P/N: 1.1N000E1

[Version B] - 2015

User Manual for Outdoor Climate Unit – HRUC E

☐ 1N000 HRUC E 120 /D/T/D

Suzhou Quick Thermal Control Co.Ltd **Copy right reserved 2012**

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User Manual 用户手册

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A	Created	zhangfenghua		12-04-13
B	Update the connector	zhangfenghua		15-03-03

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User Manual 用户手册

Table of Contents 目 录

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1 General Introduction 概 述

The product is designed and produced per customer’s specification of
产品的设计和生产符合客户以下规格书：

1N000 HRUC E 120 /D/T/D

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2 CE declaration CE 声明

Declaration of Conformity

Suzhou Huarui Thermal Control Co. Ltd

No.75 jiangpu Road Industrial Park Suzhou China.

Tel.: 0086 512 65335116 // Email: sale@topquickcooling.com

We herewith declare the following products:

Product Name: HRUC E 120 /D/T/D

Product No.: 1N000

is in conformity with the following directives:

2006/ 42 / EC	Machine Directive	EN ISO 12100
2006 / 95 / EC	Low Voltage Directive	EN 60 335-1:2012
2004 / 108 / EC	EMC-Directive	EN 60 335-2-40
2009/ 105 / EC	Simple Pressure Vessels	EN 61000-6-1:2007
97/23/EEC	The Pressure Equipment Directive, article3 paragraph 3.	EN 61000-6-4, Emission
	The Pressure Equipment Directive,category1	
	The Pressure Equipment Directive,category2	

and was manufactured in conformity with the following harmonised standard:

furthermore manufactured in conformity with the following disharmonised standard:

2011/65/EC	RoHS Directive
2002/96/EC	Waste of Electrical and Electronic Equipment (WEEE)

and furthermore declares that it is not allowed to put the machinery into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of above-mentioned Directives and with national implementing legislation i.e. as a whole, including the machinery referred to this declaration.

Place and date

Technical Responsible Person

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3 RoHS Compliance Declaration RoHS 符合性声明

European Guidelines 2002/95/EC (RoHS)

Legal regulation for Substances

Dear Sir/Madam,

Referring to the European guideline of 2002/95/EC, 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 120 /D/T/D

Yours Sincerely

General Manager

Suzhou Quick Thermal Control Co. Ltd

No.75 Jiangpu Rd.

Industrial Park Suzhou

P.R.China

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4 Technical Data 技术参数

Model No.（型号）	HRUCE 120/D/T/D // 1N000
Rated voltage AC // 交流额定电压	NA
Frequency AC// 交流频率	NA
Rated current AC // 交流额定电流	NA
Start-up current AC // 交流启动电流	NA
Rated voltage DC // 直流额定电压	-48 V DC Nominal (-38.4VDC ~ - 57.6 VDC)
Rated current DC // 直流额定电流	4.4A
Start-up current DC // 直流启动电流	5.3A
Dimensions(include flange) // 尺寸（包含法兰） **Width** mm // **宽度** mm **Height** mm // **高度** mm **Depth** mm // **厚度** mm	 452 1086 191
Installation type // 安装方式	Door cling mounted // 门装贴合式
Casing Material // 材料	SECC+RAL 7035 powder painting // 喷粉
Cooling capacity // 换热性能	120 W/K
Heating // 加热能力	NA
Temperature range // 温度范围	-40°C ~ +65°C
Alarm connector // 告警接口	9-Pin D-Sub
Cold start function // 冷启动功能	NA
AC connector // 交流接口	NA
DC connector // 直流接口	SUPU 475408/010
Protection category (Ext. circuit / Int. circuit) // 防护等级(外侧 / 内侧)	IP55
Weight // 重量	27 kg

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5 Environmental Adaptability 环境适应能力

The product is designed according ETS 300 –019

产品设计符合 ETS 300 – 019

Items // 项目		Unit // 单位	Range // 范围
Temp. 温度	Long term Running 长时间工作	℃	-10～+55
	Short term Running 短时间工作	℃	-40～+65
Humidity 湿度	Long term Running 长时间工作	%RH	5～85
	Short term Running 短时间工作	%RH	5～95
Sea Level // 海拔高度		m	≤3000
Air Speed // 空气流速		m/s	≤5.0
Solar Radi // 太阳辐射		W/m^2	≤1120
Heat // 热能		W/m^2	≤600
Note: short term means 4 days continuous working or accumulated working time less 15 days within one year. 注：短时间是指连续工作 4 天或是一年累计工作天数少于 15 天。			

