

## EFC2 V2 TC

### Service manual

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## Introduction

### Overview

This is the service manual for the Free Cooling unit EFC2 V2 TC with air inlet at the bottom, a compact F5-filter and two high flow fans. Furthermore the Free Cooling unit has an air intake damper and an advanced controlling unit.

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### Contact

In the table below you can see how to contact the manufacturer and sales offices.

Office	Sweden	Norway	Denmark
Name	Kontrollelektronik Dantherm Air Handling AB	A/S Dantherm avd. Kontrollelektronik	Dantherm Air Handling A/S
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Web	kontrollelektronik.com	www.dantherm.no	www.dantherm.com

## General information

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<b>Introduction</b>	This section gives you the general information about the unit and this service manual.
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<b>Target group</b>	The target group of this service manual is the technicians who install and maintain the unit.
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<b>Copyright</b>	Copying of this service manual, or part of it, is not allowed without written permission from Kontrollelektronik Dantherm Air Handling AB.
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<b>Reservations</b>	The service manual is subject to changes without notice.
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<b>CE-Declaration of Conformity</b>	Kontrollelektronik Dantherm Air Handling AB, Virkesgatan 5, SE-614 31 Söderköping hereby declare that the unit are in conformity with the following directives:
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2006/95/EG	Low Voltage Directive including 93/68/EEC where required
86/336 EEC	EMC Directive including 92/31/EEC and 93/68/EEC
89/392 EEC	Machine Directive

The product is manufactured according to SS-EN 604 39-1

The product is manufactured with components which follow the application standards for Low Voltage Directive and in case of norms for EMC in EU countries.

The product is controlled and tested before delivery according to the following:

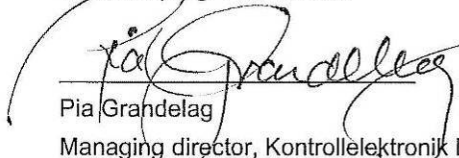
Real test of built in functions with connected temperature sensors and damper actuators.

Inspection of labeling and marking.

Ocular inspection of mounted materials and electrical connections.

Inspection that all parameter and settings are set to delivery position.

Söderköping 11.02.2008

  
Pia Grandelag  
Managing director, Kontrollelektronik Dantherm Air Handling AB

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<b>Recycling</b>	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 producers to protect the environment.
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## Technical data

### Free Cooling Performance

The table below shows the performance of the Free cooling unit:

Specification	48V DC	230V AC
Air flow (at 53 V DC)	622 l/s (2240m <sup>3</sup> /h)	700 l/s (2520m <sup>3</sup> /h)
Free cooling capacity	746 W/K	830 W/K
Free cooling capacity at $\Delta t=7^{\circ}\text{C}$	5,2 kW	5,8 kW
Power consumption	210 W	270 W
Sound pressure at 3m from shelter	Approx. 37dBA	Approx. 37dBA
External available pressure drop	50 Pa	50 Pa
Dimensions (WxHxD)	650x650x650	650x650x650
Dimensions with frame (WxHxD)	720x720x656	720x720x656

### Cabinet data

Data and dimensions of the cabinet are shown in the following table:

Specification	Designation	Value
Weight	Estimated to max	45 kg
Metal sheet material	Aluzinc AZ150	0,9-2,0 mm
Frame material	Aluminium	1,5 mm (minimum thickness)
Exterior panel coating	Pre-varnished zinc-coated steel (medium blue colour RAL 5024)	0,5 mm
Interior panel coating	Zinc-coated steel	0,5 mm
Panel insulation	Expanded polyurethane	25 mm

### Fan motor data

Data of the fan motor is shown in the following table:

Specification	48V DC	230V AC
Voltage nominal	48V DC	230V AC
Current	2x2,6 A	2x0,59 A
Power consumption	2x105 W	2x135 W
Speed	2750 rpm	2550 rpm

*Continued overleaf*

## Technical data, *continued*

### Filter data

In the table below the data of the filter are specified:

Specification	Compact filter	
Type	Compact filter	
Removal efficiency	F5	
Dimensions	540 x 548 x 130 mm	
Total Area	10,5 m <sup>2</sup>	
Filter monitor setting	130 Pa	

### Controlling

The table below show the components and types for controlling of the Free cooling unit:

Specification	48 VDC	48V DC	230V AC
Control unit (See separate manual)	ACUE CSI 3GS	ACUE 3000	TKS 3000
Indoor temperature sensor	RG-K81	RG-TD5A	RG-TD5A
Filter monitor	JDW5	JDW5	JDW5

### Damper data

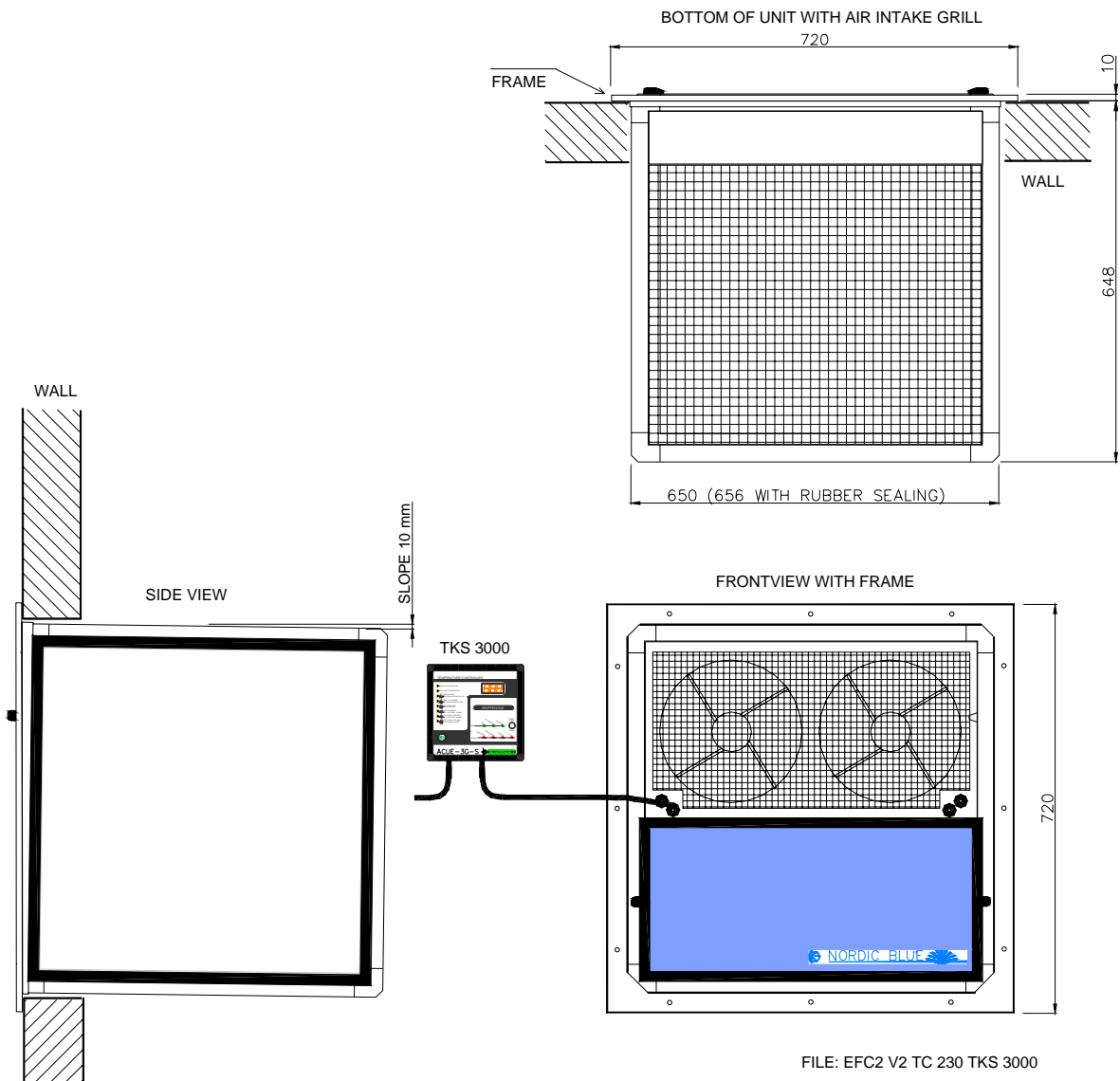
In the table below the motorized damper and actuator are specified:

Specification	TC 48V	TC 230V
Type	SP470x511	SP470x511
Dimensions (WxH)	470x511	470x511
Actuator type	LM24 A (24V DC)	LM230 A (230V AC)

## Dimensions

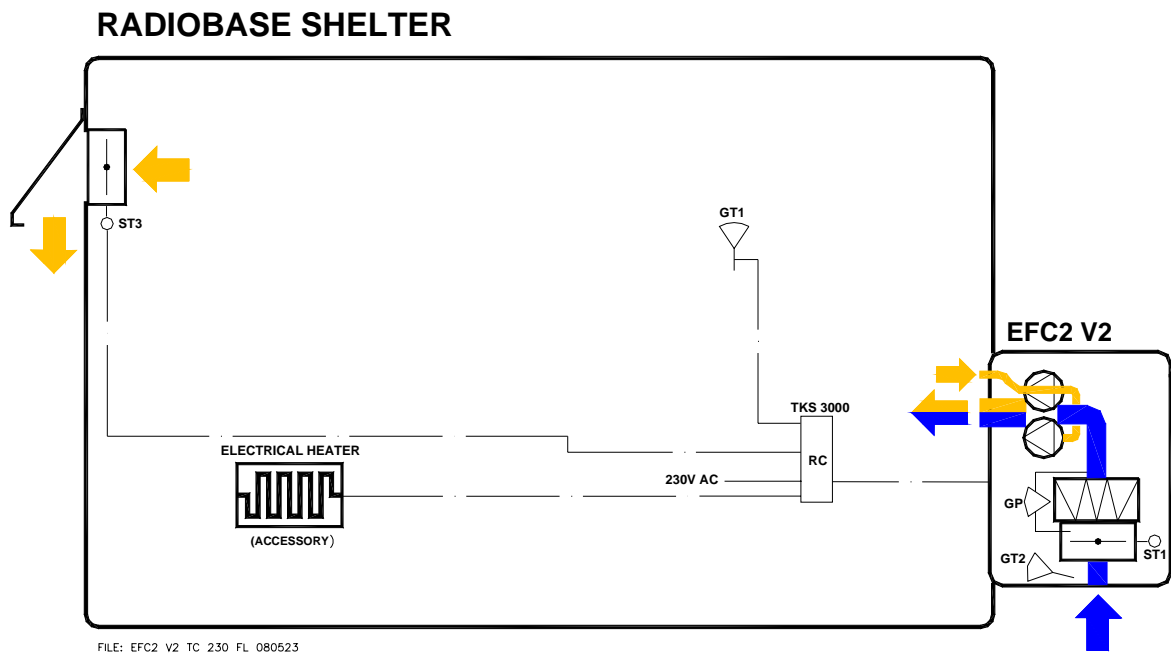
### Illustration

This drawing illustrates the dimensions of the Free cooling unit:

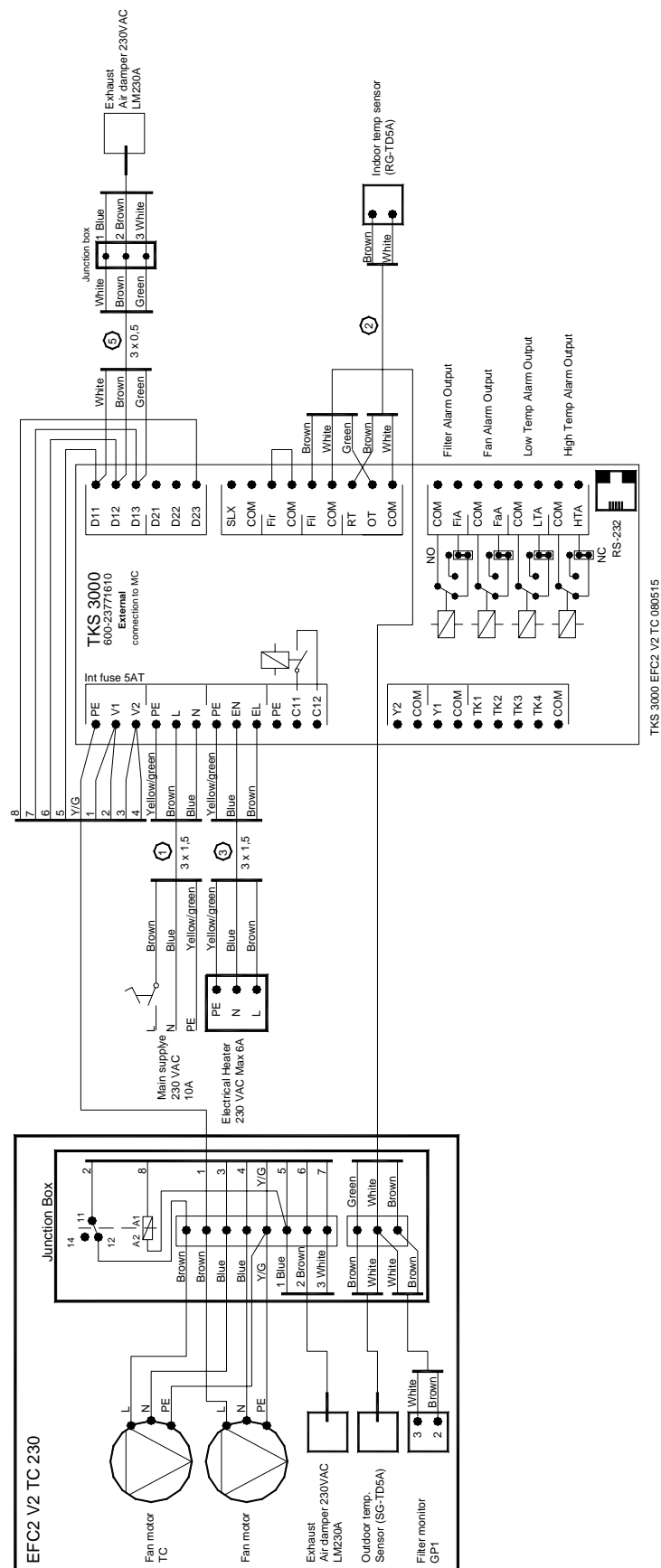


## Functional description

**Flow** The picture below schematically shows the air flow in a shelter. In the same picture some accessories that can be connected to the controller are shown.

