

Flexibox 810 G4-FG-NC

Service manual

Rev. 1.0

EN

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Introduction

Overview

Introduction	This is the service manual for the Dantherm Flexibox 810, part number 368553 variant FB 810-G4-FG-NC Please see the below table of content for further information about the sections.
Manual	Part number of this service manual is 099335 and covers variant FB819-G4-FG-NC
Target group	The target group for this service manual are the technicians who install and maintain the Flexibox 810, as well as the users of the unit.
Copyright	Copying of this service manual, or part of it, is forbidden without prior written permission from Dantherm A/S.
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.
Table of contents	<p>This service manual covers the following main topics:</p> <ul style="list-style-type: none"> Introduction 1 <ul style="list-style-type: none"> Product description 2 Accessories 6 Flexibox installation 8 Damper installation 12 Electronic controller 14 <ul style="list-style-type: none"> Connections 17 Controller operation strategy 21 Changing parameters 23 Digital input 29 Service guide 30 <ul style="list-style-type: none"> Preventive maintenance 31 Troubleshooting 33 Power Box Schematic 19 Spare part list 34 Replacing parts 35 Technical data 36 Index 40

Product description

Introduction

This section describes the overall product, and its functionality

Usage of the Flexibox 810

Flexibox 810 is designed to control the internal temperature of an outdoor telecom enclosure.

Flexibox 810 is designed to maintain correct temperature for electronic equipment, by removing dissipated heat from the electronics shelter.

Important

Dantherm recommends that any cooling system should be operating continuously, in order to maintain flawless telecom services around the clock.

Outdoor view

This illustrates the unit parts

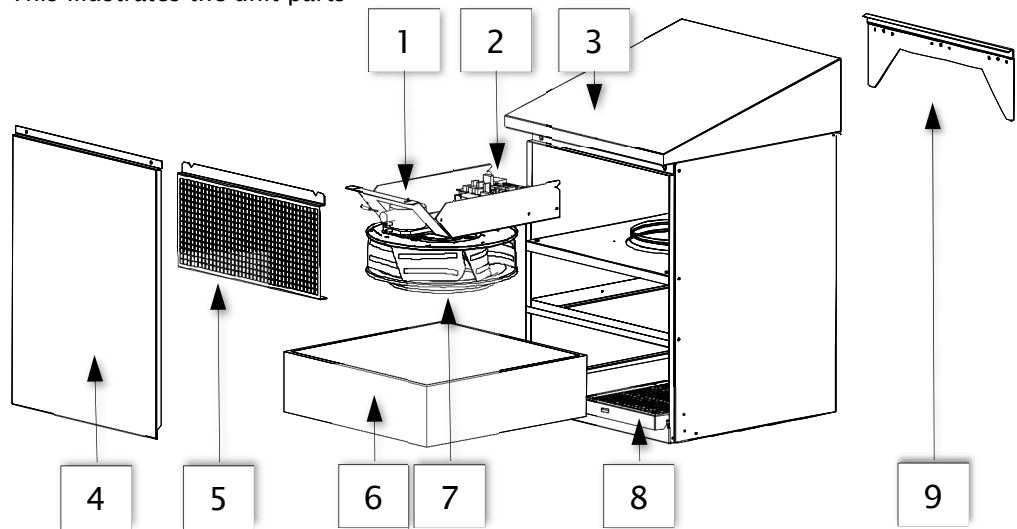


Fig. 1

Parts description outdoor view

This table shows outdoor parts according to Fig. 1

Part	Function
1	Filter guard pressure transducer
2	CC4 controller board
3	Integrated rain hood
4	Front cover
5	Safety grill
6	Filter
7	Fan
8	Filter lock frame
9	Wall bracket

Continued overleaf

Product description, *continued*

Indoor view

This illustrates the unit indoor visible parts

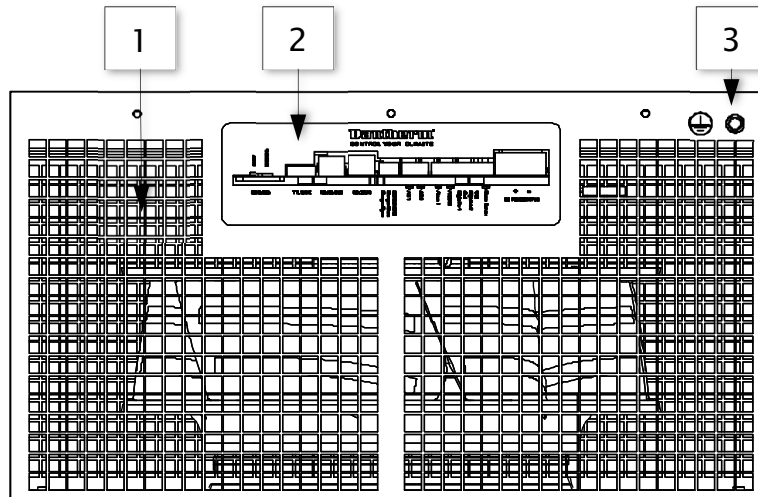


Fig. 2

Parts description indoor view

This table shows indoor parts according Fig. 2

Part	Function
1	Air inlet grill
2	Controller connection
3	Earth connection

Flexibox 810 bracket

Bracket assembly of the Flexibox 810 dimensions.

Flexibox 810

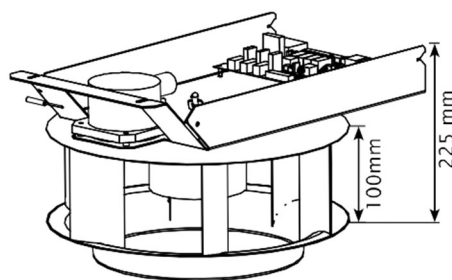


Fig. 3

Continued overleaf

Product description, *continued*

Cooling operation

The Flexibox controller continuously monitors the inside as well as the outside air temperature, and select appropriate operation mode accordingly.

Mode	Description
External heating	If the inside temperature is lower than the heat setpoint ("Heater SetPt.") parameter, any external heater connected to the Flexibox, will be activated.
Free cooling	If the inside temperature is higher than setpoint, the internal fan of the Flexibox starts up slowly, and increases/decreases speed, to maintain the setpoint temperature. Free cooling operation is dependent on a lower outside than inside temperature. In Free cooling operation, the damper will open, to emit warm air to the outside surroundings.
External AC cooling	If the inside temperature is higher than setpoint, and outside air is higher than inside, minus the temperature delta of 3° by default, the Flexibox will change to external AC mode, if connected. In this operation mode, the damper is closed.
Alarms	The controller can issue various alarms, on any of the two alarm connections. This can be set up in the configuration. See more on page 28 By default the alarms is setup to: <ul style="list-style-type: none"> • Alarm output 1 is operation error alarms, that needs immediate attention • Alarm output 2 is activated by the filter surveillance. This doesn't need immediate action, and could be handled as an warning

Continued overleaf

Product description, *continued*

Cooling air flow

The illustration and table below describe the free cooling airflow of a Flexibox 810 setup

