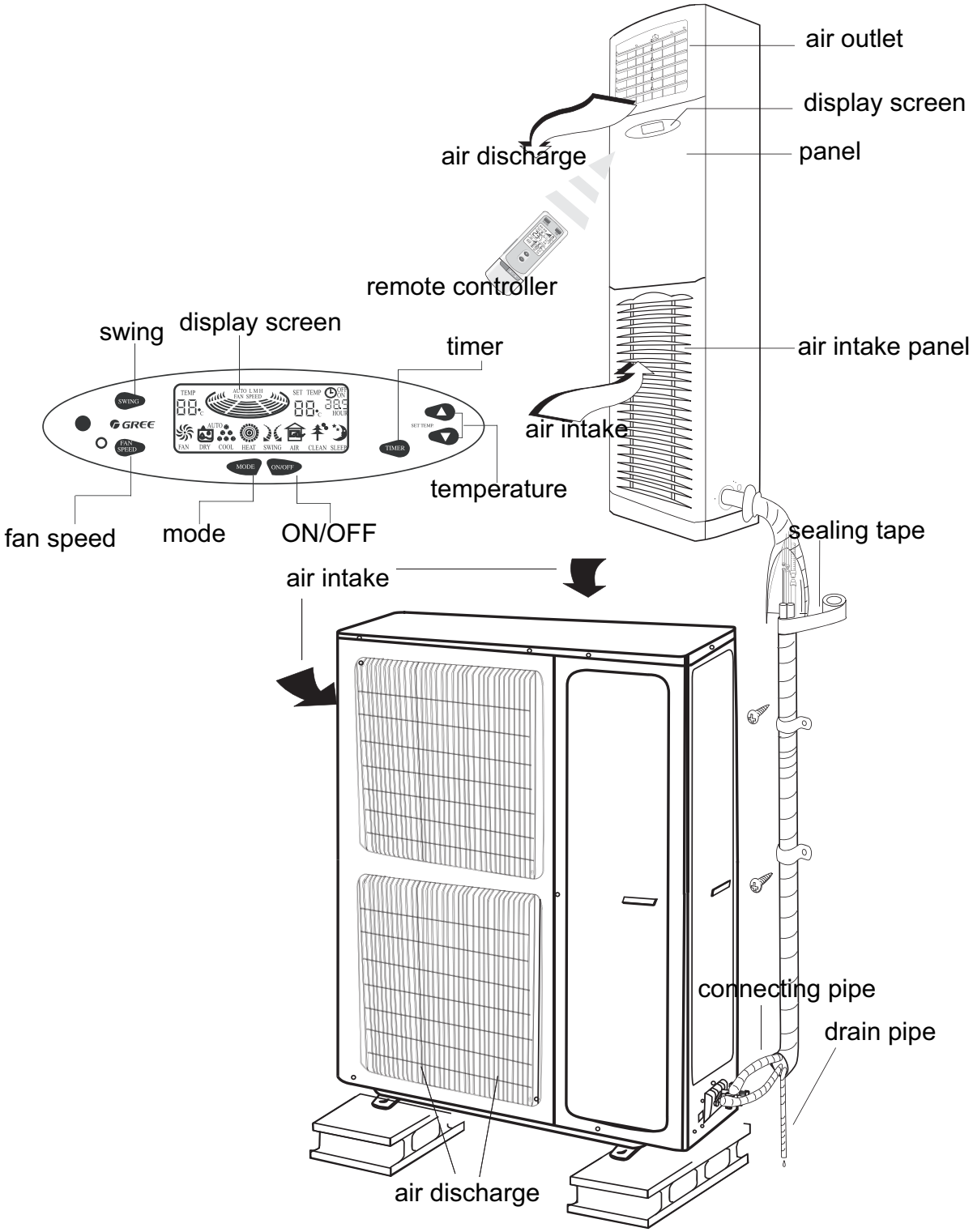
2 Specification and Technical Parameter

Model		FS 1060A	
Function		COOLING	HEATING
Rated Voltage		380-415V 3N～	
Rated Frequency		50Hz	
Total Capacity (Btu/h)		16000W	18000W
Power Input (W)		6400W	6200(9700)W
Rated Input (W)		7800W	7800(11300)W
Rated Current (A)		12.05A	12.05(17.25) A
Air Flow Volume (m^3/h) (H/M/L)**		2000	
Dehumidifying Volume (l/h)		5.2	
EER / C.O.P (W/W)		2.5	
Energy Class		/	
Indoor unit	Model of Indoor Unit	FS 1060Ai	
	Fan Motor Speed (r/min) (H/M/L)	550/500/450 r/min	
	Output of Fan Motor (w)	130W	
	Input of Heater (w)	3500W	
	Fan Motor Capacitor (uF)	6uf	
	Fan Motor RLA(A)	1.59A	
	Fan Type-Piece	Centrifugal fan – 1	
	Diameter-Length (mm)	φ369X 180.5	
	Evaporator	Aluminum fin-copper tube	
	Pipe Diameter (mm)	Φ7	
	Row-Fin Gap(mm)	3-1.4	
	Coil length (l) x height (H) x coil width (L)	914.4X471X42.2	
	Swing Motor Model	SM016	
	Output of Swing Motor (W)	4W	
	Fuse (A)	PCB 5.0A	
	Sound Pressure Level dB (A) (H/M/L)	58/53/50	
	Sound Power Level dB (A) (H/M/L)***	/	
	Dimension (H/W/D) (mm)	540/1750/380	
	Dimension of Package (L/W/H) (mm)	2000/720/515	
	Net Weight /Gross Weight (kg)	60/85	

Outdoor unit	Model of Outdoor Unit		FS 1060Ao
	Compressor Manufacturer/trademark		Dallian SANYO / SANYO
	Compressor Model		C-SBN453H8D
	Compressor Type		SCrOll
	L.R.A. (A)		67A
	Compressor RLA(A)		9.77A
	Compressor Power Input(W)		5750W
	Overload Protector		UP18
	Throttling Method		Capillary
	Starting Method		Capacitor
	Working Temp Range (℃)		-7℃≤T≤45℃
	Condenser		Aluminum fin-copper tube
	Pipe Diameter (mm)		Φ9.52
	Rows-Fin Gap(mm)		3-1.8
	Coil length (l) x height (H) x coil width (L)		745X1219.2X66
	Fan Motor Speed (rpm)		940 rpm
	Output of Fan Motor (W)		92W
	Fan Motor RLA(A)		0.42
	Fan Motor Capacitor (uF)		4uf
	Air Flow Volume of Outdoor Unit		5000 m3/h
	Fan Type-Piece		Axial fan -1
	Fan Diameter (mm)		Φ450X156
	Defrosting Method		Auto defrost
	Climate Type		T1
	Isolation		I
	Moisture Protection		IP24
	Permissible Excessive Operating Pressure for the Discharge Side(MPa)		3.9
	Permissible Excessive Operating Pressure for the Suction Side(MPa)		2.21
	Sound Pressure Level dB (A) (H/M/L)		61
	Sound Power Level dB (A) (H/M/L)		/
	Dimension (W/H/D) (mm)		950X1250X412
	Dimension of Package (L/W/H)(mm)		450X1110X1280
	Net Weight /Gross Weight (kg)		115/126
	Refrigerant Charge (kg)		R410A/5.0Kg
Connection Pipe	Length (m)		5M
	Gas additional charge(g/m)		100g//m
	Outer Diameter	Liquid Pipe (mm)	Φ12(1/2")
		Gas Pipe (mm)	Φ19(3/4")
	Max Distance	Height (m)	30
		Length (m)	30

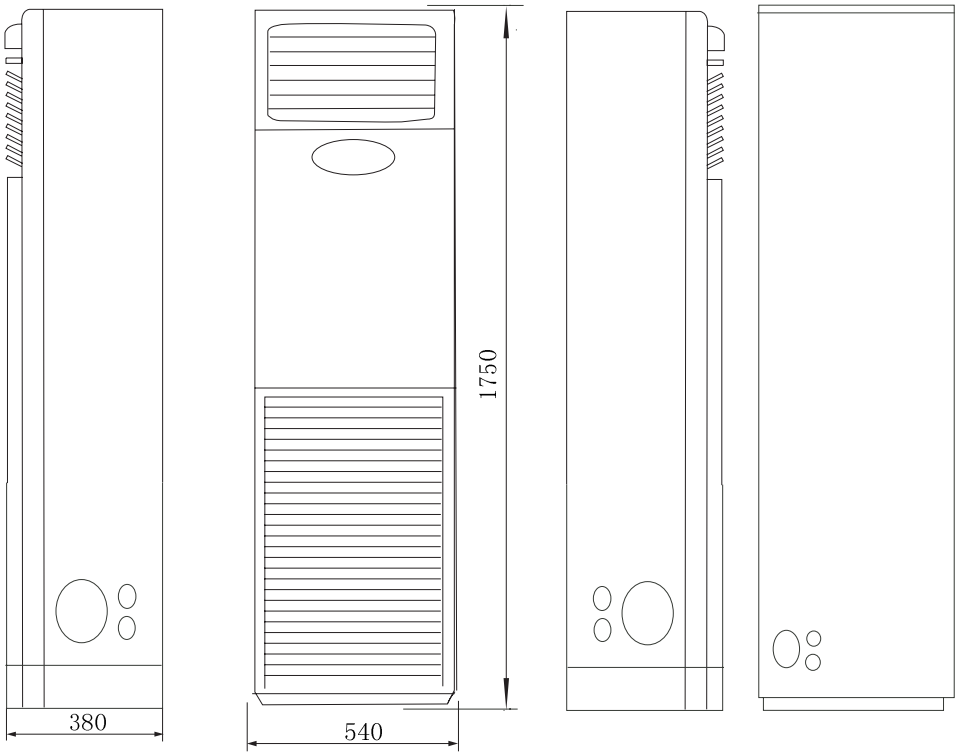
If the above specification's parameter has been changed, please refer to the nameplate.

