

Danline

Service manual

GB

No. 296032 • rev. 2.6 • 17.12.2012



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Danline

Service manual

EN

No. 296032 • rev. 2.6 • 17.12.2012



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Dantherm can accept no responsibility for possible errors and changes
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Introduction

Overview

Introduction This is the service manual for the Dantherm Air Handling Danline 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.

Caution In case of cold start the shelter must be heated to minimum + 5 °C for half an hour before the unit is connected to the electrical power.
 Do not activate the “self test” at ambient temperatures below - 20 °C as the active cooling system might indicate fault.

Attention If the unit is operated at ambient temperature below – 39 °C the condenser and the ambient sensors will indicate a fault. However, the unit will still be able to operate to some extent, e.g. recycling of internal air and heating will be in operation.

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Table of content

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General information

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

Manual, part no. Part number of this service manual is 296032.

Target group The target group for this service manual are the technicians who install and maintain the Danline unit.

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



Product No.:	Product name:	
362441	Danline 4.0 kW	1 x 230 V, 50 Hz and
	Danline 4.0 kW	3 x 400 V, 50 Hz
362443	Danline 5.5 kW	1 x 230 V, 50 Hz and
	Danline 5.5 kW	3 x 400 V, 50 Hz
362473	Danline 5.5 kW	Artic 3 x 400 V, 50 Hz
360032	Danline 6.0 L kW	3 x 400 V, 50 Hz


are in conformity with the following directives:

98/37/EEC	Directive on the safety of machines
73/23/EEC	Low Voltage Directive
2004/108/EF	EMC Directive
97/23/EEC	The Pressure Equipment Directive

- and are manufactured in conformity with the following standards:

EN 292	Machine Safety
EN 60 335-1	Low Voltage
EN 60 335-2	Low Voltage
EN 60 000-6-2	Refrigeration systems

Skive, 14.06.2007


Managing director Per Albek


Project manager

Continued overleaf

General information, *continued*

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



Product No.:	Product name:	
362445	Danline 8.0 kW	1 x 230 V, 50 Hz and
	Danline 8.0 kW	3 x 400 V, 50 Hz
362475	Danline 8.0 kW	Artic 3 x 400 V, 50 Hz
362455	Danline 8.0 kW	3 x 230 V, 60 Hz
362456	Danline 8.0 kW	1 x 230 V, 60 Hz
362447	Danline 11.5 kW	3 x 400 V, 50 Hz
362457	Danline 11.5 kW	3 x 230 V, 60 Hz
362449	Danline 13.5 kW	3 x 400 V, 50 Hz
362459	Danline 13.5 kW	3 x 230 V, 60 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 (Module A1)

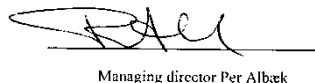
- and are manufactured in conformity with the following harmonized standards:

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	Refrigeration systems

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, 13.10.2006



Managing director Per Albæk



Project manager

Continued overleaf

General information, *continued*

**Conformity to
GOST R 50460-92**



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

Product No.:	Product name:
362441	Danline 4.0
362443	Danline 5.5
362445	Danline 8.0
362447	Danline 11.5
362449	Danline 13.5

OK 005 (OKP) code:
48 6200

Meet the requirements of directives:

GOST R MEK 60204-1-99	Safety of machinery. Electrical equipment of machines. Part 1. General requirements
GOST 12.1.003-83	Occupational safety standards system Noise. General safety requirements
GOST 12.1.012-90	Occupational safety standards system. Vibration safety. General requirements
GOST 12.2.028-84	Occupational safety standards system. General-purpose ventilators. Methods of noise characteristics determination

Customs code:
8415 82 800 0

In accordance with

Test report No 113/263 dd/ 05/04/2006 done by
ZAO ROSTEST USPP ROSTEST-MOSCOW
(registration No POCC RU.0001.21AЯ43 dd 30/12/2002)
Moscow, Nahimovsky Pr., 31

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
Ambient temperature	Is the outside air temperature
Supply temperature	Is the temperature of the air leaving the Danline to cool the electronic equipment
Return temperature	Is the temperature of the air entering the Danline from the electronic equipment
Condenser temperature	Is the temperature of the refrigerant from the condenser

Product description

Overview

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

Content This section covers the following topics:

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General description

Introduction

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

The Danline unit is a mono block microprocessor controlled Heat Management System especially designed for heat management of electronic enclosures. 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 both versions. Danline 6.0 L requires only an arctic kit up to + 35 °C.

Danline is designed for indoor placement and the slim design makes it possible to find room in most shelters or containers.

Usage

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

Function

The active elements in the temperature control are:

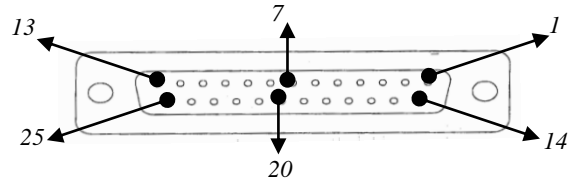
- Electrical heater(s)
- Damper
- Internal AC or DC fan
- Compressor
- Condenser fan(s)

The controller will operate these elements mainly based on the temperature reading of the return air sensor. This sensor is placed in the return air duct giving a good representation of the enclosure temperature.

Description of parts

25 poled SUB-D, illustration

This illustrates the SUB-D plug:



25 poled SUB-D, connections

Input/output connector

A Sub-D 25 female connector is located on the unit and is accessible without any dismantling of the unit. It is used for additional external equipment. The connector is located on the top of the Danline units and on the internal side of the Danline units.

Important!

The Sub-D 25 connector is not available on Danline 4.0.

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.

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	Common	-
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	Common	-
18	Brown/red	Not connected	-	-
19	Red/gray	RS485A	Output	-
20	Gray/red	RS485B	Output	-

Continued overleaf

Description of parts, *continued*

25 poled SUB-D, connections, *continued*

Pin no.	Color	Description	Function	Default setting
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 29.

DanCon versions

The DanCon control board is used in all the versions of Danline and is available in the following versions:

DanCon	With damper	Without damper
001	4.0/5.5 AC	-
002	4.0 DC	-
003	8.0 AC	-
004	8.0 DC and 6.0 L	-
005	-	4.0/5.5 AC
007	-	8.0 AC
013	5.5 DC	-
016	11.5/13.5 AC	-
017	-	11.5/13.5 AC
018	11.5/13.5 DC	-

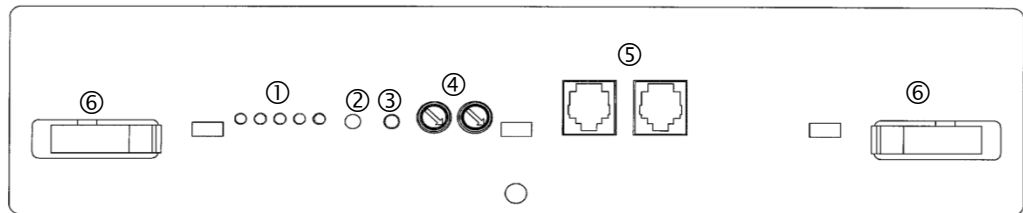
Active parts

The active parts controlled by the control board are:

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

Illustration, control board

This drawing illustrates the control board:



Continued overleaf

Description of the control board, *continued*

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 Occupied	By pressing this button the unit will go into the occupied function. Learn more about the occupied/service function in section "Functional description", page 17
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
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 19 and in the "User's guide", page 29
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 ¹⁾	The locking mechanisms must be released to remove the control panel. Remember to lock the locking mechanisms whenever a control board has been released. ¹⁾ Only on the control panel

Signals of LED

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

Part	Function
1 x Green LED	Supply Lit as soon as the controller is powered up
3 x 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 x Red LED	Fail Lit in case of a detected failure, see details in section "Fault finding guide", page 67.

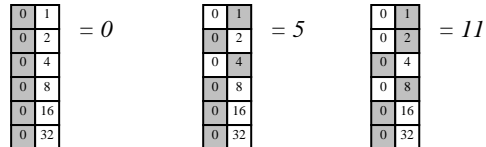
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Description of the control board, *continued*

RS485 serial line All information is represented on the serial RS485 line. This is available on the two front-mounted RJ45 jack's or at the multiple connector rear on the control board.

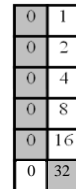
Asked or commanded through this connection the control board will respond to this. A separate datasheet is issued on this.

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:



Limitation of the fan speed

By means of DIPswitch no. 6 it is possible on Danline 4 and 5,5 to limit the speed of the external fan to maximum step 2. At the same time the maximum outdoor temperature is limited to 40 °C and the cooling performance will be reduced by 20 %.



Special option

Pressing 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.

Interconnection

If two units are present in the same enclosure, an interconnection between the two can be made. This will insure an even amount of working hours between the two units. The interconnection will also insure that the units are not opposing each other.

Functional description

Emergency cooling

Introduction

An emergency cooling function is selectable by means of PC test software and a PC. While this function is enabled, the operation of the climate unit is limited to closed loop with the use of free cooling in emergency situations. Emergency situations is defined as either compressor fault or loss of AC mains

Compressor fault

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

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

Loss of AC mains

The following steps is taken upon loss of AC mains:

- The fan curve is offset upwards with respect to the cooling set point. This is to lower the fan speed and thereby reduce the DC power consumption. The off set can be selected in the range of 0 to 15 °C. Default is 0 °C
- The damper is allowed to operate. This means that it will open and close dependent on the supply temperature and, to some degree, the return temperature. This is described in "Graphic illustration".

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

Recommended usage

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

Please contact your local dealer or Dantherm Air Handling A/S concerning guidelines for a specific situation.

Occupied function Beside the test button an occupied button is present – this override option is also present at the connector at the rear of the control board.

Once activated for 1-2 sec. the set points for heater and compressor is fixed at 20/25 °C – to make a comfort climate in the shelter. The internal fan will reduce speed to reduce the noise.

The occupied mode will be activated for an hour after which it will return to normal operation. The mode can be terminated if the button is activated shortly.

It is possible to keep the unit in occupied mode for as long time as desired by keeping the occupied button activated in that period.

LP timer/Artic kit (accessory)

The purpose of the LP timer is to allow the compressor to start up at low ambient temperatures. When the compressor is resting during ambient temperatures below approximate – 20 °C, the low pressure sensitive switch will normally be open circuit, due to low pressure in the cooling circuit. If active cooling is needed, the LP timer will short circuit the LP pressure sensitive switch for 100 seconds. This way the LP timer will give the compressor 100 seconds to build up pressure and to continue active cooling as long as there is a request for this.

Continued overleaf

Functional description, *continued*

Damper motor with (Cold operation accessory for Danline 5.5 II)

foil heater element The purpose of fitting an insulated housing with heater element around the damper motor is to secure the long term operation of the damper motor. This can be relevant for local areas with ambient temperatures in the range from - 40 to - 25 °C for several months each winter.

When fitted, the heater element will be activated whenever the damper motor temperature is below + 5 °C, and turned off again when the temperature at the motor is approximately + 15 °C. Also a safety thermostat that cut off the power at + 60 °C is fitted. This will be reset again at approximately 50 °C.

Set points

Set points

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

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

Set points received on the serial line from DanView, DanLink or the PC test software will be stored in an EEPROM on the control board and used when valid communication is in progress and 10 minutes after. This will be indicated in the LINK LED.

The range for this override with DanLink or DanView is - 10 to + 20 °C for the heater and + 20 to + 50 °C for the active cooler. If attempts are made to go out of this range or to change the set points closer to each other than 5 °C, the result will be no change. Heater set point higher than 15 °C is not recommended in versions with damper. This is due to the damper strategy allowing the damper to open when the return air temperature exceeds 18 °C.

Filter guard

Following the values for filter guard set points:

Unit	Filter guard range	Filter guard set point
Danline 4.0	20-200	90
Danline 5.5	20-200	105
Danline 8.0 and 6.0 L	50-500	190
Danline 11.5	50-500	275
Danline 13.5	50-500	275

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 29.

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

This illustration is showing 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. Compressor off after 9 minutes @ 1°C below set point OR following a 5°C drop below set point.
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 from medium to 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 medium.
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.

Self-test 1

All Danline versions without damper:

Step	Heater	Int. fan	Ext. fan	Com-pressor	LED's	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.

Self-test 2

Danline 4.0 & 5.5 – AC & DC versions with damper

Step	Heater	Damper	Int. fan	Ext. fan	Com-pressor	LED's	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.

Self-test 3

Danline 6.0 L & 8.0 DC versions with damper

Step	Heater	Damper	Int. fan	Ext. fan	Com-pressor	LED's	Duration
1	Off	Closing	Stopped	Stopped	Stopped	Jingle	30 sec.
2	On	Closing	Idle	Stopped	Stopped	Normal	35 sec.
3	Off	Closing	Medium	Idle	Running	Normal	40 sec.
4	Off	Closing	High	Medium	Running	Normal	35 sec.
5	Off	Closing	Idle	High	Running	Normal	30 sec.
6	Off	Opening	High	Stopped	Stopped	Normal	200 sec.

Continued overleaf

Test facility, *continued*

Self-test 4

Danline 8.0 - AC version with damper

Step	Heater	Damper	Int. fan	Ext. fan	Com-pressor	LED's	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.
6	Off	Opening	High	Stopped	Stopped	Normal	200 sec.

Self-test 5

Danline 11.5 & 13.5 – AC & DC versions with damper

Step	Heater	Damper	Int. fan	Ext. fan	Com-pressor	LED's	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.
6	Off	Opening	High	Stopped	Stopped	Normal	200 sec.

Get ready for use

Overview

Content

This section covers the following topics:

Topic	See page
Unpacking and mounting	24
Installation	27

Unpacking and mounting

Unpacking

The Danline unit is delivered in a box wrapped in a plastic bag. 4 lifting brackets, only to be mounted and used when moving the unit, is included.



Danline is during transport fastened with 4 screws to the pallet. The 4 brackets should be removed when unpacking the unit.

Draining pipe

The draining hose, located on the back of the unit must be guided through a hole in the shelter to the outside:

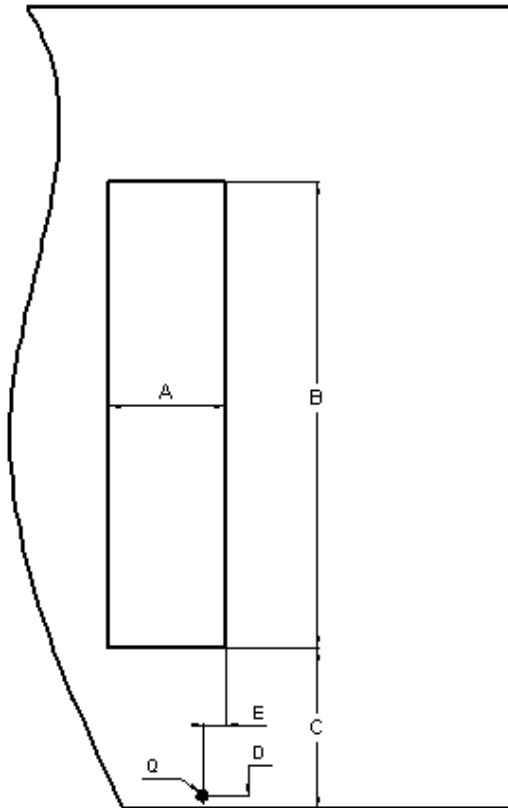


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Unpacking and mounting, *continued*

Mounting, making slot

To direct the airstreams right an optional 3 directional louver can be supplied with the unit. Make a slot in the shelter with the following dimensions. All measurements are made in millimeters:



	A	B	C	D	E	Q
Danline 4.0	281	1525	430	22	32	30
Danline 5.5	377	1525	430	22	32	30
Danline 6.0 L	581	1525	430	64	58	30
Danline 8.0	581	1525	430	64	58	30
Danline 11.5	608	1525	430	64	64	40
Danline 13.5	608	1525	430	64	64	40

A: Width of sloth

B: Height of sloth

C: Distance from floor to bottom of sloth

D: Distance from floor to the centre of the hole for drain hose

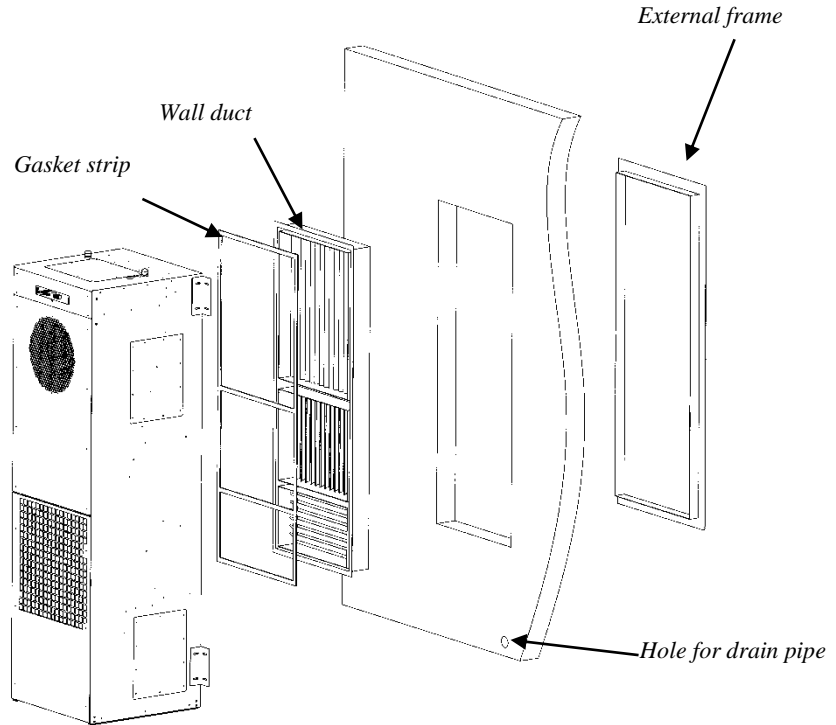
E: Distance from side of sloth to the centre of the hole for drain hose

Q: Hole diameter in wall to allow exit for drain hose

Continued overleaf

Unpacking and mounting, *continued*

Louver/gasket This illustrates the recommended louver/gasket:



**Mounting,
Louver/gasket**

Follow these steps to mount the louver/gasket::

Step	Action
1	Place the wall duct in the slot and fastened it to the wall with screws
2	Mount the extern frame from the outside and fastened it to the wall with screws
3	Seal the gab between the wall duct and the external frame with a weatherproof sealing
4	Mount the self adhesive (10 x 30 mm) gasket strip to the inside of the wall duct
5	Push the Danline towards the gasket and fix it to the shelter wall using the 4 supplied brackets

Installation

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

Important The terminals screws in the relays for the heater and the compressor **must be tightened** after unpacking the unit. The screws can go loose during transport. It is important to insert a repair switch near the unit to insure the safety of a technician working on the unit.