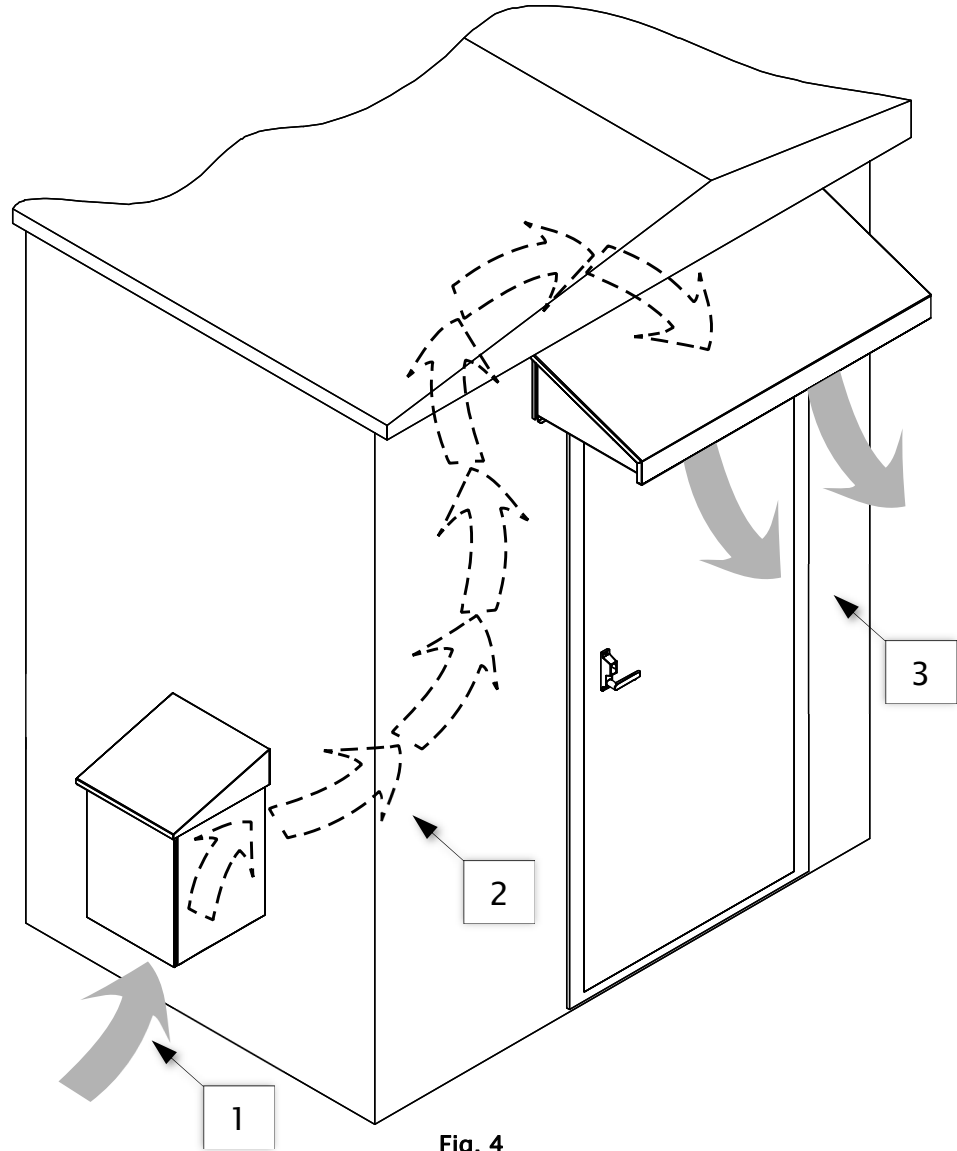


Fig. 4

Cooling

Phase	Description
1	Cold outside air is drawn into the Flexibox through the air filter, and supplied into the warmer shelter
2	Cold air will mix with the warmer air, and push the warmest air towards the ceiling
3	The open damper placed near the ceiling, releases the warm air to the outside surroundings

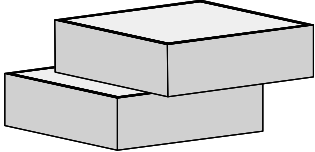

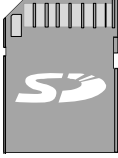
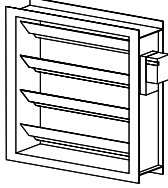
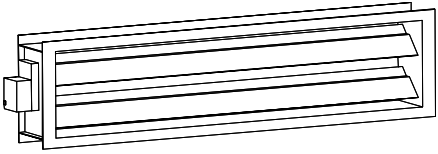
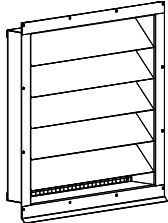
Accessories

Introduction

The Flexibox is a standalone free cooling fan box with a built in main controller. In order to get at full fledge cooling system various items can be purchased from Dantherm

Accessory list

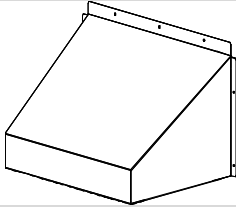
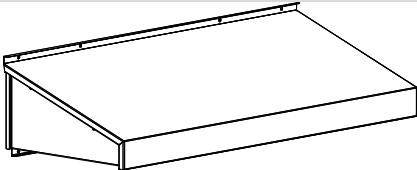
The following accessories is available for Flexibox 810:

Part description	Part no.	Illustration
G4 filter, 2 pce.	077164	
F5 filter, 2 pce.	840007	
F7 filter, 2 pce.	070568	
Dantherm RS485 display unit	075210	
SD Card with collection of Flexibox 810 configurations	081212	
Motorized damper 400x411 mm	074606	
Motorized damper 1000x211 mm	074607	
Gravity damper 400x400mm	299943	

Continued overleaf

Accessories, *continued*

Accessory list, *continued*

<p>Air inlet hood with grill 576x663x440mm For use with 074606</p>	<p>299653</p>	
<p>Air inlet hood with grill 1100x220mm For use with 074607</p>	<p>299941</p>	

Flexibox installation

Introduction The Flexibox unit needs proper installation in order to operate flawless for many years. Please follow this section for proper installation

Placement The Flexibox is designed to be mounted outside, as low as possible, thus having a minimum of 300 mm to the outside ground (even when snow is present). The damper needs to be located as close as possible to the ceiling and optimal as far away from the Flexibox as possible.

Preparation To be able to drill and place two screws in the back cover plate, the front cover and filter needs to be removed.

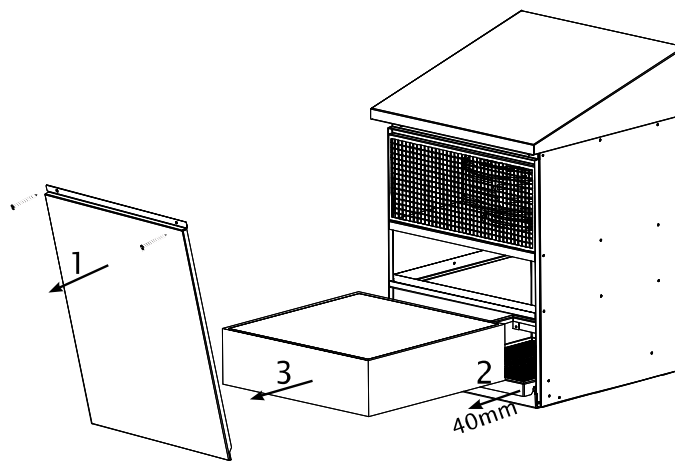


Fig. 5

Continued overleaf

Flexibox installation, *continued*

Cut inlet hole

Cut by means of proper cutting tools, according to the shelter structure, precisely at the shown measures.

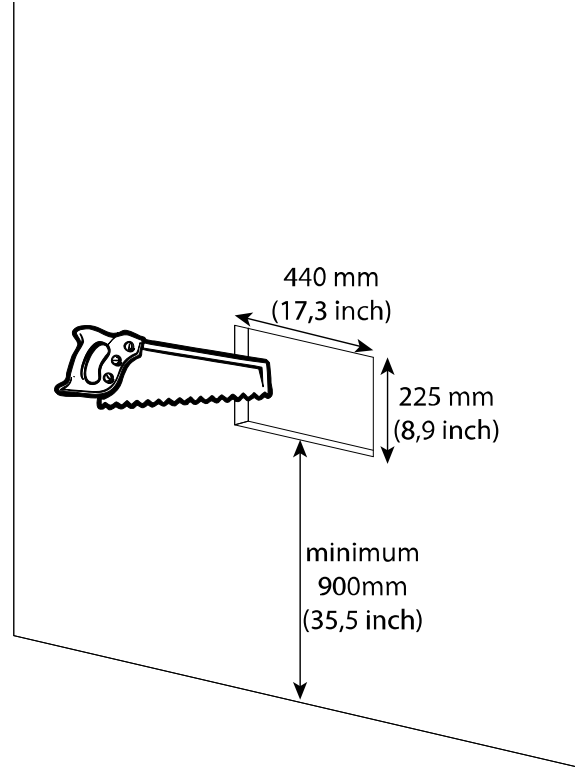


Fig. 6

Mount bracket

Mount the bracket with at least two appropriate screws, predrill holes for screws if needed.

