

客服热线：400-830-3938/800-830-3938

Rack Type Air Conditioner User Manual

一体机架空调用户手册



严正声明

产品防伪

为了切实保障您的用电安全，帮助您购买到真正的山特精密空调，请注意以下事项：

1. 认准山特注册商标： **SANTAK**、山特、**SANTAK**、**STK**、。
2. 山特所有产品机身上均贴有“产品序列号”（产品序列号是唯一的，一个产品对应一个序列号）；

如果您购买到有疑问的山特产品，可通过以下途径向本公司反馈

1. 客服热线：400-830-3938/800-830-3938
2. 品牌保护邮箱：Brandprotection@eaton.com

版权声明

山特公司致力于技术创新，不断提供更好的产品和服务满足客户需求，对产品设计、技术规格的更新，恕不另行通知。产品以实物为准。

请到山特网站 www.santak.com.cn 下载最新版的产品说明书。

版权所有 © 2020 山特电子（深圳）有限公司

1.1	FOREWORD	1	1.2.1	工作原理	15
1.2	AIR CONDITIONER DESCRIPTION.....	1	1.2.2	运行条件	15
	1.2.1 Principles of function.....	1	1.3	符合标准.....	16
	1.2.2 Operating Conditions	1	2.	安全注意事项	16
1.3	STANDARDS	2	3.	安装和操作	17
2.	SAFETY NOTICES.....	2	3.1	空调器机械安装.....	17
3.	INSTALLATION AND OPERATION....	2	3.2	电气安装.....	17
	3.1 MECHANICAL INSTALLATION	2	3.3	开机步骤.....	18
	3.2 ELECTRICAL INSTALLATION	3	4.	系统功能介绍	18
	3.3 POWER-ON STEPS.....	4	4.1	制冷功能.....	19
4.	SYSTEM FUNCTION INTRODUCTION	4	4.2	制热功能（选配）	19
	4.1 COOLING.....	4	4.3	门禁功能.....	19
	4.2 HEATING (OPTION).....	5	4.4	器件控制模式.....	19
	4.3 DOOR ALARM	5	4.5	双机切换控制（选配）	19
	4.4 COMPONENT CONTROL MODE	5	4.5.1	定时切换.....	19
	4.5 UNIT SEQUENCING CONTROL (OPTION)	5	4.5.2	温度切换	19
	4.5.1 TIME SWITCHING	5	4.5.3	高温同开.....	19
	4.5.2 TEMPERATURE SWITCH.....	5	4.5.4	故障切换.....	20
	4.5.3 BOTH WORKING WITH HIGH		4.6	自测.....	20
	TEMPERATURE	5	4.7	排氢/应急风扇（选配）	20
	4.5.4 DISTURBANCE SWITCHING.....	5	4.8	故障.....	20
	4.6 SELF TESTING	6	4.9	机组菜单结构.....	21
	4.7 HYDROGEN DISCHARGING/EMERGENCY FAN		4.9.1	操作界面	21
	(OPTION).....	6	4.9.2	菜单结构	21
	4.8 ALARM.....	6	5.	维护	22
	4.9 UNIT MENU STRUCTURE	7	5.1	日常维护表.....	22
	4.9.1 Operation interface.....	7		日常维护表.....	22
	4.9.2 Menu structure.....	7	5.2	压缩机维护	22
5.	MAINTENANCE	8	5.3	故障及恢复措施.....	23
	5.1 DAILY MAINTENANCE	8		常见故障及恢复措施 .ERROR! BOOKMARK NOT	
	5.2 COMPRESSOR MAINTENANCE	8		DEFINED.	
	5.3 COMMON FAULT	9	6.	产品有毒有害物质申明	29
1.	简介.....	15			
	1.1 前言	15			
	1.2 空调器描述.....	15			

附录 1.维修保证..... 30

附录 2.合格证..... 31

Introduction

1.1 Foreword

Note: All of the operations of this product shall be performed by professional engineers and technicians.

This manual can only be used to guide the installation and operation of EF series of industry cabinet air-conditioners. The manual content includes the functional description and regular maintenance of the unit. In this manual, the safety tips and warning signs are described as follows:

 **DANGER!**

If the measures described in the following are not strictly observed there is danger to life and health.

 **HAZARD!**

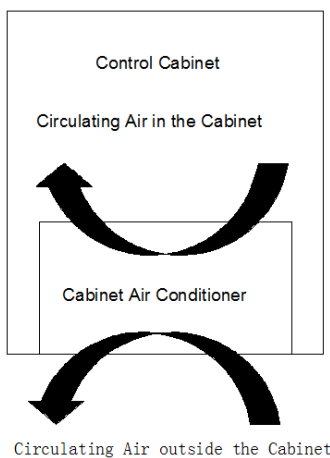
If the measures described in the following are not strictly observed there is danger to life and health due to electrical shock.

 **CAUTION!**

If the measures described in the following are not strictly observed material damage may be caused.

1.2 Air conditioner description

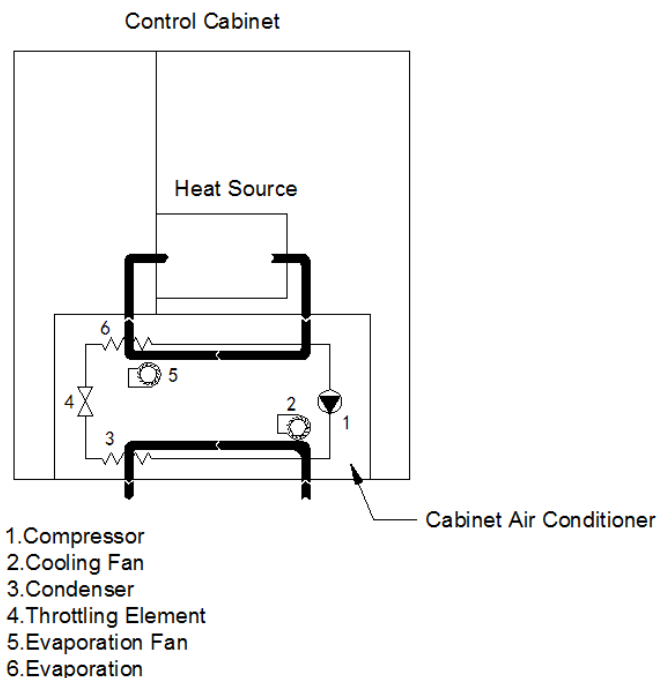
The EF series outdoor cabinet air conditioner is a cooling product developed for cabinet. This air conditioner's frequency can be regulated. It has cooling capacity regulating function, and the fans can regulate speed automatically.



Function Diagram

1.2.1 Principles of function

The refrigerant is compressed by compressor (1) into high temperature and high pressure gas; To the condenser (3), and suctioned by the cooling fan (2) from the bottom part into outdoor air, where the heat is forced through the condenser (3) to spread to the surrounding environment in the air, and the refrigerant becomes into a liquid through the throttling element (4), the refrigerant pressure drops, and in the evaporator (6), the refrigerant absorbs the heat inside the control cabinet and evaporates; The hot air is suctioned by the evaporation fan (5) from inside the control cabinet, and through the evaporator, the air is cool and forced to discharge into the inside of the control cabinet. At the same time, the air inside the control cabinet is dehumidified. This series can be used a variety of installations. This is shown in the pictures below:



Working Principle Diagram

1.2.2 Operating Conditions

- **Power system**
220VAC±15%,50/60Hz
- **External cycle temperature:**
-40°C ~ 50°C

Note: Please read the nameplate parameters on the air conditioner carefully. The actual technical

parameters shall be subject to the nameplate name.

1.3 Standards

Standard	Description
GB/T 17626.7-1998	EMC
GB4706.1	Safety of household appliances or similar electric appliance
GB4798.1	Environmental conditions existing in the application of electric and electronic product – Storage
GB4798.2	Environmental conditions existing in the application of electric and electronic product – Transportation
GB4798.3	Environmental conditions existing in the application of electric and electronic product – Use

2. Safety notices

The following safety notices are to be observed in their entirety for the correct use of the equipment:

2.1 Transport

- Keep the air conditioner in a horizontal state during transportation.
- If the cabinet needs to be transported, please remove the air conditioner and pack it separately before transportation.

2.2 Storage

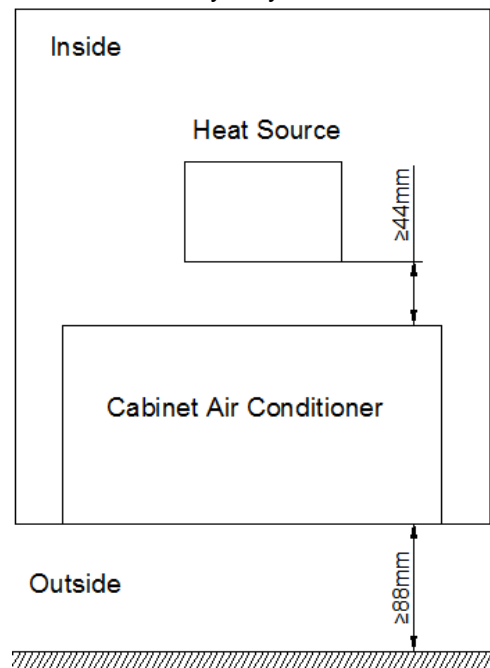
- Storage environment should not exceed 70 °.
- Keep the air conditioner in a horizontal state during storage.

