



Service Manual DAC20-450D

服务手册 DAC20-450D



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1 Introduction 简介

Purpose 目的

This Service Manual is addressed to the technical crew, who installs and maintains, Repairs the DAC20-450D air conditioner through all steps in its lifetime. This service manual Dantherm part number is 215403.

该用户/服务手册帮助工程师安装、维护和修理 DAC20-450D 空调.此服务手册丹腾料号：215403.

The manual includes descriptions of functionality, replacement of parts as well as how to carry out preventive maintenance.

此手册包括功能描述，零件更换和如何进行定期维护.

Usage of the product. 产品使用

The DAC20-450D is especially designed for cooling of electronic equipment and for outdoor installation. The unit must not be used for other purposes under any condition and should be installed and placed according to the instructions in this manual.

DAC20-450D 空调是为冷却电子设备并用于户外安装而设计的，此机器不能用于其他目的，并且必须依照此手册的说明安装和更换。

Storage 存储

During storage and transportation the unit must be kept in an upright position.

在存储和运输中，机器必须保持竖直向上的位置放置

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Declaration of conformity 符合性申明

Dantherm Group declares, that the DAC20-450D is in accordance with the following directives and standards:

丹腾公司申明，DAC20-450D 依照如下指示和标准

Standard 标准	Name / Area 名称/范围
GB50174-93	《电子计算机机房设计规范》
YDN 023	通信电源和空调集中监控系统技术要求
GB/T 7725-1996	房间空气调节器
ETS 300 019-1-2	Equipment engineering; environmental conditions and environment tests for telecommunications equipment: part 1-2: classification of environmental conditions: transportation
ETS 300 019-2-2	Equipment engineering; environmental conditions and environment tests for telecommunications equipment: part 2-2: specification of environmental tests: transportation
ETS 300 019-1-1	Equipment engineering; environmental conditions and environment tests for telecommunications equipment: part 1-1: classification of environmental conditions: storage
ETS 300 019-2-1	Equipment engineering; environmental conditions and environment tests for telecommunications equipment: part 2-1: specification of environmental tests: storage
IEC 61000-4-5	Testing and measurement techniques surge immunity test
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC68-2	Environmental test for electrical product
DKBA0.400.0004	粉末涂料质量要求

Kristian Askegaard



General Manager,

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丹腾空气系统（苏州）有限公司 总经理

2 Installation and start-up 安装和启动

This section describes the procedure from unpacking to start-up.

在这部分将描述拆包启动的程序。

Package 包装

The air condition can be delivered in different packages depend on shipping method. Here the solution is each unit wrapped with PE bag and packed in carton protected with foam. Then per Thirty units are carried in a wooden package.

根据运输方式的不同，空调采用不同的包装方式。此处每台空调套装 PE 袋后放置在一个纸箱中，然后每三十台放在一个木箱中。

Contents in the package 包装内容

The DAC20-450D air conditioner is delivered with an installation kit with the following content:

DAC20-450D 附带如下成套装置交货。

Item description	Quantity	Unit
DAC20-450D Air Conditioner	1	Pcs.
Service manual(服务手册)	1	Pcs.
Cable tie (扎带)	10	Pcs.
Power cable(电源线)	5	m
Hose(水管)	1.0	m
M6*16 screw (M6*30 螺栓)	8	Pcs.
Nut(M6 螺母)	8	Pcs.
Flat washer M6 (平垫)	8	Pcs.
Tooth washer M6(齿垫)	8	Pcs.

Tools 工具

For installation: 用于安装

- Cross Screwdriver 十字螺丝刀
- 10# Wrench 十号扳手

Mounting 装配

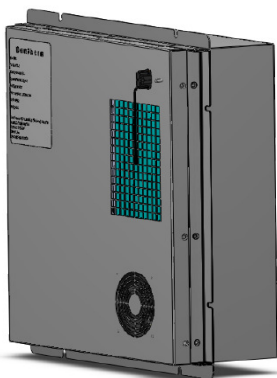
Mounting procedure 装配程序

The mounting procedure of the air conditioner unit should follow below steps:

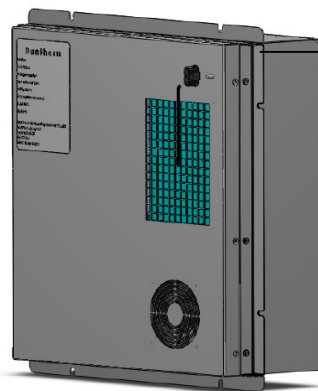
- ✓ Demount the package.
- ✓ Mount the water tube with clip lock at the bottom of the body and stick the sponge strip on inside flanges.
- ✓ Lift the unit up and place it in the wall of cabinet, mount the brackets and flanges with M6 bolts & nuts (fixing unit by installation hole).
- ✓ Connect the power cable.

