Escalade

Service manual

EN

No. 296033 • rev. 2.2 • 08.01.2007

Introduction

Overview

Introduction

This is the service manual for the Dantherm Air Handling Escalade unit.

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

Table of contents

This service manual covers the following main topics:

Table of content

Introduction

This is the complete table of content covering all sections in this service manual.

Each main section will begin with an introduction including a separate table of content covering the exact section.

Table of content

This service manual covers the following topics:

Continued overleaf

Table of content, *continued*

Table of content, ***continued***

General information

Introduction

This section gives you the general information about this service manual and about the unit.

Manual, part no.

Part number of this service manual is 296033.

Target group

The target group for this service manual is the technicians who install and maintain the unit.

Copyright

Reservations

Dantherm Air Handling A/S reserves the right to make changes and improvements to the product and the service manual at any time without prior notice or obligation.

EC-Declaration of Conformity

CE

Dantherm Air Handling A/S, Marienlystvej 65, DK-7800 Skive hereby declare that the units mentioned below:

360001	Escalade 5.8 kW	1×230V, 50 Hz
	Escalade 5.8 kW	3×400V, 50 Hz
360002	Escalade 8.7 kW	3×400V, 50 Hz
360003	Escalade 11.3 kW	3×400V, 50 Hz
360005	Escalade 11.3 kW	3×400V, 50 Hz, Mecum
360006	Escalade 8.7 kW	3×400V, 50 Hz, Cyta
028388	Escalade 8.7 kW	3×400 V, 50 Hz, Mecum

are in conformity with the following directives:

98/37/EEC	Directive on the safety of machines
73/23/EEC	Low Voltage Directive
89/336/EEC	EMC Directive
97/23/EEC	The Pressure Equipment Directive

- and are manufactured in conformity with the following harmonized standards:

EN 292	Machine safety
EN 60 335-1	Low Voltage
EN 60 335-2	Low Voltage
EN 60 000-6-2	Immunity
EN 60 000-6-3	Emission

Skive, 04.01.2007

Managing director Per Albæk

Project manager

Continued overleaf

General information, *continued*

EC-Declaration of Conformity

CE 0041

Dantherm Air Handling A/S, Marienlystvej 65, DK-7800 Skive hereby declare that the units mentioned below:

360004	Escalade 14.1 kW	3×400V, 50 Hz

are in conformity with the following directives:

98/37/EEC	Directive on the safety of machines
73/23/EEC	Low Voltage Directive
89/336/EEC	EMC Directive
97/23/EEC	The Pressure Equipment Directive

- and are manufactured in conformity with the following harmonized standards:

EN 292	Machine safety
EN 60 335-1	Low Voltage
EN 60 335-2	Low Voltage
EN 61 000-2	Immunity
EN 61 000-3	Emission
EN 378-2	Refrigerating system and heat pumps (Module A1)

Accordance with the Pressure Equipment Directive is certified by:

The Certification Body CE0041
Bureau Veritas Inspection Limited
Parklands, Wilmslow Road, Didsbury,
UK, Manchester M20 2RE

Skive, 04.01.2007

Managing director Per Albæk

Project manager

Recycling

The unit is designed to last for many years. When the time comes for the unit to be recycled, the unit should be recycled according to national rules and procedures to protect the environment.

Definitions

Introduction

This section gives you a definition of some of the technical words and terms used in this manual.

List

Here you have the list of words and terms with the matching definition:

Term	Definition
Return air (T_1)	Internal air entering the ACU from the electronic equipment
Ambient air (T_2)	External air entering the ACU
Exhaust air (T_3)	External air leaving the ACU
Supply air (T_4)	Internal air leaving the ACU
Cooling set point	Cooling set point (the temperature at which the active cooling starts)
Heating set point	The temperature at which heating is activated
Evaporator	The area where the refrigerant absorb the heat from the internal enclosure
Condenser	The area where the refrigerant give off heat to ambient air
Heat load	The heat incl. solar gain that is to be removed from the shelter or room
Ambient temperature	Outside air temperature
Condenser temperature	The temperature of the refrigerant from the condenser

Product description

Overview

Introduction

This section will give you a description of the Escalade and its functionality.

Content

This section covers the following topics:

General description

Introduction

This section gives you a description of the unit as a whole. The following section describes the different parts in details.

Usage of Escalade

The Escalade is designed to control the internal temperature of a universal shelter or room with respect to climate, moist and airborne.

The Escalade removes excess heat from electronic equipment and is especially suited in applications where the equipment requires to be maintained within defined temperature limits to achieve optimum performance and to maximize component lifetime.

Escalade is designed to be mounted outdoor.

The unit requires access to ambient air through grills on the front 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.

The unit contains heater, fans as well as an active cooling section. This ensures that the unit will work in extreme temperatures ranging from ÷ 40 °C, closed loop versions requires an arctic kit for ÷ 40 °C, and up to + 55 °C for all versions.

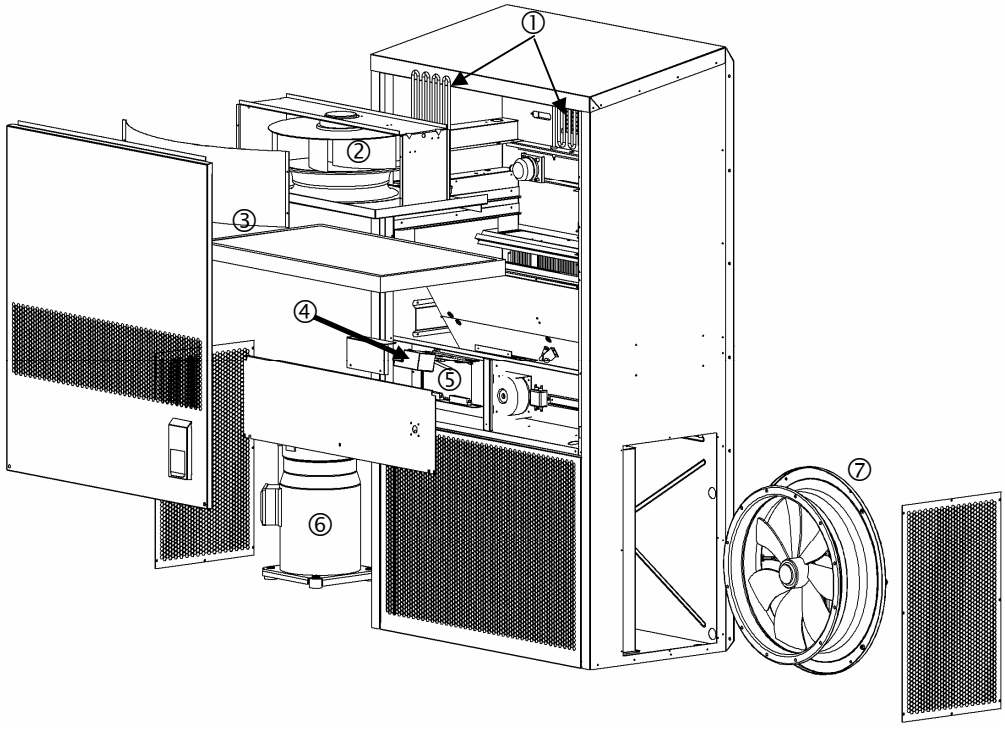
Versions

Escalade is available in the 4 versions:

- 5.8 kW
- 8.7 kW
- 11.3 kW
- 14.1 kW

Illustration, internal

This drawing illustrates the different parts, visible from the internal side:



Continued overleaf

General description, *continued*

Parts

This table gives an overview of the parts:

Part	Part
① Heater	⑤ Control board
② Internal fan*)	⑥ Compressor
③ Filter	⑦ External condenser fan
④ Damper motor	

*) The shown internal fan on the above drawing is the one in Escalade 11.3/14.1. There are two variants for the Escalade 5.8/8.7. See details in the “Spare parts list”, page 41.

Description of parts

Introduction

This section will give you a more detailed description of the parts of the Escalade.

The parts that will be described are:

- Temperature sensors
- Filter
- Damper
- Internal fan
- External condenser fan
- Heater
- 25 poled SUB-D connection
- Compressor

Temperature sensors

The purpose of the temperature sensors is to provide the control board with signals. High or low temperatures (compared with set points in the control board) result in a signal from the control board to either the air conditioning system or the heating system.

Temperature measurements are performed in the range from ÷ 40 °C to + 99 °C.

Sensor	Placement	Result
Return air sensor	Placed in the return air duct	Gives a representation of the enclosure temperature
Supply sensor	Placed in the supply air duct	Gives a representation of the supply air temperature
Ambient sensor	Placed in the air intake in front of the unit	Gives a representation of the ambient temperature
Condenser sensor	Placed in a sensor pocket on the liquid pipe, at the cooling system	Gives a representation of the temperature of the refrigerant

Filter

The purpose of the filter is to prevent dust from entering the shelter.

The filter is a pleated filter class G4 according to EN779.

Damper

The damper is used when the Escalade runs in a free cooling mode or emergency cooling mode, and will move back and forth to maintain a steady temperature in the shelter or room.

The purpose of the damper is that the Escalade can run in a free cooling mode.

See more about free cooling mode in section “Functional description”, page 17.

Continued overleaf

Description of parts, *continued*

Internal fan

The internal fan draws return air from the shelter into the Escalade, to:

- Circulate the internal air, when the return temperature is not too high (recycle)
- Draw out the return air and push it through the air condition system to cool the air (active cooling)
- Blend the return air with fresh air and push this new cooled air back to the shelter (recycle/free cooling)
- Push warm air from the shelter to the outside in order to remove excess heat (free cooling)
- Circulate the internal air and push it through the heating system to warm up the supply air back to the shelter (heat)

The internal fan is active in all modes, and runs continuously in various speeds.

External condenser fan

The external fans draw ambient air into the Escalade to:

- Cool the condenser (active cooling), or
- Provide ambient air to the shelter (free cooling or emergency cooling)
- The external fans are active in active cooling, free cooling and emergency cooling

Compressor

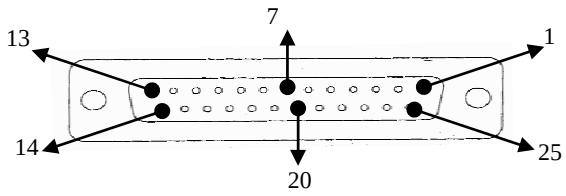
The compressor circulates the refrigerant in the cooling system.

Heater

The heater keeps the internal temperature at an adequate level at low ambient temperatures, and is often also used to heat up the shelter in start up conditions.

25 poled SUB-D, illustration

This illustrates the SUB-D plug:



Continued overleaf

Description of parts, *continued*

25 poled SUB-D, connections

The 25 poled SUB-D connection gives you the possibility of connecting additional external equipment. (see table below)

Furthermore you have the same functionality as the RS485 communication port, for details about this, see section “Description of the control board”, page 15.

Warning!
A male Sub-D 25 connector with a connection between 5 and 12 is mounted on the female Sub-D 25 connector. A removal of this male Sub-D 25 connector during operation will cause the unit to stop.

Sub-D 25 connections
The following explain the connections:

Pin No.	Color	Description	Function	Default setting
1	White/blue	Hotspot sensor	Input	-
2	Blue/white	Hotspot sensor	Input	-
3	White/orange	Alarm	Output	Normally closed
4	Orange/white	Alarm	Output	Normally closed
5	White/green	Smoke alarm	GND	Normally closed
6	Green/white	Warning	Output	Normally closed
7	White/brown	Warning	Output	Normally closed
8	Brown/white	Fault	Output	Normally closed
9	White/gray	Fault	Output	Normally closed
10	Gray/white	Interconnection +	Input	-
11	Red/blue	Interconnection -	Input	-
12	Blue/red	Smoke alarm	Input	Normally closed
13	Red/orange	Occupied	Input	Normally open
14	Orange/red	Humidity sensor	Input	Normally open
15	Red/green	Not connected	-	-
16	Green/red	Analog input 2	Input	-
17	Red/brown	Analog/Occupied/Humidity	GND	-
18	Brown/red	Not connected	-	-
19	Red/gray	RS485A	Output	-
20	Gray/red	RS485B	Output	-
21	Black/blue	Not connected	-	-
22	Blue/black	Not connected	-	-
23	Black/orange	Not connected	-	-
24	Orange/black	Not connected	-	-
25	Black/green	Not connected	-	-

Description of the control board

Introduction

This section gives you a detailed description of the control board.
Description of how to change settings is to find in section “User’s guide”, page 32.

