

# TKS 60

Service manual  
Rev. 1.3  
en

**Dantherm**<sup>®</sup>  
CONTROL YOUR CLIMATE

## Introduction

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**Introduction** This is the operation and maintenance manual for free cooling unit TKS 60.

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**Contact** On the rear page contains you find information for manufacturing and sales offices.

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## General information

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**Introduction** This section contains general information about the unit and the manual.

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**Target group** The target group of this service manual is the engineers who install and maintain the unit.

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**Reservations** This service manual may be amended without prior notice.

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### Declaration of Conformity

Dantherm A/S, Marienlystvej 65, DK7800 Skive hereby declares that unit **367060** is compliant with the following directives:

2006/42/EC	Machinery Directive
2006/95/EC	Low Voltage Directive, including 93/68/EEC where is a requirement
2004/108/EC	EMC Directive
2004/65/EC	RoHS Directive
2004/12/EC	Packaging Directive

- and that the product is manufactured in accordance with:

EN 12100:2010	Safety of Machinery
EN 60 950-1:2006	Electrical Machine Safety
EN 61000-6-2:2005	Immunity
EN 61000-6-3:2007	Emissions (residential, commercial and light industrial environments)

Skive, 23.12.2014

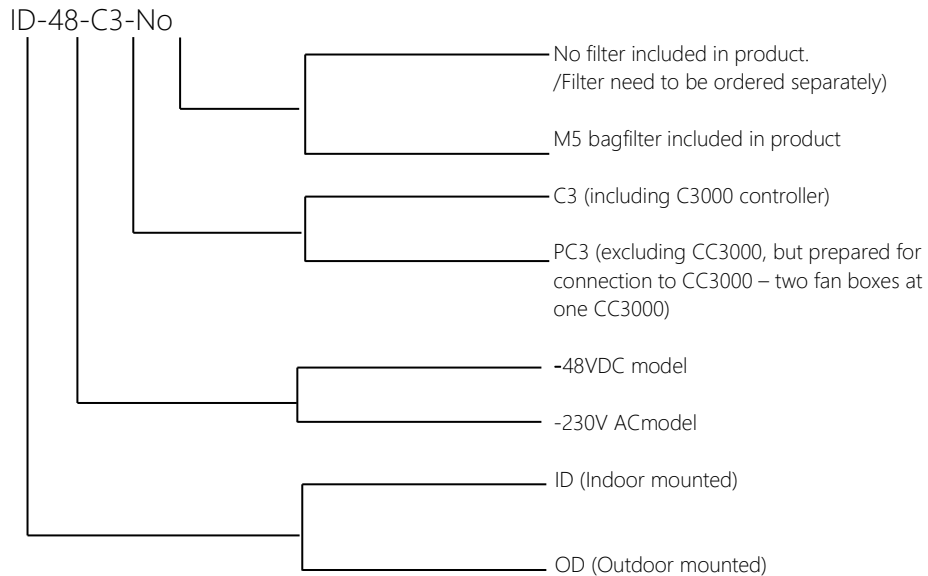
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**Recycling** The unit has been developed to last for many years. When the time comes for the unit to be recycled, it must be done in accordance with applicable national environmental protection regulations.

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## TKS Syntax

Variant syntax for  
TKS60, Art. No:  
367060



[Example shown here](#)

Indoor - 48V - CC3000 Controller - without Filter

**Please note that a bag filter is not included but must be ordered separately**

(Art. No: 087363, ISO ePM10 55% (M5), 540x487x500/9, Bag filter)



Warning

Not following these instructions could result in death or serious injury



Caution

Not following these instructions could result in injury or property damage.



Safety

The symbol means something that should NOT be done

**Project safety is your responsibility!**

Follow the instructions in this quick setup guide regarding the installation and use of the product. Not following these instructions could result in injury, death, or damage to equipment.

All work should be performed by qualified personal using safe work practices. All proper personal protective equipment should be used.

PPE required for this installation includes but is not limited to:

- Safety glasses
- Hard hat
- Safety shoes
- Hearing protection
- Cut resistant gloves
- Face shield
- Proper work attire (long sleeve shirt and long pants)

Please strictly observe the following: Special skills are required to install the Dantherm Flexibox unit. Non-qualified personnel should not attempt any of the actions shown in this quick guide. Dantherm shall not be responsible for improper installation or any accidents, damage, or injury resulting from improper installation.

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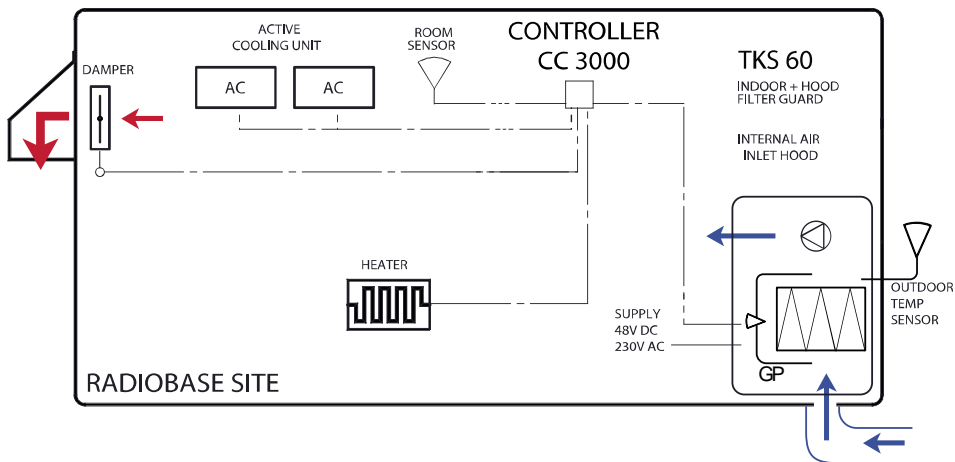
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**Reservations** Dantherm reserves the right to make changes and improvements to the product and the service manual at any time without prior notice or obligation.

**Quick setup guide** Part number of this quick setup guide is 097729

## Flowchart

**TKS 60** The illustration below shows schematically how the air flow enters the electronics cabinet. The illustration also shows some accessories and other equipment that can be connected to the control box.



## TKS models

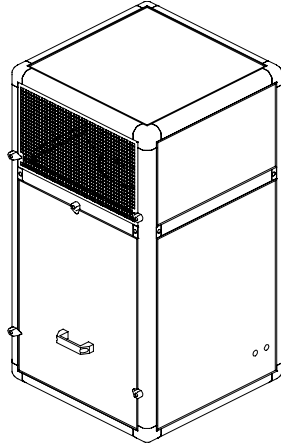
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### Overview

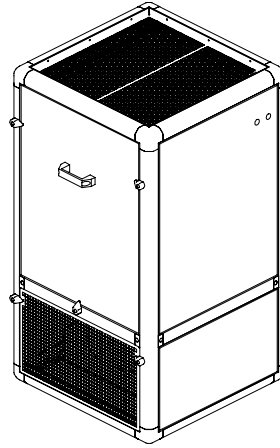
This is an overview of the various TKS installation alternatives

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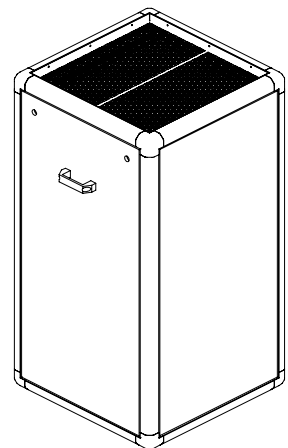
### TKS 60



Indoor floor

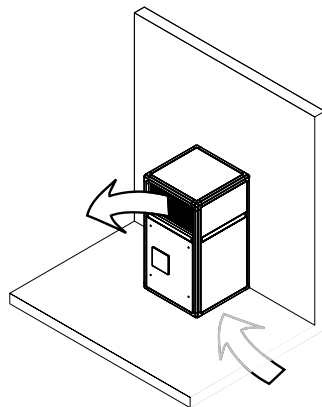


Indoor wall

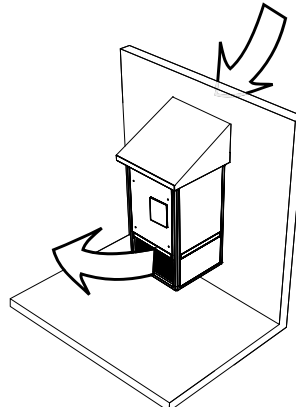


outdoor (option)