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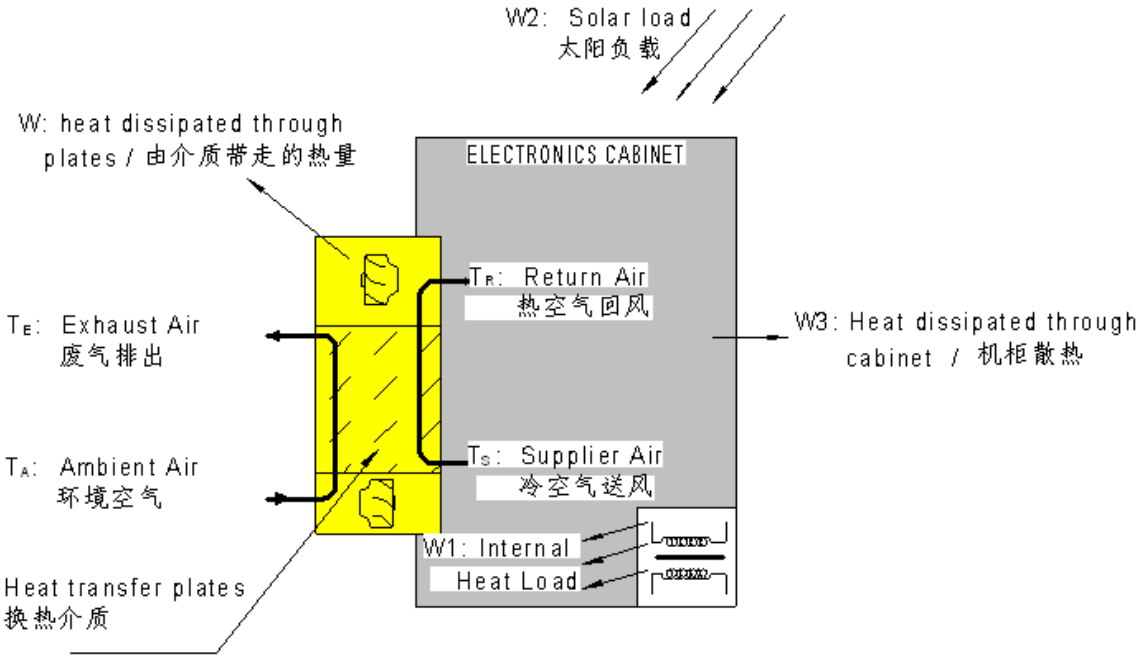
6 Working Principle 工作原理图



Heat exchanger is mostly used for enclosed area cooling, HRUC E series HEX is designed especially for mounting in 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 centrifuge fans, one for the internal circuit and one for the external circuit provide ventilation.

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。热交换器因需要环境温度进行调节，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、外循环的离心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。

The heat exchanger module is designed in such a way that the speed of the external circuit fan is controlled according to temperature, based on the pre-set pattern.

热交换器的内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。

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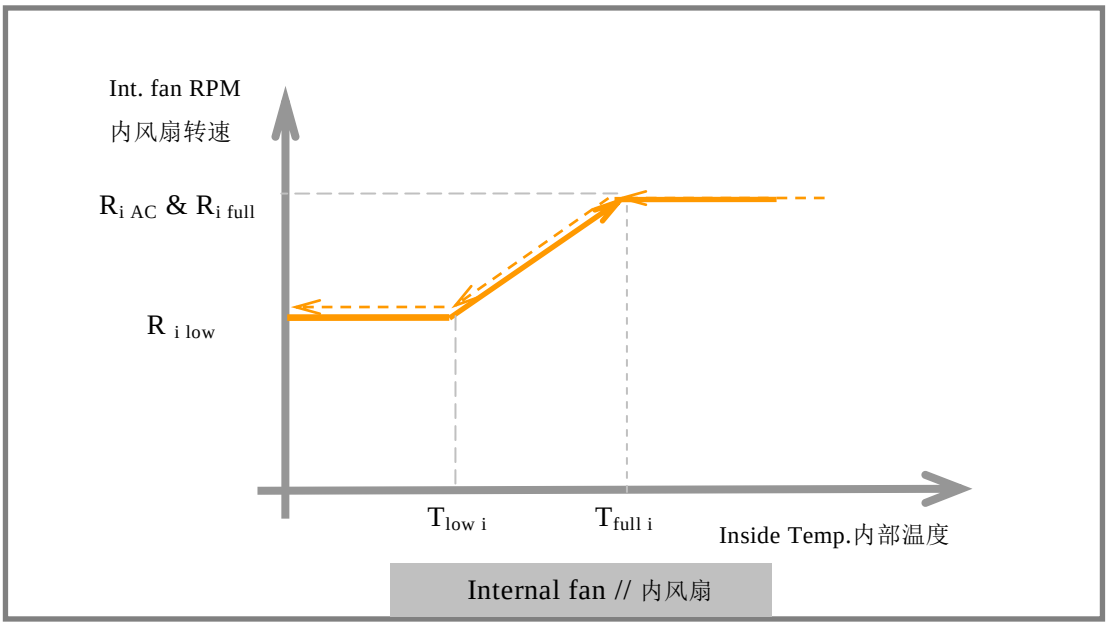
7 Functionality Introduction 功能介绍