DanCon

All Escalade units are provided with a DanCon control board.
The active parts controlled by the control board are:

- Heater element
- Damper
- Internal fan
- Compressor
- Condenser fan

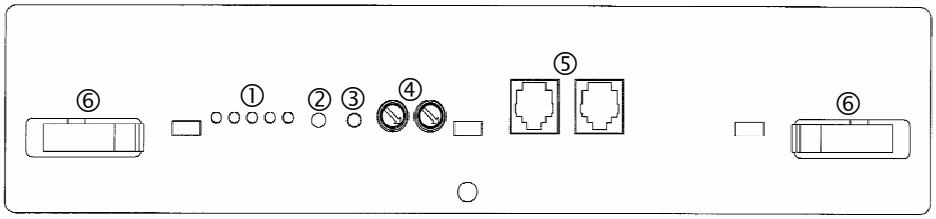
Versions

DanCon is available in the following versions:

DanCon	Escalade	Voltage supply	Damper
006	Escalade 5.8-8.7 and 14.1	AC	✓
008	Escalade 5.8-8.7 and 14.1	DC	✓
011	Escalade 5.8/8.7 and 14.1	AC	÷
012	Escalade 11.3	AC	÷
014	Escalade 11.3/14.1	AC	✓
015	Escalade 11.3/14.1	DC	✓

Illustration

This drawing illustrates the control board:



Part/function

This table gives you a description of each part on the control board:

Part	Function
① LED	The LEDs show the status and the alarm Learn more about the status and alarms in the following
② Test	By pressing this button the unit will run through a quick test program. Any detected fail can be read on the fail LED
③ Occupied	By pressing this bottom the unit will go into the occupied function. Learn more about the occupied/service function in section “Functional description”, page 17

Continued overleaf

Description of the control board, *continued*

Part/function, ***continued***

Part	Function
④ Dials	These dials give you the possibility of changing the heater and/or the cooling set points, see more in the section “Set points”, page 20 and in the “User’s guide”, page 32
⑤ RS485 communication port	These ports (RJ11 jacks) give you the possibility of connecting a pc and/or DanLink telemonitoring program (accessory). See more about this below in this section
⑥ Locking mechanisms	The locking mechanisms must be released to remove the control panel. Remember to lock the locking mechanisms whenever a control board has been released

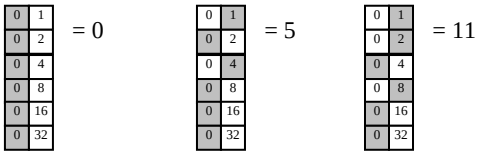
Signals of LED

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

Part	Function	
1 × Green LED	Supply	Lit as soon as the controller is powered up
3 × Yellow LED	Compressor	Lit when the active cooling is operating
	Heat	Lit when the heater is operating
	Link	Lit when (and 10 min. after) valid communication is in progress
1 × Red LED	Fail	Lit in case of a detected failure, see details in section “Fault finding guide”, page 57

RS485 serial line

All information is represented on the serial RS485 line. This is available on the two RJ11 jack’s mounted on the unit besides the air supply opening or at the multiple connector rear on the control board.



Asked or commanded through this connection the control board will respond to this. A separate datasheet is issued on this.

A DIP switch on the control board is selecting the unit’s number. This is important when using DanLink or DanView. The following is an example on how to set the Dipswitch. The Grey squares represent the position of the switch.

Special option

If activating the occupied button during the power up LED jingle the telemetry output is changing protocol and will respond with a telegram once every second.

In stand alone system’s this can be used as a convenient monitoring function using the “Commdisp” software.

Pressing the test button in the same matter will speedup all internal timers for convenient testing. This is done by factors 10, 20 and 30 depending on the timer initial length.

Functional description

Introduction

Escalade operates with 2 systems and in 6 different modes.

The 2 systems, which are described in the following, are:

- Air conditioning system
- Heating system

The 6 modes, which are described in the following, are:

- Active cooling
- Free cooling
- Recycle
- Heat
- Emergency cooling
- Service

Air conditioning system

The purpose of the air conditioning system is to cool the supply air in order to lower the temperature inside the shelter.

The air conditioning system is an on/off system.

The control board is controlling the compressor in accordance with the return temperature.

Heating system

There are two purposes of the heating system:

- Cold start-up conditions
- Cold ambient temperatures

The heating system will be operating when the temperature gets too low in the shelter.

The heat dissipation from the heater is 2000 W*) depending on the ambient temperatures.

The heater turns of when the return air temperature reaches 15 °C

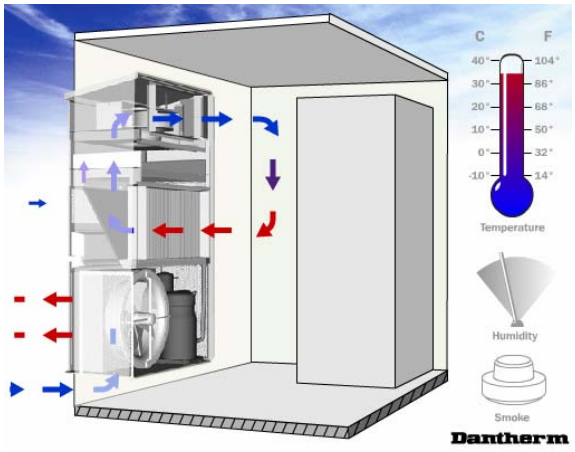
*) Standard heater is 2000 W, but optional is 6000 W heater.

Active cooling

In active cooling mode the compressor, the internal fan and the external fans are operating in order to circulate refrigerated air into the shelter, and to exhaust the heat drawn from the internal air through the condenser in the external circuit.

The Escalade will switch to active cooling mode when the temperature in the shelter reaches 27 °C*

*Set points can be adjusted, see section ”Set points”, page 20



Continued overleaf

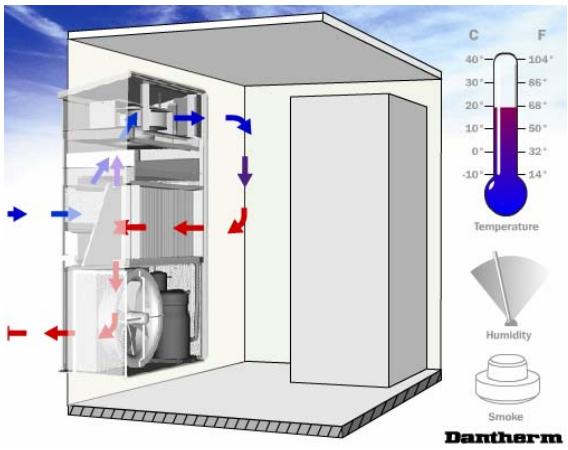
Functional description, *continued*

Free cooling

In free cooling mode the damper, the internal fan and the external fans will operate to provide exactly the fresh air amount needed to keep a constant temperature in the shelter/room (5 degrees below the cooling set point).

Free cooling is in operation between 19 °C and the preset 27 °C* in the room.

*Set points can be adjusted, see section ”Set points”, page 20



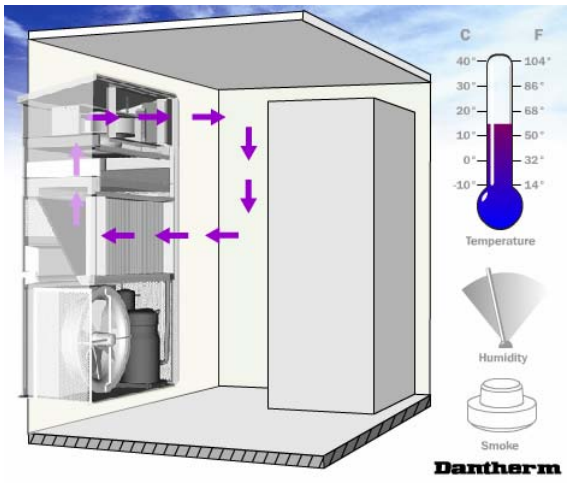
Recycle

Recycle mode occurs when the temperature in the room is above heater set points and below 19 °C*.

This will secure a uniform temperature without hot spots in the entire room.

The only component active will be the internal fan (necessary to prevent local hot spots).

*Set points can be adjusted, see section ”Set points”, page 20

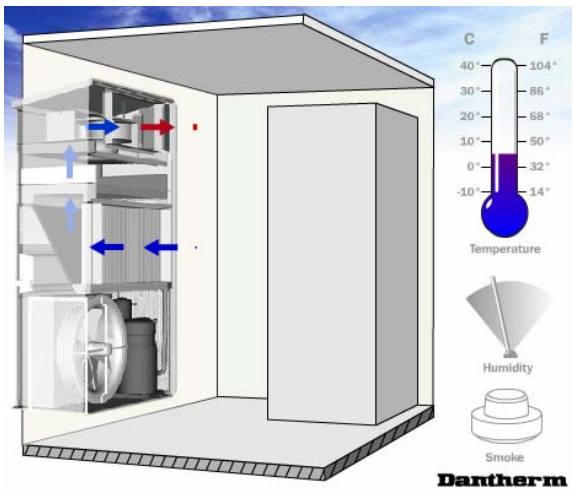


Heat

In heating mode the heating element and the internal fan will operate to keep the shelter/room temperature above the heating set point.

The heating mode is preset to be active below 5 °C*.

*Set points can be adjusted, see section ”Set points”, page 20



Continued overleaf

Functional description, *continued*

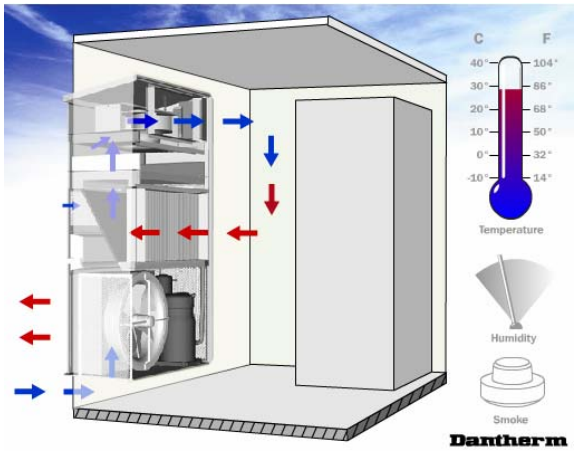
Emergency cooling

Emergency cooling will occur when there is either compressor fault or loss of AC power.

Since active cooling is not possible, the internal fan and the damper will attempt to provide fresh air cooling to keep the return temperature 5 degrees below set point even when it is not possible because of high ambient temperatures.

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

At loss of AC mains:
Mains AC power must be back before the emergency cooling situation will end.



Service

The service mode should be activated to make a comfortable climate in the shelter during service.

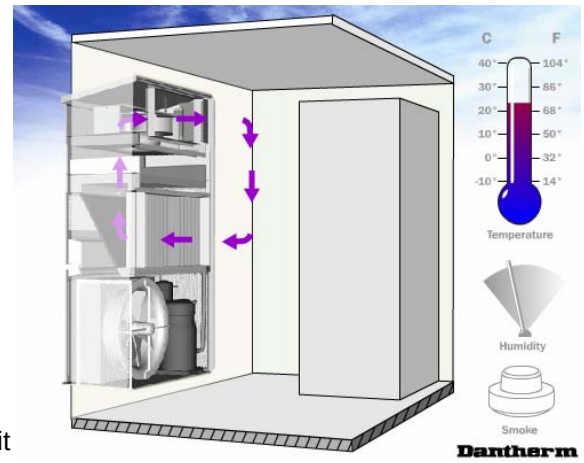
In service mode the unit will switch between active cooling, free cooling, heating and recycling to maintain:

- Comfort temperature between 20 - 25 °C
- Low fan speed to reduce sound level and air flow

Service mode is only for use when technicians are working in the shelter.

After one hour in service mode the unit automatically switches back to normal operation.

It is possible to reactivate the bottom for another period of one hour.



Set points

Introduction

This section gives you information about the set points.

The following topics will be described:

- Factory settings
- How to change set points on a stand alone unit without any of the accessories DanView or DanLink
  Changing settings with DanView or DanLink please refer to the manuals for these products

Factory settings

The factory settings are as follows:

Object	Factory set point	Range
Heater	5 °C	0 °C to15 °C
Active cooling	27 °C	20 °C to 40 °C
*) Filter guard, Escalade 5.8, G4 filter	150	20-200
*) Filter guard, Escalade 8.7, G4 filter	150	20-200
*) Filter guard, Escalade 11.3, G4 filter	150	50-200
*) Filter guard, Escalade 14.1, G4 filter	150	50-200
*) Humidity controller	55 % RH	20 - 90 % RH

*) Filter guard set points are for G4 filter. Filter guard and humidity controller are accessories!

How to change

Using the dials on the front of the control board you are able to change the above settings for the heater and the active cooling. Alternatively this can be done through the serial telemetry option.

Filter guard set point can only be set on the filter guard directly.

Humidity controller set point can only be set on the humidity controller directly.

Limitations

Limitations in set points: Please notice that the minimum difference between cooling and heating set point must be 10 degrees or more to avoid fighting between active cooling and heating.

For further information about the set point settings, please see section “User’s guide”, page 32.

Control strategy

Introduction

The control strategy ensures the best mode of operation at all times.

Measurements of ambient, supply, return and condensing temperatures decides the specific settings for fans, damper, heater and compressor.

The control board contains a programmable CPU with adjustable settings according to the exact requirements.

Strategy

The illustration bellow shows the control strategy based on the default settings:

Action	Temp. sensor	°C	Up	Down	°C	Temp. sensor	Action
Condenser fan speed increased to maximum							
Cond.	60						
60	Cond.	-					
-	Cond.	57			57	Cond.	Condenser fan speed decreased to medium
Condenser fan speed increased to medium	Cond.	50			50	Cond.	-
-	Cond.	47			47	Cond.	Condenser fan speed decreased to low
Compressor on, Damper closes, Condenser fan speed low	Return Default active cooling set point	27			27	Return Default active cooling set point	-
-	Return	22-26			22-26	Return	Compressor off after 9 minutes @ 1°C below set point OR following a 5°C drop below set point
Damper opens after compressor stop @ efficient ambient. temperature							
Internal DC fan increased to maximum	Return	24			24	Return	Internal DC fan ramp down
-	Return	18			18	Return	Damper closes unconditionally
Damper opens @ efficient ambient temperature AND return temperature above 18 °C	Supply	15			15	Supply	Damper stops
Internal AC fan speed increased to medium. Internal DC fan ramp up	Return	14			14	Return	Internal fan speed decreased to low
Damper stops	Return	11			11	Return	Damper closes
Heater off, Internal fan speed decreased low	Return	7			7	Return	-
-	Return Default heat set point	5			5	Return Default heat set point	Heater on, Internal DC fan speed increased to 90 or 100%
Internal AC fan speed increased to 75 or 100%							
Internal fan runs continuously upon powering up							

Test facility

Introduction

When activating the test button on the control board the unit starts the test program.

This is a help to identify possible faulty components.

The unit will run through the different tests according to the below table.

The fail LED will operate normally during the test 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.