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

- A torx 25 screwdriver
- A small straight-point screwdriver
- AC power supply corresponding to the nameplate on the product
- DC power corresponding to the nameplate on the product

Circuit breakers The use of circuit breakers is very important. Please see “**Technical data**”, page 71 for the recommended circuit breakers.

Mains supply, 3 phases AC Follow these steps to connect the Danline to the power supply:

Step	Action
1	Identify the AC supply cable mounted on the unit. It is the one containing 4 or 5 wires
2	Make sure that the power is switched off
3	Connect the wire marked L1, L2 and L3 to the 3 phase connectors on the AC supply
4	Connect the wire marked N to the null or neutral connector on the AC supply
5	Connect the Green/Yellow wire to the ground connector on the AC supply

Mains supply, 1 phase Ac Follow these steps to connect the Danline to the power supply:

Step	Action
1	Identify the AC supply cable mounted on the unit. It is the one containing 3 wires
2	Make sure that the power is switched off
3	Connect the wire marked L1 to the phase connector on the AC supply
4	Connect the wire marked N to the null or neutral connector on the AC supply
5	Connect the wire marked N to the null or neutral connector on the AC supply

Continued overleaf

Installation, *continued*

Mains supply, DC It is very important to make sure that the DC supply is connected with the right polarity and voltage range. A wrongly connected DC supply can cause severe damage to the unit.

Step	Action
1	Identify the DC supply cable mounted on the unit. It is the one containing 2 wires
2	Make sure that the power is switched off
3	Connect the braun wire to the plus connector on the DC supply
4	Connect the blue wire to the minus connector on the DC supply

Starting the 6.0 L unit Danline 6.0 L is equipped with an energy-efficient Scroll compressor. This compressor operates with a scroll element and therefore can run backwards. Backwards running will not damage the compressor, but it will not produce any cooling output. Therefore the direction of rotation of the compressor must be controlled, when the Danline 6.0 L has been mounted and connected to mains supply.

Follow these steps to check the direction of rotation of the compressor:

Step	Action
1	Make sure that the unit is connected to the mains supply, both AC and DC
2	Set the compressor set point at 20°C by means of the blue pot meter on the control
3	If the temperature in the room is below 20°C: Use a hot blower to heat the air entering the internal fan until the compressor starts
4	Go outside and check if hot air is blown out of the condenser. If the compressor is cooling, the air will turn hot in half a minute
5	If the air is not hot: Exchange L2 and L3 on the power supply to the unit
6	Start at step 1 and check if the compressor is cooling

User's guide

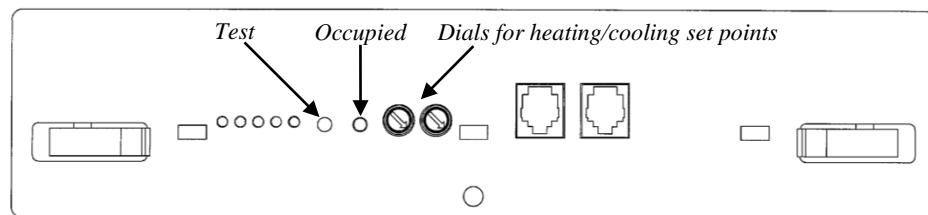
Overview

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 Danline 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 67.

Occupied function

You can force the Danline 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 19.

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.

Contents This section covers the following topics:

Topic	See page
Preventive maintenance	31
Accessories	33
Spare parts	37
Fault finding guide	67
Service agreement	69

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

Like a car the units needs to be maintained at regular intervals to prevent an overheated situation causing the electronic to shut down. The lack of maintenance could also cause pollution to the environment.

The interval between the preventive visits should not exceed 6 month. The planning of the visits should insure that a visit is done before and after the hot season. This will insure that the air conditioner will be ready when the demand for cooling is high.

Condition for warranty

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

Leaving the site

Before leaving the site, make sure that there are no alarms and that the BTS is in operation.

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 off.
2	Clean the unit carefully: <ul style="list-style-type: none"> • Air ducts • Fans • Condenser and evaporator

Continued overleaf

Preventive maintenance, *continued*

Recommended approach, *continued*

Step	Action
3	Perform the "tasks" using the checklist, see below
4	Switch the unit on again
5	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Functional description - Test facility" for details

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?	<input type="checkbox"/>	<input type="checkbox"/>
Is the fan and compressor mounted securely and free of excessive vibration?	<input type="checkbox"/>	<input type="checkbox"/>
Is the compressor free of excessive noise?	<input type="checkbox"/>	<input type="checkbox"/>
Are the coolant pipes free of obstructions, damage, corrosion and show no obvious signs of leakage?	<input type="checkbox"/>	<input type="checkbox"/>
Are the lamellas on the condenser and the evaporator clean and damage free?	<input type="checkbox"/>	<input type="checkbox"/>
Are all fan blades free of obstruction, cracks, missing blades and in balance?	<input type="checkbox"/>	<input type="checkbox"/>
Do the fans rotate freely and are they free from excessive vibration or noise?	<input type="checkbox"/>	<input type="checkbox"/>
Is all wiring and insulation free of damage?	<input type="checkbox"/>	<input type="checkbox"/>
Are all connectors sealed properly and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>

Accessories


Introduction

This section will give you an overview of the available accessories for Danline. 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 Danline:

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
		One male SUB-D 25W connector mounted and a connection box with 23 terminals. 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.	
		20-200 pa: Danline 4.0/5.5 50-500 pa: Danline 6.0 L/ 8.0/11.5/13.5	013038 014568
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

Continued overleaf

Accessories, *continued*




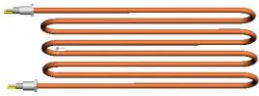

List, *continued*

Accessory	Illustration	Description	Part no.
Hot spot sensor		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 sensor 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
Humidity controller		Hygostat 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
Humidity controller kit with cable	-	As above, but with a cable	029891
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

Continued overleaf

Accessories, *continued*


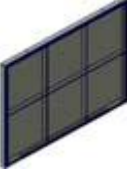


List, *continued*

Accessory	Illustration	Description	Part no.
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
Electrical heating		Danline 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.	
		Danline 4.0 Danline 5.5 Danline 6.0 L Danline 8.0 Danline 11.5/13.5	- 015405 015406 015406 015407
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.	-

Continued overleaf

Accessories, *continued*

List, *continued*

Accessory	Illustration	Description	Part no.
Internal air distribution		The purpose of the air distributor is to guide the cold supply air in the direction of possible hot areas in the room. Especially if one Danline is operating in a large/long shelter this air distributor might be needed.	016365 (Danline 8.0 – only)
Internal recycle filter (PPI Filter)		The purpose of the filter is to clean the internal airflow in recirculation mode, and it is a supplement to the standard mounted G4 filter, which cleans the intake of ambient air during free cooling.	
		Danline 4.0 Danline 5.5	016627 016628
DanView		The DanView unit is intended for display of relevant parameters in connection with the Dantherm HMS standard shelter cooling units. The display unit consists of an interface with a display with two lines of 16 characters each for verbal information on current running conditions, faults etc. as well as for input for the push buttons to select the requested information (set points, languages, measured values etc.).	012958
Weather strip		Different kinds of weather strips are available. Enquiries can be directed to Dantherm Air Handling A/S.	-

Spare parts

Overview

Introduction

This is the parts covered in this manual:

- Filter
- Internal fan
- External fan
- Control board
- Heater element
- Transformer
- Damper motor
- Temperature sensor

Table of contents

This section contains the following topics:

Topic	See page
Spare parts list	next page
How to replace the filter	39
How to replace the internal fan, Danline 4.0/5.5	41
How to replace the internal fan, Danline 6.0 L /8.0/11.5/13.5	43
How to replace the external electronics for the internal fan	45
How to replace the temperature sensors	48
How to replace the external fan, Danline 4.5/5.5	49
How to replace the external fan, Danline 6.0 L/8.0	51
How to replace the external fan, Danline 11.5/13.5	53
How to replace the control board	55
How to replace the heater element, Danline 4.0/5.5/6.0 L/8.0	57
How to replace the heater element, Danline 11.5/13.5	59
How to replace the transformer, Danline 4.0/5.5	61
How to replace the transformer, Danline 6.0 L/8.0/11.5/13.5	63
How to replace the damper motor	65

Spare parts list

Spare parts

The following table concludes all spare part numbers for Danline:

Spare part	4.0	5.5	8.0	11.5	13.5	6,0 L
Filter	010518	013673	010663	296006		015406
Internal fan DC 24V	013660	013674	296000	296007		-
Ext. electronic for 24V DC int. fan	-	296053	-	-	-	-
Internal fan DC 48V	013661	013675	010666			
Ext. electronic for 48V DC int. fan	-	296042		-	-	-
Internal fan AC 50/60 Hz	013662	013676	010665			-
External fan 50 Hz	013663	013677	010664	296008		010664
External fan 60 Hz	013663	013677	296001	-	-	-
Dancon Hardware	296084					013678
E-Prom AC free cooling	013679		296002	296009		-
E-Prom AC Closed loop	013682		296003	296010		-
E-Prom DC 24/48V	013684	013686	296004	296011		296004
Transformer	296029		296030			040846
Contactora for compressor, 1 phase supplied units	296055		296054	-	-	-
Contactora for compressor, 3 phase supplied units	296055			296054		296055
Contactora for heater	296055					
Damper motor	010530					
Heater element	011659					
Sensor	010532					
Pressurestat (LP)	011660					040847
Pressurestat (HP)	011661					040848
Dry filter	013667					
Compressor 1x230V, 50 Hz	013668	013691	296013	-	-	-
Compressor 1x220V, 60 Hz	-	-	-	-	-	-
Compressor 3x220V, 60 Hz	-	-	296005	-	-	-
Compressor 3x400V, 50/60 Hz	013689	013692	010529	296012	014873	040844
Crankcase heater						040845

How to replace the filter

Introduction 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 Danline is running in free cooling mode.

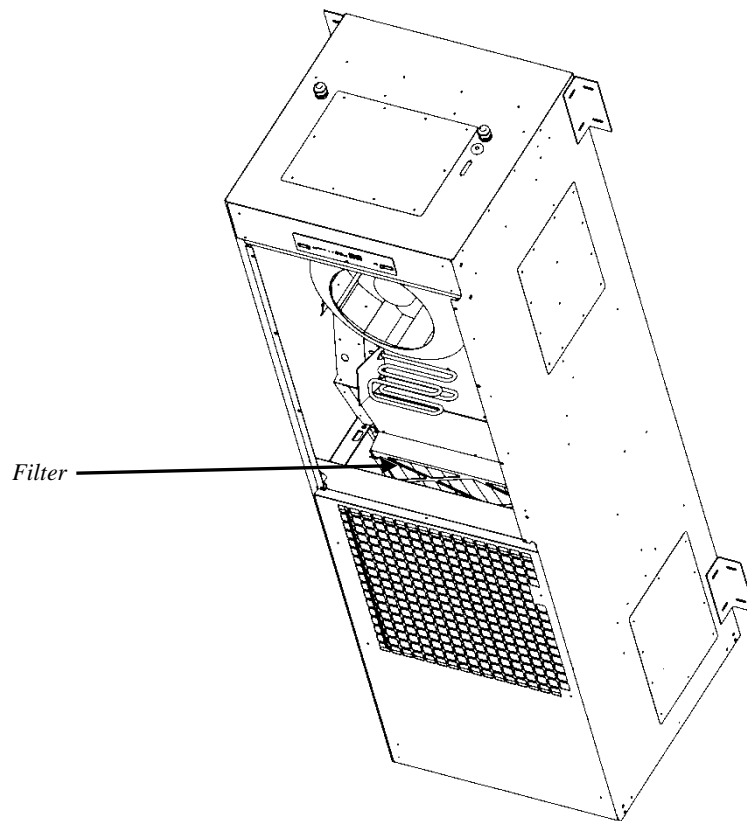
When to replace The filter must be replaced with a maximum of 6 month interval

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

- A torx 25 screwdriver
- A filter, see section called "Spare parts list", page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that all power to the unit must be switched OFF or disconnected before starting any service work on the unit.

Illustration This illustrates where the filter is placed:



Continued overleaf

How to replace the filter, *continued*

Procedure

Follow these steps to replace the filter:

Step	Action
1	Switch off power
2	Unscrew the torx 25 screws holding the top front cover in place and remove it
3	Remove the old filter by pulling it back and up from the brackets
4	Mount the sealing profile on the new filter frame, if it is not mounted already (look at the old filter to see where it must be mounted)
5	Slide the new filter in the brackets; make sure that it is fully in place. NOTE: The arrow indicating the airflow on the filter must point toward the front of the Danline
6	Remount the top front cover
7	Switch on power
8	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the internal fan, Danline 4.0/5.5

Introduction The internal fan is placed behind the front top cover of the Danline. The purpose is to circulate the air inside the indoor enclosure. The internal fan can either be of an AC or a DC operated type.

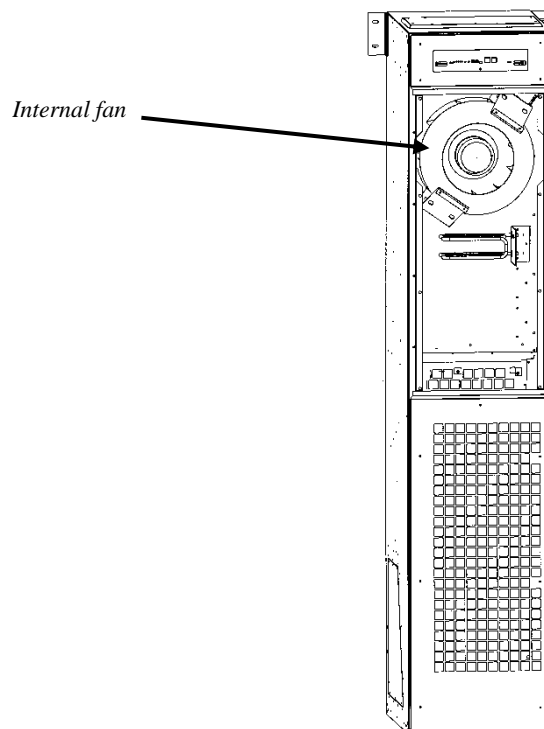
When to replace The internal fan only needs to be replaced when it is faulty or as part of a long time replacement plan, after app. 5 years.

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

- A torx 25 screwdriver
- An Allen wrench
- A new internal AC fan or DC fan. See “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that all power to the unit must be switched OFF or disconnected before starting any service work on the unit.