a) Power Supply 电源供电

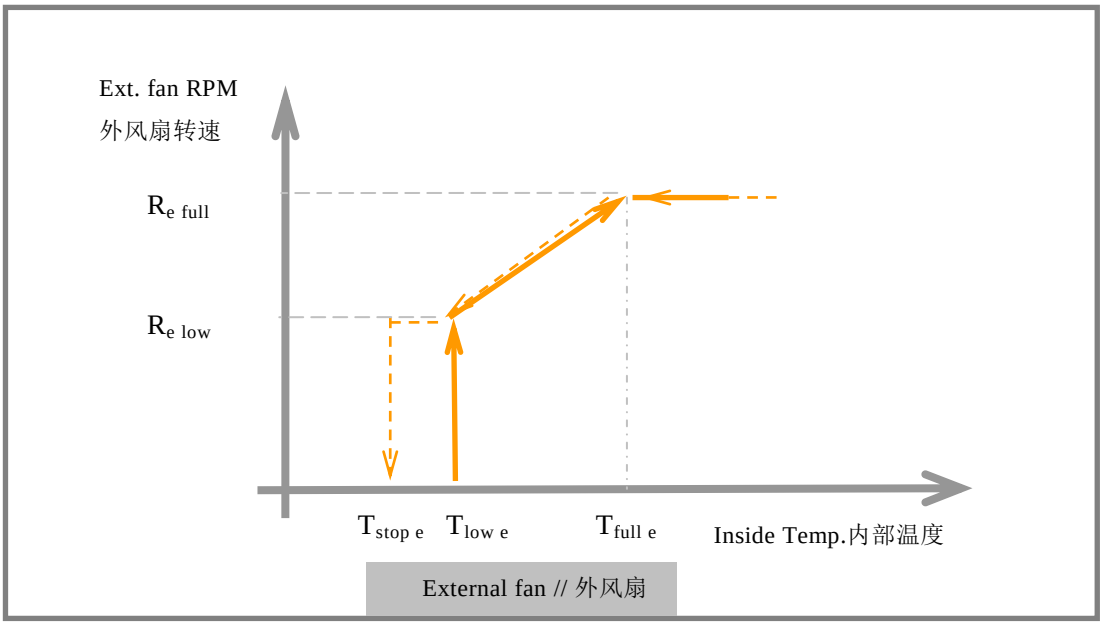
The unit should be feed by DC or both AC and DC, otherwise it gives power failure alarming. HEX with Cold start function should be feed by both AC and DC, during operation, DC is the main power, and AC will only be used at cold starting condition.

热交换器需直流供电或交直流同时供电，否则会有告警指示。带有冷启动功能的机型，交、直流同时供电，运行期间直流为主要电源，交流只有在冷启动的时候才会使用。

b) Fan Speed and heater Vs. Cabinet inside temperature Curve 风扇转速和加热器 Vs.机柜内部温度曲线



Internal fan // 内风扇



External fan // 外风扇

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The internal fan start up at low temperatures (< = $T_{low\ i}$) with speed ($R_{\ i\ low}$). Fan accelerates to ($R_{i\ full}$) when temperature rise to ($T_{full\ i}$) .

内循环风扇在低温(< = $T_{low\ i}$)下低速($R_{\ i\ low}$)启动。当温度升到($T_{full\ i}$)以上时，风扇全速($R_{i\ full}$)运转。

The fan speeds are monitored via the tacho output from the fans. This tacho signal is also used to generate a fan failure signal if deviation is more than -20%. The PWM carrier frequency is 1KHz.

风扇转速是通过风扇的调速装置来调节的，当转速偏差-20%以上时，这个调速装置会产生一个风扇失效信号。调速频率为1K赫兹。

Start-up behavior: after switch-on the fan speed accelerate continuously up to ($R_{\ i\ low}$), then the speed is regulated down to specified ramp.

Duration of start-up loop: 10 - 15 sec.

启动：接通电源使风扇持续加速到($R_{\ i\ low}$)，而后转速降到预定的数值。

持续时间：10 – 15秒

The external fan start to running in ($R_{e\ low}$) at ($T_{low\ e}$), and speed up to ($R_{\ e\ full}$)with increasing temperature until ($T_{\ full\ e}$). When temperature goes down, the external fan will be stop at ($T_{stop\ e}$).

外循环风扇在低温下($T_{low\ e}$)以低速($R_{e\ low}$)运行，随着温度升高到($T_{\ full\ e}$)转速增加到全速($R_{\ e\ full}$)。当温度下降至($T_{stop\ e}$)时，外风扇停止运行。

The fan speeds are monitored via the tacho output from the fans. This tacho signal is also used to generate a fan failure signal if deviation is more than -20%.

风扇转速是通过风扇的调速装置来调节的，当转速偏差-20%以上时，这个调速装置会产生一个风扇失效信号。

Start-up behavior: after switch-on the fan speed accelerate continuously up to ($R_{e\ low}$), then the speed is regulated down to specified ramp.

Duration of start-up loop: 10 - 15 sec.

启动：接通电源使风扇持续加速到($R_{\ e\ low}$)，而后转速降到预定的数值。

持续时间：10 – 15秒

c) Definition of Control Parameters 控制参数的定义

$R_{i\ low}$	Internal fan low Speed - RPM // 内风扇低速	1500
$R_{i\ full}$	Internal fan full speed – RPM // 内风扇全速	2300
$R_{i\ AC}$	Internal fan speed with only AC feed – RPM // 内风扇由交流供电时的转速	2300
$T_{low\ i}$	Low Temp. VS. internal fan at low speed // 内风扇低速运转时对应的温度	30℃
$T_{full\ i}$	Temp. VS. internal fan at full speed // 内风扇全速运转时对应的温度	40℃
$R_{e\ low}$	External fan low Speed – RPM // 外风扇低速	1500
$R_{e\ full}$	External fan full speed – RPM // 外风扇全速	2300
$T_{low\ e}$	Low Temp. VS. external fan at low Speed // 外风扇低速运转时对应的温度	30℃
$T_{full\ e}$	Temp. VS. external fan at full speed // 外风扇全速运转时对应的温度	45℃
$T_{stop\ e}$	Temp. for external fan stops // 外风扇停止运转温度	28℃
$T_{\_on}$	Temp. for heater start working // 加热器工作温度	NA
$T_{\_off}$	Temp. for heater stop working // 加热器停止温度	NA