4 test programs

There are 4 different test programs dependent on the Escalade version:

- ① Escalade 5.8/8.7/14.1– AC and DC versions with damper
- ② Escalade 5.8/8.7/14.1- AC versions without damper
- ③ Escalade 11.3 – AC version with damper
- ④ Escalade 11.3 – DC version with damper

Check during test

Perform the following check during the test:

Step	Action
1	Put your hand in the front of the condenser when the compressor starts. Do you immediately feel warm air coming out? **Yes**: The connections are okay, and you do not have to check further **No**: Shut of the unit and exchange the AC connections L2 and L3. Restart the test and perform this check again

Test ①

Escalade 5.8/8.7/14.1– AC and DC versions with damper:

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

Continued overleaf

Test facility, *continued*

Test ②

Escalade 5.8/8.7/14.1- AC versions without damper:

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

Test ③

Escalade 11.3 – AC version with damper:

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

Test ④

Escalade 11.3 – DC version with damper:

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

Get ready for use

Overview

Content

This section covers the following topics:

Unwrapping and mounting

Introduction

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

Wrapping

The Escalade is delivered in a cardboard box on a pallet.

Check before mounting

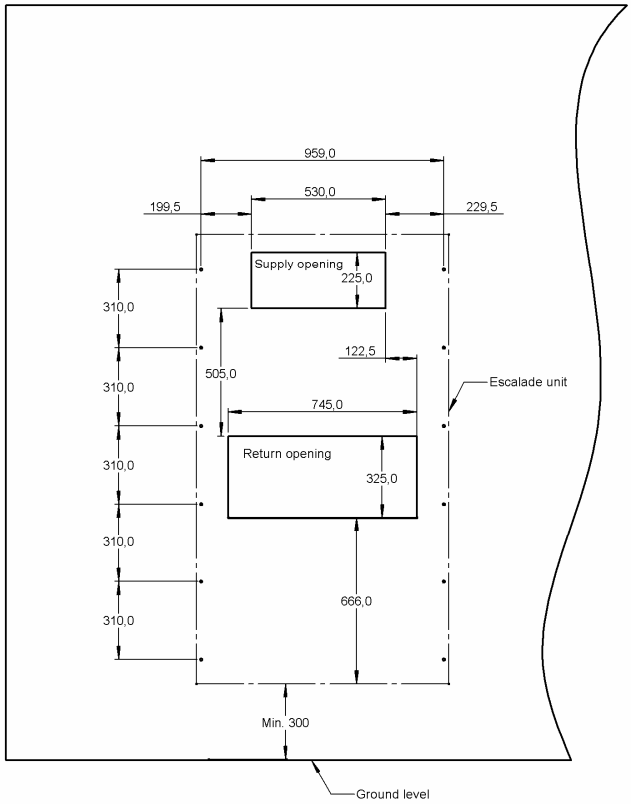
The unit must be unpacked carefully and before mounting the following must be checked:

- Voltages on the label of the unit corresponds to the voltages available in the shelter
- All terminal screws in the unit are tightened. Especially the screws that connect the AC and DC mains and the relays to the compressor and heater might have gone loose due to transportation

Making the slots

Follow this procedure to make the slots for the Escalade unit:

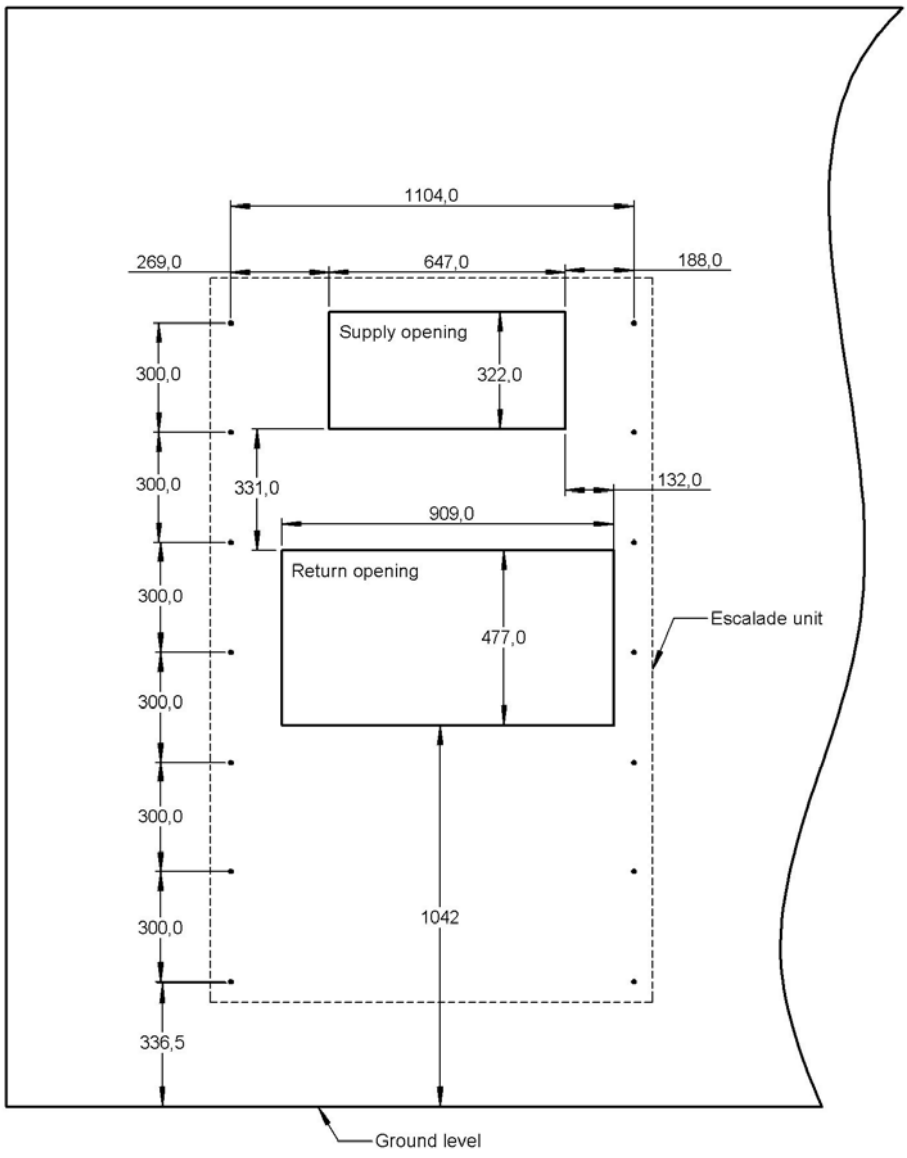
All dimensions on the drawings are measured in millimeters.

Step	Action
1	Decide which version of Escalade you have: **Escalade 5.8/8.7**: Proceed with step 2 **Escalade 11.3/14.1**: Proceed with step 3
2	Make the slots in the wall for the air in- and outlet according to this illustration: 

Continued overleaf

Unwrapping and mounting, *continued*

Making the slots, ***continued***

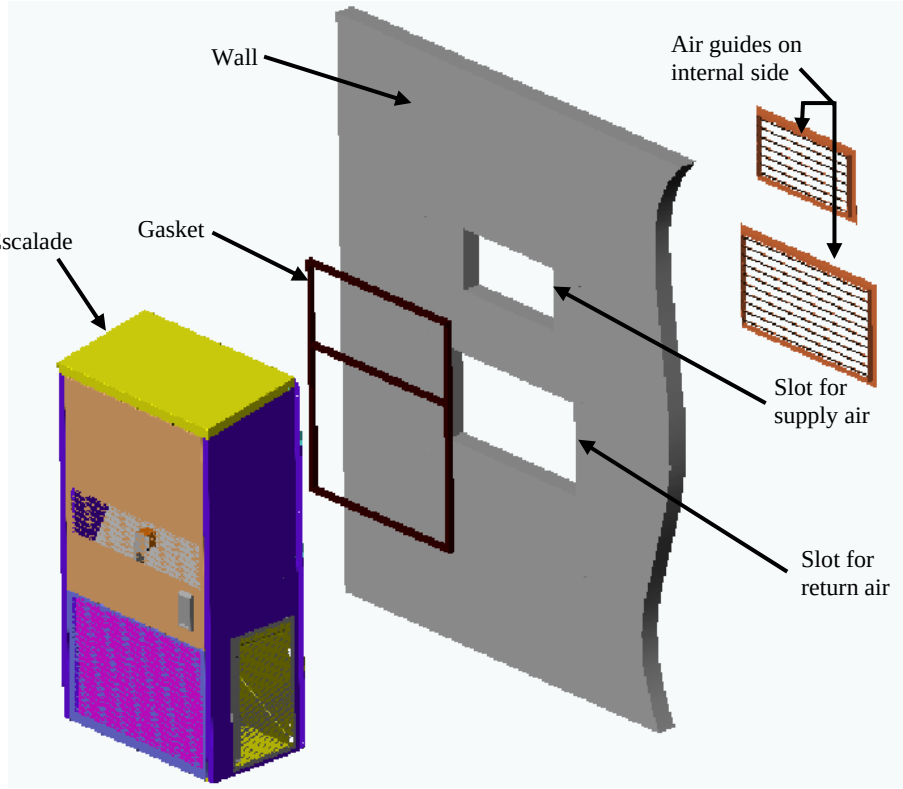
Step	Action
3	Make the slots in the wall for the air in- and outlet according to this illustration: 

Continued overleaf

Unwrapping and mounting, *continued*

Mounting of the louvers

The louvers should be mounted as illustrated here (The gasket must close the gab between the wall and the unit completely. Use weatherproof sealing if needed):



Transport of unit mounted on shelter

Important notice, transportation

If the Escalade is transported after it has been mounted on the shelter wall it is of crucial importance that the Escalade is supported underneath.

If the Escalade is not supported it will suffer damage.

The Escalade could be supported as showed on the following drawings.

Support before transportation

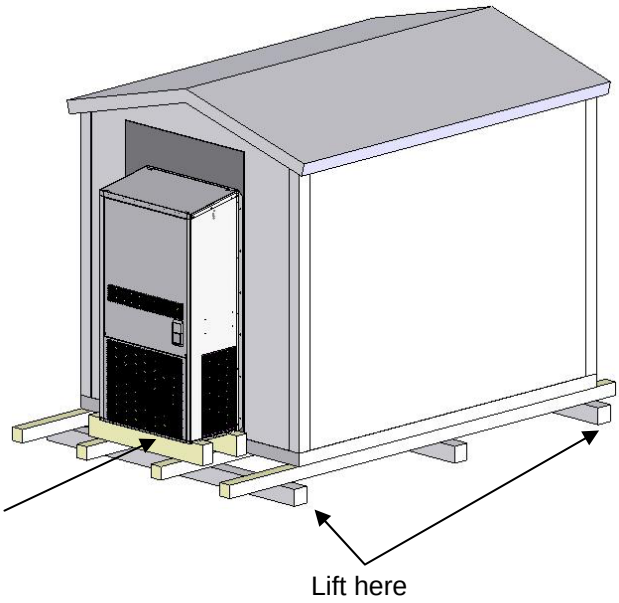
Before the Escalade can be transported, it needs to be supported.

This drawing shows the Escalade, where it has been mounted on a shelter.

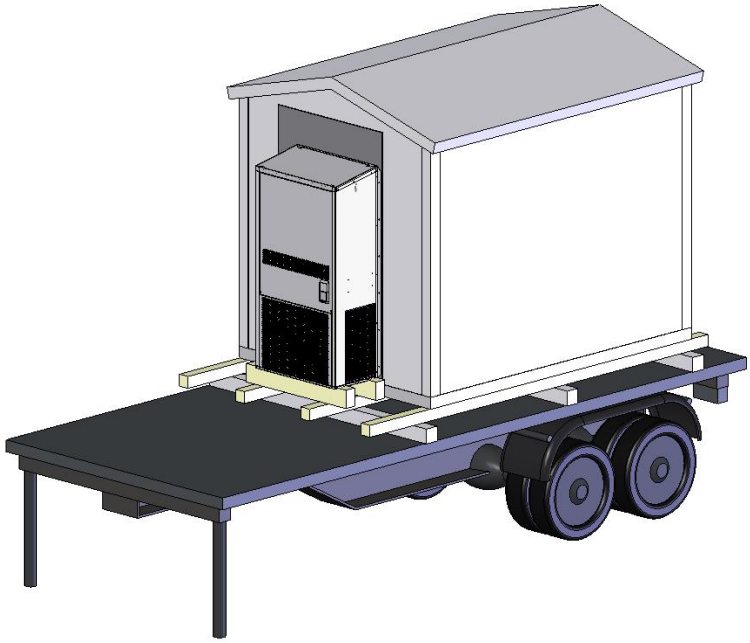
The drawing also shows the needed arrangements before transportation of an Escalade wall mounted on a shelter can take place.

The unit **cannot** be transported without the support underneath.

Also support the Escalade during loading and unloading.



Ready for transport:



Installation and starting

Introduction

This section will guide you through the installation and the starting of the Escalade.