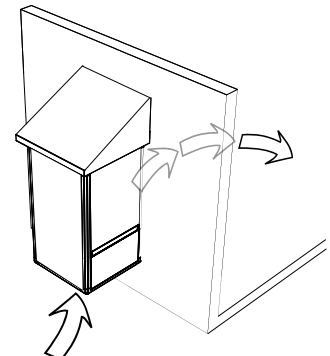
### Air flow



Indoor floor



Indoor wall



outdoor (option)

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## Technical data TKS 60

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

Specification	230 V –B ver.		48 V DC	
	M5 filter	F7 filter	M5 filter	F7 filter
Air flow m <sup>3</sup> /h	4285	4010	3200	2940
Cooling effect W/K	1424	1333	1063	977
Cooling effect at $\Delta t=5^{\circ}\text{C}$	7.1 kW	6.7 kW	5.3 kW	4.9 kW
Power consumption	782 W	773 W	389 W	405 W
Acoustic pressure	~82.3dBA		~78.2dBA	
External available pressure drop	150 Pa		150 Pa	

### Unit data

Data and dimensions of the free cooling unit are shown in the table below:

Specification	Cover	Value
Weight	Estimated max	60 kg
Constituent plate components	Zinc aluminium AZ150	0.9-2.0 mm
Frame	Aluminium	1.5 mm (minimum thickness)
External sandwich panels	Painted galvanised steel plate (Grey color. RAL 9002)	0.5 mm
Internal sandwich panels	Galvanised steel plate	0.5 mm
Insulation in sandwich panels	Polyurethane	25 mm

### Filter data

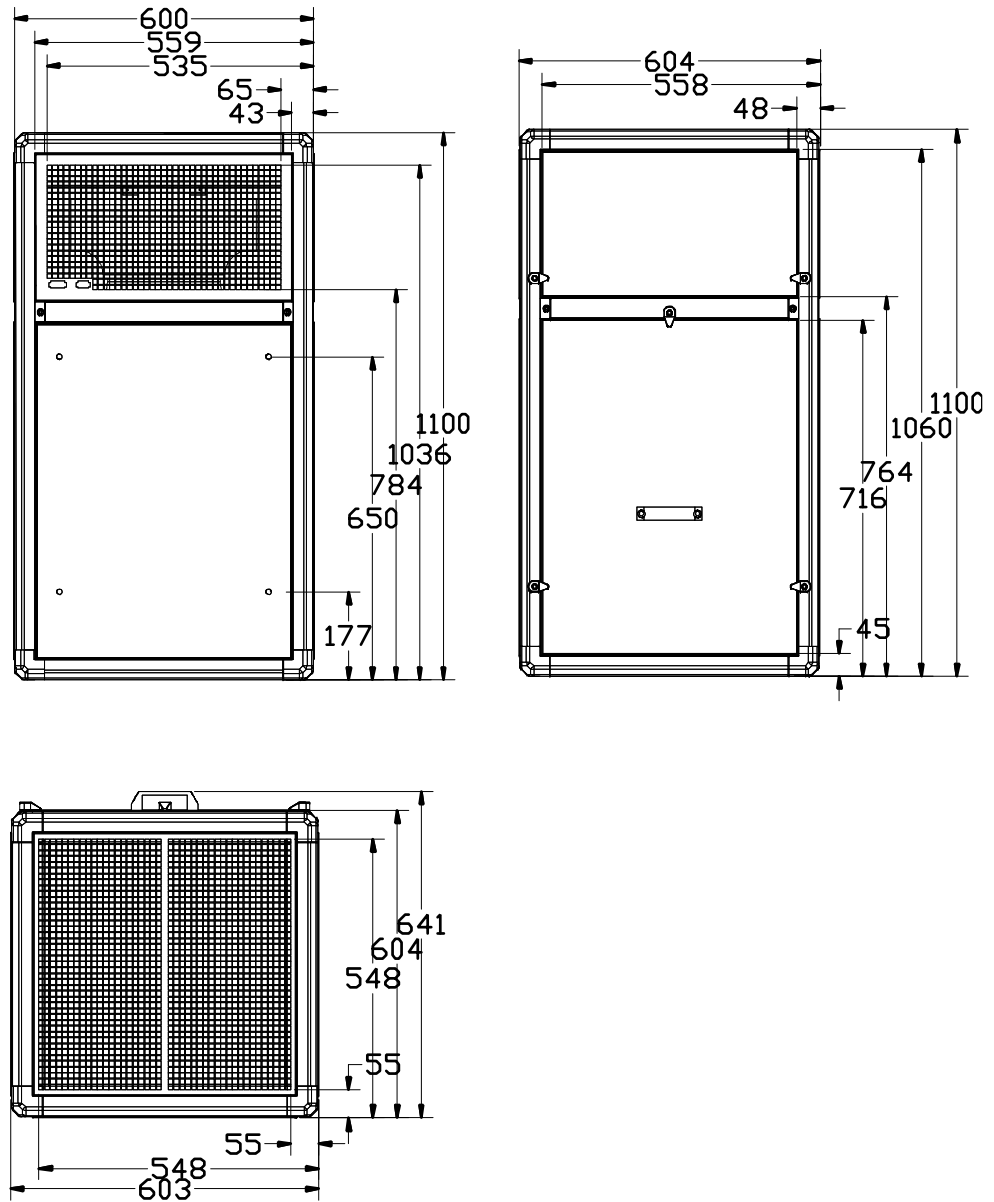
The table below shows data for the filter.

Filter	Type	Class	Dimension	Filter guard setting
087363 / 405512	Bag filter, 9 bags	M5	IF45stø:540x487x535	250 Pa
087364 / 405414	Bag filter, 8 bags	F7	IF80 stø:540x487x535	250 Pa

## Dimensions

**Dimensional diagram** The diagram below shows the dimensions of the free cooling unit:

TKS 60



### Handle

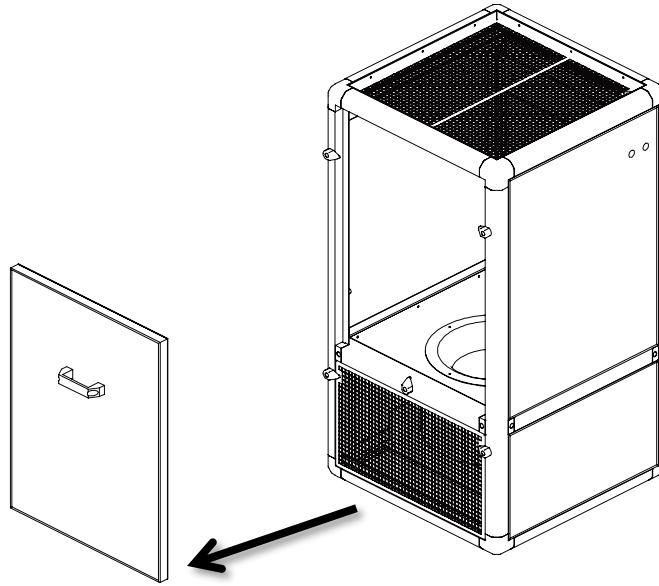
This unit has been equipped with one handle that can be secured using a padlock. In order to open the unit, the handle must first be folded out and then turned a quarter turn.