2.3 Unpacking

- Prior to and during unpacking make a visual inspection of the air conditioner to see whether any damage has occurred during transport. Especially pay attention to loose parts, dents, visible loss of oil etc.
- Any damage must be reported immediately to the forwarding agent (follow the instructions in “Rules For Damage Claims”). Moreover, the latest edition of the “After sales Service Letter of Commitment”
- Before disposing of packing material ensure that it does not contain any loose components.

2.4 Installation

- The site for the enclosure, and hence the arrangement of the air conditioner, is selected so as to ensure good ventilation;
- The location is free from excessive dirt and moisture;
- The ambient temperature does not exceed +45°C;
- The enclosure is sealed on all sides(IP54). Condensation will occur if the enclosure is leakage;
- Air inlet and outlet are not obstructed on the inside of the enclosure;
- The duct size outside the air conditioner cabinet should not be less than the limit value in the following figure.
- Units are only fitted horizontally in the specified position. Max. Deviation from the true horizontal: 2°;
- Losses from the components installed in the enclosure must not exceed the specific refrigeration capacity of the air conditioner itself;
- The customer must not modify the air conditioner in any way.



Distance Diagram

3. Installation and Operation

3.1 Mechanical installation

Before the installation of air conditioner, the fitting surface of cabinet shall be properly opened with

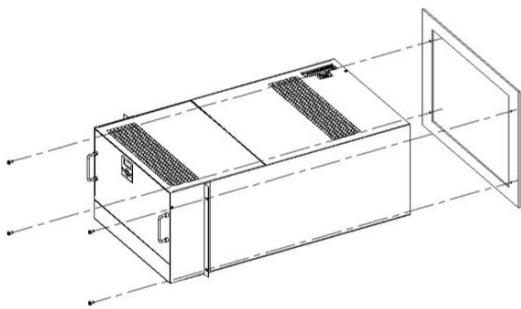
vent and screw hole, where the hole size shall refer to the appearance size figure as provided by the manufacturer.

CAUTION!

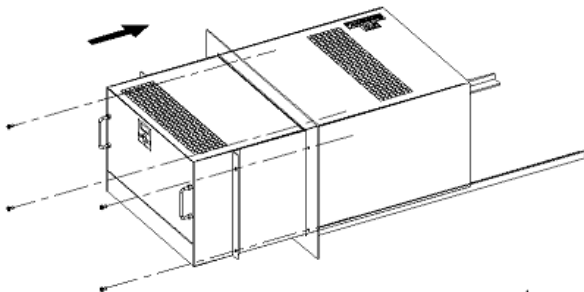
If the required cutouts are only made in the switch cabinet just before mounting of the air conditioner, make sure that swarf is not allowed to enter the device hood by using a cover sheet.

Mounting:

- 1) Insert the air conditioner into the cabinet along the guide rail direction.
- 2) The installation flange of the air conditioner and the installation surface inside the cabinet are fixed, as shown in the figure below:



Installation Diagram



3.2 Electrical installation

CAUTION!

As the cabinet air conditioner is connected to the power supply via the circuit protection device, the appropriate circuit protection device and the power cable should be chosen according to the air conditioning nameplate and technical parameters.

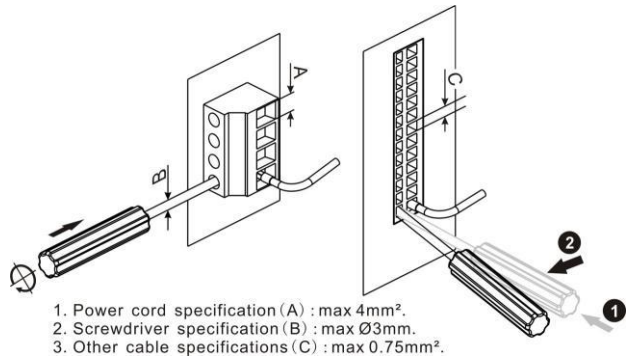
CAUTION!

Too high voltage may lead to damage of cabinet air conditioner. Please follow the voltage

requirement marked on the nameplate to switch on the air conditioner.

CAUTION!

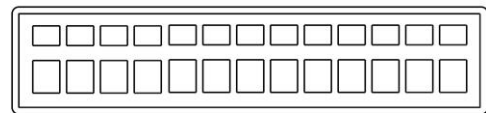
In order to avoid any damaging effects, before turning on the power supply, the cabinet air conditioner must be reliably earthed.



Note: The power input port identifier is subject to the specific unit screen



交流电源输入口



printing

References to common (copper wire) selection:

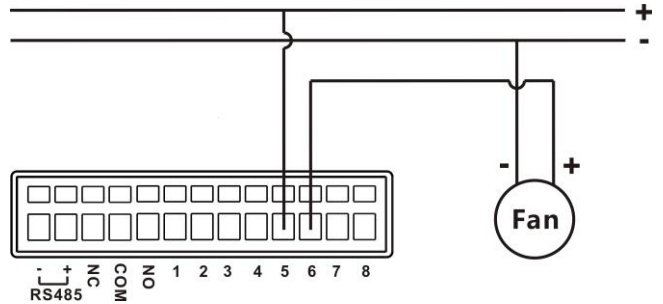
Rated Current	≤5A	≤10A	≤15A	≤25A
Power line diameter	1.0 mm	1.5 mm	2.5 mm	4 mm

Connecting interface (The power input terminal will be subject to application instructions)

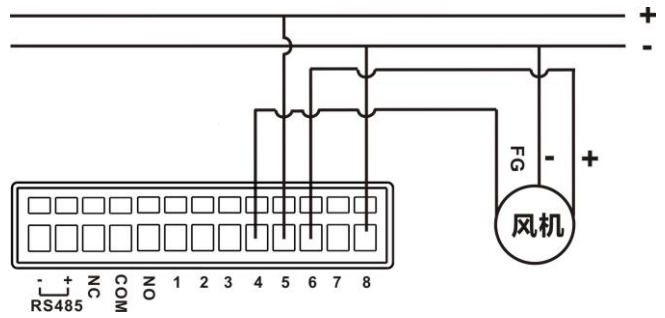
Connecting interface:

Port	Definition
Power input	L1/L: L:220VAC power input cable L; L1:110VAC power input cable L
	L2/N: N:220VAC power input cable N; L2:110VAC power input cable L
	PE: Grounding wire of the air conditioner

Alarm output	NC	The first public alarm dry nod (NC)
	COM	The first public alarm dry nod (COM)
	NO	The first public alarm dry nod (NO)(Option)
	1	The second public alarm dry nod (COM)(Option)
	2	The second public alarm dry nod (NO) (Option)
Signal input	3	N/A
	4	Hydrogen discharge / emergency fan dry contact (FG) (Option)
	5	Hydrogen discharge / emergency fan dry contact (NO) (Option)
	6	Hydrogen discharge / emergency fan dry contact (COM) (Option)
	7	Door open alarm input (option)
8		
communication ports	+	RS485 communication ports (+) (Option)
	-	RS485 communication ports (-) (Option)



DC input connecting interface diagram



DC input connecting interface diagram

(FG:optional)

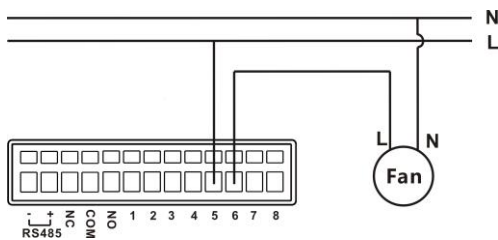
- **Alarm output (option):**

The unit provides alarm output dry contact. If there is no alarm, the dry contact is close. When there is alarm, the dry contact will open. Contact capacity: resistive load 5A@30VDC/5A@250VAC.

- **Hydrogen discharge / emergency fan electricity connecting.(option):**

Note: Contact capacity: max load 2A@-48VDC; 8A@230VAC.

- Hydrogen discharge / emergency fan(AC input) connecting interface diagram;



AC input connecting interface diagram

- Hydrogen discharge / emergency fan(DC input) connecting interface diagram;

3.3 Power-on steps

Firstly make sure the AC voltage is in accordance with the standard, and then close the power input switch. 30s later the internal cycle fan of the unit will be started. After delay time about 3min, the unit select operation mode according to the unit's.

4. System function introduction

Air conditioner running is automatically controlled completely according to the temperature inside the cabinet, and through the inner loop temperature sensor, the controller detects the cabinet return air temperature and the set point for judgment, to control the work of compressor or the fan.

4.1 Cooling

Cooling stop point=cooling start point-cooling sensitivity. When the cabinet internal temperature exceeds the cooling start-up point, the cooling will be started; when the cabinet internal temperature is lower than the cooling stop point, the cooling

Parameter	Default value	Setting range
CoolSP	25℃	[15~50]
CoolΔT	5℃	[1~10]
INHT	65℃	[20~80]

stops.

Setting point description:

CoolSP:Point when cooling starts.

Cool Δ T:Temperature control sensitivity.

INHNT:Internal high Temp. alarm point.



CAUTION!

For the reliable operation of the unit and the maximum energy efficiency, it is recommended that the users should not randomly change the temperature set point. The above set point is not on behalf of the factory settings.

4.2 Heating (Option)

Heating stop point=heating point+heating sensitivity. When the temperature inside the cabinet is lower than the heating start-up point, the heating will start; when the temperature inside the cabinet is higher than the heating stop point, the heating will stop.

Parameters	Default value	Setting range
HeatSP	0°C	[-5~15]
Heat Δ T	10°C	[1~15]

Setting point description:

HeatSP:Point when heating starts.

Cool Δ T:Temperature control sensitivity.



CAUTION!