Before you start

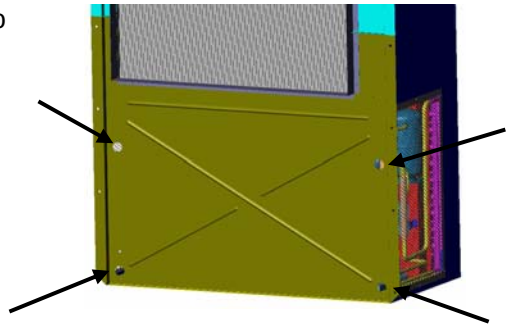
Make sure you have the following available before you start the installation:

- Tools for wire connections

AC and the DC power supply

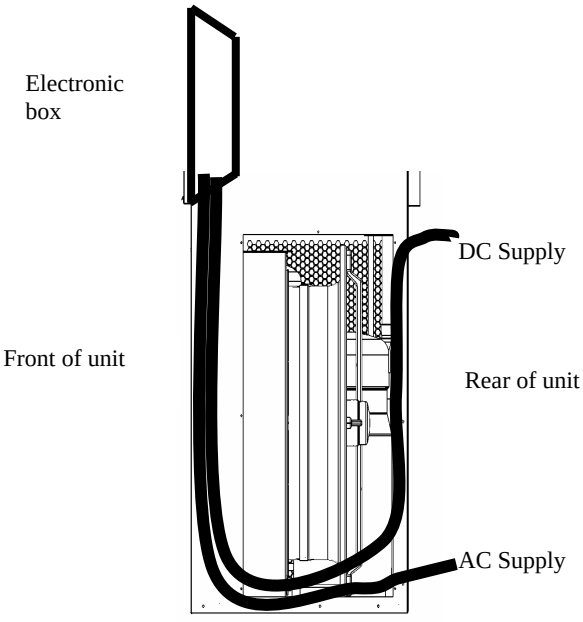
Both the AC and the DC power supply should be protected by a circuit breaker to protect the climate unit and the power supply against unexpected loads or unstable voltages. The recommended values for the circuit breaker are stated in section “Technical data”, page 61.

The AC and DC cables should be feed through one of the 4 holes on the back of the unit as convenient:



Path for cables:

This illustration shows the path for the cables:

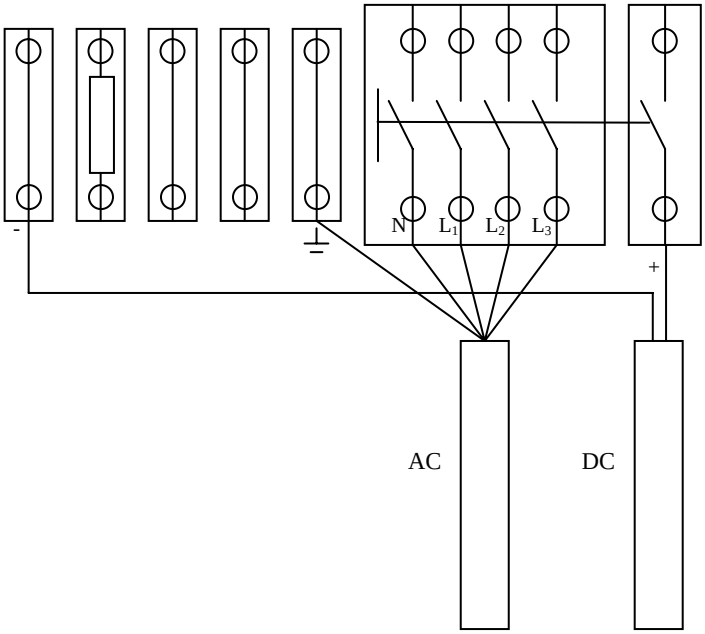


Continued overleaf

Installation and starting, *continued*

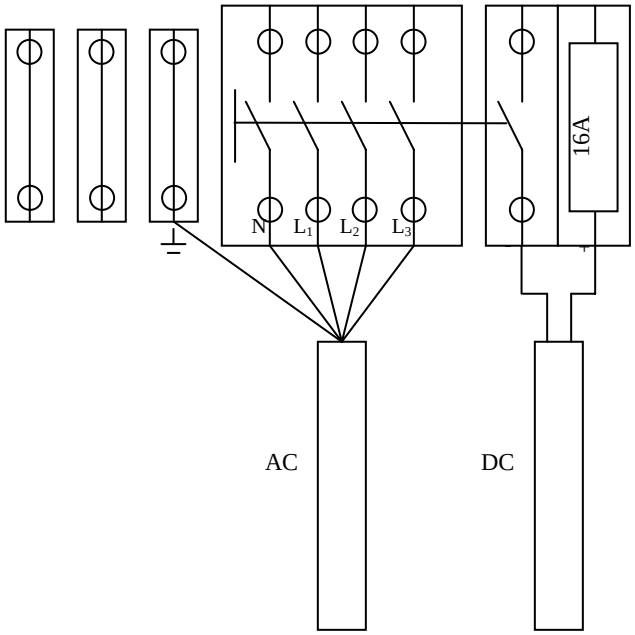
Connections, Escalade 5.8/8.7

This drawing illustrates the connections regarding Escalade 5.8/8.7:



Connections, Escalade 11.3/14.1

This drawing illustrates the connections regarding Escalade 11.3/14.1:



Continued overleaf

Installation and starting, *continued*

Procedure

It is very important that the mains AC supply phases are connected correctly!

Follow these steps to install the unit:

Step	Action
1	Connect the DC supply according to the drawing on page 30
2	Connect the AC supply according to the drawing on page 30
3	Turn on the power and the unit will start a self-test, and then start performing according to the control strategy Put your hand in the front of the condenser when the compressor starts. Do you immediately feel warm air coming out? If yes: The connections are okay If no: Shut of the unit and exchange the AC connections L2 and L3 Then try again from step 1 – 3

User's guide

Overview

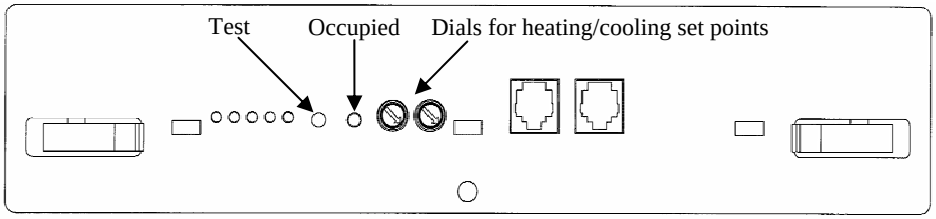
Introduction

This section only describes how to activate/use the different functions.

Under each of the functions below, you will find relevant references if further information is needed.

Illustration

This drawing illustrates the control board:



Test

You can test all functions in the Escalade by pushing a sharp object against the test button (see above illustration). The unit will then perform a self-test for about 5½ minutes.

See more about the test mode in section "Functional description", page 17.

For fault finding please see section "Fault finding guide", page 57.

Occupied function

You can force the Escalade in service mode by pushing a sharp object against the occupied button (see above illustration) on the control board for 1-2 sec.

The mode option is also present at the connector at the rear of the control board.

For further description on this mode, please see section "Functional description", page 17.

Set points

You can with a screwdriver adjust the cooling and heating set points on the dials (see above illustration) on the controller.

Limitations in set points: Please notice that the minimum difference between cooling and heating set point must be 10 degrees or more to avoid fighting between active cooling and heating.

For further information about the set points, please see section "Set points", page 20.

Service guide

Overview

Serial numbers

All requests for information, service or parts should include serial number.

Product model and serial numbers are available from the nameplate, which is located on the outside of the unit.

Dantherm model number:

- Escalade, 5.8 kW 360001
- Escalade, 8.7 kW 360002
- Escalade, 11.3 kW 360003
- Escalade, 14.1 kW 360004

Contents

This section covers the following topics:

Preventive maintenance

Introduction

The unit contains moving mechanical parts. Also the units are often placed in rough environments, with high temperatures, humidity and dirt. To keep the air conditioner fit to meet the specifications, preventive maintenance has to be carried out.

The units need preventive maintenance with specific intervals to avoid breakdown or inefficient operation and to maximize the lifetime. It is important to notice that interval between maintenance can vary depending on the specific environment.

Caution

Switch of both the DC and AC supply before working on the unit!

Make sure that all work has been performed before switching on the power again.

Tools

When performing the preventive maintenance:

use a …	to …
vacuum cleaner or compressed air	carefully clean the unit
soft bristle brush	remove dirt that the vacuum cleaner or the compressed air could not remove
screwdriver or torx	tighten loose screws and to get into the unit

Interval

It is our recommendation that intervals between preventive maintenance do not exceed 6 months. It is also our recommendation that the site and unit is examined closely during the first preventive maintenance to determine whether the interval is too long. We recommend that preventive maintenance visits are planned to occur before and after the hot seasons. This will ensure best performance during both hot and cold seasons.

Condition for warranty

The factory warranty is only valid if documented preventive maintenance has been carried out with an interval of maximum 6 months. The documentation could be in form of a written log.

Leaving the site

Before leaving the site, make sure there are no alarms!

Continued overleaf

Preventive maintenance, *continued*

Recommended approach

The recommended approach when performing a preventive maintenance visit is:

Step	Action
1	Make sure that the power to the unit is safely switched of
2	Clean the unit carefully: • Air ducts • Fans • Filter • Condenser • Evaporator
3	Perform the tasks using the checklist below
4	Switch on the power again
5	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See section “Test facility”, page 22 for details. In case of an alarm signal, please see section “Fault finding guide”, page 57

Tasks

The following must be checked when performing the preventive maintenance visit:

Item	Yes	No
Are the fans and the compressor clean and free of corrosion?	☐	☐
Is the fan and 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 lamellas on the condenser and the evaporator clean and damage free?	☐	☐
Are all fan blades free of obstruction, 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 free of damage?	☐	☐
Are all connectors sealed properly and in good condition?	☐	☐

Accessories

Introduction

This section will give you an overview of the available accessories for Escalade. You will find a list of accessories as well as a short description including part number for ordering.

Additional information is available on each accessory, please contact Dantherm Air Handling A/S.

List

Here you have the complete list with drawing, description and part number for all available accessories for Escalade:

Accessory	Illustration	Description	Part No.
Alarm Cable		Male SUB-D 25W connector and 25 free wires supplied with terminal ends. Wire No. 5 and wire No. 12 are connected to each other through a terminal block. See more about the SUB-D-signals in section “Description of parts”, page 12	016356
		Two male SUB-D 25W connector mounted. See more about the SUB-D-signals in section “Description of parts”, page 12	016359
		One male SUB-D 25W connector mounted and a connection box with 23 terminals block. See more about the SUB-D-signals in section “Description of parts”, page 12	016360
Filter guard		Comprises a pressure switch control gauging the air pressure before and after the filter. When the filter gets dirty, the pressure difference will go above the switch setting and activate the alarm lamp on “warning” level. This is to indicate that if not replaced the filter will clog with reduced cooling capacity as a result	013038

Continued overleaf

Accessories, *continued*

List, ***continued***

Accessory	Illustration	Description	Part No.
Hot spot sensor		This is an extra temperature sensor to be placed in the critical spot of the shelter. The operation of the climate unit will then be controlled in accordance with the highest value of either the return air or hot spot sensor	016363
		Same as the above, inclusive SUB-D connector	016364
Smoke alarm cable		Smoke alarm with two terminal ends for the smoke alarm connected together with a terminal block to establish a normally closed setting for this function. The other end of the cable has a male DUB-D 25W connector mounted	017275
Smoke alarm cable with hot spot sensor		Hot spot senor and 2 free smoke alarm wires supplied with terminal ends, 10 m. The two terminal ends for the smoke alarm are connected together with a terminal block to establish a normally closed setting for this function. The other end of the cable has a male SUB-D 25W connector mounted	016895
Smoke detector		The smoke alarm will detect any small amount of smoke in the enclosure air. In case of a smoke alarm the climate unit will close the damper (if fitted) and stop the unit, so that a fire will not be feed by more fresh air	016362
Control unit for smoke detector		ABV300/D is a control unit to be used together with smoke detectors. The control unit provides power for connected smoke detectors and transmits smoke alarm	017274

Continued overleaf

Accessories, *continued*

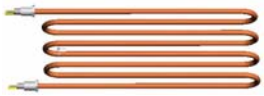
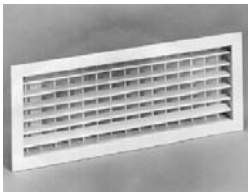
List, ***continued***

Accessory	Illustration	Description	Part No.
Humidity controller		Hygrostat with adjustable setting of the maximum allowed % RH to override the free cooling and close the damper. The closed loop operation will then gradually lower the relative humidity	016361
Interconnection cable		Interconnection cable, 10 m, with two male SUB-D 25W connector mounted for multiple units. When a compressor-cooling request is detected. It will be signaled through the interconnection cable, and one randomly selected unit will start active cooling. The interconnection will also insure that the units are not opposing each other	016394
Occupied switch		Remote possibility to enable an activation of the occupied mode, which allows better comfort conditions for personnel	015779
DanCon test kit		A pc can be connected to the unit to achieve serial communication. The communication takes place through an interface box connected via a cable to the unit RS 485 out	014966
DanLink		DanLink is a telemonitoring system designed for remote surveillance and change of set points	Hardware: 012580 Software: 017499

Continued overleaf

Accessories, *continued*

List, ***continued***

Accessory	Illustration	Description	Part No.
DanView		The DanView is a display unit for monitoring relevant parameters in connection with the Dantherm Air Handling standard shelter cooling units	012958
Electrical heating		Escalade units are as standard equipped with a 2.0 kW heating section, but can be upgraded with extra one or two times 2.0 kW to a max capacity of 6.0 kW	016244
High efficient filter		Instead of the standard coarse dust filter class G4, an optional high efficient fine dust filter type F5 is available. 5.8/8.7 F5: 5.8/8.7 F8: 11.3/14.1 F5: 11.3/14.1 F8	 014506 015475 015510 015476
Arctic kit	On request	This kit makes it possible for the Closed loop versions to operate down to ÷ 40 °C	-
Wall ducts	-	Different kinds of wall ducts are available. Enquiries can be directed to Dantherm Air Handling A/S	-
Supply and return grills		Aluminium grills suitable for the internal openings of the wall ducts. 5.8/8.7 supply: 5.8/8.7 return: 11.3/14.1 supply: 11.3/14.1 return:	 016419 016421 016420 016422
Weather strip		Different kinds of weather strips are available. Enquiries can be directed to Dantherm Air Handling A/S	-

Spare parts

Overview

Introduction

This section gives you a list of all available spare parts and under which number, they should be ordered.