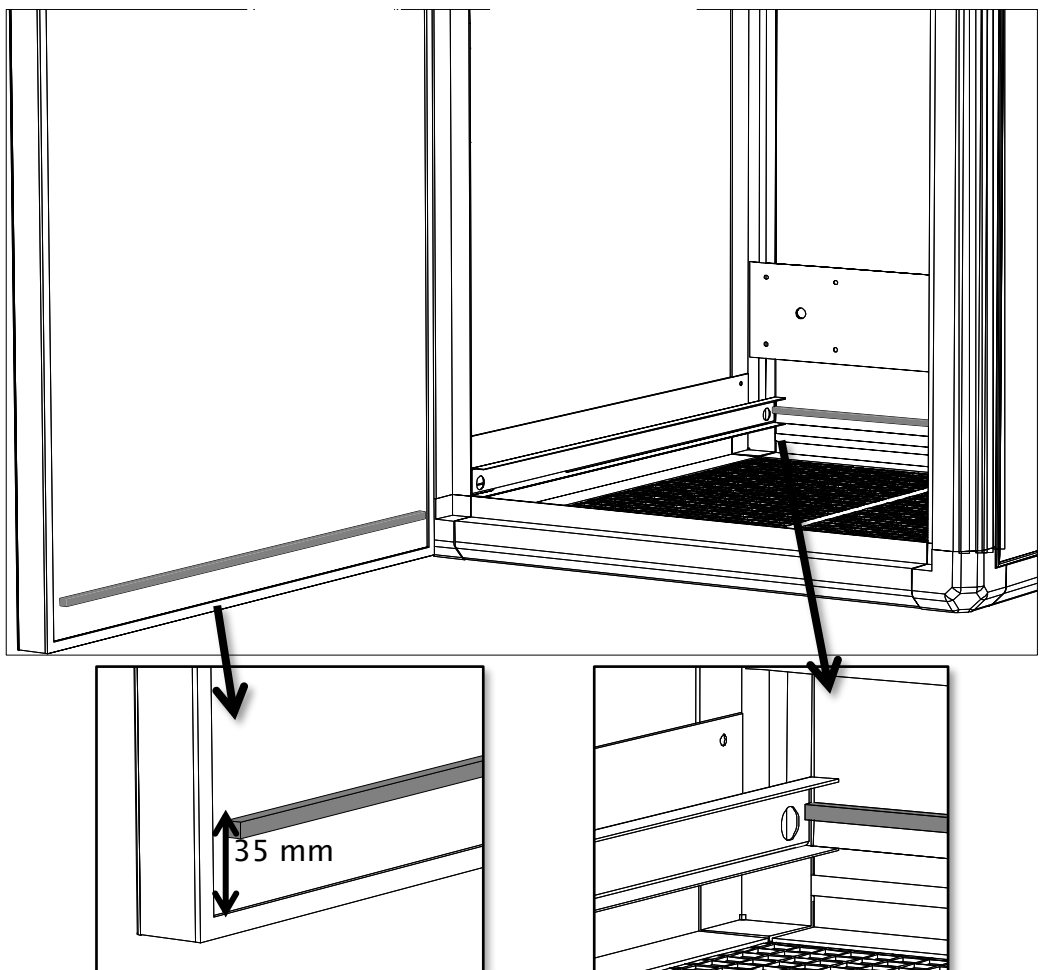
## Mount filter

1



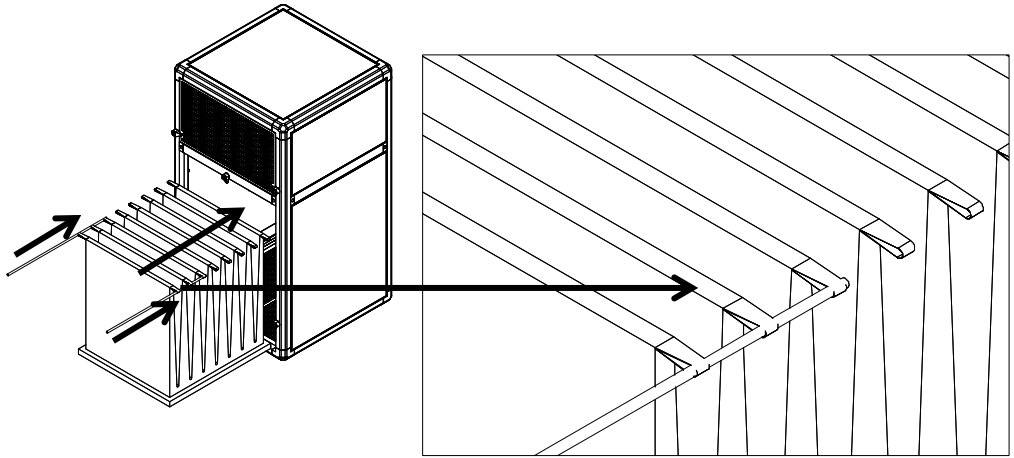
2

## Fit sealing strips

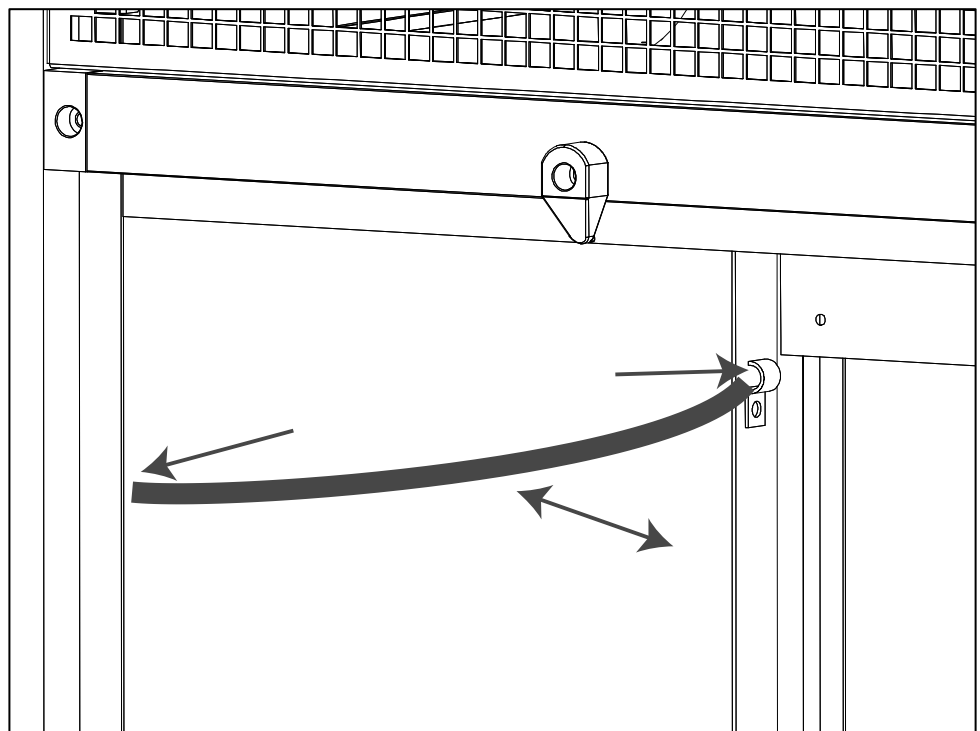


Mount filter, *continued*

3

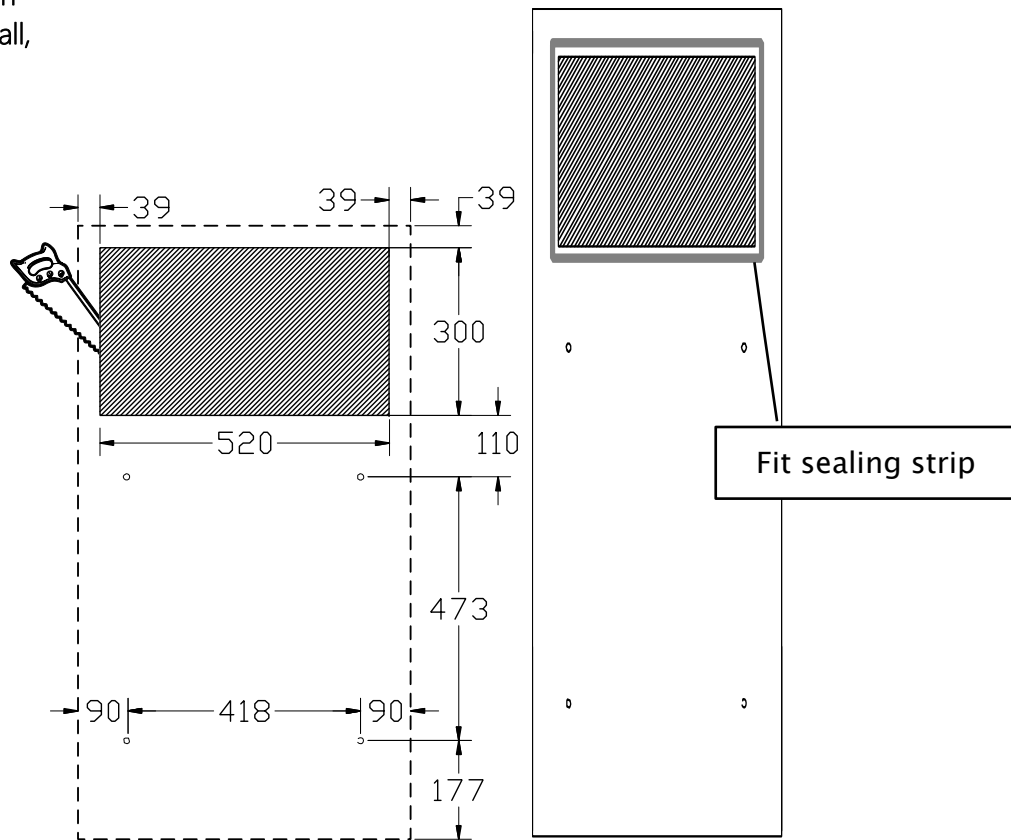


3

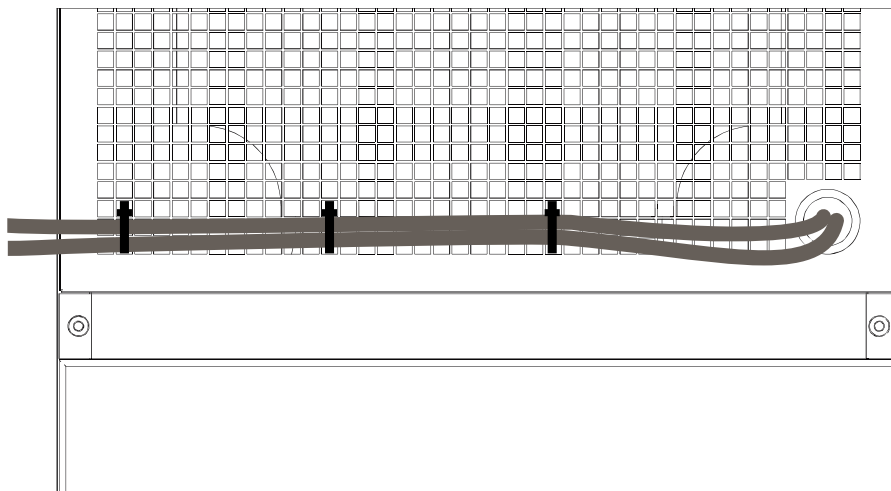


## Installation

Installation, Dimensional diagram wall, outdoor

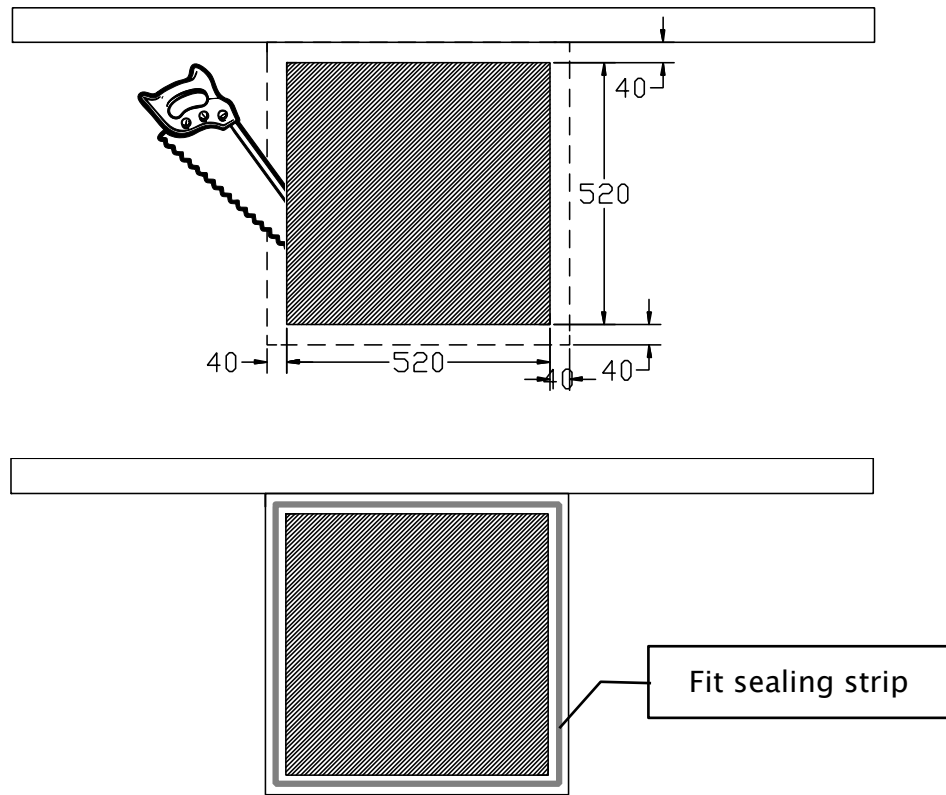