此空调必须按照如下步骤安装:

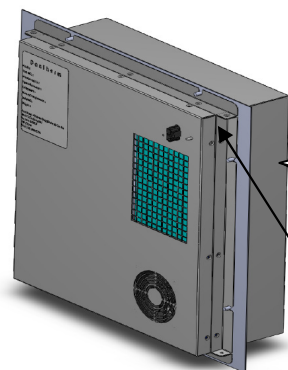
- ✓ 拆除空调外包装。
- ✓ 安装上水管并固定，然后在空调法兰内侧边上贴上密封条。
- ✓ 将空调竖直靠墙放置在机柜墙上，用 M6 螺栓固定安装法兰与支架；
- ✓ 连接电源线。



Step1 步骤 1



Step 2 步骤 2



Step3 步骤 3

DC power 直流电源

Place the main power cable, and connect it to the 48VDC power supply.

放置并连接好直流 48 伏电源线。

Start-up 启动

Turn on the power and the internal fan start running. External fan Will start running when the temperature which in the condenser middle is above 35 °C.

开启电源，内风扇将即时运转，外风扇在冷凝器中部温度超过 35 °C 后启动。

Demounting 拆卸

If the unit by any need should be demounted the steps below should be followed:

- ✓ Uninstall the main power cable from power supply. (Make sure that the power supply is powered off)
- ✓ Demount all screws on the flanges.
- ✓ Take off the air-conditioner.

在需要拆卸时，请按照下面的步骤拆卸：

- ✓ 卸掉主电源线。（确保供电电源关掉）
- ✓ 拆卸法兰上所有螺丝。
- ✓ 卸下空调。

3 Identification of the Unit 机器的识别

All units have a silver type plate label, where all the important information about the specific unit can be found. Also the Dantherm address and phone numbers are printed here so the contact can be made on the site.

所有空调都贴有标明机器规格的重要信息的标签。在标签上也有丹腾公司的地址和电话号码。

Serial number 序列号

Especially the serial number is important, and should always be mentioned when Dantherm is contacted about issues concerning the specific unit.

序列号尤其重要，当涉及到丹腾公司机器的细节问题时都会用到该序列号。

4 Description of functionality 功能描述

General Description 总体描述

The air conditioner contains a compressor, evaporator, condenser, condenser fans, and various cooling components as expansion valves, dry filter and an internal fan. The internal cabinet air is continuously circulated in a closed loop by the evaporator fan. This draws warm air from the Top cabinet and supplies the internal environment with cooled air in the bottom area via the evaporator coil. Heat is transferred from the internal air to the refrigerant and exhaust to the ambient air through the condenser coil. The closed loop internal circuit protects the enclosed equipment all types of hostile environments and control the internal thermal conditions with clean air.

The Air conditioner is designed as an on/off system, where the control board controls the compressor in accordance to the return temperature. When the active cooling is operating the condenser fan full speed running. The unit will work in extreme temperatures ranging from -5°C to +55°C. Internal side working humidity ranging from 0%---75%

空调主要包括压缩机、蒸发器和冷凝器、冷凝风扇以及如膨胀阀、干燥过滤器和内风扇等各种冷却装置。内部空气随着蒸发器风扇而循环流动。热空气从顶部进入，经过蒸发器冷却后由下部出口排出。热量从内部空气传递到制冷剂，然后通过冷凝器排放到外部环境中。这个闭环内电路保护了所有不良环境类型下的附属设备，以洁净的空气调节内部环境。

空调作为开关系统设计，控制板控制着压缩机与回风温度相一致。当机器主动运行时冷凝风扇全速运行。此空调的工作温度范围是：-5°C 到+55°C。内侧工作湿度 0%--75%。

Active parts 主要零件

The active parts that are controlled by the Control board are:

- Compressor
- Condenser fan

控制板控制的主要零件有：

- 压缩机
- 冷凝风扇

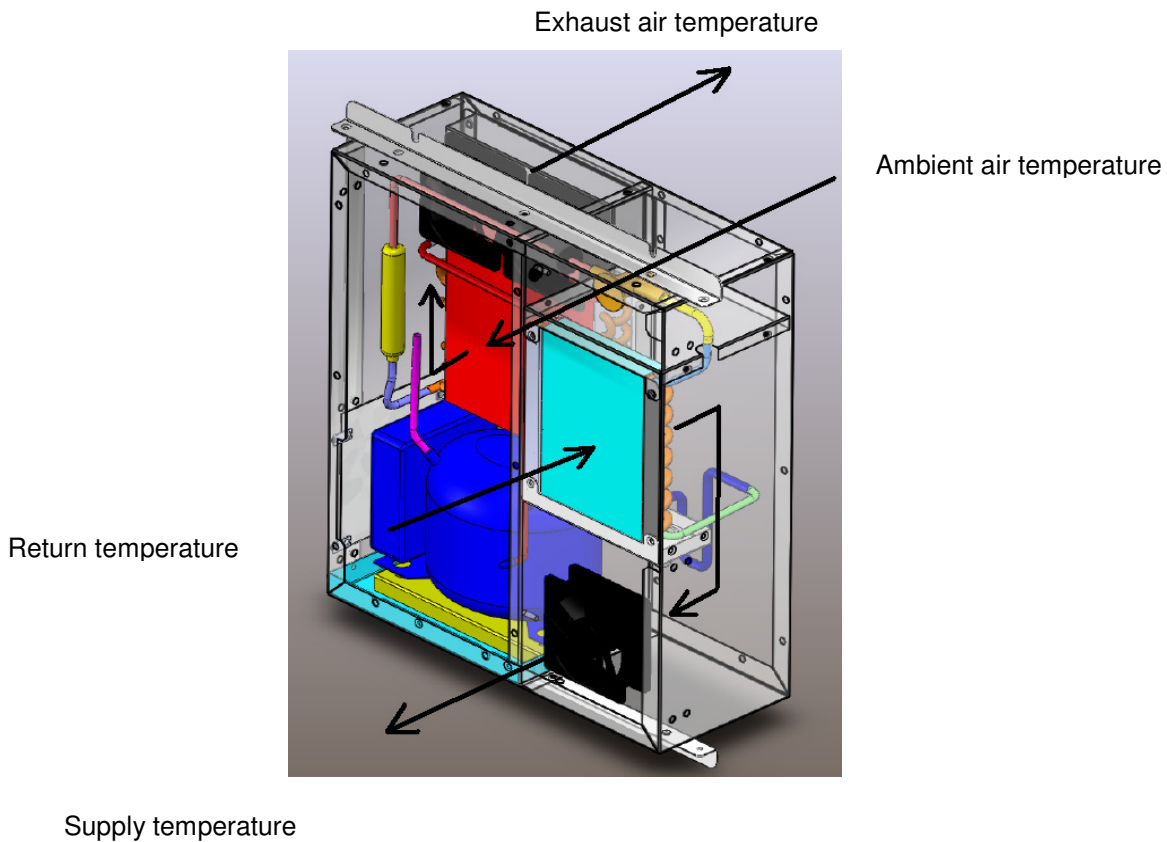
Temperature 温度

The following terms for temperatures are used in the following description (see below figure):

- ✓ Supply Air temperature is the temperature of the air leaving the unit to cool down the electronic equipment.
- ✓ Return air temperature is the temperature of the air entering the air conditioner from the electronic equipment.
- ✓ Ambient air temperature is the outside air temperature.
- ✓ Exhaust air temperature is the temperature of the air leaving the unit to the ambient.

以下是对几种温度的描述（如下图）：

- ✓ 送风温度是离开空调用于冷却电器设备的风的温度
- ✓ 回风温度是从电器设备进入空调的风的温度
- ✓ 环境空气温度是外界的空气温度
- ✓ 排风温度是从空调排到外界环境的温度



Set points 设置点

The set points can be adjusted through controller software.

设置点可以通过压缩机控制板软件调整。

The table below shows all the set point related information.

下面的表格显示所有设置点的相关信息。

Standard settings 标准设置	Range 范围	Unit 单位	Description 描述	Function 功能
25	[20-40]	°C	Compressor 压缩机	<p>Set point for the compressor operation can be selected by means of software between 20 °C and 40 °C.</p> <p>压缩机工作温度通过软件设定在 20°C ~40°C 之间。</p> <p>If the return air is set point compressor starts.</p> <p>如果回风温度超过设置点，压缩机启动。</p> <p>If the return air drops to the set point 3 °C , compressor stop.</p> <p>如果回风温度低于设定点 3°C 压缩机停止。</p>

Compressor operation 压缩机运转

Failure indications 故障描述

1. If the current to the compressor is missing the compressor running again after 30 second if the current reappears. If the HP pressure switch is activated the compressor start running when the pressure turn to normal.
 2. If the compressor start failed, the compressor will try to start after one hour later Under the normal power supply. Tow times try to start failed the control will send the signal and never try to start until the failure disappear.
1. 如果压缩机电流消失又再现，压缩机延时 30 秒启动。如果内部安全压力开关动作压缩机跳闸，当压力恢复到正常值时压缩机马上启动。
2. 如果由于压缩机自身原因未能启动，在正常供电的情况下压缩机将在一小时后尝试再一次启动，如果连续两次没有能正常启动起来那么主板将输出一个报警信号并且不再尝试启动。

High temperature alarm 高温报警

The compressor stopped when the ambient temperature high, the compressor PCB can feel the temperature and cut the power. Protect the compressor.