Furthermore the section contains an instruction in replacing the spare part.

Contents

This section contains the following topics:

Spare parts list

List

Here you have the complete list of spare parts with part numbers to use when ordering replacement spare parts.

Where only one number is stated, this number goes for all three versions of Escalade.

Spare part	Escalade 5.8	Escalade 8.7	Escalade 11.3	Escalade 14.1
Filter	011049		012845	
Internal fan DC 48 V	011047	013326	012848	
Internal fan DC 24 V DC	010417		-	
Internal fan AC 50/60 Hz	013327	013328	012850	
External fan 50 Hz	011051	013329	012851	
Control board	013678			
EPROM AC free cooling	296034		296045	
EPROM AC Closed loop	296046		296047	
EPROM DC 24/48 V	296048		296049	
Transformer	296029		296058	
Contactor for compressor	296055		296054	
Contactor for heater	296055			
Damper motor	011048			
Heater element	011052		012852	
Sensor	010532			
Pressure stat (LP)	011660			
Pressure stat (HP)	011661			
Dry filter	011662		013556	
Compressor 1 × 230 V 50 Hz	296050	-	-	-
Compressor 3 × 400 V 50/60 Hz	296052	013553	013555	296051

How to replace the filter

Product description

The purpose of the filter is to ensure that dirt and humidity from the ambient air is not let through to the electronic equipment. The filter is in use when the Escalade is in free cooling mode.

When to replace

The filter only needs to be replaced when it is faulty, very filthy or as a part of the preventive maintenance. Dantherm Air Handling A/S recommends a replacement of the filter in a maximum interval of 6 months.

Part number

See section “Spare parts list” page 41.

Tools

Make sure you have the following tools available before you start:

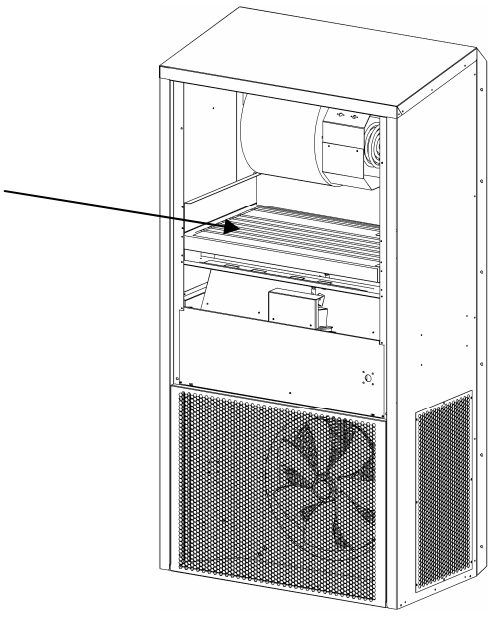
- Torx 25 screw driver – for replacement from the external side

Caution!

- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Illustration

This drawing illustrates where the filter is placed. The illustration is a 5.8/8.7 but it is the same placement in 11.3/14.1:



Continued overleaf

How to replace the filter, *continued*

Procedure

Follow these steps to replace the filter:

Step	Action
1	Switch of all the power to the unit
2	Unscrew the 2 torx 25 screws that hold the top front cover in place, and remove it
3	Pull the old filter backwards and out
4	Mount a new filter using the guides and make sure to push it completely in. Note that the arrow on the filter must point upwards
5	Mount the top front cover again
6	Connect the power and run the test program. Check that the unit does not come out with an alarm signal. In case of an alarm signal, please see section “Fault finding guide” page 57

How to replace the internal fan

Product description

The purpose of the internal fan is to circulate the air inside the indoor enclosure. The internal fan can either be of an AC operated or a DC operated type.

When to replace

The internal fan only needs to be replaced when it is faulty or as a part of a long time replacement plan, e.g. after approximately 5 years.

Part number

See section “Spare parts list”, page 41.

Tools

Make sure you have the following tools available before you start:

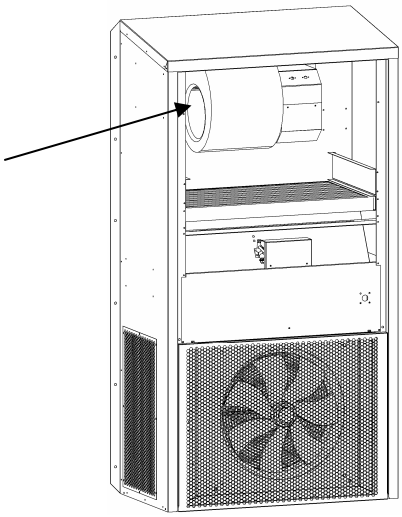
- Torx 25 screw driver
- A 6 mm Umbracho key for Escalade 5.8/8.7
- A 5 mm Allen key for Escalade 11.3/14.1

Caution!

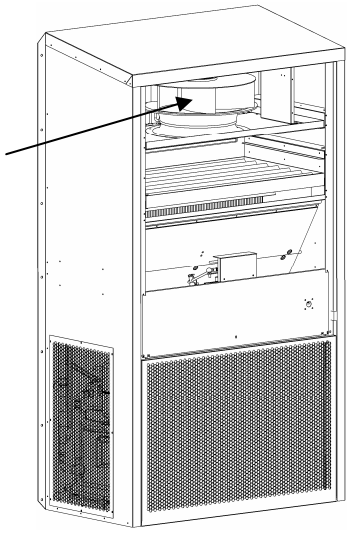
- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Illustration

This drawing illustrates the internal fan and where the fan is placed in the unit:



Escalade 5.8/8.7



Escalade 11.3/14.1

Continued overleaf

How to replace the internal fan, *continued*

Procedure

Follow these steps to replace the internal fan:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Switch of all the power to the unit</td></tr>
<tr><td>2</td><td>Unscrew the 2 torx 25 screws that hold the top front cover in place, and remove it</td></tr>
<tr><td>3</td><td>Follow these steps according to the specific model:
<table>
<tr><th colspan="2">Escalade 5.8/8.7</th><th colspan="2">Escalade 11.3/14.1</th></tr>
<tr><td>3.1</td><td>Loosen the four 6 mm Allen screws and disconnect the two plugs to the fan and the connections to the heater element</td><td>3.1</td><td>Unscrew the 2 torx 25 screws that hold the cover plate in place, and remove it</td></tr>
<tr><td></td><td></td><td>3.2</td><td>Unscrew the 4 Allen screws that hold the internal fan assembly and pull out the assembly</td></tr>
<tr><td>3.2</td><td>Lift the entire fan assembly out</td><td>3.3</td><td>Loosen the 4 torx 25 screws and disconnect the two plugs to the fan and the connections to the heater element</td></tr>
<tr><td>3.3</td><td>Dismount four 6 mm Allen screws that hold the fan on the assembly</td><td>3.4</td><td>Lift the entire fan assembly out</td></tr>
</table></td></tr>
<tr><td>4</td><td>Disconnect the 2 plugs to the DC/DC converter</td></tr>
<tr><td>5</td><td>Mount the new fan by following Step 1 to 4 in reverse order</td></tr>
<tr><td>6</td><td>Connect the power and run the test program.
Check that the unit does not come out with an alarm signal.
In case of an alarm signal, please see section “Fault finding guide”, page 57</td></tr>
</table>

How to replace the internal fan, 24 V DC for Escalade 5.8/8.7

Product description

The purpose of the internal fan is to circulate the air inside the indoor enclosure. The internal fan can either be of an AC operated or a DC operated type.

When to replace

The internal fan only needs to be replaced when it is faulty or as a part of a long time replacement plan, e.g. after approximately 5 years.

Part number

See section “Spare parts list”, page 41 in the service manual for part number information.

Tools

Make sure you have the following tools available before you start:

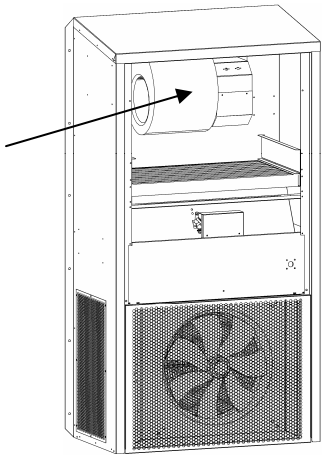
- Torx 20/25/30 screwdriver
- A 6 mm Umbracho key

Caution!

- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Illustration

This drawing illustrates the internal fan and where the fan is placed in the unit:



Continued overleaf

How to replace the internal fan, 24 V DC for Escalade 5.8/8.7, *continued*

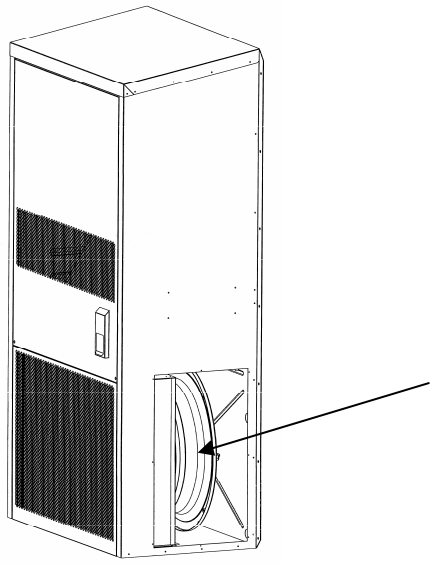
Procedure

Follow these steps to replace the internal fan:

Step	Action
1	Switch of all the power to the unit
2	Unscrew the 2 torx 25 screws that hold the top front cover in place, and remove it
3	Disconnect the two plugs to the fan and the connections to the heater element
4	Loosen the four Torx 25 screws and remove the support bracket under the fan box
5	Loosen the 8 torx 25 screws and remove the under part of the fan box including the air inlet ring and heater element
6	Loosen the four 6 mm Allen screw and lift the entire fan assembly out
7	Disconnect the 2 plugs to the DC/DC converter
8	Disconnect the plugs from the fan wire
9	Loosen the four torx 30 screws at the fan box and remove the fan and fan bracket
10	Loosen the four torx 20 screws that assemble the fan to the bracket
11	Mount the new fan by following the above steps in reverse order
12	Connect the power and run the test program. Check that the unit does not come out with an alarm signal. In case of an alarm signal, please see section “Fault finding guide”, page 57

How to replace the external fan

Product description	The external fan remove surplus heat from the condenser when the active cooling mode is active. This fan is AC driven.
When to replace	The external fan only needs to be replaced when it is faulty or as a part of a long time replacement plan, e.g. after approximately 5 years.
Part number	See section “Spare parts list”, page 41.
Tools	Make sure you have the following tools available before you start: • Torx 25 screwdriver • A 13 mm rachet spanner
Caution!	• Only trained and certified technicians are allowed to replace parts • Switch of both the DC and AC supply before working on the unit • Make sure that all work has been performed before switching on the power again
Illustration	This drawing illustrates the external fan and where the fan is placed in the unit:



Continued overleaf

How to replace the external fan, *continued*

Procedure

Follow these steps to replace the external fan:

Step	Action
1	Switch of all the power to the unit
2	Dismount the grill on the right and left side of the unit, by removing the 8 torx 25 screws on each grill
3	Remove the 13 mm bolts that holds the fan in place
4	Pull the fan out side wards and dismount the wires in the connection box on the back of the fan
5	Mount the new fan by following step 2 to 4 in reverse order
6	Connect the power and run the test program. Check that the unit does not come out with an alarm signal. In case of an alarm signal, please see section “Fault finding guide”, page 57

How to replace the control board

Product description

The control board is a microprocessor equipped PCB with input/outputs to all the electrical part of the Escalade. Based on inputs from 4 sensors placed in the unit it controls the fans, compressor etc.

When to replace

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

Part number

See section “Spare parts list”, page 41 in the service manual for part number information.

Tools

Make sure you have the following tools available before you start:

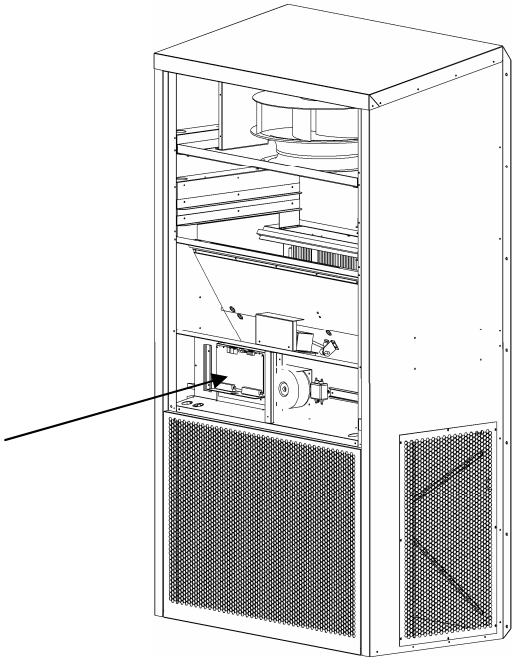
- A torx 10 screwdriver
- A torx 25 screwdriver

Caution!

- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Illustration

This drawing illustrates the control board and where it is placed in the unit:



Continued overleaf

How to replace the control board, *continued*

Procedure

Follow these steps to replace the control board:

Step	Action
1	Switch of all the power to the unit
2	Remove the 2 torx 25 screws that hold the top front cover in place
3	Switch the circuit breaker on the unit to off position
4	Remove the 2 torx 25 screws that hold the cover plate over the wires and relays in place. Result: The control board and relays are now visible
5	Remove the 2 torx 10 screws that hold the control board in place, and pull the control board forward and out of the plugs
6	Mount a new control board by following step 2 to 5 in reverse order
7	Connect the power and run the test program. Check that the unit does not come out with an alarm signal. In case of an alarm signal, please see section “Fault finding guide”, page 57

How to replace the heater element

Introduction

The heater element keeps the internal temperature at an adequate level at low ambient temperature.