3 Parts' Name

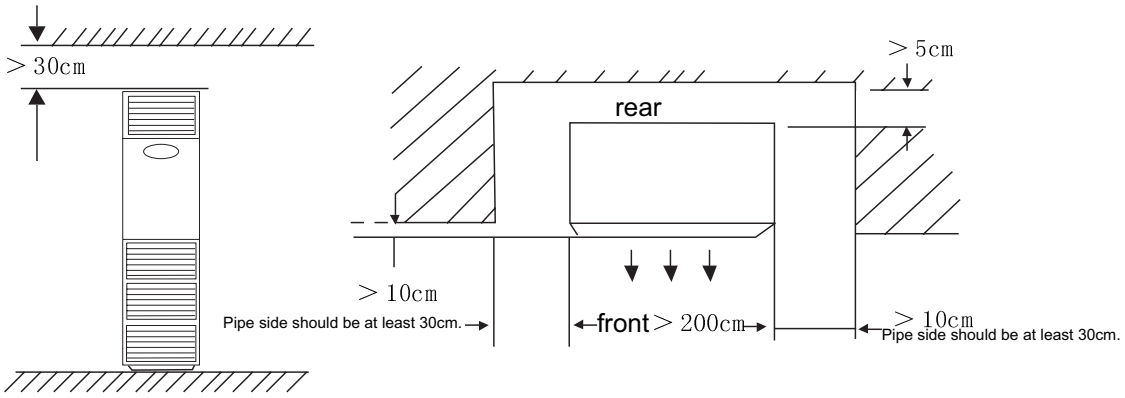

air outlet
display screen
panel
air discharge
remote controller
swing
display screen
timer
air intake panel
air intake
temperature
fan speed
mode
ON/OFF
sealing tape
air intake
connecting pipe
drain pipe
air discharge

4 Outline and Installation Dimension

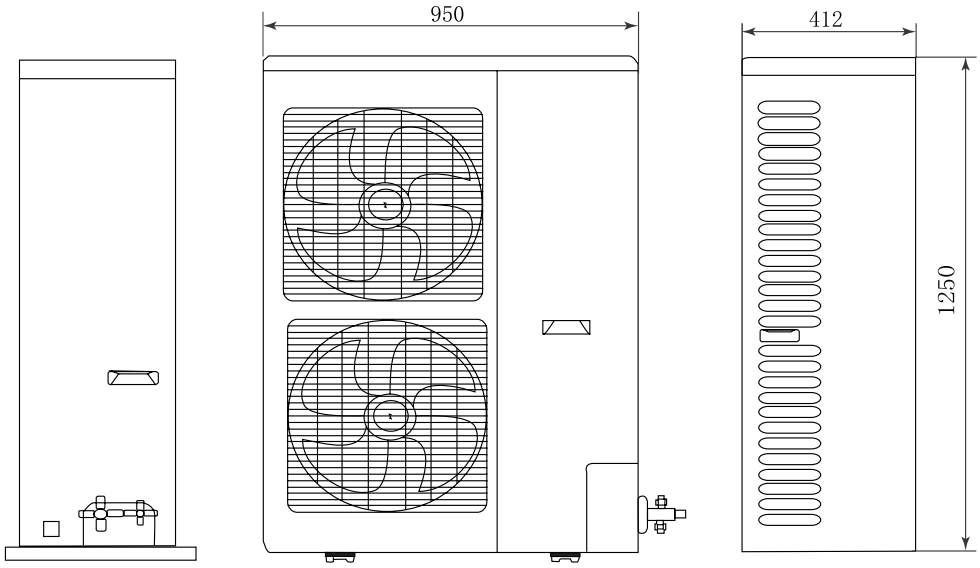
4. 1 Indoor unit's outline and installation size

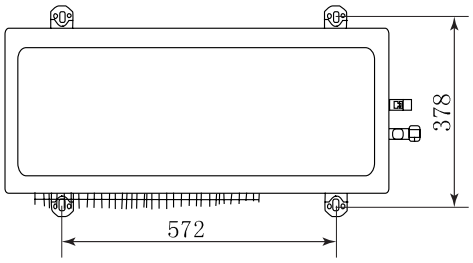


unit: mm

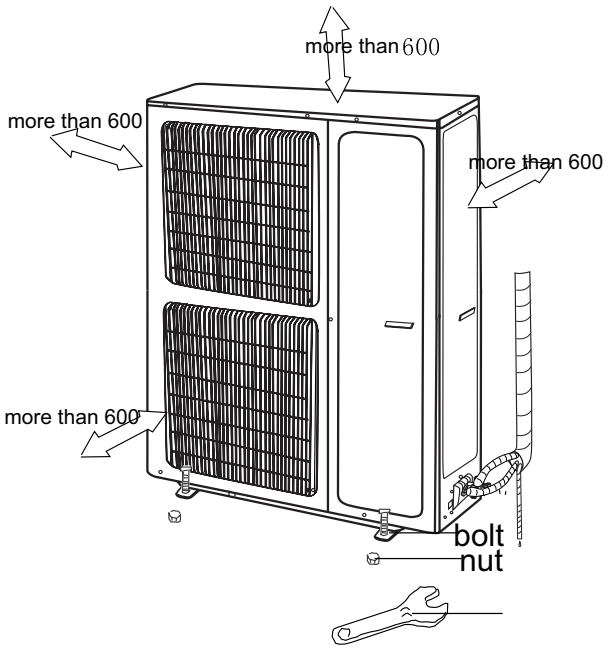


4. 2 Outdoor unit's outline and installation size





unit: mm



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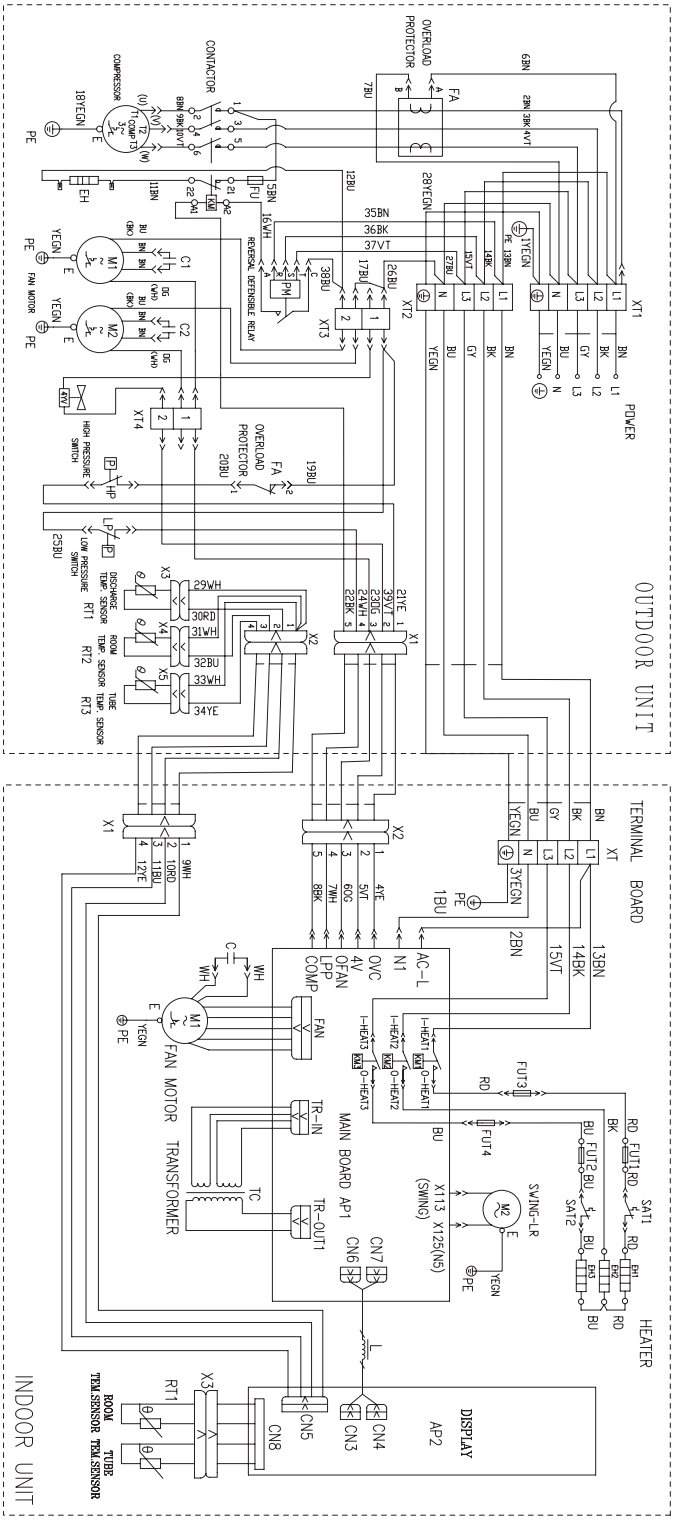


