

机柜热交换器 Cabinet Heat Exchanger

使用说明书 User Manual

在产品安装使用前请仔细阅读本手册！

Read this manual carefully before installation and using!

前言 Foreword

概述 Summary

该手册介绍 HRUC E 045/N/E/D 系列机柜热交换的使用须知、声明、产品概述、安装指导以及产品维护和质保。

The manual describes the series of HRUC E 045/N/E/D cabinet heat exchanger instructions, declaration, product overview, installation guide, maintenance and warranty.

变更记录 Change History

Version 版本	Change History 文件历史	Draft by 起草	Approved by 批准	Date 日期
A	Created	Fangshengjun		2016.8.1
B	Updated	Fangshengjun		2017.3.7
C	Updated	Fangshengjun		2017.6.2
D	Updated the curve about fan	Fangshengjun		2017.11.03

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1 使用须知 Instructions

- 本手册适用于：HRUC E 045/N/E/D 系列机柜热交换器

This manual is for: the series of HRUC E 045/N/E/D cabinet heat exchanger

- 使用本机前请务必阅读本使用说明书。

Be sure to read this manual before using the unit.

- 用户必须按照本手册规定的内容执行才可享受到产品正常质保服务。

Only when the user operate the unit in accordance with the user manual in warranty period

HuaRui can offer repair with free of charge.

2 声明 Declaration

RoHS Compliance Declaration of Cabinet heat exchanger

European Guidelines 2011/65/EU (RoHS)

Legal regulation for Substances

Dear Sir/Madam,

Referring to the European guideline of 2011/65/EU, we confirmed that according to the current status of our knowledge and in accordance with the regulations, we could produce products complying with above mentioned guidelines especially for below type:

☒ **HRUC E 045/N/E/D**

Yours sincerely,

Engineering Department

Suzhou Quick Thermal Control Technology Co., Ltd.



Declaration of Conformity

Suzhou Quick Thermal Control Technology Co. Ltd

No.75, jiangpu Rd. Industrial park Dis. Suzhou. P.R.China.

Tel.: +86 512 65335116; // Email: info@topquickcooling.com

We herewith declare the following products:

Product Name: Air to air heat exchanger

Rated supply: DC 48V

Product No: 12431

series products is in conformity with the following directives:

2014 / 35 / EU	Low Voltage Directive	EN 60 335-2-40: 2003+A11:2004+A12:2005+A1: 2006+A2:2009+A13:2013 EN0335-1:2012+A11:2014 EN 62233:2008
2014 / 30 / EU	EMC-Directive	EN 55022-2010 EN 61000-3-2: 2014 EN 61000-3-3: 2013 EN 61000-4-29: 2001
2011 / 65 / EU	RoHS Directive	EN 62321:2013

Signed for and on behalf of:

Suzhou Quick Thermal control technology Co., LTD.

Signature

苏州雷克温控技术有限公司
Frank Zhao
Suzhou Quick Thermal Control Technology Co., LTD
Frank Zhao / CTO)

Place and date of issue: Jan. 5th 2022

3 产品概述 Product Overview

关于本章 About this chapter

本章介绍了 **HRUC E 045/N/E/D** 机柜热交换的应用、产品特点、工作原理、风道设计、运行逻辑、显示屏操作指导以及告警及故障处理信息。请严格按照本手册的相关规定执行！

This chapter describes the **HRUC E 045/N/E/D** cabinet heat exchanger application, product features, the working principle, duct design, operation logic, monitor operation guide and alarm and fault processing of information. It is required to strictly operate the unit according to this user manual.

3.1 应用 Application



Important

- 该产品是专为通讯或相关工业设备应用场合而设计的高性能机柜热交换器，使用直流电源供电。其安装的意义在于对控制柜（正常工作时为密闭状态）内部实行温度控制，以保证柜内的所有热敏元件可以正常工作，发挥其最佳工作性能。

The product is designed for communication or related industrial equipment applications and design of high performance cabinet heat exchanger ,Please use the DC power, The installation is the significance of the control cabinet (normal work to a closed state) of internal temperature control, To ensure that all electronic components in the cabinet work properly at their optimal performance.

除以上说明的应用场合以外的其他任何场合使用所造成的任何损害，我方不承担责任。

Any damage caused by any other applications outside of the application object described above, Responsibility is not assumed.



Warning

- 运输：搬运或运输该产品过程中，请注意保护产品，请勿过度撞击。

Transport: In the process of handling or transport of the product, do protect the product and do not over impact.

- 存放：不要露天存放，或者长时间存放在高温、高湿的环境下(80℃,95%)。

Store: Don't open storage, or stored for a long time at high temperature, high humidity environment (80℃,95%).

- 关机：若长时间不使用该产品，请关掉主电源。

Shutdown: If not using this product for a long time, please turn off the main power



Warning

- 严禁未成年人、身体或心理存在严重缺陷及不具有相关该产品知识的人员操作该产品。

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

- 为了避免风险，电源线请务必使用同一公司或使用同规格的有安规认证的产品

In order to avoid the safe risk, the power supply cable can be got from the same cable brand's type or use the cables that passed the safety certification

- 为了更好的使用本产品，请勿在高油污、高腐蚀性环境（强酸、强碱）、含爆炸易燃气体环境使用，否则，将会造成对该产品严重的损害，我们将不会提供正常的售后服务。

Not recommended use the product under the condition of high oil, burning gas (strong acid, strong base), explosive gas, strong corrosively condition area. Otherwise the product warrantee service is not been offered by manufacture.

