Usage Instruction of Precision Air Conditioner

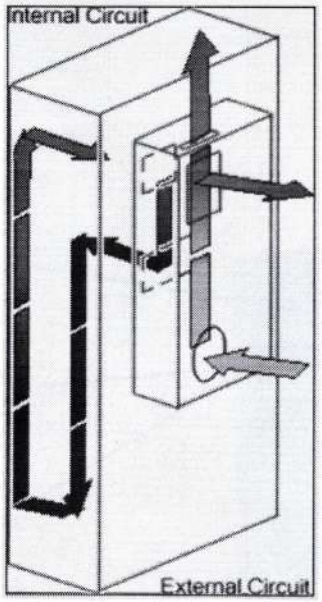
Contents

1. Product Introduction

Cabinet air condition is actively cooling with compressor, and it will remove the heat inside the cabinet to outside. It also can keep the dust and heat outside the cabinet, avoiding problems from using fan. The inside cabinet can be maintained at an ideal temperature for electrical components which effectively guarantees the stability of the electronic equipment and improves the reliability of the whole system.（Picture A）

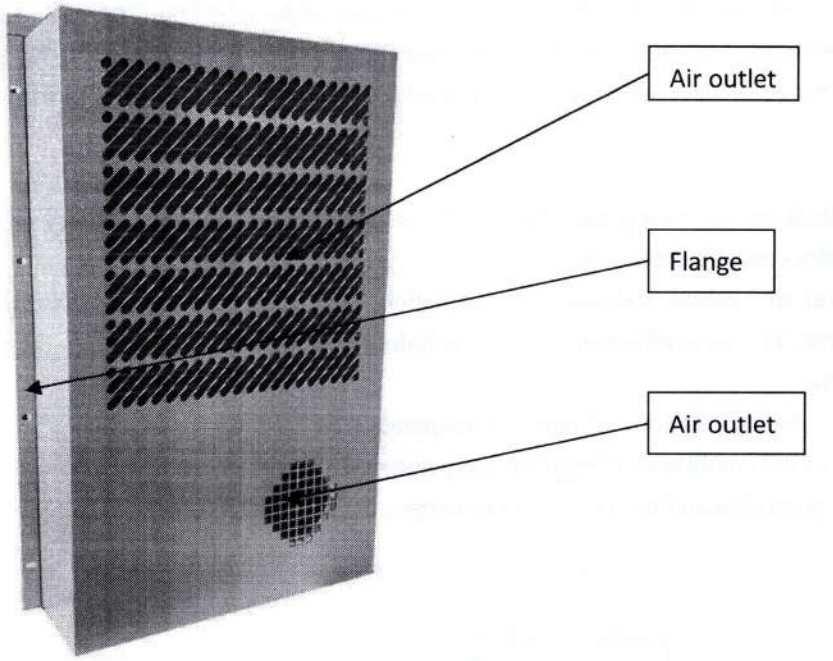
Feature.

1. This series of products can be widely used for outdoor communication cabinets, battery cabinets, electric cabinets and industry control cabinets etc.
2. The protective level of internal and external circulation is IP55, which can protect cabinet to avoid moisture, dust, water. The air conditioner can also be indoor or outdoor installed.
3. R134a or R22 system.
4. R134a system fits working conditions of high/low temperature 55℃/-5℃.
   R22 systems fits working conditions of high/low temperature 45℃/-5℃.
5. Digital temperature controller and high precision of temperature control.

