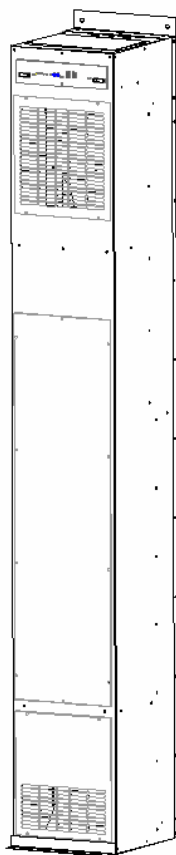


RBS 800

EN

NO. 910002 • rev. 2.0 • 01.12.2004



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Introduction

Overview

Introduction

This is the service manual for the DANTHERM RBS 800.

The below table of content gives you an overview of the main sections. Please see the complete Table of contents on page 4 for further information about the sections.

Serial number

This manual covers units produced after the below date, which is to be found in the first 6 digits in the serial number on the unit type plate (yy-mm-dd):

041201

Contents

This service manual covers the following main topics:

Topic	See page
Introduction	this page
Table of contents, complete General information	next page 6
Unwrapping, mounting and installation	21
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Technical information	43

Table of contents

Introduction

This is the complete table of contents covering all sections in this service manual. Each main section will begin with an introduction including a separate table of contents covering the exact section.

Contents

This service manual covers the following topics:

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General information

Introduction	This section gives you the general information about the unit and this service manual.
Manual, part number	Part number of this service manual is 910002.
Target group	This service manual is intended for technical staff who are to install the climate control unit, carry out preventative maintenance, and replace defective parts.
Copyright	Copying of this service manual, or part of it, is not allowed without written permission from Dantherm A/S.
Reservations	Dantherm A/S reserves the right to make changes and improvements of the product and the service manual at any time without prior notice or obligation.
CE Declaration of conformity	<p>Dantherm A/S, Marienlystvej 65, DK-7800 Skive hereby solemnly declares that the RBS 800 conforms with the following directives:</p> <ul style="list-style-type: none">• 97/37/EEC Machine directive• 89/336/EEC EMC directive <p>and has been manufactured in accordance with the following norms:</p> <ul style="list-style-type: none">• EN 292 Machine safety• EN 61000 EMC <p>December 2001</p>


Per Albæk - Managing Director

Product and functional description

Overview

Introduction This section describes the control strategy for RBS 800.

Contents The section contains the following topics:

Topic	See page
General description	next page
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Set points	12
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Comfort temperature during visit by technician	14
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General description

Introduction

The RBS 800 is a microprocessor-controlled free cooling unit designed for the regulation of the temperature in an electronics room.

The unit can operate in temperatures from $\div 40\text{ }^{\circ}\text{C}$ to $+ 55\text{ }^{\circ}\text{C}$.

The RBS 800 is intended in particular for positioning indoors, and its slim line design allows it to be installed in most rooms and containers.

Active parts

The active parts controlled by the control panel are:

- Heating element
 - Damper motor
 - Fan
-

Terms

The following terms are used in this manual:

- Outdoor air temperature: the temperature of the air outside the room or container. This is the air that can be used for cooling purposes
 - Supply air temperature: the temperature of the air blown into the room
 - Return air temperature: the temperature of the air extracted from the room or container
-

Signal lights

On the front of the control panel, there are five LEDs that indicate the current status of the system:

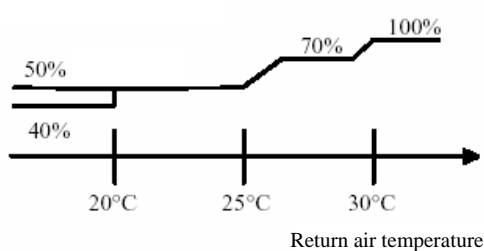
Learn more about the LEDs in section "Description of indicators, plugs and switches", page 16.

Fan

The function of the fan

The fan runs continually to circulate the air inside the room. Regulation of the fan revolutions is defined by the temperature of the return air.

- Below 25 °C
The fan runs at minimum revolutions
- Over 25 °C
The fan revolutions will increase
- At 30 °C
The fan will reach its maximum speed of revolution



If a smoke alarm (accessory) is triggered, the fan will stop immediately, irrespective of the temperature.

The fan is monitored with the assistance of a pulse generator fitted in the fan.

Back-up-function

RBS 800 can also be used as back-up unit for other cooling units that are responsible of the primary cooling.

In back-up mode will both the fan and the damper be hindered in operation because of the set point.

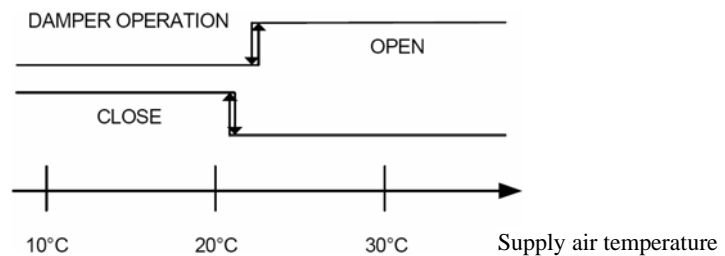
The set point can be set between 25 °C and 35 °C. The settings for back-up condition has to be set on the control board, where dip switch no. 6 must be put on ON, see more about this in section "Communications options", page 15.

Damper

Damper function Primary temperature regulation is carried out using a flow of outdoor air controlled by a damper.

The supply air consists of a mixture of the air from the room and from outdoors. The opening and closing of the damper is determined by a sensor that measures the temperature of the supply air.

The damper automatically adjusts against closed or open to reach supply air temperature at 21-22 °C. Damper mode is conditioned by the fact that the set point on the control panel has been reached. This set point relates to the return air temperature and can be set from 25 °C to 35 °C. (Learn more about this in section "Set points", page 12.



A signal from a moisture meter (accessory) will cause the damper to close if there is an AC current in the unit.

A signal from a smoke detector (accessory) will cause the damper to close immediately.

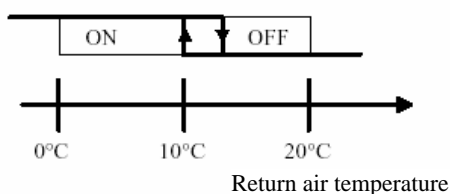
If the heating element is activated, the damper will be closed.

As the damper is not a spring-return damper, it will remain in position in the event of a power failure.

Heating

Heating function The heating function is activated when the temperature of the return air matches the setting defined using the knob on the front of the control unit (Learn more about this in section "Set points", page 12).