When to replace

The heater element only needs to be replaced when it is faulty.

Part number

See section “Spare parts list”, page 41 in the service manual for part number information.

Tools

Make sure you have the following tools available before you start:

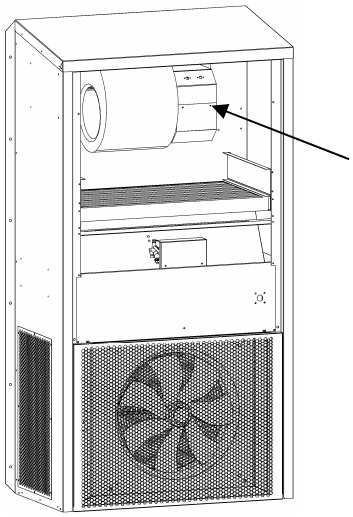
- Torx 25 screw driver
- 19 mm spanner for Escalade 5.8/8.7
- A adjustable wrench for Escalade 11.3/14.1

Caution!

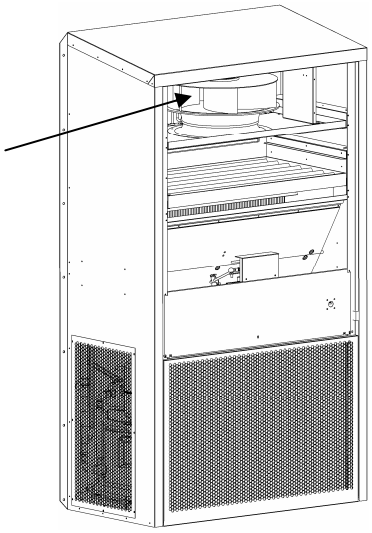
- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Illustration

This drawing illustrates the heater element and where it is placed in the unit:



Escalade 5.8/8.7



Escalade 11.3/14.1

Continued overleaf

How to replace the heater element, *continued*

Procedure

Follow these steps to replace the heater element:

<table>
<tr><th>Step</th><th colspan="4">Action</th></tr>
<tr><td>1</td><td colspan="4">Switch of all the power to the unit</td></tr>
<tr><td>2</td><td colspan="4">Remove the 2 torx 25 screws that holds the top cover in place, and remove it</td></tr>
<tr><td>3</td><td colspan="4">Follow these steps according to the specific model:
<table>
<tr><th colspan="2">Escalade 5.8/8.7</th><th colspan="2">Escalade 11.3/14.1</th></tr>
<tr><td>3.1</td><td>Loosen the four 6 mm Allen screws and disconnect the two plugs to the fan and the connections to the heater element</td><td>3.1</td><td>Unscrew the 2 torx 25 screws that hold the cover plate in place, and remove it</td></tr>
<tr><td>3.2</td><td>Lift the entire fan assembly out</td><td>3.2</td><td>Unscrew the 4 Allen screws that hold the internal fan assembly and pull out the assembly</td></tr>
<tr><td>3.3</td><td>Dismount the faulty heater element using the torx 25 screws and disconnect the spade plugs</td><td>3.3</td><td>Dismount the 2 nuts with the adjustable wrench that hold the faulty heater element and disconnect the spade plugs</td></tr>
</table></td></tr>
<tr><td>4</td><td colspan="4">Mount a new heater element by following the above steps in reverse order</td></tr>
<tr><td>5</td><td colspan="4">Connect the power and run the test program.
Check that the unit does not come out with an alarm signal.
In case of an alarm signal, please see section “Fault finding guide”, page 57</td></tr>
</table>

How to replace the damper motor

Introduction

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 the Escalade is in free cooling range, the damper motor opens and closes the damper as determined by the control board.

When to replace

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

Part number

See section “Spare parts list”, page 41 in the service manual for part number information.

Tools

Make sure you have the following tools available before you start:

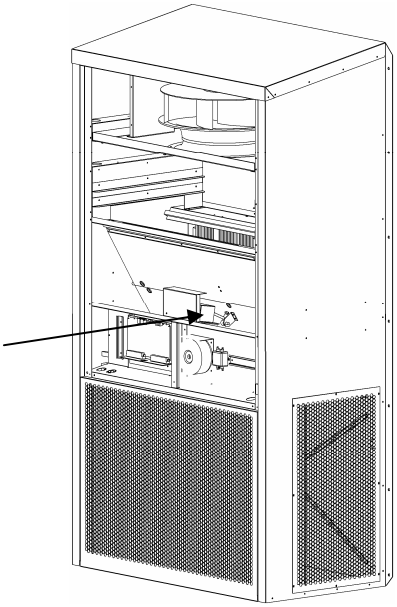
- Torx 25 screw driver
- A 10 mm wrench
- A 8 mm wrench
- A ratchet spanner for torx 25 screws

Caution!

- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Illustration

This drawing illustrates the damper motor and where it is placed in the unit.

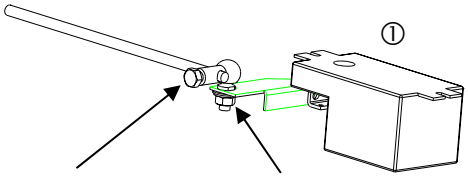


Continued overleaf

How to replace the damper motor, *continued*

Procedure

Follow these steps to replace the damper motor:

Step	Action
1	Switch of all the power to the unit
2	Unscrew the 2 torx 25 screws that hold the top front cover in place and remove it
3	Disconnect the damper motor from the DC voltage (white 3 pole plug)
4	Unscrew the 10-mm nut that holds the damper arm connected to the damper motor arm  Do not loosen! 10 mm bolt Note: Do not loosen or remove the bolt that is used for adjusting the damper.
5	Unscrew the 2-crosshead screws that hold the damper motor to the cabinet. Push the black switch down, to be able to unscrew the 2-crosshead screws, and then pull the damper motor bracket out from the unit. Note: To be able to remove the screws, use e.g. a ratchet spanner. Result: The damper motor can now be removed
6	Unscrew the two 8 mm bolts and remove the bracket
7	Mount the bracket from step 6 on the new damper motor
8	Move the damper motor arm on the faulty damper motor to the new damper motor
9	Mount the new damper motor and the front cover by following the above steps in reverse order
10	Switch the knob (direction of rotation) on top of the damper motor (see illustration step 4, ①) from 1 to 0
11	Connect the power and run the test program. Check that the unit does not come out with an alarm signal. In case of an alarm signal, please see section “Fault finding guide”, page 57

How to replace the temperature sensors

Product description

The temperature sensors measure the temperature in different places and thereafter send these measurements to the control board.

There are 4 temperature sensors:

- Ambient sensor
- Return air sensor
- Supply air sensor
- Condenser sensor

When to replace

The temperature sensors only need to be replaced when they are faulty.

Part number

See section “Spare parts list”, page 41 in the service manual for part number information.

Note

All the sensors are part of the cable set and are mounted without any separate connector. Therefore the replacing a sensor is done by cutting the sensor and solder a new one on.

Tools

Make sure you have the following tools available before you start:

- A torx 25 screwdriver
- A pair of cutting pliers
- A soldering iron with solder

Caution!

- Only trained and certified technicians are allowed to replace parts
- Switch of both the DC and AC supply before working on the unit
- Make sure that all work has been performed before switching on the power again

Procedure, return sensor

Follow these steps to replace the return temperature sensor:

Step	Action
1	Switch of all the power to the unit
2	Locate the sensor and use the pliers to cut it off, close to the sensor
3	Solder a new sensor on and make sure that the wires do not short circuit and that the isolating cable is put back in place
4	Connect the power and run the test program. Check that the unit does not come out with an alarm signal. In case of an alarm signal, please see section “Fault finding guide”, page 57

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 see section “Accessories”, page 36.

Fail LEDs

The control board 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.

Sensor failure alarm

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.

Continued overleaf

Fault finding guide, *continued*

Warning

A warning is activated on one of the following events:

- The condenser temperature sensor is missing or short circuited
- The hot spot temperature sensor is short circuited
- The return air temperature is 20 °C above the compressor set point. The alarm will be cleared when the temperature again is less than 18 °C above the set point
- The return air temperature is 5 °C below the heater set point. 2 °C above this temperature the alarm will be cleared.
- The condenser temperature has been above 75 °C. This warning will be cleared at condenser temperature again is below 60 °C and have been for at least two minutes
- The filter is clogged
- The unit is working in occupied mode

Fail

A fail is activated on one of the following events:

- The heater is faulty – doesn't use current
- Loss of mains power
- Fail on ambient air sensor – short or open circuit
- Mains failure

Alarm

An alarm is activated on one of the following events:

- The internal AC fan is stopped - no rotational pulses
- The internal DC fan is stopped - no rotational pulses
- The external condenser fan is stopped - no rotational pulses
- The compressor doesn't draw current – this due to a dropout in the HP/LP pressure switch, the winding protector or the compressor in general
- Fail on the return air sensor – open or short circuited
- Smoke alarm
- Fail on the supply air sensor – open or short circuited
- The ambient air temperature is high – indication of a possible fire. Alarm above 70 °C, off below 60 °C

Service agreement

Introduction

The unit includes mechanical and electrical parts and 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.

Hotline

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

To be able to offer quick and efficient help, please have the following information ready when contacting Dantherm Air Handling A/S:

- Name
- Company
- Country
- Phone no.
- Email
- Type (unit)
- Site/location (unit)
- Serial no/order no.
- Description of the problem

Contact Dantherm Air Handling A/S, ask for the After Sales Support 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

Preventive maintenance

Dantherm Air Handling A/S offers to do the preventive maintenance on the units so that they at all times will operate according to factory standards.

Corrective and emergency repair

In case of malfunctions of the product Dantherm Air Handling A/S offers to do emergency repair on the climate units. Agreements will be made with the customer on response time and price.

Setup

Dantherm Air Handling A/S has established a network of service partners to do the preventative maintenance. The partner is trained and certified on 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 Air Handling A/S – and the overall responsibility for the agreement will be Dantherm Air Handling A/S's.

Further information

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

Henrik Hersted
After Sales Support Manager

Dantherm Air Handling A/S

Phone: +45 9614 4767
Mobile: +45 2399 4066
Email: heh@dantherm.com

Technical information

Overview

Contents

This section covers the following topics:

If further technical details are requested, please contact Dantherm Air Handling A/S.

Technical data

Introduction

This section gives you the technical data of the Escalade units.

Performance

The table below shows the performance of the Escalade unit:

	Escalade 5.8	Escalade 8.7	Escalade 11.3	Escalade 14.1
Active cooling[1)]	5.3 kW	7.8 kW	10.7 kW	13,4 kW
Free cooling	327 W/K	697 W/K	767 W/K	800 W/K
Internal flow	1310 m^3/h	2210 m^3/h	2638 m^3/h	3174 m^3/h
External flow	2220 m^3/h	2925 m^3/h	3143 m^3/h	5038 m^3/h
Heater	2.0 kW	2.0 kW	2.0 kW	2.0 kW

[1)] Measured at 35 °C ambient, 27 °C internal and humidity below 30 %

Cabinet

This table shows the data of the cabinet:

Specification	Unit	5.8	8.7	11.3	14.1
Dimensions, unit only	W × D × H	920 × 487 × 1790		1150 × 558 × 1931	
Dimensions, unit incl. packing	W × D × H	1100 × 620 × 1850		1200 × 800 × 2100	
Weight, unit only	Kg	154	164	230	267
Weight, unit incl. packing	Kg	176	186	245	287

Electrical data, general electrical characteristics

This table shows the voltage supply tolerances valid for Escalade products:

Tolerances	All models
AC	+/- 10 %
24 V DC	19-30 V DC
48 V DC	36-56 V DC

Continued overleaf

Technical data, *continued*

Electrical data, 1 phase 230 V AC - 50 Hz

The following are product specific electrical characteristics:

Power factor				
Specification	**Escalade 5.8**	**Escalade 8.7**	**Escalade 11.3**	**Escalade 14.1**
AC	0.94	-	-	-
Unit with AC internal fan				
Max. start current[1)]	103.55 A	-	-	-
Maximum current	19.95 A	-	-	-
Nominal current, active cooling[2)]	14.55 A	-	-	-
Nominal current, free cooling	2.15 A	-	-	-
Circuit breaker	20.00 A	-	-	-
Cable dimension	4.0 mm^2	-	-	-
Unit with 24 V DC internal fan				
Max. start current[1)]	46.08 A	-	-	-
Max. current	AC: 8.40 A DC: 10.0 A	-	-	-
Nom. current, active cooling[2)]	AC: 4.80 A DC: 9.6 A	-	-	-
Nom. current, free cooling[3)]	DC: 9.6 A	-	-	-
Circuit breaker	AC: 13.00 A DC: 16.00 A	-	-	-
Cable dimension	AC: 1.5 mm^2 DC: 2.5 mm	-	-	-
Unit with 48 V DC internal fan				
Max. start current[1)]	AC: 100.80 A	-	-	-
Max. current	AC: 18.40 A DC: 7.10 A	-	-	-
Nom. current, active cooling[2)]	AC: 12.40 A DC: 7.10 A	-	-	-
Nom. current, free cooling[3)]	DC: 7.10 A	-	-	-
Circuit breaker	AC: 20.00 A DC: 16.00 A	-	-	-
Cable dimension	AC: 4.0 mm^2 DC: 2.5 mm^2	-	-	-