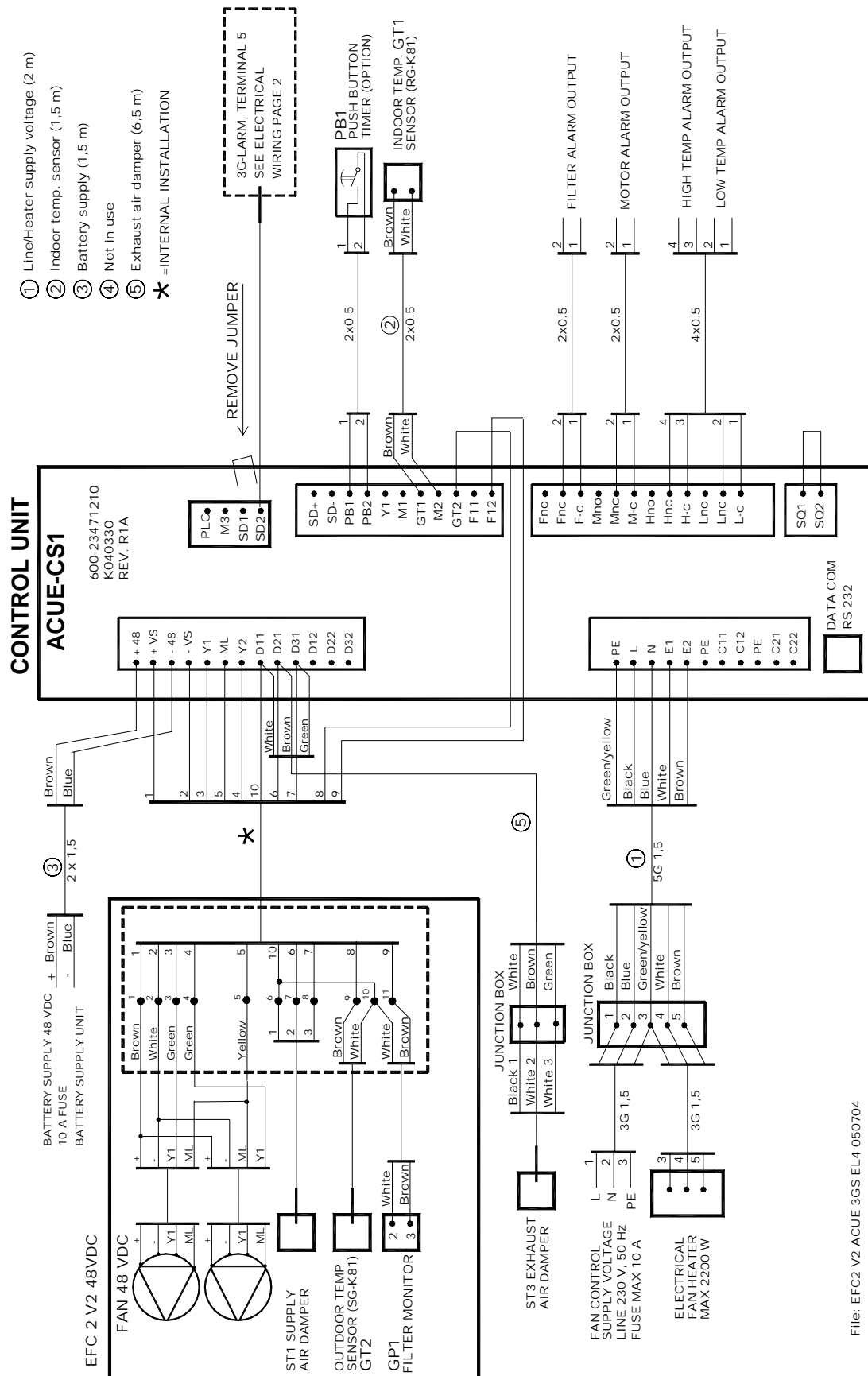


## Wiring diagram – TKS 3000





# Wiring diagram – ACUE CS1



File: EFC2 V2 ACUE EL4 050704

## Preventive maintenance

### Introduction

The unit needs preventive maintenance with specific intervals to avoid breakdown or inefficient operation. It is important to notice that interval between maintenance can vary depending on the specific environment.

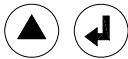
### Caution!

Switch off the AC supply before working on the unit!

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

### Service function

#### "Timer"



The controlling unit has a service function to ensure better indoor climate for 20 minutes during the presence of service technicians. To activate the service function, push one step up from the main menu to find "Timer". Now press "Enter". The control unit will now count down from 20 and then go back to normal operation.

### Interval

Kontrollelektronik Dantherm Air Handling AB recommends that intervals between preventive maintenance do not exceed 1 year. It is also our recommendation that the site and unit is examined closely during the first preventive maintenance to determine whether the interval is too long. We recommend that preventive maintenance visits are planned to occur in springtime.