It will be deactivated when the return air temperature exceeds this setting by 3 °C.



The fan speed will be fixed to 50 % when the heating element is activated.

Power consumption is monitored, and if it falls below 3 A, it will be considered an error. This will be indicated via the error relays. See the section entitled "Fault finding guide", page 38 for additional details. However, a simultaneous AC power failure will result in this error being rejected.

In the event of a fan error, the heating element will not be activated as in this case it will not be possible to ensure the required airflow to the heating element.

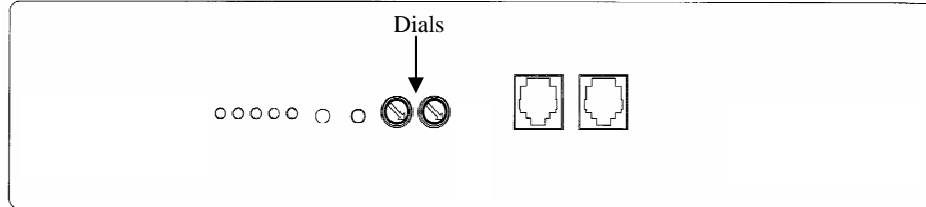
A signal from a smoke detector (accessory) will cause immediate deactivation of the heating element.

If you choose not to use the heating element, this function and the associated monitoring process can be deactivated. This can be done via the serial communication set-up and the setting will be saved in the control unit.

Set points

Drawing

This drawing illustrates the control panel with the dials:



Heat mode

Setting of the heating mode set-point shall be made on the front of the control panel (see illustration above) and it can be set from 0 °C to 20 °C.

Damper mode

Setting of damper mode set-point shall be made on the front of the control panel and it can be set from 25 °C to 35 °C.

Telemetry or DanView

When Telemetry or DanView display is used the set-point areas extends to:

- Heat: ÷ 10 °C to + 20 °C.
- Damper: + 20 °C to + 50 °C.

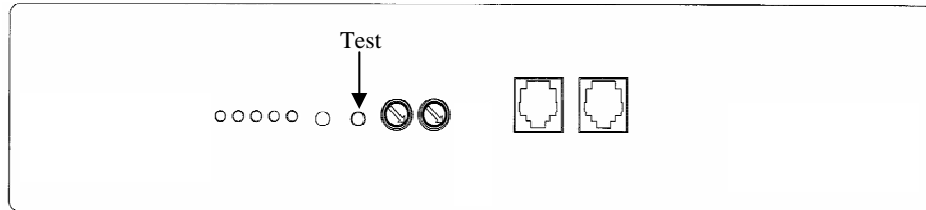
However, the controller will insist of a difference between the heating set-point and the damper set-point of minimum 5 °C, and it will therefore ignore attempts of setting them closer.

Settings made via telemetry are valid as long as valid communication is available and 10 minutes more.

Test facility

Drawing

This drawing illustrates the control panel with the test button:



Test

When activating the test button the unit starts the 5-step-test program. The unit will run through the different tests according to the below table.

The fail LED will operate normally indicating fail if and when detected.

If any fail is detected during the test, the LED will flash with a frequency of 1 Hz for 30 seconds after the test is done to indicate some fault were detected.

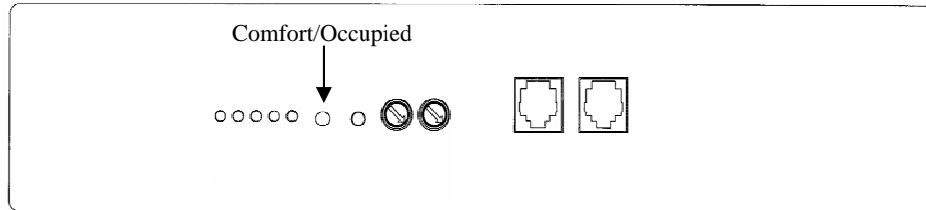
The table below describes what is checked during the test.

Test point	Heater	Damper	Internal fan	LED	Duration
1	Off	Closing	Stopped	Jingle	30 sec.
2	On	Closing	Idle	Normal	35 sec.
3	Off	Opening	Medium	Normal	40 sec.
4	Off	Closing	High	Normal	35 sec.
5	Off	Closing	Idle	Normal	30 sec.

Comfort temperature during visit by technician

Drawing

This drawing illustrates the control panel with the comfort button:



Comfort temperature

On the front panel of the control unit, there is a button marked "Occupied" (see drawing above).

Press this button and hold it down for 1–2 seconds to initiate comfort temperature conditions with temperatures between 20 °C and 25 °C and with a reduced noise level. This condition will continue for 60 minutes but can be cancelled by pressing the same button briefly. If you press the button and hold it down, the unit will remain in comfort condition.

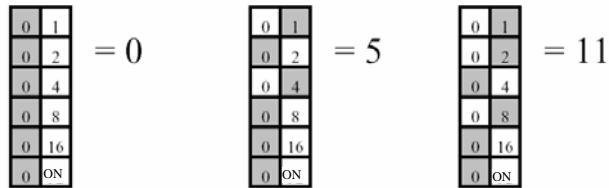
Communications options

Telemetry option All available information is supplied through the serial RS485 line. It is available through both RJ45 plugs located in the front of the control panel and in the plug behind the control unit.

A PC program for testing and troubleshooting is also an option.

The number of the unit is defined through a binary DIP converter located on the control unit. The factory setting is 0.

Setting:



Back-up

Dip switch no. 6 has been reserved for back-up setting.

When the switch is set on ON, the unit will function as a back-up unit. This could be preferable in situations where there are other primary cooling units in the shelter.

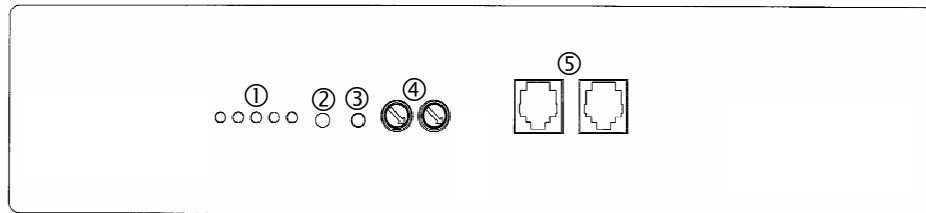
In back-up condition the unit will be standby and not running, unless the adjusted cooling and heating set point is registered by the return air temperature sensor. See more about this in section "Fan", page 9.

Description of indicators, plugs and switches

Introduction This section describes the indicators, plugs and switches with reference to the control unit.

DanCon All RBS 800 units are provided with a DanCon control panel.