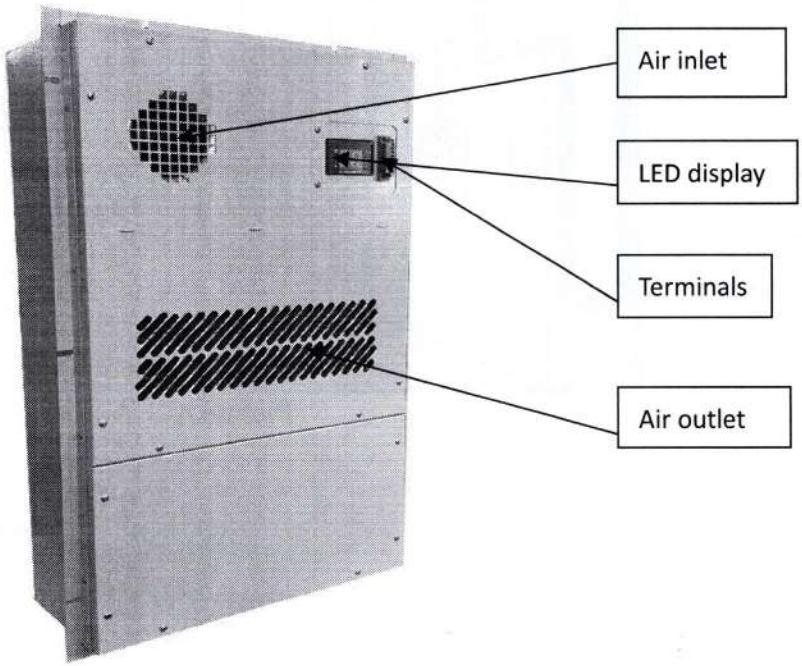


Picture A

2. Structure



Front



Back

Note---The pictures are only for reference.

3. Technical data

Model	SAD110-2
Cooling capacity (L35/L35) (W)	1000
Voltage	220V AC ± 15% 50Hz/60Hz
Rated Power (L35/L35) (W)	426
Refrigerant	R134a
Working temperature	-5~55℃
Noise (dB)	60
IP Grade	IP55

4. Air conditioner selection method

Formula:

$Q t = (Q i + Q r) \times 1.2$

Q t: Heat released by the cabinet (W)

Q i: Heat released by the inner cabinet (W)

Q r: Heat spreads from outside to the inside of cabinet (W)

Q i: Heat released by the inside of the cabinet (W)

The calculation of the heat released by the components in the cabinet is based on the following (related to the components installation).

1) Heating of variable-frequency drive, transformer, drive and servo amplifier etc.: rated power 1K, about 30~50W heat (depending on the load and divided by fan pump load and mechanical load).

2) PLC is about 35~50W heating(group as a unit), heat of industrial personal computer is controlled by its size. All calculated of 300W/ unit;

3)Heat of contact components: rated power1KW is about 5~20W heat, can be ignored compared with large power components.

4) Heat of common server is about 280-500W. Heat of UPS is 20% of its power.

E.g. When the variable-frequency drive is working with load, its loss (transformed into heating) is about 3%~5% of system rated power, which can be calculated. When the variable-frequency drive is of 1KW, the loss maybe 30W to 50W.

5) Heat of SCR:2W/A. 1KW DC Drive is about 7W~10W.

$Q r = k \times A \times \Delta T$

k---Heat transfer coefficient

1) $k=5.5W/m^2.K$ Steel cabinet

2) $k=12.0W/m^2.K$ Aluminum-magnesium alloy enclosure

3) $k=0.2W/m^2.K$ Plastic material cabinet

A ---Surface area of the cabinet（unit---m^2 ）

$\Delta T = T1 - T2$ （unit---℃）

T 1---maximum temperature of outside cabinet

T 2---controlled temperature of inside cabinet

E.g. Dimension of a steel cabinet: L×H×D: 1500×2000×800 mm,

Heat of the inside elements is 1000W,controlled temperature inside the cabinet is 28 ℃, outside temperature is 35 ℃ 。

Answer. Surface area of the cabinet---A=1.5×2×2+0.8×2×2+ 1.5×0.8=10.4 m^2.

Heat rumored from out to inside of cabinet---Q r = k ×A×Δ T = 5.5×10.4×（ 35-28 ）=400.4W

Total heat produced by the cabinet---Q t =(Q i + Q r) ×1.2=(1000+400.4) ×1.2=1680.48 W

So choose the cabinet air conditioner with cooling capacity of 2000W.

5、Installation instruction

5.1.Terms of usage（Must be read）.

5.1.1 Installation instruction.

•Please do not use this equipment in hot、dusty、moist or corrosive environment. The ambient temperature should

not be high than 55℃ and also should not be less than -5℃. The humidity should not be more than 85%. Starting voltage should not be higher or lower than 10% of the rated voltage.

•Follow the instruction, otherwise inappropriate installation will cause leakage、electric shock、fire and equipment loosening etc.

•The air conditioner should not be pressed or heat. Never pull the power cable or the drainpipe heavily.