Continued overleaf

Technical data, *continued*

Electrical data,

3 phase
400 V AC - 50 Hz

Power factor				
Specification	**Escalade**	**Escalade**	**Escalade**	**Escalade**
AC	0.81	0.81	0.78	0.79
Unit with AC internal fan				
Max. start current[1)]	48.95 A	79.15 A	105.20 A	136.20 A
Maximum current	10.55 A	16.75 A	16.15 A	20.30 A
Nom. current, active cooling[2)]	7.05 A	12.05 A	12.90 A	17.80 A
Nominal current, free cooling	2.15 A	3.05 A	3.00 A	2.90 A
Circuit breaker	13.00 A	20.00 A	20.00 A	32.00 A
Cable dimension	1.5 mm^2	2.5 mm^2	2.5 mm^2	4.0 mm^2
Unit with 24 V DC internal fan				
Max. start current[1)]	46.08 A	76.10 A	102.20 A	132.90 A
Max. current	AC: 8.40 A DC: 10.0 A	AC: 13.70 A DC: 10.00 A	AC: 9.90 A DC: 12.00 A	AC: 17.30 A DC: 12.00 A
Nom. current, active cooling[2)]	AC: 4.80 A DC: 9.6 A	AC: 9.00 A DC: 9.6 A	AC: 13.25 A DC: 12.00 A	AC: 14.90 A DC: 12.00 A
Nom. current, free cooling[3)]	DC: 9.6 A	DC: 9.6 A	DC: 12.00 A	DC: 12.00 A
Circuit breaker	AC: 13.00 A DC: 16.00 A	AC: 20.00 A DC: 16.00 A	AC: 20.00 A DC: 16.00 A	AC: 32.00 A DC: 16.00 A
Cable dimension	AC: 1.5 mm^2 DC: 2.5 mm^2	AC: 2.5 mm^2 DC: 2.5 mm^2	AC: 2.5 mm^2 DC: 4.0 mm^2	AC: 4.0 mm^2 DC: 4.0 mm^2
Unit with 48 V DC internal fan				
Max. start current[1)]	46.08 A	76.10 A	102.20 A	132.90 A
Max. current	AC: 8.40 A DC: 7.10 A	AC: 13.70 A DC: 10.00 A	AC: 13.25 A DC: 10.00 A	AC: 17.30 A DC: 10.00 A
Nom. current, active cooling[2)]	AC: 4.80 A DC: 7.10 A	AC: 9.00 A DC: 9.70 A	AC: 9.90 A DC: 5.60 A	AC: 14.90 A DC: 10.00 A
Nom. current, free cooling[3)]	DC: 7.10 A	DC: 9.70 A	DC: 5.60 A	DC: 10.00 A
Circuit breaker	AC: 13.00 A DC: 16.00 A	AC: 20.00 A DC: 16.00 A	AC: 20.00 A DC: 16.00 A	AC: 32.00 A DC: 16.00 A
Cable dimension	AC: 1.5 mm^2 DC: 2.5 mm^2	AC: 2.5 mm^2 DC: 2.5 mm^2	AC: 2.5 mm^2 DC: 4.0 mm^2	AC: 4.0 mm^2 DC: 4.0 mm^2

Continued overleaf

Technical data, *continued*

Footnotes

References to the above tables:

[1)] Maximum AC start current is starting current of the compressor plus the nominal current of the fans running. DC fan's soft start eliminates high start currents.

[2)] The values are valid during 35 °C ambient, 27 °C inside and humidity below 30 %.

[3)] The AC current is insignificant.

Operating range

This table shows the operating range of the Escalade units:

	All models
Pressure	70-106
Temperature, free cooling	÷ 40 °C - + 55 °C*)
Temperature, closed loop	÷ 40 °C - + 55 °C*)
Humidity	8-95 % RH

*) ÷ 40 °C requires an Arctic kit.

Refrigerant

This table shows the type and charge of refrigerant:

1 phase 230 V AC, 50 Hz				
Specification	**Escalade 5.8**	**Escalade 8.7**	**Escalade 11.3**	**Escalade 14.1**
Type	R134a	-	-	-
Charge	2.05 kg	-	-	-
3 phase 400 V AC, 50 Hz				
Type	R134a	R134a	R134a	R134a
Charge	2.05 kg	2.10	6.00	6.00

Storage

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

- Temperature range between ÷ 30 °C to + 40 °C
- Relative humidity max. 80 %
- The unit must be stored in an upright position

Dimensions

Illustration

This drawing illustrates the dimensions of the Escalade:

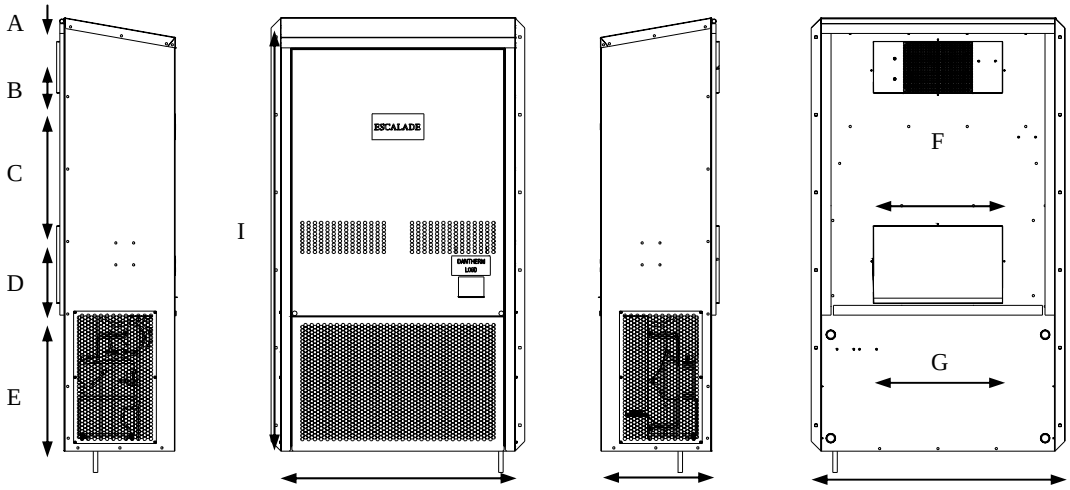


Table with dimensions

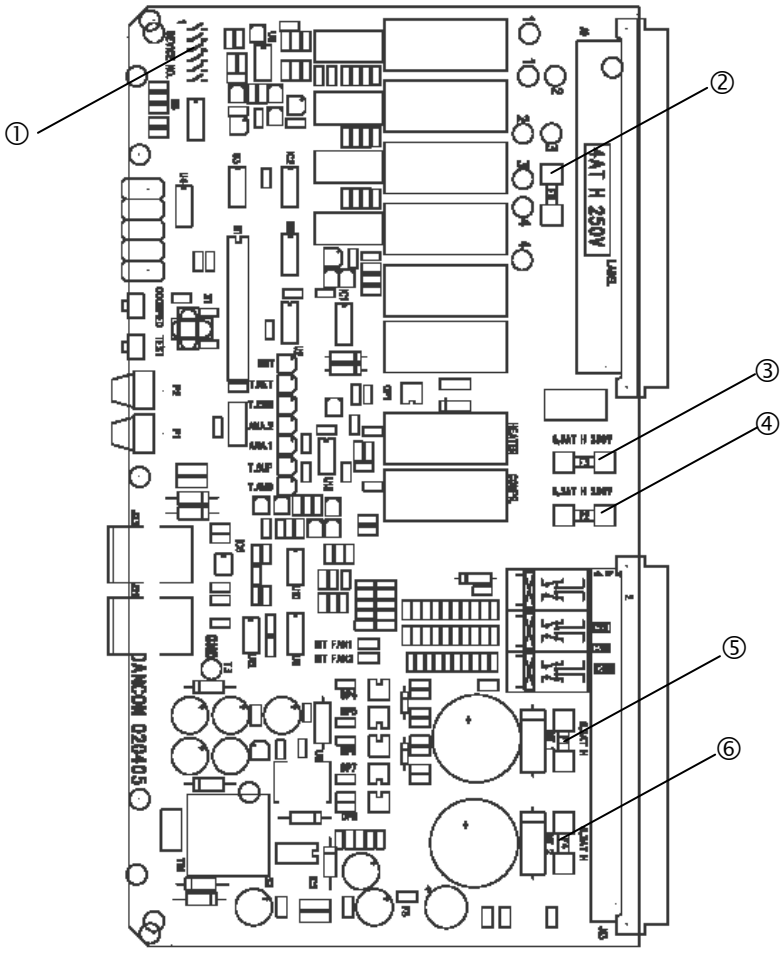
This table shows the dimensions, the letters corresponds to the drawing above:

Letter	Escalade 5.8/8.7 kW	Escalade 11.3/14.1 kW
A	92 mm	67 mm
B	200 mm	298 mm
C	528 mm	357 mm
D	304 mm	453 mm
E	666 mm	707 mm
F (Duct width)	507 mm	624 mm
G (Duct width)	723 mm	889 mm
H (Body width)	921 mm	1067 mm
I (Total height)	1790 mm	1932 mm
J (Total depth)	486 mm	559 mm
K (Total width)	997 mm	1150 mm

Connections on the PCB

Fuses and switches

This illustrates the PCB and the position of the fuses and switches:



No.	Part	Function
①	Dip switches	Selecting unit n.
②	Fuse 4.0 AT	Condenser fan 50 Hz
③	Fuse 6.3 AT	Heater/compressor
④	Fuse 6.3 AT	AC mains
⑤	Fuse 6.3 AT	Internal DC fan 2
⑥	Fuse 6.3 AT	Internal DC fan 1

Continued overleaf

Connections on the PCB, *continued*

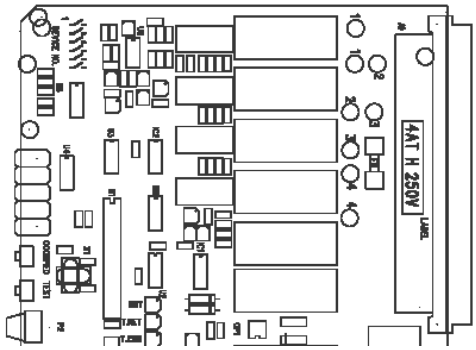
RS 485 jack's

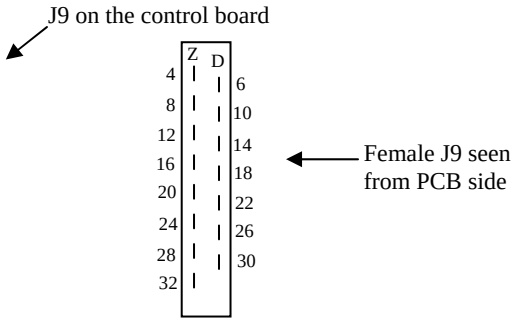
The 6 way RJ 11 female connector on the control board, or the one located beside the air injection in the top of the unit on the internal side, can be used for the DanLink (Telemetry option), computer tests or the optional display, DanView. The connections are shown in this table:

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

Mains voltage

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





J9 main voltage 15 way Eurocard connector

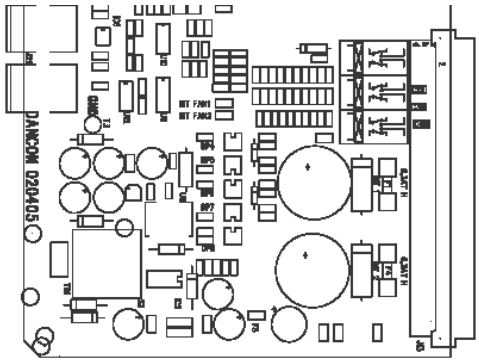
Part	Function	Part	Function
D 6	Not used	Z 4	Internal fan 2
D 10	Condenser fan 1	Z 8	Internal fan 1
D 14	Condenser fan 2	Z 16	Autotrafo 230 V
D 18	Heater	Z 20	Autotrafo 180 V
D 22	Crankcase heater	Z 24	Autotrafo 120 V
D 26	Compressor	Z 28	Common
D 30	Mains line	Z 32	Mains common