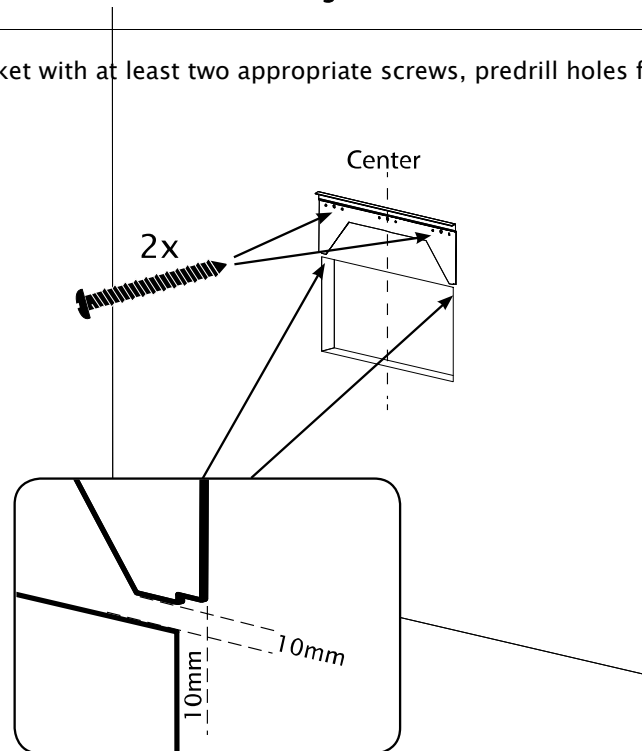


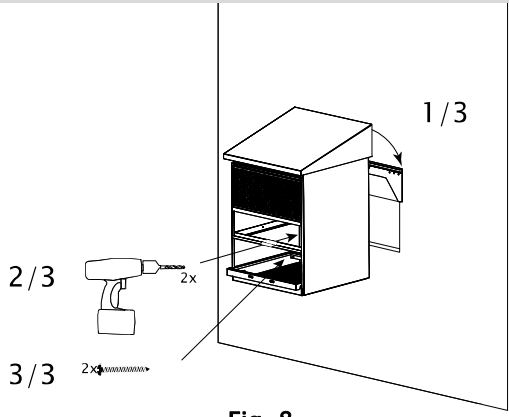
Fig. 7

Continued overleaf

Flexibox installation, *continued*

Mount Flexibox

Mount the unit onto the bracket, following this procedure:

Step	Action	Illustration
1	Lift the unit onto the bracket	 <p style="text-align: right;">Fig. 8</p>
2	Drill at least two holes 1 mm higher diameter than the screws, in the lower rear cover.	
3	Mount at least two appropriate screws, to secure the Flexibox to the shelter. Pre-drill holes into the shelter structure if needed	
4	Remount the filter and front cover.	

Sealing

The unit needs to be sealed with a grey Polymer caulking sealing, along the top cover as well as both side plates as illustrated.

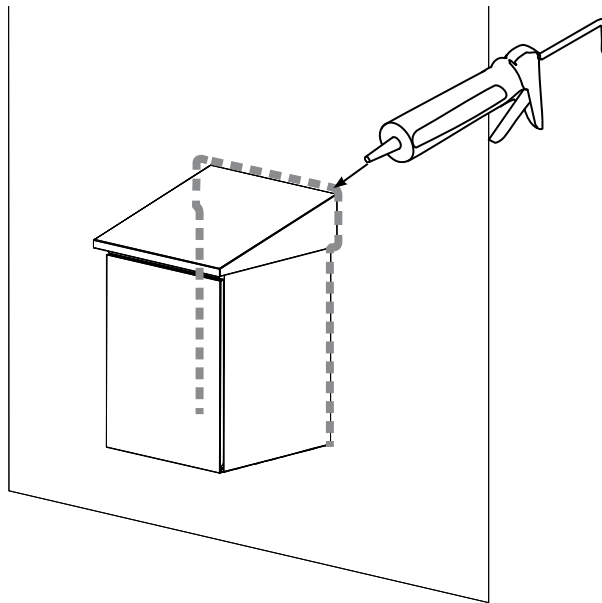


Fig. 9

Continued overleaf

Flexibox installation, *continued*

Mount temperature sensor Place the indoor temperature sensor at the location, most likely to be in the requested temperature area. Dantherm recommend the usage of a handheld infrared thermometer to locate the correct location.
Mount the sensor without the sensor housing touching any framework or walls.

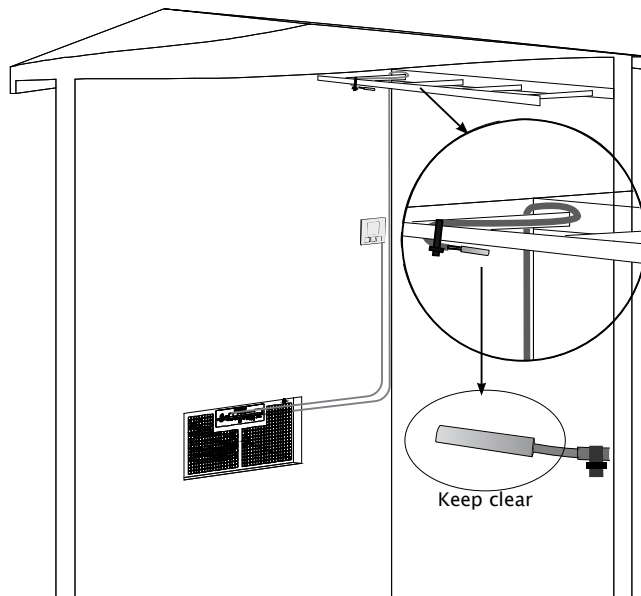


Fig. 10

Connect earth The controller and fan is galvanic isolated from the Flexibox cabinet. Earth connection is therefore mandatory. Mount an appropriate earth cable to the Flexibox cabinet, using the earth connection to the right of the PCB, and route this to the shelters earth bracket.

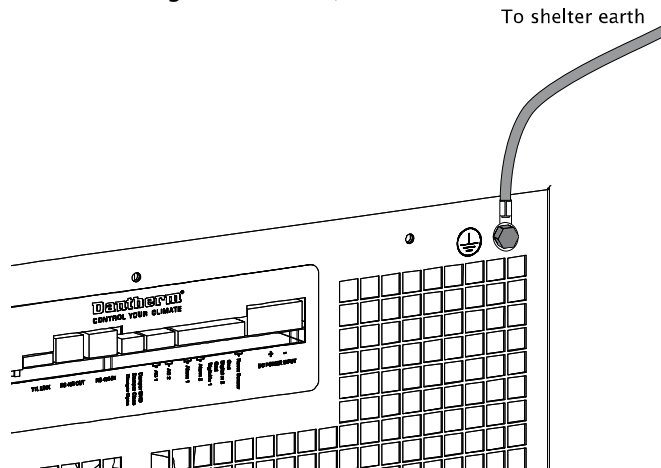


Fig. 11

Electrical connection Please follow the connection schematics on page 18 to connect the Flexibox and accessories.
If mounting the Dantherm display unit (accessory) follow the guide include.

Damper installation

Introduction

As the Flexibox unit feeds outside air into the shelter, a damper is mandatory, in order to create an balanced air flow though the shelter, pulling out the dissipated heat. The damper can be motorized or non-motorized overpressure type, which open if pressure is higher inside than outside.

Placement

The damper needs to be located as close as possible to the ceiling, optimal as far away from the Flexibox as possible, to create an inside air flow that goes through as much of the shelter as possible.

Cut out

Cut a hole using appropriate tools, according the measures shown in the leaflet following the damper.

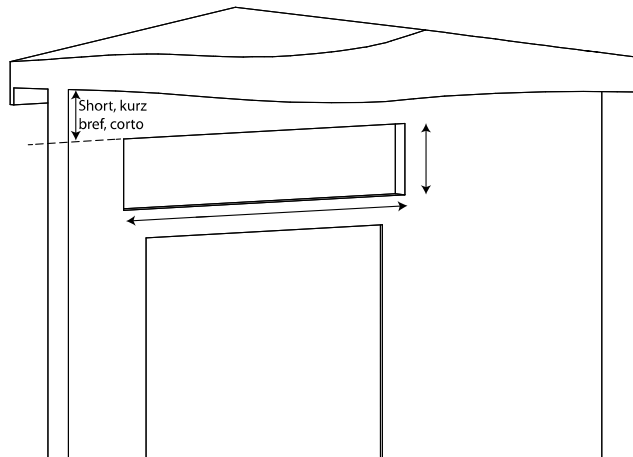


Fig. 12

Mount damper

Mount the damper with at least four appropriate screws, predrill holes if needed. Make sure the 20mm center hole in the damper frame, is turning inside and upwards