•the ground wire cannot be connected to gas pipe, water pipe, lightning rods and telephone line etc.

Use screws to fix the air conditioner on the cabin.

•The drainpipe of the cabinet air conditioner should not be warped or pressed heavily. After the installation, please make sure the drainpipe can drain water smoothly.

5.1.2 Notes.

•Please keep the right side up. Do not tilt or collide.

•The installation and circuit connection must be operated by the professionals according to the instructions strictly.

5.2. Security alarms.

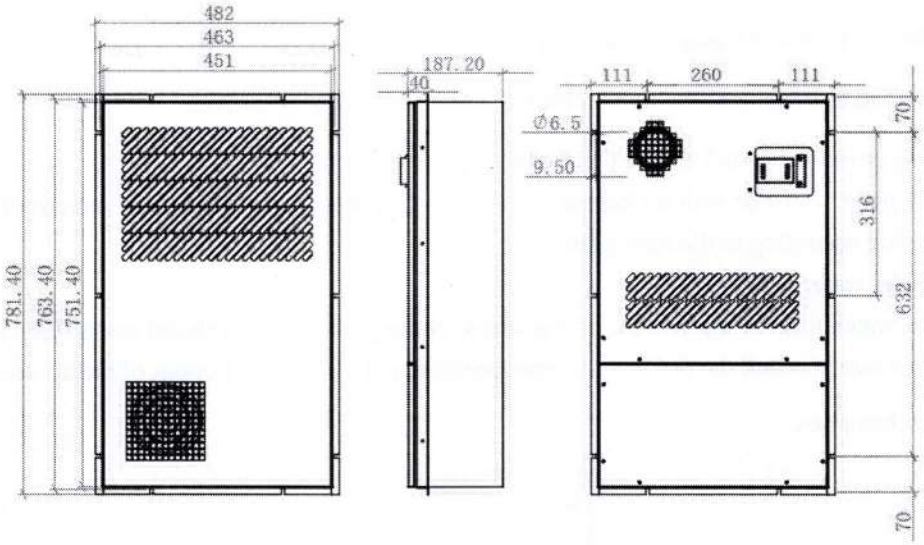
·Putting goods on the air conditioner is strictly prohibited. No pressing.

·Please cut off the power before cleaning, disassembly or maintenance in case of electric shock accident.

·Installation or usage is strictly prohibited when there is flammable gas, aggressive gas, oil mist or electrically conductive powder in the air.

•If smoke, abnormal noise or not work long time after starting up, cut off the power ,stop unit running and turn to the professionals for examine and fix.

5.3. Installation drawing.



5.4. Installation steps.

（1）Dig square holes on the installation place (the oblique part) of the base metal (usually control box) according to the dimension of the air conditioner. Please check the dimension before digging.

（2）Drilling M6 holes next to the square hold according to the dimension of the flange (door mounted) and cover (side mounted).

（3）Label sponge on the edge of the square holes.

（4）Push the air conditioner by its positive side through the inside of the square holes and then fix it with bolt.

（5）Connect the power (according to the following terminals)

1	L	AC220V
2	N	
3	PE	
4	A	RS485
5	B	
6	NC	Alarm
7	COM	
8	NO	

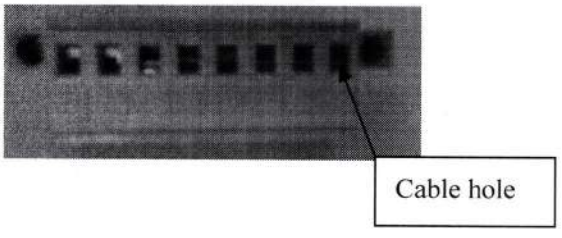
Fixed terminal

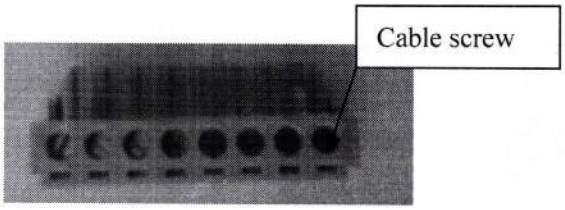
L—live wire N—zero wire

PE—ground wire

NC/COM/NO—alarm AB—RS485

Mobile terminal





a. After stripping 7mm plastic insulation of power cable, insert it into the cable hole, use a screwdriver to tighten the screw thread (same way to sensor).

b. Fix the mobile terminal into the fixed terminal with a flathead screwdriver.