Illustration This drawing illustrates the control panel:



Part/function This table gives you a description of each part on the control panel:

Part	Function
① LED	The LEDs show the status and the alarm Learn more about the status and alarms in the following
② Occupied	By pressing this bottom the unit will go into the occupied mode. Learn more about the occupied/service mode in section "Comfort temperature during visit by technician", page 14
③ Test	By pressing this button the unit will run through a quick test program. Any detected fail can be read on the fail LED, see more about this in section "Test facility", page 13
④ Dials	These dials give you the possibility of changing the heater and/or the damper set points, see more in the section "Set points", page 12
⑤ RS485 communication port	These ports give you the possibility of connecting a pc and/or DanLink telemonitoring program (accessory). See more about this in section "Communications options", page 15

Continued overleaf

Description of indicators, plugs and switches, *continued*

Signals of LED

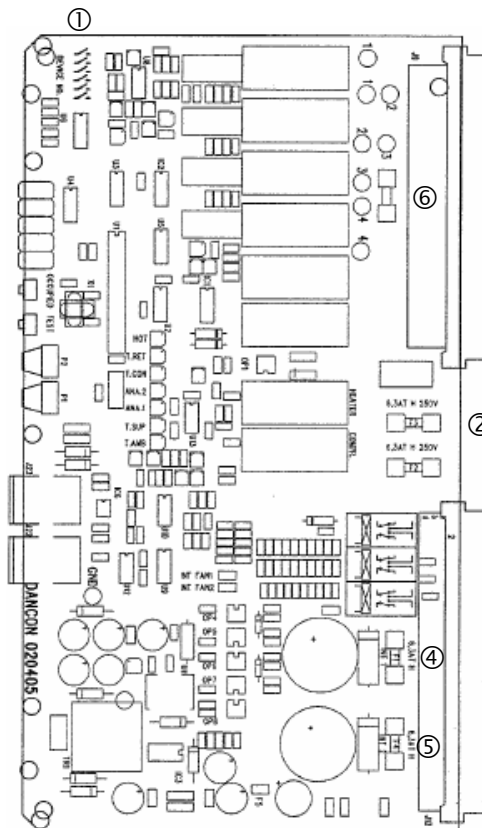
The LED provides different signals. The below table gives you a description of each signal:

A jingle starts when the unit is connected.

Part	Function	
1 x Green LED	Supply	Lit as soon as the control panel is powered up
3 x Yellow LED	Damper	Lit in damper mode
	Heater	Lit in heater mode
	Test	Lit in test mode
1 x Red LED	Alarm status	Lit in case of a detected failure, see details in section "Fault finding guide", page 38.

Fuses and switches

The illustration below shows the control unit and the location of the fuses and switches:



Continued overleaf

Description of indicators, plugs and switches, *continued*

Part/function

This table refers to the illustration on the previous page:

No.	Part	Function
1	DIP switch	Selection of unit number
2	Fuse 6,3 AT	Heating element
3	Fuse 6,3 AT	AC
4	Fuse 6,3 AT	Not used
5	Fuse 6,3 AT	Not used
6	Fuse 6,3 AT Fuse 4,0 AT	Not used Not used

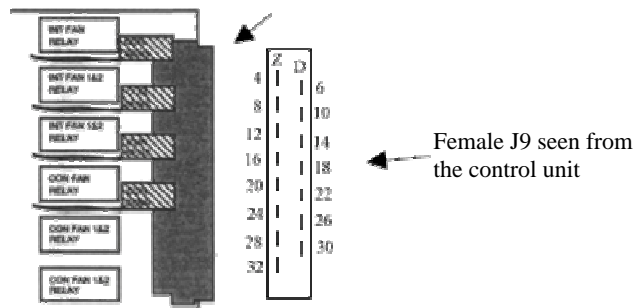
RS 485 jack's

This table lists the connections in the plug:

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

Main power J9

This illustration shows the main power plug in the control unit:



Continued overleaf

Description of indicators, plugs and switches, *continued*

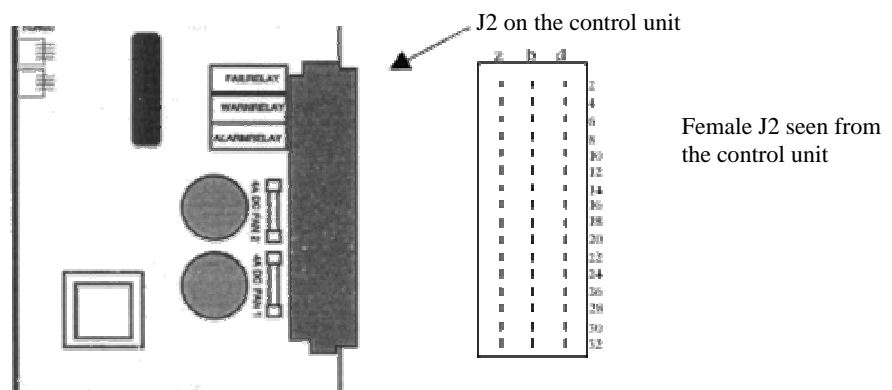
Part/function This table refers to the illustration above:

Pin no.	Function
D 6	I Not in use
D 10	Not in use
D 14	Not in use
D 18	Heating element
D 22	Not in use
D 26	Not in use
D 30	Main line
Z 4	Not in use
Z 8	Fan

Part/function,
continued

Pin no.	Function
Z 16	Autotransformer 230 V
Z 20	Autotransformer 180 V
Z 24	Autotransformer 120 V
Z 28	Shared
Z 32	Main power, shared

Low voltage J2 This illustration shows the low voltage plug in the control panel:



Continued overleaf

Description of indicators, plugs and switches, *continued*

Part/function

This table refers to the illustration above:

Pin no.	z	b	d
2	Interconnection -	“Warning” relay NC.	Fail relay NC.
4	Interconnection +	“Warning” relay com.	Fail relay com.
6	Damper GND	Damper control	Damper supply
8	36 V AC supply	Power meter compr. GND	Power meter heat GND
10	36 V AC supply	Power meter compr.	Power meter heat
12	GND	Alarm relay NC.	Alarm relay com.
14	- Batt Int DC fan.	PWM Int. DC fan	+ Batt Int DC fan.
16	“Hot spot” sensor GND	Return sensor GND	Cond. sensor GND
18	“Hot spot” sensor	Return sensor	Cond. sensor
20	- 48 V DC int. fan	Rot. Sign. Int. DC fan	+48 V DC int. fan
22	Dig./Analogue GND	Analogue input 2	Analogue input 1
24	Digital input 3	Digital Input “Occupied”	Digital Input smoke alarm
26	- Batt ext. DC fan	PWM Ext. DC fan	+ Batt ext. DC fan
28	RS 485 B	Supply air sensor GND	Outdoor air sensor GND
30	RS 485 A	Supply air sensor	Outdoor air sensor
32	- 48 V DC ext. fan	Rot. Sign. Ext. DC fan	+48 V DC ext. fan

Input/output terminals

An extra row of terminals is located next to the supply terminals:

Terminal no.	Description
1	Warning
2	Warning
3	Alarm
4	Alarm

Unwrapping, mounting and installation

Introduction

This section describes how the unit must be unwrapped, mounted, installed, started and disconnect.