当环境温度太高时压缩机主板会感知压缩机运行温度，如果超出压缩机安全工作温度将切断电源使压缩机停止。

Condenser fan operation 冷凝风扇运转

The condenser fan is stopped until cooling is needed. When the compressor starts the main-board can feel condenser temperature when condenser temperature above 35 °C condenser fan will also start.

冷凝风扇只有在制冷时才运转，当压缩机开始运行时，控制板可感知冷凝器温度，当温度达到 35 度时冷凝风扇也开始运转。

Internal fan operation 内风扇运转

Always running

持续运转

The purpose of the internal fan is to circulate the internal air, and therefore the internal fan will constantly be running when the power supply is turned on.

内风扇的目的是使内部空气循环，因此内风扇将在电源接通后持续不断的运转。

5 Technical data 技术数据

Performance: Ambient/return = 35 °C / 35 °C 性能：环境/回风 35°C / 35 °C			
Specification 规格	Unit 单位	Designation 设计	Value 值
Voltage 电压	V	Voltage supply 供电电压	45-57
Current 电流	A	Max. cooling current 最大制冷电流	5.5
Loads 功率	W	Total unit 总功率	187
Cooling capacity 制冷能力	W	Incl. osmotic heat and solar gain 包括渗透热量和太阳光热量	450
Refrigerant 制冷剂	G	R134a	200
Int. air flow 内侧风量	M3/h		200
Ext. air flow 外侧风量	M3/h		350
Pressure 压力			
Operation 操作	Pa	Operating pressure 操作压力	101.3 (70-106)
Disp.	Pa	Estimated pressure drop internal 估计内侧压降	80
Drop 压降	Pa	Pressure drop in climate unit (int.)	80
Temperature 温度			
Tcooling	°C	Cooling set points 冷却设置点	25[+20 – +40]
tooperate	°C	Operating temperature 操作温度	-5 - +55
Noise level	dB(A)	Sound Pressure @ 25 [°C] 声压	67
Cabinet data 机柜数据			
Specification 规格	Unit 单位	Designation 指示	Value 值
Dimensions.尺寸	mm	Height x Width x Depth 长 x 宽 x 高	491x442x157.5
Weight 重量	kg	Net Weight 净重	18.5
Metal sheet material 钣金材料	mm	stainless steel & Aluzinc steel 不锈钢&、覆 铝锌板	1.5 / 1.0
Packaging 包装	-		/
Signal 信号	-	Type signal and warnings 信号和警告类型	/

6 Preventive maintenance 定期维护

This heat management system contains moving mechanical parts, and is often placed in rough environments with high temperatures, humidity and dirt. To keep the air conditioner in a shape where it will Perform according to the specifications, preventive maintenance has to be carried out.

这个热处理系统包括可移机构件，它可以在高温潮湿污垢的恶劣环境下经常更换。执行定期维护可保持空调按规格正常运行。

Warning 警告

Do not start working on the unit before the power is safely switched off. Do not switch it on before all the work has been performed and the unit is ready for use. Only trained and certified technicians are allowed to carry out replacement of parts and other maintenance tasks!

在电源安全关闭前不要在空调上维护。在维护完成并准备使用前不要接通电源。仅受过培训并被鉴定的技术人员才能执行零件更换或其他维护任务！

Tools 工具

Needed equipment 需要设备	To carry out...执行
Vacuum cleaner or compressed air. 真空吸尘器或压缩气	Carefully clean the unit 认真清洁机器
Soft bristle brush 柔软的鬃刷	Remove dirt that the vacuum cleaner or compressed air could not remove 去除吸尘器或压缩气体不能移走的灰尘
Screwdriver and bits. 螺丝刀和附件	Tighten loose screws 扭紧松掉的螺丝

Like a car the units need to be maintained with at regular interval to prevent an overheated situation causing the BTS to shut down. Also lack of maintenance could cause unnecessary pollution to the environment.

就像汽车一样空调也需要有规律地维护来防止过热情形下引起的 BTS 关闭。同时缺少维护将引起不必要的空气污染。

The interval between the preventive visits should not exceed 6 months. If the air-conditioner application in-clement environment preventive visits should not exceed 2 months .The visits should be planned so that one of the visits is done before and after the hot season. In that way the air conditioner will be ready, when the demand for cooling is high.

维护周期不要超过 6 个月。如果空调应用的场所环境严酷维护周期不要超过 2 个月。维护应在炎热季节前完成。这样空调将会在高制冷需求时准备好。

Conditions of warranty 质保

The factory warranty is only valid if documented preventive maintenance has been carried out with an interval of maximum 6 month. The documentation could be in form of a written log on the site, or a report from the computer test program.