e) HEX Start-up behaviour 热交换器上电自检顺序

After unit switch-on the temperature sensor will self test; then the internal fan speed will accelerate continuously up to (Re low), then stop running, this will take about 30s; after that, external fan will accelerate continuously up to (Ri low), then stop running, this will take about another 30s; finally, the Heater will self test, this will take about 30s. The controller will test whether unit get temperature sensor, fan, Heater failure. It will initiate alarming once any of them got problem. During testing process, the green LED will light in 3Hz speed, after self-testing finished, it will keep lighting. Red alarming LED will be on if alarming signal generated. Once self testing finished, then the unit will turn to normal operation.

Note: Self testing process will be conducted once “test” button been pressed continuously 5s on front control panel.

热交换器一旦上电，传感器将自检；然后是内风机将启动运行自检，然后停止，预计持续 30 秒；之后是外风机启动自检，然后停止，预计持续 30秒；最后是加热器自检，预计持续 30秒。通过自检过程，控制单元判断是否有传感器、风扇、加热器故障；自检过程中绿色LED 以3Hz 频闪，自检结束后如有故障，红色LED 灯将长亮，告警；无故障，绿灯常亮，正常运行。

注：自检过程可以通过长按控制面板上的“TEST”键5秒来实现；

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f) Alarm 告警

The unit will give below alarming once components got failure, the signal can be detected by connecting 9 Pin Sub-D port.

当热交换器中零部件失效就会产生告警，告警信号可通过9 针的接口查询

- NO type Alarm NO型报警

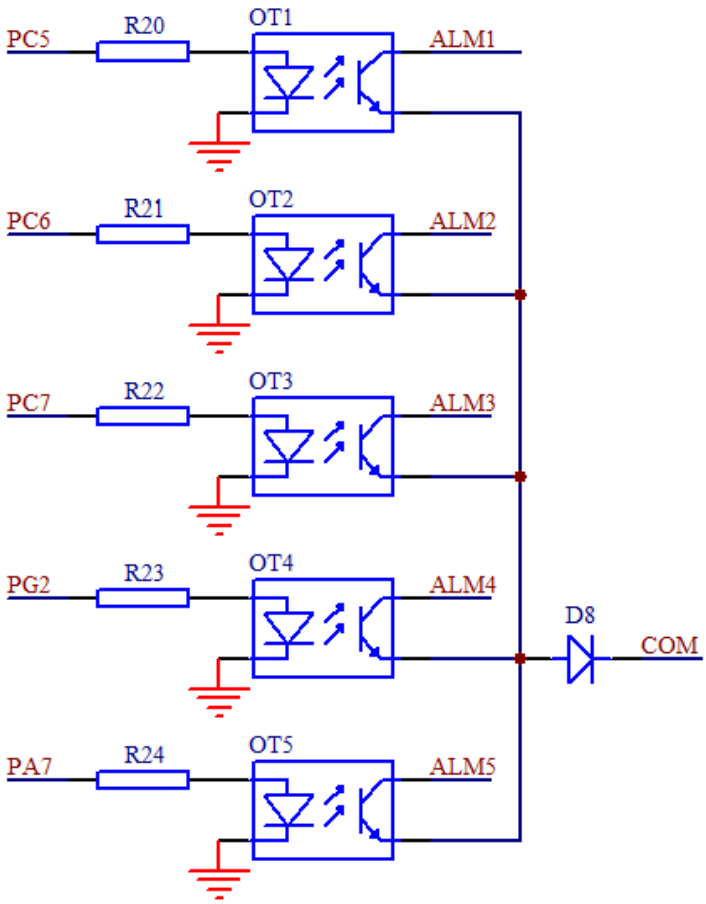
Alarming type: ***normally open***, Photo coupler type.

Unit Alarm will be activated when component failure happen, the red LED light at the same time. For example, the internal fan alarm, the external fan alarm, the heater alarm, as well as temperature alarm. The alarm can output through alarming cable that connection customer monitor unit and HEX.

告警方式： 正常断开，光耦隔离输出。

如果任何一个零件故障，如内风扇告警或外风扇告警或温度告警或者加热器告警，都会产生系统告警，同时红灯亮。激活的报警信号会通过连接客户监控后台和热交换器之间的告警线输出。