3.2 产品铭牌 Product nameplate

  		Technical Data	
Product Data		Rated Voltage Range:	48VDC(36V-72V)
Product Type	Heat Exchanger	Rated Current(max):	0.6A
NOKIA Number/Version	1AF29835CAAA/G01	Fuse Value:	12A
DT Material Number	40371525	Rated Wattage:	25W
Supplier Part Number/Version	12431/Ver. C	Specific Cooling Capacity:	45W/K
Product Date	Wk xx/xx	Weight:	16kg
		Temp. Range:	-25~70℃
		IP Grade:	IP55
Manufacturer: Suzhou Quick Thermal Control Technology Co., Ltd. Add: No.75 jiangpu Road Suzhou Industrial Park Jiangsu China Tel: +86 512 65335116 www.topquickcooling.com		 12431W20180625001	
HID:LENSN	S/N::12431W20180625001		
HTN:1AF29835CA	G:01		
MNr: 40371525	4L:CN		

3.3 产品特点 Product features

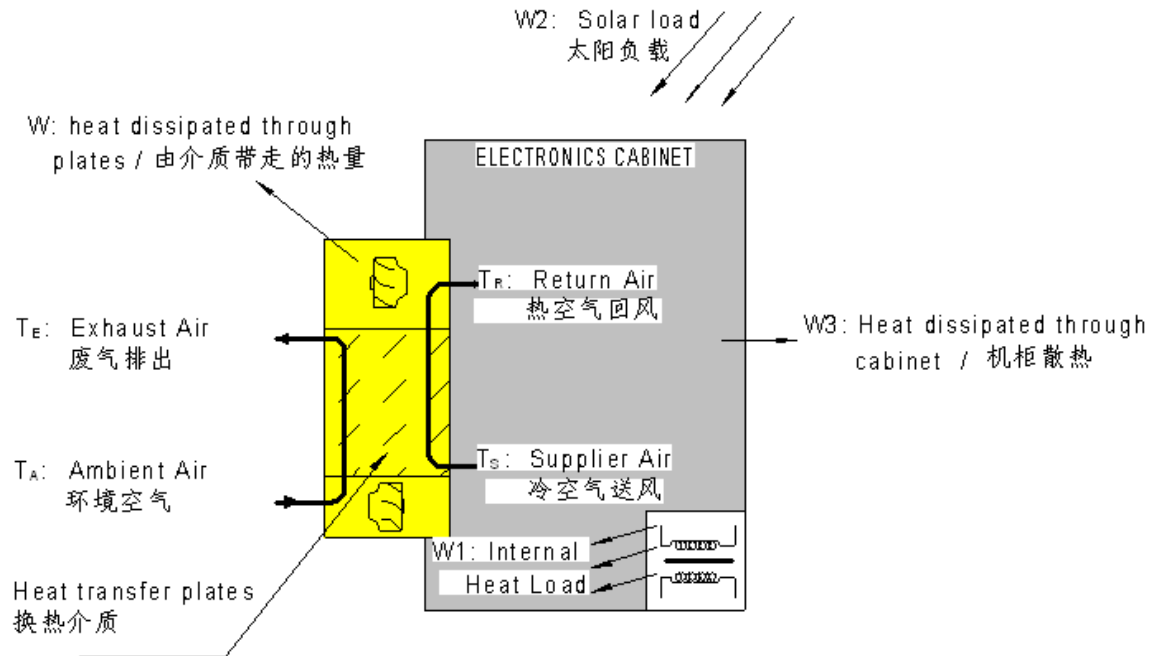
- 适合高温工况
Suitable for high temperature
- 开机自检
Self testing function
- 报警输出功能
Alarming output to monitoring system
- 维护方便
Easy maintenance
- 实现遥测、遥信、遥调，可实现多重自动保护和全面的故障自诊断功能；

Remote measuring, remote communication, remote control, which can realize multiple automatic protection and comprehensive self-testing function;

- 多重保护功能、RS485 接口 (MODBUS-RTU 协议) ；

Multiple self-protection design & RS485 communication port (MODBUS-RTU protocol);

3.4 工作原理 Working principle



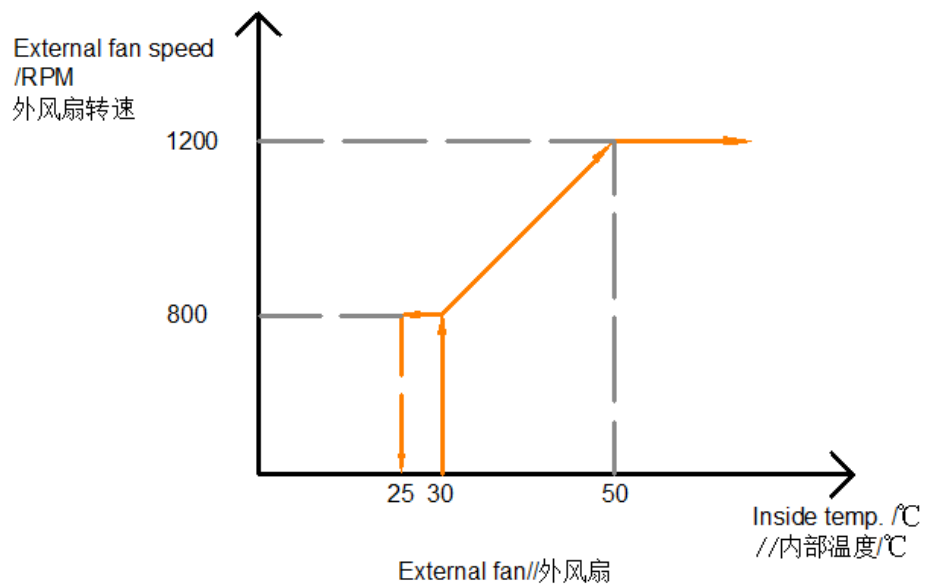
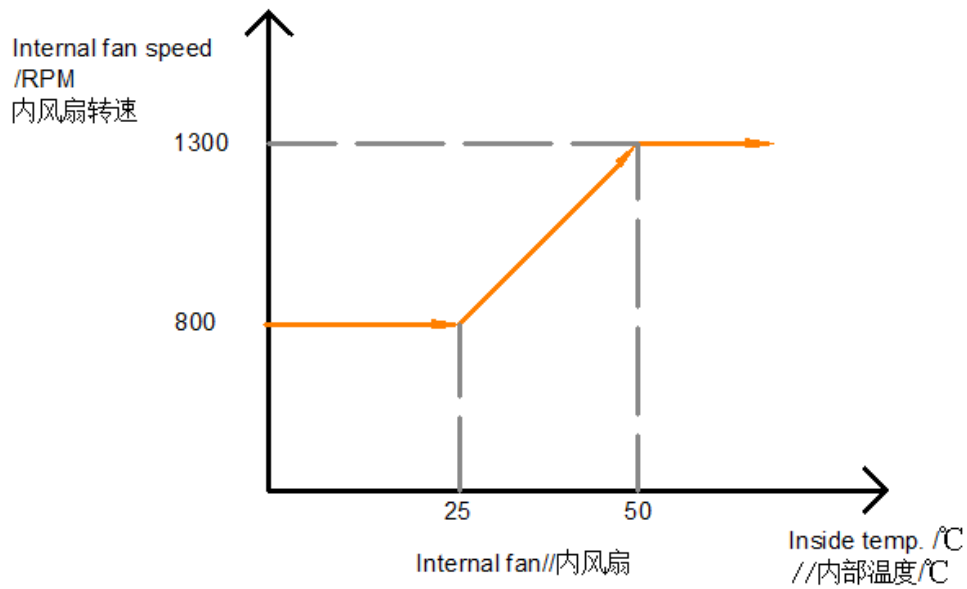
热交换器通常用在对密封区域的降温，HRUC E 系列的热交换器是专为机柜而设计的产品。热交换器因需要比柜内温度低的外部空气，用以对柜内空气进行热交换，因此需要有一个通道与外界相通。密闭的内部空气通过环境空气而实现冷却。内、外循环的风扇使空气产生对流，通过中间的换热装置实现热量的传递。