工厂质保只在以 6 个月为周期的定期维护执行的情况下才有效。文件必须是书面登录或计算机测试报告的形式。

Recommended maintenance approach 推荐维护方法

The recommended approach when performing a preventive maintenance visit is:

执行定期维护的推荐方法:

Step 步骤	Action 动作
1	Make sure that the power to the unit is safely switched off. 确保电源已安全切断。
2	Clean the unit carefully for dust especially at: Air ducts, Fans, Condenser and evaporator coils. 认真清洁机器上的灰尘，特别是在空气输送管，风扇，冷凝器芯和蒸发器芯
3	Perform a test simulating all temperatures within the specified temperature range. 在规定温度范围内执行模拟温度测试。

For the customer cabinet:

The cabinet should have no leakage (like cable holes, gap between the door and the cabinet body etc.) when the door is closed.

During repairing and maintenance you are advised to shut down the air-con, otherwise it will probably cause several drops of water because of high humidity

对于客户的机柜:

在机柜门关闭的情况下，必须保证机柜没有泄露（像：电缆走线孔，机柜门与机柜之间的缝隙等密封良好）

在机柜维修和维护时，我们建议您最好关闭空调，否则可能会因为高湿的空气而导致有少量的冷凝水喷出。

Checklist 检查清单

Checklist	Yes	No
Are the fans, and the compressor clean and free of corrosion? 风扇和压缩机是否干净并没有腐蚀?		
Are the fans and the compressor mounted securely and free of excessive vibration? 风扇和压缩机是否安全地安装并且没有过多的摇动?		
Is the compressor free of excessive noise? 压缩机是否没有过大的噪音?		
Are the coolant pipes free of obstructions, damage, corrosion and show no obvious signs of leakage? 冷却管是否没有堵塞、损坏、腐蚀和明显可见的泄漏?		
Are the coil lamellas clean and undamaged? 芯片是否干净和无损坏?		
Are all fan blades free of obstructions, cracks, missing blades and in balance? 风扇的叶片是否无堵塞、裂缝、缺少叶片和平衡?		
Do the fans rotate freely and are they free from excessive vibration or noise? 风扇是否自由旋转，并且是否无过大振动和噪音?		
Is all wiring and insulation undamaged? 配线和绝缘材料是否无损坏?		
Are all connectors seated properly and in good conditions? 连接器是否在适当的位置，是否完好?		

Before leaving the site!

在离开前

Make sure that there are no alarms and that the BTS is in operation before leaving the site.

在你离开前，请确保 BTS 正常运转且无报警

7 Replacement of spare parts 更换部分零件

No components in the DAC20-450D are to be replaced regularly. This section is therefore only describing how to replace the spare parts if they are not running smoothly – so only replace if the component is faulty!

DAC20-450D 中没有零件是经常更换的。因此这部分只描述部分零件没有平缓运行时如何更换它们—所以只更换有问题的零件！

Before the demounting the old spare part it is very important to order the new spare part from Dantherm. To do this most effectively the product version and serial number should be checked so this information can be passed on when ordering. This information can be found on the silver type plate on the cabinet.