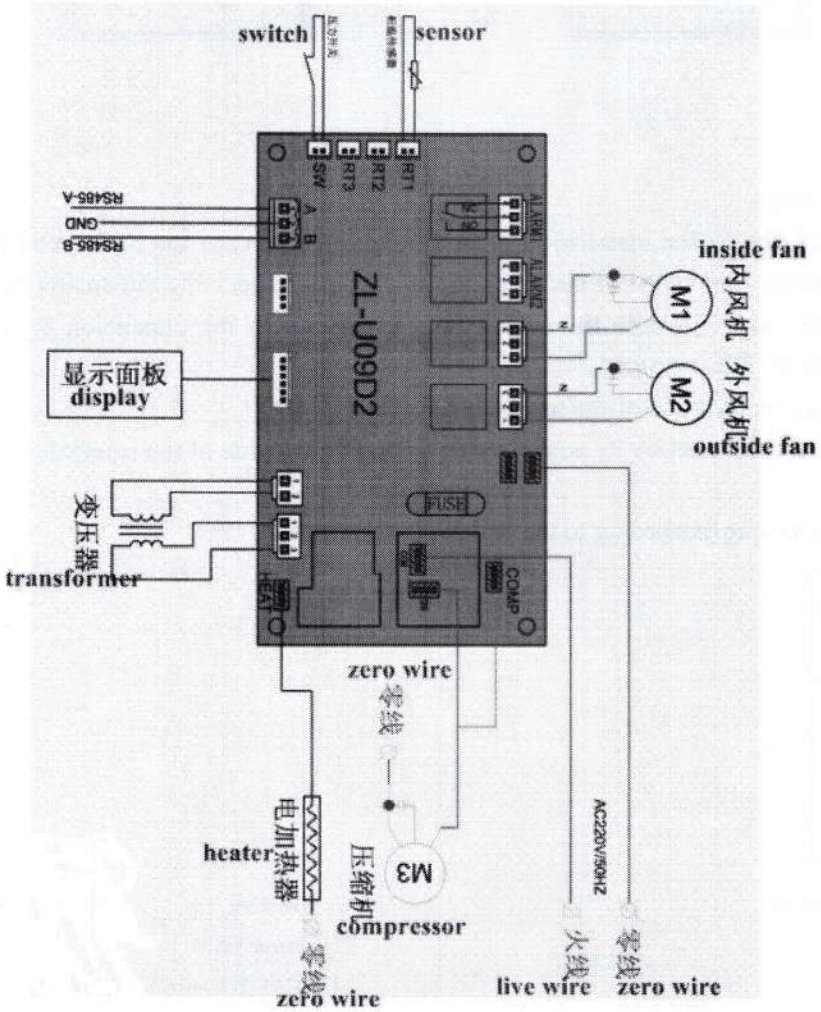
c. Finishing power cable and ensure their safety and aesthetics.

Notes ---The power must be shut off before installation. Choose appropriate cables and circuit protection device according to the nameplate.

（6）Connect the water tube.

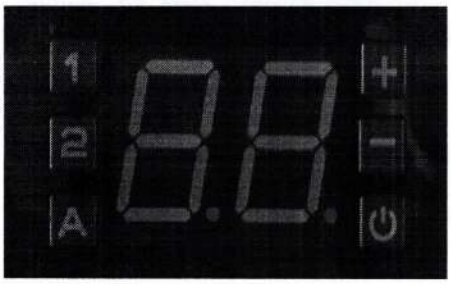
Screw the water tube to the bottom of the drain, connect the drain with the water tube and tighten them with a hoop (install the drain at a proper position, not exceed the bottom of the air conditioner).

（7）Electrical schematics.



6. Instruction of control system.

6.1 Function key.



Indicator lights — L1, L2, L3 L4

"1"	Set turn on or turn off temperature of cooling function.
"2"	Set turn on or turn off temperature of heating function. （heating function is optional）.
"A"	Set alarm of high and low temperature.
"+"	Increase setting parameter.
"-"	Reduce setting parameter.
⏻	Power switch.

Introduction of LED lights on control plate.