Heat exchanger is mostly used for enclosure cooling, HRUC E series is designed especially for mounting on a cabinet. The unit uses ambient air for temperature regulation so it must have access to ambient. The internal temperature of the enclosure is cooled via effective utilization of the ambient air. An air/air counter-current plate heat exchanger is used to transfer the heat. Two sets fans, one set for the internal cycle and the other set for the external cycle air circulation.

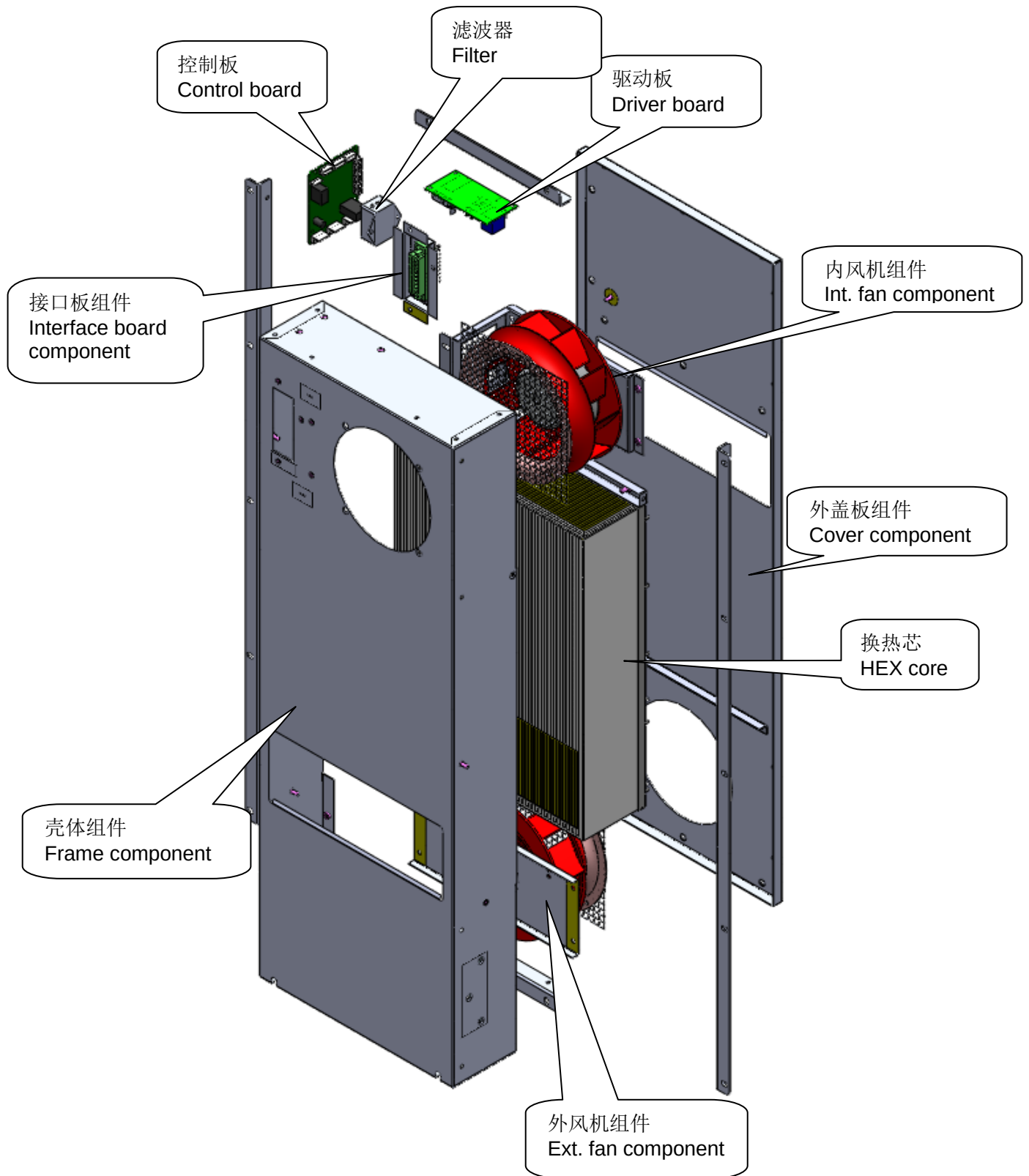
热交换器风扇的风速是由温度控制的，是基于一个已调整好的模式而设计的。

The speed of the fans is controlled according to return air temperature which based on the control system.