Illustration This illustrates where the fan is placed:



Continued overleaf

How to replace the internal fan, Danline 4.0/5.5, *continued*

Procedure

Follow these steps to replace the fan:

Step	Action
1	Switch off all power to the unit
2	Unscrew the 8 torx 25 screws that holds the top front cover in place and remove it
3	Loosen the 4 mm Allen screws that holds the bracket where the fan is mounted on in place
4	Unplug the fan from the power supply Result: The fan and bracket can now be removed from the unit
5	Move the bracket to the new fan
6	Mount and connect the new fan by following step 1 to 4 in reverse order
7	Switch on power again
8	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the internal fan, Danline 6.0 L /8.0/11.5/13.5

Introduction

The internal fan is placed behind the front top cover of the Danline. The fan is circulating 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 part of a long time replacement plan. The recommended is after app. 5 years.

Before you start

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

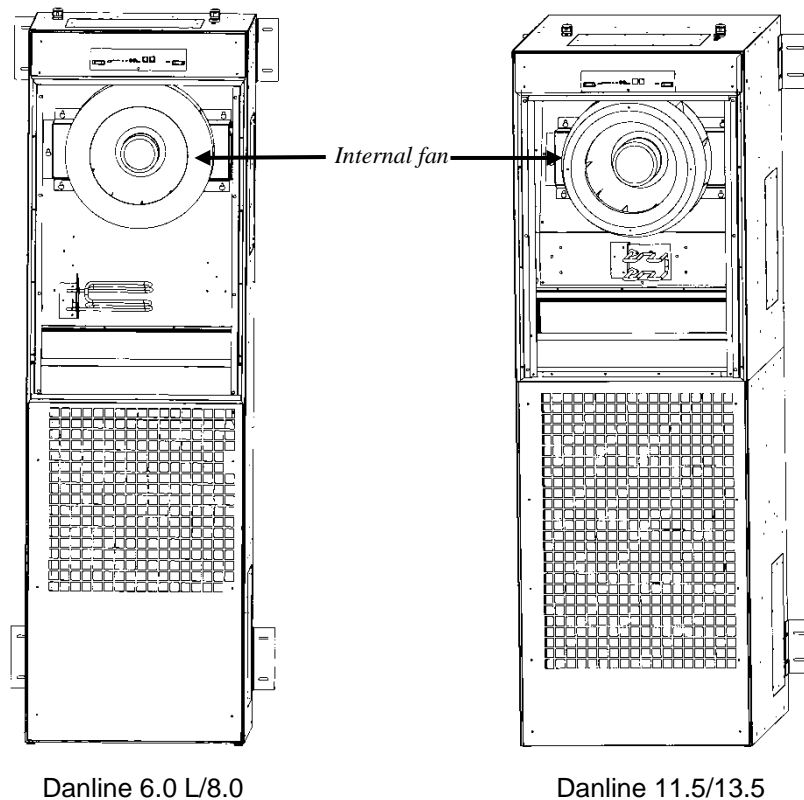
- A torx 25 screwdriver
- A PZ3 screwdriver
- A new internal fan, see “Spare parts list”, page 38 for details

Caution!

Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration

This illustrates where the fan is placed:



Continued overleaf

How to replace the internal fan, Danline 6.0 L /8.0/11.5/13.5, *continued*

Procedure

Follow these steps to replace the fan:

Step	Action
1	Switch off all power to the unit
2	Unscrew the 8 torx 25 screws holding the top front cover in place and remove it
3	Loosen the 6 PZ3 screws holding the bracket with the fan mounted in place
4	Unplug the fan from the power supply. On Danline 8.0 it is necessary to open the service lit on the right side of the unit in order to do this. This is done by unscrewing the 14 Allen screws. RESULT: The fan and bracket can now be removed from the unit
5	Mount the new fan by following step 2, 3 and 4 in reverse order
6	Connect the new fan to the power supply. Remember to close the lit again
7	Switch on power again
8	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the external electronics for the internal fan

Introduction The external electronic box for the internal DC fan is suitable for Danline 5.5 DC/8.0 48 V DC, and it is placed behind the front top cover of the Danline. The purpose is to control the speed of the fan dependent on the signal from the control board

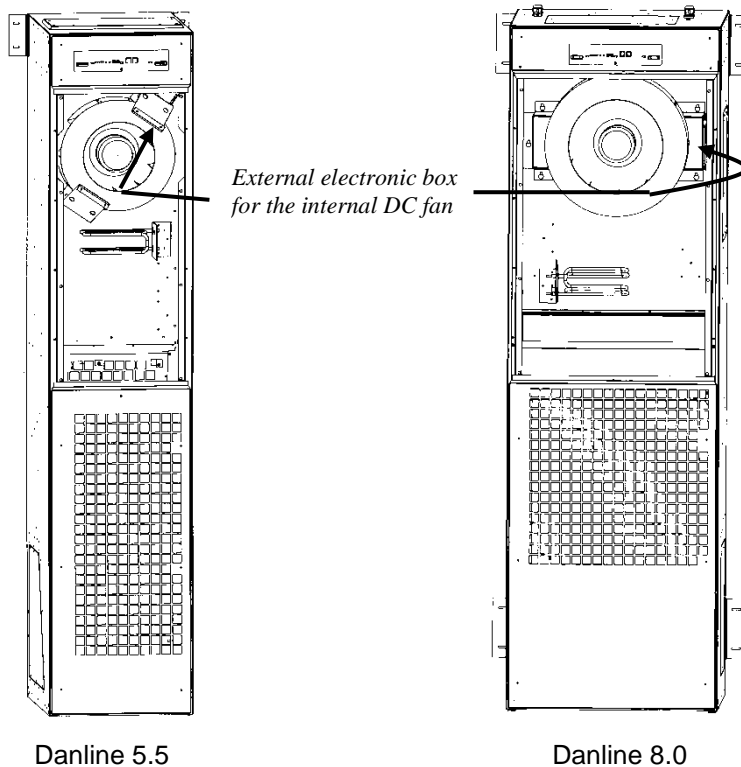
When to replace The external electronic box for the internal DC fan only needs to be replaced when it is faulty.

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

- A torx 25 screwdriver
- A new external electronic box for the internal DC fan. See “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that all power to the unit must be switched OFF or disconnected before starting any service work on the unit.

Illustration This illustrates where the external electronic box for the internal DC fan is placed:



Continued overleaf

How to replace the external electronics for the internal fan, *continued*

Procedure

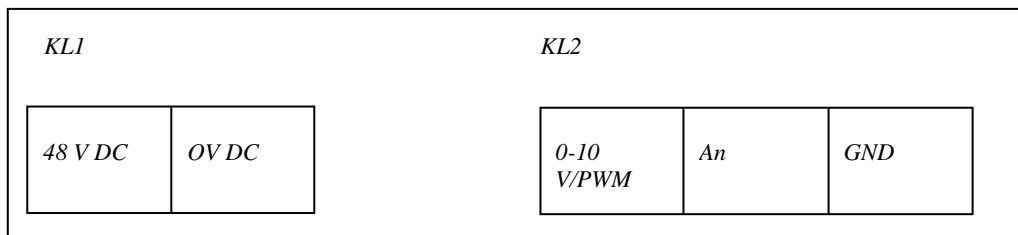
Follow these steps to replace the fan:

Step	Action
1	Switch off all power to the unit
2	Unscrew the 8 torx 25 screws that holds the top front cover in place and remove it
3	Loosen the 4 mm unbrako screws that holds the bracket where the fan is mounted on in place
4	Unplug the fan from the power supply Result: The fan and bracket can now be removed from the unit
5	Unplug the connectors to the external electronic box for the internal DC fan
6	Unscrew the 4 torx 25 screws holding the external electronic box for the internal DC fan in place. NOTE: The screw is mounted through a loose spacer between the external electronic box for the internal DC fan and the metal plate. Be aware that the spacer is present when remounting it
7	Mount and connect the new external electronic box for the internal DC fan by following step 2 to 6 in reverse order
8	Switch on power again
9	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

Connections: Location of plugs

The following illustrates the location of plugs on the external electronic box for the internal DC fan.

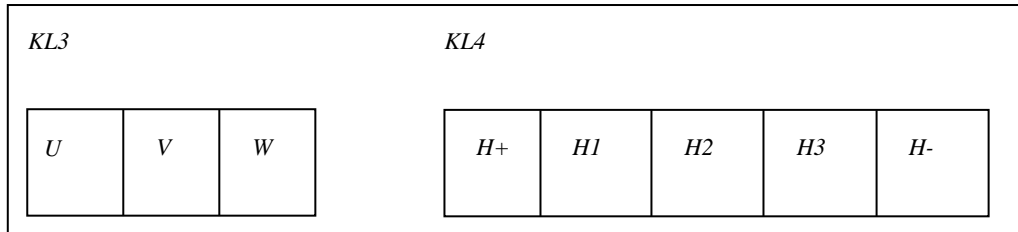
View of the external electronic box for the internal DC fan from one side:



Continued overleaf

How to replace the external electronics for the internal fan, *continued*

Connections: View of the external electronic box for the internal DC fan from other side:
Location of plugs



Connections: Specification of the plug connections:
Plug specification

KL1	Pin	Name	Colour of cable	Use
	1	24V or 48V	Red	24/48V DC supply
	2	GND	Blue	0V DC supply
KL2	Pin	Name	Colour of cable	Use
	1	0-10 V	Yellow	Control input
	2	An	White	Tach signal out
	3	GND	Blue	Reference

KL3	Pin	Name	Colour of cable	Use
	1	U	Black	Motor winding
	2	V	Blue	Motor winding
	3	W	Brown	Motor winding
KL4	Pin	Name	Colour of cable	Use
	1	H+	Red	Power supply for hall-sensors
	2	H1	Orange	Hall-sensor 1
	3	H2	Brown	Hall-sensor 2
	4	H3	Yellow	Hall-sensor 3
	5	H-	Blue	Power supply for hall-sensors

How to replace the temperature sensors

Introduction

The 4 sensors mounted in the unit is:

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

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.

When to replace

The sensor only needs to be replaced when faulty.

Caution!

Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Before you start

Before you start replacing any of the sensors make sure that you have the following available:

- A torx 25 screwdriver
 - A pair of cutting pliers
 - A soldering iron with solder
 - A new sensor. See "Spare parts list", page 38 for details
-

Procedure

Follow this procedure for replacing any of the sensors:

Step	Action
1	Switch off all 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	Switch on the power
5	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the external fan, Danline 4.5/5.5

Introduction The purpose of the external fans is to remove surplus heat from the condenser when the active cooling is active. To achieve the necessary airflow the Danline is equipped with two identical fans that will run simultaneously. The fans are AC driven.

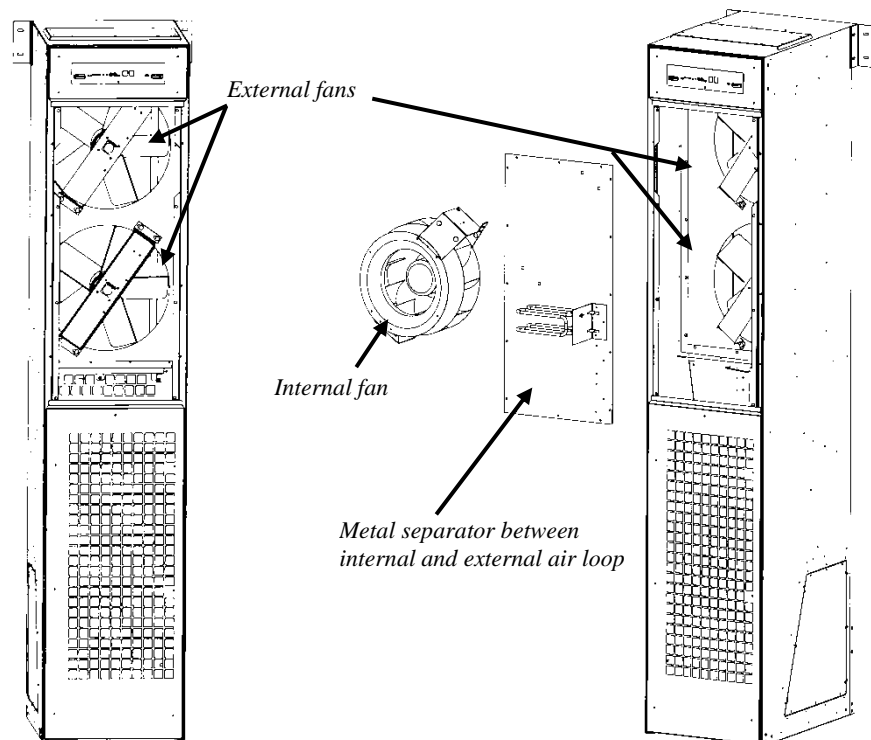
When to replace The external fans only need to be replaced when they are faulty.

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

- A torx 25 screwdriver
- A new external fan. See “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the fans are placed:



Continued overleaf

How to replace the external fan, Danline 4.5/5.5, *continued*

Procedure

Follow this procedure to replace any one of the external fans:

Step	Action
1	Switch of all power to the unit
2	Unscrew the 8 torx 25 screws that holds the top front cover in place and remove it
3	Loosen the 4 mm unbrako screw holding the bracket with the internal fan mounted
4	Unplug the internal fan from the power supply and remove it
5	Unscrew the 16 torx 25 screws holding the metal separator between internal and external air loop and remove it. RESULT: The two external fans are now accessible
6	Remove the 4 torx 25 that holds the fan in place that you want to replace
7	Unplug the fan and take it out
8	Mount the new fan. The new fan comes mounted with the bracket
9	Assemble the unit again by following step 1 to 6 in reverse order
10	Switch on power again
11	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the external fan, Danline 6.0 L/8.0

Introduction The purpose of the external fan is to remove surplus heat from the condenser when active cooling is performed. The fan is an AC driven centrifugal fan.

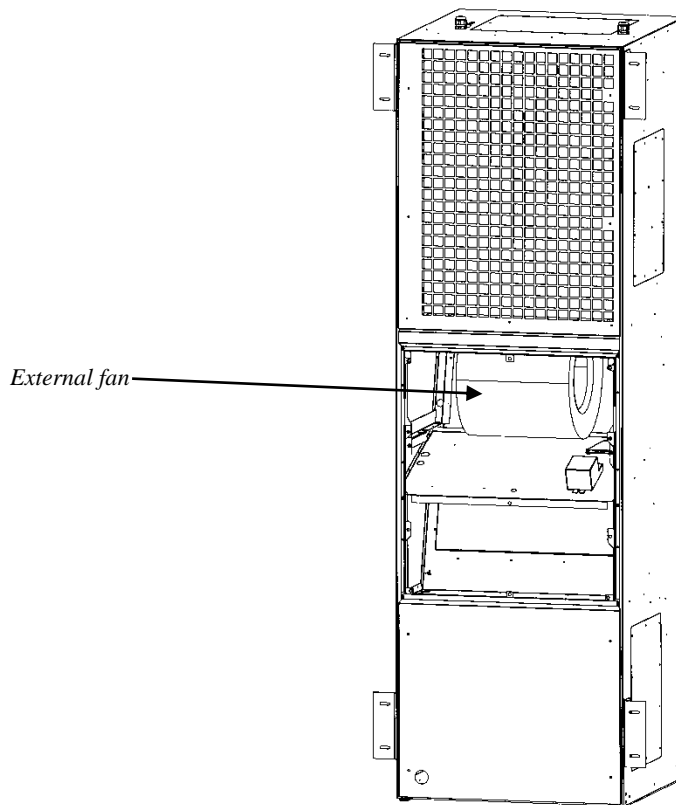
When to replace Only faulty external fans need to be replaced.

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

- A torx 25 screwdriver
- An adjustable spanner
- A new external fan, see “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the fan is placed:



Continued overleaf

How to replace the external fan, Danline 6.0 L/8.0, *continued*

Procedure

Follow this procedure to replace the external fan:

Step	Action
1	Switch off all power to the unit
2	Pull the Danline out from the wall
3	Unscrew the 10 torx 25 screws holding the back cover in place and remove the cover
4	Remove the cable binder on the ambient sensor
5	Unscrew the two 8 mm nuts holding the external fan in place
6	Unplug the fan and take it out
7	Mount the new fan and assemble the unit again by following step 2 to 6 in reverse order
8	Switch on power
9	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the external fan, Danline 11.5/13.5

Introduction The purpose of the external fan is to remove surplus heat from the condenser when active cooling is performed. The fan is an AC driven fan.