For the reliable operation of the unit and the maximum energy efficiency, it is recommended that the users should not randomly change the temperature set point. The above set point is not on behalf of the factory settings.

4.3 Door alarm

To avoid an increase in condensation, a door operated switch should be used which will switch the air conditioner off when the switch the air conditioner off when the enclosure door is opened. After judging whether the cabinet door is opening or not by the sign sent by the door magnetic switch ,the air conditioner will alarm and stop.

CAUTION: When door opened, the door magnetic switch will be triggered to shut down the air conditioner after one minute. After door closed, the door magnetic switch will be released, then the air conditioner will start work after three minutes when the temperature inside is higher than the set point.

4.4 Component control mode

1) Control modern of internal fan:

The inner fan runs in normal speed when system runs normally.

2) Control mode of external fan:

Air circulation mode: The external fan stops.

Cooling mode: The external fan's running speed depends on the condenser's temperature. The higher the temperature is, the higher the fan speed is; the lower the temperature is, the lower the fan speed is.

3) Control mode of compressor:

Air circulation mode: Compressor stops.

Cooling mode: The compressor's running speed depends on the temperature differences between return air and setting value. The higher the difference is, the higher the compressor speed is; the lower the difference is, the lower the compressor speed is.

4.5 Unit sequencing control (option)

The equipment has linkage function including time switching, disturbance switching, high temperature switching.

4.5.1 Time Switching

Two air conditioners switch as setting time.

4.5.2 Temperature switch

1) When cabinet temp reach the setting point cooling point only one air-con will work. When temp lower than cooling stop point, the air-con stops working.

2) When cabinet temp reach the setting point high temp point, two air-cons will work together. When temp lower than (high temp point - sensitivity), one air-con stops working, only one air-con will work alone.

4.5.3 Both working with high temperature

When one appears high temperature alarm, the other will work at the same time. If high temperature alarm is cleared, one air conditioner will be closed, it will recover to time and temperature switching status.

4.5.4 Disturbance switching

1) When one air conditioner has a problem, the other will start immediately.

- 2) If the fault that is come up in the switching time is cleared, it do not switch to other until time switch is finished.
- 3) If the fault is not cleared, the other will work all the time.

4.6 Self testing

The unit provides the self testing function for on site test and it will automatically goes to self-testing procedure if choosing self-testing function in the system function menu, the procedures are as below:

- 1) If the compressor doesn't stop, stop the compressor.
- 2) The internal fan runs for 60 seconds.
- 3) The external fan runs for 60 seconds.
- 4) The compressor runs for 60 seconds with low limit speed, meanwhile the external fan runs with 50% full speed.
- 5) The compressor runs for 60 seconds with upper limit speed, meanwhile the external fan runs with full speed.
- 6) If configured with heater, starts heater and runs for 120s.
- 7) If configured with hydrogen discharging fan, starts the fan and runs for 120s.
- 8) The compressor, internal fan & external fan, electric heater, hydrogen discharging fan stops.
- 9) Self-testing procedures finished, the unit works according to the normal logic.

4.7 Hydrogen discharging/emergency fan (option)

Discharge hydrogen at regular times: according to the requirement for environment inside the

cabinet, the hydrogen discharging fan realizes

automatic cycle hydrogen discharging and forced ventilation. The interval time of each automatic cycle hydrogen discharging is 24 hours and the discharging time is 5 minutes.

2) **Forced ventilation:** when the compressor does not have cooling capacity (including compressor failure, power failure), the temperature inside the cabinet is higher than the start up point (emergency point + sensitivity) of emergency fan , start the emergency fan.

4.8 Alarm

The cabinet air conditioner provides the following alarm information. Please refer to table for the setting point.

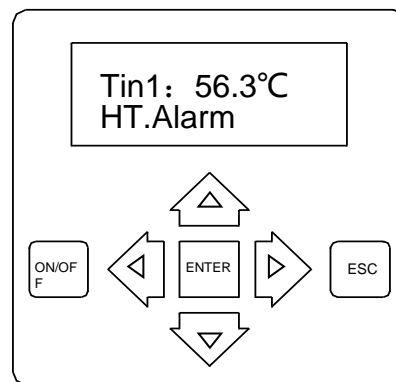


Diagram for alarm triggered

If the alarm hasn't been recovered, the alarm information will be still on, until the alarm has been eliminated. And you can check the alarm statistics through entering the alarm menu shown as Figure.

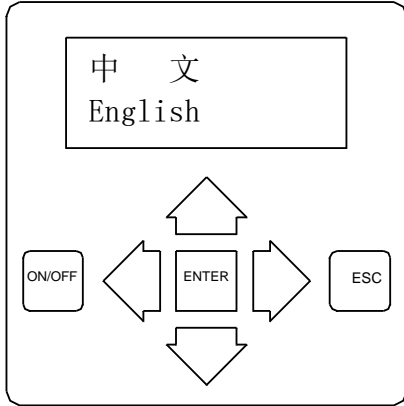
Alarm parameter and the setting point

Parameter	Default value	Setting range	Trigger Condition	Action
Cabinet High Temp	65	20–80 °C	Cabinet temp reach 40°C	Only send alarm
Evaporator Freeze	0	-40–15°C	Cabinet temp higher than cooling stop point, but evaporator temp lower than 0°C	Send alarm, and shut down compressor
System Frequent High Pressure	--	--	High pressure switch operates too much	Send alarm, and shut down compressor
Controller Board Power Down Alarm	--	--	No power supply to controller board	Send alarm, and shut down cooling system
Cabinet Temp Sensor Failure	--	--	Temp sensor failure	Only send alarm
Evaporator Temp Sensor Failure	--	--	Temp sensor failure	Only send alarm
Condenser Temp	--	--	Temp sensor failure	Only send alarm

4.9 Unit menu structure

4.9.1 Operation interface

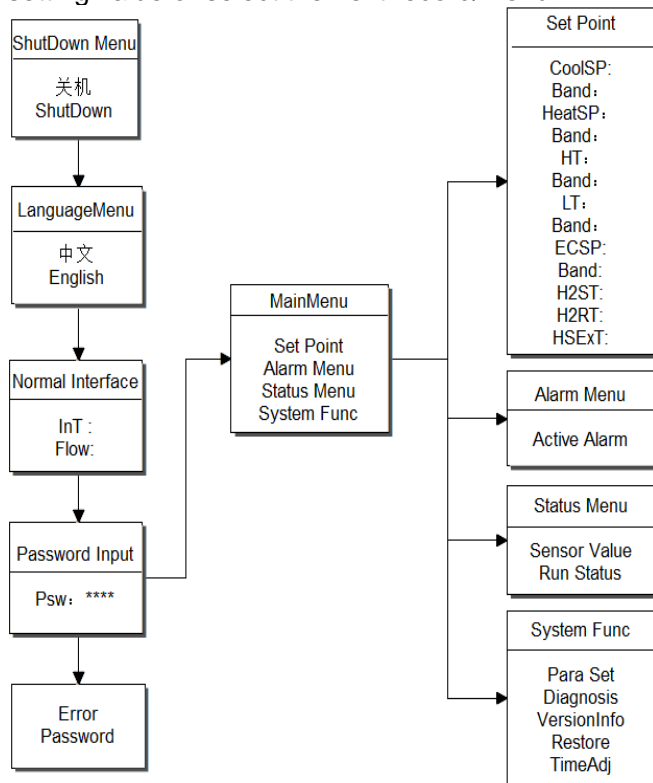
The unit controller adopts the 96x32 LCD, which contains 7 buttons for the setting. The operation interface is as shown in the following figure:



ON/OFF: ON/OFF button (press the button 5s), this can be used to turn on/off the unit.

▲ : Up button, which is used to increase the setting value or select the previous record/menu.

▼ : Down button, which is used to decrease the setting value or select the next record/menu.



4.9.2 Menu structure

◀ : Left button, which is used to select the previous bit of the data.

▶ : Right button, which is used to select the next bit of the data.

ENTER: ENTER button, which is used to confirm the entry.

ESC: Quit button, which is used to return to the previous page menu.

If there is no keyboard operation for consecutively 60s under any interface after start-up, it will automatically return to the normal display interface. When any button is pressed after the system is powered up, the backlight will turn on. If there is no keyboard operation for consecutively 60s, the backlight will be off.

The factory default operation password of the unit is "0001". To change it, you need to press ENTER on the normal display interface to enter the password input interface, press the LEFT button or RIGHT button to select the bits for change, and press the UP/DOWN button to change the relevant digits, and finally press ENTER button to confirm the change. If the password is incorrect, the interface will display the error message, and the unit setting cannot be changed. If the password is correct, you can enter the main menu and edit the unit setting.

Remarks:

InT: Internal return temperature sensor

Tp: Evaporator coil temperature sensor

Te: Compressor exhaust pipe

temperature sensor

Cond: Condenser coil temperature

sensor

Unit menu structure

Note: This diagram is unit menu structure, not the real factory setting.

5. Maintenance

To ensure the normal operation of the air conditioner, please perform regular maintenance for it by referring to Table 5.1.



Hazard!

All the maintenance should be performed by qualified professionals. Please disconnect the

power and communication & alarm output cables of the air conditioner before any maintenance and do not reconnect them until the maintenance is completed.

5.1 Daily maintenance

Daily maintenance table

Check item	Step description	Maintenance cycle
Wiring	Visually check if the wiring is loose	One year
Fan abnormalities	Turn the fan to check if it is smooth and if there is any abnormal noise	One year
Drainage pipe	Visually check if the drainage mouth is blocked	Six months
Condenser	Check the cleanness of the condenser and clean it with compressed air	Six months
Filter	Check visually and clean. If there is dust accumulation, it can be blown or washed and dried	Six months

5.2 Compressor maintenance

When the compressor is faulted, the solution is replaced with new unit.