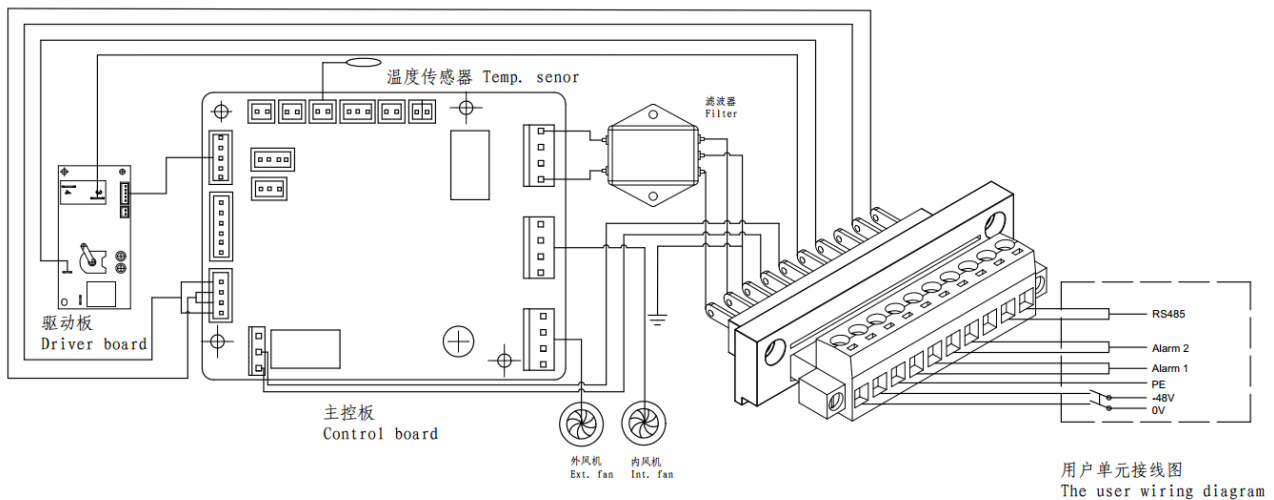
3.5 风扇转速 Vs.内部温度曲线 Fan Speed Vs. Inside temperature Curve



3.6 产品部件 The components of product



3.7 控制电路图 Control wiring diagram



3.8 运行逻辑 Operation logic

热交换器上电，首先进行自检程序，若自检过程中发现故障。则产生告警进入故障处理模式。若自检过程中无故障，则自检结束后按照正常模式运行。

After unit switch-on, the unit will perform a self-testing program firstly. If there is any trouble during self-test, the alarm will be generated, the system according to the alarm fault code to enter fault handling operation. If there is no trouble during the self-test, system will be normal running automatically.

- 自检：Self-testing

自检过程如下：The self-test procedure is as follows:

第一步：检测回风温度传感器；

First: Detection of return air temperature sensor;

第二步：检测内风机；

Second: Detection of internal fan;

第三步：检测外风机；

The Third: Detection of external fan;

系统的正常工作状态包括待机、换热两种状态。

- 待机运行 Standby mode

若回风温度满足待机运行条件(无需换热或加热时)，则热交换器进入待机运行状态，此时只低速运行内风机。

If the return air temperature meets the condition of the Standby mode (not need heating or heat transfer), the heat exchanger runs into the standby operating state, At this point only the low speed fan inside.

- 换热运行 Heat exchange mode

若回风温度满足换热运行条件（柜内温度高于外风机开启温度），则热交换器进入换热运行状态，此时内外风机会根据柜内温度的不同进行调速运行。

If the return air temperature meets the condition of the heat exchanger (cabinet inner temperature is higher than the outer fan start temperature), the heat exchanger runs into the heat transfer state, At this point the fan will change speed according to the cabinet inner temperature.

3.9 监控 Monitoring

热交换器可通过软件监控，只需连接 T/R+ & T/R-接口。请联系厂商以获取更多的信息。

The unit can be monitored by software through T/R+ & T/R- port. Please consult to the manufacture for more information.

4 安装指导 Installation guide

4.1 设备安装 Machine installation

安装步骤: Installation steps:

- 1) 拆除热交换器外包装, 核对包装清单, 确认设备是否完好;

Removal of packaging box, check the package list and the machine is well.

- 2) 使用螺母, 将热交换器按图 4-1 安装在机柜上;

Installed the Heat exchanger on the cabinet use nuts, as Figure4-1

- 3) 以下安装步骤完成后, 请再次确认检查。

The mechanical part of installation is finished till now. please double check.