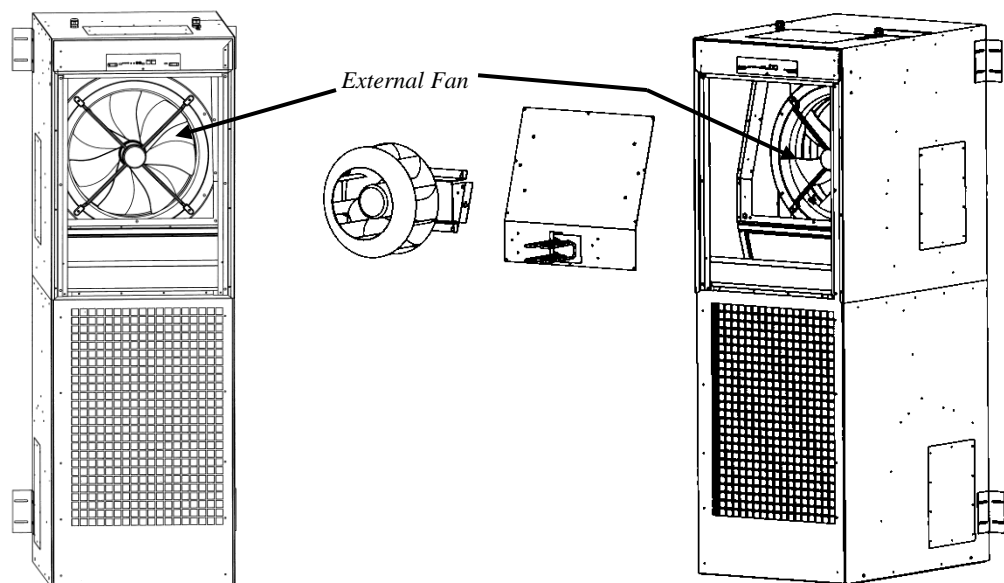
When to replace Only faulty external fans need to be replaced.

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

- A torx 25 screwdriver
 - A PZ3 screwdriver
 - An adjustable spanner
 - A new external fan, see “Spare parts list”, page 38 for details
-

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the fan is placed:



Continued overleaf

How to replace the external fan, Danline 11.5/13.5, *continued*

Procedure

Follow this procedure to replace the external fan:

Step	Action
1	Switch off all power to the unit
2	Unscrew the 8 torx 25 screws holding the top front cover in place and remove it
3	Loosen the 6 PZ3 screws holding the bracket with the fan mounted in place
4	Unplug the fan from the power supply. RESULT: The internal fan and bracket can now be removed from the unit
5	Loosen the 10 Torx 25 screws holding the metal plate separating the internal air loop from the external and remove it
6	Unplug the fan from the power supply
7	Loosen the 4 10mm nuts holding the external fan in place. RESULT: The external fan can now be removed from the unit
8	Mount the new fan by following step 1 to 6 in reverse order
9	Switch on power again
10	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the control board

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

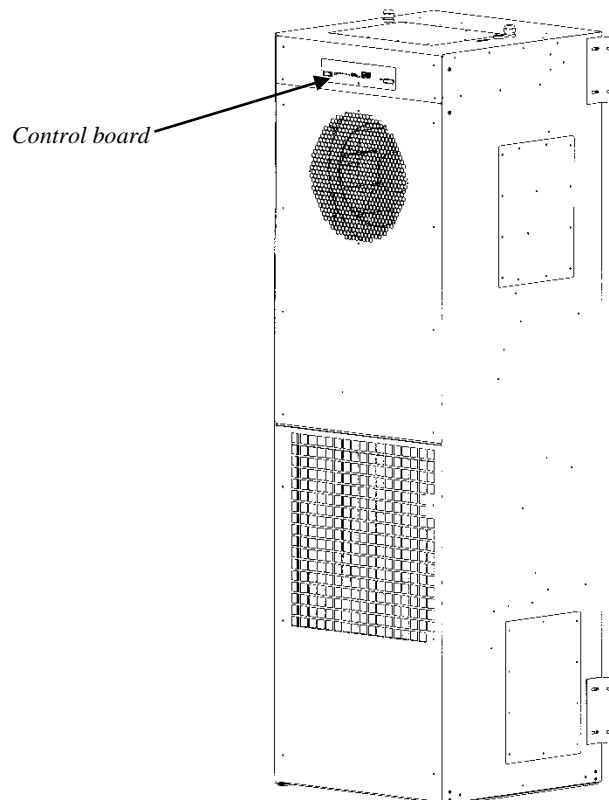
When to replace The control board only needs to be replaced when it is faulty.

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

- A screwdriver
- A new control board, see “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the control board is placed:



Continued overleaf

How to replace the control board, *continued*

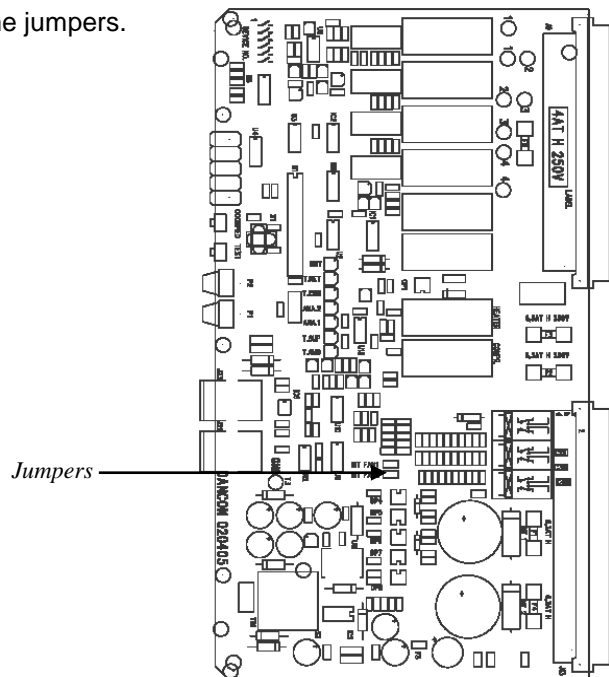
Procedure

Follow these steps to replace the control board:

Step	Action						
1	Switch off all power to the unit						
2	Remove the screw holding the control board in place						
3	Pull the 2 white plastic tabs out and press them away from the centre of the control board. RESULT: The control board can now be removed						
4	Check if the E-PROM is the right version before mounting it on the new control board. Compare with type sign						
5	Proceed with the following:						
	<table border="1"> <thead> <tr> <th>If the unit is a...</th> <th>Then...</th> </tr> </thead> <tbody> <tr> <td>Danline 4.0 DC</td> <td>Remove jumpers (see illustration)</td> </tr> <tr> <td>Other Danline versions</td> <td>Go to step 6</td> </tr> </tbody> </table>	If the unit is a...	Then...	Danline 4.0 DC	Remove jumpers (see illustration)	Other Danline versions	Go to step 6
	If the unit is a...	Then...					
Danline 4.0 DC	Remove jumpers (see illustration)						
Other Danline versions	Go to step 6						
6	Slide the new control board into the sloth. Make sure that it is pressed backwards into the sockets by applying a moderate impact to the front of the control board						
7	Mount the torx 20 screw again and the unit is ready for use						
8	Switch on power						
9	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details						

Illustration

This illustrates the location of the jumpers.



How to replace the heater element, Danline 4.0/5.5/6.0 L/8.0

Introduction The purpose of the heater elements is to keep the temperature on an adequate level at low ambient temperatures.

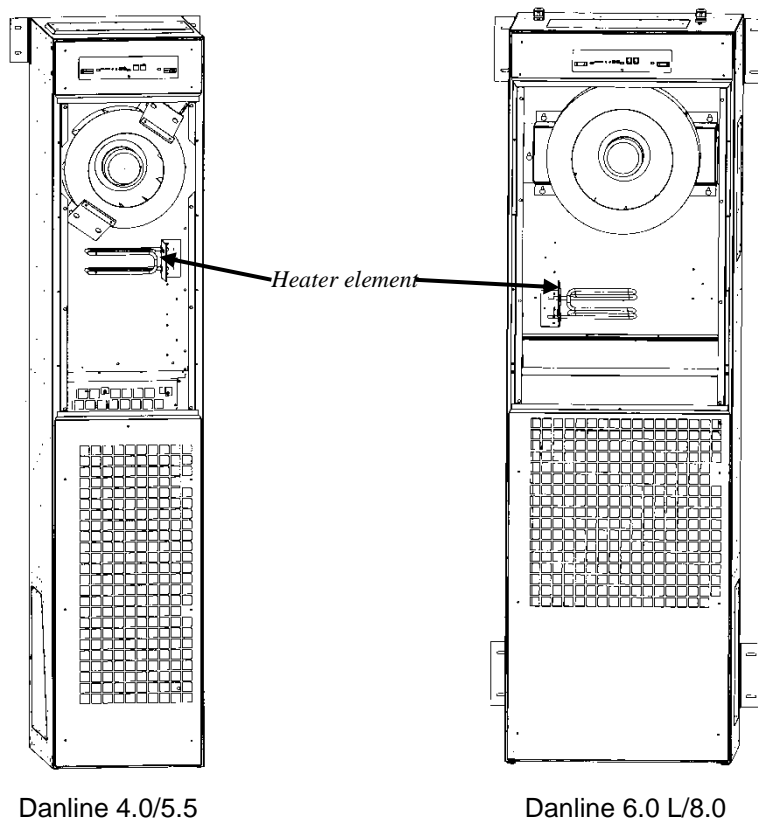
When to replace Only faulty heater elements need to be replaced.

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

- A torx 25 screwdriver
- An adjustable spanner
- A new heater element, see “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that all power to the unit must be switched OFF or disconnected before starting any service work on the unit.

Illustration This illustrates where the heater element is placed:



Continued overleaf

How to replace the heater element, Danline 4.0/5.5/6.0 L/8.0, *continued*

Procedure

Follow these steps to replace the heater element:

Step	Action
1	Switch off all power to unit
2	Unscrew the torx 25 screws holding the top front cover in place and remove it
3	Remove the two spade plugs connecting the heater element to the AC power
4	Remove the two 8 mm nuts holding the heater element in place. The heater element can now be removed from the unit
5	Install the new heater element by performing step 2 to 4 in reverse order
6	Switch on the power
7	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the heater element, Danline 11.5/13.5

Introduction The purpose of the heater elements is to keep the temperature on an adequate level at low ambient temperatures.

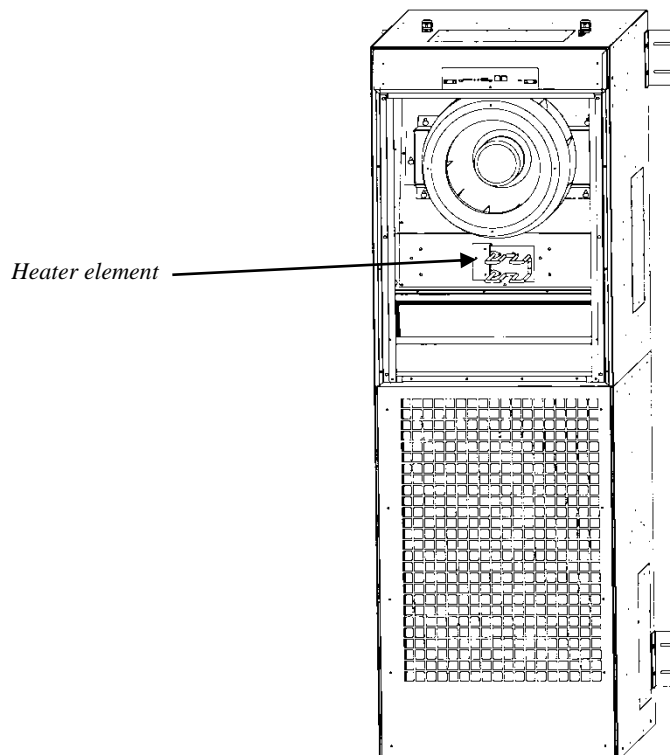
When to replace Only faulty heater elements need to be replaced.

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

- A torx 25 screwdriver
- An adjustable spanner
- A new heater element, see “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the heater element is placed:



Continued overleaf

How to replace the heater element, Danline 11.5/13.5, *continued*

Procedure

Follow these steps to replace the heater element:

Step	Action
1	Switch off all power to the unit
2	Unscrew the 6 torx 25 screws holding the top front cover in place and remove it
3	Unscrew the three 4 mm bolts holding the bracket with the heater element mounted
4	Remove the two spade plugs connecting the heater element to the AC power
5	Install the new heater element by performing step 2 to 4 in reverse order
6	Switch on the power again
7	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

How to replace the transformer, Danline 4.0/5.5

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

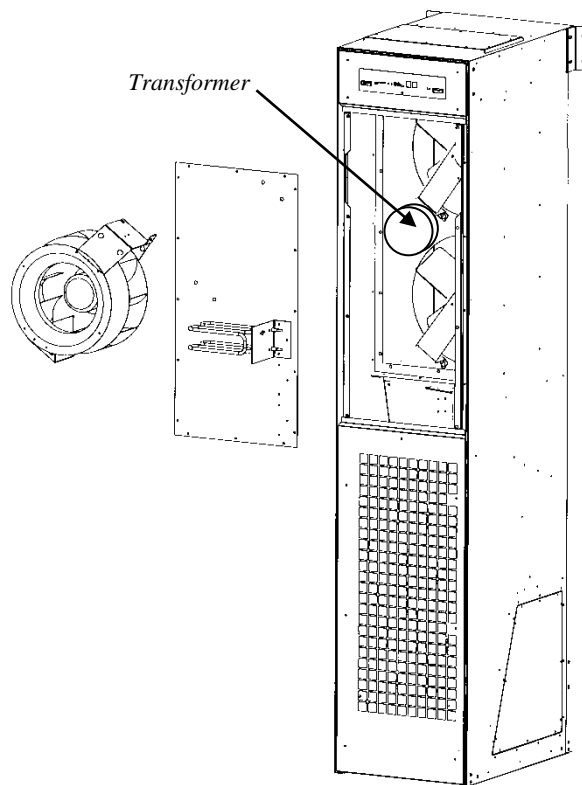
When to replace Only a faulty transformer needs to be replaced.

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

- A torx 25 screwdriver
 - A PZ3 screwdriver
 - A new transformer
-

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the transformer is placed:



Continued overleaf

How to replace the transformer, Danline 4.0/5.5, *continued*

Procedure

Follow this procedure to replace the transformer:

Step	Action
1	Switch off all power to the unit
2	Unscrew the 8 torx 25 screws that holds the top front cover in place and remove it
3	Loosen the 4 mm umbracho screw that holds the bracket where the internal fan is mounted on in place
4	Unplug the fan from the power supply and remove the internal fan
5	Unscrew the 16 torx 25 screws that hold the back cover for the internal fan in place and remove it
6	Dismount the connections to the transformer. The connectors differ in size and makes remounting easy
7	Remove the transformer by unscrewing the 6 mm screw holding the transformer in place
8	Mount the new transformer by performing step 2-7 in reverse order
9	Switch on power again
10	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications

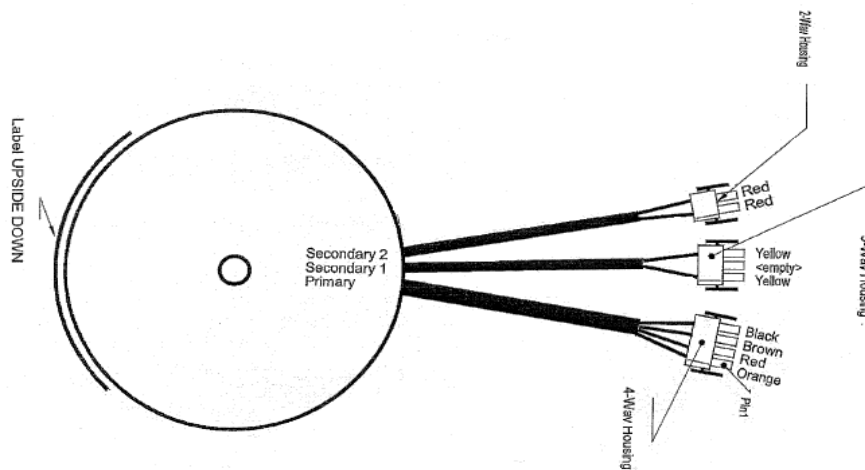
Illustration

This illustration describes the connections of the transformer:

2 Way connector	
Colour	Function
Red	Output: 24 V AC
Red	Output: 24 V AC

3 Way connector	
Colour	Function
Yellow	Output: 40 V AC
-	-
Yellow	Output: 40 V AC

4 Way connector	
Colour	Function
Orange	Input: 230 V AC
Red	Output: 180 V AC
Brown	Output: 120 V AC
Black	0 V



How to replace the transformer, Danline 6.0 L/8.0/11.5/13.5

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

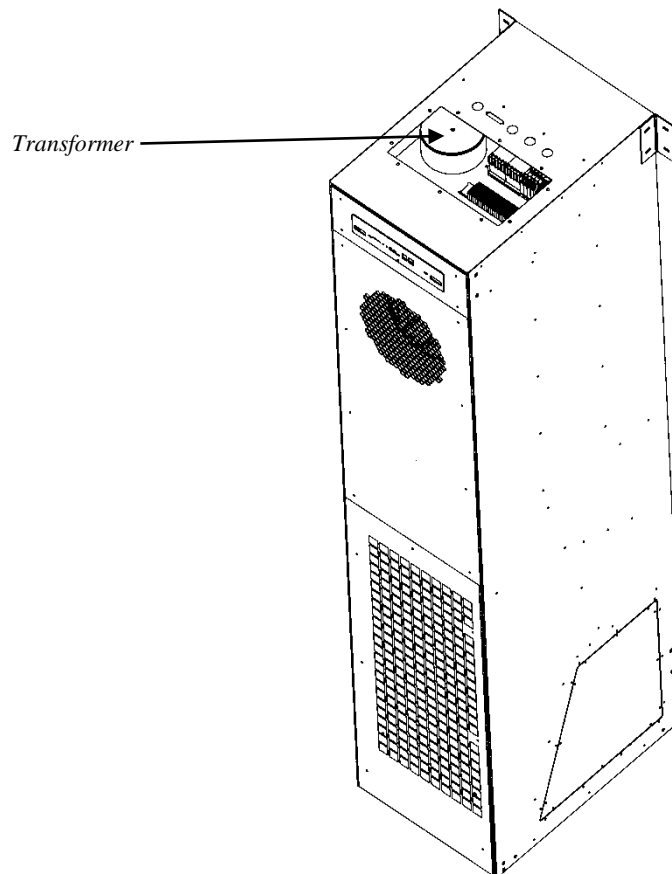
When to replace Only a faulty transformer needs to be replaced.