Continued overleaf

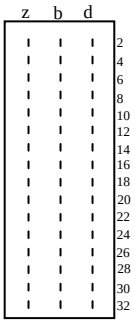
Connections on the PCB, *continued*

Low voltage J13

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



J13 on the control board



J13 female seen from PCB side

J13 low voltage 48 way Eurocard connector

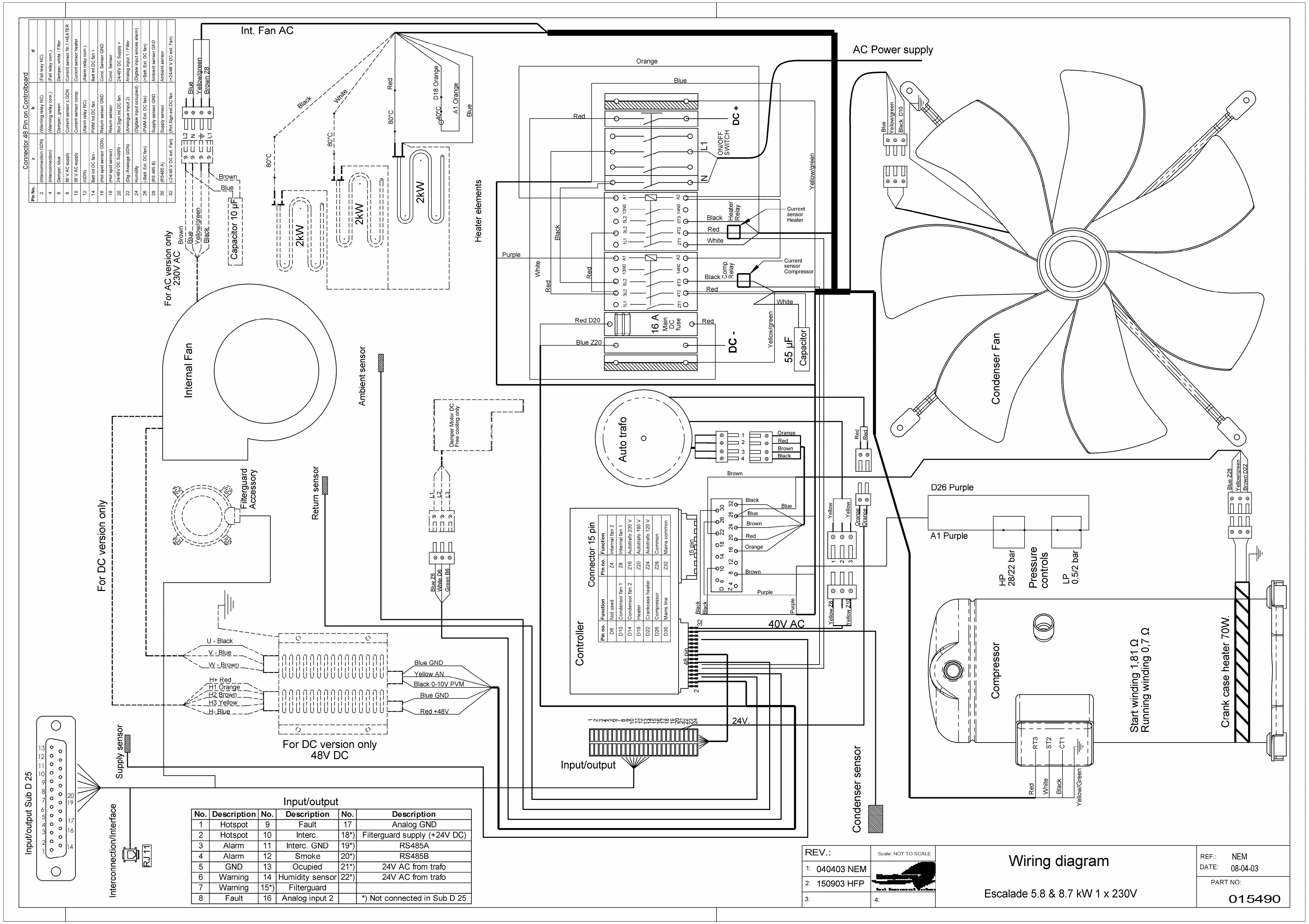
Pin No.	z	b	d
2	Interconnection -	Warning relay NC.	Fault relay NC.
4	Interconnection +	Warning relay com.	Fault relay com.
6	Damper GND	Damper control	Damper supply
8	36 V AC supply	Current sensor comp. GND	Current sensor heater GND
10	36 V AC supply	Current sensor comp.	Current sensor heater
12	GND	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 sensor GND	Ambient sensor GND
30	RS 485 A	Supply sensor	Ambient sensor
32	- 48 V DC ext. fan	Rot. Sign. Ext. DC fan	+ 48 V DC ext. fan

Resistance of temperature sensors

Scheme

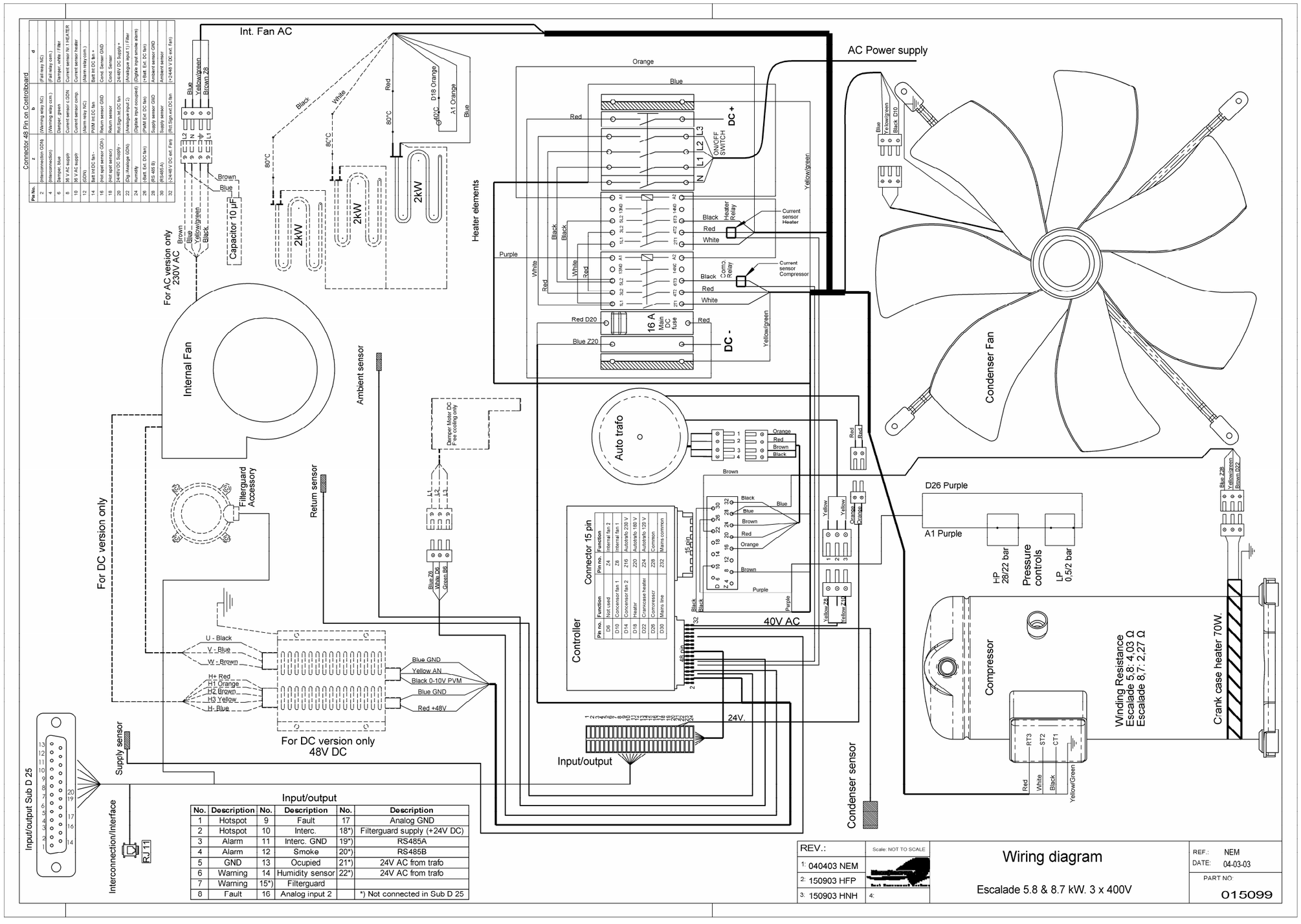
The table shows the resistance of the sensor at a given temperature:

Temperature °C	Resistance in Ohm	Temperature °C	Resistance in Ohm	Temperature °C	Resistance in Ohm
÷ 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


Int. Fan AC
AC Power supply
Heater elements
2kW
2kW
2kW
Capacitor 10 µF
For AC version only
230V AC
Internal Fan
Ambient sensor
Return sensor
Filterguard
Accessory
For DC version only
For DC version only
48V DC
Supply sensor
Input/output Sub D 25
Interconnection/Interface
RJ 11
DC +
DC -
ON/OFF SWITCH
16 A Main DC fuse
55 µF Capacitor
Auto trafo
Connector 15 pin
Controller
40V AC
24V
Input/output
Condenser Fan
D26 Purple
A1 Purple
HP 28/22 bar
Pressure controls
LP 0,5/2 bar
Compressor
Start winding 1,81 Ω
Running winding 0,7 Ω
Crank case heater 70W.
Condenser sensor
REV.:
1: 040403 NEM
2: 150903 HFP
Wiring diagram
Escalade 5.8 & 8.7 kW 1 x 230V
REF.: NEM
DATE: 08-04-03
PART NO:
015490

Input/output

No.	Description	No.	Description	No.	Description
1	Hotspot	9	Fault	17	Analog GND
2	Hotspot	10	Interc.	18*)	Filterguard supply (+24V DC)
3	Alarm	11	Interc. GND	19*)	RS485A
4	Alarm	12	Smoke	20*)	RS485B
5	GND	13	Ocupied	21*)	24V AC from trafo
6	Warning	14	Humidity sensor	22*)	24V AC from trafo
7	Warning	15*)	Filterguard		
8	Fault	16	Analog input 2		*) Not connected in Sub D 25



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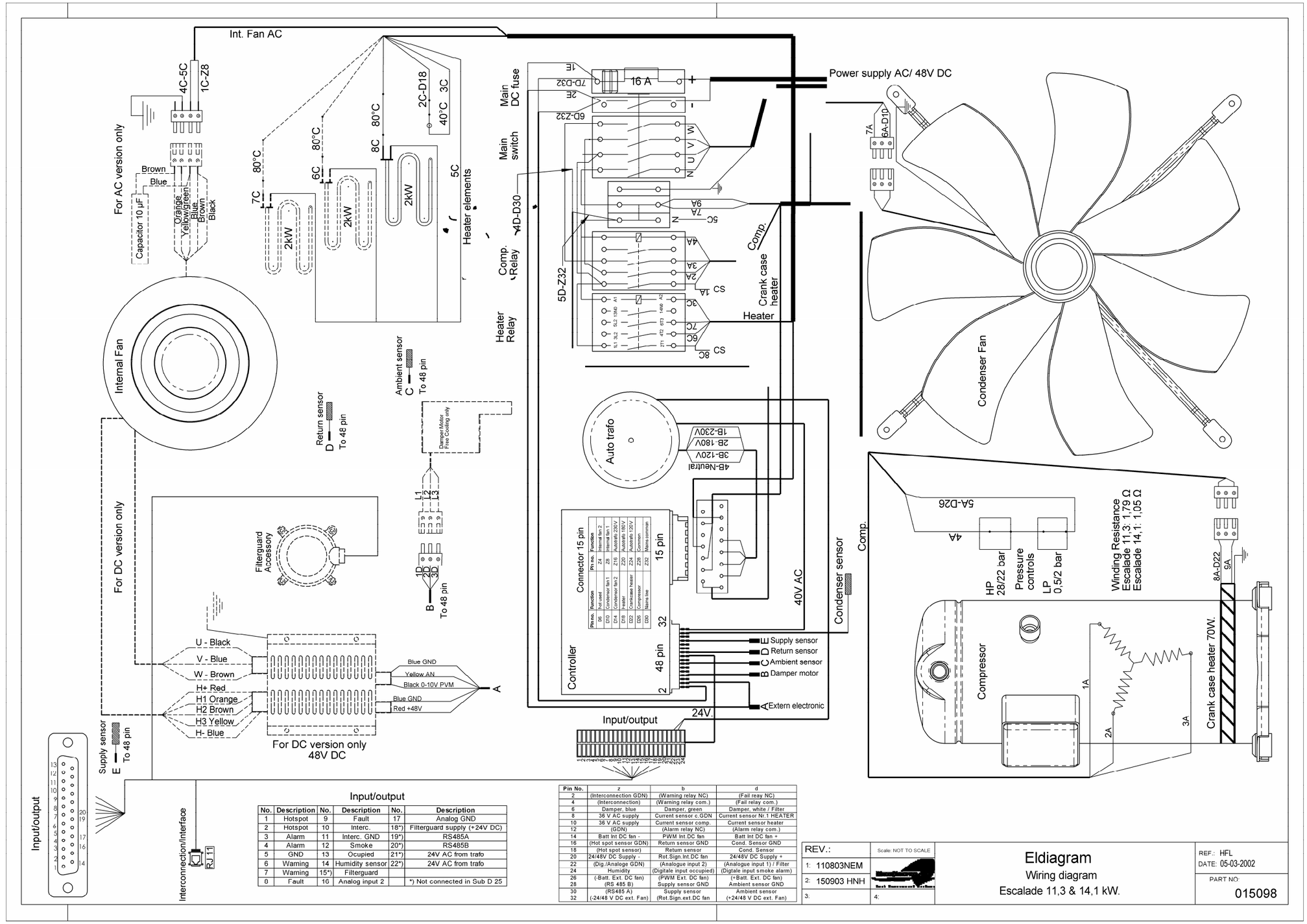

Input/output

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Pin No.	z	b	d
2	(Interconnection GDN)	(Warning relay NC)	(Fail reay NC)
4	(Interconnection)	(Warning relay com.)	(Fail relay com.)
6	Damper, blue	Damper, green	Damper, white / Filter
8	36 V AC supply	Current sensor c.GDN	Current sensor Nr.1 HEATER
10	36 V AC supply	Current sensor comp.	Current sensor heater
12	(GDN)	(Alarm relay NC)	(Alarm relay com.)
14	Batt Int DC fan -	PWM Int.DC fan	Batt Int DC fan +
16	(Hot spot sensor GDN)	Return sensor GND	Cond. Sensor GND
18	(Hot spot sensor)	Return sensor	Cond. Sensor
20	24/48V DC Supply -	Rot.Sign.Int.DC fan	24/48V DC Supply +
22	(Dig./Analoge GDN)	(Analogue input 2)	(Analogue input 1) / Filter
24	Humidity	(Digitale input occupied)	(Digtale input smoke alarm)
26	(-Batt. Ext. DC fan) (RS 485 B)	(PWM Ext. DC fan) Supply sensor GND	(+Batt. Ext. DC fan) Ambient sensor GND
28			
30	(RS485 A)	Supply sensor	Ambient sensor
32	(-24/48 V DC ext. Fan)	(Rot.Sign.ext.DC fan	(+24/48 V DC ext. Fan)

REV.:	Scale: NOT TO SCALE	Eldiagram	REF.: HFL
1: 110803NEM		Wiring diagram	DATE: 05-03-2002
2: 150903 HNH		Escalade 11,3 & 14,1 kW.	PART NO: 015098
3:	4:		

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