If above electric circuit diagram has been changed, please refer to it on the body.

6 Controller's function manual and operation method

1 Temperature Parameters

- Indoor preset temperature (T_{preset})
- Indoor ambient temperature ($T_{amb.}$)

2 Basic Functions

Once the unit is started under any modes, the compressor will keep running within 6 minutes. Once the unit's stopped, it cannot be restarted until after 3-minute lag.

(1) Cooling Mode

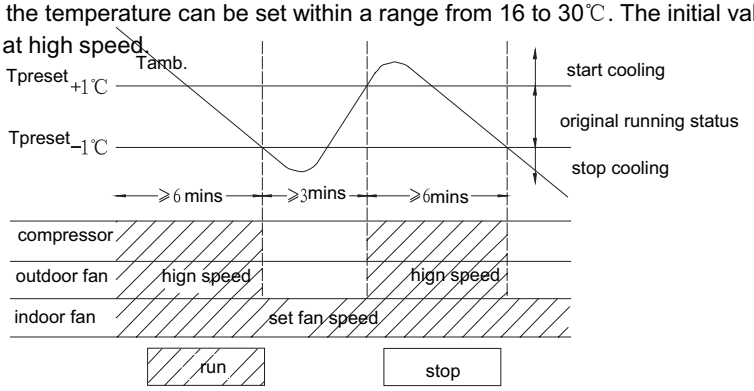
① Cooling Conditions and Process

When $T_{amb.} \geq T_{preset}+1℃$, the unit will run under cooling mode, in which case the compressor and outdoor fan will be started, and the indoor fan will run at preset speed.

When $T_{amb} \leq T_{preset}-1℃$, the unit will be stopped under cooling mode, in which case the compressor and outdoor fan will be stopped, while the indoor fan will run at preset speed.

When $T_{preset}-1℃ < T_{amb.} < T_{preset}+1℃$, the unit will maintain its original operating status.

- Under cooling mode, the temperature can be set within a range from 16 to 30℃. The initial value is 25℃. The outdoor fan runs at high speed.



(2) Dry Mode

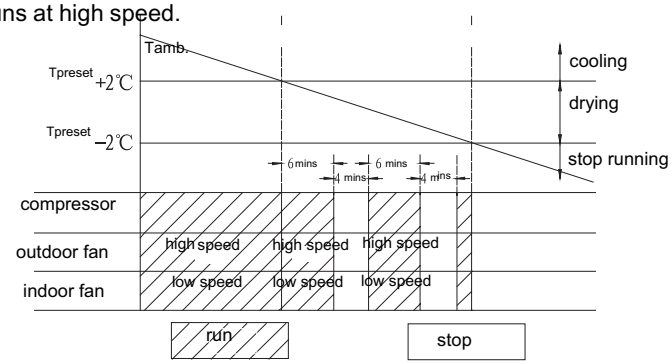
① Drying Conditions and Process

When $T_{amb.} \geq T_{preset}+2℃$, the unit will run under cooling mode, in which case the compressor and outdoor fan will be started, and the indoor fan will run at low speed.

When $T_{preset}-2℃ \leq T_{amb.} \leq T_{preset}+2℃$, the compressor, indoor fan and outdoor fan will run 6 minutes and stop 4 minutes in repeated cycle, while the indoor fan will run at low speed.

When $T_{amb.} < T_{preset}-2℃$, the compressor, outdoor fan and indoor fan will be stopped.

- Under this mode, the temperature can be set within a range from 16 to 30℃. The initial value is 25℃. The outdoor fan runs at high speed.



(3) Heating Mode

① Heating Conditions and Process

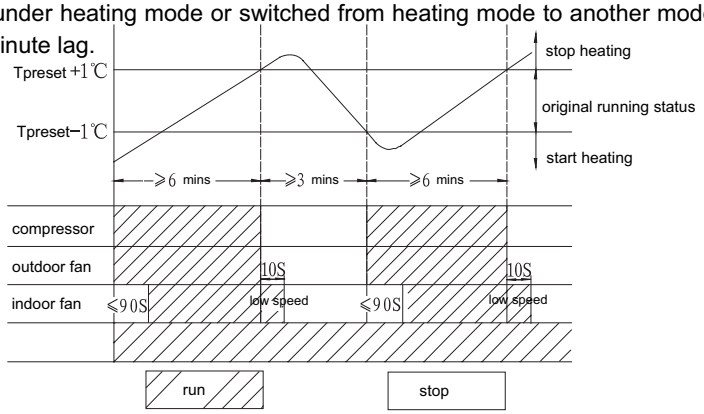
When Tamb.≤ Tpreset- 1℃ , the unit is running in heating mode. Meawhile, the reversing valve, compressor and the outdoor fan start running. When the unit is turned on to turn to heating mode or switch to heating mode from other modes, the four-way valve start running after the compressor is started for the first time in 20s, and the indoor fan will start running after 90s delayed at most.

If $T_{amb.} \geq T_{preset} +1℃$, the compressor and outdoor fan will be stopped, while reversal valve will remain energized and the indoor fan will run at low speed for 10s and then it will stop running.

When $T_{preset} -1℃ < T_{amb.} < T_{preset} +1℃$, the unit will maintain its original operating status.

➢ Under heating mode, the temperature can be set within a range from 16 to 30℃. The initial value is 25℃.

If the unit is switched off under heating mode or switched from heating mode to another mode, the 4-way valve will be de-energized after 2-minute lag.



② Defrosting Conditions and Process

When detecting any frost in condenser, the system will start defrosting(The auxiliary electric heater,if any, will be stopped firstly, and then start defrosting after 1 min.),in which case the compressor, indoor fan and outdoor fan will be stopped simultaneously, the 4-way valve will stop in 3S and the compressor will be started in another 30S.(Defrost will not be detected during high temperature protection).When detecting the frost in condenser is removed, the defrost is completed, in which case the compressor stops, while the 4-way valve runs. 30S later, the compressor starts running,outdoor fan runs,and the indoor fan will run in 90S at least.

③ Auxiliary electric heater working condition

When indoor fan is runnng and Tevap. is lower than Tamb. and Tamb. ⩽ Tpreset-2℃, auxiliary electric heater will start running. When indoor fan isn't running, or Tevap. is high, or Tamb. is high, the auxiliary electric heater will stop running. After the auxiliary electric heater is stopped, it can be restarted only after 2min delayed.

$T_{outdoor} \geqslant 16℃$, outdoor fan is running at low fan speed;

$T_{outdoor} \leqslant 13℃$, outdoor fan is running at high fan speed;

$13℃ < T_{outdoor} < 16℃$, Outdoor fan keep the original running status.

(4) Fan Mode

Indoor fan will run at preset speed → Auto Speed → Low Speed → Mid. Speed → High Speed →

➢The temperature can be set within a range from 16 to 30 ℃. The initial value is 25 ℃

(5) AUTO Mode

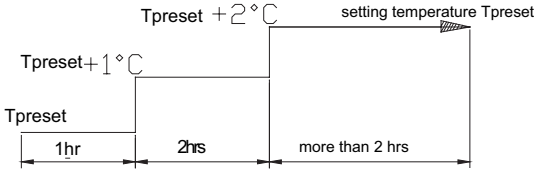
Under this mode, the system will automatically select its running mode (cooling, dry, heating or fan) with the change of ambient temperature.

➢ Once a mode is started, the unit will run at least 30 seconds before it can turn to other running status under auto mode according to the ambient temperature.