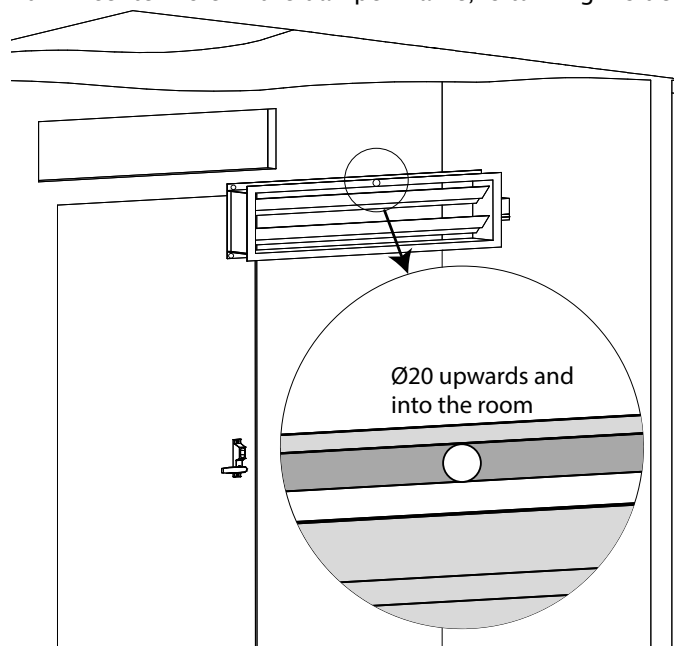


Fig. 13

Continued overleaf

Damper installation, *continued*

Mount rain hood

Mount the outside rain hood with appropriate amount and type of screws. Pre-drill if needed

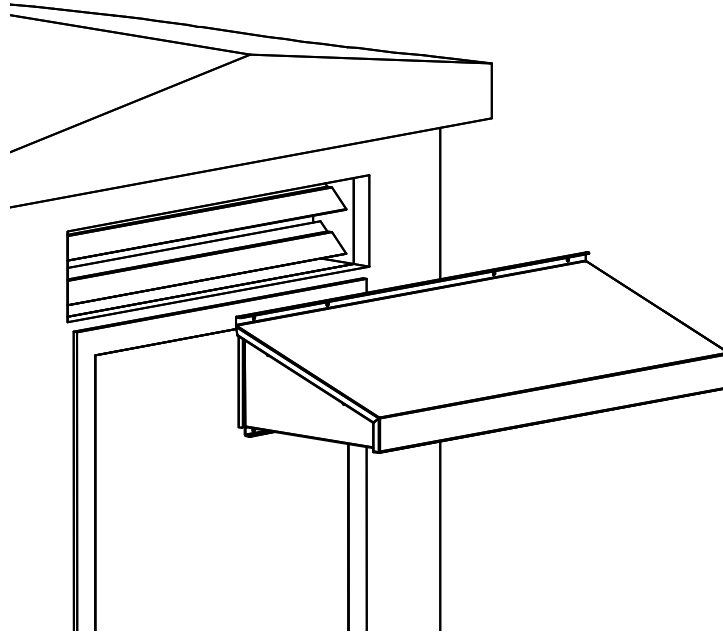


Fig. 14

Seal rainhood

Seal with a grey Polymer caulking sealing as illustrated

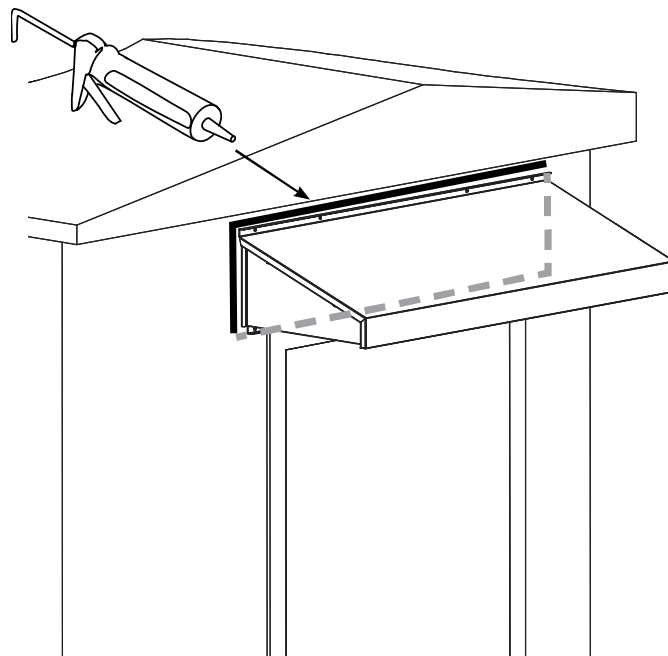


Fig. 15

Connection

If using a motorized version, connect according the connection schematics shown on page 18

Electronic controller

Introduction

This section describes features of controller, and how it operates.

WARNING

Never carry out any installation, maintenance or service, without disconnecting the DC power supply, by means of the external power supply disconnecting device.

Table of content

This section covers the following main topics:

Electronic controller	14
Connections	17
Controller operation strategy	21
Changing parameters	23
Digital input	29

Continued overleaf

Controller overall

Main PCB

The Flexibox 810 has a built in Dantherm CC4 telecom cooling controller, which can be setup to cover almost every cooling needs.

Key figures:

- External connections:
 - power supply
 - room temperature sensor
 - digital input to force a specific operation (shut down in case of fire)
 - digital output for external heater and AC unit
 - 2 pce. digital alarm output
 - 2 pce. RS485 / MODBUS protokol
 - damper open/close
 - TTL interface for “on the fly” survailence and override parameters (factory)
- Flexibox Internal connections on PCB rear edge
- Two LED for visual operation feedback
- SD card interface for logging and programming operation parameters(on the fly, no need to reboot). The interface supports FAT formatted SD cards up to 32GB

Digital outputs are NO/NC jumper changeble, and digital input are NO/NC changeble in parameters setting

Please be aware that the controllers boot sequence last for approx. 120 seconds at each power on

Overall control functionality

The control board selects automatically operation mode, between four operation modes, depending on the inside as well as the outside temperature

Operation	Fan	Damper	External heat	External AC
Heating	Off	Closed	On	Off
Free cooling	On	Open	Off	Off
Active cooling	Off	Closed	OFF	On
Power save mode	Off	Closed	Off	Off

Continued overleaf

Controller overall, *continued*

Start-up

When power is connected, the controller boots up **that last up to 120 seconds**, in which the unit seems to be total off.

After 120 second the fans starts and control LED turn on, and the system is running.

LED feed back

The PCB board has two LED located above the SD card reader close to the PCB board edge.

- Green LED is lit in normal operation.(120 seconds initialising time, after re-boot)
 - RED LED is lit, if any of the alarms states are active on any of the outputs. The power save mode alarm will stop normal operation; any other alarm doesn't affect the operation.
-

Default factory settings

By default the Flexibox is delivered with standard parameters that is setup:

- No AC connected. To be changed in parameter 13 in section "Compressor/AC-Unit Configuration" – see more on page 26
 - Digital input set as fire shut down. When input is activated, the fan shuts down, and any motorized damper will close. Input 1 has higher priority than input 2. See more on page 29
 - Critical operation alarms are active on output 1, and maintenance warnings (filter change) are active on output 2. See more on page 28
-

Connections

Introduction

The controller needs only DC power, damper (if motorizes) and indoor temperature sensor connected, to operate in free cooling mode.

Full advantages of Flexibox system require additional external units to be connected, changing the controller to be a full-fledged all year room temperature controller

Block schematic

This illustrates the overall system block schematic, with internal as well as external connection's