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

- A torx 25 screwdriver
- A PZ3 screwdriver
- A new transformer, see “Spare parts list”, page 38 for details

Caution! Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration This illustrates where the transformer is placed:



Continued overleaf

How to replace the transformer, Danline 6.0 L/8.0/11.5/13.5, *continued*

Procedure

Follow this procedure to replace the transformer:

Step	Action
1	Switch off all power to the unit
2	Remove the top lid by unscrewing the torx 25 screws in order to gain access to the electronic enclosure
3	Locate the transformer on the left side of the enclosure
4	Dismount the connections to the transformer. The connectors differ in size and makes remounting easy
5	Remove the transformer by unscrewing the 6 mm screw holding the transformer in place
6	Mount the new transformer by performing step 2-5 in reverse order
7	Switch on power again
8	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See “ Test facility ”, page 21” for details

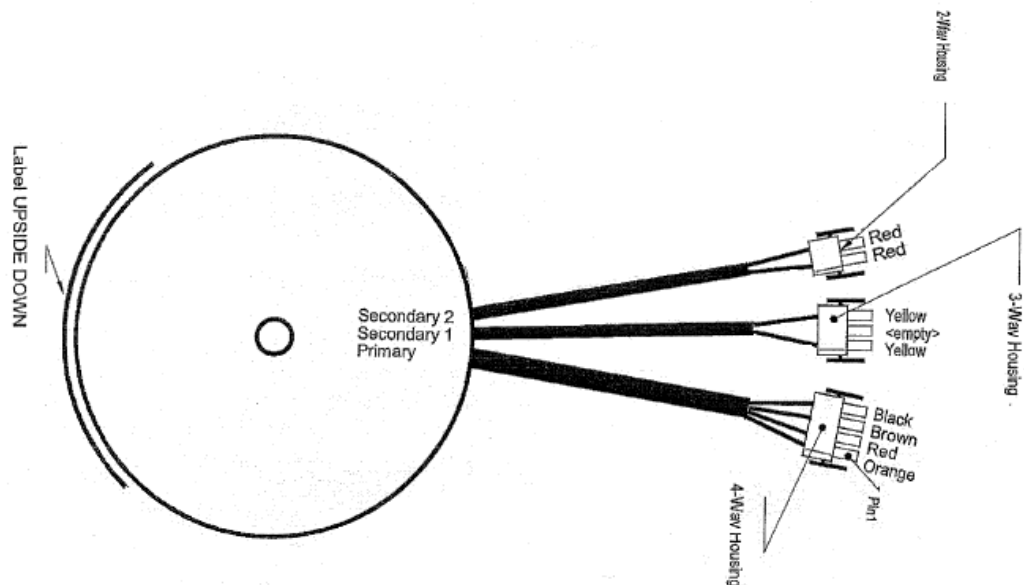
Illustration

This illustration describes the connections of the transformer:

2 Way connector	
Colour	Function
Red	Output: 24 V AC
Red	Output: 24 V AC

3 Way connector	
Colour	Function
Yellow	Output: 40 V AC
-	-
Yellow	Output: 40 V AC

4 Way connector	
Colour	Function
Orange	Input: 230 V AC
Red	Output: 180 V AC 160 V for Danline 6.0 L
Brown	Output: 120 V AC
Black	0 V



How to replace the damper motor

Introduction

When the Danline unit is in the 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. The typical fault would be that the damper does not move at all.

Before you start

Make sure that you have the following available before you begin:

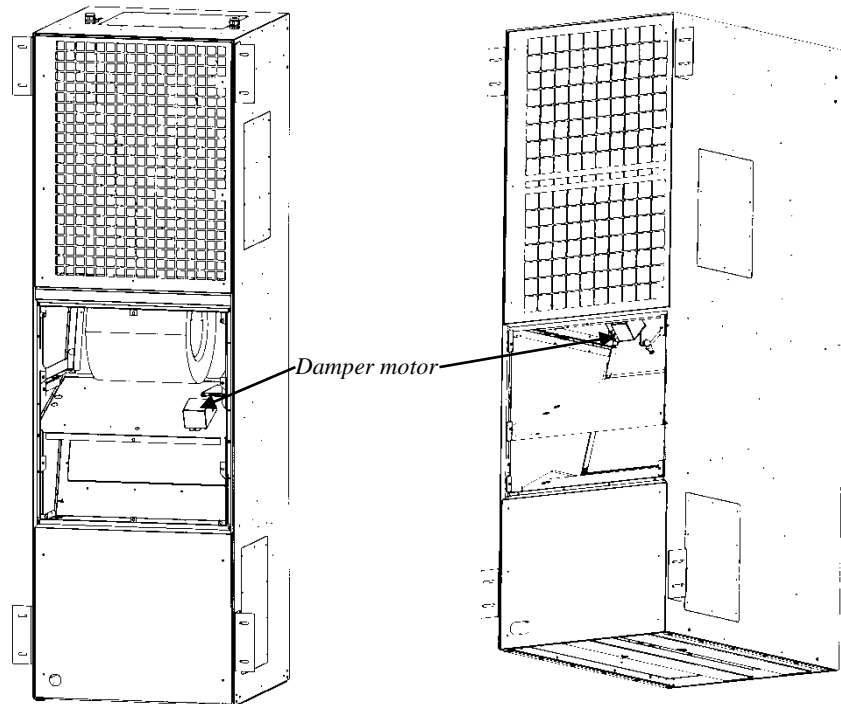
- A torx 25 screwdriver
- A 13 mm wrench
- A PZ2 screwdriver
- A new damper motor, see section called “Spare parts list”, page 38 for details

Caution

Only trained and certified technicians is allowed to carry out the replacement of parts. Remember that **all power to the unit must be switched OFF or disconnected before starting any service work on the unit.**

Illustration

This illustrates where the damper motor is placed:



Danline 4.0/5.5/6.0 L/8.0

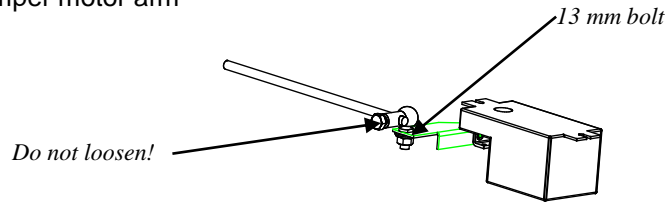
Danline 11.5/13.5

Continued overleaf

How to replace the damper motor, *continued*

Procedure

Follow these steps to replace the damper motor:

Step	Action
1	Switch off all power to the unit
2	Pull the Danline out from the wall
3	Unscrew the torx 25 screws that keep the back cover in place
4	Remove the cable binder on the ambient sensor and remove the cover
5	Unscrew the 13 mm nut that is holding the damper arm connected to the damper motor arm  <p>NOTE: Do not loosen or remove the bolt used for adjusting the damper</p>
6	Disconnect the damper motor from the DC voltage
7	Unscrew the screws that hold the damper motor to the cabinet. RESULT: The damper motor can now be removed
8	Move the damper motor arm on the faulty damper motor to the new damper motor
9	Mount the new damper motor, back and front cover by following the steps from 1 to 5 in reverse order
10	Switch on the power
11	Perform a self-test by pushing the test button and making sure that the unit performs corresponding to the test specifications. See "Test facility", page 21" for details

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 Air Handling 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 33.

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

The Alarm status LED will light up if an alarm, a fault or a warning occurs. Lowest is the **WARNING** alarm activated on one of following incidences:

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

A permanent lit Alarm status LED will indicate a WARNING.

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
 - A slow flashing Alarm status LED – app. ½ Hz (once every 2 seconds) – will indicate a FAULT.
-

Alarm

An alarm is activated on one of the following events:

- The internal AC fan is stopped - no current consumption
 - The internal DC fan is stopped - no rotational pulses
 - The condenser fan is faulty – doesn't use current.
 - The compressor doesn't draw current – this due 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.
 - Smoke alarm.
 - 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.
 - A fast flashing fail LED – app. 2 Hz (2 per second) – is indicating an ALARM.
-

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
- Phone no.
- Site/location (unit)
- Company
- Email
- Serial no/order no.
- Country
- Type (unit)
- 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.

Topic	See page
Technical data	71
Dimensions	77
Connections on the PCB	78
Resistance of temperature sensors	81
Wiring Diagram	82

Technical data

Introduction

The technical data for Danline is described in this section. Further details can be obtained by contacting Dantherm Air Handling A/S.

Performance

The table below shows the performance of the Danline unit:

Specification	Unit	4.0	5.5	6.0 L	8.0	11.5	13.5
Active cooling ¹⁾	kW	3.7	5.5	5,7	8.0 ²⁾	11.7	13.5
Free cooling	W/K	266	400	659	659	726	726
Internal flow	m ³ /t	850	1150	2440	1900	2850	2850
External flow	m ³ /t	1400	1800	1540	2400	3550	3550
Heater	kW	1.5	1.5	1,5	1.5	1.5	1.5

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

²⁾ 1 x 230 V AC, 50 Hz version: 7.0 kW

Cabinet

This table shows the data of the cabinet:

Specification	Unit	4.0	5.5	6.0 L/8.0	11.5	13.5
Dimensions, unit only	W	300	400	600	650	650
	D	600	600	600	900	900
	H	2000	2000	2000	2000	2000
Dimensions, unit incl. packing	W	500	500	700	700	700
	D	700	700	700	1000	1000
	H	2150	2150	2150	2150	2150
Weight, unit only	Kg	120	140	170	253	273
Weight, unit incl. packing	Kg	140	145	200	260	280

Electrical data, general electrical characteristics

This table shows the voltage supply tolerances valid for all Danline units:

- Tolerances, AC = +/- 10 %
- Tolerances, 24 V DC = 19-30 V DC
- Tolerances, 48 V DC = 36-56 V DC

Continued overleaf

Technical data, *continued*

Electrical, 1 phase 230 V AC, 50 Hz

Product specific electrical characteristics:

The following tables show the key electrical characteristics for the Danline units. Please note that the circuit breaker and cable dimensions are the recommended values from Dantherm Air Handling A/S. Local rules may override this recommendation.

Power factor						
Specification	4.0	5.5	6.0 L	8.0	11.5	13.5
AC	0,93	0,97	-	0,95	-	-
Unit with AC internal fan-						
Max. start current ¹⁾	45 A	55 A	-	95 A	-	-
Maximum current	14,00 A	18,70 A	-	22,30 A	-	-
Nominal current, active cooling ²⁾	10,98 A	15,62 A	-	14,10 A	-	-
Nominal current, free cooling	0,75 A	0,52 A	-	2.10	-	-
Circuit breaker	16,00 A	20,00 A	-	32,00 A	-	-
Cable dimension	2,5 mm ²	2,5 mm ²	-	4,0 mm ²	-	-
Unit with 24 V DC internal fan						
Max. start current ¹⁾	AC 45 A	AC 55 A	-	AC 95 A	-	-
Max. current	AC 13,30 A DC 9,50 A	AC 18,00 A DC 9,80 A	-	AC 20,00 A DC 12,00 A	-	-
Nom. current, active cooling ²⁾	AC 10,23 A DC 7,30 A	AC 15,10 A DC 9,00 A	-	AC 12,00 A DC 9,00 A	-	-
Nom. current, free cooling ³⁾	DC 7,30 A	DC 9,00 A	-	DC 9,00 A	-	-
Circuit breaker	AC 16,00 A DC 16,00 A	AC 20,00 A DC 16,00 A	-	AC 32,00 A DC 16,00 A	-	-
Cable dimension	AC 2,5 mm ² DC 2,5 mm ²	AC 2,5 mm ² DC 2,5 mm ²	-	AC 4,0 mm ² DC 2,5 mm ²	-	-
Unit with 48 V DC internal fan						
Max. start current ¹⁾	AC 45 A	AC 55 A	-	AC 95 A	-	-
Max. current	AC 13,30 A DC 5,50 A	AC 18,0 A DC 6,3 A	-	AC 20,0 A DC 10,0 A	-	-
Nom. current, active cooling ²⁾	AC 10,23 A DC 3,90 A	AC 15,10 A DC 5,10 A	-	AC 12,00 A DC 4,30 A	-	-
Nom. current, free cooling ³⁾	DC 3,90 A	DC 5,10 A	-	DC 4,30 A	-	-
Circuit breaker	AC 16,00 A DC 10,00 A	AC 20,0 A DC 10,0 A	-	AC 32,0 A DC 10,0 A	-	-
Cable dimension	AC 2,5 mm ² DC 2,5 mm ²	AC 2,5 mm ² DC 2,5 mm ²	-	AC 4,0 mm ² DC 2,5 mm ²	-	-

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.

Continued overleaf

Technical data, *continued*

Electrical, 1 phase This is the electrical data, 1 phase, 230 V AC, 60 Hz:
230 V AC, 60 Hz

Power factor						
Specification	4.0	5.5	6.0 L	8.0	11.5	13.5
AC	-	-	-	0,95	-	-
Unit with AC internal fan						
Max. start current ¹⁾	-	-	-	-	-	-
Maximum current	-	-	-	-	-	-
Nominal current, active cooling ²⁾	-	-	-	-	-	-
Nominal current, free cooling	-	-	-	-	-	-
Circuit breaker	-	-	-	-	-	-
Cable dimension	-	-	-	-	-	-
Unit with 24 V DC internal fan						
Max. start current ¹⁾	-	-	-	AC 130 A	-	-
Max. current	-	-	-	AC 31,3 A DC 12,0 A	-	-
Nom. Current, active cooling ²⁾	-	-	-	AC 15,00 A DC 9,00 A	-	-
Nom. Current, free cooling ³⁾	-	-	-	DC 9,00 A	-	-
Circuit breaker	-	-	-	AC 40,0 A DC 16,0 A	-	-
Cable dimension	-	-	-	AC 6,0 mm ² DC 2,5 mm ²	-	-
Unit with 48 V DC internal fan						
Max. start current ¹⁾	-	-	-	AC 130 A	-	-
Max. current	-	-	-	AC 31,3 A DC 10,0 A	-	-
Nom. Current, active cooling ²⁾	-	-	-	AC 15,00 A DC 4,30 A	-	-
Nom. Current, free cooling ³⁾	-	-	-	DC 4,30 A	-	-
Circuit breaker	-	-	-	AC 40,0 A DC 10,0 A	-	-
Cable dimension	-	-	-	AC 6,0 mm ² DC 2,5 mm ²	-	-

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.