在拆卸旧零件前向丹腾公司订购新的零件。为了最有效的完成此过程，请检查产品的版本和序列号并在订购前传递给丹腾公司。这个信息可以在箱体上的银色型号标签上找到。

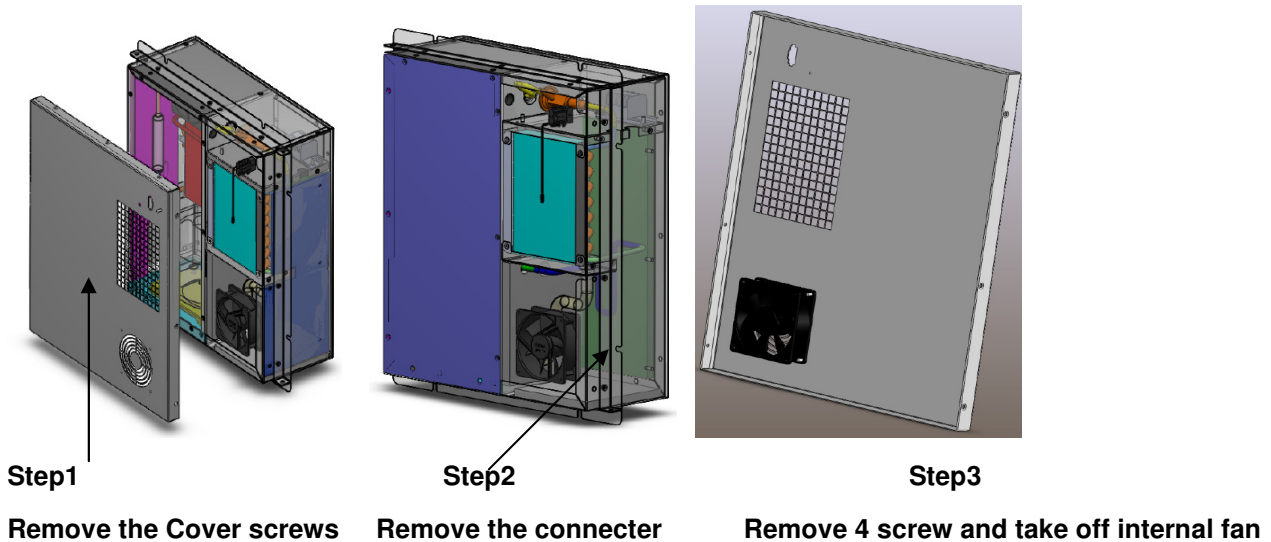
Replacing the external fan 更换内风扇

Replacing the internal fan (see below pictures) 更换内风扇 (如下图)

Tools:

- M7 Socket Wrench M7 套筒
- Cutter 剪刀
- T20 Screwdriver T20 螺丝刀

Step 步骤	Action 行动
1	Remove internal cover install screw (see step1) 去除边内侧盖板的安装螺丝。(如步骤 1)
2	Remove the connector. (see step2) 移除风扇电源线接头。(如步骤 2)
3	Pull out the internal fan assembly, remove 4 screws & cable ties on internal fan .(see step3) 拿出内风扇套件, 去除固定内风扇的 4 颗螺丝和绑带, 然后更换内风扇 (如步骤 3)



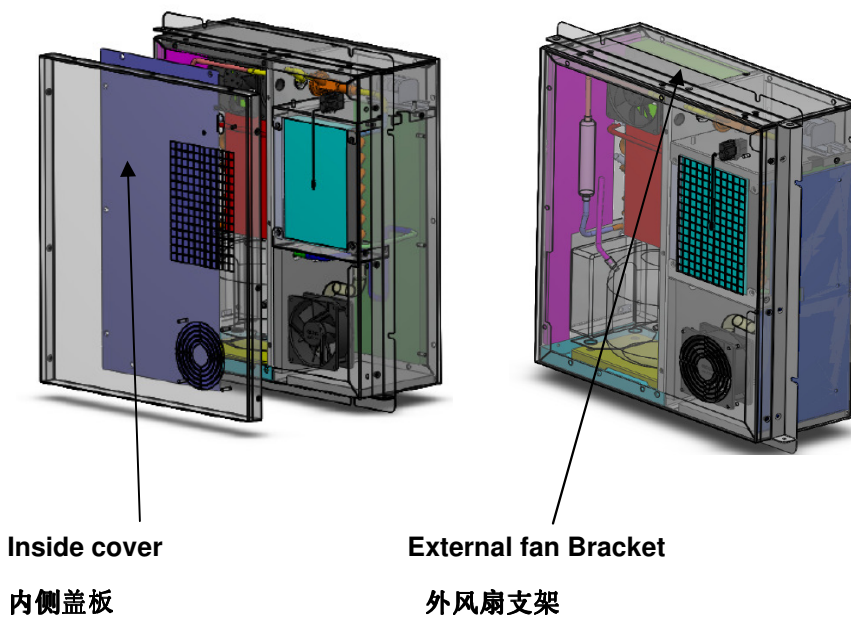
Replacing the internal fan 更换外风扇

Tools:

- Cutter 剪刀
- “+”screw driver “+”字螺丝刀
- Knife 刀片

Step 步骤	Action 行动
1	Remove screws fixing the inside cover same as replacing the internal fan. 去除固定内侧盖板的螺丝，如同更换内风扇一样。去除内盖板。
2	Unplug the connector and remove four screws on external fan cover plate. 拔掉接头，除去外风扇支架上的 4 颗螺丝。
3	Replace the external fan. 更换风扇。

Replacing the external fan(see below pictures)更换外风扇（如下图）



8 Scrapping 报废

Main components 主要部件

The main components of the unit are:

- The cooling circuit including the compressor, coils and refrigerant liquid.
- The printed circuit boards (PCB's) with electronic components and connecting wires
- Fans
- Metal parts such as shell

主要部件有：

- 制冷循环包括压缩机、蒸发器，冷凝器和制冷剂。
- 具有电子部件的主板和电线
- 风扇
- 钣金等等。

Cooling circuit 制冷循环

Refrigerant gas 制冷气体

When scrapping an air conditioner the refrigerant needs to be removed from the unit even though the air conditioner is using an environmental friendly type of refrigerant gas named R134a.