DISPOSAL: Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary.



City Trash Can

5.3 Common fault

Common fault and recovery measure.

Fault	Possible cause	Check or maintenance
Unit doesn't start	Open circuit or short circuit	Check the open circuit or short circuit point, and maintain the main power supply
	Controller failure	Replace controller
Internal fan doesn't start	Terminal is loose	Check whether the connecting terminal is loose.
	Power failure	Check the AC input power voltage, whether the voltage is in the range.
	Fan blocking	Check whether there is foreign matter blocking the fan.
	Internal return Temp. is too low	Check whether the internal return Temp. is lower than the internal fan stop point. If so, the internal fan will stop.
External fan doesn't start	Terminal is loose	Check whether the connecting terminal is loose.
	Power failure	Check the AC input power voltage, whether the voltage is in the range.
	Fan blocking	Check whether there is foreign matter blocking the fan.
	No energy-saving/cooling requirement	Check the detected internal Temp. and the external fan status through the display interface.
Fan has abnormal noise	Bearing wear	Replace fan.
	Fan impeller scrape other materials	Check whether there is interference between cables and fan impeller.
Compressor doesn't start	Electrical connecting is loose	Tighten the electrical connector.
	Power is off	Check the main power supply switch, and check whether the interface display "Starting".
	Power failure	Check the AC input power voltage, whether the voltage is in the range.
	Compressor motor damaged	Replace compressor
	No cooling requirement	Check the detected internal Temp. and the compressor status through the display interface.
	Delayed start-up	The delayed time of compressor interval start-up is 3 minutes.
Poor cooling efficiency	External cycle air flow is not enough.	Clean the impurities existing in coil or air inlet.
High condensate pressure	The condenser is clogged by dirt	Clean the condenser.
	The condenser fan does not work	Refer to fault description: External fan doesn't start.
The evaporator freeze up	The internal fan is not running	Refer to fault description: Internal fan doesn't start.
	The capillary temperature sensor	Check whether the connection is normal ,if not ,replace the capillary temperature sensor.









	can not work	
--	--------------	--

5.4 Charge Refrigerant

Units sold outside mainland China do not contain refrigerant. Please refer to the following operations to charge refrigerant on site.

1 Tools Preparation

Table 5-1Tools preparation

Tool	Illustration	Function
Screwdriver		<ul style="list-style-type: none"> • Dedicated screwdriver is used to remove the anti-theft screws. • Flat-blade screwdriver is used to remove the connecting wire from the controller. • Phillips screwdriver is used to remove screws from other parts.
Diagonal pliers		Used to process cables on site and remove the fixed cable ties.
Portable vacuum pump		Used to vacuum on site.
Pressure gauge		Used to monitor system pressure, maintain pressure, and charge refrigerant for use.
Refrigerant		R410A refrigerant.
Electronic scale		Used to charge refrigerant and monitor the weight of the refrigerant charged.
Protective gloves		Wear gloves when charging refrigerant and vacuuming.
Goggles		Used to protect the eyes.

2 Disassemble the Unit

- **Figure 5-1** Disassemble the unit



- Step 1** Use a small flat-blade screwdriver to remove the air conditioner power cables (L, N, PE). See **A** in **Error! Reference source not found.**
- Step 2** Use a small flat-blade screwdriver to remove the air conditioner signal lines (RS485+, RS485-). See **B** in **Error! Reference source not found.**
- Step 3** Remove the signal line fixed buckles and the drainage pipe binding ties. See **C** in **Error! Reference source not found.**
- Step 4** Open the front door of the cabinet and use a Phillips screwdriver to remove the four installation screws of the air conditioner. See **D** in **Error! Reference source not found.**
- Step 5** Grasp the two handles on the front panel of the air conditioner and slowly pull out the air conditioner. See **E** in **Error! Reference source not found.**
- Step 6** Use a flat-blade screwdriver to remove the screws of the upper cover and remove the upper cover. Find the refrigerant charging port, as shown in **F** in **Error! Reference source not found.**



CAUTION

The charging port is divided into a high-pressure charging port and a low-pressure charging port, and the refrigerant is charged from the low-pressure port. See **G** in **Error! Reference source not found.**

3 Charge Refrigerant

Step 1 Connect the vacuum pump.

Use a pressure gauge to connect the high-pressure charging port (red pipe) and low-pressure charging port (blue pipe) of the air conditioner, and the middle pipe is connected to the vacuum pump.

- **Figure 5-2** Connect to the vacuum pump

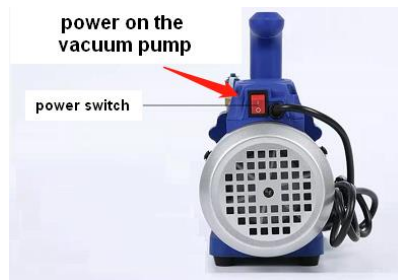


- | | | |
|---------------------------------|----------------------------------|--|
| (1) Low pressure gauge | (2) High pressure gauge | (3) Zero adjustment screw |
| (4) Low pressure valve | (5) Sight window | (6) High pressure valve |
| (7) Low pressure side interface | (8) High pressure side interface | (9) Vacuum pump or refrigerant interface |

Step 2 Use a vacuum pump to vacuum the refrigeration system.

After confirming that the pipeline connection is completed, turn on the vacuum pump to start vacuuming. The vacuum degree of the system is required to be below **35Pa**.

- **Figure 5-3** Power on the vacuum pump



Step 3 Maintain pressure on the system.

After the vacuum is completed, power off the vacuum pump, close all the pressure gauges and tighten the connection between the pressure gauge and the vacuum pump. Keep the pressure of the system for 20-30 minutes and observe whether the pointer of the pressure gauge does not move. If the value of the pressure gauge needle remains unchanged (maintained at -0.1MPa), it proves that the system is well sealed and can be filled with refrigerant.

● **Figure 5-4**Maintain pressure



Step 4 Refrigerant charge.

After the system pressure is maintained, remove the vacuum pump from the pipeline, and connect the pipeline to the refrigerant tank to charge the refrigerant.

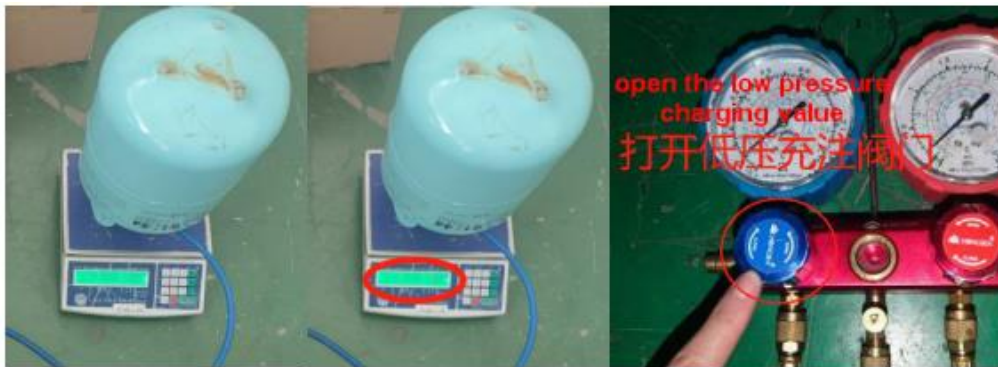
1. Move the gas pipe connecting the vacuum pump to the refrigerant tank and tighten it, then loosen the connection of the middle pipe of the pressure gauge by 4-5 turns.

- **Figure 5-5** Connect to the refrigerant tank



2. Turn on the switch of the refrigerant tank, let the gas pour into the pipe and rush out from the connection. The process lasts for about 10 seconds, and then tighten the pressure gauge connection so that the air in the pipe is discharged to the outside.
3. After exhausting the air from the pipeline, the refrigerant charge is started. Please turn the refrigerant tank upside down when charging, and you must use an electronic scale to ensure the quality of the refrigerant charged.

- **Figure 5-6** Charge refrigerant



4. After the refrigerant charging is completed, close the valve on the low pressure port side of the pressure gauge, do not remove the pipeline connection for the time being, and perform the power-on operation and refrigeration operation.

- **Figure 5-7** Close the low pressure charging value



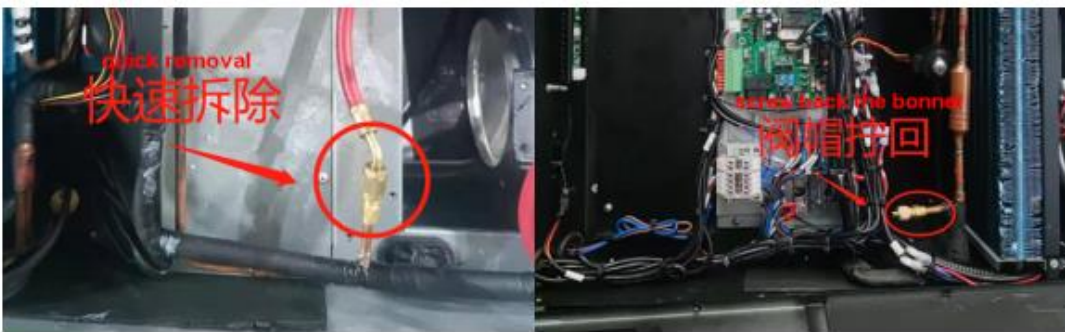
4 Power On and Test the Air Conditioner

Power on the unit and adjust the cooling point of the unit to below the temperature detected by the indoor sensor. Run the unit for half an hour to see if the cooling of the unit is operating normally.