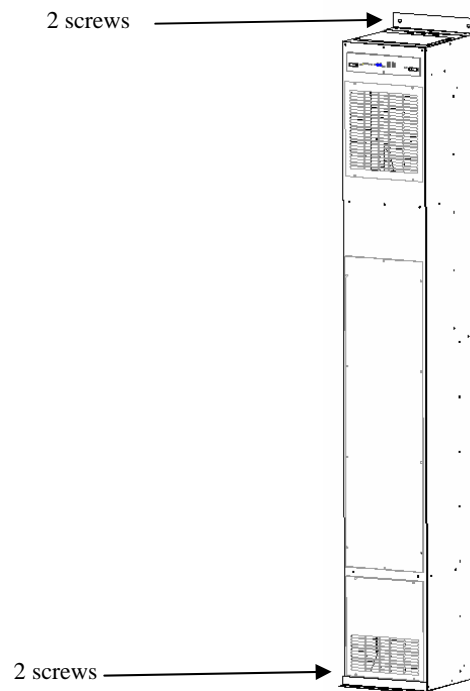
Unwrapping

The RBS 800 is delivered in cardboard packaging and consists of the following parts:

- 1 x RBS 800
 - 1 x floor flange (loose)
 - 4 x screws with washers
 - 1 sealing profile for fitting between the floor and the flange
 - 1 service manual
-

Installation

The climate control unit must be installed vertically using 4 screws (2 at the top and 2 at the bottom). The screws must pass through the flanges and sit firmly in the wall or floor.



Continued overleaf

Unwrapping, mounting and installation, *continued*

Procedure

To connect the climate control unit, follow these steps:

Step	Action
1	Important Check that both the 220 V AC and 48 V DC connections are free from current before you start the connection procedure. Make sure that the 220 V AC connection is protected by a 10 A fuse.
2	Connect the control cables via the 9-pole "D" plug in the control unit, which is used for remote control of the set points.
3	Connect the 48 V/2.5 A DC supply to the 2-conductor cable <ul style="list-style-type: none"> • red to positive • black to negative
4	Connect the earthed 220 V/50 Hz AC supply to the 3-conductor cable <ul style="list-style-type: none"> • blue to neutral • brown to phase • yellow/green to Earth

Start

Once the unit is connected, switch on the power. The climate control unit can now be programmed using the external control unit if required, and the system will then be ready for use.

Disconnection

To disconnect the climate control unit, follow these steps:

Step	Action
1	Switch off the AC and DC supplies to the climate control unit
2	Disconnect the AC and DC power supply cables from the control unit, which is positioned under the inspection cover at the top of the unit
3	Remove the cable from the 9-pole "D" plug on the control unit
4	Remove the 2 screws that hold the flange to the floor
5	Remove the 2 screws at the top of the unit that hold the unit to the wall. NB: Remember that removing these screws will free the climate control unit and that it can therefore fall over

Service guide

Overview

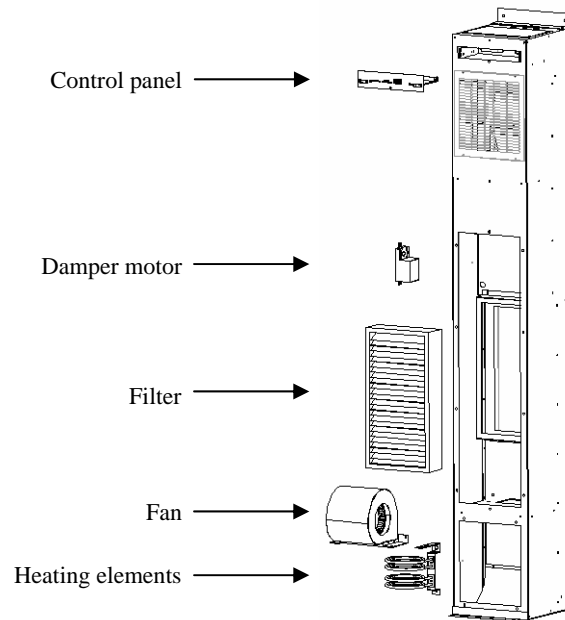
Introduction

The climate control unit requires little maintenance. In fact the only maintenance required is replacement of the filter that prevents dust from the ambient air from entering the sensitive electronic circuits. When replacing the filter, you must clean the air ducts and test the functions of the climate control unit.

If any of the vital parts are defective, they must be replaced. This section describes how this is done.

Positioning

The replaceable parts for which instructions are supplied are shown in this overview drawing:



Contents

This section contains the following topics:

Topic	See page
Preventative maintenance	next page
Spare parts	26
Fault finding guide	38
Hotline	40
Recycling of the unit	41
Service agreement	42

Preventative maintenance

Introduction The units are often placed in tough environments distinguished by high temperatures, humidity and dust. Preventative maintenance is essential to ensure that the unit always has the capacity to perform as expected.

Warning! Remember to disconnect all power supplies to the unit before starting work. The power must not be reconnected until the work has been completed and the unit is ready for testing.

Tools needed You will need the following tools for the maintenance work:

Use a ...	to...
Vacuum cleaner and/or air compressor	Clean the unit thoroughly
Soft brush or paintbrush	Remove the dirt that could not be removed by vacuuming or blasting with compressed air.
Screwdriver and torx	Tighten loose screws

Intervals In the same way as a car, the unit must be checked at regular intervals. Failure to perform preventative maintenance regularly can result in stoppages of both the unit and the electronic systems it was intended to keep cool or warm.
The interval between maintenance checks must not exceed 6 months. These checks should be planned for immediately before and after the hot season. This will make sure that the unit will be able to meet requirements for cooling and heating.

Warranty conditions The factory warranty is only valid if preventative maintenance checks at intervals of no more than 6 months can be documented. This documentation may take the form of an on-site log or a print-out from the PC test program.