空调报废时需要将制冷剂从机器中移除去，即使空调使用的是环保型制冷剂 R134a。

Only a certified cooling technician should carry out the evacuation by using the necessary evacuation and recycling equipment. If the refrigerant gas is not to be recycled by the evacuator it must be passed on to the local authorities for decomposition.

只有有鉴定资格的技术员才能使用必要的撤除和回收设备撤除。如果制冷气体不用撤除器回收，必须经当局许可才分解。

Compressor 压缩机

The compressor contains oil and precautions must be taken to prevent the oil from polluting our environment. The compressor should together with the copper tubes be left at local recycling authorities.

装有油的压缩机必须被防范以防止空气污染。压缩机和铜管应该留在当地的回收机构。

PCB 控制板

In most places there are local rules for scrapping PCB's as well as for connecting wires, and these rules are to be followed. Generally it is important to separate the metal parts from the wires and PCB's before scrapping.

在大多数地方，都由当地的法规规定了 PCB 与连接线废弃方法。一般地，在废弃前，非常重要的一点就是要将钣金件与连接线和 PCB 板分开。

Fans 风扇

The fans consist of plastic, metal and an internal PCB. They are subject to recycling and should be left to the local “scrap dealer”.

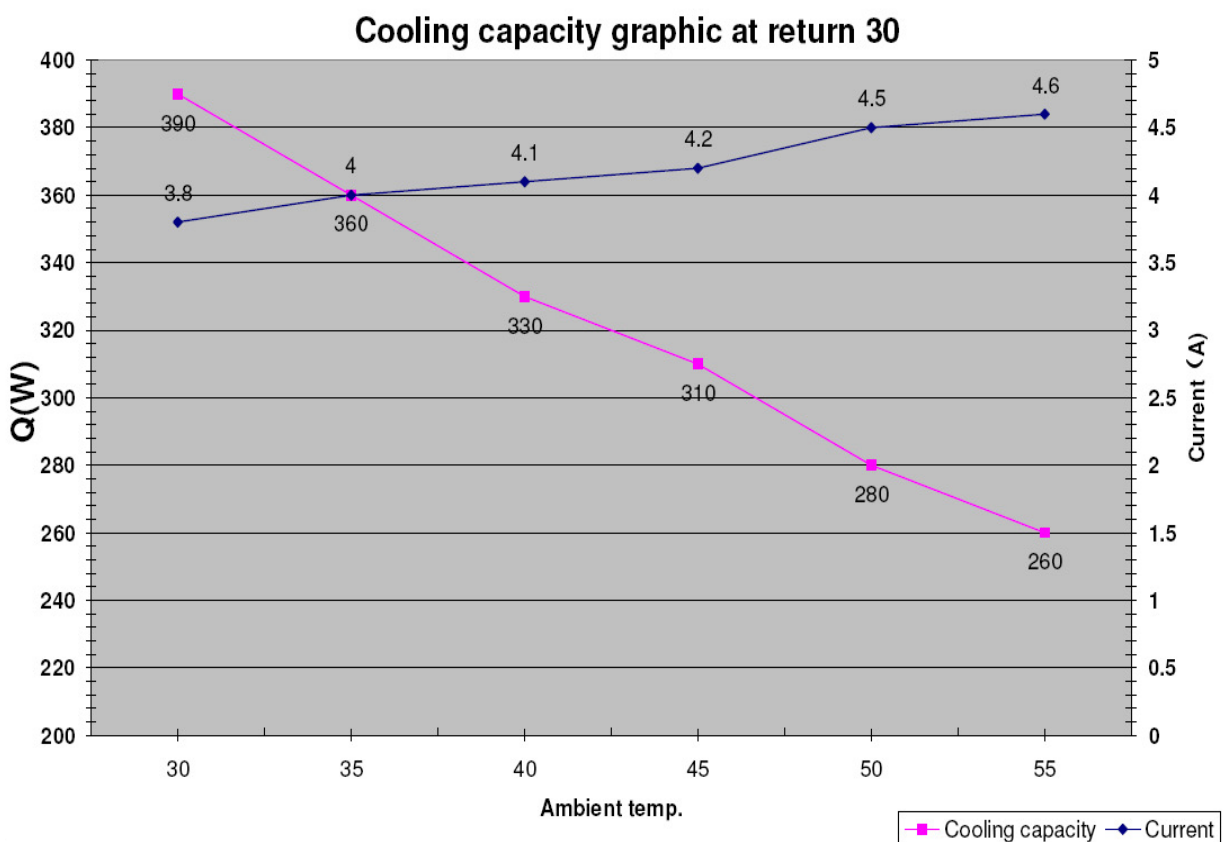
风扇是由塑料，金属和内部的 PCB 组成。它们可以进行循环利用,应当送到当地的废弃物经销商。