outdoor only  
(cable tie)



## Installation, *cont.*

Installation, Dimensional diagram floor

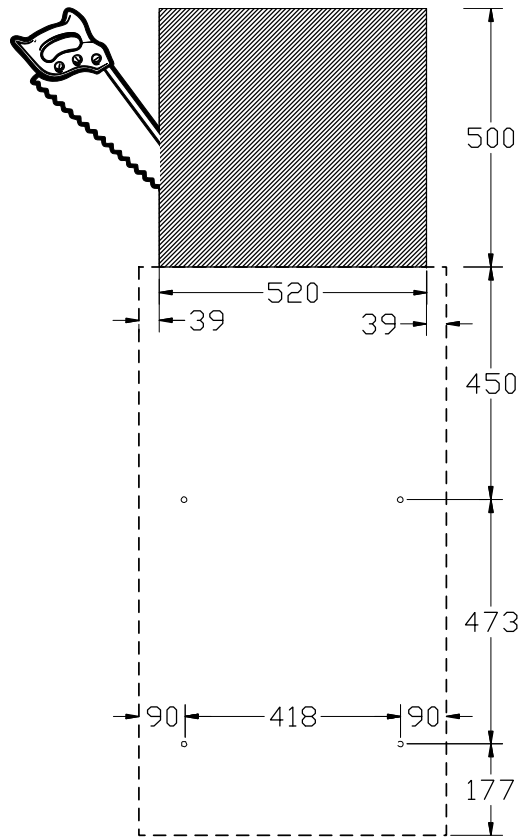


*Continued overleaf*

Installation, *cont.*

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Installation, Dimensional diagram wall, Indoor



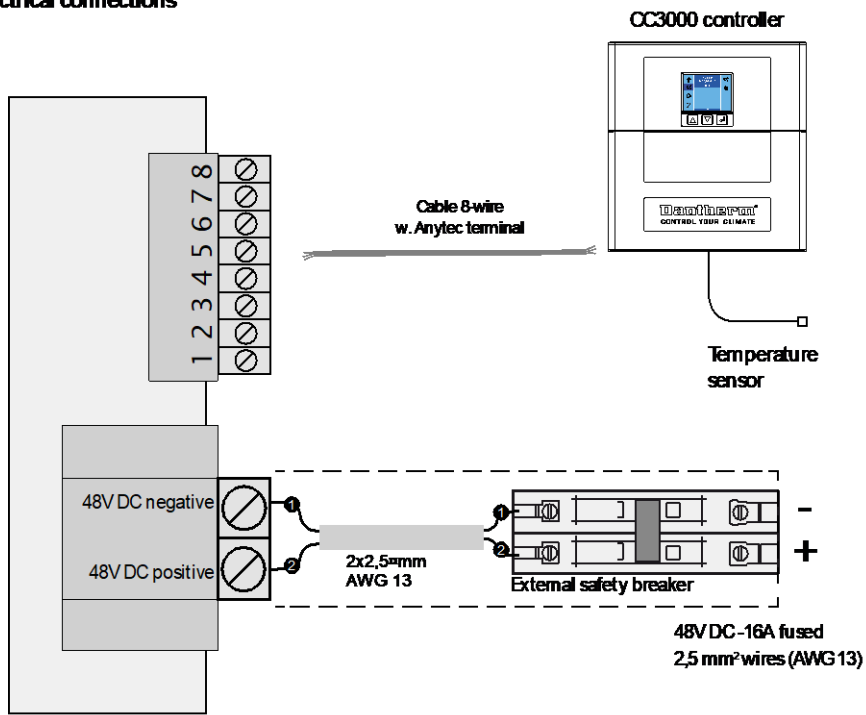
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*Continued overleaf*