### Condition for warranty

The factory warranty is only valid if documented preventive maintenance has been carried out with an interval of maximum 1 year. The documentation could be in form of a written log.

### Leaving the site

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

### 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	Remove the worn-out filter and clean the unit carefully.
3	Clean the dampers and check them regarding function and tightness.
4	Clean the fan and check its mounting.
5	Check and clean the air intake and exhaust accessories.
6	Insert the new filter carefully into the unit.
7	Close the unit and make sure that the service is completed correctly.
8	Turn on the power to the unit.
9	Run the Self test according to the separate manual for the controller.

### Function tests

Fan and filter alarm function tests can be done by the following actions.

Function test	Action
Filter	Open the service door and put a plate of carton or similar on the intake side of the filter, blocking a big part of the filter area. Close the service door, run the free cooling unit and check that filter alarm is given. Stop and remove the plate.
Fan	Open the lid to the controlling unit and remove the brown cable connected to the connector marked "TK1". Close the lid, run the free cooling unit and check that fan alarm is given. Restore the controller.

## Spare parts list

### List

Below are the complete list of spare parts with part numbers:

Spare part	Type	Part number
Compact filter	F5, 540 x 548 x 130 mm	900-07605482
Fan 230V		023-92184844
Fan 48V		023-92184831
Control Unit 230V	TKS 3000	600-23771610
Control Unit 48V	ACUE 3000	600-23671410
Control Unit 48V	ACUE CSI 3GS	600-23471210
Indoor temp. sensor	RG-TD5A	720-112420
Indoor temp. sensor	RG-K81	720-110524
Filter monitor	JDW5	021-422314
Damper actuator	LM230	889-331570
Damper actuator	LM24	889-331562

### Contact

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Address	Virkesgatan 5	Postboks 147 / Storgatan 29	Marienlystvej 65
	SE-614 31 Söderköping Sweden	NO-1851 Mysen Norway	DK-7800 Skive Denmark
Phone	+46 (0)121 130 40	+47 69 89 37 67	+45 96 14 37 00
Fax	+46 (0)121 133 70	+47 69 89 47 35	+45 96 14 38 20
E-mail	info@kontrollelektronik.se	dantherm.no@dantherm.com	dantherm.dk@dantherm.com
Web	kontrollelektronik.com	www.dantherm.no	www.dantherm.com

## Test Report: TKS 3000 and ACUE 3000

### Introduction

After electrical installation of the free air cooling unit, the display normally shows actual room temperature (if indication is at Indoor temp).

The following tests shall be done to secure the function of the system. Every checkpoint shall be receipted with a sign and finally a date. This is to secure and document the guarantee and future service.

Observe: Check that there is no protection paper blocking the filter before starting up. If there is, no air flow will come and you will get a filter alarm.

### Start a test

To start a new test you push two steps up from the main menu to find "Self Test". Now push "Enter". The control unit will now execute the Self test according to the schedule below.

### Test performance

Test phase	Time (s)	Action	Check
1	60	Heater activated (if installed).	
		<b>Check that the heater becomes warm.</b>	
2	120	Air dampers to environment open (if installed).	
		<b>Check that the air damper opens.</b>	
3	60	Fan signal speed up to max.	
		<b>Check that the fan speed up to max speed.</b>	
4	120	TC-function active (if installed). Fan signal is reduced to min. speed.	
		<b>Check that the fan speed is reduced. Check that the TC-damper opens alternative one of the fans are stopped.</b>	
5	60	AC unit active (if installed), fan is stopped.	
		<b>Check that the Active Cooling unit starts.</b>	
6	10	Relay output Filter alarm active.	
		<b>On the connector (if installed) check that the circuit is closed (/or opened).</b>	
7	10	Relay output summary alarm fans active.	
		<b>On the connector (if installed) check that the circuit is closed (/or opened).</b>	
8	10	Relay output Low temp. alarm active.	
		<b>On the connector (if installed) check that the circuit is closed (/or opened).</b>	
9	10	Relay output High temp. alarm active.	
		<b>On the connector (if installed) check that the circuit are closed (/or opened).</b>	
10	10	Room sensor tested.	
		<b>Observe the display.</b>	
11	10	Outdoor sensor tested.	
		<b>Observe the display.</b>	