- When the ambient temperature reaches the cooling point of the air conditioner, the air conditioner will automatically enter the cooling state when the air conditioner is powered on for 3 minutes.
- If the ambient temperature does not meet the cooling conditions, you can turn on the load to make the air conditioner enter the cooling state.

After the unit is operating normally, quickly remove the high and low pressure connections. A small amount of refrigerant will be sprayed out during the dismantling process, which is normal. Screw the bonnet back to complete the refrigerant charging.

- **Figure 5-8** Remove the refrigerant charging port connection



5 Reinstall the Air Conditioner Into the Cabinet

Lift the air conditioner and slowly push it into the cabinet from the front, avoiding the air conditioner limit blocks on the left and right sides of the cabinet until the mounting flange is close to the cabinet column, and then install the air conditioner in the reverse order according to **2** Disassemble the Unit.

1. 简介

1.1 前言

注意：任何针对本产品的操作必须由专业的工程技术人员进行。

本手册只能用于指导 EF 系列空调器的安装和操作。手册内容包含机组的功能描述和定期维护。本手册中，安全提示和警示符号说明如下：



警告！

如果没有严格遵守所述的措施，将有生命危险或造成健康危害。



危险！

如果没有严格遵守所述的措施，将可能因电击遭受生命或健康危害。

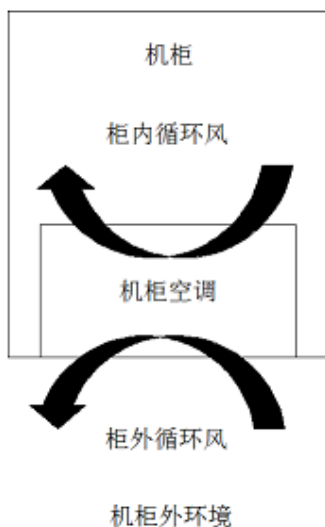


注意！

如果没有严格遵守所述的措施，将有可能造成财产损失。

1.2 空调器描述

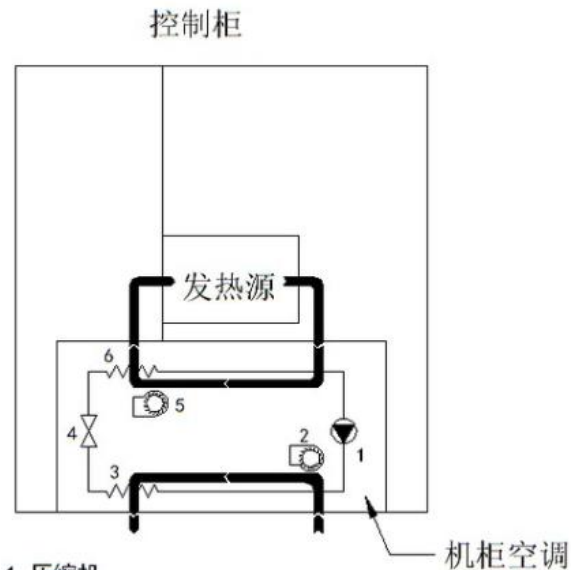
EF 系列空调器是针对控制柜等应用环境而开发的一款制冷产品。适用于机柜内部设备发热量较大，内部设备对于环境温度敏感，且内外需要完全隔离的应用场合。该产品属于交流供电的直流变频空调，具有制冷量自动调节风机自动调速功能。



功能示意图

1.2.1 工作原理

压缩机（1）将制冷剂压缩成高温高压气体；到冷凝器（3）中，并由冷凝风机（2）从底部吸入室外空气通过冷凝器（3）将热量强制散至周围环境空气中，制冷剂变成液体。通过节流元件（4）后制冷剂压力下降，在蒸发器（6）中，制冷剂吸收控制柜内部热量并蒸发，由蒸发风机（5）从控制柜内部吸入热空气，通过蒸发器后空气被冷却并强制排入控制柜内部。同时控制柜的空气被除湿。



1. 压缩机
2. 冷凝风机（外风机）
3. 冷凝器（换热器）
4. 节流元件
5. 蒸发风机（内风机）
6. 蒸发器（换热器）

工作原理示意图

1.2.2 运行条件

● 电网

设计为单相电源输入的空调适用于：
220VAC±15%,50/60Hz

● 外循环温度：

-40℃ ~ 50℃

注：空调上的铭牌参数请用户仔细阅读，实际使用技术参数以铭牌标称为准。

1.3 符合标准

标准	标准描述
GB/T 17626.7-1998	电磁兼容性
GB4706.1	家用和类似用途电器的安全
GB4798.1	电工电子产品应用环境条件-储存
GB4798.2	电工电子产品应用环境条件-运输
GB4798.3	电工电子产品应用环境条件-使用

2. 安全注意事项

为正确使用设备，需要严格遵守以下安全注意事项：

2.1 运输

- 运输时保持机柜空调机组处于最终使用时的摆放状态。
- 如果整体机柜需要运输，请在运输前将机柜空调拆下并单独包装。

2.2 储运

- 储存环境不应超过 70°。
- 储存时使机组处于最终使用时的摆放状态。

2.3 开箱

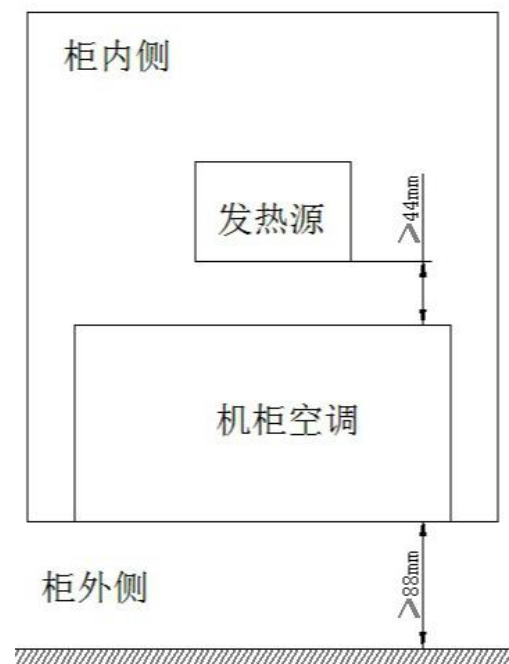
- 开箱前即开箱时应当仔细查看机柜空调，看是否存在因运输造成的破坏，尤其注意是否有部件松动、凹坑、擦伤和漏油等现象。任何损坏应当立即通知承运商。（根据“损坏规则”指示）。并且适用于《英维克售后服务承诺书》的最新版本。
- 在处理包装材料前，务必确认里面没有任何松动的部件。

2.4 安装

- 为了取得良好的通风条件，需要对控制柜及空调的安装地点进行选择；
- 所选的地点不能有过度的灰尘且不能过度潮湿；
- 环境温度不超过+45℃；
- 控制柜尽量达到(IP54 级)，如果密封性不好，

可能会产生过多冷凝水；

- 在控制柜内部，空调器进风口和出风口不能有障碍物阻塞。
- 空调器柜外的风道尺寸应不低于下图的限值。
- 空调器需要水平安装和使用，最大倾斜角不得大于 2°；
- 必须由专业人员操作电器连接及修理；
- 务必使用原装配件；
- 控制柜内部电气元器件的热释放不能超过空调器制冷功率；
- 用户不能以任何方式改动空调。



空调风口距离示意图

3. 安装和操作

3.1 空调器机械安装

空调安装前机柜的安装面需开好通风口和螺钉固定孔，开孔尺寸请见制造商提供的外形尺寸图。

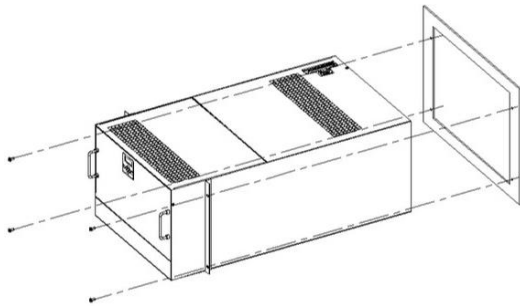
注意：金属碎屑可能损坏机柜！

如果在安装现场开安装孔，确保使用保护罩，以免切削进入机柜，损坏电器元件。

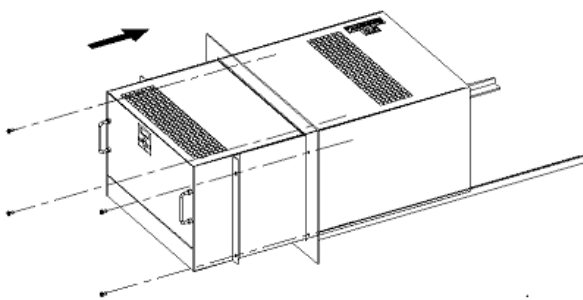
注意：安装步骤示意图不代表空调出厂外观！
安装示意图仅用来指导安装，图中空调外观不代表实际空调外观。

安装：

- 1) 空调沿着导轨方向插入机柜内部。
- 2) 空调安装法兰和柜内安装面固定，如下图所示：



安装示意图



3.2 电气安装

注意：

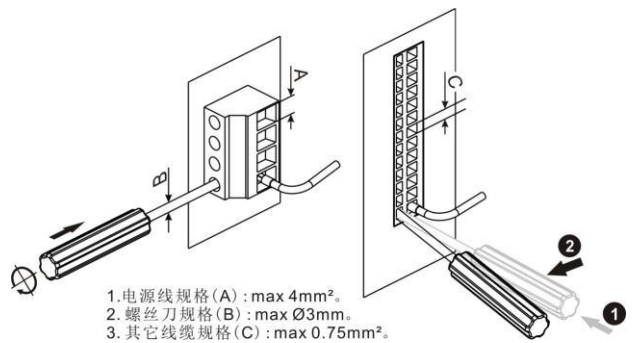
机柜空调应由电路保护装置连接到电源，请根据空调铭牌和技术参数选择合适的电路保护装置和电源线缆。

注意：

电压过高可能导致机柜空调损坏。请按照铭牌标注的电压要求接通空调。

注意：

为了避免任何破坏性的影响，接通电源前机柜空调必须可靠接地。



1. 电源线规格 (A) : max 4mm².
2. 螺丝刀规格 (B) : max Ø3mm.
3. 其它线缆规格 (C) : max 0.75mm².