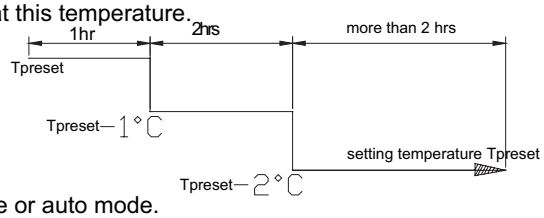
3 Other Control

(1) Sleep Function

If the controller is under cooling or dry mode, the preset temperature will be increased by 1℃ one hour after running under sleep mode and will be increased by another 1℃ after two hours. The temperature will increased by 2℃ within two hours. After that, the unit will run at this temperature.



If the controller is under heating mode, the preset temperature will be decreased by 1℃ one hour after running under sleep mode and will be decreased by another 1℃ after two hours. The temperature will decreased by 2℃ within two hours. After that, the unit will run at this temperature.



 No sleep function under fan mode or auto mode.

(2) Timer function

① Timer ON

TIMER ON function can be set when the unit is at off mode. At the time for Timer ON, the controller will run under preset mode. The interval of time setting is 0.5h and can be set within 0.5-24hr.

② Timer OFF

TIMER OFF function can be set when the unit is at on mode. At the time for Timer OFF, the system will be stopped. The interval of time setting is 0.5h and can be set within 0.5-24hr .

(3) Swing Control

You can control its ON and OFF by using the swing button. The swing is valid only when the indoor fan is running.

(4) Buzzer

When the controller is energized or receives correct signal from press button, the buzzer will give out a beep.

(5) Auto fan speed control of indoor fan

In this mode, indoor fan will select the fan speed(high, medium, low) according to the change of ambient temperature. Once the fan speed is started, it can be switched according to the condition only after running for 30s.

(6) Indicator control

The indicator will make a blink when the controller is just energized. The indicator will blink under any condition as below: Defrosting; Antifreeze Protection; Compressor high pressure protection; Compressor low pressure protection;Exhaust pipe high temp. protection; forcible cooling; forcible heating.

(7) Power-off Memory

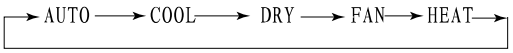
Memory content:mode, swing,timer,preset temp.,preset fan speed.

After the power is failed, if it's re-energized ,the unit will automatically start to run by the memory of last time.

4 Button

(1) MODE button

Press MODE key to select and display the run mode as below:



(2) FAN button

Press FAN key to select and display the run mode as below:

AUTO, low, medium, high

➢ Fan speed is not adjustable under dry mode.

(3) TEMP setting button (TEMP∧and TEMP∨)

1)Press TEMP.∧ or TEMP.∨each time, the preset temp. will increase or decrease 1℃ and the range of adjustment is 16-30℃ .Under AUTO mode, this button doesn't work.

2) Press the temp. buttons ∧and∨simultaneously,all the buttons function on the display screen willl be shielded .If press the two keys once again, the shield will be released.

(4) **Timer Button**

You can press this button to set the time for AUTO ON when the unit is stopped, or set the time for AUTO OFF when the unit is running. Each press of TIMER button will increase the time setting by 0.5h. If you keep holding down this button, the time setting will automatically increase by 0.5h every 0.5s. The setting range is 0.5-24hr.

(5) Swing button

Press SWING button once, SWING will be displayed. If indoor fan has been in operation, the swing motor will work. If press this button again, SWING will be disappeared and swing motor will be stopped.

(6) ON/OFF button

This button is controlling ON/OFF of the controller. After each pressing, the ON/OFF will be switched once.

5 Protection

(1) Indoor Antifreeze Protection

When the unit is cooling under cooling or dry mode . If it is detected that the system is under antifreeze protection, the indicator will blink and E2 will be displayed, in which case the compressor and the outdoor fan will stop running, while indoor fan and swing motor will maintain the original status. When antifreeze protection is released, the indicator will be black, LCD will resume its display and the controller runs in preset mode.

The button is not shielded under antifreeze protection.

(2) **Compressor High-pressure Protection**

If high-pressure protection is detected, the unit will close all loads and shield all buttons and remote-control signal, meanwhile, the indicator will blink and E1 will be displayed.

Upon detecting that the compressor high-pressure protection is released, the indicator will still blink and E1 wil be displayed, in which case you have to press ON/OFF button to switch off the unit before you can clear E1 display and turn the indicator. Press ON/OFF button to resume the operation.

(3) **Compressor Low-pressure Protection**

1.After the compressor is started for 3mins, if it is detected for 3 minutes successively that the low-pressure switch is broken, the complete unit will be stopped and the indicator will flicker. In 3 minutes, the unit will restore running automatically. If low-pressure switch protection occurs 2 times successively, the indicator flickers and E3 is displayed ,and the unit cannot restore running automatically, so as to remind the user of air leakage. Press ON/OFF button to switch off the unit and press it again to restore operation.

2.Under defrosting mode, low-pressure switch signal can not be detected,which should be done after defrosting finished 10 minutes later.

3.From the controller, you can press down SWING button and FAN SPEED button simultaneously to shield the detection of low pressure switch signal for purpose of air collection. Detection will be resumed automatically after 6 minutes,or you can resume detection by pressing ON/OFF button to switch off the unit and pressing it again to start the unit.

4.Under heating mode,if the outdoor ambient temp. is lower than 0℃ or equal to 0℃ ,this detection will be shielded.

5.Under heating mode,if compresoor is running while outdoor fan is stopped(Hi-temp. protection),the detection will be shield till the outdoor fan resumes running.

6.If it is detected that the low-pressure switch is off when the compressor is stopped, the complete unit will be stopped, the indicator will blink and E3 will be displayed, in which case the unit cannot be restarted automatically. You have to press ON/OFF button to switch off the unit and press this button again to restart.

(4) **Discharge Pipe High-temp. Protection**

After the compressor is started, if the discharge temperature is too high or exhaust sensor is in short circuit (or open circuit), the indicator will flicker and the unit will be stopped when the indoor ambient temperature reaches the preset value.After the compressor is stopped for 3 mins, the complete unit will be restarted when the discharge temperature is resumed to normal range.

If above phenomena occurs twice continuously, the complete unit cannot be restarted automatically, the indicator will blink and E4 will be displayed. Press ON/OFF button to switch off the unit and press it again to switch on the unit. If the discharge temperature is normal, the unit will run under preset mode.

If turn on the unit in heating mode or turn to heating mode from other modes, the air discharge temperature will shield 1min for protection when turning on the unit or the compressor is started up for the first time.

(5) Indoor ultra-high temp. protection

Under heating mode, if it is detected that the temp. of evaporator pipe is too high,the outdoor fan will stop runing(defrosting won't be detected),if temp. gets right, outdoor fan will start running(defrosting will be detected).

(6)Low-voltage Protection

When the compressor is running,and it is detected that the current exceeds specified value,the unit will stop running when indoor ambient temperature reaches preset temp. After the compressor has stopped for 3 mins, the unit will automatically resume its original running status. If there are more than 6 times protection (If the compressor has stopped for more than 6mins, the times of protection will be cleared),their indicator light flickers and displays E5,and the unit can not resume its original running status. It needs to press the ON/OFF button to stop the unit and repress the button to resume operation.

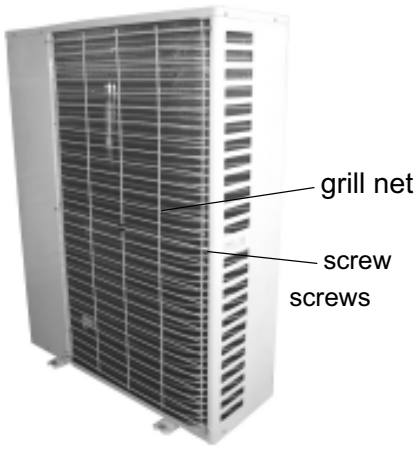
(7)Malfunction and Protection Code

E1	Compressor High-pressure Protection
E2	Indoor Antifreeze Protection
E3	Compressor Low-pressure Protection
E4	Exhaust Pipe High-temp. Protection
E5	Low-voltage Protection

8. 2 Disassembly procedure of outdoor unit

Operating Procedures / Photos

1.Disassemble grill net
Unscrew the support chassis between rear plate and valve and 6 tapping screws on condenser side plate, and then remove the grill net.



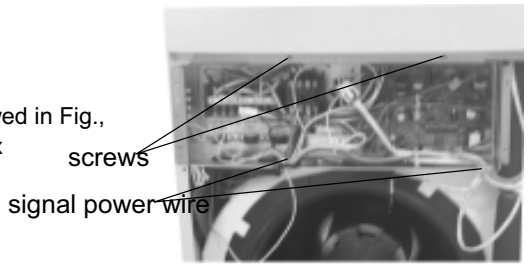
2.Disassemble the top cover plate
Unscrew the tapping screws around top cover plate and pull it upward, then remove the top cover plate.