## Test Report: TKS 3000 and ACUE 3000, *continued*

**Fire & smoke alarm** After the self test, the Fire and smoke alarm (if applicable) shall be done.

Alarm	Action	Check
Fire & smoke alarm	Activate the smoke detector.	
	<b><i>Check that everything is stopped: Fan, Heater, AC, and that the dampers are closed. The display shows "Fire Alarm".</i></b>	

**Sign the protocol**

	Test report data
Site – station designation/no	
Test date	
Test made by	
Signature	
Company	

**Documentation** Send a copy of the protocol to the responsible operator.

## Test Report: ACUE CS1

### Introduction

After electrical installation of the free air cooling unit, the display normally shows actual room temperature (if indication is at Indoor temp).

The following tests shall be done to secure the function of the system. Every checkpoint shall be receipted with a sign and finally a date. This is to secure and document the guarantee and future service.

Observe: Check that there is no protection paper blocking the filter before starting up. If there is, no air flow will come and you will get a filter alarm.

### Start a test

To initiate Self test following procedure must be done.

Press the push button "RESET MOTOR/TIMER" and hold it pressed until the display shows a "0". The control unit will now execute the self test after the schedule below.

By pressing the push button again you can do manual steps in the test without time delay. The test can be stopped whenever you wish by pressing the button approximately 5 seconds or until the display show any form of a two-figure number.

The designations in the protocol refer to the flow chart in the manual.

### Test performance

Test phase	Time (s)	Action	Check
0	100	Heater activated.	
		<b>Check that the heater becomes warm.</b>	
1	100	Air dampers to environment open.	
		<b>Check that the air damper opens.</b>	
2	40	Fan signal speed up to max.	
		<b>Check that the fan speed up to max speed.</b>	
3	100	TC-function active. Fan signal is reduced to min. speed.	
		<b>Check that the fan speed is reduced. Check that the TC-damper opens alternative one of the fans are stopped.</b>	
4	20	Test of Room temp. sensor GT1.	
		<b>Observe the display (see next side).</b>	
5	20	Test of Outdoor temp. sensor GT2.	
		<b>Observe the display (see next side).</b>	
6	20	Activation of Low temp. alarm.	
		<b>Check the indication lamp Low temp.</b>	
7	20	Activation of High temp. alarm.	
		<b>Check the indication lamp Low temp.</b>	
8	40	Cooling unit 1 active (if AC-UNITS = 1 or 2).	
		<b>Check the AC-unit starts (if installed).</b>	
9	40	Cooling unit 2 active (if AC-UNITS = 2).	
		<b>Check the AC-unit starts (if installed).</b>	

## Test Report: ACUE CS1, *continued*

### Test of temperature sensors

If the display show a “-“ this means that the sensors is out of range. What the sensor indicate, warm or cold, indicates with the lamps LOW TEMP. ALARM respectively HIGH TEMP. ALARM following:

LOW TEMP. ALARM: The sensor indicate very cold (**short-circuit**).

HIGH TEMP. ALARM: The sensor indicate very hot. (**cut-off or not connected**).

**To make the test of the sensors as reliable as possible, please make no manual steps.**

**Fire & smoke alarm** After the self test, the Fire and smoke alarm (if applicable) shall be done.

Alarm	Action	Check
Fire & smoke alarm	Activate the smoke detector.	
	<b><i>Check that everything is stopped: Fan, Heater, AC, and that the dampers are closed. The display shows “Fire Alarm”.</i></b>	

### Sign the protocol

	Test report data
Site – station designation/no	
Test date	
Test made by	
Signature	
Company	

### Documentation

Send a copy of the protocol to the responsible operator.

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