- Circuit for Photo coupler type refer to photo below: 光耦隔离输出电路参考下图：



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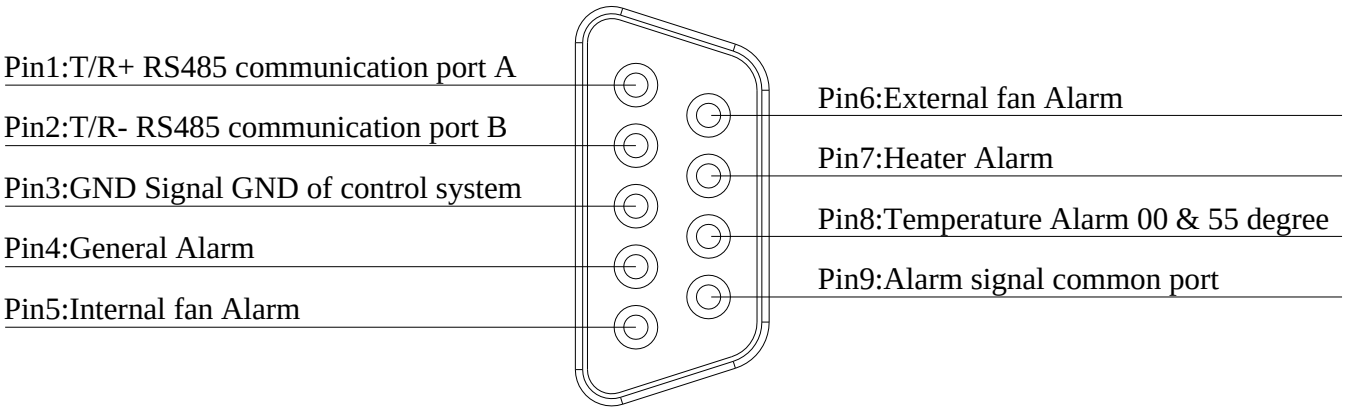
- Alarm definition 报警定义:

No.	Pin Number	Name	Alarm definition	Notes
1	Pin 1	T/R＋	RS485 communication port A	
2	Pin 2	T/R－	RS485 communication port B	
3	Pin 3	GND	Signal GND of Control system	
4	Pin 4	ALARM1	General Alarm	
5	Pin 5	ALARM2	Internal fan Alarm	
6	Pin 6	ALARM3	External fan Alarm	
7	Pin 7	ALARM4	Heater Alarm	Option
8	Pin 8	ALARM5	Temperature Alarm 55 & 00 degree	
9	Pin 9	ALARM-COM	Alarm signal common port	

- pin D-Sub port pin definition: DB9弯角插座引脚电气定义：



- Relay signal Output with no polarity dry switch type 无极性干节点继电器输出功能

Function 1:NO/NC type Alarm signal output.
Alarming type: normally open/ normally closed (optional), no polarity dry switch type.
The alarm type is only for general alarm, it is can not know which component failure happen when alarm is activated.
功能 1：NO/NC 型报警信号输出
告警方式：正常断开/正常闭合（可选），无极性干接点输出。
此报警方式仅用于总告警，报警时不能明确具体的失效零件类别。

Function 2: The relay can be feed with load(s), but the load should meet the following requests:
1. Max. Voltage : 125V AC / 30V DC
2. Max.Power:62.5VA / 60W
3. Max. load current:0.5A/2A

功能 2：继电器可以带负载，但负载需同时满足下列条件：
1. 最大电压：125VAC / 30VDC
2. 最大功率：62.5VA / 60W
3. 最大负载电流：0.5A/2 A

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g) Monitoring 监控

The unit can be monitored by software through RS485 port, just get connect with 9 Pin Sub-D. Please consult to the manufacture for more information.

热交换器可通过软件监控，只需连接RS485 接口 上9 Pin Sub-D 端子。请联系厂商以获取更多的信息。

h) Lighting 指示灯

There are two LEDs on control board, see below definition:

在控制板上有两种颜色的指示灯，请参考以下的定义：

<table>
<tr><th>LED</th><th>Label
标签</th><th>Color
颜色</th><th colspan="2">Status
状态</th><th>Definition
定义</th></tr>
<tr><td rowspan="3">Power indicator
LED
电源指示灯</td><td rowspan="3">Run
运行</td><td rowspan="3">Green
绿色</td><td colspan="2">on</td><td>Normal operation // 正常运行</td></tr>
<tr><td colspan="2">3 Hz lighting</td><td>Self testing // 自检</td></tr>
<tr><td colspan="2">Off // 关</td><td>No power feed // 无电源供给</td></tr>
<tr><td rowspan="8">Alarming Indicator
LED
告警指示灯</td><td rowspan="8">Alarm
告警</td><td rowspan="8">Red
红色</td><td colspan="2">Off // 关</td><td>No alarm // 无告警</td></tr>
<tr><td rowspan="7">On
//
开</td><td>Lighting times
// 闪烁次数</td><td>Defect define // 缺陷定义</td></tr>
<tr><td>1 times</td><td>INT.Fan defected // 内风扇故障</td></tr>
<tr><td>3 times</td><td>EXT.Fan defected // 外风扇故障</td></tr>
<tr><td>5 times</td><td>Temperature sensor defected // 温度传感器故障</td></tr>
<tr><td>7 times</td><td>Heater alarming // 加热器报警</td></tr>
<tr><td>9 times</td><td>High temperature alarming //
高温报警</td></tr>
<tr><td>10 times</td><td>Low temperature alarming //
低温报警</td></tr>
</table>

Note:

The lighting times of alarming indicator describe on the above form is means:

To 3Hz frequency separated in time 2s consecutive flashes.