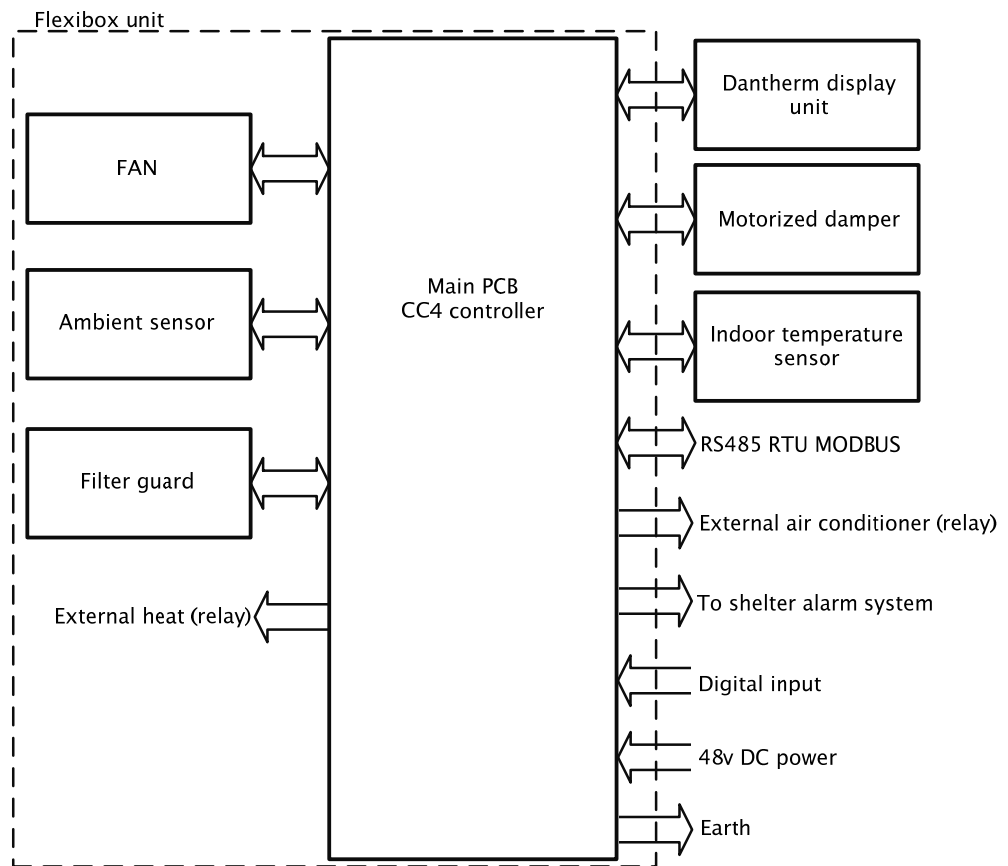


Fig. 16

Continued overleaf

Connections, *continued*

Connection schematic

This illustration shows the external connections.

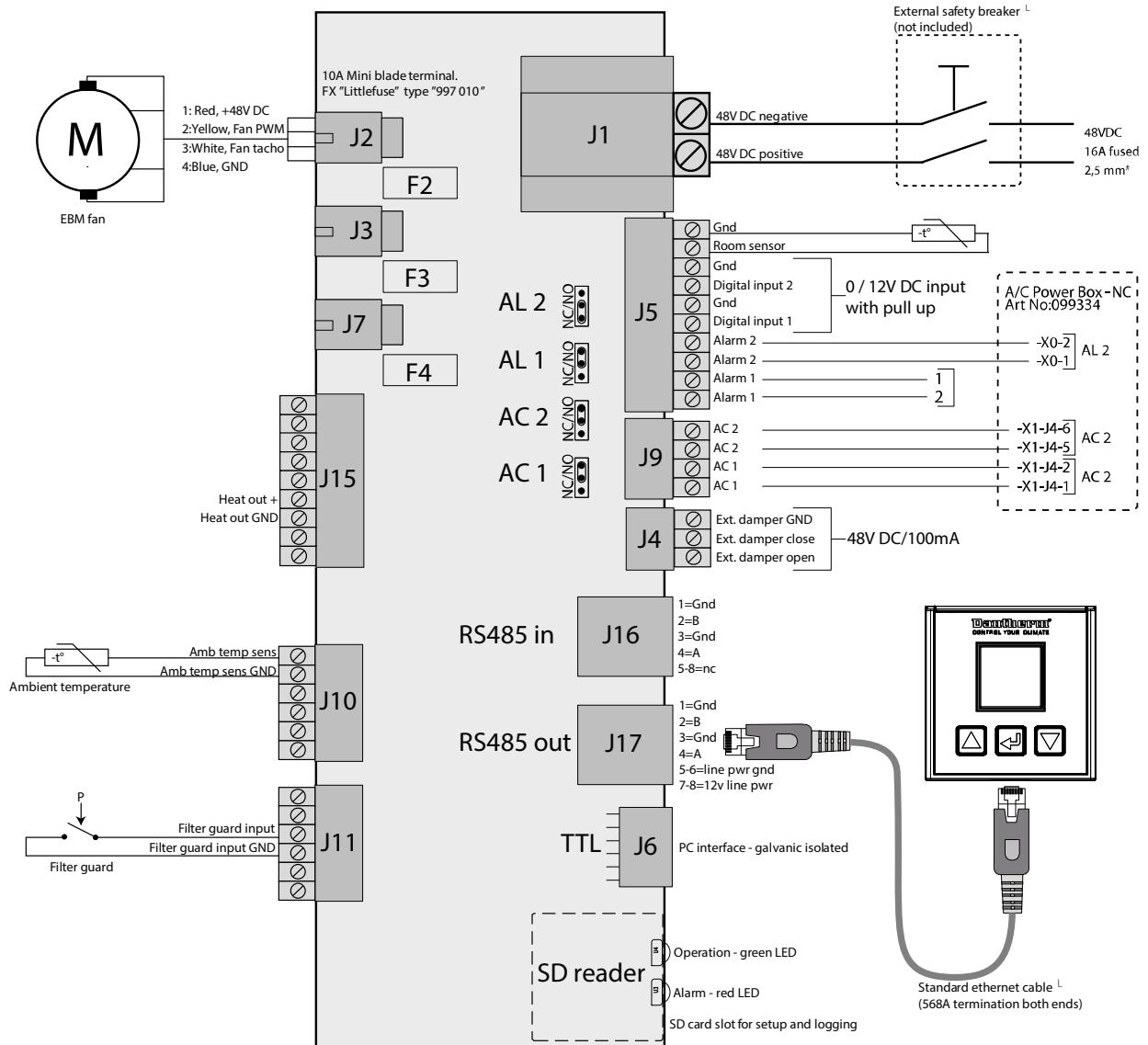
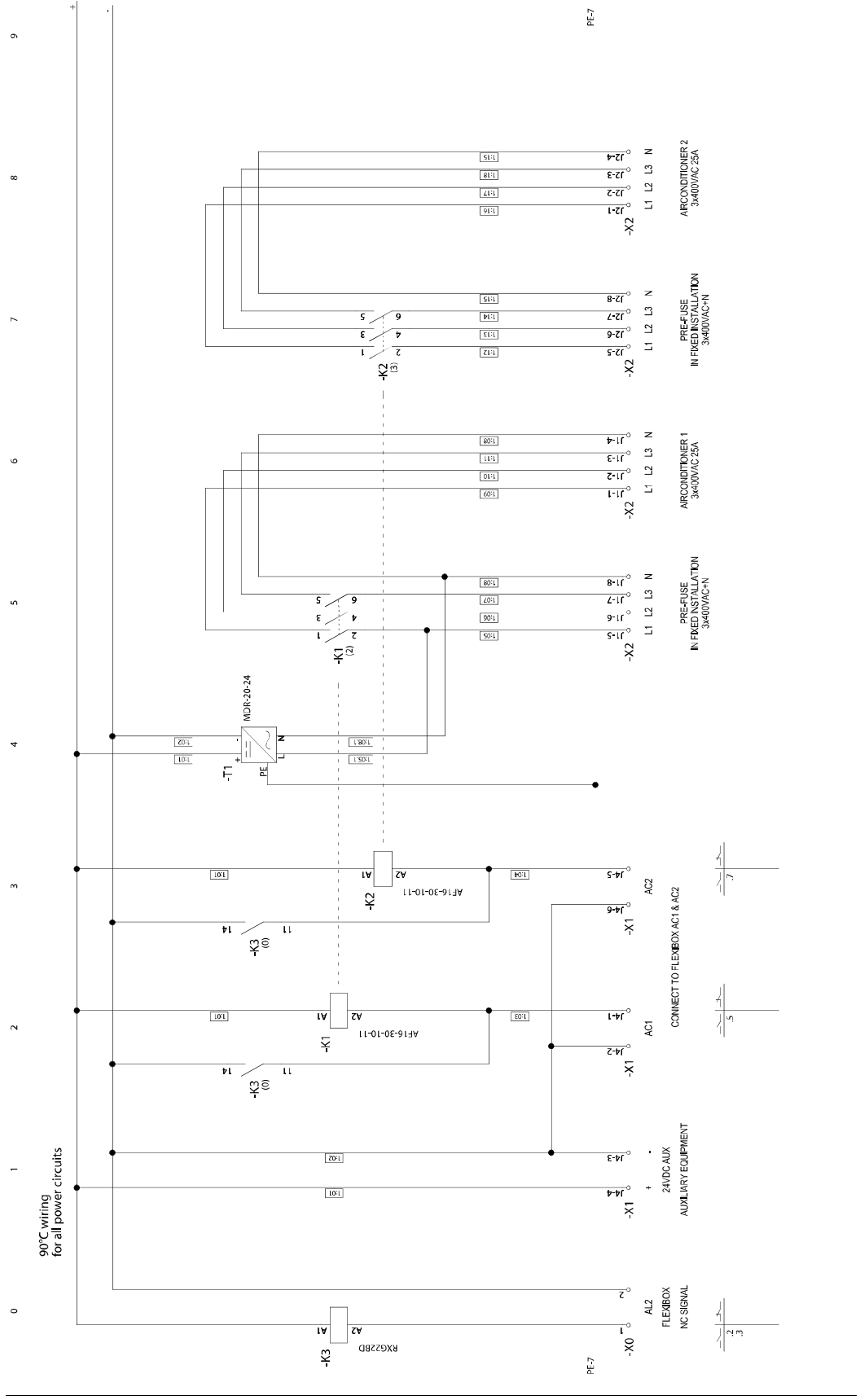