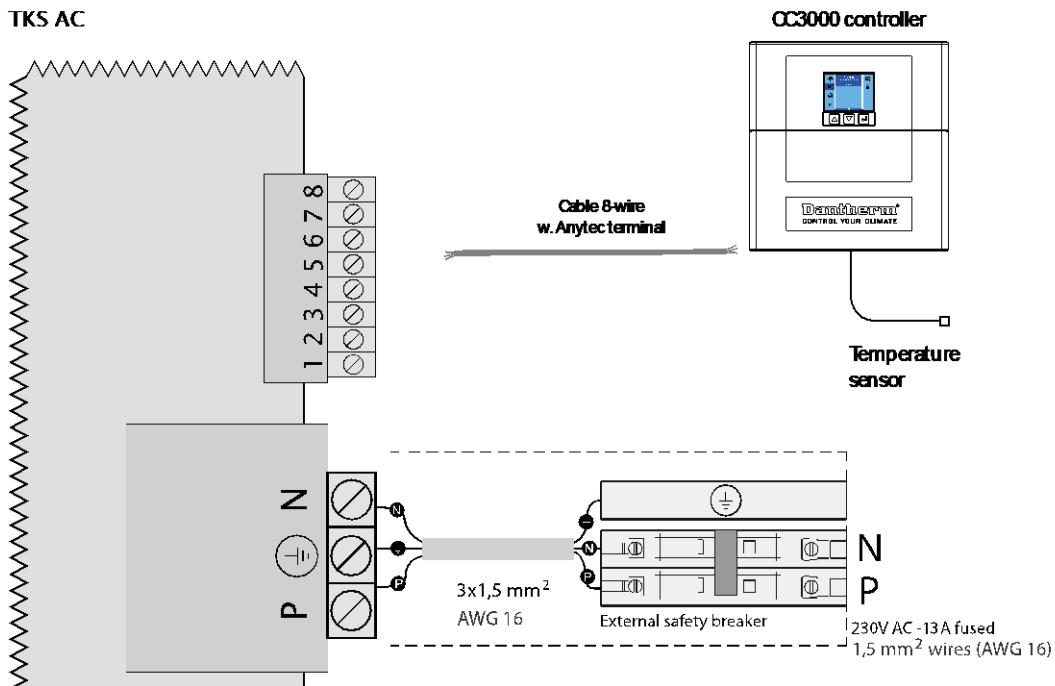
Installation, *cont*

**Mandatory electrical connections**

**TKS DC**

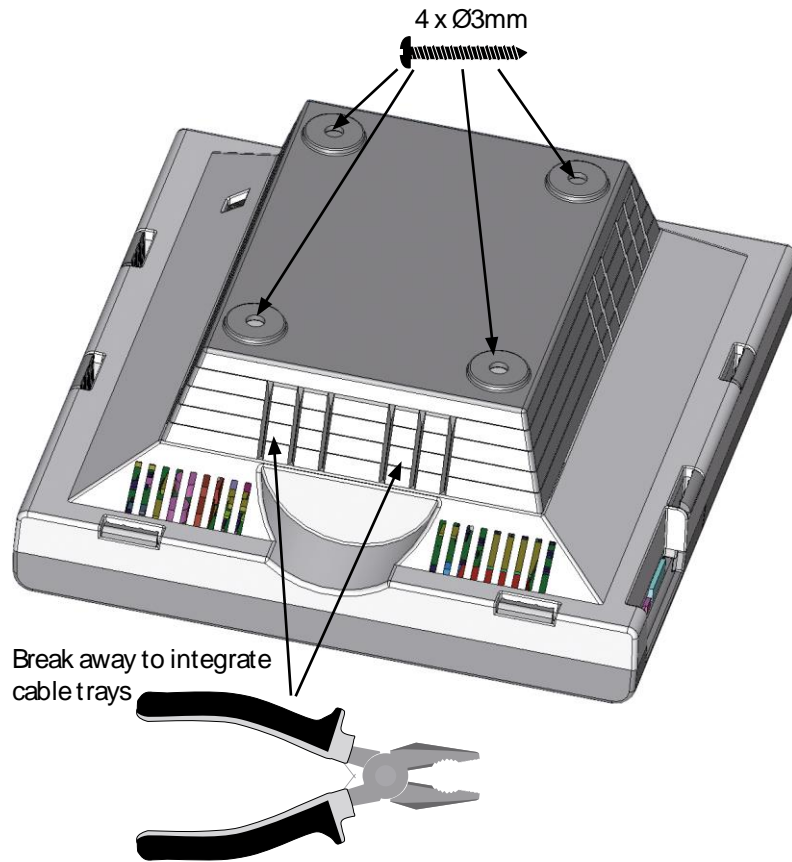


**TKS AC**

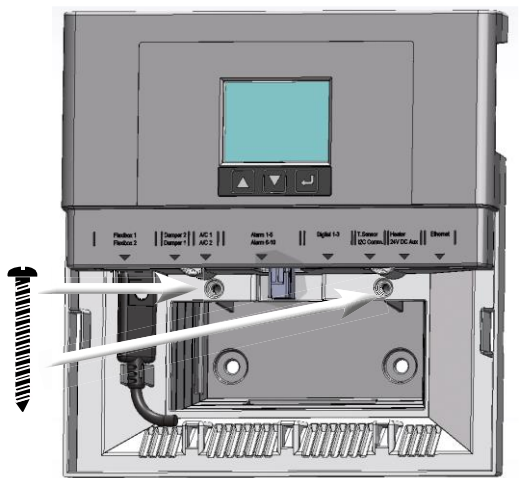


## Controller CC3000

### Controller CC3000 rear

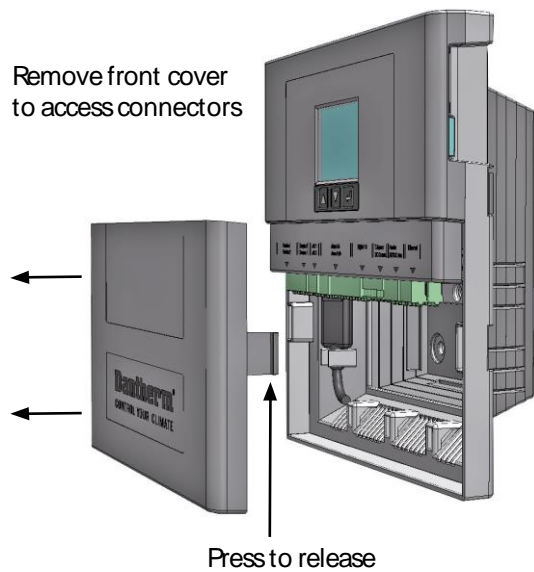


### Fasten main part to the wall mount



Use two screws to secure the main part of the casing to the wall mount.

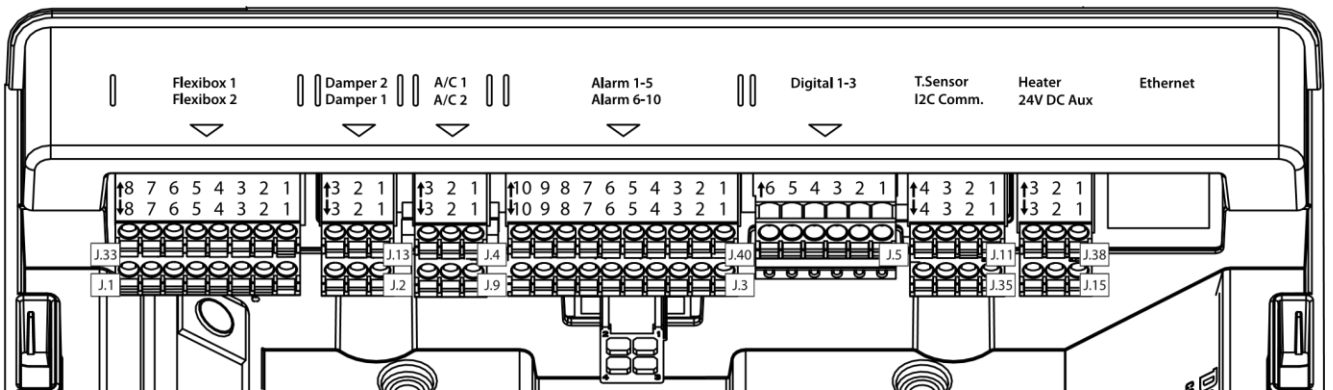
### Access connectors



## Connect controller CC3000 to TKS 60



Mount all green connectors from extra equipment such as: Flexibox Aircon, alarms, Temp, RH sensors and digital in and output.



### System Setup



At startup insert SD card in the slot located on the side of the CC3000 controller. This will allow you to select the config file for your TKS 60.

**Note:** When the SD card is inserted the controller will automatically update firmware. See instructions in display.

Until the SD card is inserted the controller will remain inactive and the buttons will not function.

For product configuration and advanced use please refer to the user manual for the CC3000 controller.



## Controller CC3000

How to:

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### Check correct installation.