备注：

在上述表格中描述的告警指示灯闪烁次数定义为：以 3Hz 的频次，在 2s 的时间隔后连续闪烁的次数！

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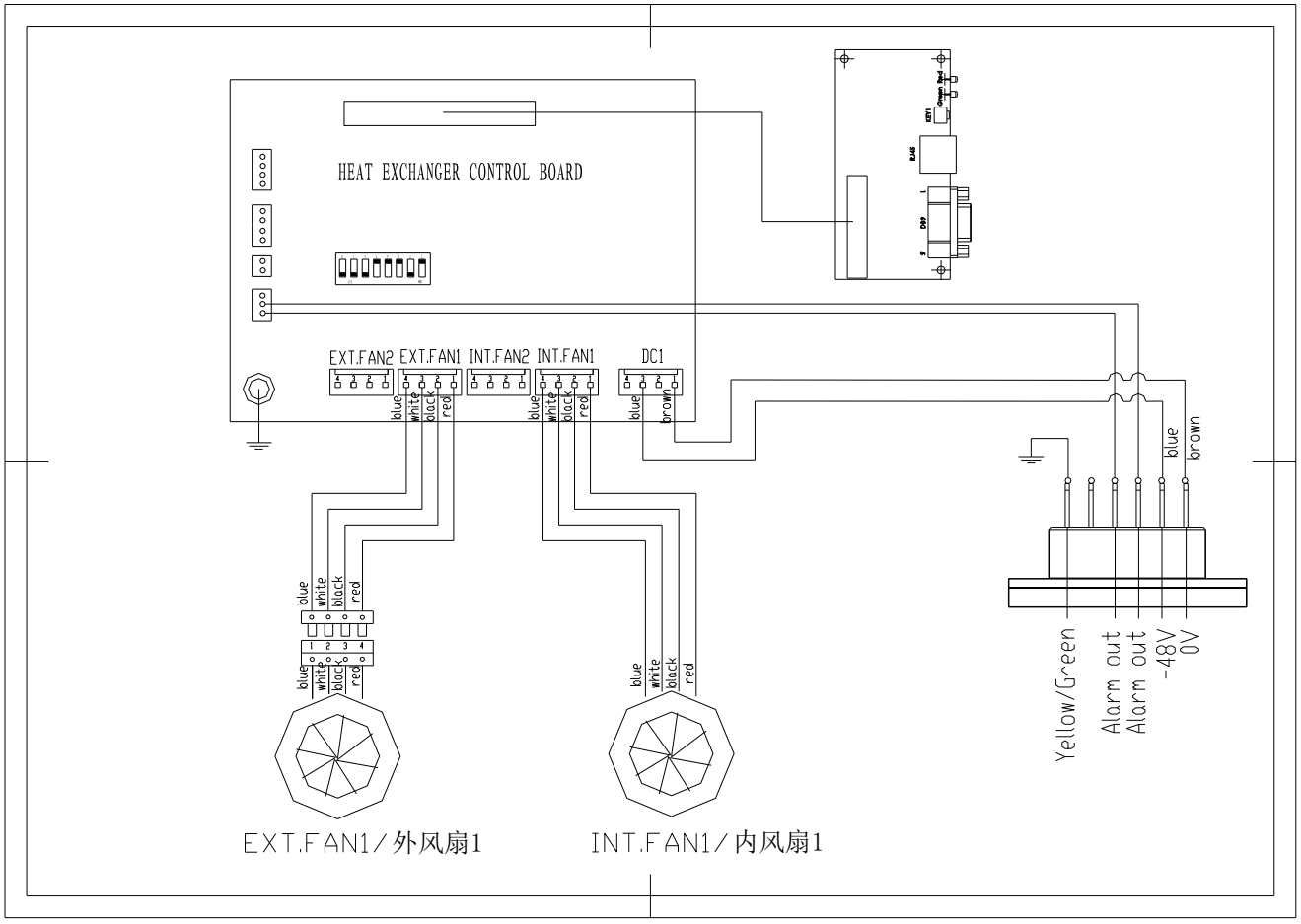
8 Interface Introduction 界面说明

a) Electrical Interface – Circuit diagram as below 电路板线路图



Power Input 电源

The unit must be feed with DC Power or both AC and DC power, below size circuit breakers are suggested to install before unit:

热交换器需直流或交、直流同时供电，建议在使用热交换器之前安装以下规格的断路器：

Fuse	1N000 // 1N00B // 1N00C
DC fuse	> = 10 Amps
AC fuse	> = 10 Amps

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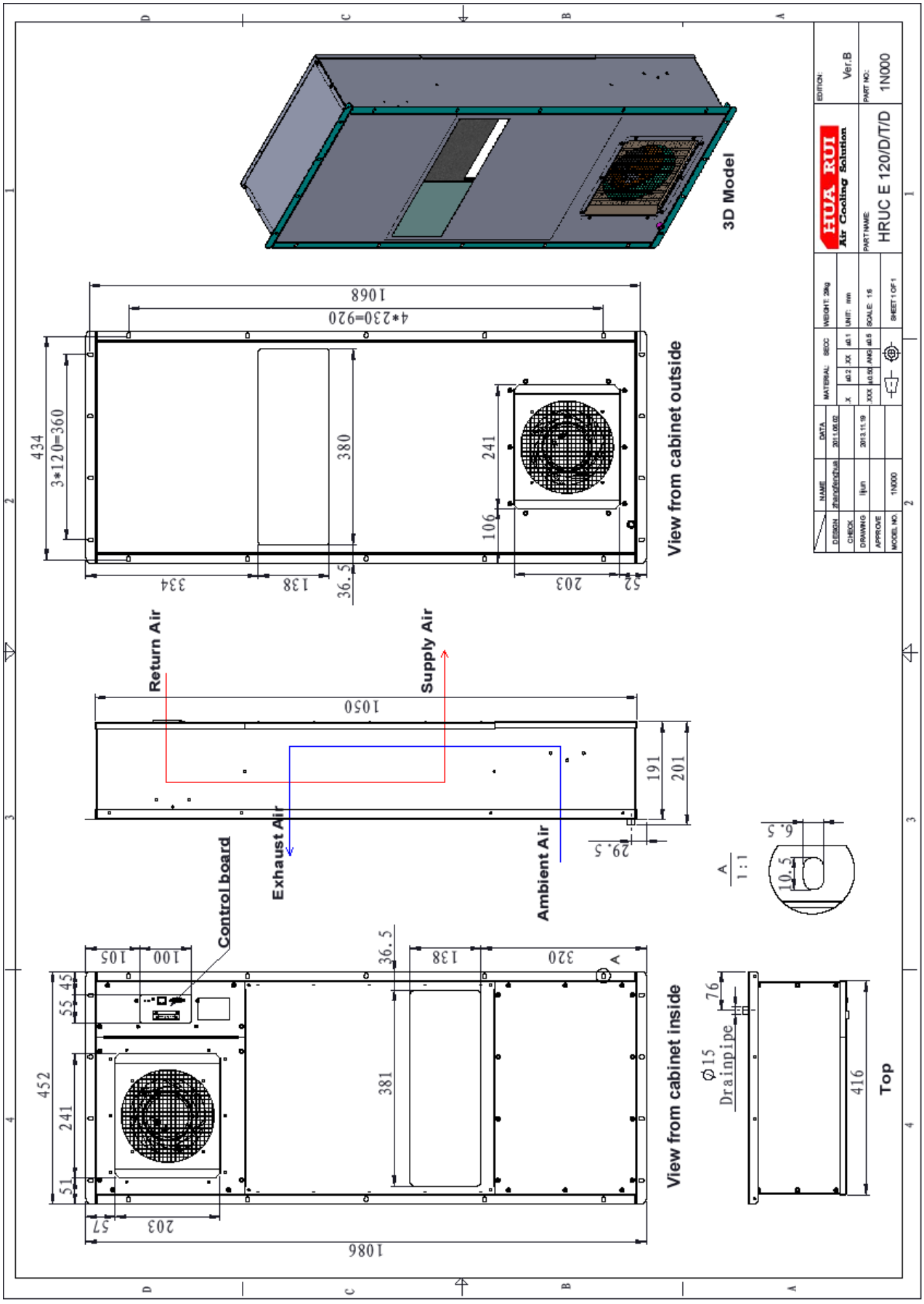
b) Mechanical Interface



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9 Preventative Maintenance 预防性维护

It is recommended to perform preventive maintenance on the unit twice a year (depends on the location of the site and the nearby surroundings) and the following should be done:

建议热交换器的预防维护一年两次（取决于当地的地理位置和周围的环境），需完成以下几点：

a) 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。

b) Switch all the circuit breakers related to the climate unit off.

关闭与热交换器连接的所有线路。

c) Remove the internal and external fan.

拆除内、外风扇。

d) Clean the blades of both fans using a brush, compressed air and a vacuum cleaner.

用毛刷、压缩空气和真空吸尘器清洁风扇的叶片。

e) Clean the heat transfer core using a small brush, compressed air and a vacuum cleaner, the air pressure should less than 0.5bar.

使用小型毛刷、压缩空气和真空吸尘器清洁换热芯片，压缩空气的压力需小于 0.5bar.

f) Mount the fans back again.

将风扇装好。

g) Switch the unit ON again. This will activate the internal test programme that runs for about 30 seconds, testing the fans at various speeds.

将开关打开。这可以激活测试程序，运行 30 秒，测试风扇以不同的转速运转是否正常。

h) Finish.

结束.

10 Replacing of Components 零部件的替换

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

备注：更换之前确保与换热器相连的所有线路断开。

10.1 How to replace the internal fan 如何替换内风扇

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

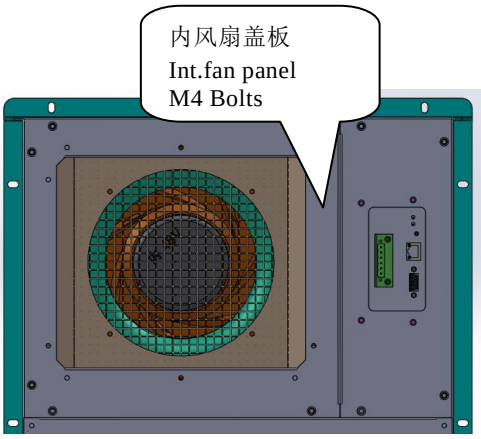
在更换之前请确保您有以下工具和设备：

- ✓ A cross screwdriver of M4，

  一把 M4 十字头螺丝起子,

- ✓ A new fan (insure the same type)