Name	Light	On	Off	Flash
Compressor Light	L1	Start	Stop	On time-lapse protection
Heater Light	L2	Start	Stop	

6.2 Operating.

When power on, the screen displays "OF", press "⏻" （Power key）for 2 seconds and then it will display ambient temperature the sensor tests.

a. Set up of cooling.

Under the state of power on, press Key [1] for 3 seconds, after the screen displays "C1", then enter the state of cooling settings.

Press Key [+] or [-] to adjust setting options and setting parameters.

Press Key [A] to switch setting options and setting parameter.

Press the Power Key to exit cooling setting.

After finish the settings, press Key [1] for a long time to confirm and then exit settings.

b. Set up of heating.

Under the state of power on, press Key [2] for 3 seconds, after the screen displays "H1", then enter the state of heating settings.

Press Key [+] or [-] to adjust setting options and setting parameters.

Press Key [A] to switch setting options and setting parameter.

Press the Power Key to exit heating settings.

After finish the settings, press Key [2] for a long time to confirm and then exit settings.

c. Enter parameter settings.

Use a set of pass word to enter parameter settings. The original pass word is "11".

Under the state of displaying present temperature, press Key [A] for 3 seconds, the screen will display 『--』.Then press Key [+] or [-] to input pass word. Finally press [A] to confirm.

If input pass word is not correct, the screen will display 『Er』 and then it will return the state of temperature testing.

If input pass word is correct, the screen will display『A1』and then it enter the state of parameter settings.

Press Key [+] or [-] to choose parameter code. When choose a parameter, press Key [A], it will display the setting data of the parameter, then press Key [+] or [-] to adjust the parameter settings.

After finish the settings, press Key [A] to return the state of displaying parameter code.

d. Exit parameter settings.

After finish the settings, you must press Key [A] for 3 seconds to exit parameter settings. It will return the state of temperature testing and store the setting parameters of this time.

If not press any key in 60 seconds, it will exit parameter settings automatically. And the setting parameters of this time are invalid. The controller will still run according to original setting data.

Introduction of parameter code and settings.

No.	Parameter Code	Setting Option	Original Data	Setting Range	Unit	Remark
000	A1	Start temperature of cooling function	30	21～50	℃	
001	A2	Stop temperature of cooling function	25	20～50	℃	
002	A3	Start temperature of heating function	0	-9～19	℃	
003	A4	Stop temperature of heating function	5	-9～19	℃	
006	A7	High temperature alarm	55	25～60	℃	
007	A8	Low temperature alarm	-5	-9～19	℃	
008	A9	Start temperature of dehumidification	75	25～70	℃	Unavailable temporarily
009	AA	Stop temperature of dehumidification	45	25～70	℃	Unavailable temporarily
010	AB	Calibration temperature of RT1	0	-9～+9	℃	
011	AC	Calibration temperature of RT2	0	-9～+9	℃	
012	B1	Open & Close setting of pressure alarm	2	0 ～ 2		0:Forbidden 1:Open 2:Close
013	B2	Make RT1 be set	1	0 ～ 1		0:Forbidden, 1:Start
014	B3	Make RT2 be set	0	0 ～ 1		0:Forbidden, 1:Start
015	B4	Make humidity sensor be set	0	0 ～ 1		0:Forbidden, 1:Start
016	B5	Setting of compressor mode	0	0 ～ 2		0:Normal control 1:Force start 2:Force stop
017	B6	Setting of heater model	2	0 ～ 2		0:Normal control 1:Force start 2:Force stop
018	B7	Setting of inside fan	1	0 ～ 2		0:Normal control 1:Force start 2:Force stop
019	B8	Setting of outside fan	0	0 ～ 2		0:Normal control 1:Force start

						2:Force stop
020	C1	Setting of RT1 failure	1	0 ~ 1		0:Forbidden, not test failure alarm of RT1
021	C2	Setting of RT2 failure	0	0 ~ 1		0: :Forbidden, not test failure alarm of RT2
022	C3	Setting of temperature sensor failure	0	0 ~ 1		0: :Forbidden, not test failure alarm of temperature sensor
023	C4	Setting of high temperature alarm failure	1	0 ~ 1		0: Forbidden, not test failure alarm of high temperature
024	C5	Setting of low temperature alarm failure	1	0 ~ 1		0: Forbidden, not test failure alarm of low temperature
025	C6	Setting of pressure alarm failure	1	0 ~ 1		0: Forbidden, not test failure alarm of pressure
026	Pr	System(controller) start & stop	0	0 ~ 1		0:Stop 1:Start
027	P1	Pass word	11	0 ~ 99		
028	P2	Equipment address	1	1 ~ 99		
029	P3	RS485 bps	3	0 ~ 3		0: 2400bps,1:4800bps,2:9600bps 3:19200bps
030	Ed	Exit parameter settings.				

