

# Service Manual

**DCU22-2000DH**

**366146**



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## Revision History

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# 1、 Overview

## Introduction:

The target groups for this Service Manual are the technicians who install and maintain this unit. The manual covers a functional description, replacement of parts as well as how to carry out preventive maintenance.

The part No. of this service manual is 214369.

## Usage of the product

This unit is especially designed for cooling of electronic equipment and for door mounting. The unit requires access to ambient air through slots on the backside of the unit. The unit must under no conditions be used for other purposes and should be installed and placed according to the instructions in this manual.

## Storage

If the unit is stored in a warehouse the following conditions apply:

- 1、 Temperature range between – 40 °C to + 85 °C.
- 2、 Operating and storage range: 5~95% RH.
- 3、 The unit must be stored in an upright position.

## Identification of the Unit

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.


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

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## Declaration of conformity

Dantherm declares, meet 2002/95/EC.ROHS directive for mass production. This unit is in conformity with the following directives and standards:

Directive	Name / Area
98/37/EEC	Safety of Machines
73/23/EEC	Low Voltage
89/336/EEC	EMC
Standard	Name / Area
EN 292	Machine Safety
EN 60 950	Electrical Machine Safety
EN 50 082-1	Immunity
EN 50 081-2	Emission
EN 50 106	Safety for Electrical Machinery
GR-487-CORE	According to Belcore (shock)
GR-63-CORE	According to Belcore(shock)
IEC 60529-IP 55	IP Rating According to IEC
UL 484	Safety for Electrical Machinery
CE	Declaration of Conformity for Machinery
EN 300-0191-2	Transportation shock
EN300-019-1-4	Operation shock
General Manager, Dantherm (Suzhou) Co., Ltd.	
<b>Kristian Askegaard</b>	
	

## 2、 General introduction

This section describes how the unit works, the cooling and control strategy.

### General description

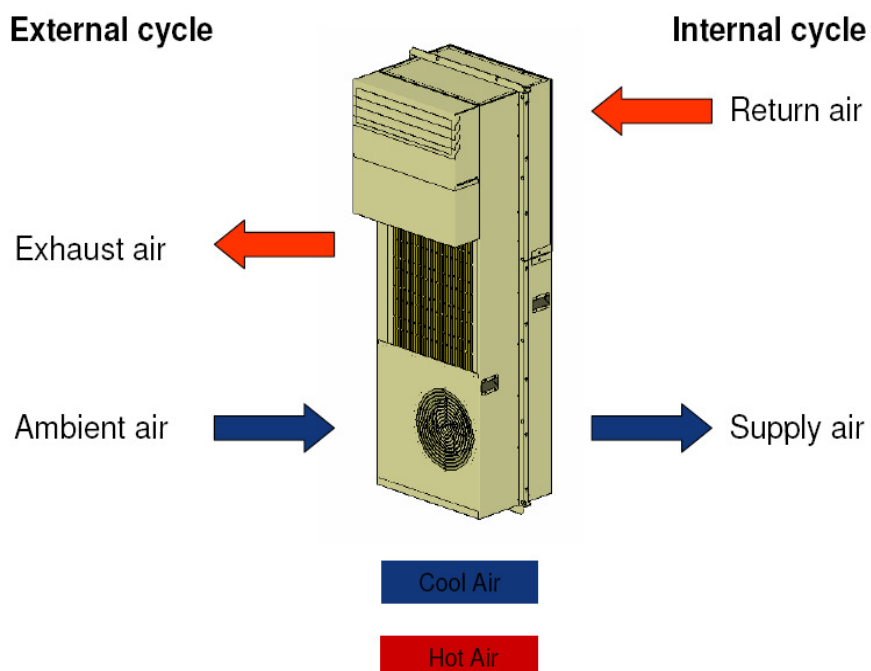
The unit is a mono block microprocessor controlled heat management system especially designed for heat management of electronic enclosures. The unit contains fans, compressor as well as an active cooling section. Internal fan and damper motor as well as a free cooling section. This ensures that this unit will work in extreme temperatures ranging from -40°C to +55°C.

### Working principle

About the working principle of this combine unit, please see below illustration.

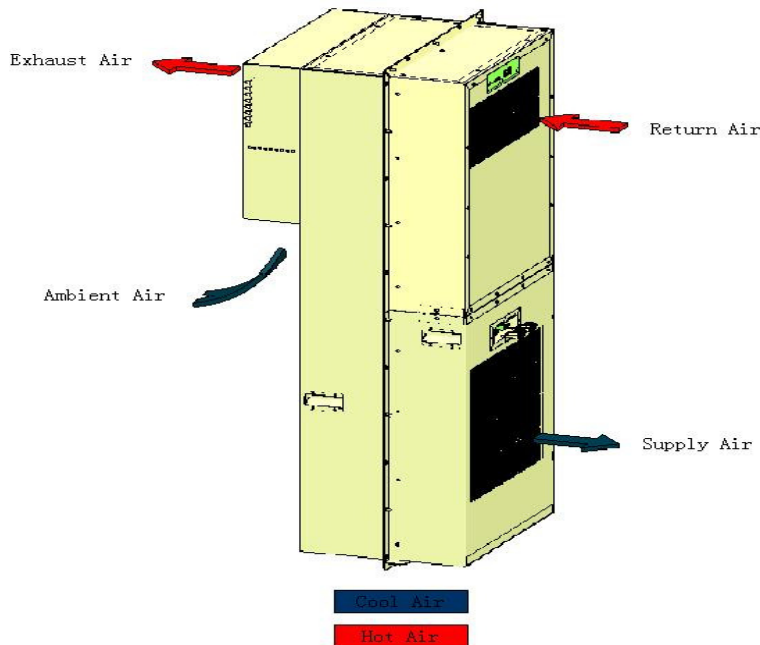
#### 1、 Active cooling

Under this mode, the internal air and external air are not interaction.



## 2. Free cooling

Under this mode, the ambient air will come into the cabinet through a filter to cool down the cabinet and the hot air generated by the cabinet's components will forced to outside.



### Active parts

The active parts are controlled by the control board. The controller will operate these elements mainly based on the temperature reading of the return air sensor. This is placed in the return air duct giving a good representation of the enclosure temperature.

- 1、 Damper
- 2、 Internal DC fan
- 3、 Compressor
- 4、 Condenser fan
- 5、 Filter blockage detection kit (option)
- 6、 Humidity detector (option)
- 7、 Heater kit (option)

### Temperatures

The following terms for temperatures are used in the following description:

- 1、 Ambient temperature is the outside air temperature
- 2、 Supply air temperature is the temperature of the air leaving the unit to cool the electronic equipment.
- 3、 Return air temperature is the temperature of the air entering the unit from the electronic equipment.
- 4、 Condenser temperature is the temperature of the refrigerant from the condenser.



## Indicators

1、 On the front five LED's will give an indication of the present status of the climate unit:

At the left a green LED, marked "Supply" is lit as soon as the controller is powered on. At this time an LED jingle is performed where all LED's will be lit one by one.

2、 The three LED's following green are yellow. The "Compressor" LED will be lit when the active cooling is operating. The "Heater" LED will be lit once the heater is operated (it's an option) and the "Link" LED when and ten minutes after valid communication via the RS485 connection have been in progress.

3、 The red LED "Alarm status" will only be lit in case of a detected fault. Several indications are shown.



## Set points

Set points for heating and cooling are done by on board dials. Alternatively this can be done through the telemetry option.

The range for the heater is 0°C to 15°C. The active cooler has a range of 20°C to 40°C.

**Notice: our recommendation is 35°C, we did the test from 25°C to 40°C; but if you want to set lower than 25°C, maybe there has some risks because of ambient temperature, heat load, etc..**

## Control strategy

### 1、 Internal DC fan:

The fan is always running at full speed once the 48VDC supplied (Active and Emergency Cooling Mode)

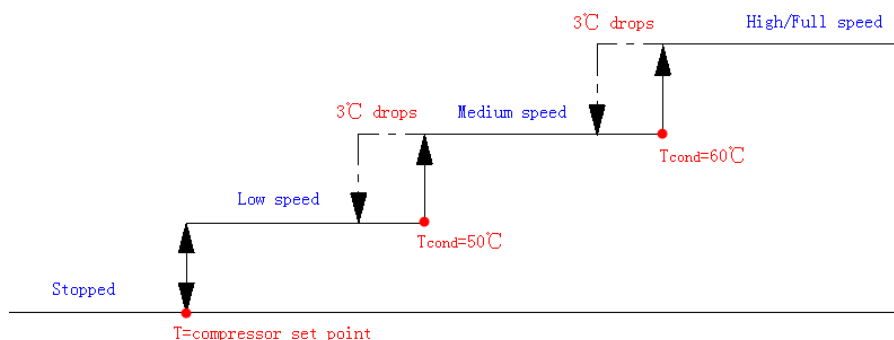
### 2、 External AC fan:

The external fan starts together with the compressor, at the compressor set point (default is 35°C).

When the compressor is on, the external AC fan will run at low speed. The external AC fan will stop when the compressor stops.

When the condenser temperature reaches 50°C, the external AC fan will run at medium speed. If temperature drops 3°C (47 °C), the speed returns to low.

When the condenser temperature reached 60°C, the external AC fan will run at full speed. If temperature drops 3°C (57 °C), the speed returns to medium.



### 3、 Compressor:

When the return air temperature reaches the compressor set point (default is 35°C),the compressor starts.

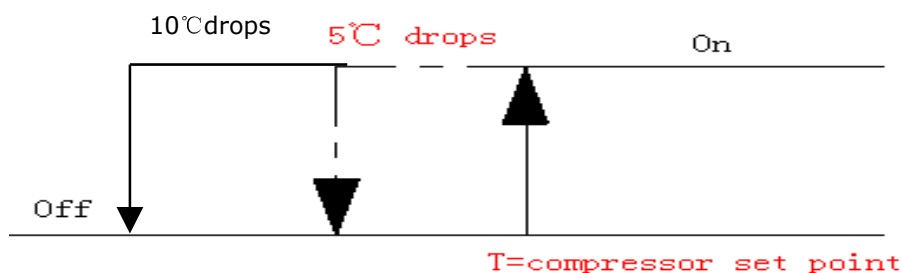
When the compressor starts, it will always run for at least last 9 minutes

in 9 minutes,If the return air is 10°C below the compressor set point, the compressor will stop.

After 9 minutes, If the return air is 5°C below the compressor set point, the compressor will stop.

When the compressor stops, it will always wait for at least 8 minutes before it can restart.

If the compressor has a failure (e.g. HP/LP alarm or overheat protection, then it will wait 30 minutes before it can restart.



#### 4. Damper:

★ **For Energy Saving Mode, the damper will open when these temperature conditions are met:**

Return air temperature is above 18°C

Supply air temperature is above 15°C

Ambient air temperature must be 5°C lower than return air temperature. But when AC-mains is not present or by compressor failure, the difference value is reduced to 2°C.

The damper will take 90 seconds to go from completely closed to completely open.

The damper will stop when these temperature conditions are met:

Supply air temperature is below 15°C and above 11°C

The damper will be forced to close when these temperature conditions are met:

Supply air temperature is below 11°C

Return air temperature is below 18°C

★ **For Emergency Cooling Mode, the damper will only open when AC mains failure or Compressor failure.**

In Emergency Cooling Mode, the damper will open when these temperature conditions are met:

Return air temperature is above 18°C

Supply air temperature is above 15°C

Ambient air temperature must be 2°C lower than return air temperature.

The damper will take 90 seconds to go from completely closed to completely open.

The damper will stop when these temperature conditions are met:

Supply air temperature is below 15°C and above 11°C


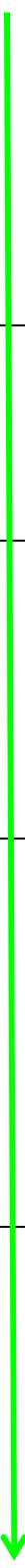
The damper will be forced to close when these temperature conditions are met:



Supply air temperature is below 11°C

Return air temperature is below 18°C

**Note: the Energy Saving Mode and Emergency Cooling Mode are the different software version.**

This illustration is showing the control strategies based on the default settings.

Action	Temperature sensor	°C	UP	Down	°C	Temperature sensor	Action
Condenser fan speed increased to maximum (around 2650RPM)	Condenser sensor	60			60	Condenser sensor	-
-	Condenser sensor	57			57	Condenser sensor	Condenser fan speed decreased to medium (around 2250RPM)
Condenser fan speed increased to medium (around 2250RPM)	Condenser sensor	50			50	Condenser sensor	-
-	Condenser sensor	47			47	Condenser sensor	Condenser fan speed decreased to low (around 1850RPM)
Compressor on damper closes condenser fan speed low (around 1850RPM)	Return sensor (default active cooling set point)	35			35	Return sensor	Compressor on damper closes condenser fan speed low (around 1850RPM)

-	Return sensor	30-34			30-34	Return sensor	Compressor off after 9 minutes @ 5°C drop below set point Damper opens after compressor stop @ efficient ambient temperature
	Return sensor	25-30			25-30	Return sensor	Compressor off in 9 minutes @ 10°C drop below set point Damper opens after compressor stop @ efficient ambient temperature
-	Return sensor	18			18	Return sensor	Damper close unconditionally
Damper opens @ efficient ambient temperature and return temperature above 18°C	Supply sensor	15			15	Supply sensor	Damper stops
Damper stops	Return sensor	11			10	Return sensor	Damper closes
-	default heater set point	5			5	Return sensor default heater set point	Heater on (optional feature)
Internal fan runs continuously upon DC powering up							

## 3、 Optional components

### Control logic (P13)

#### A) Energy Saving Mode

This mode means that the damper will open and/or close with efficient air temperature, see the chapter of “control strategy” for detail.

#### B) Emergency Cooling Mode

It is a different software version choice relative to the energy saving mode. While this function is enabling, the operation of the climate unit is limited to closed loop with the use of free cooling in emergency situation. Emergency situation is defined as either compressor is fault and or loss of AC mains.

##### 1、 Compressor fault

If a compressor fault occurs, the damper is allowed to operate. This means that it will open and close dependent on the supply temperature and, the ambient temperature and, the return temperature. This is described in “Graphic illustration”.

The compressor fault timer must have returned to zero before the emergency cooling situation will end.

##### 2、 Loss of AC mains

The following steps are taken upon loss of AC mains:

The fan curve is offset upwards with respect to the cooling set point. This is to lower the fan speed and thereby reduce the DC power consumption. The offset can be selected in the range of 0°C to 15°C. Default is 0°C.

The damper is allowed to operate. This means that it will open and close dependent on the supply temperature and, to some degree, the return temperature. This is described in “Graphic illustration”.

Mains AC power must be back before the emergency cooling situation will end.

##### 3、 Recommended usage

This option is only recommendable if the climate unit situated in areas with a high concentration of humidity, salt, sand or pollution in the air.

Please contact your local dealer or Dantherm Air Handling concerning guide lines for a specific situation.

### **Heater kit(options)**

It is an 800W heater option, the heater is switched on when the return air temperature goes below the heater set point (default is 5°C) and off again 2°C above this.

The current consumption by the heater is monitored when switched on. Does the consumption fall below 3A, the heater is regarded as faulty and this will be signaled by the failure relays. This fault will be rejected when a simultaneous loss of AC main power is detected.

If the internal DC fan is malfunctioning the heater will not be switched on, as no air will pass the heating elements.

### **Filter blockage detection kit(options)**

The filter blockage detection kit is detected whether the air filter is blocked by the dust or other things.

The default set point is 220Pa, when the pressure difference between the air filter outlet and inlet is arrived to the set point, the pressure switch is regarded as faulty and the “alarm status” LED on the controller will be slow flashed, but this will not be signaled by the failure relays.

### **Humidity detector(options)**

The humidity detector is detected the ambient humidity. When the ambient humidity is higher than the set point, the humidity detector is regarded as faulty and the “alarm status” LED on the controller will be slow flashed, the damper is forced to close, but this will not be signaled by the failure relays.

## 4、 Error handling

### Introduction

The Dancon is equipped with three failure or relays give alarms depending on the severity of the fault.

### Warnings

Warnings will not send out the alarm to the WSM.

The alarm status LED will light up if an alarm, a fault or a warning occurs.

A permanent lit alarm status LED will indicate a WARNING.

- 1、 The condenser temperature sensor is missing or short.
- 2、 The return air temperature is 20°C above the compressor set point. The warning will be cleared when the temperature again is less than 18°C below the set point.
- 3、 The return air temperature is 5°C below the heater set point. 2°C above this temp the warning will be cleared.
- 4、 The condenser temperature has been above 75°C. The warning disappears when the condenser temperature has been below 60°C for at least 2 minutes.
- 5、 The filter is clogged (option).
- 6、 Humidity is higher than set point (option).

### Faults

Faults will send out the alarm to the WSM detection through relay.

A slow flashing alarm status LED (approximately 1/2 Hz or once every 2 seconds), will indicate a fault.

The Fault situation will be initiated by one of the following incidences:

- 1、 The heater is fault – does not use current.
- 2、 Loss of AC mains power
- 3、 Fault on the ambient air sensor - short or open circuit.



## Alarms

Alarms will send out the alarm to the WSM detection through relay.

A fast flashing fail LED (app. 2 Hz or 2 times per second), will indicate an alarm.

The alarm situation will be initiated by the following incidences:

- 1、 The internal DC fan is stopped----no rotational pulse.
- 2、 The condenser fan is faulty----doesn't use current.
- 3、 The compressor doesn't draw current----this due a dropout in the HP/ LP pressure switch, the winding protector or the compressor in general.
- 4、 Failure on the return air sensor----open or short.
- 5、 Failure on the supply air sensor ---- open or short.
- 6、 The ambient temperature is high----indication in a possible fire. Alarm is above 70°C, off below 60°C.

A fast flashing fail LED----app. 2 Hz (2 per second) ----is indicating an alarm.

## Sensor failure handling

Temperature measurements are performed in the range from -40°C to +99°C. Readings outside this range is regarded as a sensor failure. -40°C is regarded as a short circuit and +99°C is regarded as a missing sensor or open loop.

### Return air sensor

A faulty return air sensor will result in the main controlling sensor being regarded as supply sensor with a possible offset. The real measurement of the supply sensor is used during heating. An offset of 10°C is added during active cooling.

### Supply and ambient air sensor

The ambient air is always regarded as efficient if the supply or the ambient air sensor is defective.

### Condenser sensor

A faulty condenser sensor will result in a fixed medium speed of the condenser fan when operated.

## 5、 Description of indicators, controls and connections


### Front panel

This illustrates the front cover of the Dancon control board and its parts and functions:


Part	Function
Supply	Green LED indicates that the power is on
Compressor	Yellow LED indicates that the compressor is running
Heater	Yellow LED indicates that the heater is on
Link	Yellow LED indicates that the unit is communication( or has been for less than 10 minutes ago)
Alarm status	Red LED with the following function: <ul style="list-style-type: none"> <li>• Permanent on is Warning</li> <li>• Flashing slow( once every 2 second) is Fault</li> <li>• Flashing fast is Alarm( 2 per second)</li> </ul>
Occupied (Do not use)	This function is not available on this product.
Test (Do not use)	This function is not available on this product – pushing the Test Button will generate an alarm, and the unit will have to be power off/on to make alarm disappear.
Heater set point	Adjustment of heater set point (0°C----15°C)
Compressor set point	Adjustment of compressor set point (20°C----40°C) recommend 35°C
RS 485 output	Two parallel RS485 output (RJ11 jacks)

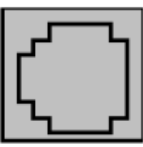
Set point



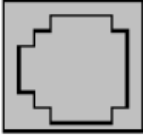
Heater



Compressor

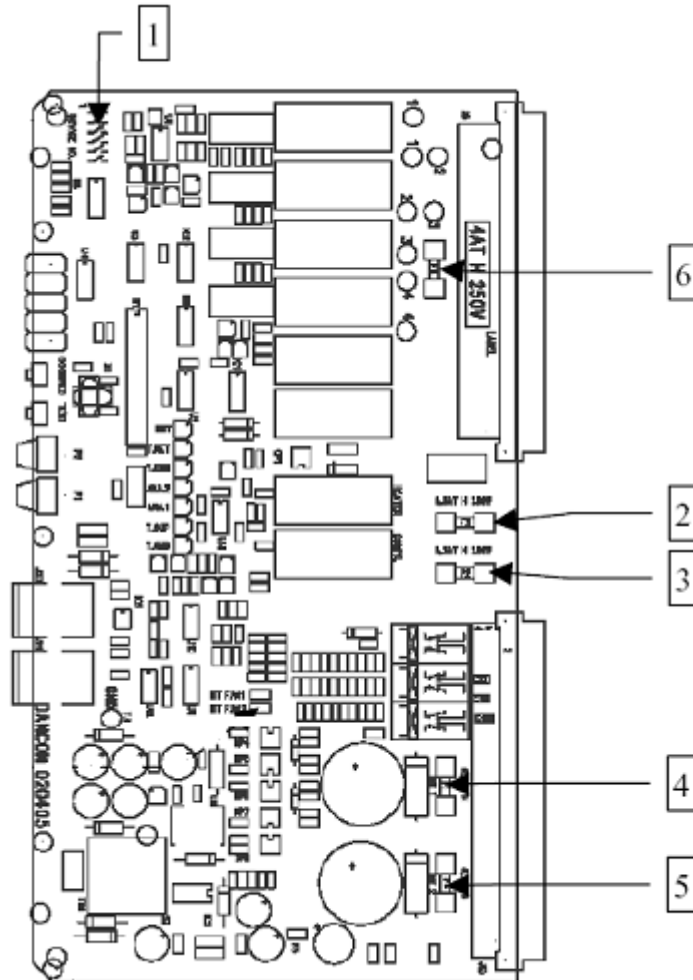


RS485 output



## Control board layout

This illustrates the control board and the position of the fuses, switches and the jumpers.



No	Part	Function
1	Dipswitches	Selecting unit No.
2	Fuse, 6.3A TH	Heater/ Compressor
3	Fuse, 6.3A TH	AC mains
4	Fuse, 6.3A TH	Internal DC fan 1
5	Fuse, 6.3A TH	Internal DC fan 2
6	Fuse, 6.3A TH	Condenser fan 60Hz
	Fuse, 4.0A TH	Condenser fan 50Hz

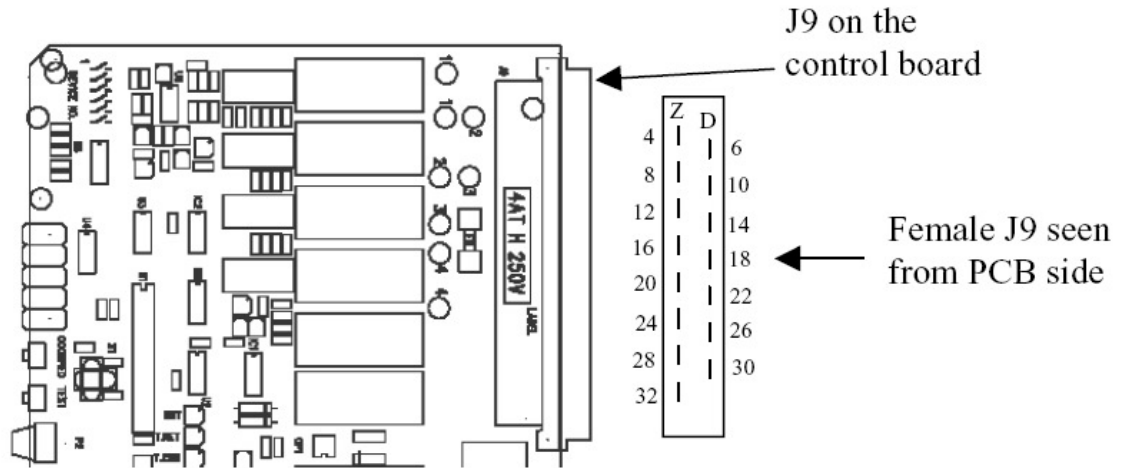
## RJ11 jack's

The 6 way RJ11 female RS485 parallel jack's on the front panel can be used for DanLink (telemetry option), computer tests or DanView (display). The connections are shown in this table:

Pin No.	Function
1	Logic GND
2	Data B
3	Data A
4	Data A
5	Data B
6	Logic GND

## Main voltage

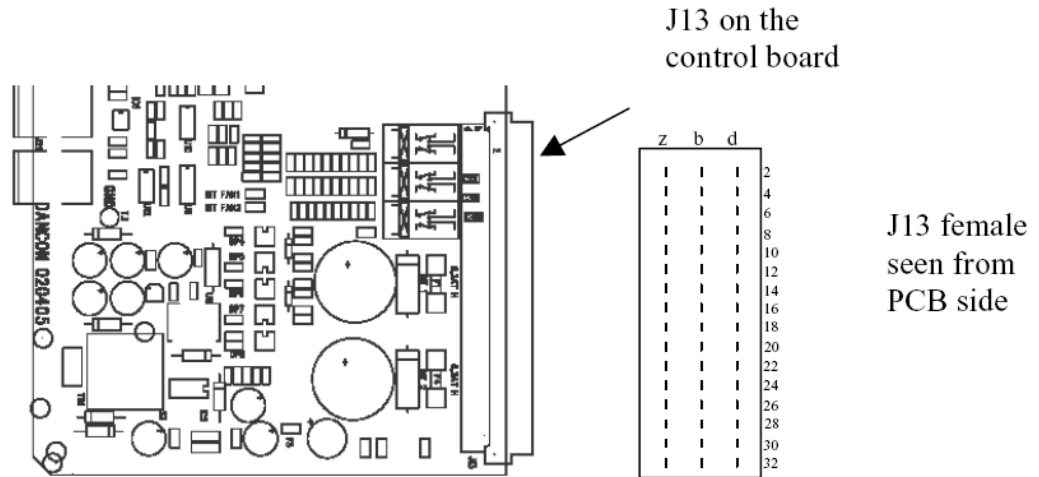
This shows the connections to the high voltage connector on the control board:



Pin No.	Row Z	Row D
4	Internal fan 2	-
6	-	Not used
8	Internal fan 1	-
10	-	External fan 1
12	Not used	-
14	-	External fan 2
16	Auto transformer 230V	-
18	-	Heater
20	Auto transformer 180V	-
22	-	Compressor crankcase heater
24	Auto transformer 120V	-
26	-	Compressor
28	Auto transformer common	-
30	-	Mains common
32	Mains line	-

## Low voltage

This shows the connections to the low voltage connector on the control board:



Pin No.	Row Z	Row B	Row D
2	Interconnection-	Warning relay NC	Fault relay NC
4	Interconnection+	Warning relay common	Fault relay common
6	Damper supply 0 VDC	Damper control	Damper supply 24 VDC
8	40 VAC neutral	Current sensor compressor	Current sensor heater
10	40 VAC phase	Current sensor compressor	Current sensor heater
12	GND	Alarm relay NC	Alarm relay common
14	0 VDC internal DC fan	PWM output internal DC fan	24/ 48 VDC internal DC fan
16	Hot spot sensor	Return sensor	Condenser sensor
18	Hot spot sensor	Return sensor	Condenser sensor
20	0 VDC supply	Rotation input internal DC fan	24/ 48 VDC supply
22	Alarm/ occupied common	Not used	Filter alarm
24	Humidity alarm input	Occupied input	Smoke alarm input
26	Not used	Not used	Not used
28	RS485 B	Supply sensor	Ambient sensor
30	RS485 A	Supply sensor	Ambient sensor
32	Not used	Not used	Not used

## 6、 Mounting and connecting

### Introduction

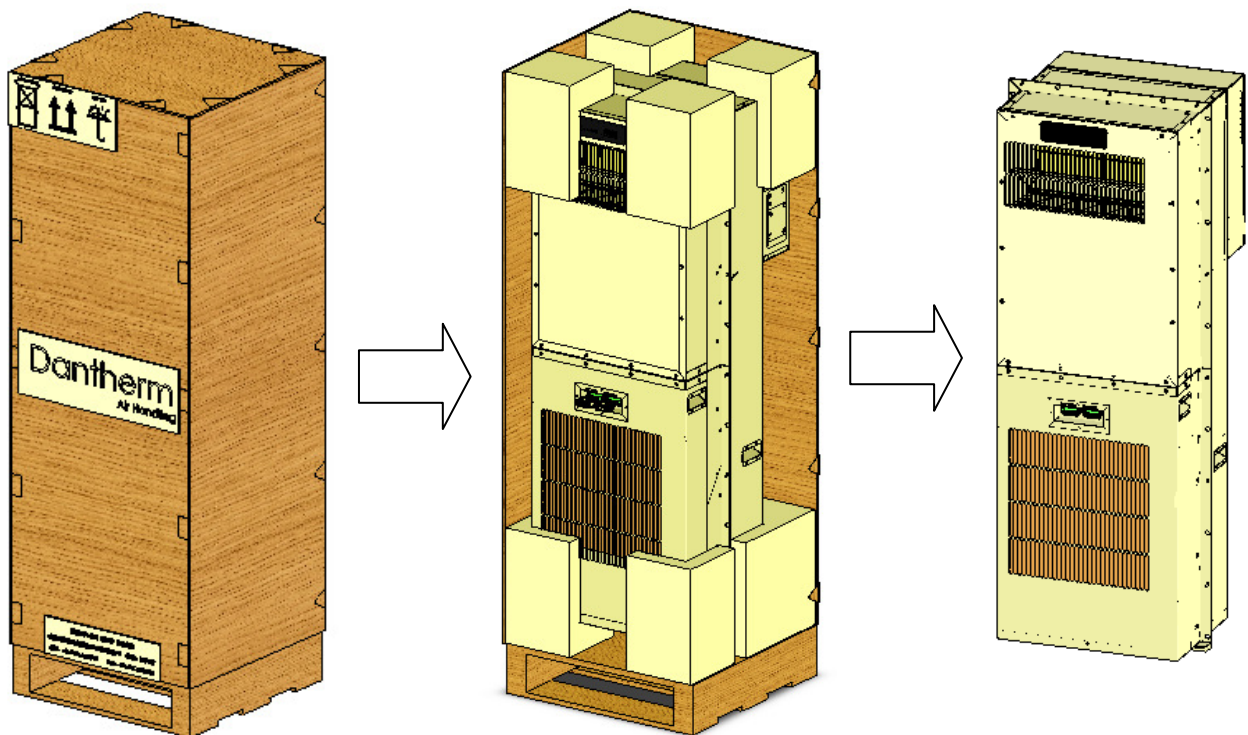
This section describes in the details how to mount and connect the unit.

### Unpacking

This unit is delivered in a wooden box wrapped in a plastic bag.

Tools: Hammer

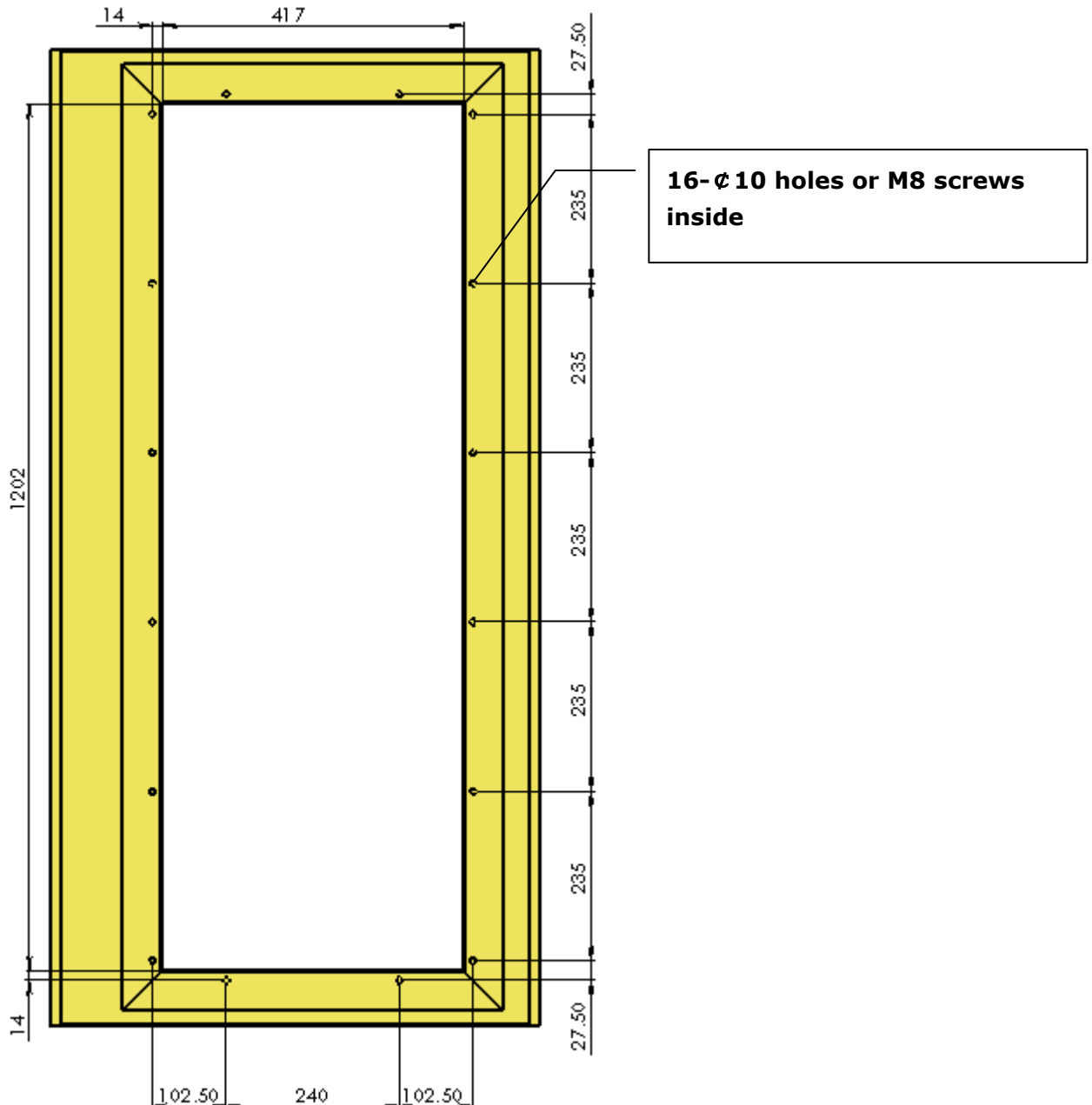
Cutting pliers



## How to mounting the unit

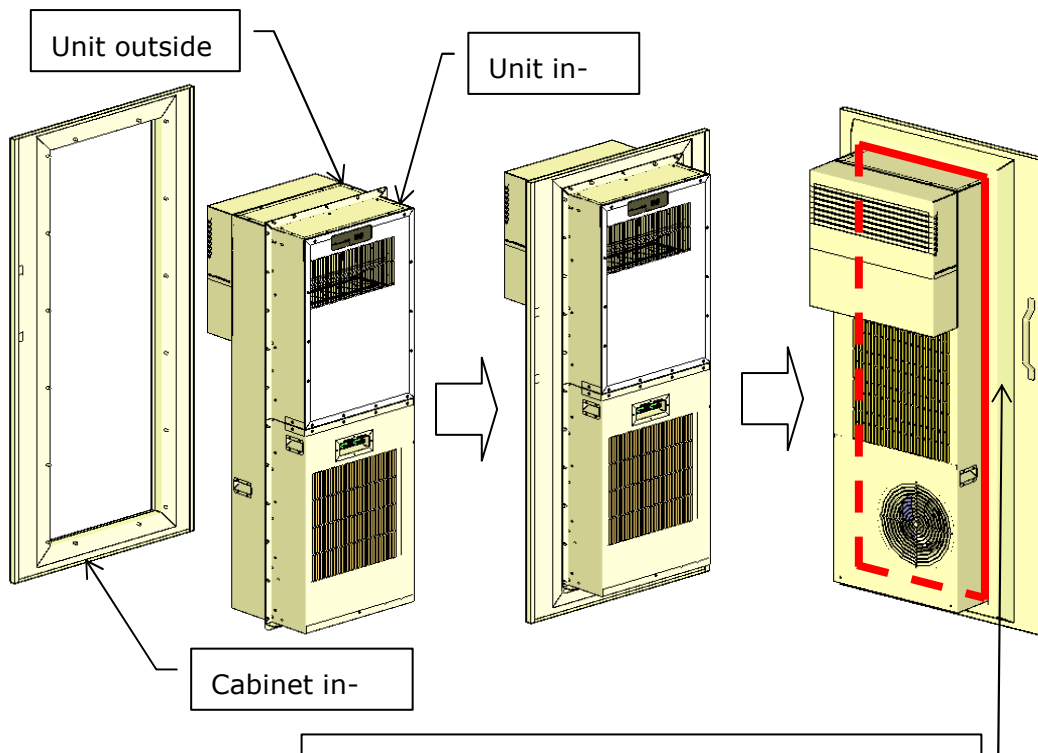
To lead the airstreams correctly and mount the unit effectively, it needs make a hole and set screws or mounting holes on the telecom cabinet's door with following dimensions. All the measurements are made in millimetres.

**The unit must keep in an upright position, and the mounting angle must  $\leq 3^\circ$  .**





Below illustrates how to mount the unit on the cabinet. When mounting the unit, stick the attached weather strip on the outside flange firstly.



**Use the sealant to seal the gaps between the unit and the cabinet door from outside when completed mounting.**

**Warning:**

IP55 is guaranteed for Dantherm A/C and please make sure the marked area being glued when installing the unit. Any leakage caused by no glue in the marked area, is beyond Dantherm's responsibility.

**Must follow the IEC 60529-IP 55 standard to do the water spray testing.**

**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**

**How to connect the unit**

**Before you start make sure that you have the following ready:**

- 1、 A small straight point screwdriver
- 2、 Two male plug which as attachment.
- 3、 AC power supply corresponding to the name plate on the product
- 4、 DC power supply corresponding to the name plate on the product

### Mains supply:

**Warning: 1 phase AC supply (operation voltage range should be between 198-240V, if exceed this range, the compressor can not starting normally, the compressor running a long period of non-normal voltage range, may be can caused the compressor damaged)**

Follow these steps to connect the power supply correctly:

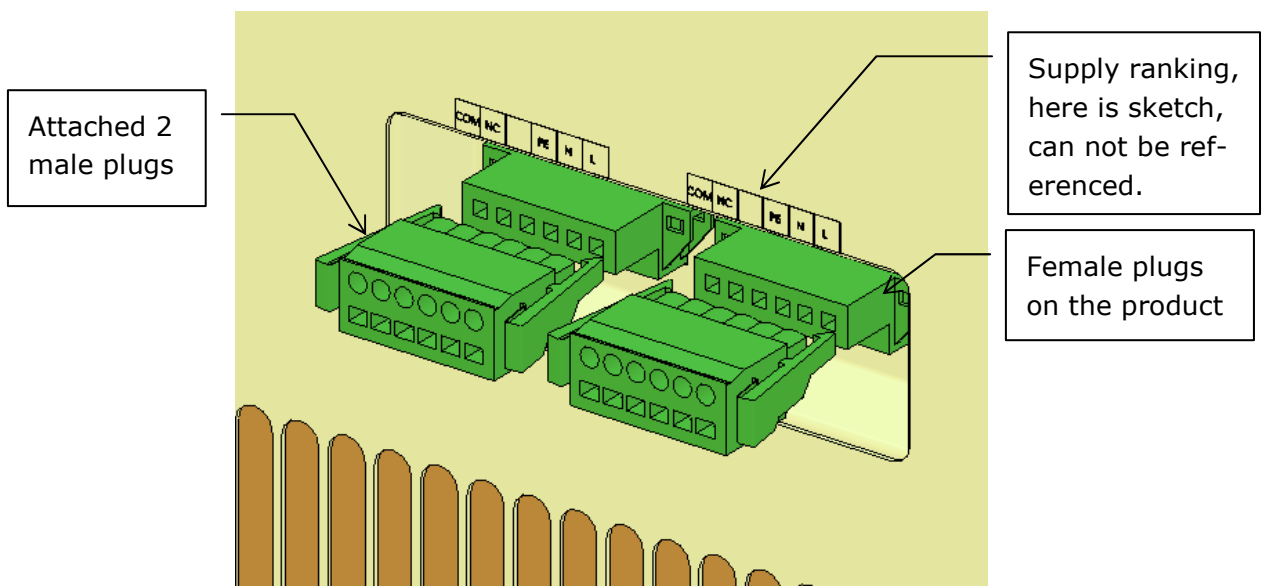
- 1、 Identify the AC supply cable mounted on the cabinet, it is the one containing 3 wires.
- 2、 Make sure that the power is switched off.
- 3、 Connect the wire to the attached male plug correctly according to the product's power supply ranking which marked at the near of product's power terminal.
- 4、 Connect the male plug to female plug on the product.

### DC supply (48V ± 20%)

It is very important to make sure that the DC supply I connected to the right polarity and voltage range.

★ **A wrongly connected DC supply can cause several damage (the controller will be damaged) to the unit.**

- 1、 Identify the DC supply cable mounted on the cabinet. It is the one containing 2 wires.
- 2、 Make sure that the power is switched off.
- 3、 Connect the wire to the attached male plug correctly according to the product's power supply ranking which marked at the near of product's power terminal.
- 4、 Connect the male plug to female plug on the product.



## 7、 Preventive maintenance

### Purpose

The purpose of the following instruction is to guide you through how to clean and maintain an A/C.

### Description

The air conditioner cleaning and maintenance is the key to help the air conditioner improve the cooling capacity, improve life time, higher energy saving, and better performance.

After the air conditioner start, depending on environmental conditions; climatic conditions; the number of the compressor start/stop frequency; dust and air pollution, cleanliness of the cabinet and many other factors, help determine the maintenance frequency. Normally, the period of preventive maintenance should not surpass six months. In case of very bad air quality, the period of two months need be considered.

### Conditions of warranty:

**The factory warranty is only valid if documented preventive maintenance has been carried out with an interval of maximum 6 month (normally air quality location) or 2 month (very bad air quality location). The documentation could be in form of a written log on the site, or a report from the computer test program.**

### Several clean-up methods can be utilized.

Tools and materials:

#### 1) Mechanical cleaning

Vacuum cleaner or compressed air

Soft bristle brush

Screwdriver

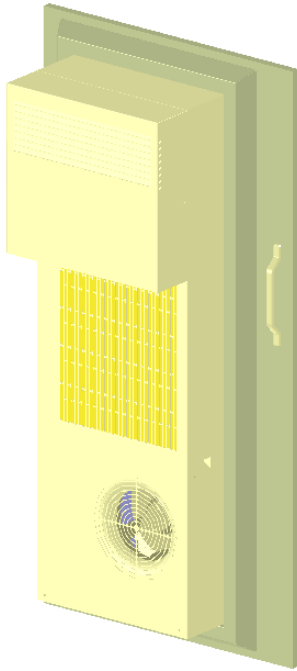
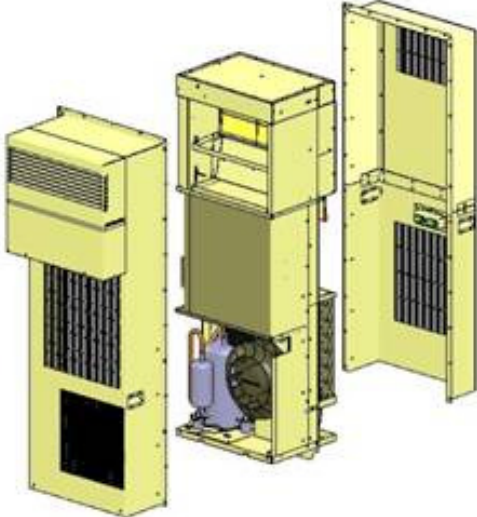
#### 2) Liquid cleaning


CNHR-60 cleaning agent for coil's fins/CNHR-60

Water

Screwdriver

## Procedure

<p>Cut off the power supply. Take air conditioning off from the cabinet door or side.</p>	
<p><b>1, Mechanical Cleaning (recommended cleaning method)</b></p>	
<p>1-1 Open the units cover, use a vacuum cleaner very careful clean-up the dust. Especially at: air ducts, condenser and evaporator fan, Condenser and evaporator coil. Then use pressurized air/brush to remove/loosen dust that the vacuum cleaner could not remove. Then use a vacuum cleaner to remove the remaining matter</p>	
<p>1-2 You should finished all the items in the below check list. Then perform a test simulating all temperatures within the specified temperature range.</p>	

<b>2, Liquid Cleaning</b>	
<p>2-1</p> <p>Open the units cover, use CNHR-60 cleaning agent sprayed evenly on the surface of the condenser and evaporator fins, condenser fan, air duct; five minutes later, then use the low pressure water to rinse them.</p> <p><b>Note: before you carry out liquid cleaning, you should remove the evaporator fan and PCB.</b></p>	
<p>2-2</p> <p>You should finished all the items in the below check list. Then perform a test simulating all temperatures within the specified temperature range.</p>	
<p>Please install the unit and connect power. The cleaning and maintenance process is finished.</p>	

Check list	Yes	No
Are the fans and the compressor clean and free of corrosion?		
Are the fans and the compressor mounted securely and free of excessive vibration?		
Is the compressor free of excessive noise?		
Are the coolant pipes free of obstructions, damage, and corrosion and show no obvious signs of leakage?		
Are the coil fins clean and not deformed?		
Do the fans rotate freely and are they free from excessive vibration or noise?		
Is all wiring and insulation undamaged?		
Are all connectors seated properly and in good conditions?		

## 8、 Replacement of parts

### Introduction

This is parts covered in this manual:

- 1、 Air filter
- 2、 Internal DC fan
- 3、 External AC fan
- 4、 Control board
- 5、 Auto transformer
- 6、 Damper motor
- 7、 Heater kit (option)
- 8、 Filter blockage detection kit (option)
- 9、 Humidity detector (option)

## Replacement of the air filter

This section describes the replacement of the air filter. The filter is used for filtering the dust and dirt from the ambient air when using free cooling.

When to replace

### Option 1: combine unit with energy saving mode

The filter must be replaced with a maximum of 6 months (normally air quality location) or 2 months (bad air quality location) interval.

### Option 2: combine unit with emergency cooling mode

The filter must be replaced with a maximum of 1—2 year interval.

Before you start

### Make sure that you have the following available before you start:

A Torx 20 screwdriver

A 7# spanner

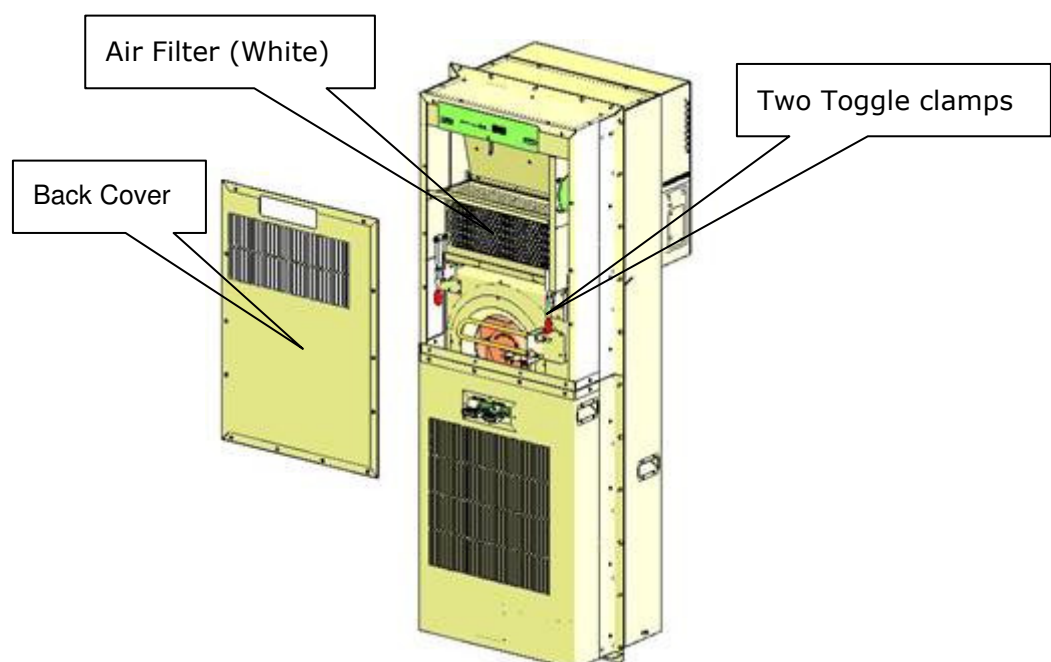
A filter, see section called “spare parts” for details.

### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

### Illustration

This illustrates where the air filter is placed.



Follow these steps to replace the air filter:

Step	Action
1	Switch off power
2	Unscrews the 12 Torx screws holding the back cover in place
3	Loose the toggle clamp which fix the air filter
4	Remove the old air filter, and then put the new one in place. Note: the arrow indicating the air flow on the filter, or let the green side towards out
5	Remount the back cover
6	Switch on power

### Replacement of the internal DC fan

The internal DC fan is placed behind the back down cover. The purpose is to circulate the air inside the door closure.

When to replace

The internal fan only needs to be replaced when it is faulty.

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

A Torx 20 screwdriver

A 7# spanner

A new internal DC fan, see “spare parts” for details

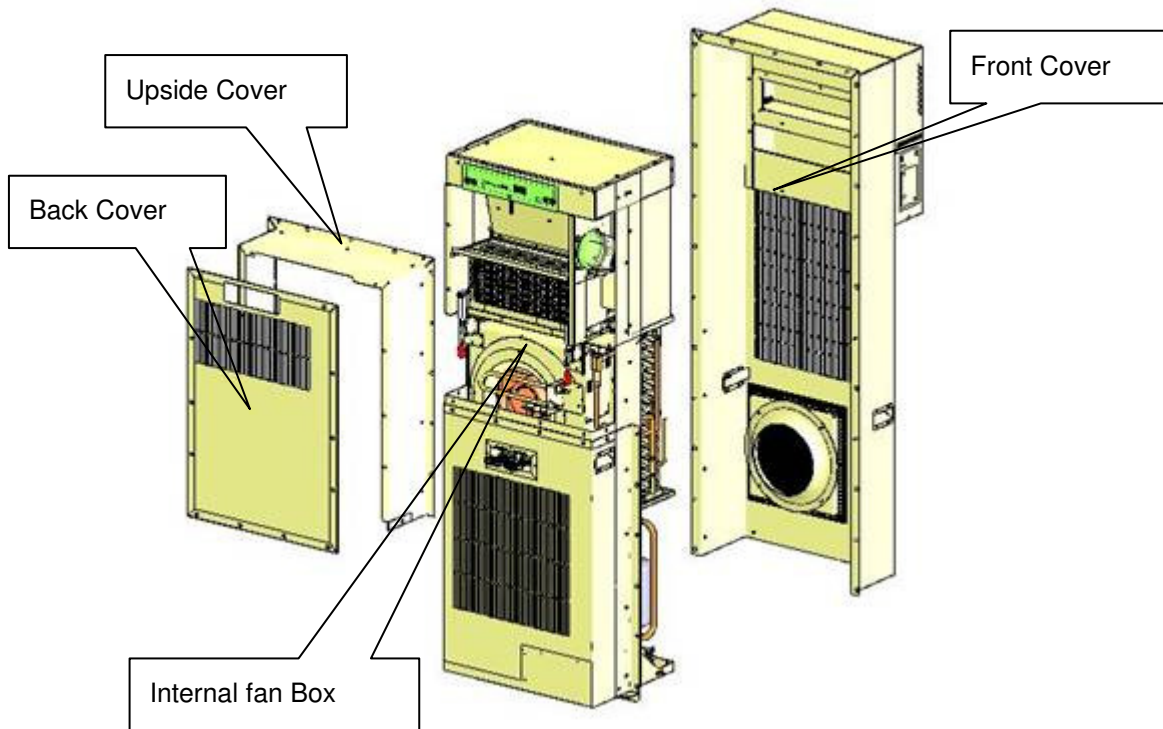
#### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

#### Illustration

This illustrates where the fan is placed.





**Follow these steps to replace the internal fan:**

Step	Action
1	Switch off all powers of unit
2	Unscrew the 13-M4 nuts on the two side flanges and top flange, then remove them
3	Move the whole front cover together
4	Unscrew the 12-M4 torx screws on the back cover, and then remove the cover
5	Unscrew the 13-M4 torx screws on the upside cover, and then remove the cover
6	Unplug the fan from the power supply
7	Unscrew the 6 torx screws which fix the internal fan box, then take the box out
8	Unscrew the 6 torx screws which fix the internal fan bracket, then take the fan and its bracket out.
9	Use the new fan replace the old one
10	Mounting and connect the new fan by the step 2 to 8 in reverse order
11	Switch on power

## Replacement of the external AC fan

The purpose of the external AC fan is to surplus heat from the condenser when the active cooling is active.

When to replace

The external fan only needs to be replaced when it is faulty.

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

A Torx 20 screwdriver

A 7# spanner

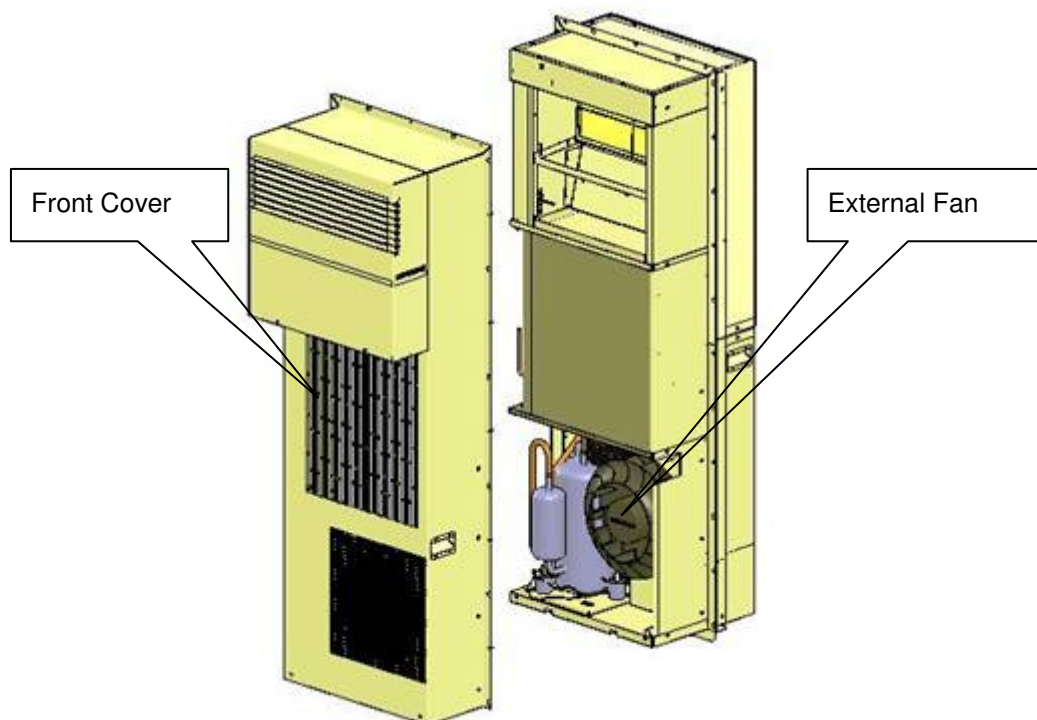
A new external AC fan, see “spare parts” for details

### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

### Illustration

This illustrates where the fan is placed.



Follow these steps to replace the external fan:

Step	Action
1	Switch off all powers of the unit
2	Unscrew the 13-M4 nuts on the two side flanges and top flange, and remove them
3	Remove the front cover
4	Disconnect the external fan from the power supply
5	Unscrew 6 torx screws which fixed the external fan bracket.
6	Take the fan and bracket out
7	Use the new fan replace the old one
8	Mounting and connect the new fan by the step 2 to 6 in reverse order
9	Switch on power

## Replacement of control board

The control board is microprocessor equipped PCB with input/outputs to all the electrical parts of the unit. It controls the fans, compressor, etc. based on inputs from the 4 sensors placed in the unit.

When to replace

The control board only needs to be replaced when it is faulty.

Before you start

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

A Torx 20 screwdriver

A 7# spanner

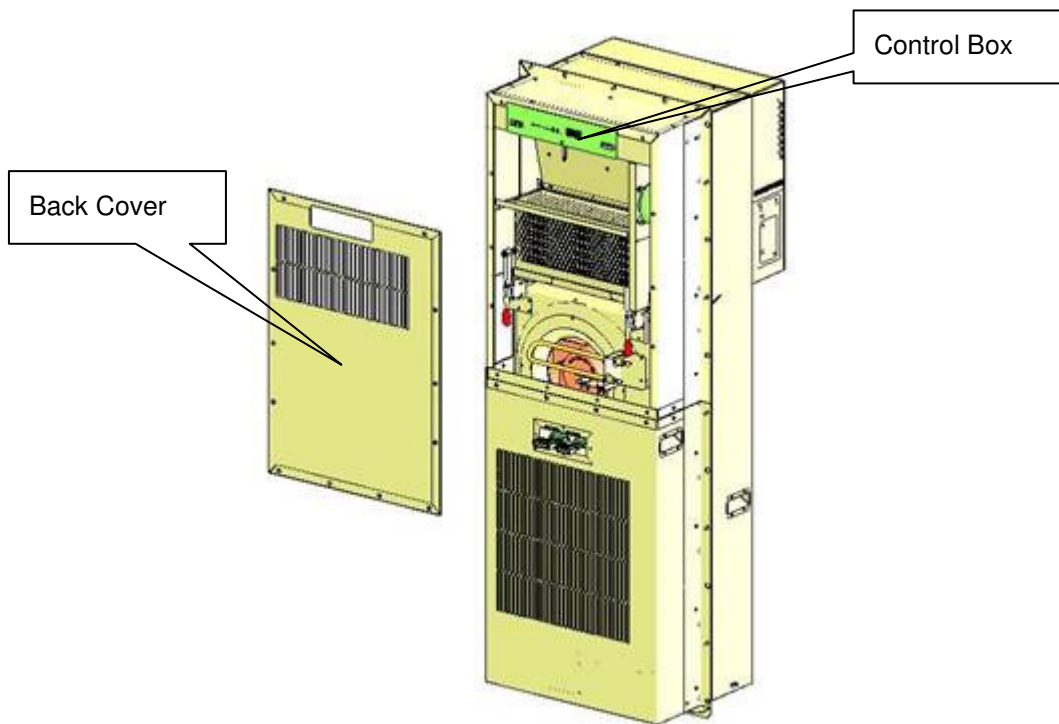
A new control board, see “spare parts” for details

### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

### Illustration

This illustrates where the control board is placed.



**Follow these steps to replace the control board:**

Step	Action
1	Switch off all powers of the unit
2	Unscrews the 12 torx screws holding the back cover in place and remove them
3	Unscrew 1 torx screw which fixed the controller
4	Pull the 2 with plastic tabs out and press them away from the centre of control board, the control board now can be removed
5	Check if the E-PROM is the right version before mounting it on the new control board. Compare with type sign.
6	Slide the new control board into the slide way. Make sure that it is pressed backwards into the sockets by applying a moderate impact to the front of the control board
7	Mount the back cover again
8	Switch on power

## Replacement of the auto transformer

The following is detailed description on how to replace the auto transformer.

When to replace

The auto transformer only needs to be replaced when it is faulty.

Before you start

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

A Torx 20 screwdriver

A 7# spanner

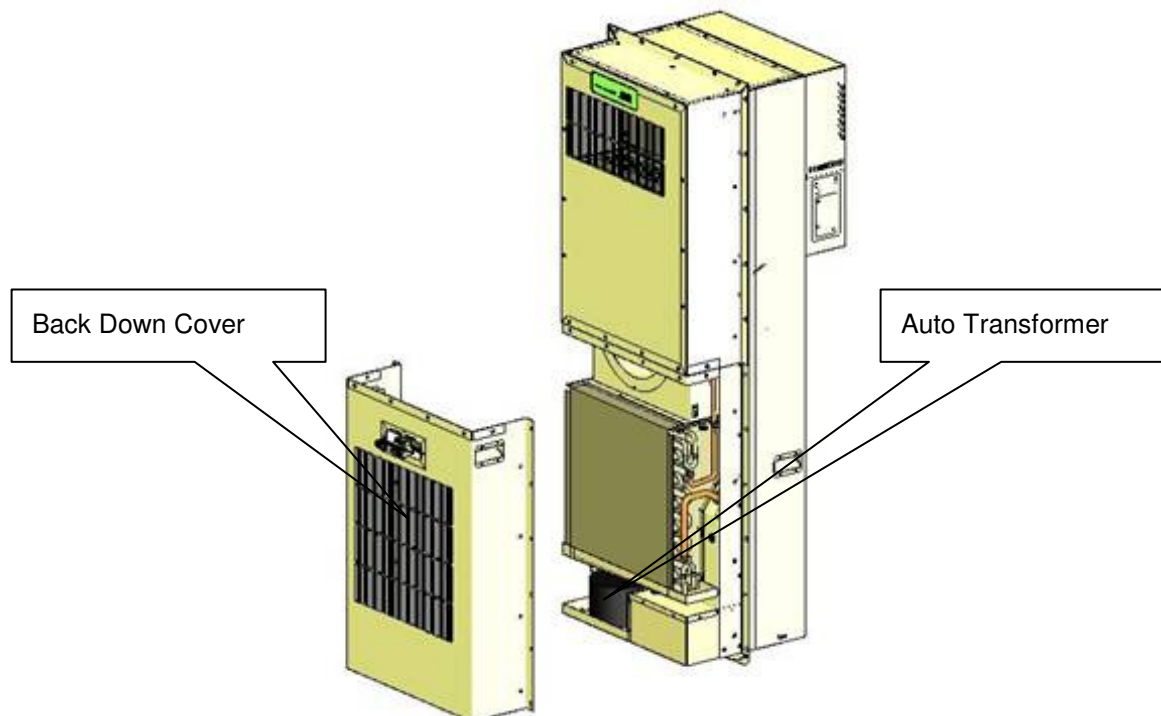
A new auto transformer, see “spare parts” for details

### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

### Illustration

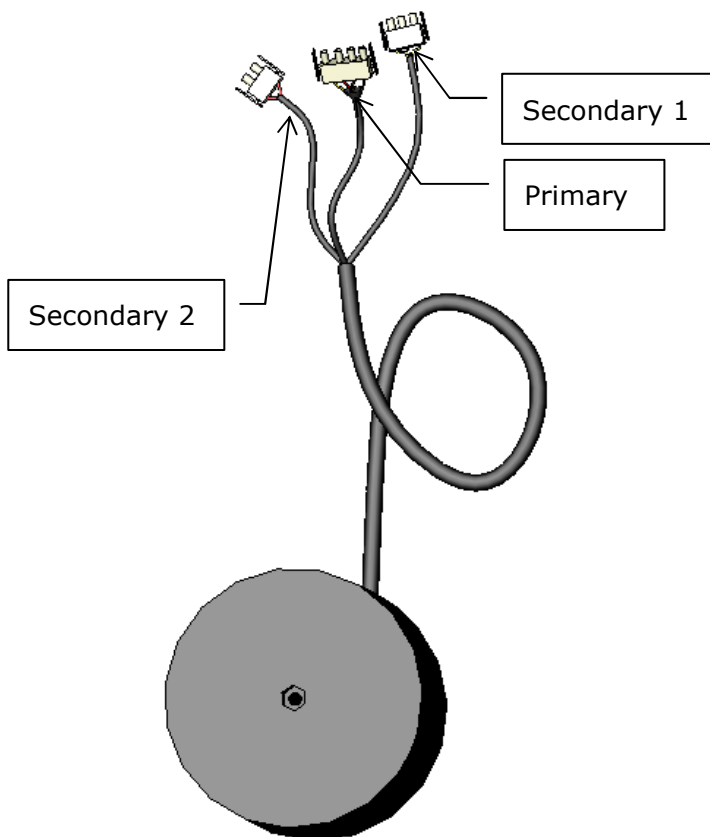
This illustrates where the auto transformer is placed.



Follow these steps to replace the auto transformer:

Step	Action
1	Switch off all powers of the unit
2	Unscrew the 6-M4 nuts on the two side flanges, and remove them
3	Unscrew the 7-M4 torx screws on the back down cover, and then remove the back down cover Caution: the power cable linked on the connector
4	Unplug all the connectors, Unscrew the 4-M4 nuts which fix the auto transformer bracket
5	Remove the auto transformer with its bracket
6	Exchange the auto transformer, and mount it
7	Mount the back down cover again
8	Switch on power

Below illustrates the connectors of the auto transformer:



	Colour	Function
2 way connector	Red	Output: 24 VAC
	Red	Output: 24 VAC
3 way connector	Yellow	Output: 40 VAC
	-	
	Yellow	Output: 40 VAC
4 way connector	Orange	Input: 230 VAC
	Red	Output: 180 VAC
	Brown	Output: 120 VAC
	Black	0 V

## Replacement of the damper motor

The damper motor keeps the damper in the right position according to the signals from the control board. This is done in order to use the ambient air for cooling.

When to replace

The damper motor only needs to be replaced when it is faulty. The typical faulty would be that the damper does not move at all.

Before you start

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

A Torx 20 screwdriver

A 7# spanner

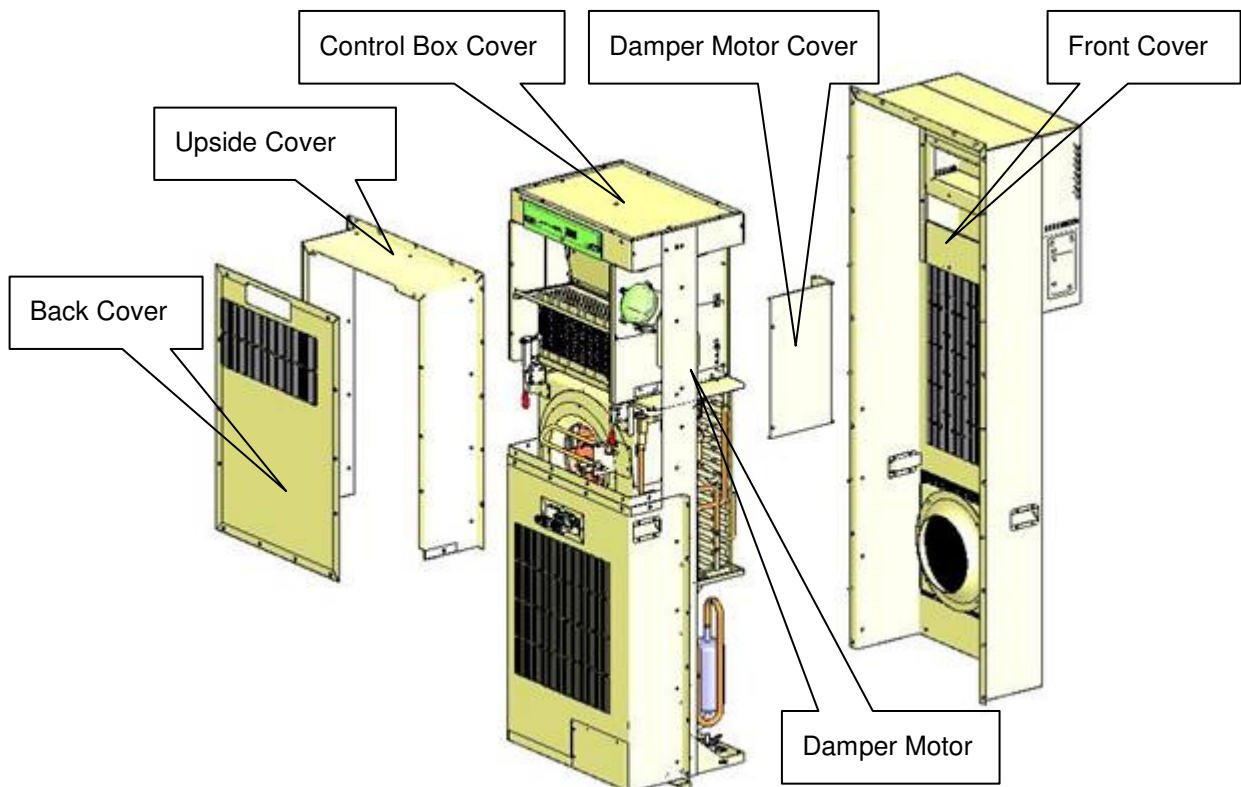
A new damper motor, see “spare parts” for details

### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

### Illustration

This illustrates where the damper motor is placed.



Follow these steps to replace the damper motor:

Step	Action
1	Switch off all the powers of the unit
2	Unscrew the 13-M4 nuts on the two side flanges and top flange, and remove the front cover
3	Unscrew the 12-M4 torx screws on the back cover and then remove the back cover
4	Unscrew the 13-M4 torx screws on the upside cover and then remove the cover
5	Unscrew the 2-M4 torx screws and 2-M4 nuts which all fixed the damper motor cover, and then remove the cover
6	Unscrew the 8-M4 torx screws on the controller box cover, and then remove the cover
7	Unplug the connector linked to the damper motor in the controller box
8	Unscrew the 2-M4 nuts fixed the damper motor, and exchange it
9	Mounting and connect the new damper motor by the step 2 to 8 in reverse order
10	Switch on power

### Replacement of the heater kit (option)

The heater element is to keep the temperature on an adequate level at low ambient temperature.

When to replace

The heater only needs to be replaced when it is faulty. The typical faulty would be that the unit will not be heating.

Before you start

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

A Torx 20 screwdriver

A spanner

A new heater, see “spare parts” for details

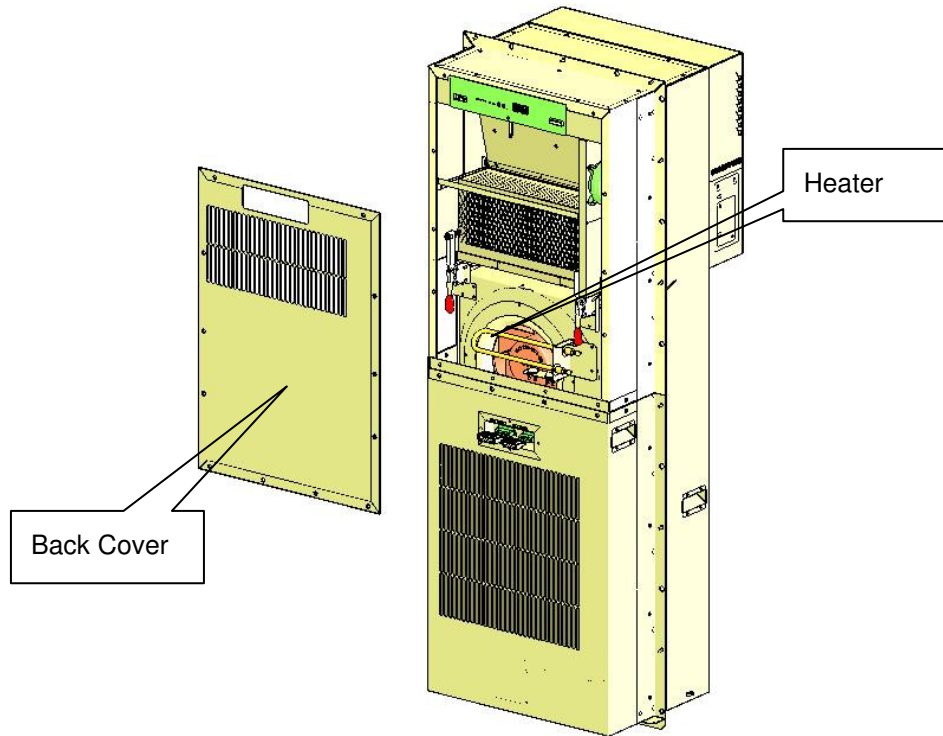
#### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

#### Illustration

This illustrates where the heater is placed.





**Follow these steps to replace the heater element:**

Step	Action
1	Switch off all powers of the unit
2	Unscrews the 12 torx screws holding the back cover in place and remove them
3	Unplug the heater connectors
4	Unscrew 2 nuts which fixed the heater on its bracket
5	Use the new heater replace the old one, mount it again
6	Mount the back cover again
7	Switch on power

## Replacement of filter blockage detection kit (option)

The filter blockage detection kit is to detect the air filter whether it was blocked.

When to replace

The filter blockage detection kit only needs to be replaced when it is faulty. The typical faulty would be that it is not act even if the set point is lower than 80Pa.

Before you start

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

A Torx 20 screwdriver

A 6# spanner

A 7# spanner

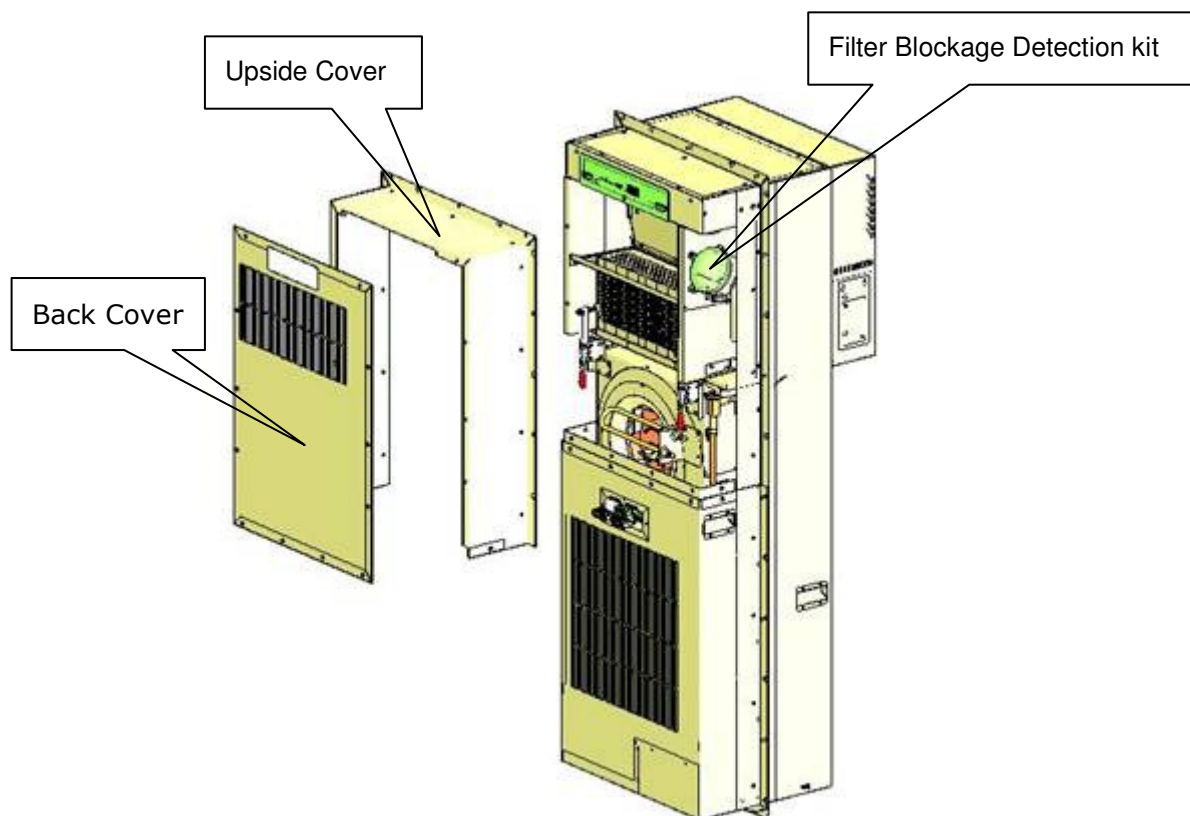
A new filter blockage detection kit, see "spare parts" for details

### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

### Illustration

This illustrates where the pressure switch is placed.



Follow these steps to replace the filter blockage detection fit:

Step	Action
1	Switch off all powers of the unit
2	Unscrews the 12 torx screws holding the back cover in place and remove them
3	Unscrew the 9-M4 nuts on the side and top flange which fixed the upside cover
4	Unscrew the 13-M4 torx screws on the upside cover and then remove the upside cover
5	Unscrew the 4-M3 nuts which fixed the filter blockage detection fit
6	Put out the filter blockage detection fit, use the new one replaced, and then reconnect the signal cable and the tube
7	Mount the filter blockage detection fit again
8	Mount the cover by the step 2 to 6 in reverse order
9	Switch on power

### Replacement of humidity detector (option)

The humidity detector is to detect the ambient humidity to prevent the high humidity air come in the cabinet when the damper is open.

When to replace

The humidity detector only needs to be replaced when it is faulty. The typical faulty would be that the damper is opening when outside is raining even the set point is lower than 50RH%

Before you start

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

A Torx 20 screwdriver

A 7# spanner

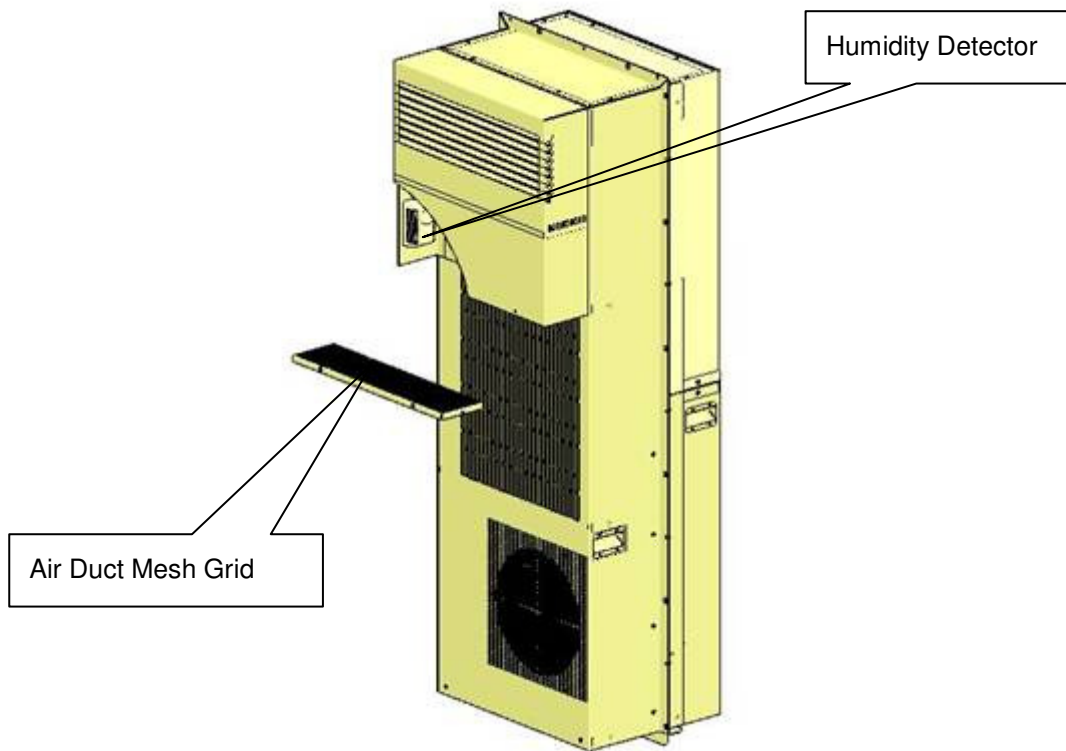
A new humidity detector, see “spare parts” for details

#### Caution

Only trained or certified technicians are allowed to carry out the replacement of parts. Remember that all power to the unit must be switched off or disconnected before start any service work on the unit.

#### Illustration

This illustrates where the humidity detector is placed, the humidity detector is placed in the front water-proof cover.



**Follow these steps to replace the humidity detector:**

Step	Action
1	Switch off all powers of the unit
2	Take off the air duct mesh grid
3	Use a straight screwdriver to take off the detector's white cover
4	Unscrew the 2-M4 nuts which fixed the humidity detector on the sheet metal.
5	Put out the humidity detector, and then replace it
6	Mount the humidity detector by the step 2 to 4 in reverse order
7	Switch on power

## 9、 Specifications

This section contains the specifications of this unit. Further details can be obtained by contacting Dantherm.

### Electrical data

Performance: Ambient/return = 35 °C / 35 °C

Specification		Value	Unit	Description
Voltage supply		220/230 ± 10%	VAC	One phase(the compressor can start only in the normal AC voltage range)
		48 ± 20%	VDC	-
Frequency		50/60 ± 1	Hz	Nominal
Cooling current	AC	5.2/8.0	A	Measured under 55 °C / 55 °C
	DC	2.3	A	Measured at specified condition
Heating current	AC	3.5/3.6	A	Measured at specified condition
	DC	2.3	A	Measured at specified condition

## Performance data

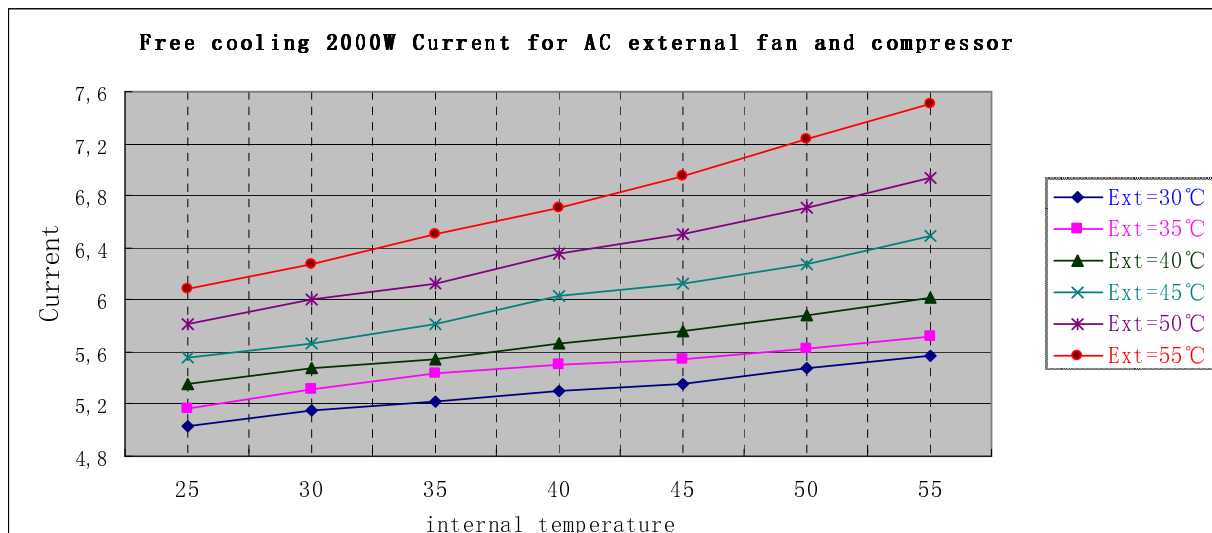
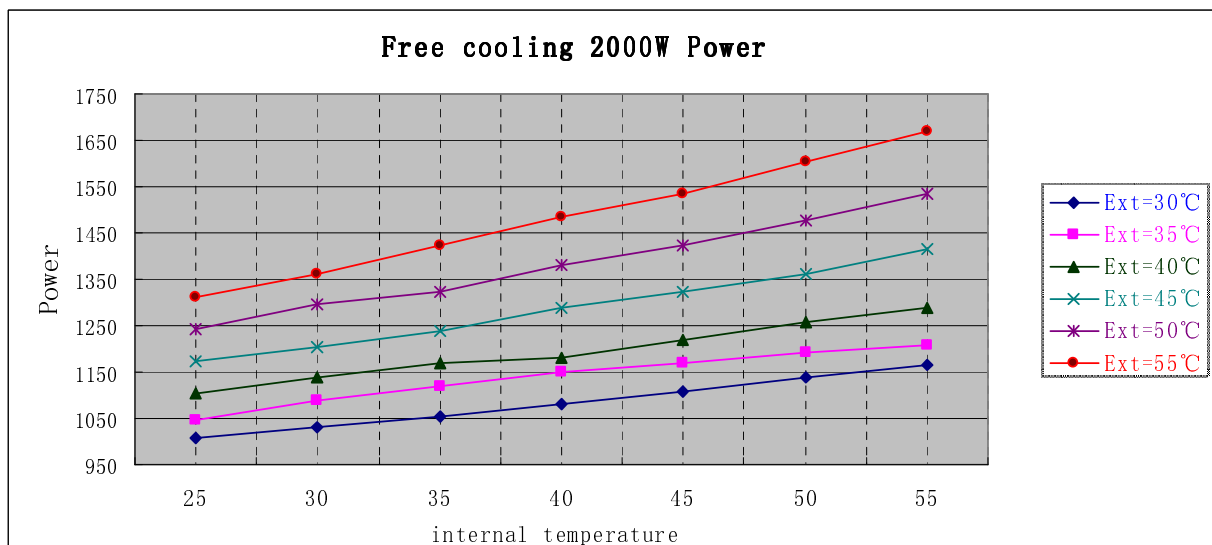
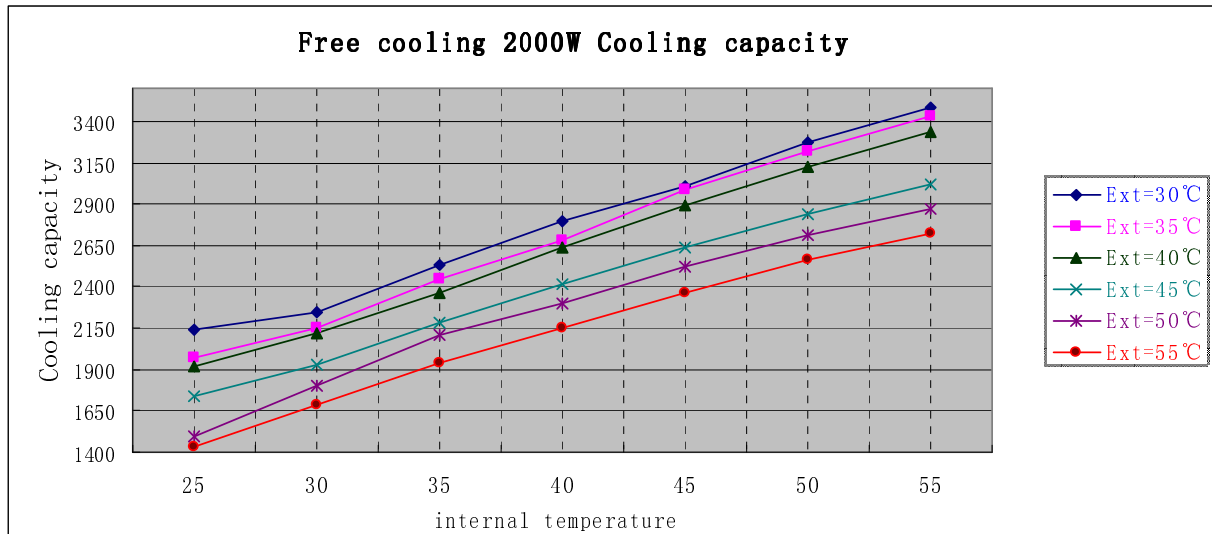
Performance: Ambient/return = 35 °C / 35 °C

Specification	Value	Unit	Description
Active cooling capacity	2000(50Hz) 2300(60Hz)	W	Include osmotic heat and solar gain
Free cooling capacity	135	W	Include osmotic heat and solar gain (Test Condition: Ambient/Return = 10°C/30°C)
Refrigerant	1000	g	R134A
Internal airflow	755	M <sup>3</sup> /h	Active cooling mode
External airflow	860	M <sup>3</sup> /h	External fan running at H speed
Internal airflow	744	M <sup>3</sup> /h	Free cooling mode
Design pressure(HP)	3.1	MPa	-
Design pressure(LP)	1.0	Mpa	-
Operating pressure	101.3	KPa	Operating pressure
Disp. Pressure	100	Pa	Estimated pressure drop internal
Drop pressure	50	Pa	Pressure drop in climate unit (int.)
Operating temperature	-40~+55	°C	Operating temperature
Noise	66.5 without cabinet	dB(A)	Max. Noise Level (test method: distance 1.5m, height 1.2m referred GR487)
	66.1 with cabinet	dB(A)	
	68.6 without cabinet	dB(A)	Max. Noise Level (test method: According ISO 3744 )
	59.2 with cabinet	dB(A)	

## Cabinet data

Specification	Value	Unit	Description
Dimension	1245*460*405	mm	Height*Width*Depth(with flange)
Net weight	68	kg	Exclude the packing
Sheet metal material	Aluzinc+SUS + ALMG	-	Out cover painted
Packing	1465*500*500	mm	Height*Width*Depth

## Performance curves



## 10、 Recycling of the unit

### Introduction

This air conditioner is designed to last for a number of years. When the time comes for the unit to be recycled, the following precautions should be taken to protect our environment.