请按照下图示意进行安装

Please follow the below diagram of installation

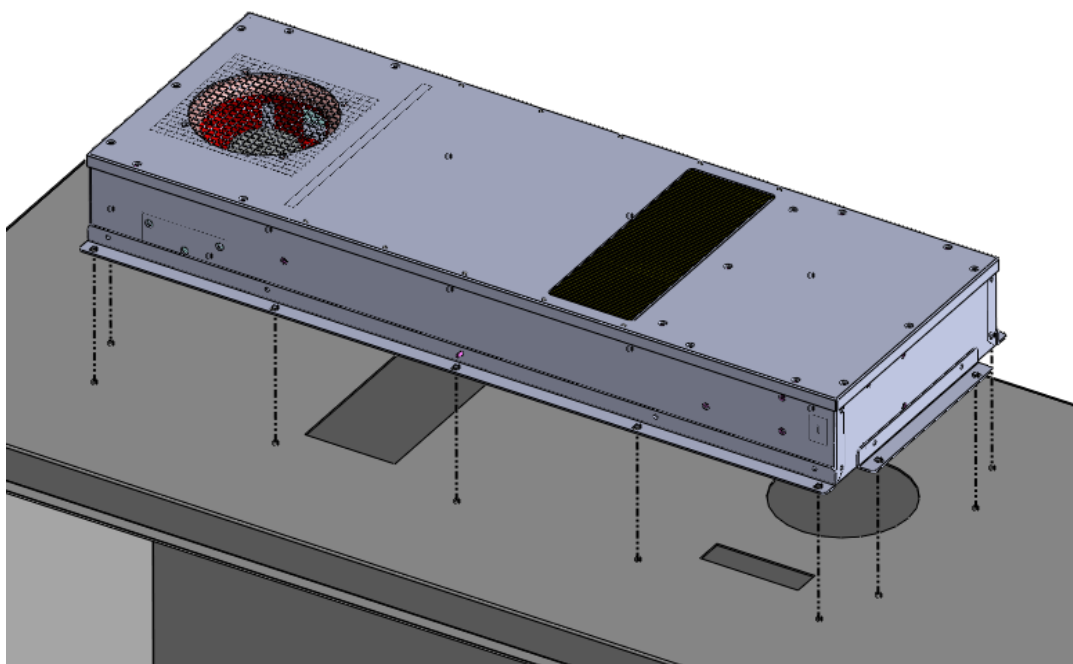
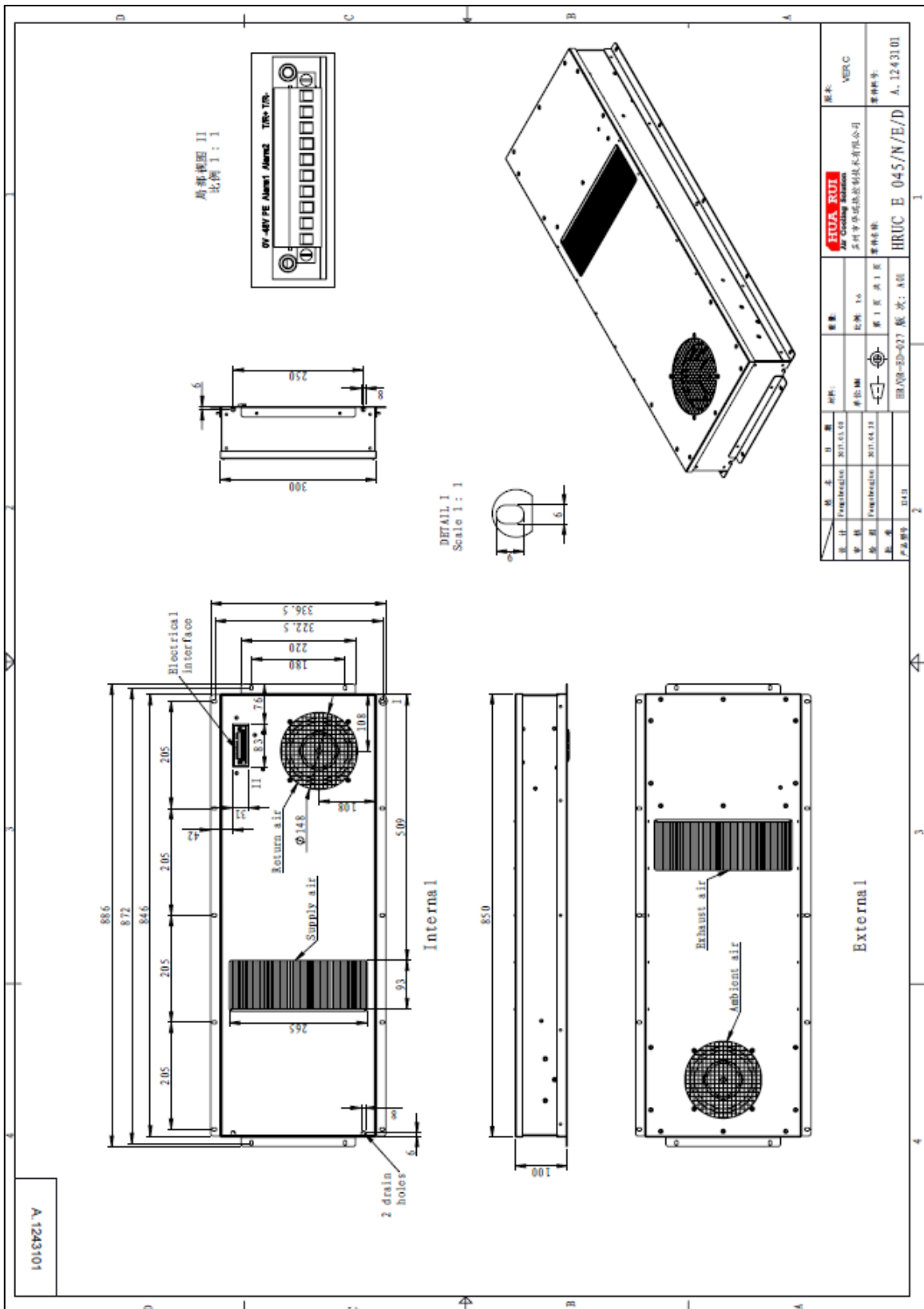


图 4-1 安装示意图 Figure 4-1 Installation diagram

Mechanical Interface 安装界面

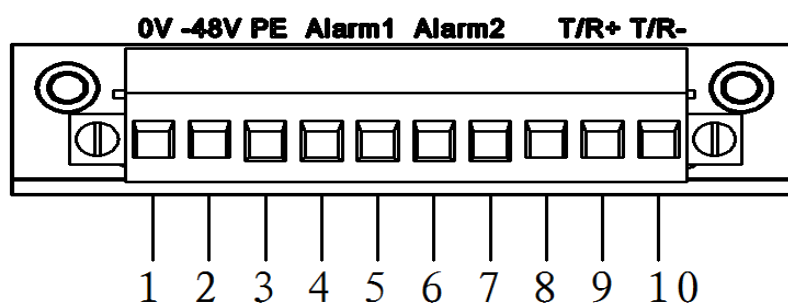


Important

请勿在高油污、易燃气体、高腐蚀性（强酸、强碱）及环境温度超过 70℃、湿度超过 95%的环境下使用该产品。

- Don't use this unit in high oil, burning gas, explosive gas, strong corrosively (strong acid, strong base) condition, the ambient air must be under 70℃, and the humidity not higher than 95%.