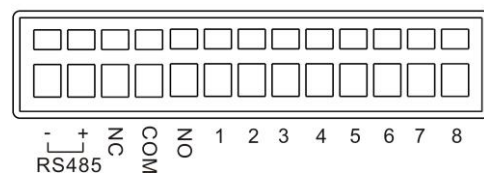
注:电源输入口标识以具体机组丝印为准
常用（铜导线）选择参考：单位：mm²

额定电流	≤5A	≤10A	≤15A	≤25A
电源线径	1.0	1.5	2.5	4

接线端子标识示意图（电源输入端子以具体机组应用为准）：



交流电源输入口



接线端子标识定义:

端口		定义
电源	L	L:220V 火线;
	N	N:220V 零线;
	PE	空调电源地线
告警输出	NC	第 1 路公共告警继电器干接点输出 NC 触点
	COM	第 1 路公共告警继电器干接点输出 COM 触点
	NO	第 1 路公共告警继电器干接点输出 NO 触点 (选配)
	1	第 2 路公共告警继电器干接点输出 COM 触点(选配)
	2	第 2 路公共告警继电器干接点输出 NO 触点 (选配)
信号输入	3	N/A
	4	排氢/应急风扇反馈输入 (选配)
	5	排氢/应急风扇控制继电器干接点输出 NO (选配)
	6	排氢/应急风扇控制继电器干接点输出 COM (选配)
	7	门禁告警输入 (选配)
8		
通信	+	RS485 接口 D+ (上位机监控接口) (选配)
	-	RS485 接口 D- (上位机监控接口) (选配)

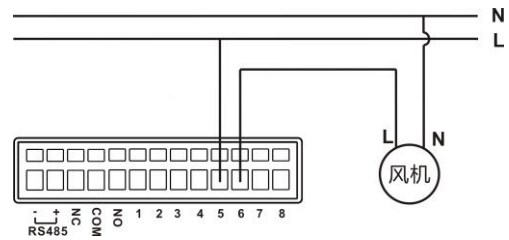
● 公共告警输出:

当公共告警干节点按 COM、NC 接线时,无告警输出时干节点为闭合状态,有告警输出时干节点为断开状态。触点容量:阻性负载 5A@30VDC/5A@250VAC。

● 排氢/应急风机电气安装 (选配):

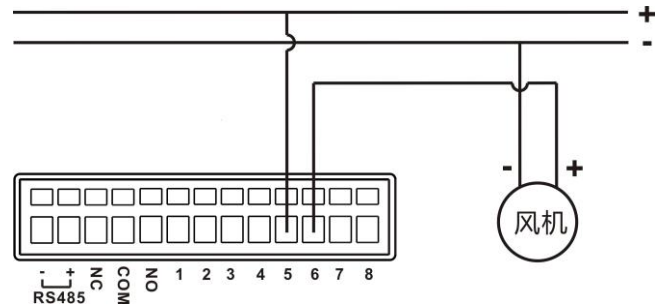
注意:排氢/应急风机干接点最大容量为:交流风机:8A/230V;直流风机:2A/-48V。

➤ 交流排氢/应急风机输入端口接线示意图:

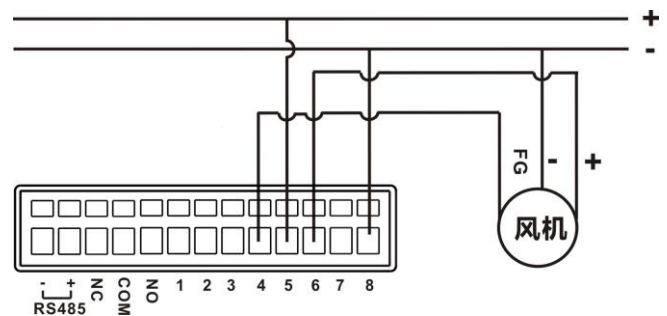


交流排氢/应急风机输入端口接线示意图

➤ 直流排氢/应急风机输入端口接线示意图:



直流排氢/应急风机输入端口接线示意图



直流排氢/应急风机输入接口接线示意图 (FG: 选配)

3.3 开机步骤

先确认输入的交流电压都符合要求。闭合电源输入空开,开机 30s 后室内循环风机运行。延时一段时间后 (3min 左右) 交流机柜空调会按照设定的参数并参考室内、外循环温度自动选择运行模式。

4. 系统功能介绍

空调器运行完全根据机柜内部的温度自动控制,控制器通过内循环温度传感器检测机柜回

风温度和设定值比较进行判断，控制压缩机或风机的工作。

4.1 制冷功能

制冷停止点=制冷点-回差，当机柜内部温度超过制冷点，开始制冷运行，当柜内温度低于制冷停止点，制冷运行停止。

参数	缺省值	设置范围
制冷点	25℃	[15~50]
回差	5℃	[1~10]
内高温	65℃	[20~80]

设置点描述：

制冷点：制冷运行开启的温度点

回差：温度控制的灵敏度

内高温：柜内高温告警点



注意：

为使机组运行可靠和发挥最大能效，不建议用户随意更改温度设定点。以上设置点不代表出厂设置。

4.2 制热功能（选配）

加热停止点=加热点+加热灵敏度，当机柜内部温度低于加热开启点，开始加热运行，当机柜内部温度高于加热停止点停止加热。

参数	缺省值	设置范围
加热点	0℃	[-5~15]
加热灵敏度	10℃	[1~15]

设置点描述：

加热点：加热运行开启的温度点

加热灵敏度：温度控制的灵敏度



注意：

为使机组运行可靠和发挥最大能效，不建议用户随意更改温度设定点。以上设置点不代表出厂设置。

4.3 门禁功能

当打开控制柜门时，为了避免冷凝水的形成，需要采用门磁开关，确保空调关闭。根据机柜门磁开关上送的信号判定柜门处于开启状态后，空调机组发出告警信号，并停机。注：当柜门打开，门磁开关

动作后，约 1 分钟关闭空调；当柜门关闭，门磁开关动作后，如满足制冷需求，约 3 分钟启动空调。

4.4 器件控制模式

1) 内风机控制模式：

在系统正常运行时，内风机按正常风速运行。

2) 外风机控制模式：

送风模式：外风机停止运行

制冷模式：外风机的转速取决于冷凝器的温度，冷凝器温度越高，外风机的转速就越快；冷凝器温度越低，外风机的转速就越慢。

3) 压缩机控制模式：

送风模式：压缩机停止运行

制冷模式：压缩机的转速取决于回风温度和设定值的温差；温差越大，转速越快；温差越小，转速越慢。

4.5 双机切换控制（选配）

机组提供双机联动功能。包括时间切换、故障切换、高温切换。

4.5.1 定时切换

两台空调按照设定的时间切换运行。

4.5.2 温度切换

1) 当温度达到制冷点时，空调单机工作；当柜内温度小于制冷停止点时，单机停止工作。

2) 当空调达到高温设定点时，空调双机工作；当柜内温度低于（高温设定点-高温灵敏度）时，双机停止工作，空调单机工作。

4.5.3 高温同开

无论哪台空调出现高温告警，两台都同时运行。高温告警消除，关一台空调恢复到正常切换状态。

4.5.4 故障切换

- 1) 其中一台空调发生故障停机时，另外一台机组立即启动运行。
- 2) 在切换时间内发生故障的空调故障消除，也要等切换时间运行完成后切换。

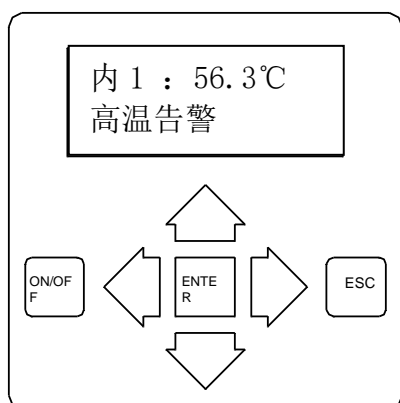
4.6 自测

在系统功能菜单中选择自测功能，机组自动进入自测程序，自测程序如下：

- 1) 若压缩机没关闭，关闭压缩机。
- 2) 内风机运行 60S。
- 3) 外风机运行 60S。
- 3) 压缩机下限速运行，外风机 50%转速运行 60S。
- 4) 压缩机上限速运行，外风机 100%转速运行 60S。
- 5) 若选配电加热，开启电加热 120S。
- 6) 若选配排氢风扇，开启排氢风扇 120S