Continued overleaf

Technical data, *continued*

Electrical, 3 phase This is the electrical data, 3 phase, 230 V AC, 60 Hz:
230 V AC, 60 Hz

Specification	Power factor					
	4.0	5.5	6.0 L	8.0	11.5	13.5
AC	-	-	-	0,95	0,75	0,90
Unit with AC internal fan						
Max. start current ¹⁾	-	-	-	-	-	-
Maximum current	-	-	-	-	-	-
Nominal current, active cooling ²⁾	-	-	-	-	-	-
Nominal current, free cooling	-	-	-	-	-	-
Circuit breaker	-	-	-	-	-	-
Cable dimension	-	-	-	-	-	-
Unit with 24 V DC internal fan						
Max. start current ¹⁾	-	-	-	AC 130 A	AC 140 A	AC 157 A
Max. current	-	-	-	AC 23,30 A DC 12,00 A	AC 36,80 A DC 12,00 A	AC 34,80 A DC 12,00 A
Nom. Current, active cooling ²⁾	-	-	-	AC 16,30 A DC 9,00 A	AC 23,60 A DC 12,00 A	AC 23,60 A DC 12,00 A
Nom. Current, free cooling ³⁾	-	-	-	DC 9,00 A	DC 12,00 A	DC 12,00 A
Circuit breaker	-	-	-	AC 32,00 A DC 16,00 A	AC 40,00 A DC 16,00 A	AC 40,00 A DC 16,00 A
Cable dimension	-	-	-	AC 4,0 mm ² DC 2,5 mm ²	AC 6,0 mm ² DC 4,0 mm ²	AC 6,0 mm ² DC 4,0 mm ²
Unit with 48 V DC internal fan						
Max. start current ¹⁾	-	-	-	AC 130 A	AC 140 A	AC 157 A
Max. current	-	-	-	AC 23,30 A DC 10,00 A	AC 36,80 A DC 10,00 A	AC 34,80 A DC 10,00 A
Nom. current, active cooling ²⁾	-	-	-	AC 16,30 A DC 4,30 A	AC 23,60 A DC 10,00 A	AC 23,60 A DC 10,00 A
Nom. current, free cooling ³⁾	-	-	-	DC 4,30 A	DC 10,00 A	DC 10,00 A
Circuit breaker	-	-	-	AC 32,00 A DC 10,00 A	AC 40,00 A DC 10,00 A	AC 40,00 A DC 16,00 A
Cable dimension	-	-	-	AC 4,0 mm ² DC 2,5 mm ²	AC 6,0 mm ² DC 4,0 mm ²	AC 6,0 mm ² DC 4,0 mm ²

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.

Continued overleaf

Technical data, *continued*

Electrical, 3 phase This is the electrical data, 3 phase 400 V AC, 50 Hz:
400 V AC, 50 Hz

Power factor							
Specification	4.0	5.5	6.0 L	8.0	11.5	13.5	
AC	0,79	0,82	-	0,86	0,83	0,83	
Unit with AC internal fan							
Max. start current ¹⁾	26 A	25 A	-	41 A	80 A	90 A	
Maximum current	6,60 A	9,30 A	-	15,90 A	18,80	21,80	
Nominal current, active cooling ²⁾	5,01 A	7,42 A	-	11,70 A	13,17 A	15,17	
Nominal current, free cooling	0,75 A	0,52 A	-	2,10	1,97 A	1,97 A	
Circuit breaker	10,00 A	13,00 A	-	20,00 A	32,00 A	32,00 A	
Cable dimension	1,5 mm ²	1,5 mm ²	-	2,5 mm ²	4,0 mm ²	6,0 mm ²	
Unit with 24 V DC internal fan							
Max. start current ¹⁾	AC 26 A	AC 25 A	-	AC 41 A	AC 80 A	AC 90 A	
Max. current	AC 05,8 A DC 9,5 A	AC 08,8 A DC 9,8 A	-	AC 13,0 A DC 12,0 A	AC 16,8 A DC 12,0 A	AC 19,8 A DC 12,0 A	
Nom. current, active cooling ²⁾	AC 4,26 A DC 7,30 A	AC 6,90 A DC 9,00 A	-	AC 9,60 A DC 9,00 A	AC 11,20 A DC 12,00 A	AC 13,20 A DC 12,00 A	
Nom. current, free cooling ³⁾	DC 7,30 A	DC 9,00 A	-	DC 9,00 A	DC 12,00 A	DC 12,00 A	
Circuit breaker	AC 10,0 A DC 16,0 A	AC 13,0 A DC 16,0 A	-	AC 20,0 A DC 6,47 ha	AC 32,0 A DC 16,0 A	AC 32,0 A DC 16,0 A	
Cable dimension	AC 1,5 mm ² DC 2,5 mm ²	AC 1,5 mm ² DC 2,5 mm ²	-	AC 2,5 mm ² DC 2,5 mm ²	AC 4,0 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⁾	AC 26 A	AC 25 A	AC 40 A	AC 41 A	AC 80 A	AC 90 A	
Max. current	AC 5,8 A DC 5,5 A	AC 8,8 A DC 6,3 A	AC 9,3 A DC 10,0 A	AC 13,0 A DC 10,0 A	AC 16,8 A DC 10,0 A	AC 19,8 A DC 10,0 A	
Nom. current, active cooling ²⁾	AC 4,26 A DC 3,90 A	AC 6,90 A DC 5,80 A	AC 6,50 A DC 4,30 A	AC 9,60 A DC 4,30 A	AC 11,20 A DC 10,00 A	AC 13,20 A DC 10,00 A	
Nom. current, free cooling ³⁾	DC 3,90 A	DC 5,80 A	DC 4,30 A	DC 4,30 A	DC 10,00 A	DC 10,00 A	
Circuit breaker	AC 10,0 A DC 10,0 A	AC 13,0 A DC 10,0 A	AC 13,0 A DC 10,0 A	AC 20,0 A DC 10,0 A	AC 32,0 A DC 16,0 A	AC 32,0 A DC 16,0 A	
Cable dimension	AC 1,5 mm ² DC 2,5 mm ²	AC 1,5 mm ² DC 2,5 mm ²	AC 1,5 mm ² DC 2,5 mm ²	AC 2,5 mm ² DC 2,5 mm ²	AC 4,0 mm ² DC 4,0 mm ²	AC 4,0 mm ² DC 4,0 mm ²	

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.

Continued overleaf

Technical data, continued

Operating range This table shows the operating range of the Danline units

	Danline 4.0/5.5/8.0/11.5/13.5	Danline 6.0 L
Pressure	70 – 106 kPa	70 – 106 kPa
Temperature, free cooling	-40 °C – 55 °C	-40 °C – 35 °C
Temperature, closed loop	-40 °C ¹⁾ – 55 °C	-40 °C ¹⁾ – 35 °C
Humidity	0 – 100 % relative humidity	0 – 100 % relative humidity

Footnotes ¹⁾ - 40 °C requires an Arctic kit.

Refrigerant This table shows the type and charge of refrigerant

Danline		4.0	5.5	6.0 L	8.0	11.5	13.5
1 phase 230 V AC 50 Hz	Type	R134a	R134a	-	R134a	-	-
	Charge	1,6 kg	2,4	-	5,0	-	-
1 phase 230 V AC 60 Hz	Type	-	-	-	R134a	-	-
	Charge	-	-	-	4,0	-	-
3 phase 230 V AC 60 Hz	Type	-	-	-	R134a	R134a	R134a
	Charge	-	-	-	5,0	8,3 kg	8,3 kg
3 phase 400 V AC 50 Hz	Type	R134a	R134a	R134a	R134a	R134a	R134a
	Charge	1,6 kg	2,4	5,0	2,6	8,0 kg	8,0 kg

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

Continued overleaf

Dimensions

Illustration

This drawing illustrates the dimensions of the Danline:

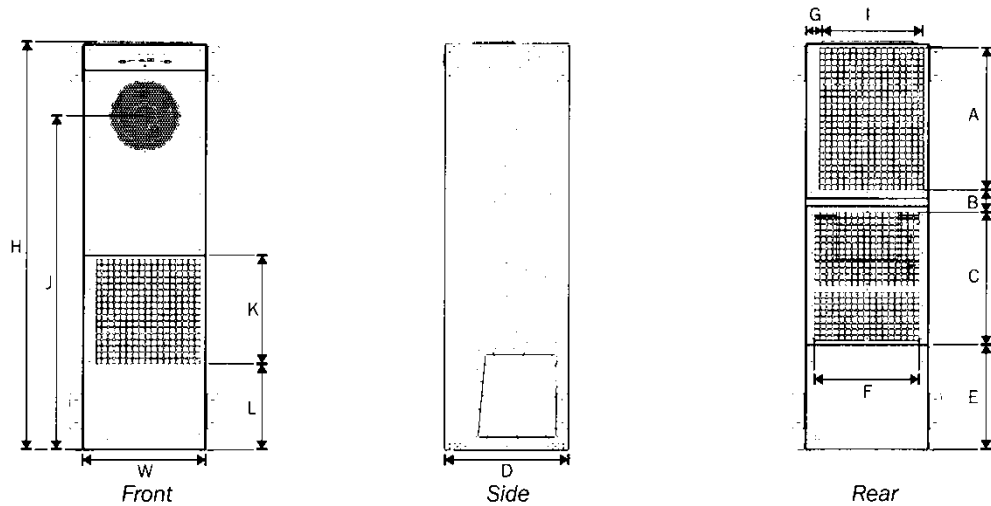


Table with dimensions

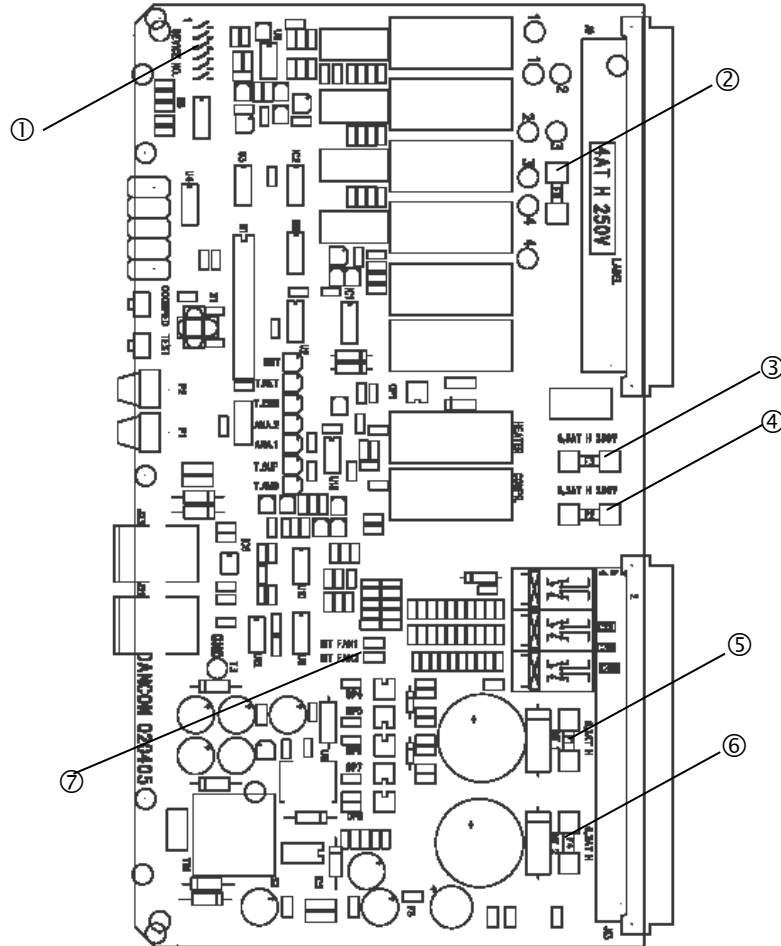
This table shows the key dimensions, the letters corresponds to the drawing above:

Letter	Danline 4.0	Danline 5.5	Danline 6.0 L/8.0	Danline 11.5	Danline 13.5
H (height)	2000 mm	2000 mm	2000 mm	2000 mm	2000 mm
W (width)	300 mm	400 mm	600 mm	650 mm	650 mm
D (depth)	600 mm	600 mm	600 mm	900 mm	900 mm
A (duct height)	895 mm	895 mm	685 mm	862 mm	862 mm
B	73 mm	73 mm	107 mm	72 mm	72 mm
C (duct height)	520 mm	480 mm	620 mm	495 mm	495 mm
E	443 mm	485 mm	530 mm	497 mm	497 mm
F (duct width)	235 mm	335 mm	505 mm	593 mm	593 mm
G	67 mm	73 mm	73 mm	83 mm	83 mm
I (duct width)	205 mm	305 mm	505 mm	537 mm	537 mm
J	1617 mm	1605 mm	1617 mm	1629 mm	1629 mm
K (duct height)	490 mm	692 mm	505 mm	775 mm	775 mm
L	172 mm	175 mm	422 mm	220 mm	220 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 No.
②	Fuse 6,3 A TH Fuse 4,0 A TH	Condenser fan 60Hz* Condenser fan 50 Hz
③	Fuse 6,3 A TH	Heater/compressor
④	Fuse 6,3 A TH	AC mains
⑤	Fuse 6,3 A TH	Internal DC fan 2
⑥	Fuse 6,3 A TH	Internal DC fan 1
⑦	Jumpers	Select Danline 4.0 DC by removing jumpers

* Only Danline 8.0

Continued overleaf

Connections on the PCB, *continued*

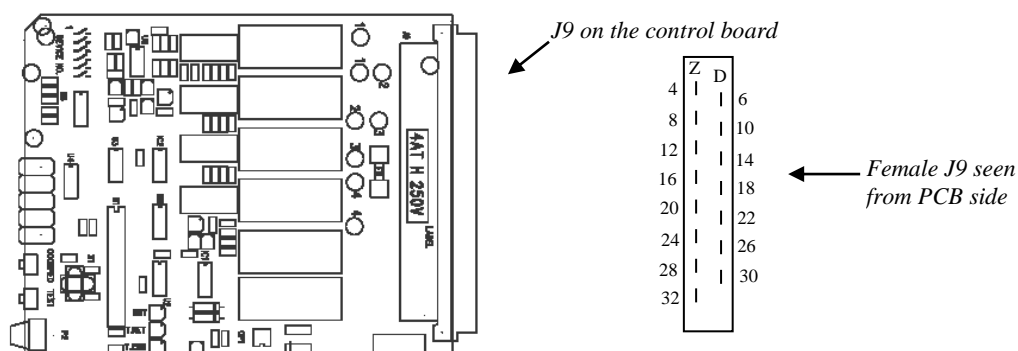
RJ11 jack's

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

Pin no.:	Function	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:



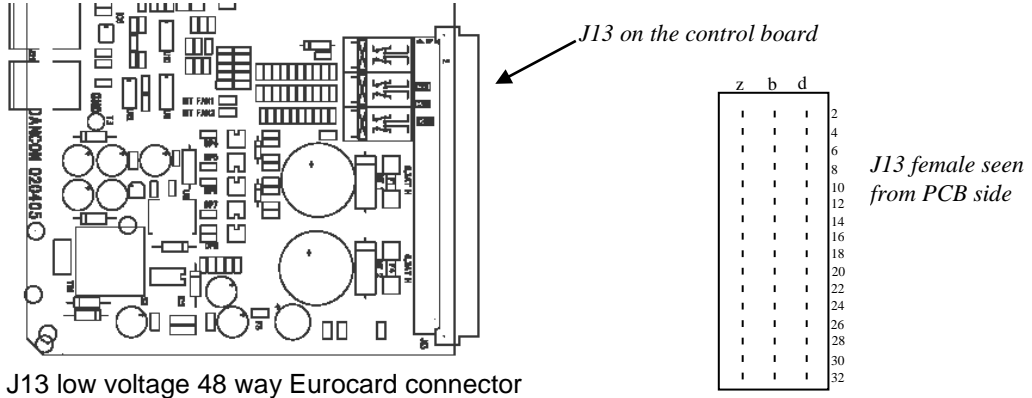
J9 main voltage 15 way Eurocard connector

Part	Function	Part	Function
D 6	Not used	Z 4	Internal fan
D 10	External fan 1	Z 12	Not used
D 14	External fan 2	Z 8	Internal fan 1
D 18	Heater	Z 16	Autotrafo 230 V
D 22	Compressor crankcase heater	Z 20	Autotrafo 180 V
D 26	Compressor	Z 24	Autotrafo 120 V
D 30	Mains common	Z 28	Autotrafo Common
-	-	Z 32	Mains line

Continued overleaf

Connections on the PCB, *continued*

Low voltage J13 This shows the connections to the low voltage connector on the control board:



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 supply 0 V DC	Damper control	Damper supply 24 V DC
8	40 V AC neutral	Current sensor comp.	Current sensor heater
10	40 V AC phase	Current sensor comp.	Current sensor heater
12	GND	Alarm relay NC.	Alarm relay com.
14	0 V DC Int DC fan	PWM output int. DC fan	24/48 V DC int. DC fan
16	Hot spot sensor	Return sensor	Cond. sensor
18	Hot spot sensor	Return sensor	Cond. sensor
20	0 V DC supply	Rot.input int. DC fan	28/48 V DC supply
22	Alarm/Occupied common	Not used	Filter alarm
24	Humidity alarm input	Occupied Input	Smoke alarm Input
26	Not used	Not used	Not used
28	RS 485 B	Supply sensor	Ambient sensor
30	RS 485 A	Supply sensor	Ambient sensor
32	Not used	Not used	Not used