4.2 电气安装 Electrical installation



Electrical Interface definition 电气接口定义

No. /序号	Silk print symbol / 丝印	Definition / 定义	Remark / 备注
1	0V	Positive electrode of DC power/直流电源正极	/
2	-48V	Negative electrode of DC power/直流电源负极	-36~-72V
3	PE	Grounding / 电源接地	/
4	Alarm 1	Minor alarm (Int.fan alarm/Ext.fan alarm/Controller alarm) / 次要告警 (内、外风机告警/控制告警)	NC / 常闭
5			
6	Alarm 2	Major alarm (High temp. alarm/ Low temp. alarm/ Temp. senor alarm) /主要告警 (高、低温告警/温度传感器告警)	NC / 常闭
7			
8	/	/	/
9	T/R+	RS485 Communication interface/通讯接口	RS485
10	T/R-		

4.2.1 用户接线要求 User wiring requirement

用户自配电源、电源线缆及断路器应该满足以下表格要求：

The power, the power cable and the breaker should meet the following form, when they are supplied by customer

项目 // Item	要求 // Request
电源 // Power	直流电源// DC Power
电压范围 // Voltage range	DC:48V(36V-72V)
断路器 // Circuit breaker	建议直流电源断路器不小于 12A The recommended DC power circuit breaker is not less than 12A

4.2.2 上电前检查 Pre-operational checks

热交换器的安装和电气连接完成后，请核对下列检查表：

After heat exchanger installation and the electrical connection are completed, please check the following checklist:

序号 Serial number	检查项目 Check items
1	装配螺钉已经紧固。 Ensure the screw is fastening
2	内外循环的进出风口附近无明显的阻挡物。 Ensure that there is enough space near the internal and external of the air condition
3	电源线极性连接正确，告警信号线缆连接正确。 Power line to connect the right polarity Alarm signal cables are connected correctly
4	用万用表检查供电电压，供电电压正常，符合铭牌上的要求。 Using a multimeter to check the supply voltage, power supply voltage is normal, consistent with the requirements on the nameplate.

注：本设备正确的电源型式请参见机身铭牌。如未正确输入电源，将会有告警

Note: the correct power type of the machine sees the nameplate on the machine surface. If the power is not input correctly, the unit will be alarm



Warning

热交换器上电运行过程中，若发生异常噪音、震动，请立即切断电源，并通知专业人士进行检查。

When the heat exchanger is running, if there is abnormal noise, vibration, please cut off power immediately and notify the professionals to inspect.

5 产品维护和质保 Maintenance and Warranty

5.1 产品维护 Product maintenance

5.1.1 准备工具：Prepare tools

表 5-1 维护工具 Table7-1 Maintenance Tools

序号 Number	工具 Tools
1	万用表 Multimeter
2	M3 十字螺丝刀 M3 Phillips screwdriver
3	M4 十字螺丝刀 M4 Phillips screwdriver
4	M3 一字螺丝刀 M3 Straight screwdriver
5	M4 套筒扳手 M4 Socket spanner

5.1.2 日常维护 Routine maintenance

表 5-2 日常维护 Table5-2 Routine maintenance

序号 NUM	检测项目 Check items	检验方法 Check methods	故障解决方法 Solution
1	电源线牢固性 Power line firm	1、关闭热交换器输入电源 Turn off the supply power 2、用手拉动电源线，观察是否有松脱现象 Pulled the power line, watch whether the line is loosening 3、用螺丝刀拧动电源线端子上的螺丝，观察是否有松动现象 Screw the screws on the power cable terminals with a screwdriver, watch whether the screw is loosening	若发现有电源线有松脱或者松动现象，应重新用扎带绑紧电源线；用螺丝刀将松动的螺丝拧紧 If there is a power line loses, You should tie tightly power cable; with a screwdriver to the loose screw

2	供电电压稳定性 Voltage Stability	用万用表测量热交换器输入电压，观察用电压是否在正常范围内 Use the multimeter to measure heat exchanger input voltage to watch whether the voltage is within normal range.	若电压不在正常供电范围，请立刻关闭输入电源。直到输入电源稳定后才可再次运行热交换器 If the voltage is not within the normal range, Please turn off the power supply immediately. Power on heat exchanger until the supply voltage within normal range.
3	安装螺丝牢固性 Screw firmly	用螺丝刀拧动热交换器的安装螺丝，观察是否有松动现象 Use scrowdriver to screw the screws and watch whether the screw is loosening	若有松动现象，则拧紧螺丝 If the screw is loosening, please tighten it.
4	系统运行 Cooling	系统断电后重新上电，观察热交换器自检程序是否正常 Power on the switch and watch whether the self-test is correct.	1、若发现自检过程中，有异常震动或声音，请立即关闭电源，并联系专业人士进行维护 While self-testing, if there is abnormal noise, vibration, please cut off power immediately and notify the professionals to inspect. 2、自检过程中若发生告警，请根据告警代码进行处理 If it is alarm while self-test, please process

5.1.3 预防性巡视 Preventative site visit

It is recommended to perform preventive site visit on the unit once a year (depends on air cleaning of the nearby surroundings), check the cleanliness of the external cycle inlet and outlet, and if the fans failure.

建议每年对热交换器进行一次预防性巡视（取决于当地的环境），主要检查热交换器外循环进出风口是否脏堵，内、外风扇是否故障。

- If the external cycle inlet and outlet need cleaning, the following is recommended.

如果外循环进出风口脏堵，可按以下步骤进行处理：

1. Switch off all the circuit breakers related to the climate unit

关闭与热交换器连接的所有线路：

2. When clean the external cycle inlet and outlet with a small brush, compressed air and a vacuum cleaner, the air pressure should be less than 0.5bar;

使用小型毛刷、压缩空气和真空吸尘器清洁外循环进出风口换热芯片，压缩空气的压力需小于 0.5bar；

3. Switch on the unit. Once self testing finished, the unit turn to normal operation.

将开关闭合。自检完成后，热交换器正常运行。

4. Finish.

结束。

- If fans failure, the following is recommended.