3.Disassemble the front plate
Unscrew 3 tapping screws on front plate and pull it upward, then remove the front plate.

Operating Procedures / Photos

4.Disassemble electric box

Unscrew 2 screws on electric box and pull out the signal power wire and the power cord as showed in Fig., and pull it downward, then remove the electric box



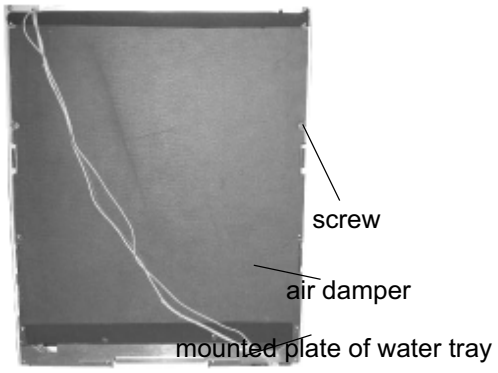
5.Disassemble panel

Unscrew 2 screws used for fixing the panel, pull the panel downward and pull out the signal wire, then remove the panel.

6.Disassemble air damper and the mounted plate of water tray

Unscrew 10 screws around the air damper, and then remove the air damper.

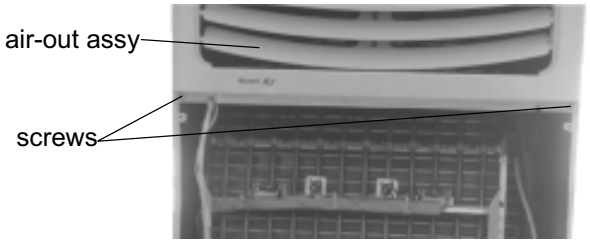
Unscrew 2 screws on the mounted plate of water tray and then remove it.



Operating Procedures / Photos

7.Disassemble air-out Assy

Unscrew the 3 screws used for connecting air outlet and top cover and the 2 screws used for connecting left plate and right plate



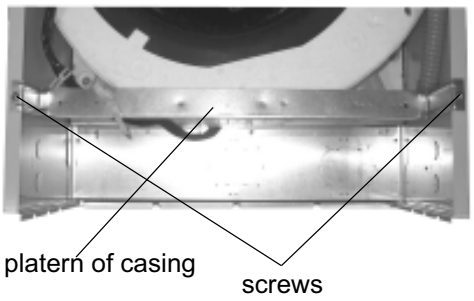
8.Disassemble chassis

Unscrew the screws around the chassis and pull it outward, then disassemble the chassis.

Operating Procedures / Photos

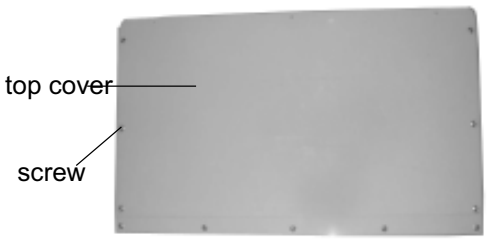
9.Disassemble lower platen of casing

Unscrew the 2 screws on the lower platen of casing and pull it upward, then you can remove the lower platen of casing



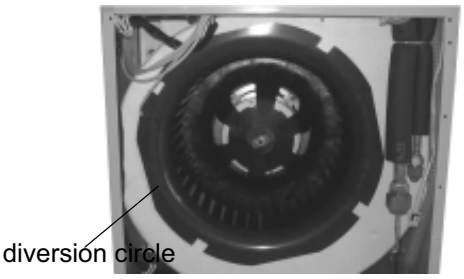
10.Disassemble top cover

Unscrew the screws around the top cover and then remove the top cover.

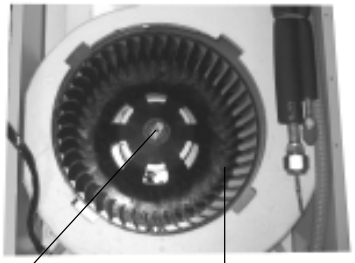


11.Disassemble air damper and the mounted plate of water tray

Press the diversion circle by hand to rotate it in clockwise direction and lift it to remove the diversion circle. As shown in Fig. 12. Unscrew the nut on blade by wrench and lift it upward to remove the blade.

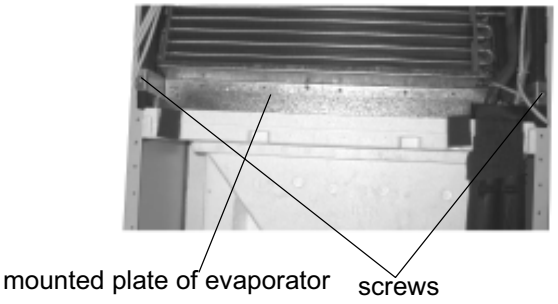


Operating Procedures / Photos



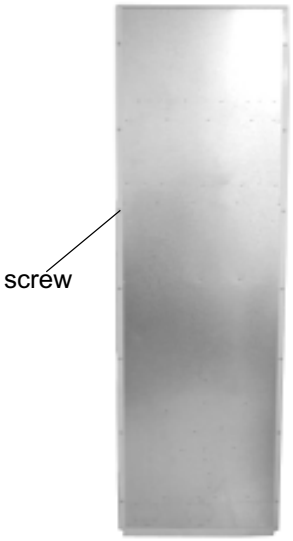
12.Disassemble mounted plate of evaporator

Unscrew the 2 screws on the mounted plate of evaporator and then remove it.



13.Disassemble the left side and right side plates

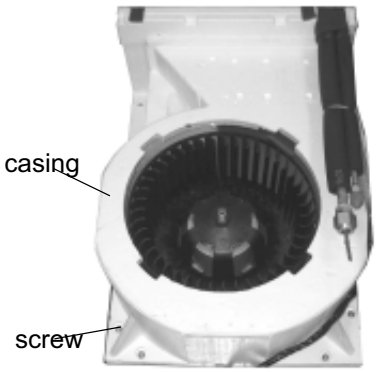
Unscrew the screws used for connecting the left and right side plates and rear plate, and then remove it.



Operating Procedures / Photos

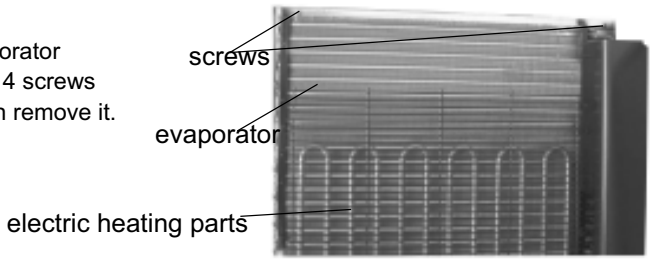
14.Disassemble casing

Unscrew the screws used for fixing the casing and then remove the casing。



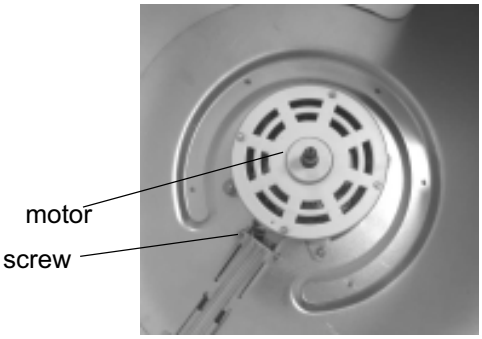
15.Disassemble evaporator

Unscrew the 2 screws used for fixing evaporator and then remove evaporator. Unscrew the 4 screws used for fixing the electric heating and then remove it.



16.Disassemble motor

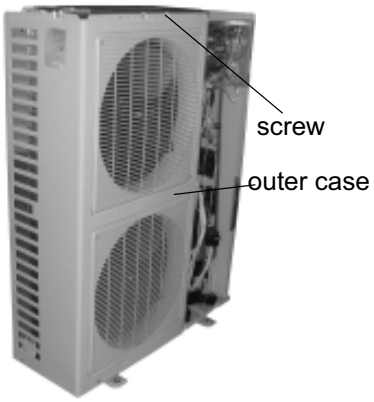
Unscrew the screws used for fixing the motor and then remove it.



Operating Procedures / Photos

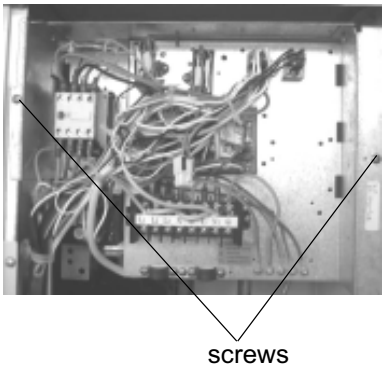
4.Disassemble the outer case

Unscrew the screws around the outer case and then remove it.