Please note that the guidelines are general---local rules and procedures may overrule these guidelines and should be observed and followed carefully.

### Main components

The main components of the unit are:

The cooling circuit includes the compressor and the refrigerant liquid.

The printer circuits board (control board) with electronic components and connecting wires.

Fans.

Metal parts such as cover and air duct plates.

### Cooling circuit

When recycling an air conditioner, the refrigerant needs to be removed from the unit. Only certified cooling technicians with the necessary equipment may do this. The technicians should then pass the refrigerant to the local authorities for decomposition.

The compressor contains oil. Precautions must be taken to prevent the oil from polluting our environment. The compressor should together with the copper tubes be left for recycling locally.

### Printed circuit board (control board)

It is common that a set of local rules is made for the recycling of printed circuit boards as well as connecting wires. Generally it is important to separate the metal parts from the wires and PCB's before recycling.

### Fans

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


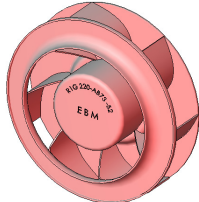

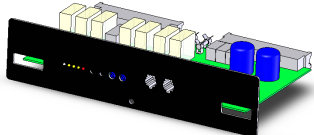

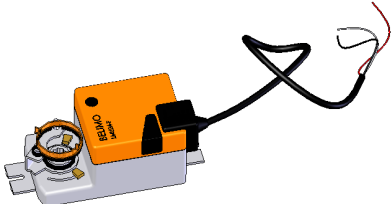
### Metal parts

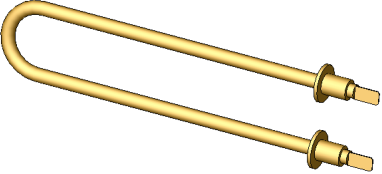
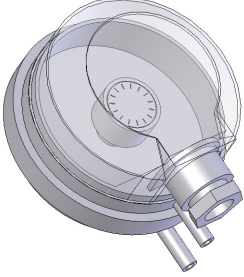
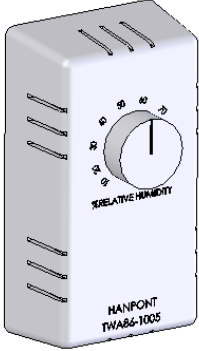
The metal parts are uncritical to recycle and can be left to local "scrap dealer". A few parts might have a thin visible layer of PVC-foam insulation. The PVC must be separated from the metal and recycled separately.



## 11、 Spare part

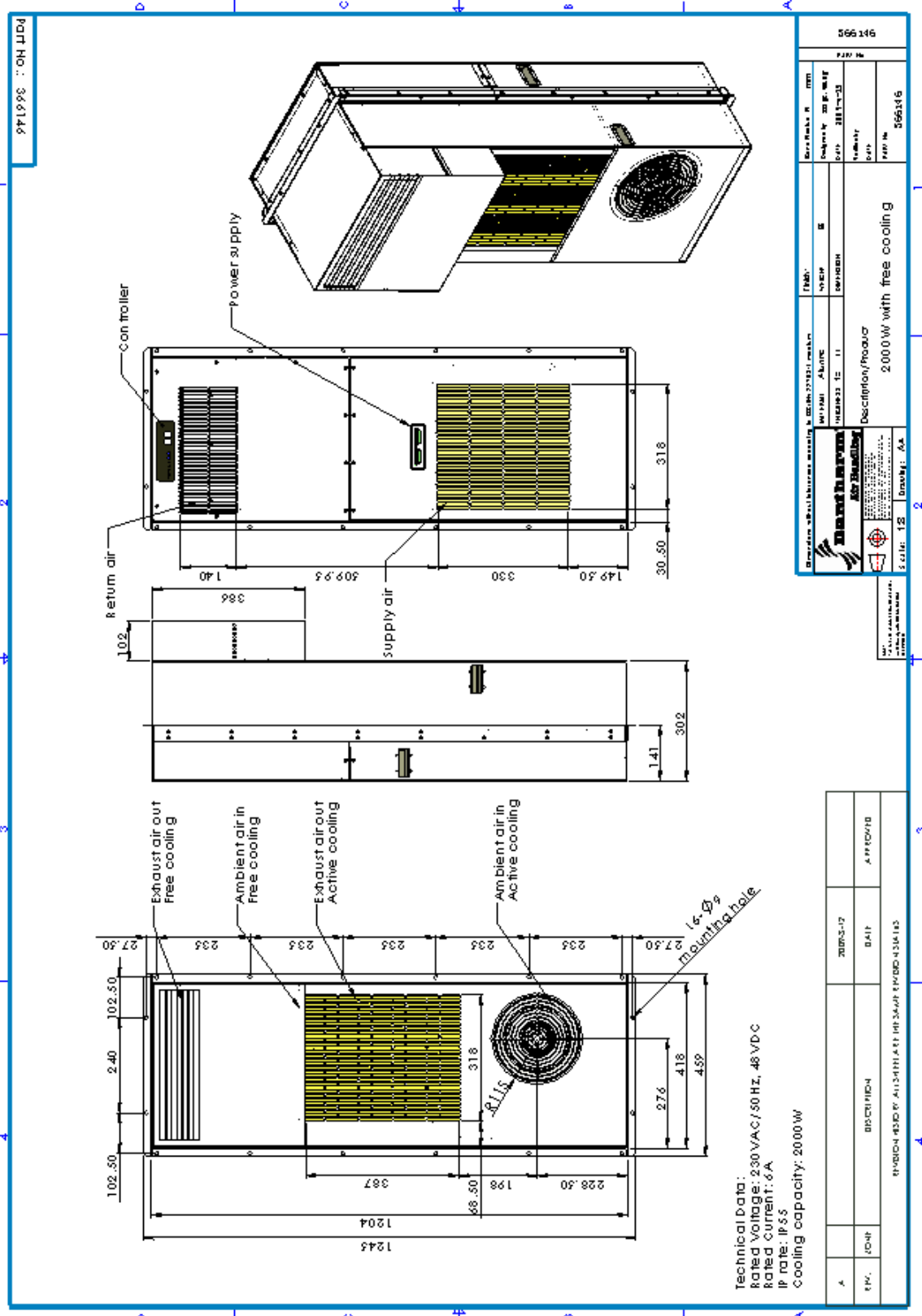
This section contains the Dantherm spare part number's to use when ordering replacement spare parts.

Dantherm part No.	Description	Picture
213506	Air filter	
040182	Internal DC fan	
182189 (182361)	External AC fan (182361----anti-salt fog)	
517966	Control board	
515520	Auto transformer	
213507	Damper motor	

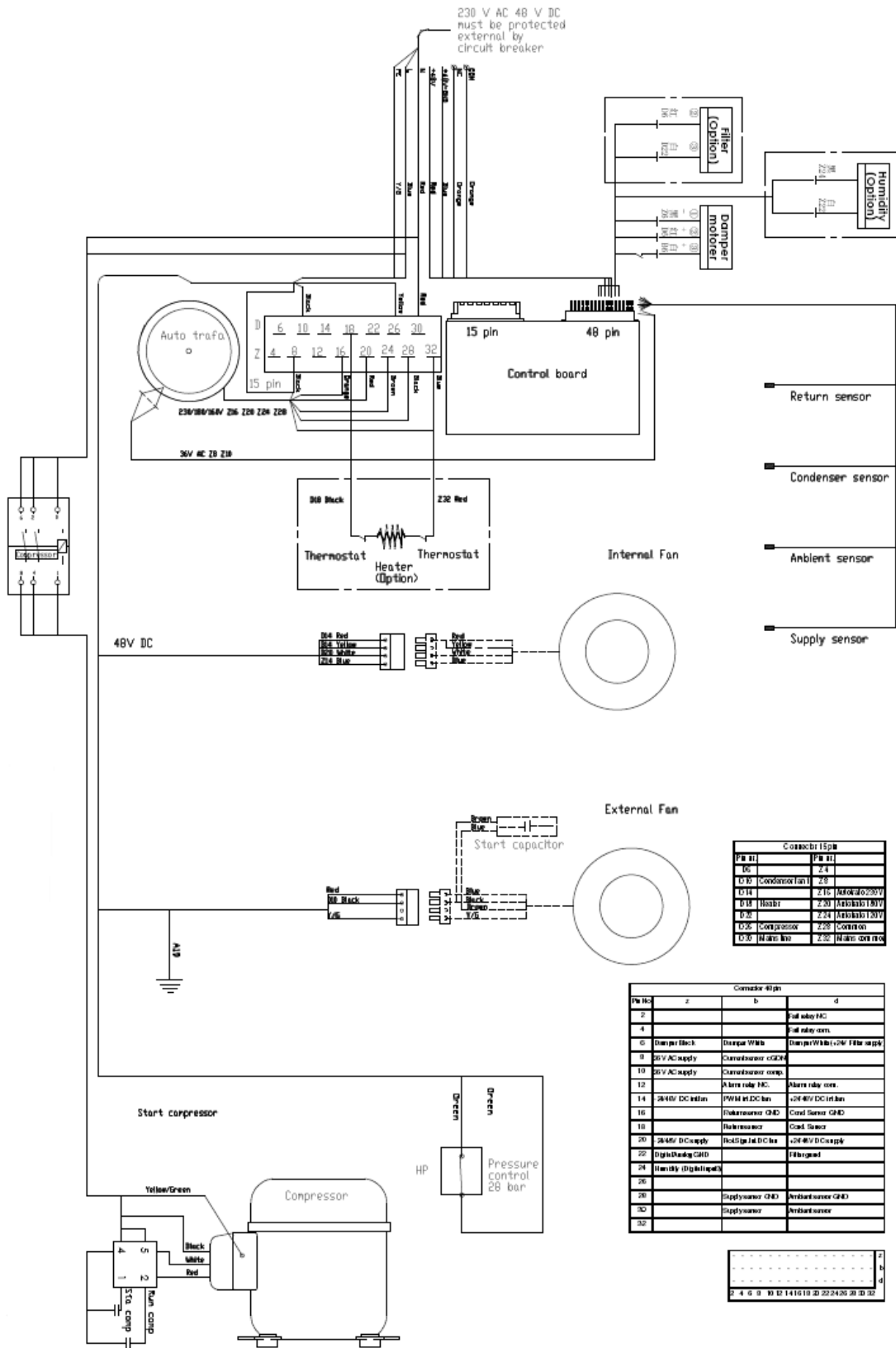
Dantherm part No.	Description	Picture
182207	800W heater (option)	
215096	Filter blockage detection kit (option)	
214614	Humidity detector (option)	

# 12、 Appendix

## Dimension



# Wiring diagram



## 13、Hotline help

The service department of Dantherm is ready to help in case of a problem. Please help yourself and us by having the following information's prepared before making the call.

Your name: \_\_\_\_\_ Company name: \_\_\_\_\_

Country: \_\_\_\_\_ Site/Location: \_\_\_\_\_

Phone No.: \_\_\_\_\_ E-mail (if possible): \_\_\_\_\_

Unit model: \_\_\_\_\_ Unit part No.: \_\_\_\_\_

Unit serial No.: \_\_\_\_\_

Description of problem: \_\_\_\_\_

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Then call +86 0512 66678500 and ask for the service department or fax +86 0512 66678501, help will be provided as soon as possible.