Notes: The air conditioner has the function of starting automatically if power is on, you need not operate Power Key frequently.

7. Cooling system

7.1 Basic components.

Air conditioner is composed of compressor, condenser, evaporator, electric control system, expansion valve and capillary tube, dry filter and fans etc.

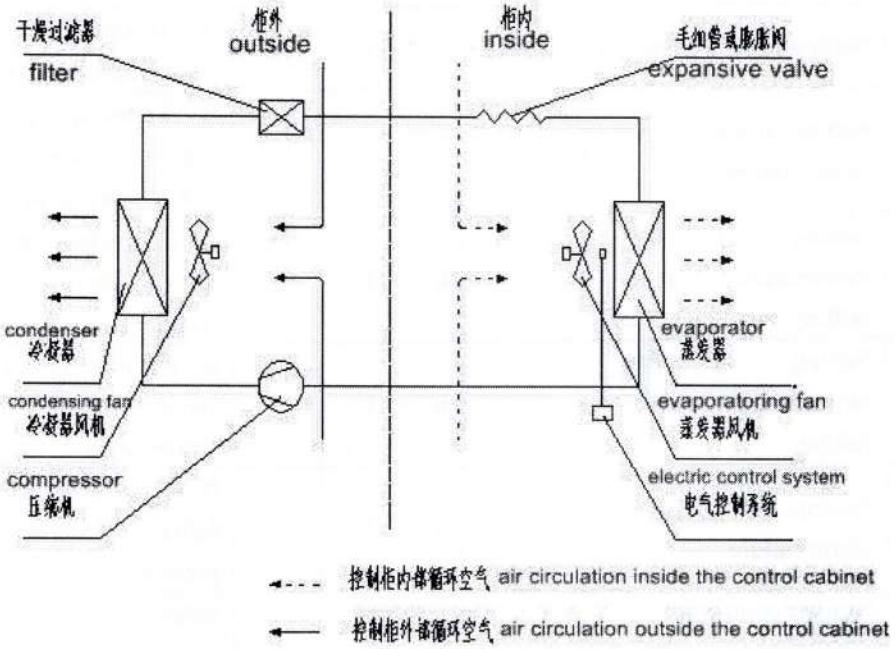
7.2 Cooling theory.

7.2.1The compressor takes in the gas refrigerant from the evaporator and compresses it into high temperature and high pressure then sends it into the condenser. The refrigerant will release heating in the condenser and then the cold high pressure liquid goes through capillary throttling and turns into low temperature and low pressure and then flows in to the evaporator. The refrigerant will absorb heat and then turns into gas in the evaporator. Thus forms the cooling cycle system.

7.2.2 The condenser and evaporator has circulation fan to enhance air convection and heat exchange efficiency. The heat exchange between condenser and air is outside the control box and that of evaporator and air is inside the control box.

7.2.3 The electrical system is mainly monitoring the temperature of the cooled closed cabinet and controls the cooling circulation by setting temperature.

7.2.4 Drawing of cooling theory.



8. Operation

8.1 Check before operation.

Please check the following after the electrical and air conditioner installation:

a. No barrier before air inlet and outlet.

b. The air conditioner is installed vertically, and all mounting screws have been tightened.

c. Air conditioner drain has been securely mounted and connected with the drain line cabinet (optional).

d. Connecting power cord has been connected reliably.

e. Fans can freely rotate with no strange noise.

f. AC input voltage matches with the contents of the nameplate parameters

8.2 Start to operate

a. Turn on the power breaker and start running.

b. AC input power closed, the inside fan runs. If the inside temperature reaches the operation conditions, the cooling and heating systems start to operate. When the cooling system starts to operate, the outside circulation fan is controlled by condenser thus it will start after the compressor.