  一个新的风扇（确保相同的型号）



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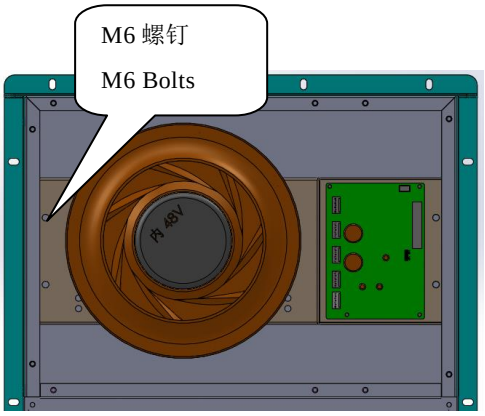
1. Unscrew the M4 bolts placed on the panel, then remove the panel; (see below pictures)
   去掉盖板上的螺钉，将盖板拆除
2. Unscrew the bolts on the fan fixed board;
   去掉风扇座上的螺钉；
3. Unplug the connector and keep the fan parallel, and then remove the subassembly from the unit;
   断开风扇端子，将风扇组件水平取出；
4. Disassemble the fan from the subassembly;
   将风扇从风扇组件上拆除；

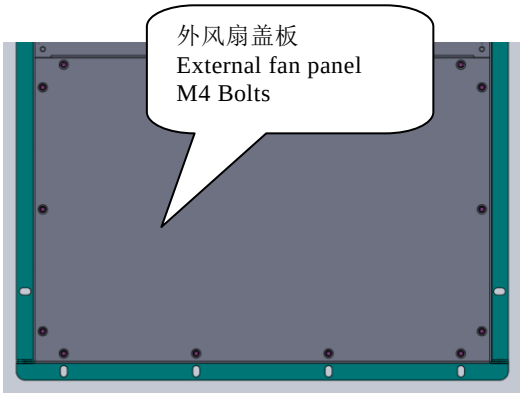


5. Mount the new fan by following step 1 、2、3and 4 in reverse order.
   按照 1-4 的相反步骤安装新的风扇。

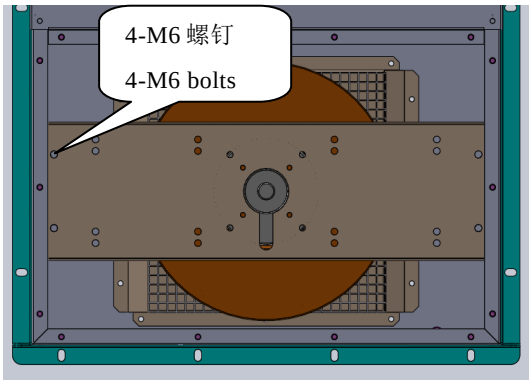
10.2 How to replace the external fan 如何替换外风扇

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：

- ✓ A cross screwdriver of M4，
  一把 M4 十字头螺丝起子,
- ✓ A new fan (insure the same type)
  一个新的风扇（确保型号相同）



1. Unscrew the M4 bolts placed on the panel, then remove the panel;
   去掉盖板上的螺钉，将盖板拆除；
2. Unscrew the 4 bolts on the fan fixed board，Unplug the connector and keep the fan parallel, and then remove the subassembly from the unit;
   去掉风扇座上的螺钉，断开风扇端子将风扇组件水平取出；
3. Disassemble the fan from the subassembly;
   将风扇从组件上拆除；
4. Mount the new fan by following step 1 、2 and 3 in reverse order.
   按照 1-3 的相反步骤更换新的风扇.



10.3 How to replace the PCB- Printed Circuit Board 如何更换线路板

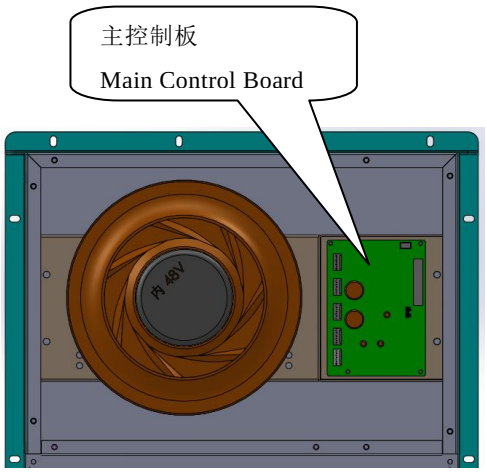
Before you start make sure that you have the following available:
在更换之前确保您有以下工具和设备

- ✓ A cross screwdriver of M4&M3，

QMS 007

M4&M3 十字头螺丝起子

- ✓ A new circuit board (insure the same type)
  一个新的线路板（确保型号相同）



1. Unscrew the M4 bolts placed on the panel, then move out the panel together with the circuit board; (see below picture)
   去掉面板上的螺钉，将控制板面板和控制板一起取出；
2. Unplug all the connectors on the circuit board and then remove the subassembly from the unit;
   断开线路板上所有的端子，将线路板组件拆除；
3. Disassemble the circuit board from the subassembly;
   将线路板从组件上拆除；
4. Mount the new circuit board by following step 1 、2and 3 in reverse order.
   按照 1-3 的相反的步骤更换线路板.

11 Spare Parts list 备件清单

Part Number // 料号	HRUCE 120/D/T/D // 1N000
3.0020004	External fan // 外风扇 R1G 225
3.0020003	Internal fan // 内风扇 R1G 225
3.0030008	Main Control board // 主控制板
3.0030009	Communication board // 通信面板

12 Manufacturer Address 制造商地址

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