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

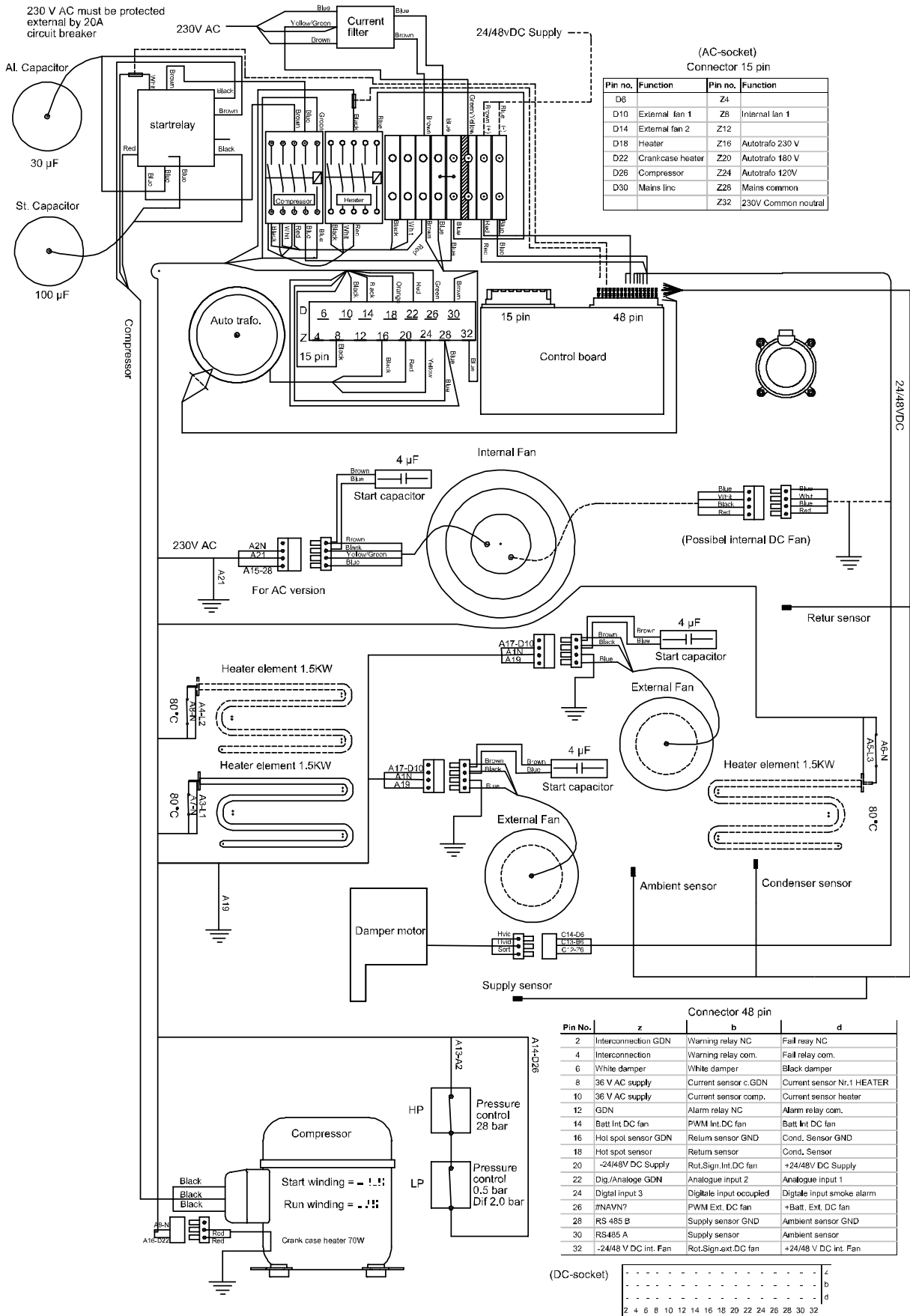
Wiring Diagram

Introduction This section contains all of the wiring diagrams for Danline.

Content This section has the following topics.

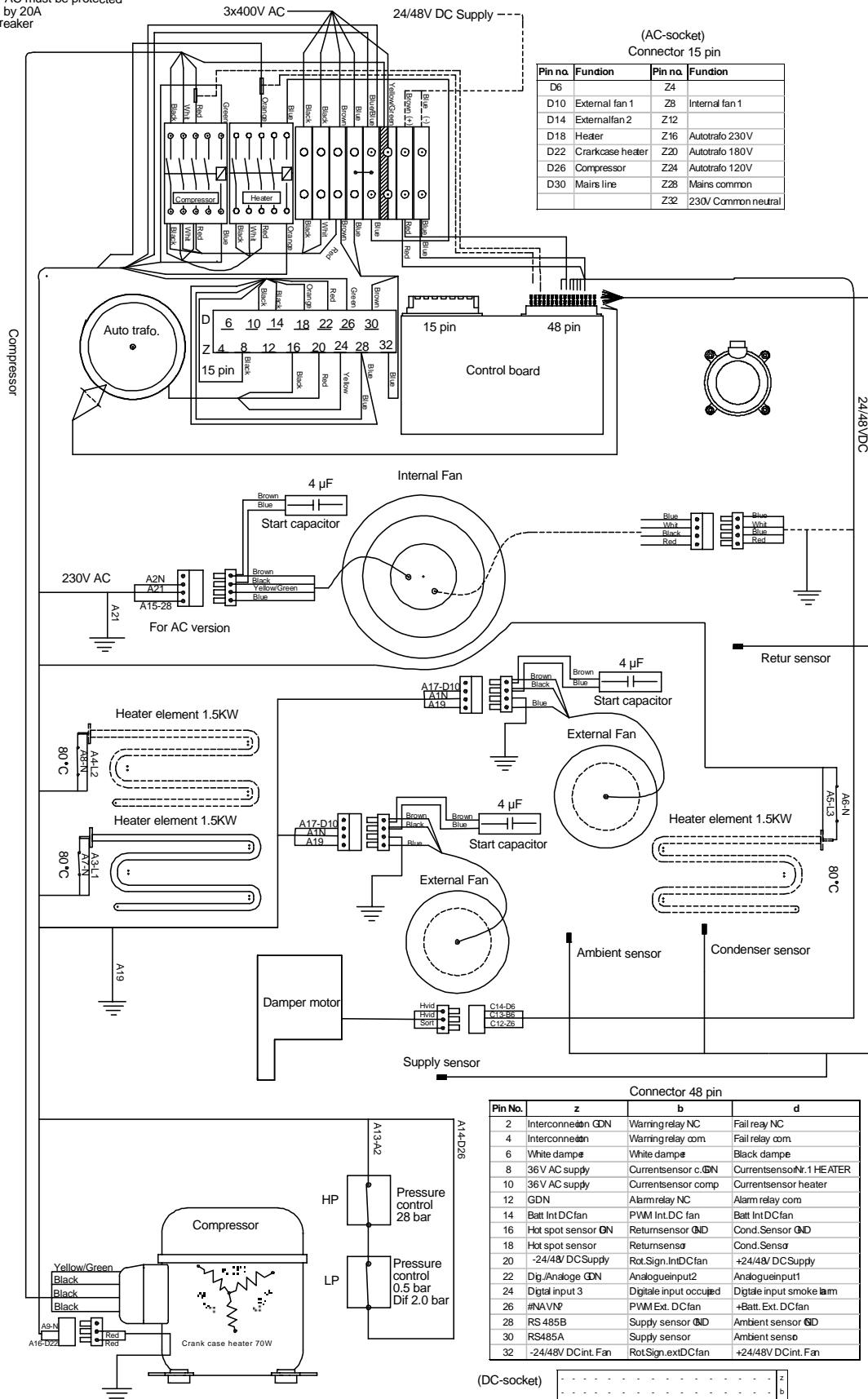
Topic	See page
Wiring diagram for Danline 4.0 – 1X230 V AC	83
Wiring diagram for Danline 4.0 – 3X400 V AC	84
Wiring diagram for Danline 5.5 – 1X230 V AC	85
Wiring diagram for Danline 5.5 – 3X400 V AC	86
Wiring diagram for Danline 8.0 – 1X230 V AC	87
Wiring diagram for Danline 6.0 L/8.0 – 3X400 V AC	88
Wiring diagram for Danline 11.5/13.5 – 3X400 V AC	89

Wiring diagram for Danline 4.0 – 1X230 V AC



Wiring diagram for Danline 4.0 – 3X400 V AC

V AC must be protected al by 20A breaker



(AC-socket)
Connector 15 pin

Pin no.	Function	Pin no.	Function
D6		Z4	
D10	External fan 1	Z8	Internal fan 1
D14	Externalfan 2	Z12	
D18	Heater	Z16	Autotrafo 230V
D22	Crarkcase heater	Z20	Autotrafo 180V
D26	Compressor	Z24	Autotrafo 120V
D30	Mairs line	Z28	Mains common
		Z32	230V Common neutral

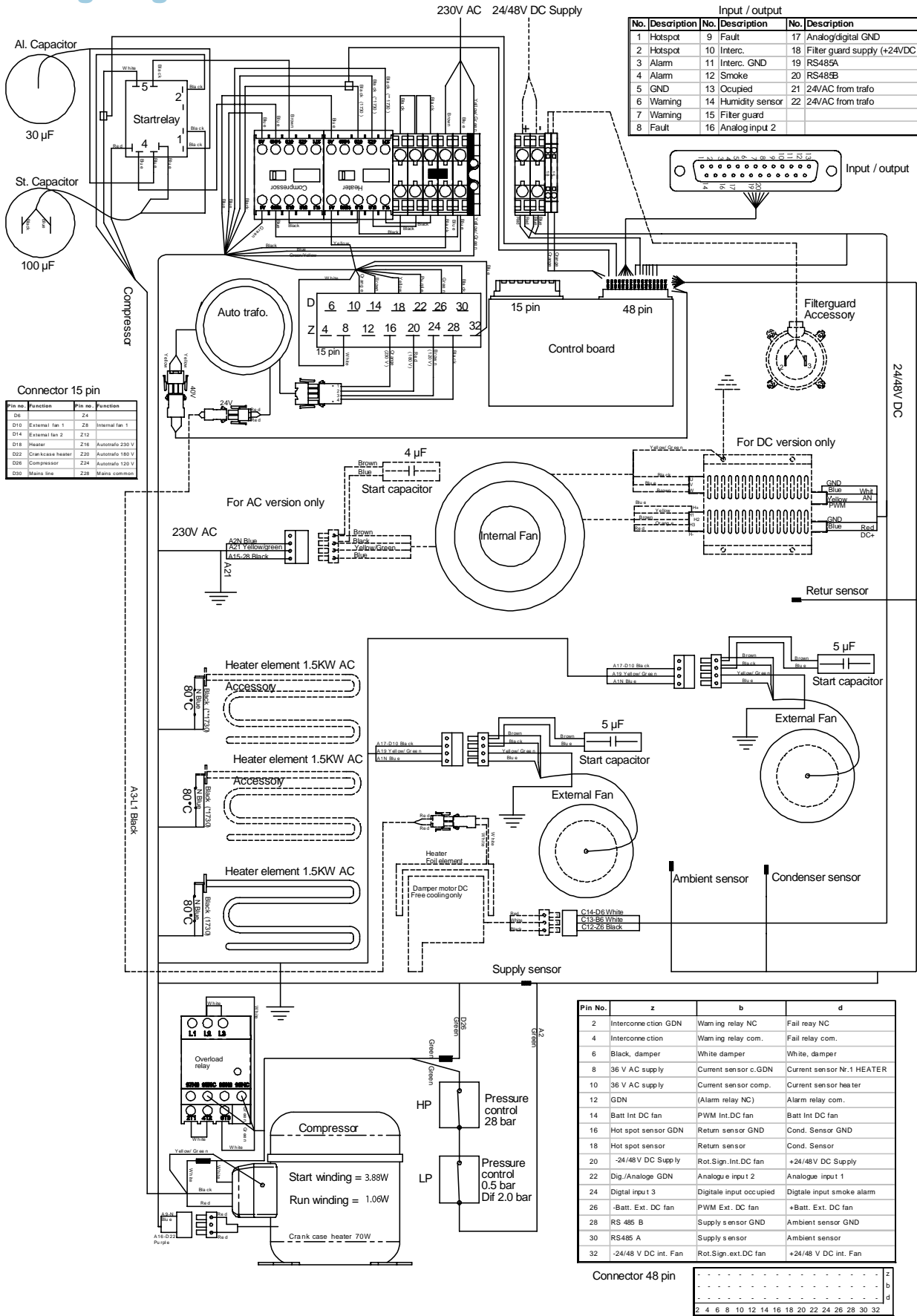
Connector 48 pin

Pin No.	z	b	d
2	Interconnectiøn GDN	Warning relay NC	Fail relay NC
4	Interconnectiøn	Warning relay com.	Fail relay com.
6	White dampø	White dampø	Black dampø
8	36 V AC supply	Currentsensor c.GDN	CurrentsensoNr. 1 HEATER
10	36 V AC supply	Currentsensor comp	Currentsensor heater
12	GDN	Alarm relay NC	Alarm relay com.
14	Batt Int.DCfan	PWM Int.DC fan	Batt Int.DCfan
16	Hot spot sensor GN	Returnsensor GND	Cond.Sensor GND
18	Hot spot sensor	Returnsensø	Cond.Sensø
20	-24/48V DC Supply	Rot.Sign.Int.DCfan	+24/48V DC Supply
22	Dig./Analoge GDN	Analogeinput2	Analogeinput1
24	Digital input 3	Digitale input occupiød	Digitale input smoke lam
26	#NAVNø	PWM Ext. DCfan	+Batt. Ext. DCfan
28	RS 485B	Supply sensor GND	Ambient sensor GND
30	RS485A	Supply sensor	Ambient sensø
32	-24/48V DCint. Fan	Rot.Sign.extDCfan	+24/48V DCint. Fan

(DC-socket)

z	b	d
2	4	6
8	10	12
14	16	18
20	22	24
26	28	30
32		

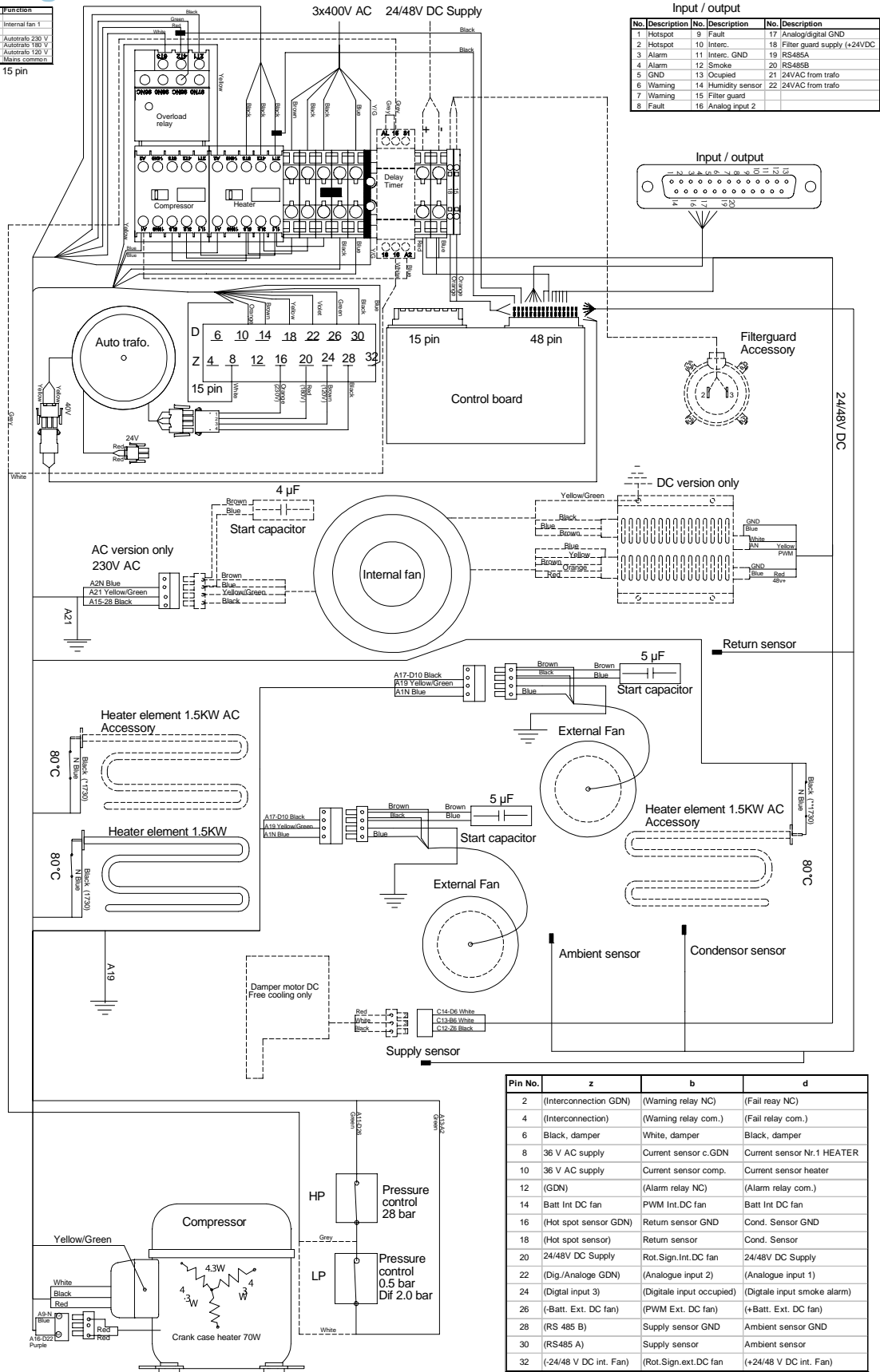
Wiring diagram for Danline 5.5 – 1X230 V AC