Metal parts 钣金件

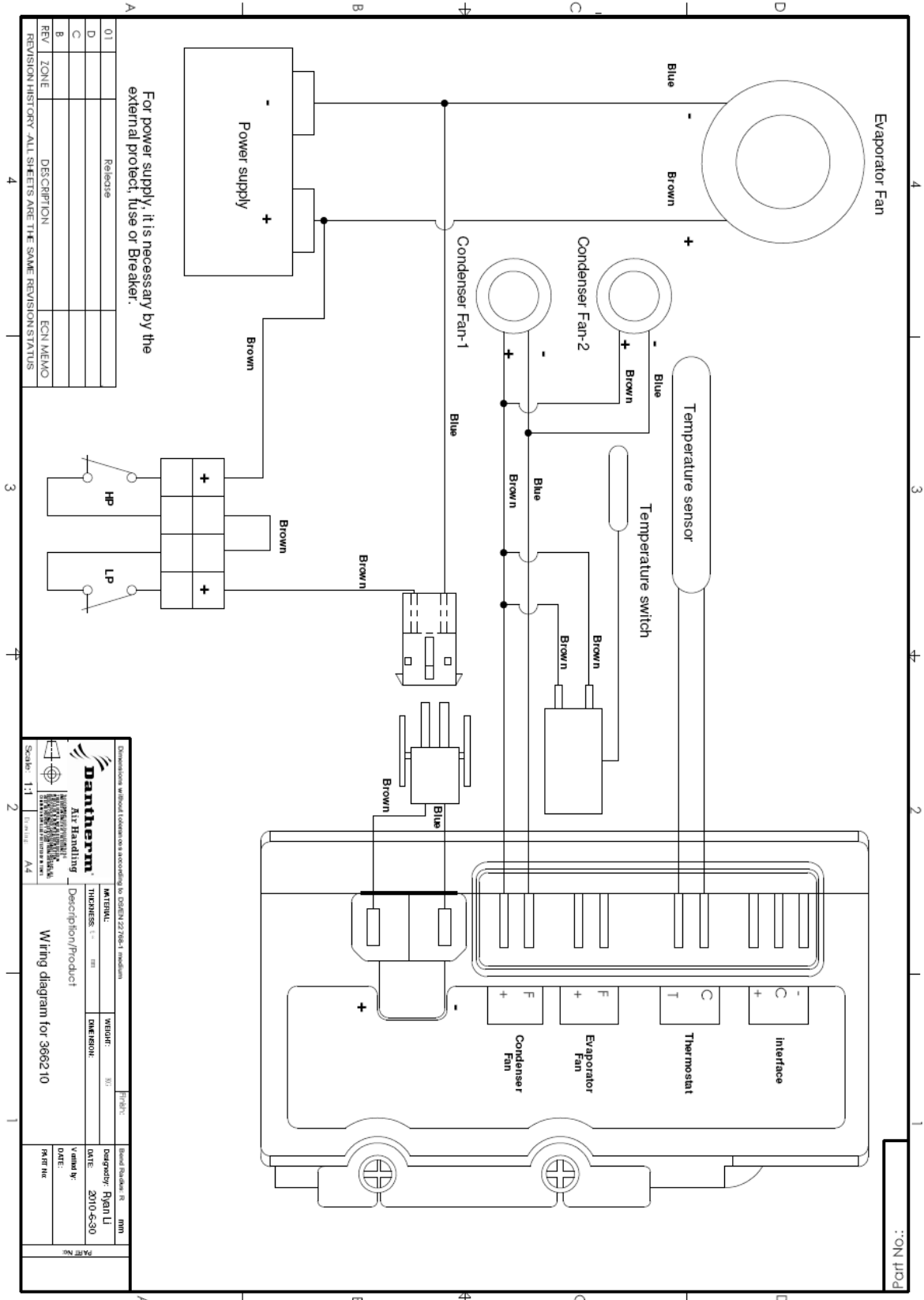
The metal parts are uncritical to scrap and can be left to local “scrap dealer”. A few parts might have a thin visible layer of PVC-foam insulation. In that case the PVC should be separated from the metal part and scrapped separately.

钣金件的废弃要求不高，可以送到当地的废弃物经销商，零件可能有微小的可见绝缘层，在某种程度上，绝缘层应当与钣金和循环利用单独分开。

9 performance 性能曲线



Wiring diagram



01	Relievis
D	
C	
B	
REV	ZONE
DESCRIPTION	
ECN MEMO	
REVISION HISTORY - ALL SHEETS ARE THE SAME REVISION STATUS	



 Dantherm Air Handling

MATERIAL:	WEIGHT:	UNIT:
THICKNESS: 1.5 mm	30	mm
Description/Product		
Wiring diagram for 366210		
DATE:	DESIGNED BY:	mm
DATE:	DATE:	2010-6-30
DATE:	DATE:	

Port No.: