



Service Manual

Agility 1.0kW



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Revision History		
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01	First design	Jane (2009-06-01)
02	Second design	Jane (2009-09-15)
03	Third design	Jane (2010-03-02)
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1. Introduction

Purpose

This Service Manual is addressed to the technical crew, who installs and maintains the Agility 1.0kW through all steps in its lifetime.

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

Usage of the product

This unit is especially designed for cooling of electronic equipment and for door or side 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 -20°C to +70°C.
- 2、 Relative humidity maximum is 80%.
- 3、 The unit must be stored in an upright position.

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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 60 335-1	Low voltage
EN 60 335-2	Low voltage
EN 60 950	Electrical Machinery 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)
529-IP 55	IP rating according to IEC
CE	Declaration of conformity for machinery.

Kristian Askegaard



General Manager, Dantherm Air handling (Suzhou) Co., Ltd.

2. 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.

3. Installation and start-up

Within this section the procedure of getting started is described from unpacking till start-up.

Package

The unit can be delivered in different packages depending on shipping method, but the most common solution is packed with film and protected with paper corners. If that is the case, the film should carefully be cut open with a cutting tool.

Contents in the package The Agility 1.0kW air conditioner is delivered with an installation kit with the following content:

Item description	Quantity	Unit
Agility 1.0kW Air Conditioner	1	pcs
Service manual	1	pcs
Weather strip	3	m
M8 screw	8	pcs
M8 flat washer	8	Pcs
M8 stretch washer	8	Pcs

Tools

For installation:

- Small screwdriver (electrical shock protected)
- Cutting nippers
- spanner

Mounting

Mounting procedure

The mounting procedure of this unit should follow these steps:

1. Demount the package.
2. Stick the weather strip on the inside round.
3. Mount this unit on the chosen wall/cabinet with 8 M8 screws.
4. Connect the power cable and connector.

AC power Place the main power cable from the unit as wished, and connect it to the AC power supply by following mentioned three steps:

(Make sure that the power supply is powered off under installation!)

1. The air conditioner must be protected by fuse, air-break switch, etc.
2. Connect the blue/brown wire to power.
3. Connect the yellow/green wire to ground/earth.

Start-up

Plug and play

Turn on the power and the internal fan will start running. (If set points should be changed then do that first by adjusting set points on the operating panel of the electronic temperature controller.)

Demounting

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

1. Uninstall the main power cable from power supply. (Make sure that the power supply is powered off!)
2. Take out the signal cable.
3. Unscrew the 8 mounting screws. (Save the screws for reinstallation.)

4. Description of functionality

General description The Agility 1.0kW unit is an industrial controller Heat Management System especially designed for heat management of electronic enclosures. The unit contains compressor, condenser, evaporator, fans as well as an active cooling section. The unit will work in extreme temperatures ranging from -20°C to +55°C.

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

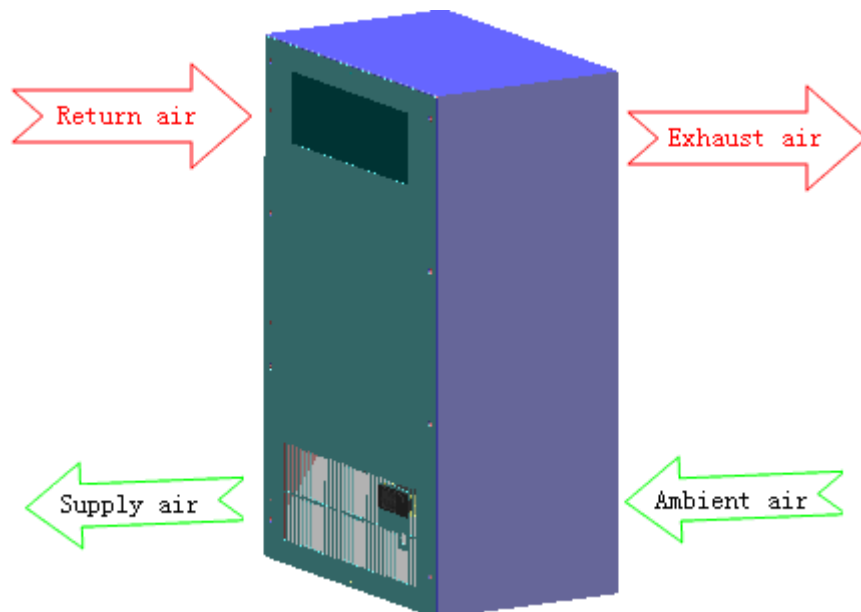
- Compressor
- Condenser fan
- Heater

Temperature

The controller manages the internal temperature based on the return air temperature.

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.



Set points

The set points can be adjusted on the operating panel of the electronic temperature controller.

The table below shows all the set point related information.

Standard settings	Range	Unit	Description	Function
25	16 – 40	°C	Compressor	If the return air temp. exceeds set point the compressor starts. If the return air drops to set point -5°C (0-15 adjustable) the compressor stops.
1	0 – 15	°C	Heater	If the return air temp. drops to set point the heater starts. If the return air increases to set point +1°C (0-15 adjustable) the heater stops.

Alarm signal

When an alarm is activated, the display shows the corresponding message (as illustrated in the table) that flashes alternating with the temperature; if fitted and enabled, the buzzer is also activated. Push SET key, make the buzzer turn into a quite mode .All the alarms have automatic reset (that is, they stop when the causes are no longer present).

Alarm code	Buzzer and alarm relay	Alarm description	rest	Enable alarm parameters involved
DI	active	DI error	automatic	
E0	active	Probe 1 error	automatic	
EE	not active	unit parameter error	not possible	
EF	not active	operating parameter error	manual	
HI	active	high temperature alarm	automatic	[AH] [Ad]
LO	active	low temperature alarm	automatic	[AL] [Ad]

Controller operation

Designation	Temp	[°C]	up	down	[°C]	Temp	Designation
Internal fan runs							
High temperature alarm		60	↑	↓	60		
		55			55		High temperature alarm rescind
		50			50		
		45			45		
		40			40		
		35			35		
		30			30		
Compressor starts Condenser fan starts	Return	25			25		
		20			20	Return	Compressor stops Condenser fan stops
		15			15		
		10	10				
Low temperature alarm rescind		5	5				
Heater stops	Return	2	2				
		1	1	Return	Heater starts		
		0	0		Low temperature alarm		
		-5	-5				
		-10	-10				
		-15	-15				
		-20	-20				
Internal fan runs							

Compressor operation

Runtime protection

To increase the lifetime of the compressor, the length of respectively for on/off mode can be no shorter than 3 minutes unless one of the following two restrictions are taking place: (standard set point.)

1. If the return air temperature increases to 25°C the compressor starts running.
2. If the return air temperature drops to 20°C the compressor stops.

Condenser fan operation

When the compressor starts it will activate the condenser fan to run.

If the return air temperature decreases to 20°C the compressor will stop even though it has been running less than 3 min. This will force the condenser fan to stop.

Heater operation

The heater is turned on and off by the electronic temperature controller according to the set point- see table above in the section: Set points.

If the heater is turned on the compressor will not be able to start, because the electronic temperature controller is prohibiting this situation to appear.

Internal fan operation

Always running

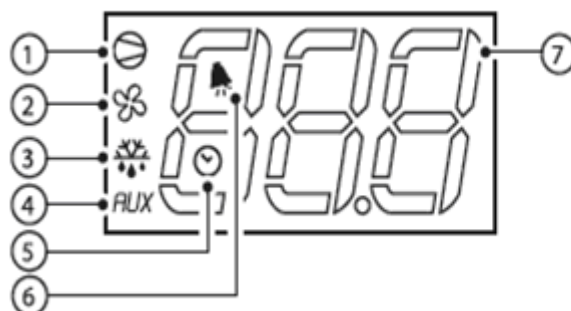
The purpose of the internal fan is to circulate the internal air, and therefore the internal fan will constantly be running when the power supply is turned on.

5. Operating panel

The electronic temperature controller includes an operating panel, which can be activated after inputting the password.

Display

but. no.	function compressor	normal operation			Display
		ON	OFF	flash	
1	compressor and cond fan	compressor and cond fan on	compressor and cond fan off	call	ON
2	unused	-	-	-	-
3	Heat	Heat on	Heat off	call	ON
4	Aux/Alarm	Alarm	No Alarm	call	OFF
5	unused	-	-	-	-
6	buzzer	Alarm	No Alarm	call	OFF
7	digits	three digits with decimal point and range -199 to 999. values in °C/°F			



Modifying the parameters

The operating parameters, set using the front keypad, are divided into two families: frequent (type F) and configuration (type C). Access to the latter type is protected by a password that prevents random modifications or entry by unauthorized persons.

Accessing the type F parameters

- Press the SET button for more than 5 seconds (in the event of alarms, first mute the buzzer) the display shows the code of parameter 'PS' (password);
- Use the UP and DOWN buttons to scroll the names of the parameters. The scrolling of the parameters is accompanied by an icon on the display that represents (where possible) the category the parameter belongs to;
- Press SET to display the value associated with the parameter; increase or decrease the value using the UP or DOWN button respectively; press SET to temporarily save the new value and return to the display of the parameter;
- Repeat the operations if necessary;
- Press the SET button for more than 5 seconds to permanently save the parameters and exit the parameter setting procedure.

Accessing the type C parameters

- Press the SET button for more than 5 seconds (in the event of alarms, first mute the buzzer) the display shows the code of parameter 'PS' (password);
- Press the SET button to enter the password; use the UP and DOWN buttons to scroll the numbers until displaying "22" (password to access the parameters);
- Press the SET button to confirm the password;
- Use the UP and DOWN buttons to scroll the names of the parameters. The scrolling of the parameters is accompanied by an icon on the display that represents (where possible) the category the parameter belongs to;
- Press SET to display the value associated with the parameter; increase or decrease the value using the UP or DOWN button respectively;
- Press SET to temporarily save the new value and return to the display of the parameter;
- Repeat the operations if necessary;
- Press the SET button for more than 5 seconds to permanently save the parameters and exit the parameter setting procedure.

Parameter List

Par.	Description	Vis.	min	max	unit	def
PS	Password	F	0	200	-	22
/2	Probes stability	C	1	15	-	4
/4	Displayed probe selection	C	1	3	-	1
/5	°C/°F selection	C	0(°C)	1(°F)	-	0
/6	Decimal point inhibit	C	0	1	-	0
/C1	Probe 1 offset	C	-50	50.0	°C/°F	0
/C2	Probe 2 offset	C	-50	50.0	°C/°F	0
St1	set point for compressor(setpoint1)	F	r1L	r1H	°C/°F	25
St2	set point for heater(setpoint2)	F	r2L	r2H	°C/°F	1
rd1	Regulation differential 1	F	0	15	°C/°F	5
rd2	Regulation differential 2	F	0	15	°C/°F	1
r1L	Min value for setpoint 1	C	-50	r1H	°C/°F	16
r1H	Max value for setpoint 1	C	r1L	+15 0	°C/°F	40
r2L	Min value for setpoint 2	C	-50	r2H	°C/°F	0
r2H	Max value for setpoint 2	C	r2L	+15 0	°C/°F	15
c0	start delay after power-on for compressor and heater	C	0	100	Min	0
c1	delay between 2 consecutive starts	C	0	100	Min	0
c2	minimum compressor OFF time	C	0	100	Min	3
c3	minimum compressor ON time	C	0	100	Min	3
A0	alarm differential temperature	C	-1	10	°C/°F	5
AL	low temperature alarm	C	-50	10	°C/°F	0
AH	high temperature alarm	C	30	80	°C/°F	60

Ad	temperature alarm delay	C	0	199	Min	0
A4	3rd input conf.	C	0	1	-	1
A7	digital input alarm delay	C	0	199	Min	0
F0	Fan control by temperature probe 2(CON.T)	C	0	199	Min	0
F1	Set point for fan	F	-50	130	°C/°F	45
F2	Controller close fan	C	0	1		1
F4	Regulation differential of fan	F	0	15	°C/°F	10
Ft	Set time for the temperature probe 2(CON.T) is higher F1 if the compressor is stop	C	0	200	Min	1
H0	supervisor serial address	C	0	207	-	1
H1	Choose the heater or fan	C	0	1		1
H4	disable buzzer	C	0	1	-	0
H5	ID code (read-only)	C	1	199	-	1
Notes:						
Vis: "F" means the parameters can access without password.						
"C" means the parameters are protected by password.						

Self-test

Press UP + DOWN for more than 5 seconds, start a self-test process:

Test point	Description	Int Fan	Heater	Comp.	Cond Fan	Alarm	Duration
1	OFF	On	Off	Off	Off	Off	8s
2	Heater	On	On	Off	Off	Off	20s
3	Alarm	On	Off	Off	Off	On	10s
4	Comp. and cond	On	Off	On	On	Off	45s

6. Technical data

Performance: Ambient/return = 35 °C / 35 °C			
Specification	Unit	Designation	Value
Loads			
Cooling capacity	W	Incl. osmotic heat and solar gain	1000
Heater	W	Heat dissipation (nominal voltage)	800
Refrigerant	g	R134a	400
Flow			
Internal	M ³ /h		400
External	M ³ /h		700
Pressure			
Operation	K Pa	Operating pressure	101.3 (70-106)
Disp.	Pa	Estimated pressure drop internal	100
Drop	Pa	Pressure drop in climate unit (int.)	50
Temperature			
T _{cool}	°C	Cooling set points	[+16 ~ +40]
t _{operate}	°C	Operating temperature	-20 ~ +55
Noise level	Db(A)	Sound Pressure @ 35°C	63
Cabinet data			
Specification	Unit	Designation	Value
Dimensions.	mm	Height x Width x Depth	738x452x295
Weight	kg	Net weight	44
Metal sheet material	mm	Aluzinc steel & stainless steel	1.0 / 1.5
Packaging	-	Pallet + Carton	-
Signage	-	Type signage and warnings	-
Electrical data			
Specification	Unit	Designation	Value
Voltage supply:	V AC	One phase	220
Power consumption.	W	Measured at specified condition	615
Frequency	Hz	Nominal (tolerance ±2 Hz)	50
Current	A	Measured at specified condition	2.3
Max. Start current	A	Compressor start-up	12

7. Preventive maintenance

General description

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.

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.

Recommended clean-up methods

Caution

Do not start working on the unit before both the AC supply 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! Two clean-up methods can be utilized.

clean-up method	Needed Tools and materials
Mechanical cleaning	Vacuum cleaner or compressed air Soft bristle brush Screwdriver
Liquid cleaning	NHR-60 cleaning agent for coil's fins Screwdriver Water

Procedure

uninstall Cut off the power supply. Take air conditioning off from the cabinet door or side.

clean **Mechanical Cleaning (recommended cleaning method)**

Step	Action
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.
2	You should finished all the items in the below check list. Then perform a test simulating all temperatures within the specified temperature range.

Liquid Cleaning

Step	Action
1	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.
2	You should finished all the items in the below check list. Then perform a test simulating all temperatures within the specified temperature range.

install Please install the unit and connect power. The cleaning and maintenance process is finished.

Checklist

Checklist	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, corrosion and show no obvious signs of leakage?		
Are the coil lamellas clean and undamaged?		
Are all fan blades free of obstructions, cracks, missing blades and in balance?		
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 spare parts

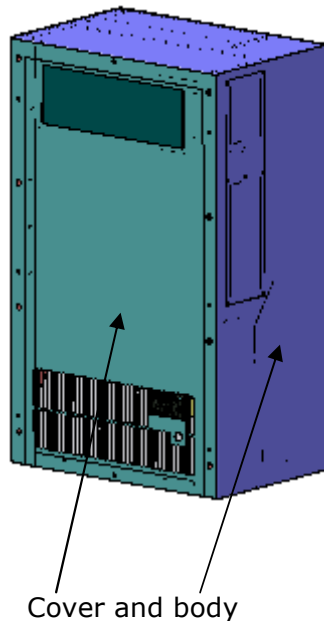
When to replace

No components in the air-con unit 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 they component is faulty!

Before the demounting the old spare part it is very important to order the new spare part at 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.

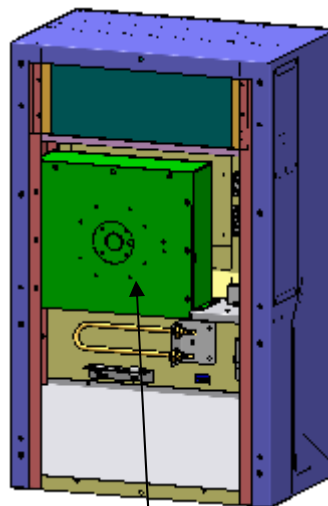
Replacing the internal fan

Step	Action
1	Unscrew 8 screws on the cover, and remove the cover from the unit.
2	Unscrew 7 screws on the internal fan box, then remove it.
3	Unscrew 6 screws on the internal fan box to open it, then replace the internal fan.



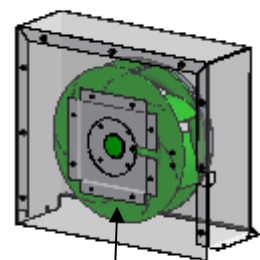
Cover and body

Step1



Internal fan box

Step2

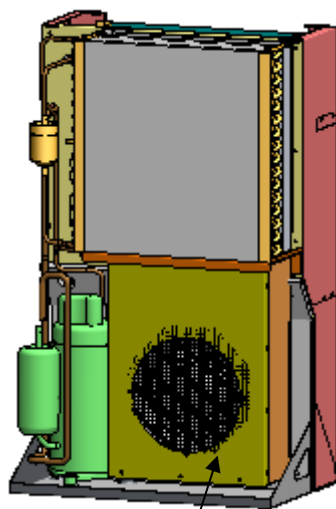


Internal fan

Step3

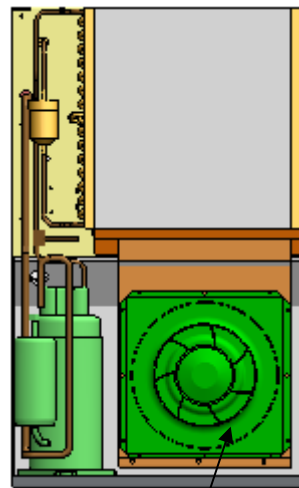
Replacing the external fan

Step	Action
1	Unscrew 8 screws on the cover, and remove the cover and the body from the unit.
2	Unscrew 11 screws on the external fan box cover, then remove it.
3	Unscrew 9 screws on the external fan bracket, then remove the bracket and the fan.
4	Unscrew the screw and replace the external fan from the bracket.



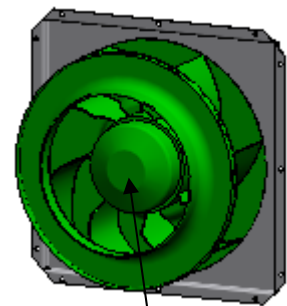
External fan box

Step2



External fan bracket

Step3

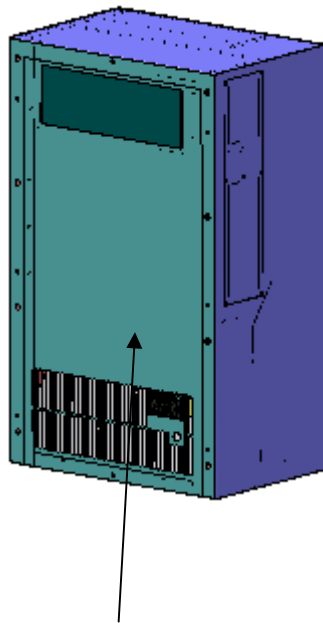


External fan

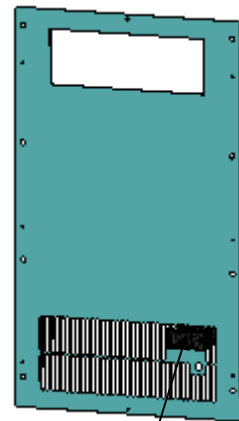
Step4

Replacing the control board

Step	Action
1	Unscrew 8 screws on the cover, and remove it from the unit.
2	Disconnect all cables mounted on the control board, then replace the control board.



Cover
Step1

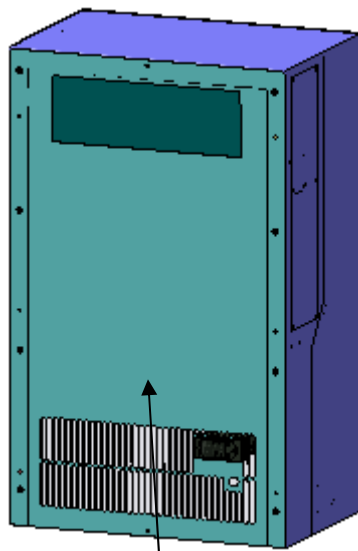


Control board
Step2

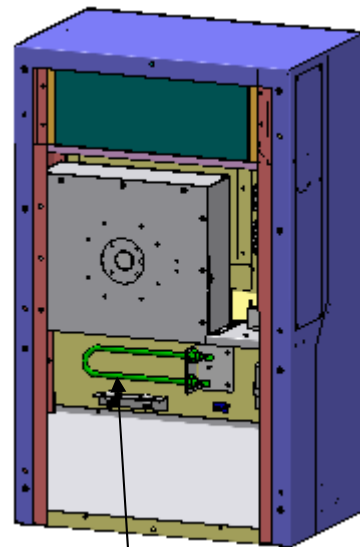
Replacing the heater

The heater is located below the evaporator coil on the internal site. If the heater should be replaced the following steps should be followed:

Step	Action
1	Unscrew 8 screws on the cover, and remove it from the unit.
2	Unplug the two cables directly connected to the heater. Unscrew the two nuts fixing the heater, and take it out. Replace the heater with a new one and fix it with the two nuts. Remember to reconnect the cables.