如果风扇故障，可按以下步骤进行处理：

1. Listen to the fans while in operation. The sound should be constant and with very little fluctuation otherwise the fans are out of balance and should be replaced;

风扇运行时听风扇的声音。声音应该连续且有轻微的波动，否则风扇就失去平衡需要更换；

2. Switch off all the circuit breakers related to the climate unit

关闭与热交换器连接的所有线路；

3. Remove the internal and external fan;

拆除内、外风扇；

4. Mount the fans back again;

将风扇装好；

5. Switch on the unit. Once self testing finished, the unit turn to normal operation.

将开关闭合。自检完成后，热交换器正常运行。

6. Finish.

结束。

5.2 零部件的替换 Replacing of Components

Note: Make sure that all circuit breakers related to the climate unit are switched off before you start.

备注：更换之前确保与热交换器相连的所有线路断开

5.2.1 如何更换内风扇 How to replace the internal fan

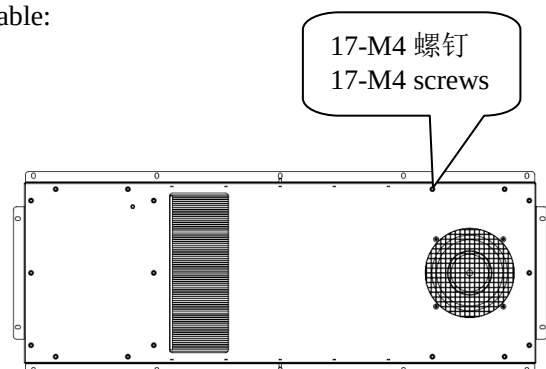
Before you start make sure that you have the following available:

在更换之前请确保您有以下工具和设备：

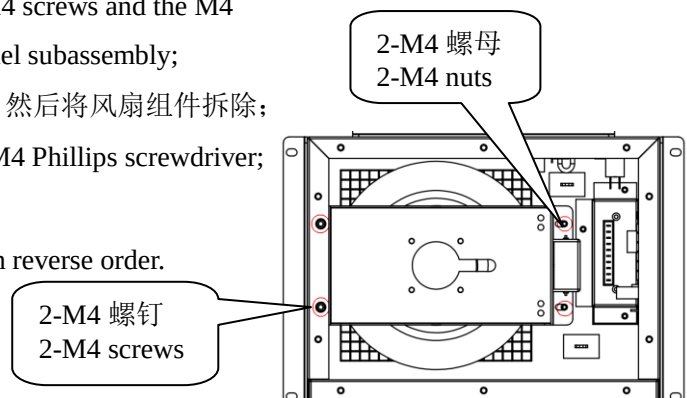
- ✓ M4 Phillips screwdriver;
M4 十字头螺丝刀
- ✓ M4 Socket spanner
M4 套筒扳手
- ✓ A new fan (insure the same type)
一个新的风扇（确保相同的型号）

1. Unscrew the M4 screws on the cover, remove the cover;

卸掉盖板上的螺钉，将盖板移除；



2. Unplug the internal fan connector, unscrew the M4 screws and the M4 nuts on the fan fixed board, then remove the panel subassembly;
拔掉内风扇端子，卸掉风扇座上的螺钉和螺母，然后将风扇组件拆除；
3. Disassemble the fan from the subassembly with M4 Phillips screwdriver;
将风扇从风扇组件上拆除；
4. Mount the new fan by following step 1, 2 and 3 in reverse order.
按照 1-3 的相反步骤安装新的风扇。



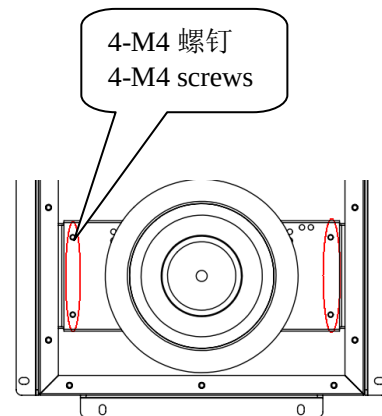
5.2.2 如何更换外风机 How to replace the external fan

Before you start make sure that you have the following available:

在更换之前请确保您有以下工具和设备：

- ✓ M4 Phillips screwdriver;
M4 十字头螺丝刀
- ✓ A new fan (insure the same type)
一个新的风扇（确保相同的型号）

1. Unscrew the M4 screws on the cover, remove the cover;
卸掉盖板上的螺钉，将盖板移除；
2. Unplug the internal fan connector, unscrew the M4 screws on the fan fixed board, then remove the panel subassembly;
拔掉内风扇端子，卸掉风扇座上的螺钉，然后将风扇组件拆除；
3. Disassemble the fan from the subassembly with M4 Phillips screwdriver;
将风扇从风扇组件上拆除；
4. Mount the new fan by following step 1, 2 and 3 in reverse order.
按照 1-3 的相反步骤安装新的风扇。



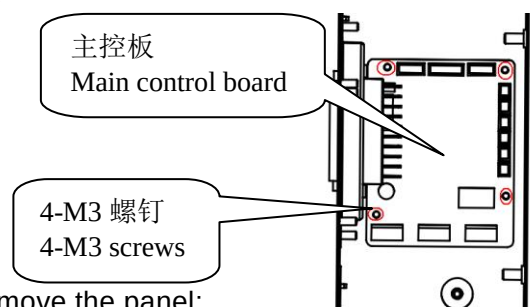
5.2.3 如何更换线路板 How to replace the PCB-printed circuit board

Before you start make sure that you have the following available:

在更换之前确保您有以下工具和设备：

- ✓ M3 & M4 Phillips screwdriver;
M3 & M4 十字头螺丝刀；
- ✓ A new circuit board (insure the same type)
一个新的线路板（确保相同的型号）