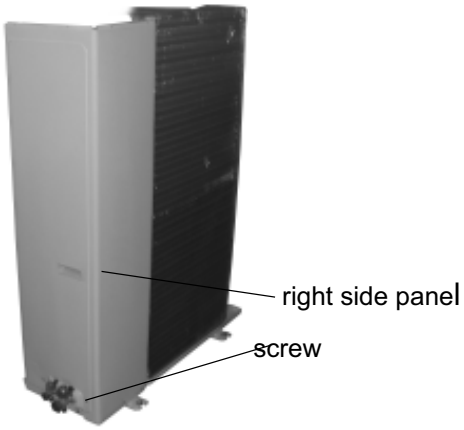
5.Disassemble electric box

Unscrew the screws around the electric box and then remove the electric box assy.



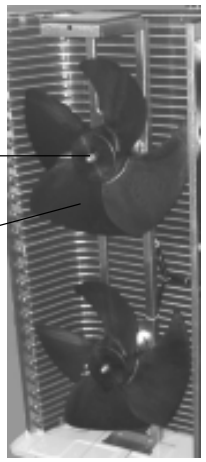
6.Disassemble right side plate

Unscrew the screws around the right side plate assy and the right side plate assy.



7.Disassemble axial blade

Disboard the nut on blade with wrench and then remove the blade.

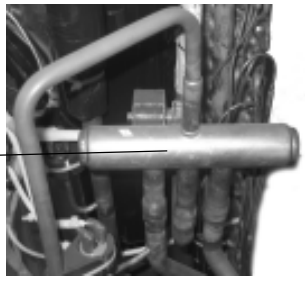


8.Disassemble outdoor motor

Unscrew 4 tapping screws used for fixing the motor pull out the leading wire and remove the motor. Unscrew 2 tapping screws used for fixing the motor support, lift it upward and then remove the motor support.

9. Disassemble four-way valve

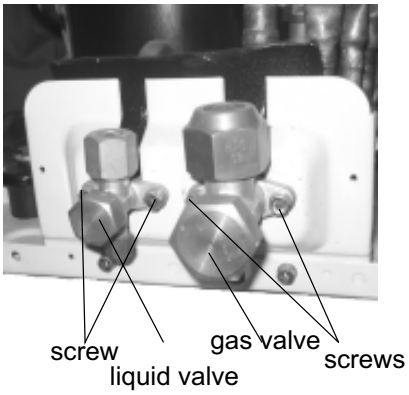
Unscrew the fixing nut of the four-way valve coil and remove the coil. Wrap the four-way valve with wet cotton and unsolder the 4 weld spots connecting the four-way valve to take it out. Welding process should be as quick as possible and keep wrapping cotton wet all the time. Be sure not to burn out the leading wire of compressor.



Operating Procedures / Photos

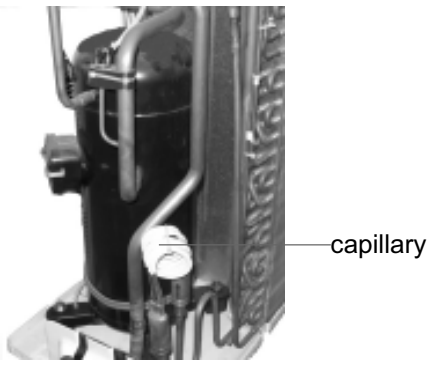
10. Disassemble valve

Unscrew 2 screws used for fixing the valve and unsolder its connection pipe, the remove the valve.



11.Disassemble capillary

Unsolder the weld spot used for connecting capillary and other pipes and then remove the capillary.

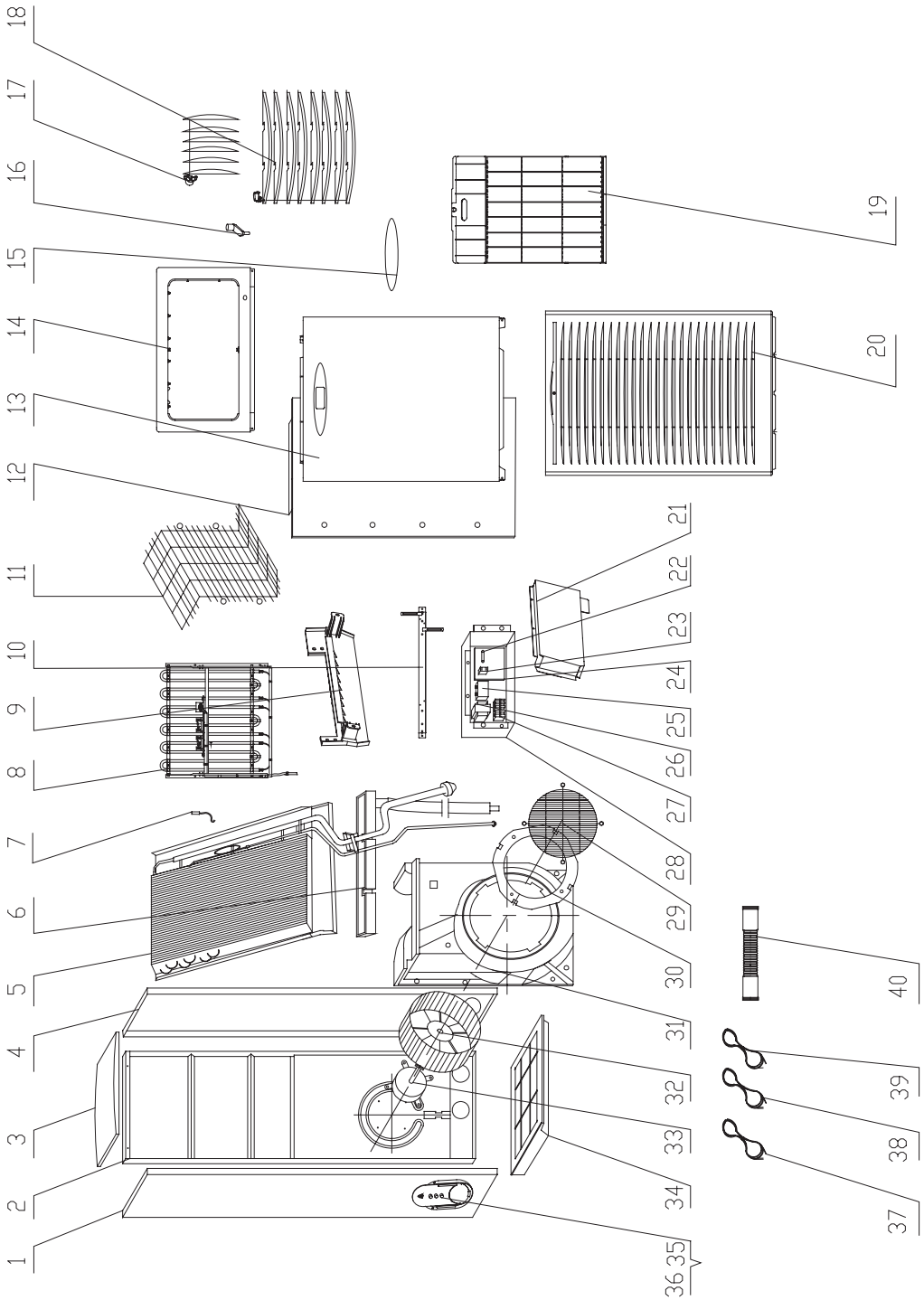


12.Disassemble compressor

Unscrew 4 foot screws of compressor and unsolder the connection pipes, then remove the compressor.