Recommended procedure The recommended procedure for preventative maintenance checks is:

Step	Action
1	Make sure that the unit is completely free from current of all kinds
2	Clean the unit thoroughly: <ul style="list-style-type: none"> • Air ducts • Fan blades

Continued overleaf

Preventative maintenance, *continued*

Recommended procedure, *continued*

Step	Action
3	Carry out the tasks specified in the checklist below
4	Reconnect the power supply to the unit
5	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

Tasks

The following tasks constitute the minimum to be carried out during a preventative maintenance procedure:

Topic	Yes	No
Is the fan free of rust?	<input type="checkbox"/>	<input type="checkbox"/>
Is the fan properly affixed and free from unwanted vibrations?	<input type="checkbox"/>	<input type="checkbox"/>
Are the fan blades all present, free of cracks and properly balanced?	<input type="checkbox"/>	<input type="checkbox"/>
Are all cables and insulation covers undamaged?	<input type="checkbox"/>	<input type="checkbox"/>
Are all plugs connected and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>

Computer test

A computer program has been developed to test the unit. Refer to the manual included in the test package for additional details.

Spare parts

Introduction This subject contains instructions for replacement of spare parts.

Contents The subject contains the following topics:

topic	See page
How to replace the filter	next page
How to replace the fan	29
How to replace the control panel	31
How to replace the heating element	33
How to replace the damper motor	35
How to replace the temperature sensors	37

How to replace the filter

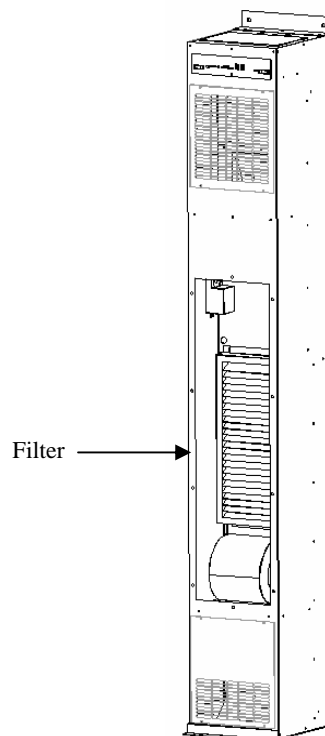
Introduction There is a mechanical filter in the climate control unit to ensure that external impurities in the air cannot pass through into the internal environment.

When to replace it Just how often you have to replace the filter depends on where the unit is installed. As a rule of thumb, the filter must be changed at least once a year.
If the filter becomes soiled, the airflow will be reduced and the climate control unit trigger an alarm to the external monitoring system.

Before you start Before you start to replace the filter, make sure that you have the following with you:

- 1 torx 25 screwdriver
- 1 new panel filter from CAMFILL (Dantherm spare part number 290540)

Drawing This drawing shows the climate control unit with the inspection cover in the middle of the unit removed:



Continued overleaf

How to replace the filter, *continued*

Procedure

To replace the filter, follow these steps:

Step	Action
1	Switch off the AC and DC supplies to the unit
2	Remove the torx screws to remove the inspection cover in the middle of the unit
3	Remove the 4 torx screws to remove the filter. NB: The arrow at the end of the filter shows which way it is to be inserted!
4	Fit the new filter. NB Remember to position it correctly! See step 3
5	Refit the inspection cover
6	Switch on the AC and DC supplies to the climate control unit.
7	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

How to replace the fan

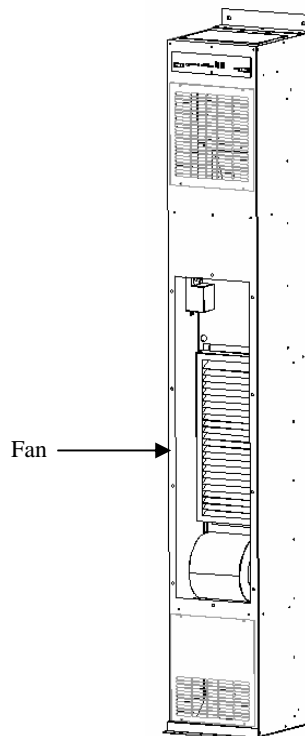
Introduction The fan is located at the bottom of the climate control unit. It is a 48 Volt DC fan that is connected to the control circuit.

When to replace it The fan must be replaced when it sounds unusual or is otherwise defective.

Before you start Before you start to replace the fan, make sure that you have the following with you:

- A torx 25 screwdriver
- A socket screwdriver (straight notch) for disconnecting cables in the connector sleeve.
- A new EBM fan (Dantherm spare part number 291830)

Drawing This drawing shows the climate control unit with the inspection cover in the middle of the unit removed:



Continued overleaf

How to replace the fan, *continued*

Procedure

Follow these steps to replace the fan:

Step	Action
1	Switch off the AC and DC supplies to the climate control unit
2	Remove the torx screws to remove the inspection cover in the middle of the unit
3	Remove the 4 torx screws that hold the fan in place
4	Carefully pull the fan out and disconnect the cables from the plug
5	Fit the plug to the new fan
6	Put the fan in position and fasten it with the 4 torx screws
7	Make sure that the fan can rotate freely and then replace the inspection cover
8	Switch on the AC and DC supplies to the climate control unit
9	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

How to replace the control panel

Introduction

The control panel is a PCB fitted with a microprocessor and inputs and outputs for all the electrical parts of the RBS 800. They control the fan and the damper on the basis of three temperature sensors.

When to replace

The control panel should only be replaced when it is broken.

Before starting work

Make sure you have the following before starting work:

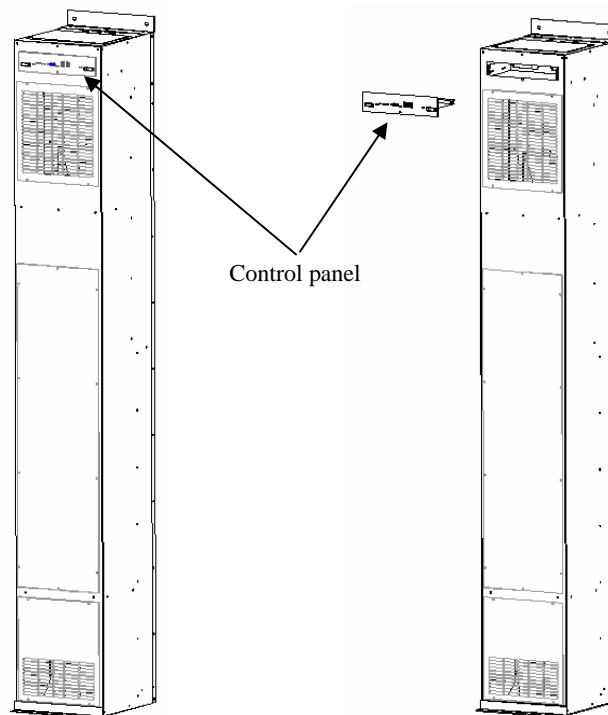
- A torx 20 screwdriver
 - A new control panel (Dantherm spare part number 290520)
-

Warning!