1. Unscrew the M4 screws placed on the cover, then remove the panel;



卸掉盖板上的螺钉，将盖板拆除；

2. Unplug the internal fan connector, unscrew the M4 screws and M4 nuts on the fan fixed board, and then remove the subassembly;

拔掉内风扇端子，卸掉内风扇座上的螺钉，然后将风扇组件拆除；

3. Unplug all the connectors on the circuit board and then remove the subassembly from the unit;

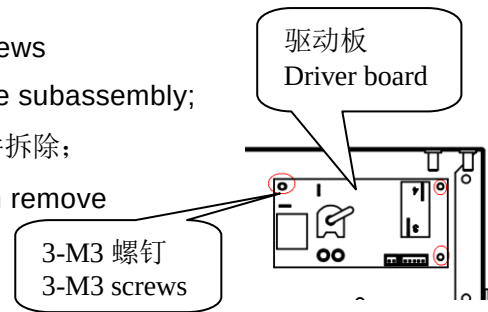
断开线路上所有的端子，从线路板组件拆除；

4. Disassemble the circuit board from the subassembly with M3 Phillips screwdriver;

将线路板从组件上拆除；

5. Mount the new circuit board by following step 1, 2, 3 and 4 in reverse order.

按照 1-4 的相反的步骤更换线路板。



5.2.4 如何更换滤波器 How to replace the filter

Before you start make sure that you have the following available:

在更换之前确保您有以下工具和设备：

- ✓ M3 & M4 Phillips screwdriver;
M3 & M4 十字头螺丝刀；
- ✓ A new filter (insure the same type)
一个新的滤波器（确保相同的型号）

1. Unscrew the M4 screws placed on the cover, then remove the panel;

卸掉盖板上的螺钉，将盖板拆除；

2. Unplug the internal fan and filter connector, unscrew the M4 screws and M4 nuts on the fan fixed board, and then remove the subassembly;

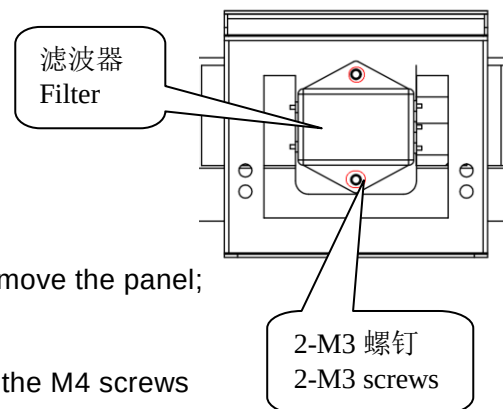
拔掉内风扇端子和滤波器上的端子，卸掉内风扇座上的螺钉和螺母，然后将风扇组件拆除；

3. Disassemble the filter from the subassembly with M3 Phillips screwdriver;

将滤波器从组件上拆除；

4. Mount the new filter by following step 1, 2, and 3 in reverse order.

按照 1-3 的相反的步骤更换滤波器。



5.2.5 其他故障分析与处理 Other fault analysis and treatment

表 5-3 其他故障分析与处理 Table5-3 other fault analysis and processing

故障状态 Fault state	原因分析 Analysis of the reasons	故障排除方法 Solutions
电源接通后，柜内温度过高，但热交换器不运转 Power on the switch ,the cabinet temperature is too high but heat exchanger is not working	1、停电或无电源 Power failure or no power 2、设备故障 Machine fault	1、检查电源、电路 Check the power supply and the electric circuit 2、请与专业维修人员联系 Please contact professional maintenance.
正常运转中。突然停止运行，且电器系统无故障 The machine is stopping suddenly ,and the electric system is normal	1、柜内温度已达到设定温度 The cabinet temperature greater than or equal to the cooling set temperature. 2、其他系统故障 Other system fault	1、 根据需要设定启动温度 Setting start temperature according to the needs 2、 请与专业维修人员联系 Please contact professional maintenance.

5.2 售后服务和维修 Service and repair

● 保修期 Warranty period

产品质保 36 个月。

The product guarantee period is 36 months

● 质保范围 Warranty coverage

本产品 在保修期 内，凡属于产品本身质量问题而导致故障的，本公司将为您免费维修，客户报修时需提供产品标号。但是由以下任何原因造成的故障不属于我司的保修范围。

During the warranty period, all belong to the product itself quality problems caused by fault, the company will be free for you to repair; Household repair is required to provide the product label. But by any of the following causes the failure does not belong to our warranty.

1) 已超过保修期的；

Out of the Warranty period

2) 不能提供产品出厂编号的（见机身贴示的铭牌）；

Cannot provide the product label(the product label is on the nameplate);

3) 由于在异常条件或环境中运行，或者用非本使用说明书中指定的不恰当安装方式安装、维护或操作导致的故障；

Because of the abnormal condition or environment ,or the instructions specified in the inappropriate installation, maintenance or operation causes the fault;

4) 非本设备造成的故障，比如由用户的设备、用户的软件等造成的故障；

Not caused by equipment failure, caused by user's other equipment or software.

- 5) 用户自行更换或拆装产品零部件造成损坏的，或由非授权维修服务者拆修而造成损坏的；

User changed or disassembles by theirself, or maintained by the person without authorization.

- 6) 诸如火灾、地震、洪水等不可抗力而造成损坏的故障。

Caused by force major such as fires, earthquakes, floods and other damage to the fault.

免责声明 Disclaim

我司的保修仅限于已发送的产品。我司对可能由设备故障衍生的任何损失不负责任。

The warranty is for the delivered products.

Irresponsible is for any loss that may be caused by equipment failure.

5.3 回收处理 Reclaim



到本产品使用期限或不再使用该产品时，请勿将本产品直接作为垃圾处理，请交给当地政府认可的废物收集中心进行处理。

At the end of the unit working life, the produce must not be disposed of as urban waste; it must be taken to a special local authority differentiated waste collection centre or to a dealer providing this service.



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