After installation of controller and cooling product, correct connectivity can be checked by use of a selftest function. > See manual for CC3000.

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If automatic sequence is started, controller will activate all outputs one by one. Time duration for each step is 3 minutes, which should be sufficient for the installer to check that fans, dampers, air conditioners, heaters and alarms are correctly connected.

Test steps can be bypassed by pressing down key.

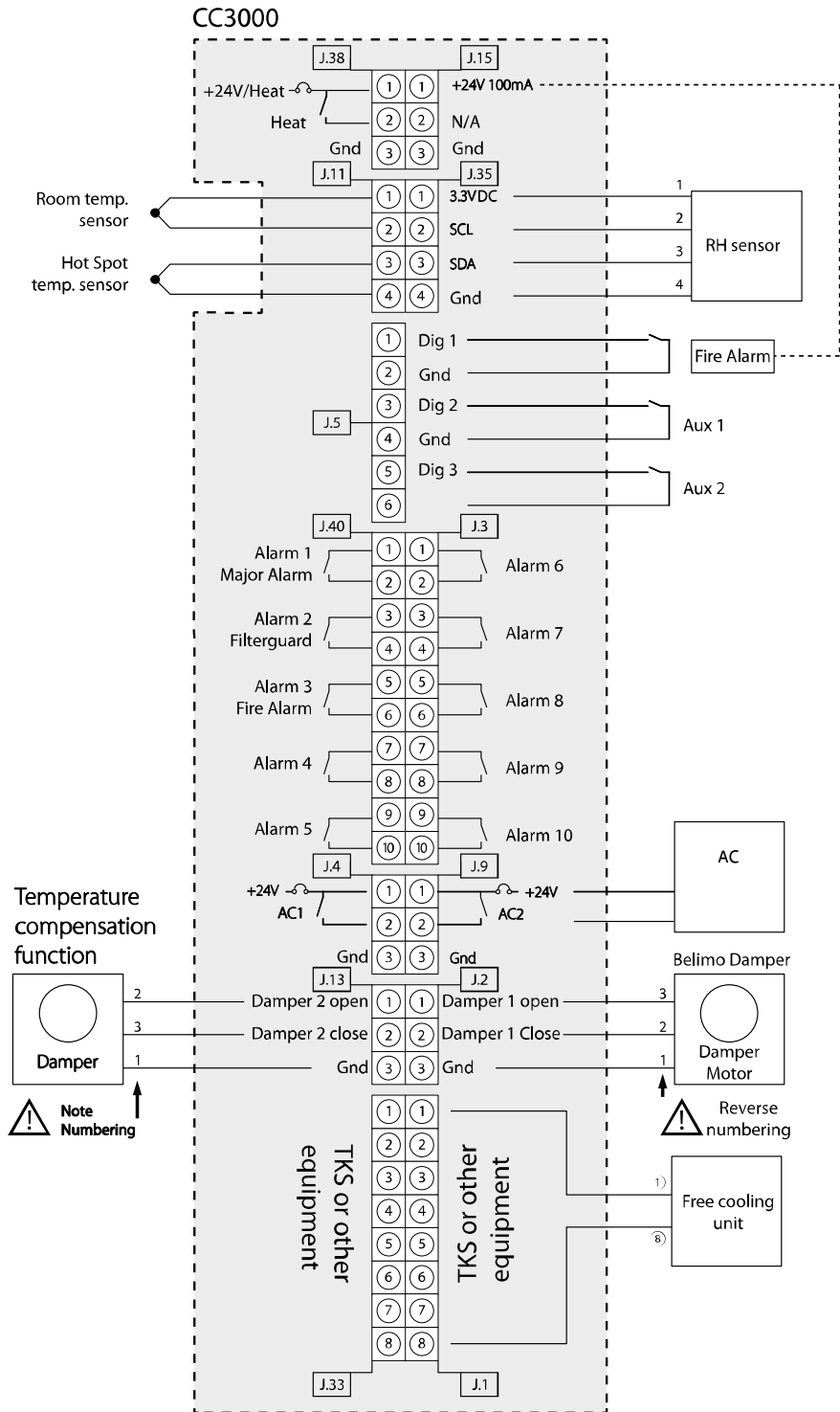
A manual sequence can also be used, if only certain outputs are checked. Use up/down key to select output and press enter. Output is now activated. Pressing enter again, will deactivate output.

After connectivity check, go to main menu and check that indoor/outdoor temperature reading is correct and that set point is correct.

If shelter temperature is below set point, indoor temperature sensor can be heated by hand, to check that fan starts when temperature reach set point.

Note: If sensor temperature reach air conditioner set point and air conditioner is started, it has a minimum runtime of 3 minutes.

Electrical diagram – CC3000-AC



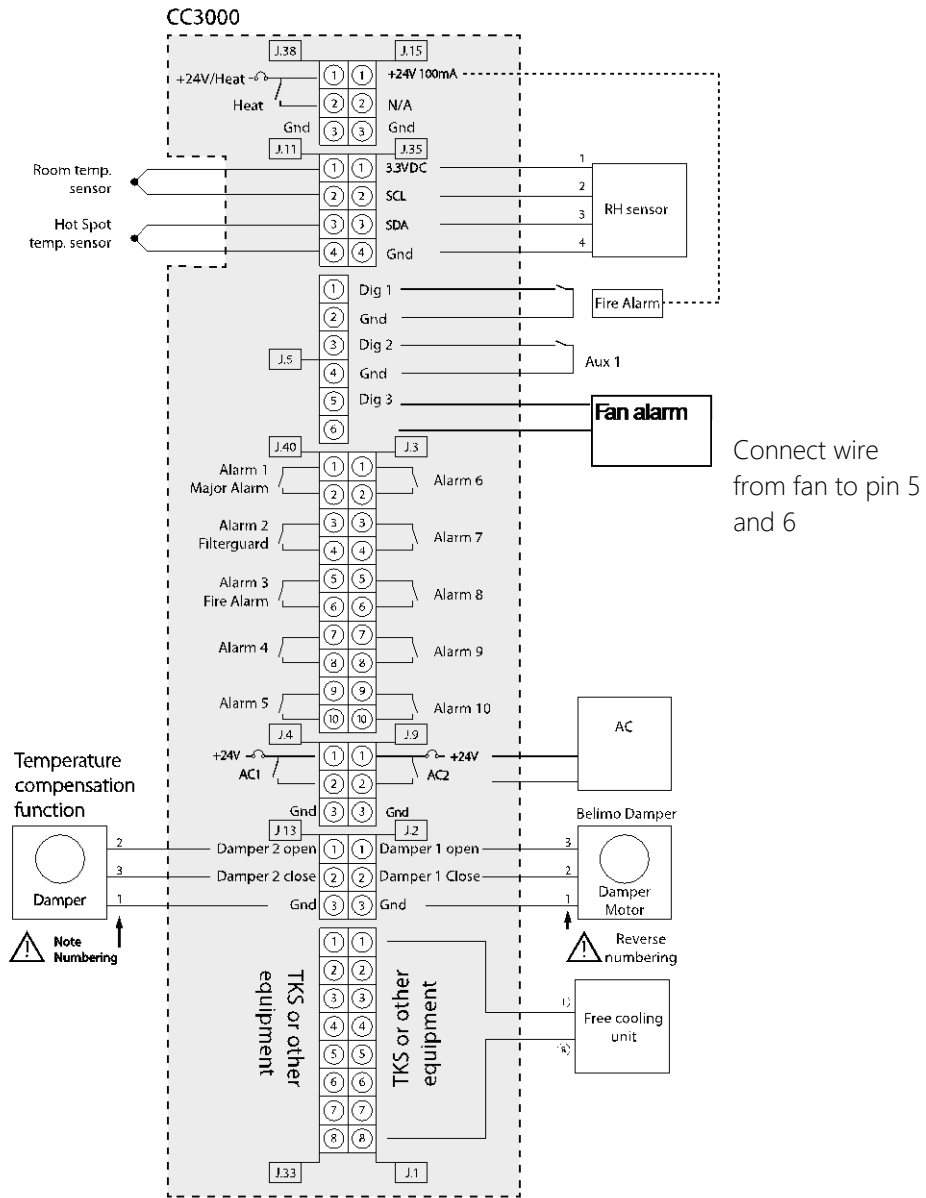
# TKS60 -230C AC

Connection of fan alarm TKS60 230V AC.

Electrical diagram – CC3000

Default Cooling strategies (can be changed using the CC3000 controller).