Switch off the AC and DC supplies to the unit before starting work!

Drawing

This drawing shows where the control panel is located:



Continued overleaf

How to replace the control panel, *continued*

Procedure

Follow these steps to replace the control panel:

Step	Action
1	Switch off the AC and DC supplies to the unit
2	Remove the torx 20 screw that holds the control panel in place
3	Pull the two white plastic handles out and press them away from the middle of the control panel. Result: You can now remove the control panel
4	Check that the E-PROM is of the correct type before fitting it in the new control panel. Compare it with the rating plate
5	Push the new control panel into the grooves and make sure to push it tightly into the plug on the rear panel
6	Replace the torx 20 screw
7	Reconnect the AC and DC supplies to the unit
8	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

How to replace the heating element

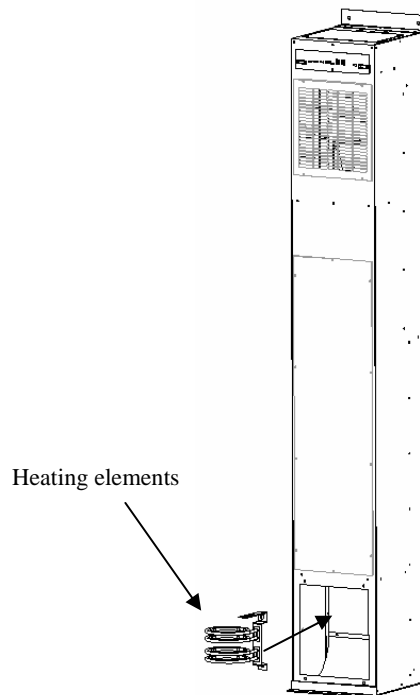
Introduction The complete heating element consists of two identical heating units that are to ensure that the desired temperature is maintained even if the ambient temperature should fall. The heating elements are positioned behind the inspection cover at the bottom of the climate control unit.

When to replace The heating elements should only be replaced when they are faulty.

Before you start Before you start, make sure that you have the following with you:

- A torx 25 screwdriver
- A small pair of pincers
- A new heating element (Dantherm spare part number 290550)
- Type TY125-40-1000 strips (142 x 3.6 mm)

Drawing The drawing shows the positioning of the heating elements:



Continued overleaf

How to replace the heating element, *continued*

Procedure

To replace the heating elements, follow these steps:

Step	Action
1	Switch off the AC and DC supplies to the climate control unit
2	Remove the torx screws to remove the inspection cover at the bottom of the unit
3	Use the pincers to cut the strips that hold the cable to the heating unit
4	Remove the torx screw at the very top of the heating element, and turn the entire unit clockwise
5	Remove the screw at the bottom of the heating element. You can then remove the element itself
6	Disconnect the cables that are joined via pins to the defective heating element
7	Fit the new heating element and use strips to fasten the cables in place. NB! Make sure that the cables are well separated from the heating unit
8	Refit the inspection cover
9	Switch on the AC and DC supplies to the climate control unit
10	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

How to replace the damper motor

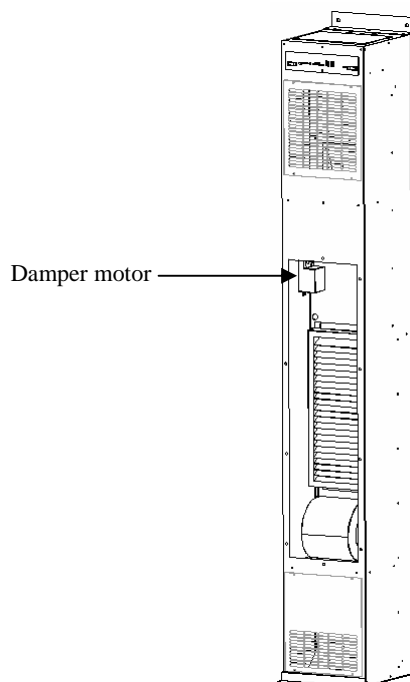
Introduction The damper motor opens and closes the damper depending on the temperature and function selected. The motor is located under the inspection cover of the filter in the middle of the climate control unit.

When to replace The damper motor should only be replaced when it is faulty.

Before you start Before you start to replace the motor, make sure that you have the following with you:

- A torx 25 screwdriver
- A 13 mm crescent wrench or an adjustable spanner
- A new damper motor (Dantherm spare part number 290530)
- Type TY125-40-1000 strips (142 x 3.6 mm)

Drawing The drawing indicates the location of the damper motor:



Continued overleaf

How to replace the damper motor, *continued*

Procedure

Follow this procedure to replace the damper motor:

Step	Action
1	Switch off the AC and DC supplies to the climate control unit
2	Remove the torx screws to remove the inspection cover in the middle of the unit
3	Remove the three torx screws on the outside of the climate control unit which hold the damper motor in place
4	Cut the strips that hold the cable in place
5	Separate the AMP plug and socket
6	Loosen the 13 mm bolt that holds the damper motor arm in place on the connector rod. NB! Do not loosen the 13 mm bolt that holds the ball joint to the connector arm
7	Use the three screws to fasten the new damper motor in place, connect the plug and socket and reconnect the connector rod and the damper motor
8	Refit the inspection cover
9	Switch on the AC and DC supplies to the climate control unit
10	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

How to replace the temperature sensors

Introduction

There are three temperature sensors in an RBS 800:

- Outdoor sensor
- Return air sensor
- Supply air sensor

All the sensors are an integral part of the cable set, i.e. without plugs. To replace a sensor you therefore have to cut the old one out and solder the new one in place.

When to replace

The temperature sensors should only be replaced when they are faulty.

Before you start

You will need to have the following items with you:

- A torx 25 screwdriver
- A set of pincers
- A soldering iron and soldering tin
- A new sensor (Dantherm spare part number 010532)

Procedure

Follow this procedure to replace on of the sensors:

Step	Action
1	Make sure that the unit is completely free from current of all kinds
2	Localize the defective sensor and cut the cable close to the sensor
3	Solder the new sensor in place and make sure that it has not short-circuited
4	Reconnect the power supply to the unit
5	Carry out a PC test with a simulation of all temperatures. Alternatively, you can use the test function to run a test. Remember to check that the unit reacts as described in the section entitled: "Test facility", page 13

Fault finding guide

Introduction This section will give you an instruction in locating the fault, when the fail LED on the control panel is active.