8 Assembly Drawing and Parts List

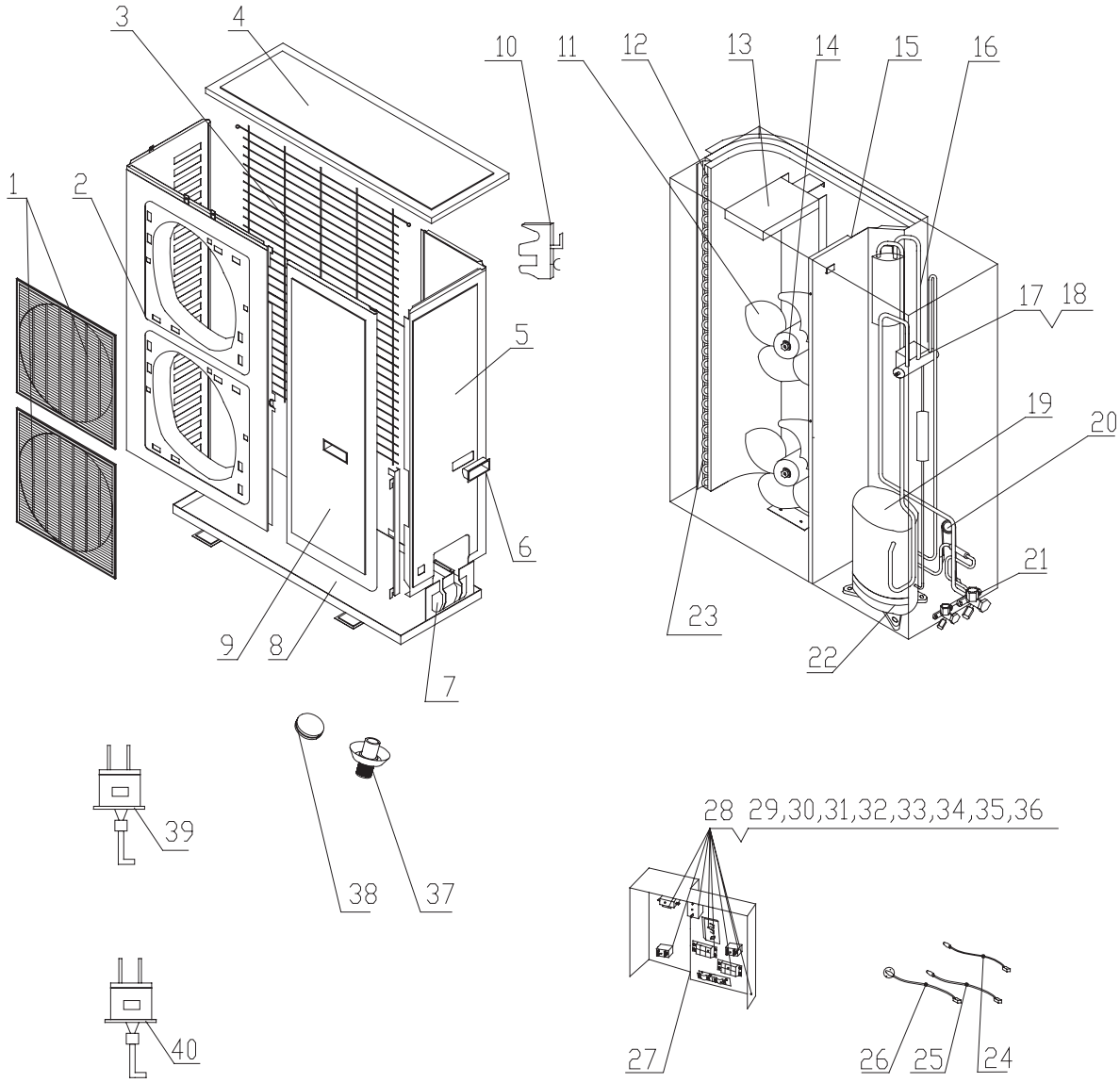
8.1 Assembly drawing for indoor unit parts



8. 2 Parts list for indoor unit

No	Description	Part Code	Qty
		FS 1060Ai	
1	Left Side Plate Sub-Assy	01304305	1
2	Rear Plate Sub-Assy	01304177	1
3	Top Cover Sub-Assy	22244470	1
4	Right Side Plate Sub-Assy	01304179	1
5	Evaporator Assy	01004283	1
6	Water Tray Sub-Assy	12414471	1
7	Temperature Sensor	39000171	1
8	Electric Heater Tube	32004053	1
9	Breakwater Sub-Assy	01364483D	1
10	Propeller housing press plate sub-assy	01364471	1
11	Rear Grill	01474034	1
12	Air Guard Assy	01364496	1
13	Front Panel Assy	20004386	1
14	Air Outlet Assy	2000447001	1
15	Display	30543070	1
16	crank	10564201	1
17	Synchronizing Motor	15214215	1
18	Air Louver	10514452	6
19	Filter Sub-Assy	11144471	1
20	Air Intake panel Assy	200044711	1
21	Electric Box Cover Sub-Assy	01404403	1
22	Fuse	46010013	1
23	Relay	44020331	3
24	Relay	44020345	7
25	Main Board	30033066	1
26	Capacitor CBB61	33010037	1
27	Transformer	43110237	1
28	Terminal Board	42010258	1
29	Electric Box Assy	01404334	1
30	Protective covering	01474027	1
31	Diversion Circle	10374202	1
32	Propeller Housing Sub-assy	12104470	1
33	Centrifugal fan	10314401	1
34	Fan Motor	15014431	1
35	Chassis	22224471	1
36	Rear Cover	2224422002	3
37	Baffle Plate	2611408802	3
38	Connecting Cable	40030311	2
39	Connecting Cable	40030309	1
40	Connecting Cable	40030310	1
41	Drain Pipe	05230022	1