Free cooling mode

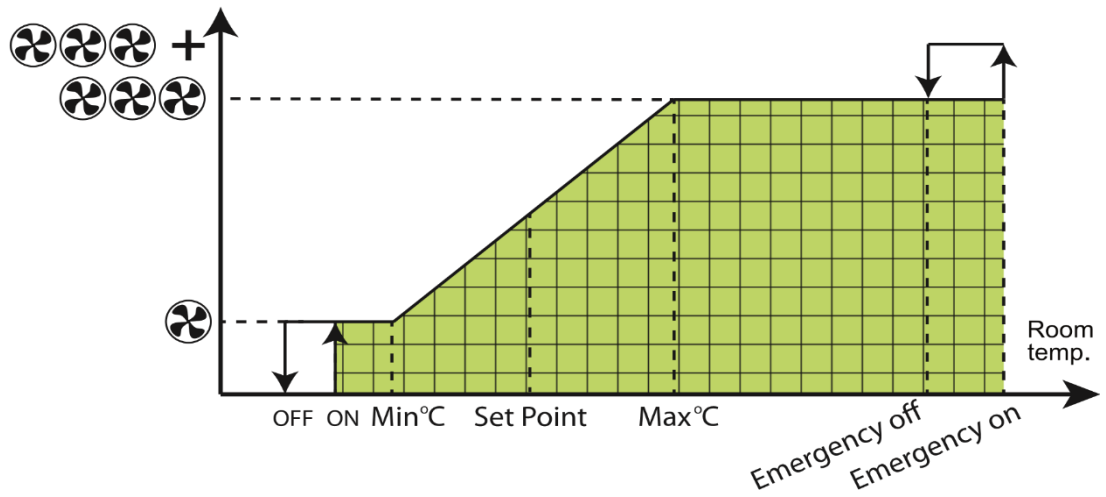


## Control strategi

Default Cooling strategies (can be changed using the CC3000 controller)

### Free Cooling Mode

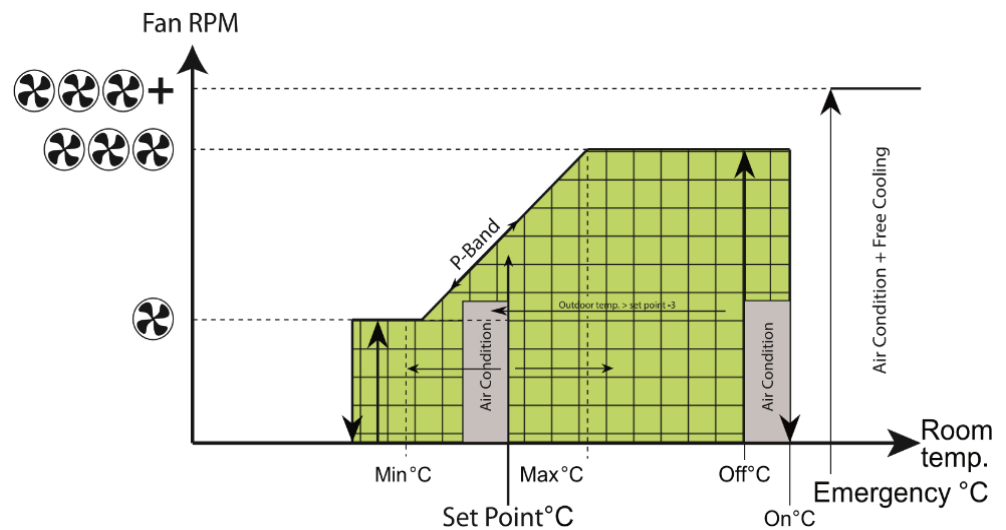
	Description	Value
Off	Temperature when fan stops	20
On	Temperature when Fan starts	23
Min °C	Temperature at bottom of P-band	25
Max °C	Temperature at top of P-band	29
Set Point	The wanted indoor temperature; fan speed will be adjusted between Min°C and Max °C	27
Emergency on	Fan run 100%	38
Emergency off	Fan go back to nominal speed	36



Standard Mode (Freecooling <> A/C)

	Description	Value
Off	Temperature when fan stops	20
On	Temperature when Fan starts	23
Min °C	Temperature at bottom of P-band	25
Max °C	Temperature at top of P-band	29
Set Point	The wanted indoor temperature; fan speed will be adjusted between Min°C and Max °C	27
A/C 1 on	External Air Con unit 1 start if connected	31
A/C 1 off	External Air Con unit 1 stops if connected	29
A/C 2 on	External Air Con unit 2 start if connected	33
A/C 2 off	External Air Con unit 2 stops if connected	31
Emergency on	Fan run 100% and both A/C 1 and A/C 2 starts	38
Emergency off	Fan stops both A/C 1 and A/C 2 continue to run	36

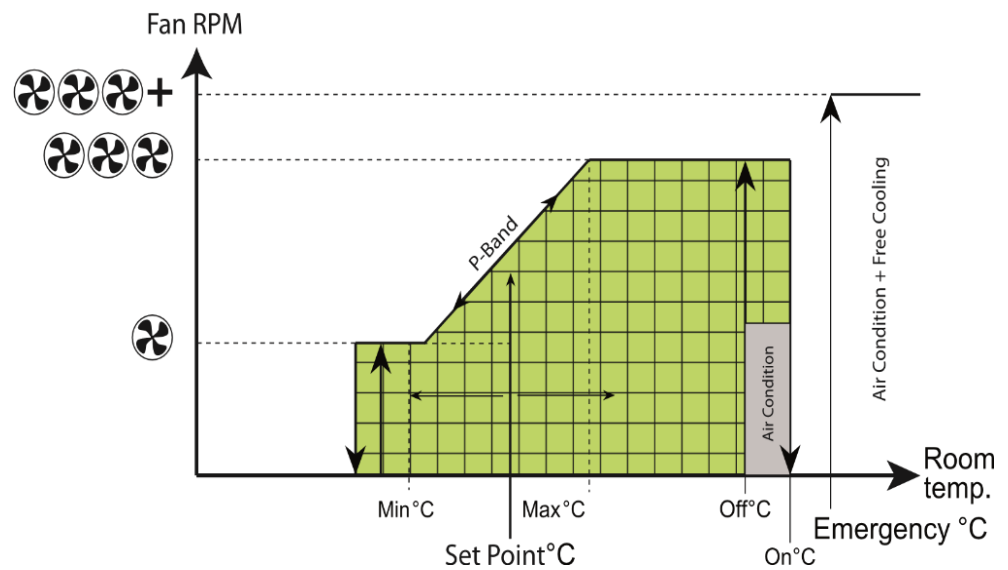
A/C unit 1 start at set point if outdoor temperature is less than 3°K colder than set point.  
If outdoor temperature is more than 3°K colder than setpoint the A/C unit 1 will start at 31°C



Energy save Mode (Freecooling > A/C)

	Description	Value
Off	temperature when fan stops	20
On	Temperature when Fan starts	23
Min °C	temperature at bottom of P-band	25
Max °C	Temperature at top of P-band	29
Set Point	The wanted indoor temperature; fan speed will be adjusted between Min°C and Max °C	27
A/C 1 on	External Air Con unit 1 start if connected	31
A/C 1 off	External Air Con unit 1 stops if connected	29
A/C 2 on	External Air Con unit 2 start if connected	33
A/C 2 off	External Air Con unit 2 stops if connected	31
Emergency on	Fan run 100% and both A/C 1 and A/C 2 starts	38
Emergency off	Fan stops both A/C 1 and A/C 2 continue to run	36