Wiring diagram for Danline 5.5 – 3X400 V AC

Pin no.	Function	Pin no.	Function
D06	External fan 1	Z4	Internal fan 1
D10	External fan 2	Z6	Internal fan 2
D14	External fan 2	Z12	Autotrafo 230 V
D18	Heater	Z16	Autotrafo 180 V
D22	Crankcase heater	Z20	Autotrafo 180 V
D26	Compressor	Z24	Autotrafo 180 V
D30	Main line	Z28	Main common

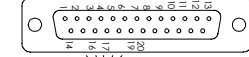
Connector 15 pin



Input / output

No.	Description	No.	Description	No.	Description
1	Hotspot	9	Fault	17	Analog/digital GND
2	Hotspot	10	Interc.	18	Filter guard supply (+24VDC)
3	Alarm	11	Interc. GND	19	RS485A
4	Alarm	12	Smoke	20	RS485B
5	GND	13	Occupied	21	24VAC from trafo
6	Warning	14	Humidity sensor	22	24VAC from trafo
7	Warning	15	Filter guard		
8	Fault	16	Analog input 2		

Input / output

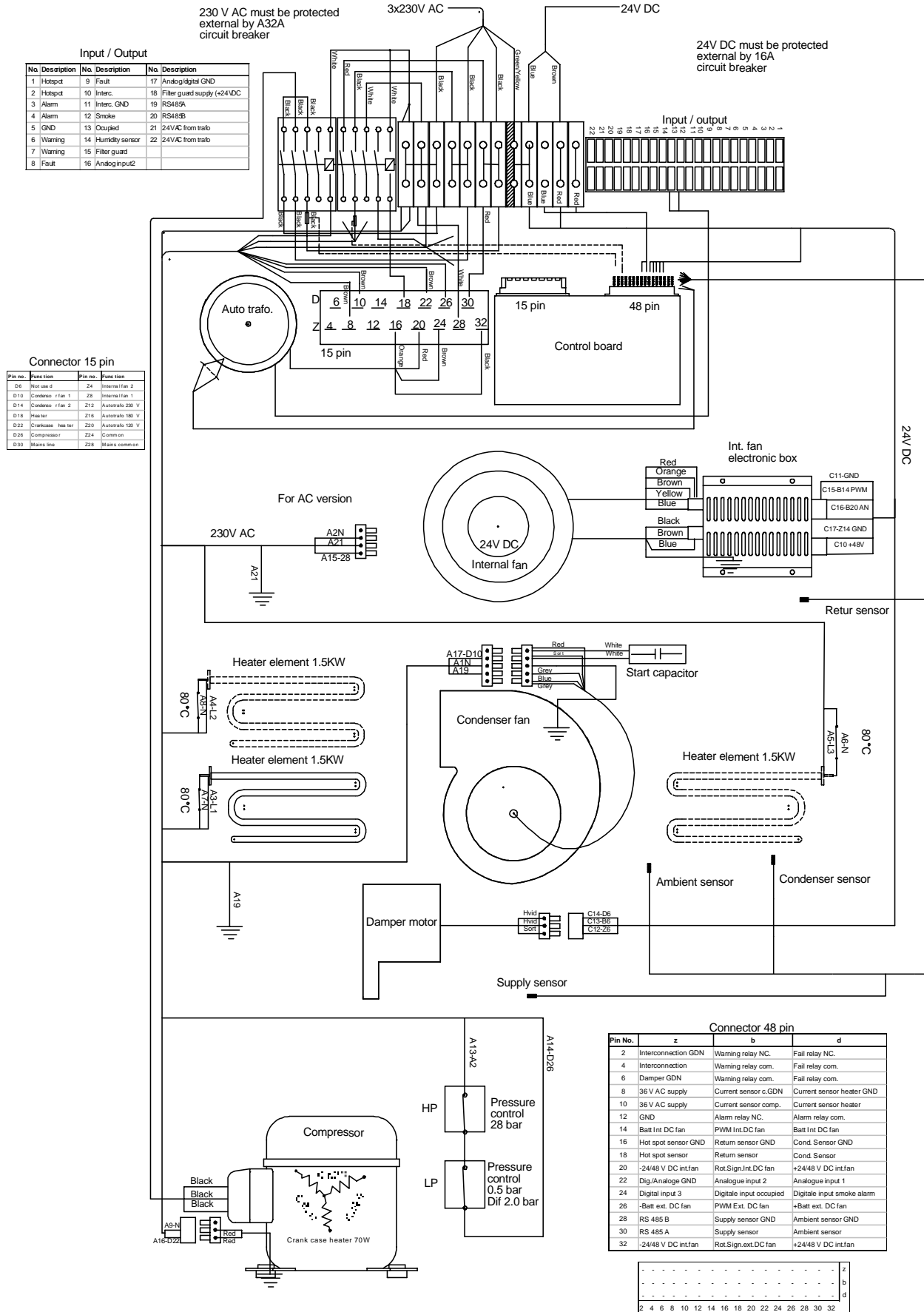


Pin No.	z	b	d
2	(Interconnection GDN)	(Warning relay NC)	(Fail relay NC)
4	(Interconnection)	(Warning relay com.)	(Fail relay com.)
6	Black, damper	White, damper	Black, damper
8	36 V AC supply	Current sensor c.GDN	Current sensor Nr.1 HEATER
10	36 V AC supply	Current sensor comp.	Current sensor heater
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)	(Analoge input 2)	(Analoge input 1)
24	(Digital input 3)	(Digitale input occupied)	(Digitale 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	(RS485 A)	Supply sensor	Ambient sensor
32	(+24/48 V DC int. Fan)	(Rot.Sign.ext.DC fan)	(+24/48 V DC int. Fan)

Connector 48 pin

z	b	d
2	4	6
8	10	12
14	16	18
20	22	24
26	28	30
32		

Wiring diagram for Danline 8.0 – 1X230 V AC

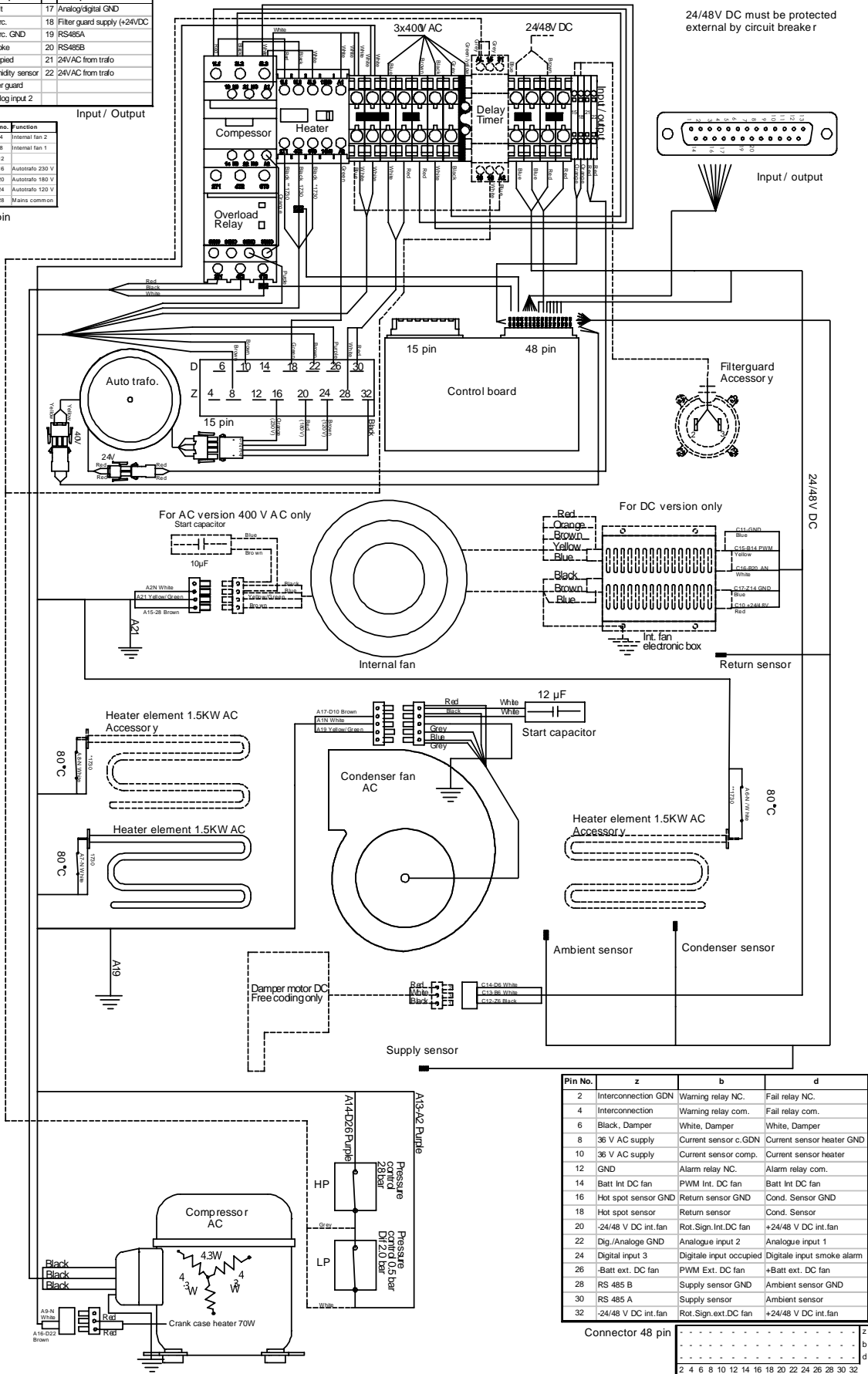


Wiring diagram for Danline 6.0 L/8.0 – 3X400 V AC

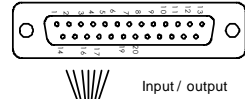
No.	Description	No.	Description	No.	Description
1	Hotspot	9	Fault	17	Analog/digital GND
2	Hotspot	10	Interac.	18	Filter guard supply (+24VDC)
3	Alarm	11	Interac. GND	19	RS485A
4	Alarm	12	Smoke	20	RS485B
5	GND	13	Occupied	21	24V AC from trafo
6	Warning	14	Humidity sensor	22	24V AC from trafo
7	Warning	15	Filter guard		
8	Fault	16	Analog input 2		

Pin no.	Function	Pin no.	Function
D8	Not used	Z4	Internal fan 2
D10	Condensor fan 1	Z8	Internal fan 1
D14	Condensor fan 2	Z12	
D16	Heater	Z16	Autotrafo 230 V
D22	Crankcase heater	Z20	Autotrafo 180 V
D26	Compressor	Z24	Autotrafo 120 V
D30	Mains line	Z28	Mains common

Connector 15 pin



24/48V DC must be protected external by circuit breaker



Input/output

For AC version 400 V AC only

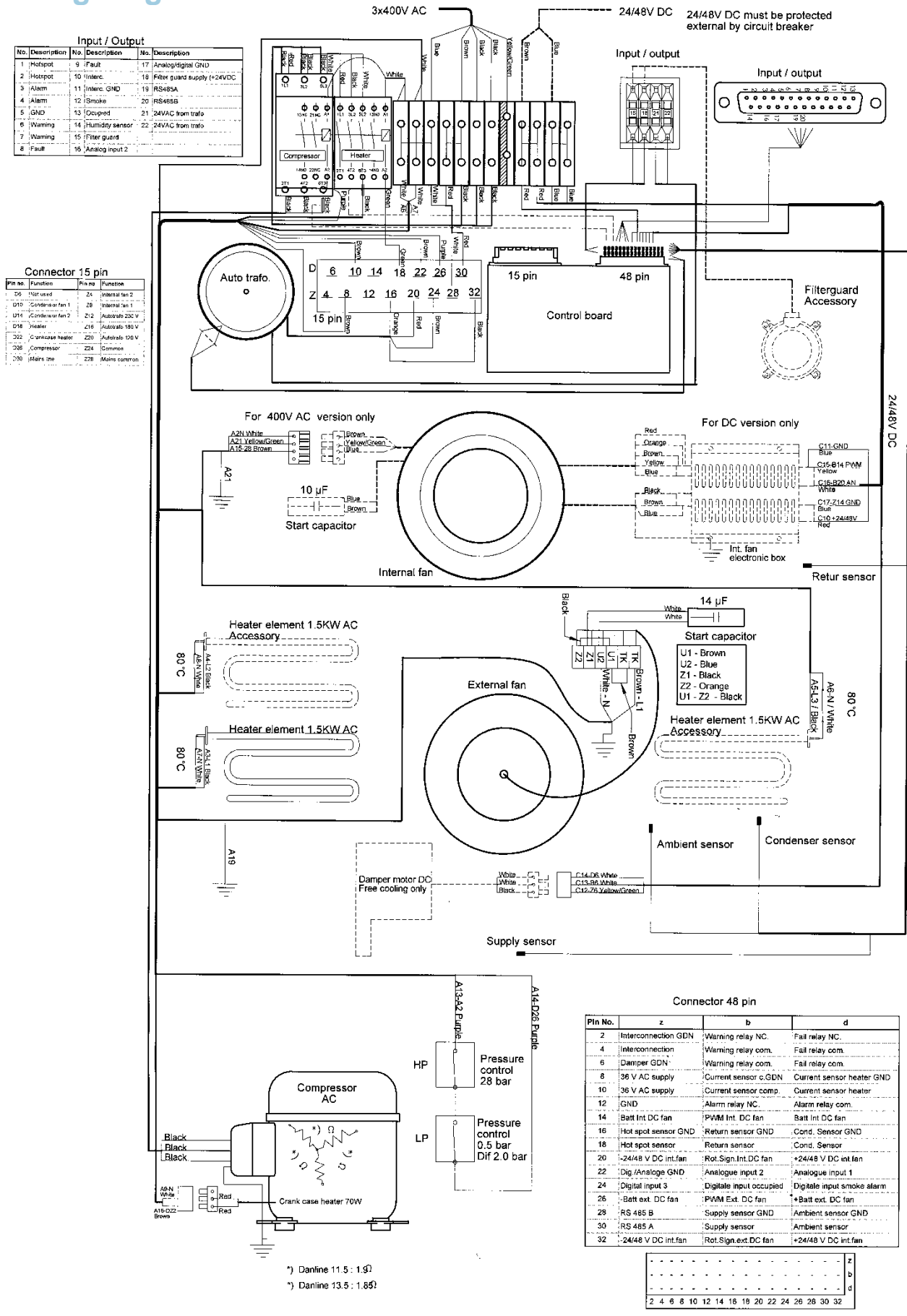
For DC version only

Pin No.	z	b	d
2	Interconnection GDN	Warning relay NC.	Fail relay NC.
4	Interconnection	Warning relay com.	Fail relay com.
6	Black, Damper	White, Damper	White, Damper
8	36 V AC supply	Current sensor c.GDN	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	-24/48 V DC int.fan	Rot.Sig.Int.DC fan	+24/48 V DC int.fan
22	Dig./Analoge GND	Analoge input 2	Analoge input 1
24	Digital input 3	Digitale input occupied	Digitale 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	-24/48 V DC int.fan	Rot.Sig.ext.DC fan	+24/48 V DC int.fan

Connector 48 pin

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Wiring diagram for Danline 11.5/13.5 – 3X400 V AC



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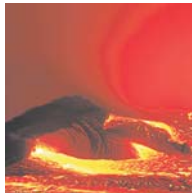
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Our Head Office is located in Denmark, and we have companies in Denmark, Norway, Sweden, the United Kingdom, the United States and China, with an extensive European dealer network.

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