DanLink Besides fault finding from the LED signals Dantherm can provide DanLink as accessory. DanLink can provide you with specific information of where the fault is located.

For further information about DanLink, please contact Dantherm A/S.

Fail LEDs The control panel is equipped with three failure or alarm relays. These three relay's give alarms depending on the degree of alarm. The alarms are categorized as follows:

Category	Fail LED	When to be cleared...
Warning	Permanently lit	To be cleared when convenient
Fail	Slowly flashing (½ Hz ~once every 2 seconds)	To be cleared soon but not immediately
Alarm	Fast flashing (2 Hz ~ 2 per second)	To be cleared as soon as possible
Fault during test	Flashing (1 Hz ~1 each second) for 30 seconds after the test has ended	After the 30 seconds the LED will act according to the severity of the fault (one of the 3 above), and you should act accordingly

The following gives you a description of each type of alarm.

Warning A warning is activated on one of the following events:

- The hot spot temperature sensor is short circuited
- The return air temperature is 10 °C or more above the damper set point. The alarm will be cleared when the temperature again is 8 °C or less above the set point

Fail A fail is activated on one of the following events:

- Loss of mains power
- Fail on ambient air sensor – short or open circuit
- Smoke alarm input activated

Continued overleaf

Fault finding guide, *continued*

Alarm

An alarm is activated on one of the following events:

- The internal DC fan is stopped – no rotational pulse
 - The heater is faulty – doesn't use current
 - Fail on the return air sensor – open or short
 - Fail on the supply air sensor – open or short
 - The ambient air temperature is high – indication of a possible fire. Alarm above 70 °C, off below 60 °C
-

Hotline

Introduction The After Sales Support Department of Dantherm A/S is ready to help you in case of a problem.

Information Please help yourself and us by having the following information prepared before making the call:

Your name			
Company name		Country	
Phone number		Email	
Type (unit)		Serial no. (unit)	
Site/location (unit)			

Description of the problem Here you can write down a description of the problem:

Contact Contact Dantherm, ask for the service department and help will be provided as soon as possible:

Phone: +45 96 14 37 00
 Fax: +45 96 14 38 00
 Email: service@dantherm.com

Recycling of the unit

Introduction	<p>The air conditioner, heat exchanger or free cooling unit 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.</p> <p>Please note that the guidelines are general – local rules and procedures may overrule these guidelines and should be observed and followed carefully.</p> <p>Some of the below mentioned components may not be of relevance to your product.</p>
Main components	<p>The main components of the unit are the:</p> <ul style="list-style-type: none"> • Mechanical cooling system including refrigerant (only in air conditioners) • Printed circuit boards (PCB's) with electronic components and connecting wires • Fan(s) • Metal parts such as cover and air duct plates • Recuperator (only in heat exchangers) • Filter materials – to be recycled according to local regulations
Mechanical cooling	<p>The mechanical cooling includes pipes, compressor, valves, pressure switches etc. It is very important that all refrigerant is evacuated from the system when the unit is recycled. The various parts of the mechanical cooling shall then afterwards be separated and sorted according to local regulations.</p>
Printed circuit board (PCB)	<p>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.</p>
Fans	<p>The fan(s) consist of plastic, metal and often also an internal PCB. They are subject to recycling and should be recycled according to local regulations.</p>
Metal parts/wires	<p>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.</p>
Recuperator	<p>The recuperator is manufactured of epoxy coated alu metal sheets, and it can be left to local "scrap dealer".</p>

Service agreement

Introduction

The climate unit includes mechanical parts such as fans, dampers, compressors etc. The unit is often placed in a rough environment where the components are exposed to different climate conditions. Therefore the unit will need preventative maintenance on a regular basis.

Dantherm offers to do this maintenance as well as corrective and emergency repair on the units so that they at all times will operate according to factory standards.

Preventative maintenance visit

A preventative maintenance visit is a planned visit on a site. The visit could include the following:

- An initial computer test, simulating various temperatures
- Cleaning of the unit
- Visual inspection of the unit – checking for leakages, corrosion etc.
- A final computer test of the unit
- Completion of a inspection report

Some of the activities above are not relevant for your product. The visit can also include other activities, for example battery checks.

Corrective and emergency repair

In case of malfunctions of the product Dantherm offers to do corrective as well as emergency repair on the climate units. Agreements will be made with the customer on response time and price.

Setup

Dantherm has established a network of service partners to do the preventative maintenance. The partner is trained and certified in the actual climate units. The partner will also carry an adequate number of spare parts – so that any repairs can be made during the same visit.

The agreement will be made with Dantherm – and the overall responsibility for the agreement will be Dantherm's.

Further information

For further information about a service agreement in your country or region, please contact:

Henrik Hersted
After Sales Support Manager
Dantherm A/S
Phone: +45 9614 4767
Mobile: +45 2399 4066
heh@dantherm.com

Technical information

Overview

Introduction

This section contains the technical data for the unit.

Contents

This section covers the following topics:

Topic	See page
Technical data	next page
Dimensions	46
Resistance in temperature sensors	47

Technical data

Performance

These technical data refers to "Performance":

Specification		Unit	Designation	Data
Loads	Cooling heater	kW kW	Heat load, int. fan and solar gain Heat dissipation at nominal voltage	0,8 2,0
Flow	int.	m ³ /h	Temperature raise approx. 5 °C	Idle → 570
Pressure	Operate Disp. Drop.	KPa Pa Pa	Operating pressure Estimated press. drop in shelter. Pressure drop over filter (int)	101,3 0 20
Filters Temp:	T _{max} T _{max} T _{max}	°C °C °C	At direct cooling (EU) Supply temperature Return temperature Ambient temperature	F5 31 36 ÷ 20 → + 30
Humidity		%	Relative humidity	8 → 100
Sound level		B(A)	Lw (according to ETS 300 753 cl 4.1)	Day 6.1, Night 5.6 (15 °C) ambient

Cabinet

These technical data refers to "Cabinet":

Specification	Unit	Designation	Data
Dimensions	mm	Height x width x depth (HMS only)	2100 x 300 x 300
Weight	kg	-	35
Material	-	Aluzinc	0.9/2.0
Surface	-	Powder paint/Surface treatment	Not treaded
Packaging	-	Included	-
IP-rating	IP	External to internal air path (IEC 529)	54
Environment	-	-	-
Fire retardance	-	-	-
Safety	-	According to EN 60950	-
Signage	-	Type signage and warnings	CE