Fig. 17

Continued overleaf

Power Box Schematic



Connection

This describes the connections shown at

Fig. 17

Part	Function
J1 -power input	The power supply input accepts 40–60V DC, has an isolated potential to earth (cabinet parts). This means that the input even accepts –48V DC. Just connect positive to positive, and negative to negative. The input needs external connected 16A circuit breaker. If input is below 40V DC the unit stops operation, and goes into power save mode, in order to prioritize power to the telecom services. Power save mode can activate an alarm. See more about alarms on page 28
J5 -room sensor	Temperature sensor input supporting NTC resistor type: Vishay NTCLE100E3272GB0. Resistance: 8790Ω @ 0°C. 3372Ω @ +20°C. 1439Ω @ +40°C.
J5- digital input	For use with external dry contacts (max.10mA @ 12V). Input is configurable to “Normally open” or “Normally closed” by changing sw parameters This input can force a specific operation, for instance shutting down the Flexibox and close the damper in case of a fire. Input parameter setup on page 29
J5- alarm 1 / 2 outputs	Dry contact, rated 0,5A@60Vdc – “Normally Open” or “Normally closed” jumper changeable. Operation alarms can be routed in the SW parameters list, to either output 1 or 2
J5 - AC 1	Dry contact, rated 0,5A@60Vdc – “Normally Open” or “Normally closed” jumper changeable for connecting external air conditioners
J15 - HEAT (not illustrated)	J15 is located on the rear edge of the PCB. See unit schematics Fig. 19 for connection. Rated to 40–60Vdc/300mA out (use fx. Relay ABB AF12Z30-01-21 or similar)
J4 - damper	The damper output feeds the damper motor with 40–60Vdc/ max. 100mA
J16 / 17 RS 485	RS485 – RTU Modbus. J17 can supply the Dantherm display unit with power. Communication data: <i>baud rate – 9600</i> <i>data bits – 8</i> <i>parity – none</i> <i>stop bits – 1</i> <i>flow control – none</i> The MODBUS device ID can be set in the parameter list.
J6 - TTL	TTL to PC interface. Used by factory only
SD card reader	Supports up to 32GB SD card. Learn more on page 28

Controller operation strategy

Introduction

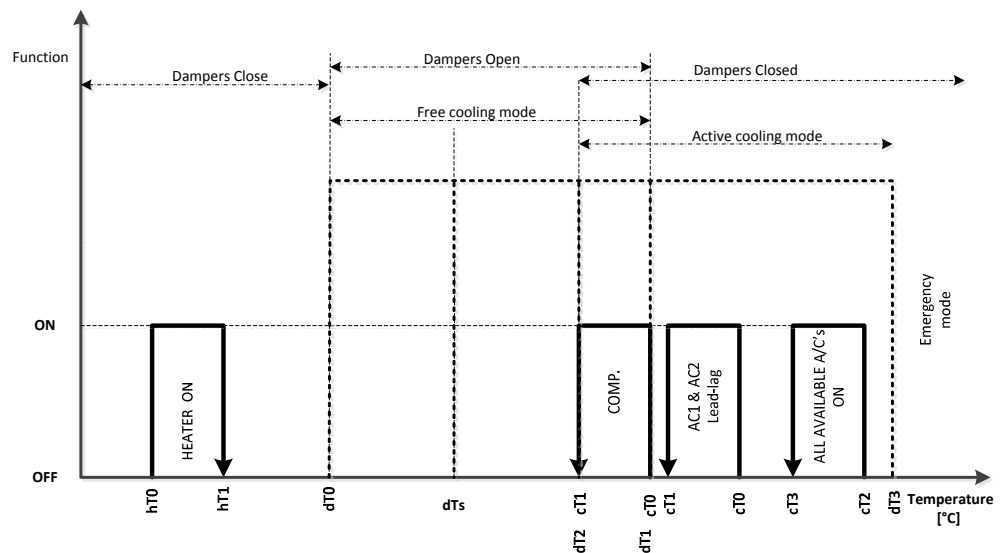
The controller is pre-programmed from factory with default parameters covering the most common setup. These can be changed to specific needs. In order to do so, it's mandatory to know how these affect each other.

Main decisions

When installing the Flexibox it's imperative to decide if the Flexibox system needs additional AC connected or not, as this influences quite a lot on the cooling strategy. When setting the parameter 13 in AC section of the parameters and connecting an AC, the external AC will be used for cooling when either the outside temperature is too high for free cooling OR the indoor temperature rises above setpoint (cT0)

Function strategy With AC

This shows the universal controllers operation mode depending on temperature. (Compressor mode isn't present in Flexibox) :

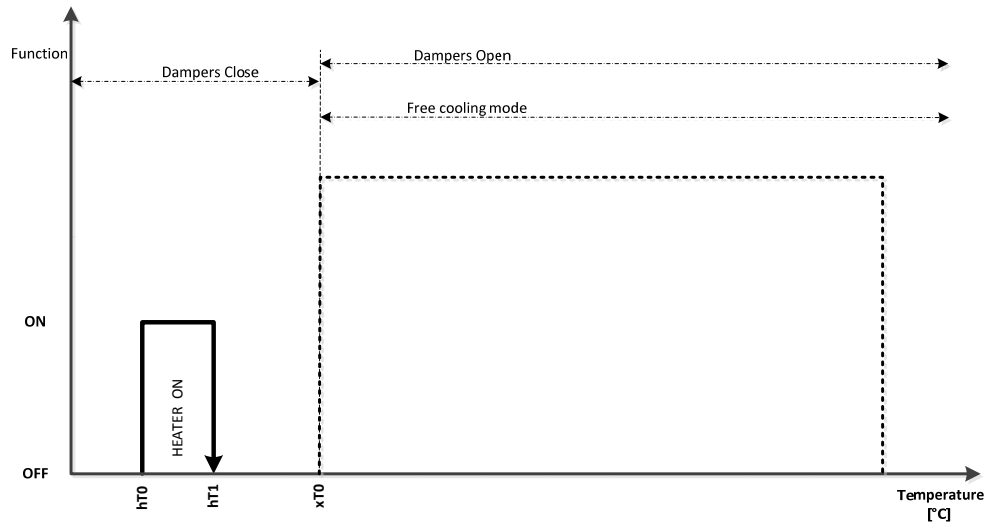


Continued overleaf

Controller operation strategy, *continued*

Function strategy without AC

This shows the universal controller operation mode depending on temperature in systems without AC connected.



Fan control strategy

This illustration shows the universal controllers fan control depending on temperature. The idle mode isn't present in Flexibox:

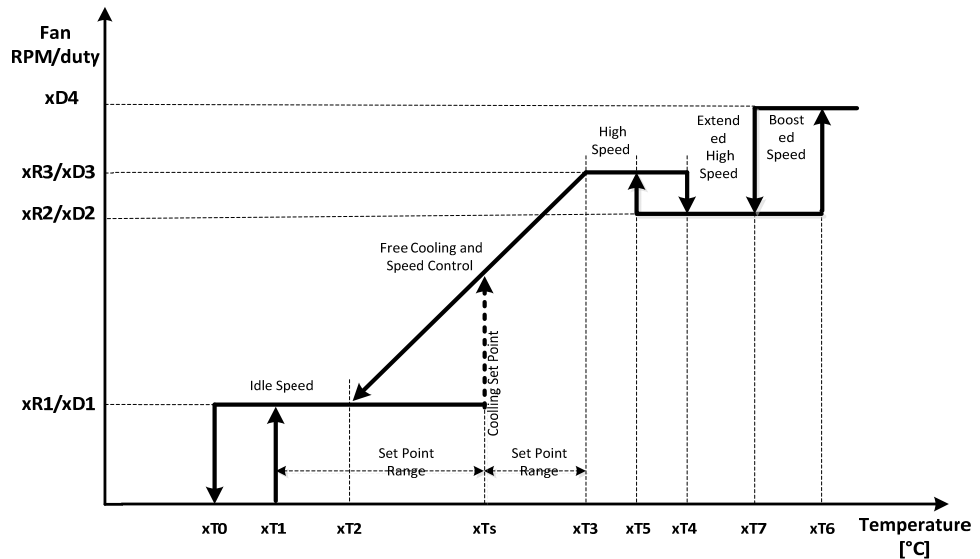


Fig. 18

Default settings for the Flexibox 810 parameters can be found on page 38.