4.8 故障

空调器提供如下告警信息，设定按照参数设置表。



告警未恢复，显示屏会一直显示，直到告警消除。还可以通过显示屏进当前告警栏，查看多个的告警信息。

- 3) 如果故障一直未解除，另一台空调会一直运行。

- 7) 关闭内、外风机，压缩机、电加热、排氢风扇。
- 8) 自测结束，系统自动进入正常控制模式运行。

4.7 排氢/应急风扇（选配）

- 1) 定时排氢：按照柜内环境需求，排氢风扇实现自动循环排氢以及强制通风功能，自动循环排氢每次排氢间隔时间为 24 小时，排氢时间为 5 分钟。
- 2) 强制通风：当压机无制冷能力（包括：压机故障、停电）时且柜内温度高于应急风扇开启点（应急点+应急回差），开启应急风扇。

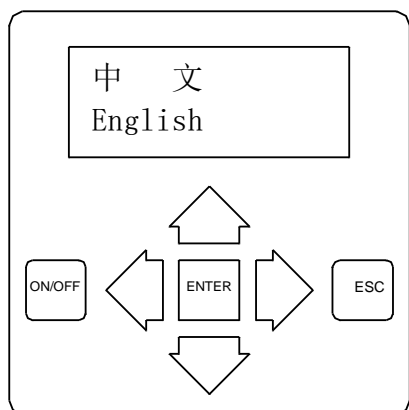
告警内容及参数设置点

屏幕显示	缺省值	设置范围	描述	执行动作
柜内高温	65	20~80℃	柜内温度过高	只告警
蒸发器冻结	0	-40~15℃	蒸发器表面温度过低	告警，关闭压缩机
系统频繁高压	--	--	高压开关多次动作	告警，关闭压缩机
控制板断电	--	--	控制板无电源输入	告警，机组不运行
柜内温度传感器故障	--	--	传感器线路短路或断路	只告警
蒸发器表面温度传感器故障	--	--	传感器线路短路或断路	只告警
冷凝器表面温度传感器故障	--	--	传感器线路短路或断路	只告警

4.9 机组菜单结构

4.9.1 操作界面

机组控制器采用 96×32 液晶显示，共 7 个按键来对控制器进行设置，操作界面如下图：



ON/OFF：开/关机键，操作此键（长按 5s）对机组进行开/关机；

▲：上移键，选择上一条记录/菜单或者对设置值（仅限密码）进行增加；

▼：下移键，选择下一条记录/菜单或者对设置值（仅限密码）进行降低；

◀：左移键，对设置值进行增加或者在进行密码操作时选择前一位数据；

▶：右移键，对设置值进行降低或者在进行密码操作时选择后一位数据；

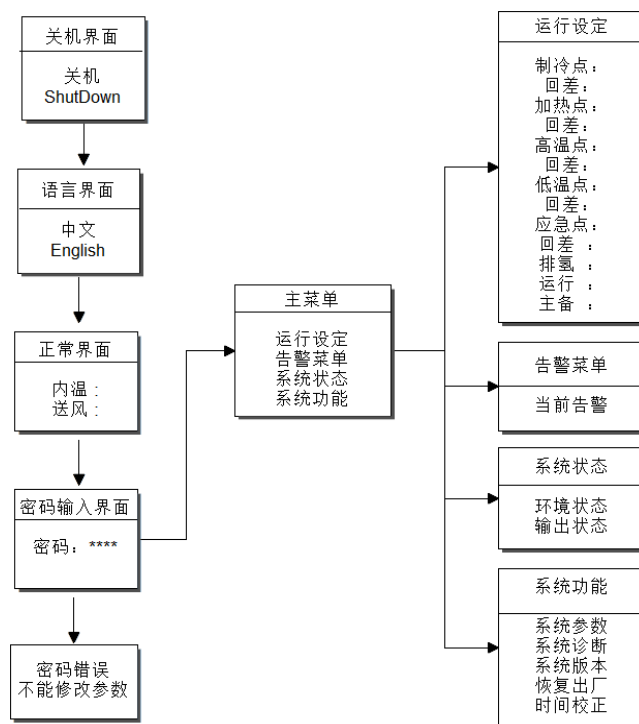
ENTER：回车键，确认输入；

ESC：退出键，返回上一屏菜单；

开机后，在任何界面下，若持续 60 秒无键盘操作，自动返回正常显示界面。系统上电后，按任意键，背光灯亮，如果持续 60 秒无键盘操作，背光灯灭。机组出厂的操作密码为“0001”。在正常显示界面按回车进入密码输入界面，按左移键，

右移键选择需要输入的位，按上下键修改，输入完毕按回车键确认。如果密码不正确，界面显示错误信息，不能修改机组设定。如果密码正确，进入主菜单，可以对机组设定进行编辑。

4.9.2 菜单结构



状态说明：

内温：表示内回风口温度传感器

盘管：表示蒸发器盘管上的温度传感器

排气：表示压缩机排气管温度传感器


冷凝：表示冷凝器盘管上的温度传感器

菜单结构图

注：此图仅为菜单结构图，不代表出厂参数配置。

5. 维护

为了保障空调器的正常运行，请参考表 5.1 对空调器进行定期维护。

 危险！所有的维护工作必须由合格的专业人员进行维护，在进行任何维护前，请事先断开空调

器电源和信号线，维护工作结束后接通空调器电源和信号线。

5.1 日常维护表

日常维护表

检查项目	步骤内容描述	维护周期
接线	目视检查是否有松脱	1 年
风机异常	拨动风机，转动是否顺畅，有无异响	1 年
冷凝水排出	目视检查冷凝水排放是否顺畅，排水路径是否有异物堵塞。	6 个月
冷凝水处理器	目视冷凝水处理器槽内部是否有积泥或其它异物，取出后用布沾水擦干净	6 个月
冷凝器	检查冷凝器清洁状况，用压缩空气清洁冷凝器	1 年
过滤网	目视检查，并清洁。如有积灰，可吹或清洗并晾干。	6 个月

5.2 压缩机维护

压缩机出现故障时，采取整机替换的措施。

处理：该产品严禁作为未分类的城市垃圾处理。必须采取特殊的方式进行独立处理。



城市垃圾桶

5.3 故障及恢复措施

现象	可能的原因	检查和维修
设备不启动	电路开路或短路	检查电路开路或短路处，并维修总电源
	控制器故障	更换控制器
内风机不启动	端子松脱	检查风机电源端子是否松脱
	电源故障	检查输入电源的电压，是否在工作范围内
	风机卡住	检查是否有异物卡住风机
	回风温度过低	检查柜内温度是否低于内风机设置的停止点，若低于停止点，则风机不运行
外风机不启动	端子松脱	检查风机电源端子是否松脱
	电源故障	检查交流电源的电压，是否在工作范围内
	风机卡住	检查是否有异物卡住风机
	制冷需求	检查柜内温度显示及操作界面中风机的输出状态
风机异响	风机轴承磨损	更换风机
	风机扇叶摩擦	检查是否有线缆等与风机扇叶干涉
压缩机不启动	电路连接松动	紧固电路接头
	未开电源	检查主电源开关，并检查显示界面是否显示“开机”
	电源故障	检查交流电源的电压，是否在工作范围内
	压缩机电机烧坏	更换压缩机
	无制冷需求	检查柜内温度显示及操作界面中压缩机的输出状态
	停机延时	压缩机间隔启动的延时时间为 3 分钟
制冷效果差	外循环风量不足	清除盘管或空气入口处进入的杂质
冷凝压力高	冷凝器脏堵	清洁冷凝器。
	外风机不运转	参考现象：外风机不启动。
蒸发器冻结	内风机不运转	参考现象：内风机不启动。
	盘管温度传感器故障	检查接线是否正常，否，则更换盘管传温度感器