9. Error and handling

Error	Possible Reasons
E1: failure of Sensor 1.	The sensor of RT1 is damaged or loose.
Hi: high temperature alarm	Temperature exceeds setting alarm temperature.
Lo: low temperature alarm	Temperature is below setting alarm temperature.
HP: pressure protection	Alarm of switch open or close.
EE: data storage failure.	The function of data storage failure.
After power on, the cabinet temperature is higher than setting temperature and the air conditioner does not run.	① Check the power supply and circuit.
	② Contact professional people for help.
The air conditioner runs normally but the cooling effect is not ideal.	① Choose another air conditioner or correct cooling capacity according to the heat loading.
	② Make sure the air conditioner works within its normal working temperature range.
	③ Contact professional people for help.
The air conditioner runs normally, it suddenly stops cooling and no electrical control system failures.	① Normal phenomenon. It monitor the temperature inside the cabinet temperature and then decides whether star or stop cooling according it..
	② Contact professional people for help.
The air conditioner runs normally, it suddenly stops running with no electrical control system failures.	① Check the power supply.
	② Contact professional people for help.

10.Notes

- •Please install leakage circuit breaker
- •Don't put your fingers or objects in the air outlet because the running air conditioner will cause injury to human beings or damage to the air conditioner.
- •Do not repair without professionals.
- • The air conditioner can not be inverted in any case, otherwise it may cause damage to the machine. Try to remain stable during handling process. The tilt angle shoud not exceed 45 degrees.

11. Packing List

No.	Description	Unit	Qty	Remark
1	Air conditioner	pc	1	
2	Usage instruction	pc	1	
3	Sponge	pc	4	
4	Bolts+Nuts+mats	set	1	
5	Factory Certification	pc	1	

12. Warranty Terms

12.1 Warranty.

The warranty period depends on the contract within normal use.

12.2 Free maintenance range.

During warranty period, any problems caused by the product itself will be repaired for free. Customers are required to provide product model.

12.3 Disclaimer range.

• Has exceeded the warranty period

•Cannot provide the product serial number（see nameplate attached to the product）.

•Damage caused by the user's replacing parts or disassembly, or damage caused for disassembly by non-authorized service.

•Power supply voltage instability due to above voltage range of the air conditioner, which cannot meet national safety standards electricity for air conditioners.

•Physical damage caused during shipment, installation and other improper use (such as the air conditioner cannot be inverted etc.).

•Damage caused by the rain, liquid or other solid into the air conditioner thus cause corrosion or burn of control board and fan motor burned.

•Control board burned (or transition aging) caused by super high or low temperature, compressor aging and fan motor burned (or transition aging).

•Not in accordance with the specification requirements for installation or maintenance or damage caused by force majeure

• Other damage not caused by the product quality reasons.

12.4Notes on returning repair within warranty period.

To Langji customer, freight paid by manufacture. Please try to use original package and gasket materials.

If you cannot use original package, please meet the following standards when make self-package.

No upside down, no tilt, carton must be marked in words of "Handle with care, cannot be reversed".

The air conditioner in the packaging box must be fixed. There must be at least 20mm thick foam gasket surrounded (especially on top and at bottom) inside the packaging box to prevent shake and collisions.

13. After-sales service and maintenance

Good maintenance is best way to keep the equipment, please maintain the equipment according to the usage instruction.

Notes.

All the maintenance must be done by professional workers. Before maintenance, please cut off the power and signal cable and then connect them after maintenance.

B. Please use neutral detergent if you want to clean the cabinet. Do not use organic solvent.

13.1Maintenance of condenser and evaporator

There is filter for external air circulation. Please use soft brush to clean. Better 3 to 4 times per year.

13.2 Check safety of electricity

a. Check the power wiring and communication wiring of the cabinet air conditioner.

b. Check whether the cabinet air conditioner is functioning properly.

c. Check the cooling capacity.

d. Better 2~4 times inspection according to the user equipment maintenance frequency

13.3 After sales service and maintenance

The equipment maintenance, commissioning and other services required is paid service.

The price of the air conditioner does not include travel expenses of qualified engineer.

14. Remark

If the user has other special requests, besides the items of this usage instruction, it should also include other items and notes listed in the signed technical agreement by both parties. If such usage instruction conflicts with signed technical agreement, the technical agreement shall prevail.