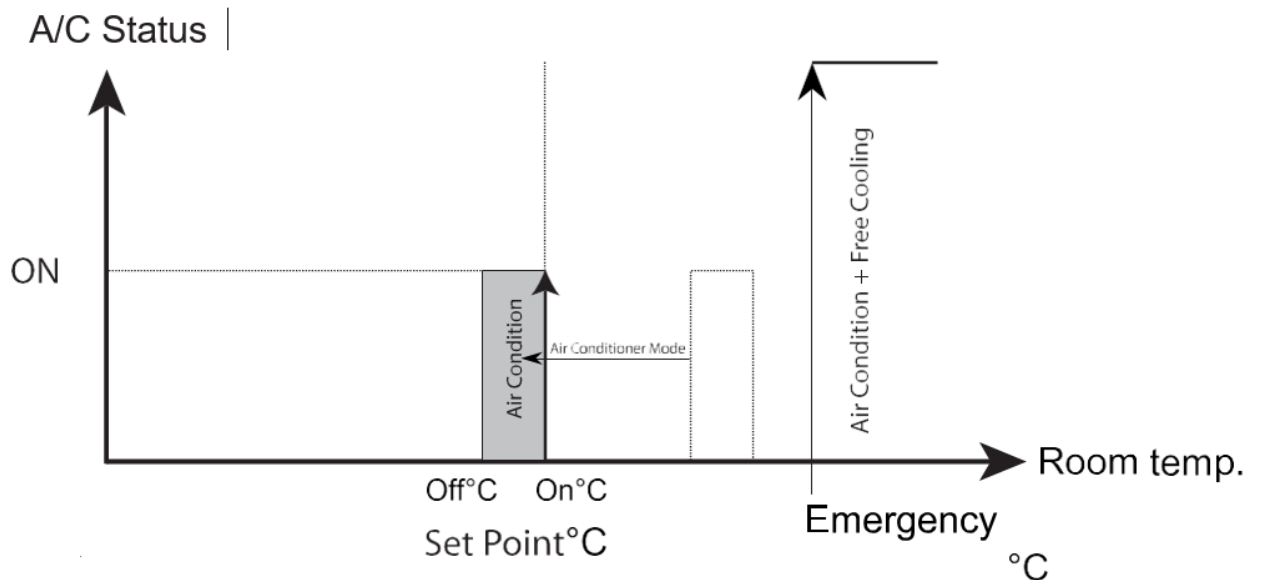
If outdoor temperature is less than 1°C colder than indoor room temperature the Fan will stop. The connected Air-con units will start and stop according to the table above.



Air conditioner mode

	Description	Value
Set Point	External Air Con unit 1 start if connected	27
A/C 1 off	External Air Con unit 1 stops if connected	25
A/C 2 on	External Air Con unit 2 start if connected	29
A/C 2 off	External Air Con unit 2 stops if connected	27
Emergency on	Fan run 100% and both A/C 1 and A/C 2 starts	38
Emergency off	Fan stops both A/C 1 and A/C 2 continue to run	36

The free cooling unit is not active, only the connected Air conditioner Preventive Maintenance




**Introduction**

The free cooling unit requires preventive maintenance at regular intervals to avoid stoppages and impaired performance. Bear in mind that the servicing interval may vary depending on the conditions of the environment in which the cooler operates. Turn off all electrical power to the unit before carrying out any work on it.

### Comfort mode



- Select  and press enter.  
If this is OK press arrow down two times and when cursor is on Disable/enable press enter.
- Press arrow down one time and then enter to exit this submenu.

The fan is limited to idle speed in comfort mode.

If you want to change set point and duration this can be changed by pressing enter when the cursor has highlighted the menu line.

### Servicing interval

Dantherm recommends the unit to be serviced at least once a year. We also recommend that the unit is inspected during the initial service to determine if the servicing interval is too long. We recommend that preventive maintenance is carried out during spring.

### Warranty requirements

The factory warranty only applies if servicing has been carried out and documented at an interval of a maximum of one year. The documentation may be a written log.

### Preventive maintenance

The recommended procedure for preventive maintenance is:

Step	Activity
1	Make sure that the power supply to the unit has been safely turned off.
2	Remove the old filter and carefully clean the unit.
3	Clean the dampers and check that they work and close tightly.
4	Clean the fan and check its attachment.
5	Check and clean the air intake and ventilation accessories.
6	Carefully fit the new filter.
7	Close the unit and ensure that all servicing has been carried out correctly.
8	Turn on the power to the unit.
9	Run the self-test in accordance with the separate control unit manual.



## Spare parts list

Spare parts &  
accessories  
TKS 60

The list of spare parts and their item numbers is shown below

Spare part	Type	Item number
<b>48V</b>		
Fan 48VDC	R3G355-RP23-XL	087365
Satellite PCB 48V DC		093713
10 pcs. Fuse 58V DC 110 Amp		094152
<b>230V</b>		
Satellite PCB 230 V AC		093716
48V DC Power Supply for 230V DC models		093717
10 pcs. Fuse 4A, 250V (ø5,2x20mm)		096645
Fan 230V B1 (Type:R3G 355-RT01-I-7)		088024
<b>Common</b>		
CC3000 control including SD card configured for all units		093719
CC3000 Connector kit		092081
Controller Cable for CC3000		093724
Filter guard monitor		840020
Outdoor temperature sensor 2600mm cord (For outdoor units.)		036761
Room temperature sensor 8m cable		096873
Damper actuator for both 48V and 230V LM24A KTE		840021
<b>Accessories</b>		
Heater (optional)	1300/550 W, 230 V	840023
Bag filter	IF45stø:540x487x535/9-M5	087363 / 405512
Bag filter	IF80tø:540x487x535/8-F7	087364 / 405414

## Function Test

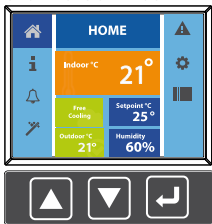
### Introduction

After connecting the free cooling unit, the display normally shows the current room temperature.

The following test must be carried out to ensure that the system works. Each test phase must be acknowledged with a signature and a date. This is to maintain the warranty and to provide documentation prior to future servicing.

NB Before starting the unit, check that there is no protective paper blocking the filter. If the filter is blocked, air flow is stopped, and a filter alarm is given.

### Start a self-test



First check the home menu.

If the indoor and outdoor temperature sensors show unexpected temperatures check their location and condition. Move or replace if necessary.

### Check for any alarms.

Press down arrow twice and if any alarm is highlighted.

If no alarms are activated go to self-test

To start a self-test **card** press down arrow 4 times and then enter.

An automatic self-test can be carried out by pressing enter when the cursor is on Stop/start.

A manual test can be carried out by using the arrow buttons to navigate the menu to the specific test point that needed to be tested.

### Automatic test

Step	Time (s)	Activity	Result
1	120	Damper to outdoor opens (if installed) <b>Check visually that the damper is open</b>	
2	120	Fan runs 75% of max rpm <b>Check that the fan(s) ramp up</b>	
3	120	Damper to outdoor close (if installed) <b>Check visually that the damper is closed</b>	
4	120	Electrical heater is active (if installed) <b>Check that the heater is hot</b>	
5	120	Air conditioner 1 is active (if installed) <b>Check the Air conditioner 1 starts</b>	
6	120	Air conditioner 2 is active (if installed) <b>Check the Air conditioner 2 starts</b>	
7	120	Alarm 1, Fan 1 alarm <b>NC, check it is change to NO (multimeter)</b>	
8	120	Alarm 2, Alarm for clogged filter <b>NC, check it is change to NO (multimeter)</b>	
9	120	Alarm 3, Digital 1 fire alarm (if installed to digital 1) <b>NC, check it is change to NO (multimeter)</b>	
10	120	Alarm 4, low temperature 10°C <b>NC, check it is change to NO (multimeter)</b>	

Function Test, *cont.*

Step	Time (s)	Activity	Result
11	120	Alarm 5, low supply voltage 42VDC	
		<b>NC, check it is change to NO (multimeter)</b>	
12	120	Alarm 6, high voltage 60VDC	
		<b>NC, check it is change to NO (multimeter)</b>	
13	120	Alarm 7, Room temperature sensor	
		<b>NC, check it is change to NO (multimeter)</b>	
14	120	Alarm 8, Outdoor temperature sensor	
		<b>NC, check it is change to NO (multimeter)</b>	
15	120	Alarm 9, high temperature alarm (40°C)	
		<b>NC, check it is change to NO (multimeter)</b>	
16	120	Alarm 10, High humidity alarm (if installed)	
		<b>NC, check it is change to NO (multimeter)</b>	

**Fire & smoke alarm** Once the self-test has been completed, a fire and smoke alarm test (if applicable) should be carried out.

Alarm	Activity	Result
Fire and smoke alarm Activate the fire/smoke alarm	The fire and smoke alarm must be connected to digital 1, it is important that the smoke alarm have a dry contact (potential free)	
	<b>Check that Fans, heater, Air cons etc stops immediately and there ia an alarm at alarm No 3</b>	

Signature

Test report information	
Site / station designation	
Test date	
Test carried out by	
Signature	
Company	

Function test

Go to self-test point manual point Fans start the fan  
Go to alarm menu  
Check that alarm Filterguard 1 in the display have a highlighted alarm icon







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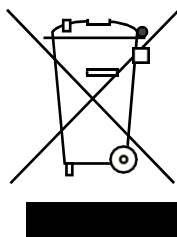
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