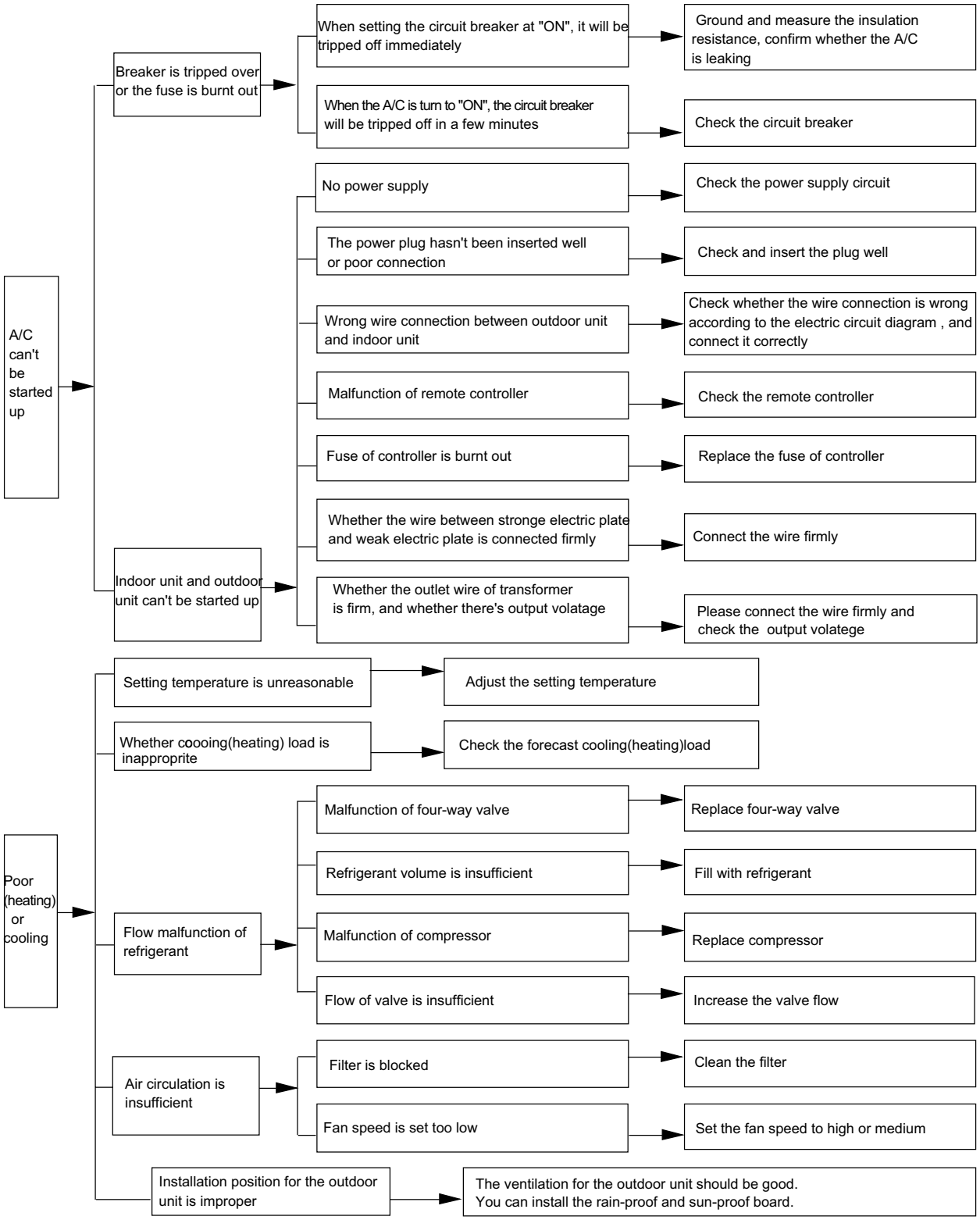
8.3 Assembly drawing for outdoor unit

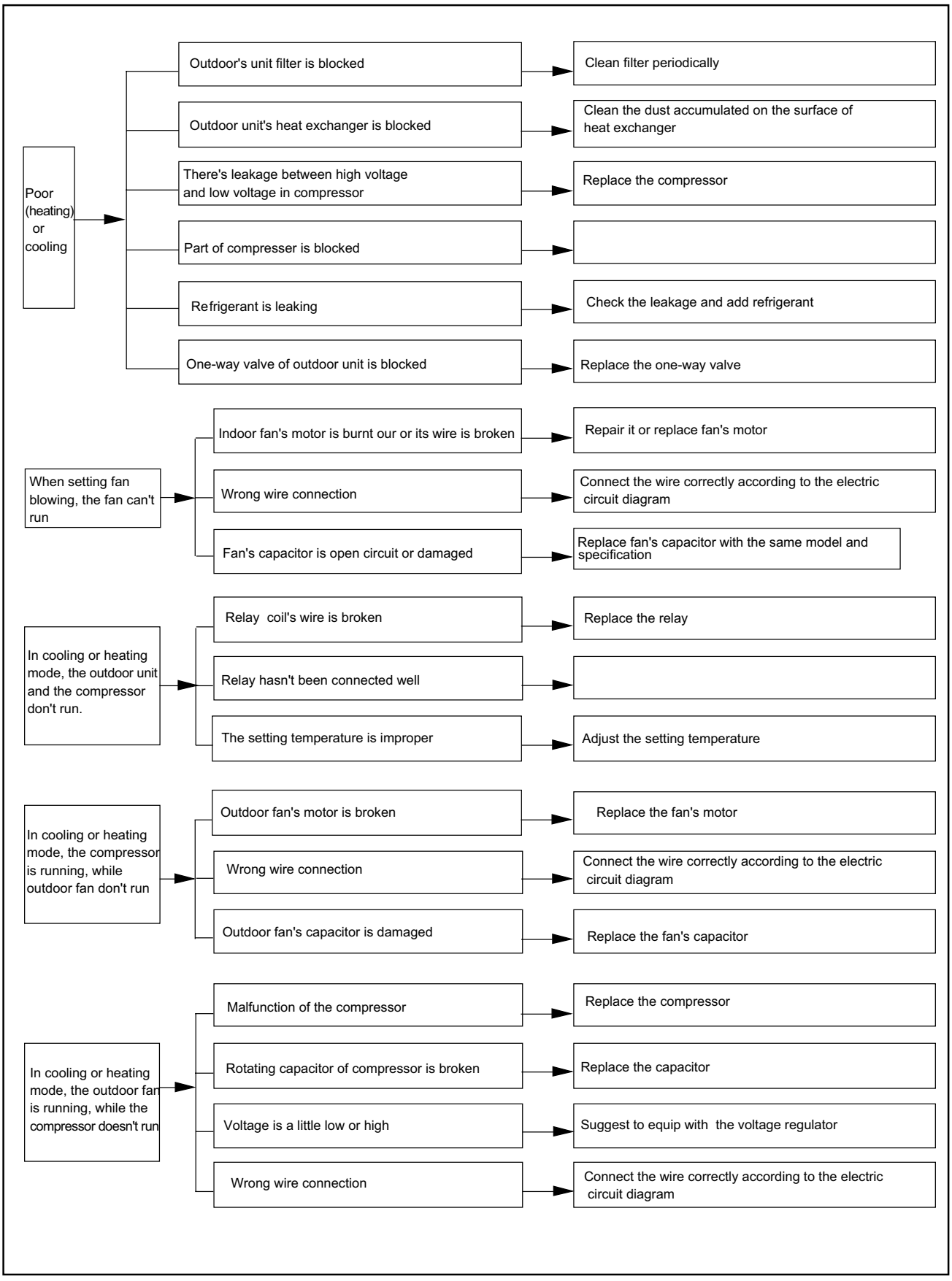


8. 4 Parts list of outdoor unit

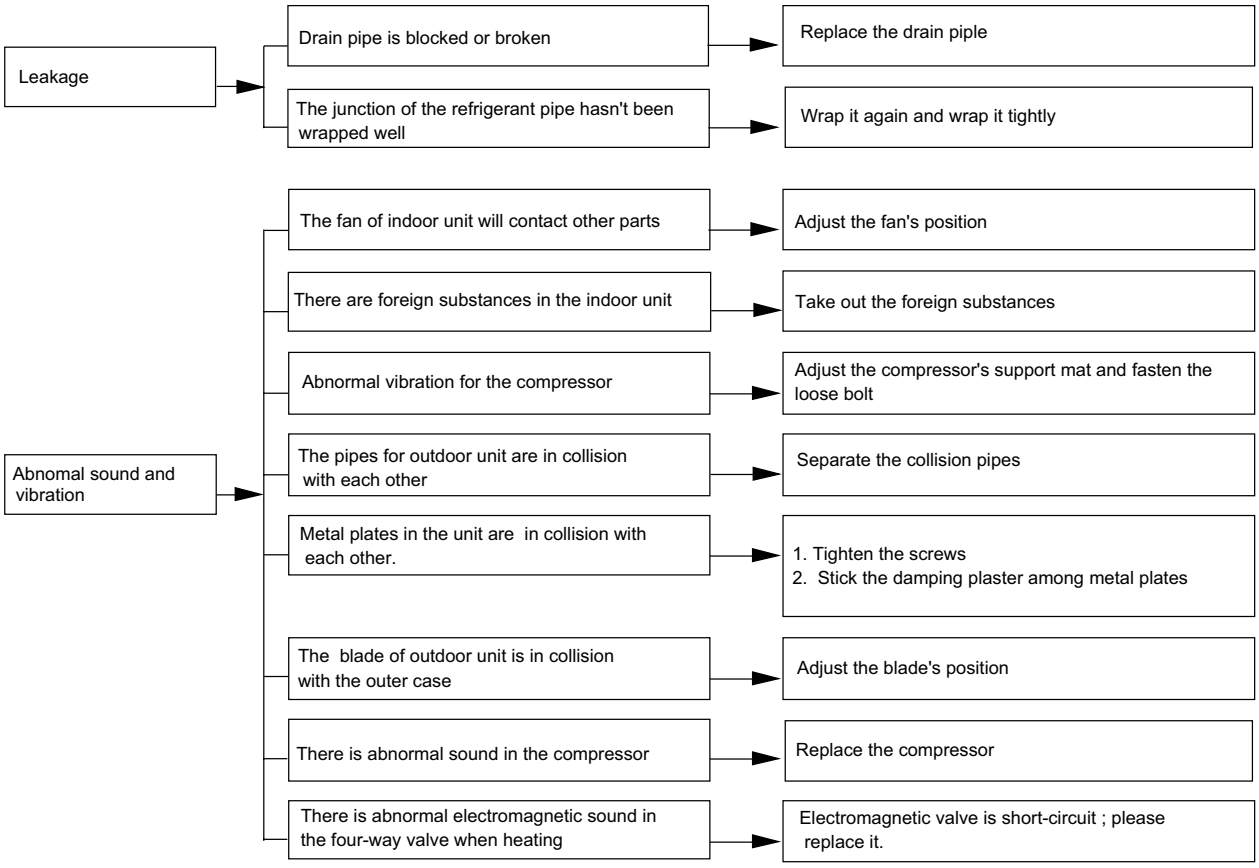
No	Description	Part Code	Qty
		FS 1060Ao	
1	Panel Grille	22414102	2
2	Cabinet	01435436	1
3	Rear Grill	01475432	1
4	Top Cover	01255472	1
5	Rear Side Plate Sub-Assy	01303712	1
6	Handle	26235253	2
7	Valve Support Sub-Assy	01715001	1
8	Chassis Sub-assy	01205472	1
9	Front Side Plate	01305431	1
10	Sensor supprt	24211341	1
11	Axial-flow Fan	10335253	2
12	Condenser Assy	01105341	1
13	Motor Support Sub-Assy	01705471	1
14	Fan Motor	15015451	2
15	Mid-clapboard sub-assy	01235473	1
16	Inhalation Tube Sub-Assy	03639066	1
17	4-way Valve Assy	03025268	1
18	4-way Valve Accessary	430004002	1
19	Compressor and fittings	00129052	1
20	Assistant Capillary Sub-Assy	03005283	1
21	Cut-off Valve 3/4(R410A)	07130212	1
22	Electric heater(compressor)	76515404	1
23	Condenser support sub-assy	01894148	1
24	Temperature Sensor	39000129	1
25	Air-out Temp. Sensor	39000163	1
26	Outdoor Tube Sensor	39000127	1
27	Electric Box Assy	014054709	1
28	AC Contactor	44010236	1
29	Over Current Protector	46020103	1
30	Transformer	43110242	1
31	Relay	44020332	1
32	Terminal Board	42010258	2
33	Capacitor CBB61	33010013	2
34	Phase Reverse Protector	46020052	1
35	Relay	44020369	1
36	Terminal Board	42011103	2
37	Drainage Connecter	06123401	1
38	Drainage Plug	06813401	2
39	Pressure Protect Switch	460200061	1
40	Low pressure switch	46020007	1

9 Troubleshooting





Replace the compressor



Notice: there's no malfunction in respect of heating for cooling only units.