Continued overleaf

Technical data, *continued*

Electrical

These technical data refers to "Electrical":

Specification	Unit	Designation	Data
Power consumption	W	Heater + fan	2100
Power consumption	W	Direct cooling	100
Voltage	DC V AC V	Nominal (tolerance) Nominal (tolerance $\pm 10\%$)	48 (32-56) 230
Frequency	Hz	Nominal	50
Current	A	AC/DC	9/3
Start current	A	AC/DC	9/15
EMC/RFI	-	According to EN 500082-1 & 50081-2	-

Control strategy

These technical data refers to "Control strategy":

Specification	Unit	Designation	Data
Direct cooling	$^{\circ}\text{C}$	On/off (supply temperature)	22/20
Heater	$^{\circ}\text{C}$	On/off (return temperature)	17/20
Alarms	$^{\circ}\text{C}$	On/off (return temperature)	36/18

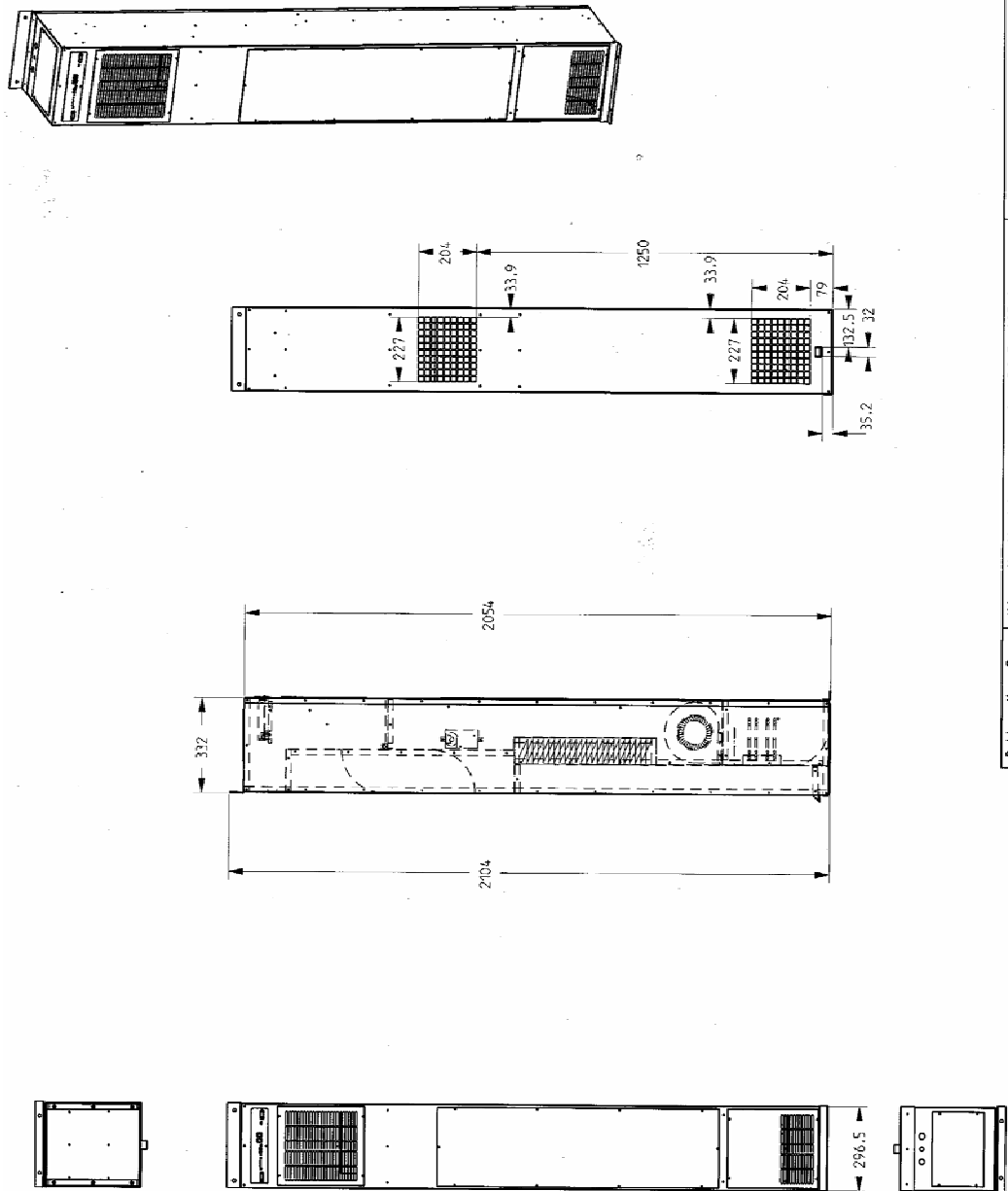
Recommended fuse sizes

Failure to use the appropriate fuses may cause irreparable damage to the unit.
This table lists the recommended fuse sizes:

Type	Sizes
AC	10 A
DC	4 A

Dimensions

Dimensions of the unit See the dimensions on the drawings:



Resistance in temperature sensors

Chart

The chart below lists the resistance in the sensors at given temperatures.

Temperature in Celsius	Resistance in Ohms	Temperature in Celsius	Resistance in Ohms	Temperature in Celsius	Resistance in Ohms
-40	90061	-8	13391	24	2821
-39	84325	-7	12694	25	2700
-38	78988	-6	12037	26	2584
-37	74021	-5	11418	27	2474
-36	69397	-4	10835	28	2369
-35	65089	-3	10284	29	2270
-34	61074	-2	9765	30	2175
-33	57331	-1	9275	31	2084
-32	53840	0	8812	32	1998
-31	50583	1	8375	33	1916
-30	47542	2	7963	34	1837
-29	44701	3	7572	35	1763
-28	42046	4	7204	36	1691
-27	39568	5	6855	37	1623
-26	37249	6	6525	38	1558
-25	35079	7	6213	39	1496
-24	33049	8	5918	40	1437
-23	31149	9	5638	41	1381
-22	29369	10	5375	42	1327
-21	27701	11	5122	43	1275
-20	26138	12	4884	44	1226
-19	24672	13	4659	45	1179
-18	23297	14	4445	46	1133
-17	22007	15	4242	47	1090
-16	20795	16	4050	48	1049
-15	19656	17	3867	49	1009
-14	18589	18	3694	50	972
-13	17585	19	3529	51	936
-12	16641	20	3373	52	901
-11	15753	21	3224	53	868
-10	14916	22	3083	54	836
-9	14132	23	2949	55	805