Changing parameters

Introduction

This section will guide you through each parameter.

We strongly recommend using the Dantherm display unit to change the basic cooling and heating set points or obtain and load one of the standard parameters packages. Both options are Dantherm accessory

ONLY qualified personnel should change each specific parameter below.

SD interface

The controller has an integrated SD card reader that can:

1. Store operation logging data, if an SD card is present continuously
2. Place an empty SD card in the reader, and the controller stores the parameter configuration immediately on the card (cc4_cfg.txt)
3. If inserting an SD card with a newer cc4_cfg.txt, the controller will upload the new configuration, and restart operation with the new parameters. No need to reboot Flexibox.

Editing parameters

The SD card together with a regular PC can edit the parameters in a few easy steps:

Step	Action
1	Insert an empty SD card in the Flexibox controller (turn the card up-side/down). The green LED flashes shortly, and the current configuration is now stored on the SD card
2	Pull out the SD card, and insert it into a standard computer with a ASCII txt editor application. If using a Windows based computer, the included application Wordpad can be used.
3	Open the config_CC4.txt file on the SD card using Wordpad. We recommend to save a backup file on the computer, before changing any parameter
4	Change the relevant parameter, to cover your specific needs. See below parameter listings. Do not change the spacing or any other character.
5	Save the file with the same filename on the SD card
6	Re-insert the SD card in the Flexibox controller, the green LED flashes shortly, and the configuration has changed. No need to reboot

Continued overleaf

Changing parameters, *continued*

Cooling fan configuration, 1–9– The first section in the parameters file covering parameter 1 to 9, controls the setpoints for which the fan changes speed.

Example.

Cooling Fan Configuration			
	Fan 1	Fan 2	Fan 3
1.OFF Temp	[xT0] [-40-80]: 20.0	:20.0	:20.0
2.IDLE ON Temp	[xT1] [-40-80]: 23.0	:23.0	:23.0
3.IDLE entry Temp	[xT2] [-40-80]: 24.0	:24.0	:24.0
4.SET POINT Temp	[xTs] [-40-80]: 24.0	:24.0	:24.0
5.HIGH SPEED Temp	[xT3] [-40-80]: 28.0	:28.0	:28.0
6.EXTND HS entry Temp	[xT4] [-40-80]: 30.0	:30.0	:30.0
7.EXTND HS exit Temp	[xT5] [-40-80]: 28.0	:28.0	:28.0
8.BOOST entry Temp	[xT6] [-40-80]: 36.0	:36.0	:36.0
9.BOOST exit Temp	[xT7] [-40-80]: 34.0	:34.0	:34.0

The table below explains each parameter

Parameter	Function	Dependencies
1:OFF Temp	Fan off	Damper 2 parameter 1:Lower Close Temp should always be changed to the same value
2: IDLE ON Temp	Not used in Flexibox	Should always be 1°C lower than parameter 4: SET POINT Temp
3:IDLE entry Temp	Not used in Flexibox	Should be equal to 4: SET POINT Temp
4.SET POINT Temp	Fan start set point	Damper 2 parameter 2:SET POINT should always be changed to the same value.
5.HIGH SPEED Temp	Upper level with max nominal fan level	
6.EXTND HS entry Temp	When exceeding this set point the fan will speed up to extend mode	
7.EXTND HS exit	Extended mode off	
8.BOOST entry Temp	When exceeding this set point the fan will speed up to boost mode	If AC is enabled, boost mode is overruled by AC
9.BOOST exit Temp	Boost mode off	If AC is enabled, boost mode is overruled by AC

Only parameters in this above table are to be changed!

Continued overleaf

Changing parameters, *continued*

Damper configuration

The second section in the parameters file is covering Damper parameter 1 to 11 controlling any motorized damper.

Example.

Damper Configuration		1 not active	active
		Damper 1	Damper 2
1.LOWER Close Temp	[dT0] [-40-80]:	20.0	: 20.0
2.SET POINT	[dTs] [-40-80]:	24.0	: 24.0
3.UPPER Open Temp	[dT1] [-40-80]:	60.0	: 60.0
4.UPPER Close Temp	[dT2] [-40-80]:	60.0	: 60.0
5.EMGNCY Open Temp	[dT3] [-40-80]:	60.0	: 60.0
6.Override - Digi.1	[x/0/1]:	0	: 0
7.Override - Digi.2	[x/0/1]:	0	: 0
8.Override - Sensor Fail	[x/0/1]:	x	: x
9.Sensor Sel. OBDR/ROOM/SUPPLY	[0/1/2]:	1	: 1
10.Damper Run dur.	[30 - 300]:	120	: 120
11.Enable	[xDè] [0/1]:	1	: 1

The table below explains each parameter

Parameter	Function	Dependencies
1.LOWER Close Temp	Damper close temperature	Should be equal to 1: OFF Temp in section "Cooling fan Configuration"
2.SET POINT	Damper open temperature	Should be equal to 1: OFF Temp in section "Cooling fan Configuration"

Only parameters in this above table are to be changed!

Continued overleaf

Changing parameters, *continued*

Compressor/AC Configuration

The third section in the parameters file is covering AC parameter 1 to 12 controlling any external connected Air Conditioner

Example.

Compressor/AC-Unit Configuration		not active	Flexibox AC output	2 not active
		Comp	A/C 1	A/C 2
1.ON Temp	[cT0] [-40-80]: 32.0	: 32.0	: 32.0	: 32.0
2.OFF Temp	[cT1] [-40-80]: 30.0	: 30.0	: 30.0	: 30.0
3.Emerg ON Temp	[cT2] [-40-80]: 55.0	: 36.0	: 36.0	
4.Emerg OFF Temp	[cT3] [-40-80]: 55.0	: 34.0	: 34.0	
5.Override - Digi.1	[x/0/1]: x	: 0	: 0	
6.Override - Digi.2	[x/0/1]: x	: x	: x	
7.Override - Sensor Fail	[x/0/1]: x	: x	: x	
8.Sensor Sel. OBD/ROOM/SUPPLY	[0/1/2]: 1	: 1	: 1	
9.Min. ON duration Sec.(1-30min)	[60-1800]: 480	: 180	: 180	
10.Restart time-out Sec.(1-30min)	[60-1800]: 120	: 180	: 180	
11.Lead/Lag Enable	[0/1]: 0	: 0	: 0	
12.Enable	[xAe] [0/1]: 0	: 0	: 0	

The table below explains each parameter

Parameter	Function	Dependencies
1.ON Temp	External AC is activated.	ALWAYS change both A/C 1 and A/C 2 simultaneously so they always are identical
2.OFF Temp	External AC is deactivated.	identical
12.Enable	AC active on output AC	ALWAYS change both A/C 1 and A/C 2 simultaneously so they always are identical

Parameter 3-12 ISEN`T to be changed!

When AC is on, the fan and damper is closed automatically.

Heater Configuration

The fourth section in the parameters file is covering external heater configuration 1 to 7 controlling any external connected heater

Heater Configuration	
1.ON Temp	[hT0] [-40-80]: 12.0
2.OFF Temp	[hT1] [-40-80]: 14.0
3.Override - Digi.1	[x/0/1]: 0
4.Override - Digi.2	[x/0/1]: 0
5.Override - Sensor Fail	[x/0/1]: x
6.Sensor Sel. OBD/ROOM/SUPPLY	[0/1/2]: 1
7.Enable	[xDe] [0/1]: 1

The table below explains each parameter

Parameter	Function	Dependencies
1.ON Temp	External heat is activated.	When heat is on, the fan and damper is closed automatically
2.OFF Temp	External heat is deactivated.	

Only parameters in this above table are to be changed!

Continued overleaf

Changing parameters, *continued*

System Control Configurations

The fifth section in the parameters file is covering overall system parameters controlling any various system events

Example.