5.4 空调充注制冷剂维护操作

卖到中国大陆外的地区的机组是不带制冷剂的，现场请参考以下进行操作充注制冷剂。

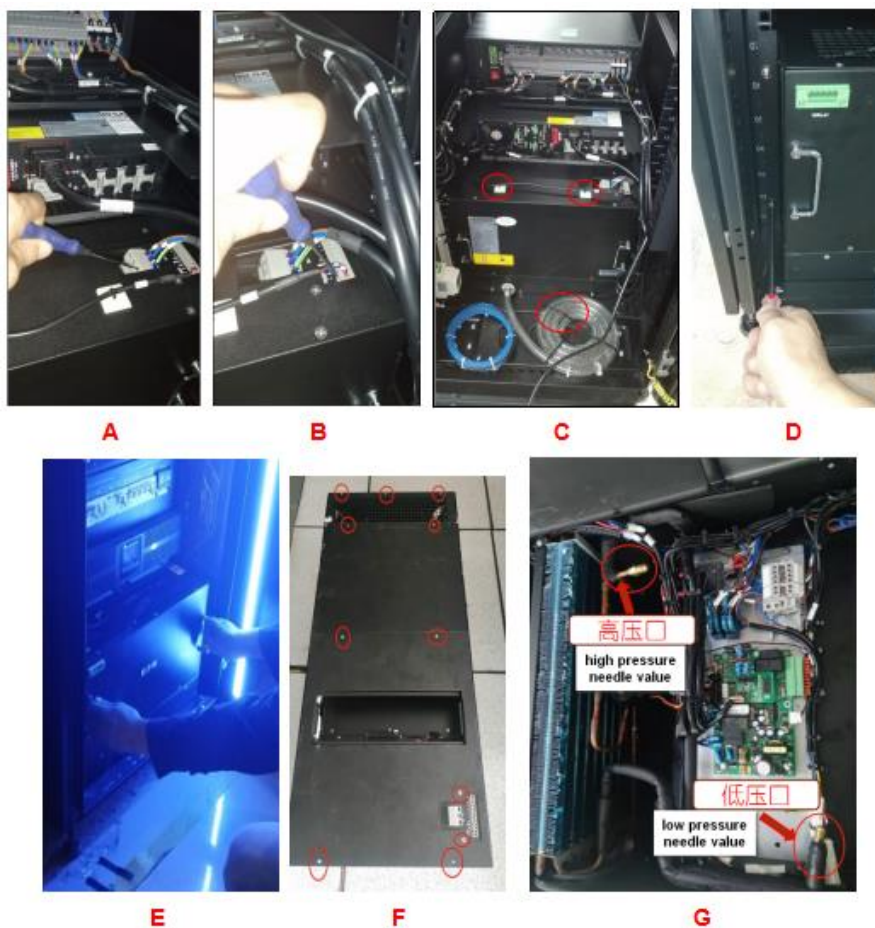
1 工具准备

表 5-1 工具准备

工具名称	图示	功能
螺丝刀		<ul style="list-style-type: none"> • 专用螺丝刀拆卸外循环侧防盗螺钉。 • 一字螺丝刀拆卸控制器上连接线。 • 十字螺丝刀拆卸其它部件的螺钉。
斜口钳		现场加工线缆，去除固线扎带。
便携式真空泵		现场抽真空。
工具名称	图示	功能
双头压力表		监测系统压力，保压，充注制冷剂使用。
制冷剂		R410A 制冷剂。
电子秤		充注制冷剂，监测充注制冷剂重量
防护手套		充注制冷，抽真空等使用手套
护目镜		保护眼睛使用

2 空调机组拆装

● 图 5-1 拆卸空调



步骤 1 使用小一字螺丝刀拆除空调电源线（L、N、PE 线）。(参见图 5-1 中标识 A)

步骤 2 使用小一字螺丝刀拆除空调信号线（RS485+，Rs485-）。(参见图 5-1 中标识 B)

步骤 3 拆下信号线与机组的理线扣、排水管绑扎线。(参见图 5-1 中标识 C)

步骤 4 打开机柜前门，使用十字螺丝刀拆除空调安装的四颗螺钉。(参见图 5-1 中标识 D)

步骤 5 拉住空调前面板的两个把手从前面慢慢抽出空调。(参见图 5-1 中标识 E)

步骤 6 使用一字螺丝刀空调拆除上盖板螺钉并取下上盖板，找到制冷剂充注口（参见图 5-1 中标识 F）。

注意：充注口分为高压充注口和低压充注口，充注制冷剂从低压口充注。(参见图 5-1 中标识 G)

3 制冷剂充注

步骤 1 管路连接。

使用双头压力表，分别连接空调的高压充注口（红色管路）以及低压充注口（蓝色管路），中间管路连接真空泵。

图 5-2 连接真空泵



- | | | |
|-----------|-----------|---------------|
| (1) 低压表 | (2) 高压表 | (3) 调零螺钉 |
| (4) 低压阀门 | (5) 视液窗 | (6) 高压阀 |
| (7) 低压端接口 | (8) 高压端接口 | (9) 真空泵或制冷剂接口 |

步骤 2 系统抽真空。

确认管路连接完好后，开启真空泵开始抽真空。系统真空度要求为 35Pa 以下。若现场没有真空度计量器。（如图十一所示）

图 5-3 开启真空泵



步骤 3 系统保压。

真空抽完后关闭真空泵，将压力表全部关闭，拧紧压力表与真空泵连接。进行 20-30 分钟的系统保压，并观察压力表指针是否保持不动，若压力表针保持数值（维持在-0.1MPa）不变动，证明系统密封性良好，可进行制冷剂充注。

图 5-4 系统保压



步骤 4 制冷剂充注。

系统保压完成后，将真空泵从管路上拆下，并将管路连接到冷媒罐上，进行冷媒充注。

制冷剂充注过程如下：

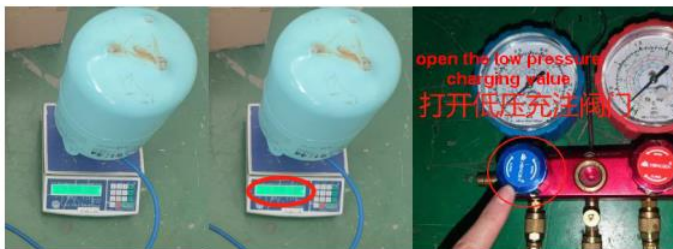
1. 将连接真空泵的气管移至制冷剂罐上并拧紧，然后将双头压力表中间管路连接处拧松4-5圈。

● 图 5-5 连接制冷剂罐



2. 打开制冷剂罐开关，让气体灌入管道，并从连接处冲出，过程持续 10 秒左右，然后拧紧压力表连接处，将管路内的空气排出到外部。
3. 管路排空完成后，正式进入制冷剂充注环节。注意充注时请将制冷剂罐倒置，且必须借助电子秤确保制冷剂充注量准确。

● 图 5-6 充注制冷剂



4. 充注完成后关闭压力表低压口侧阀门，暂不拆除管路连接，上电进行制冷运行。

● 图 5-7 关闭低压充注阀



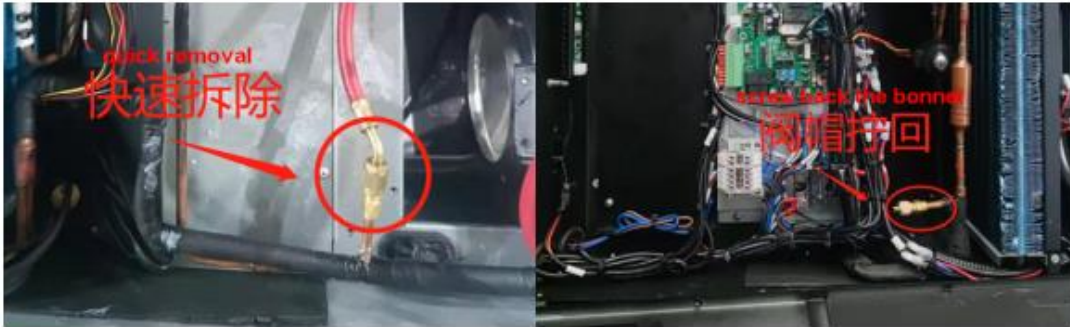
4 上电测试空调

对机组进行上电，并将机组的制冷点调整至室内温度传感器检测到的温度值以下。运行机组半小时，检查机组制冷是否正常。

- 当环境温度达到空调制冷点时，空调通电 3 分钟后自动进入制冷状态。
- 当环境温度不满足时，可打开负载使空调进入制冷状态。

机组运行正常后，将高低压连接口分别快速拆除。拆处过程中会有少量制冷剂喷出，属于正常情况。将阀帽拧回完成充注。

● 图 5-8 移除制冷剂充注口连接



5 将空调装回机柜

将空调抬起，从前面缓慢推入机柜中，注意避开机柜左右两侧的空调限位块，直至安装法兰贴紧机柜立柱，然后按之前“02 空调机组拆装”安装步骤的反向顺序重新安装好空调。

6. 产品有毒有害物质申明

表 1:

产品中有害物质的名称及含量

部件名称	有害物质					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
压缩机	×	○	×	○	○	○
电机	○	○	○	○	○	○
钣金件	○	○	○	○	○	○
紧固件	○	○	○	×	○	○
铜配件	×	○	○	○	○	○
电控板	×	○	×	○	○	○
其他	×	○	○	×	○	○

本表格依据 SJ/T 11364 的规定编制。
 ○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
 ×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。



该环保使用期限是指在正常使用条件下，产品及其附件产品含有的有害物质或元素不会外泄，以及用户使用该产品时不会对环境造成严重污染或对其人身、财产造成严重损害的期限。

环保使用期限的免责条款：环保使用期限规定的具体期限仅为符合中华人民共和国的相应的法律规定，并非代表我司向客户提供保证或负有任何义务。环保使用期限中假定客户按照操作手册在正常情况下使用本产品。对于本产品中配备的某些组合件（例如，装有电池的组合件）的环保使用期限，可能低于本产品的环保使用期限。

表 2:

产品中有害物质的名称及含量

部件名称	有害物质					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚(PBDE)
电机	○	○	○	○	○	○
钣金件	○	○	○	○	○	○
紧固件	○	○	○	×	○	○
铜配件	×	○	○	○	○	○
电控板	×	○	×	○	○	○
其他	×	○	○	×	○	○

本表格依据 SJ/T 11364 的规定编制。
 ○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
 ×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

附录 1.维修保证

本公司承诺：自购机之日起，为您提供两年免费保修：

- 凭经销商有效证明保修；
- 凭机器生产序号保修。

如机器发生故障，请拨打 400/800 电话联系或与就近的山特服务网点及经销商联络。

作为山特用户，您享有如下服务：

- 两年保修；
- 24 小时热线服务；
- 全国联合保修；
- 网上技术服务支持；

发生以下情况，不在保修范围内：

- 人为故障；
- 保修期外；
- 生产序列号更改、丢失的成品；
- 因不可抗拒及外来原因引起的损坏或损失；
- 未经授权私自拆机或修改；
- 违反机器操作/ 使用规定；

注：以上内容如有变更，恕不另行通知，山特公司拥有最终解释权

附录 2.合格证

合格证

本产品经检验，符合质量标准。

 **SANTAK**

山特电子(深圳)有限公司

厂址: 深圳市宝安区 72 区宝石路 8 号 邮编: 518101

客服传真:(0755)27572730

客服中心 E-mail 地址:upsservice@eaton.com

客服热线: 400-830-3938/800-830-3938