Cover
Step1



Heater
Step2

9. Scrapping

Introduction The air conditioner is designed to last for a number of years. When the time comes that the unit needs to be scrapped 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 including the compressor, coils and refrigerant liquid.
- Fans
- Metal parts such as shell.

Cooling circuit

Refrigerant gas 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.

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.

Compressor

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.

Fans

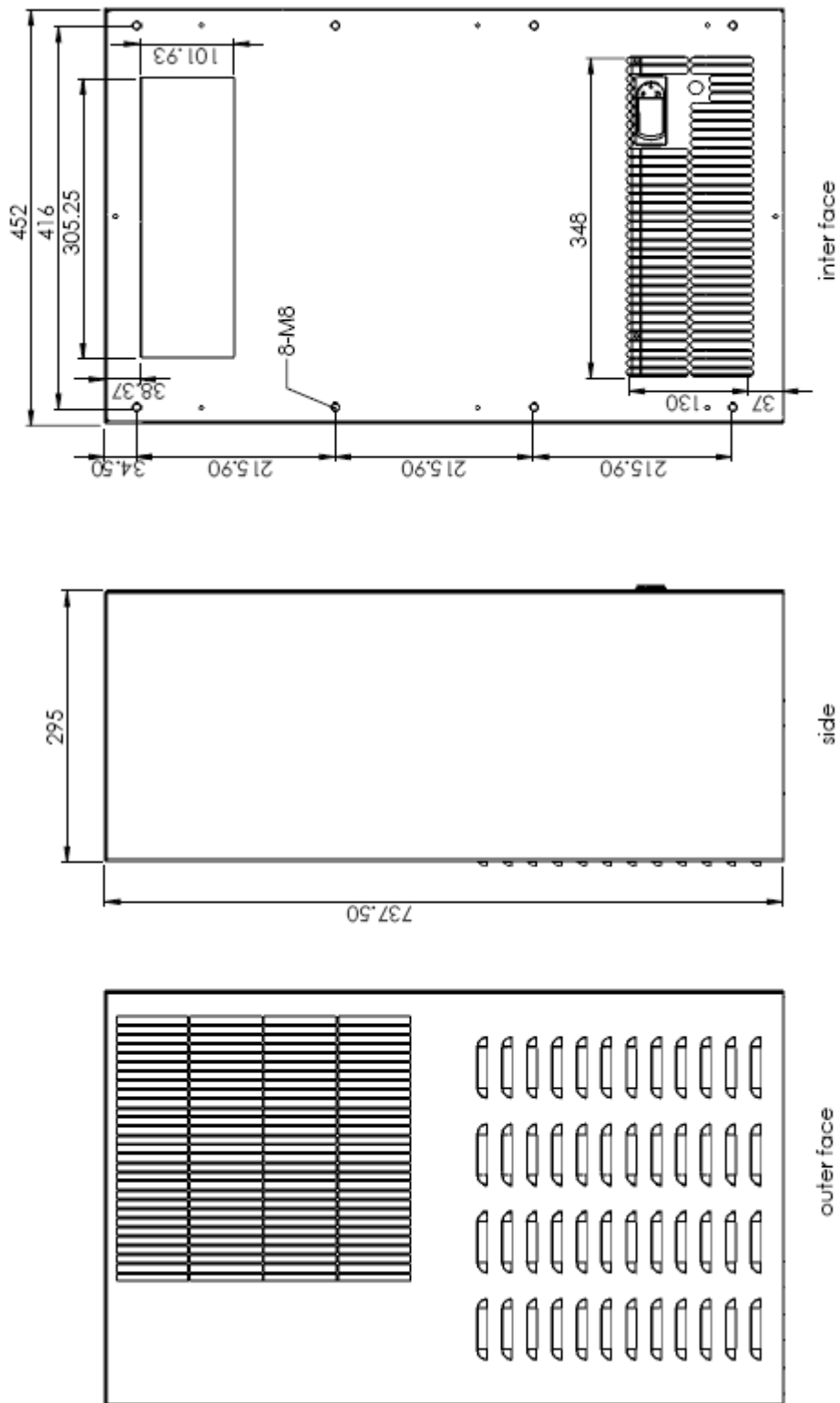
The fans consist of plastic, metal and an internal PCB. They are subject to recycling and should be left to the local “scrap dealer”.

Metal parts

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.

10. Model drawings and wire diagram

Model drawings



Wire diagram