System Control Configurations

```

1.Norm. Vdc Low Level      [V1] [18-60]: 40
2.Norm. Vdc High Level    [V2] [18-60]: 60
3.Temp Alarm Low Limit    [TL] [(-40)-80]: 0.0
4.Temp Alarm high Limit   [TH] [(-40)-80]: 50.0
5.Delta T                 [Dt] [(-40)-80]: 3.0
6.Alarm1 NO/NC Type       [Alm1] [0/1]: 0
7.Alarm2 NO/NC Type       [Alm2] [0/1]: 0
8.Alarm1 delay sec        [Alm1 delay] [0-100]: 10
9.Alarm2 delay sec        [Alm2 delay] [0-100]: 10
10.Dig.1 NO/NC Type       [Dig1] [0/1]: 0
11.Dig.2 NO/NC Type       [Dig2] [0/1]: 0
12.Door Xtch. NO/NC Type  [Door] [0/1]: 0
13.Filter Grd NO/NC Type  [Filt] [0/1]: 0
14.Phase Monitor NO/NC Type [PHm] [0/1]: 0
15.Status Log Dis/Ena.    [Log] [0/1]: 1
16.Log interval in min.   [Int] [1-60]: 1
17.RS-485 Bus Pow. Dis/Ena [0/1]: 1
18.ModBus Slave Addr      [1-255]: 23
    
```

The table below explains each parameter

Parameter	Function	Dependencies
3. <i>Temp Alarm Low Limit</i>	The lower alarm trigger limit	Alarm mapping see page 28
4. <i>Temp Alarm high Limit</i>	The upper alarm trigger limit	Alarm mapping see page 28
6. <i>Alarm1 NO/NC Type</i>	Change between NO (normally open) and NC (normally close) contact configuration 0=NO and 1=NC	Alarm mapping see page 28
7. <i>Alarm2 NO/NC Type</i>	Change between NO (normally open) and NC (normally close) contact configuration 0=NO and 1=NC	Alarm mapping see page 28
10. <i>Dig.1 NO/NC Type</i>	Change between NO (normally open) and NC (normally close) contact configuration 0=NO and 1=NC	
15. <i>Status Log Dis/Ena.</i>	SD card logging active	SD card needs to be inserted
16. <i>Log interval in min.</i>	Logging interval on SD card	
17. <i>RS-485 Bus Pow. Dis/Ena</i>	RS485 power out. Disable if using J17/ RS-485 with non Dantherm display.	
18. <i>ModBus Slave Addr</i>	Set the device adresse if having more devices in order to avoid address conflicts	

Only parameters in this above table are to be changed!

Continued overleaf

Changing parameters, *continued*

Alarm mapping

The last section in the parameters file is covering overall handling of system alarm events.

Example.

- RED LED on the PCB's edge is lit, if any of the alarms states are active on any of the outputs. This means that if both outputs are disabled on a specific parameter, the LED doesn't switch on, regardless of the alarm state.
- The *Pwr Save Mode* alarm will stop Flexibox operation. Any other alarm doesn't affect the operation, except for heater if connected.
- By default, **operation alarms** are active on output 1, and maintenance **warnings** (filter change) is active on output 2

If alarm is triggered and parameters is "1", the specific output is activated



19. Alarm Mapping	1. Alarm1	2. Alarm2
1. Pwr Save Mode [PSM] [0/1]:	1	: 0
2. Room Temp H/L [THL] [0/1]:	1	: 0
3. Fan 1 [F1] [0/1]:	1	: 0
4. Fan 2 [F2] [0/1]:	0	: 0
5. Fan 3 [F3] [0/1]:	0	: 0
6. Onbrd. Sens [OS] [0/1]:	0	: 0
7. Room Sens [RS] [0/1]:	1	: 0
8. Amb. Sens [AS] [0/1]:	1	: 0
9. Supp. Sens [SS] [0/1]:	0	: 0
10. Cond. Sens [CS] [0/1]:	0	: 0
11. Digi.1 I/P [FIL] [0/1]:	0	: 0
12. Digi.2 I/P [FI] [0/1]:	0	: 0
13. Door Xtch I/P [DI] [0/1]:	0	: 0
14. Filt Grd I/P [FI] [0/1]:	0	: 1
15. Phase I/P [FI] [0/1]:	0	: 0

The table below explains each parameter

Parameter	Function	Dependencies
<i>1. Pwr Save Mode</i>	Alarm if the voltage is outside range, and the controller enters power save mode	
<i>2. Room Temp H/L</i>	Gives alarm if the temperatures is outside range	Range is defined in parameter 3 and 4 in section <i>System Control Configurations</i>
<i>3. Fan 1</i>	Faulty fan	
<i>7. Room Sens</i>	Defective room sensor	
<i>8. Amb. Sens</i>	Defective outdoor sensor	
<i>11. Digi.1 I/P</i>	Input 1 activate alarm	External connection to input 1
<i>14. Filt Grd I/P</i>	Filter guard is active	By default, the filter is only activating output 2 dividing the 2 alarm outputs in a "warning" and a "emergency" outputs.

Only parameters in this above table are relevant in Flexibox!

Digital input

Introduction

The Flexibox system can be setup to operate in a large variety of situations depending on the temperatures measured. In other operation situation, it can bring value to force a specific operation, e.g. in case of a fire, where the unit and damper needs to be shut down, and thereby minimizing the amount of incoming oxygen to the fire.

Possible operation

These are some of the possibilities:

- Shutting down in case of a fire.
- Shutting down in case of service inside the shelter.
- Route other alarms from external equipment (FX AC unit) through the digital input to the flexibox alarm output
- Force external heat on/off
- Force external AC on/off

Parameters settings

If Digital input is connected, the parameters in various sections can be set according this:

Parameter X=doesn't change the current operation state

Parameter 0=force OFF

Parameter 1=force ON

Parameter

The various sections of parameters in the parameter file brings various possibilities:

Setting NO/NC on the digital input see page 27

By default the fan and damper is shut down when input is active (fire alarm)

Force fan:

Cooling Fan Configuration

	Fan 1	Fan 2	Fan 3
18.Override - Digi.1	[x/0/1]: 0	:x	:x

Force damper

Damper Configuration

	Damper 1	Damper 2
6.Override - Digi.1	[x/0/1]: 0	0

Force AC

Compressor/AC-Unit Configuration

	Comp	A/C 1	A/C 2
5.Override - Digi.1	[x/0/1]: x	0	0

Force heat

Heater Configuration

3.Override - Digi.1	[x/0/1]: 0
---------------------	------------

Read the previous section to learn how to change parameters

Service guide

Overview

Introduction

This section gives all relevant information about servicing, spare parts and trouble shooting.

Serial numbers

Product model and serial numbers are found on the nameplate.
Please have product model and serial numbers ready if you are contacting After Sales Support.

Contents

This section covers the following topics:

Service guide.....	30
Preventive maintenance.....	31
Troubleshooting.....	33
Power Box Schematic	19
Spare part list.....	34
Replacing parts	35
Technical data.....	36

Preventive maintenance

Introduction

Preventive maintenance has to be carried out to:

- Anticipate a continues operation in product expected lifetime of 10 years or more
- Meet the warranty conditions
- Avoid malfunctions
- Avoid inefficient operation
- Maximize the unit's lifetime

Caution

- Switch off DC supply before working on the unit
- Make sure that all work has been performed correctly before switching power back on

Maintenance schedule

If filter guard is connected to shelter surveillance system, the maintenance can be carried out initiated by a filter alarm.

If not connected, the maintenance should be carried out according a time-based schedule.

Planning	Action
Time scheduled	<p>The factory warranty is only valid if documented preventive maintenance has been carried out, with an time interval of:</p> <ul style="list-style-type: none"> • Maximum 12 months when unit is located in normal air quality areas • Maximum 6 months when unit is located in dirty areas, fx close to roads. <p>Dantherm recommend that unit are examined closely during the first preventive maintenance, to determine whether the service interval is too long.</p>
Filter alarm scheduled	<p>The factory warranty is only valid if documented preventive maintenance has been carried out, when a filter alarm is present.</p>

Maintenance LOG

A written log placed at the site, together with an electronic log on the SD card, is adequate documentation for preventive maintenance.

Continued overleaf

Preventive maintenance, *continued*

Cleaning

The unit must be cleaned according to the recommended preventive maintenance plan.
Tools required:

- Vacuum cleaner or compressed air
- Soft brush
- TX20 screwdriver
- Cleaning agent if it's very fealty

Phase	Description
1	Open the units cover, and remove the old filter
2	Remove any leaves trapped in the air inlet safety grill
3	Check previous service log for fan failures or replacements. If the fan has been running more than 5 years its needs to be replaced, if the expected product lifetime of 10 years or more, or more, is to be maintained.
4	Clean the fan (if not exchanged) with a vacuum cleaner or high-pressure air or using a cleaning agent if necessary.
5	Clean air path with a vacuum cleaner or high-pressure air or using a cleaning agent if necessary.
6	Place new filter in the filter position, and lock the filter locking frame.
7	Perform end inspection according list below

Inspection

The unit must be inspected prior to any reassemble and put back into service.
Please follow below steps:

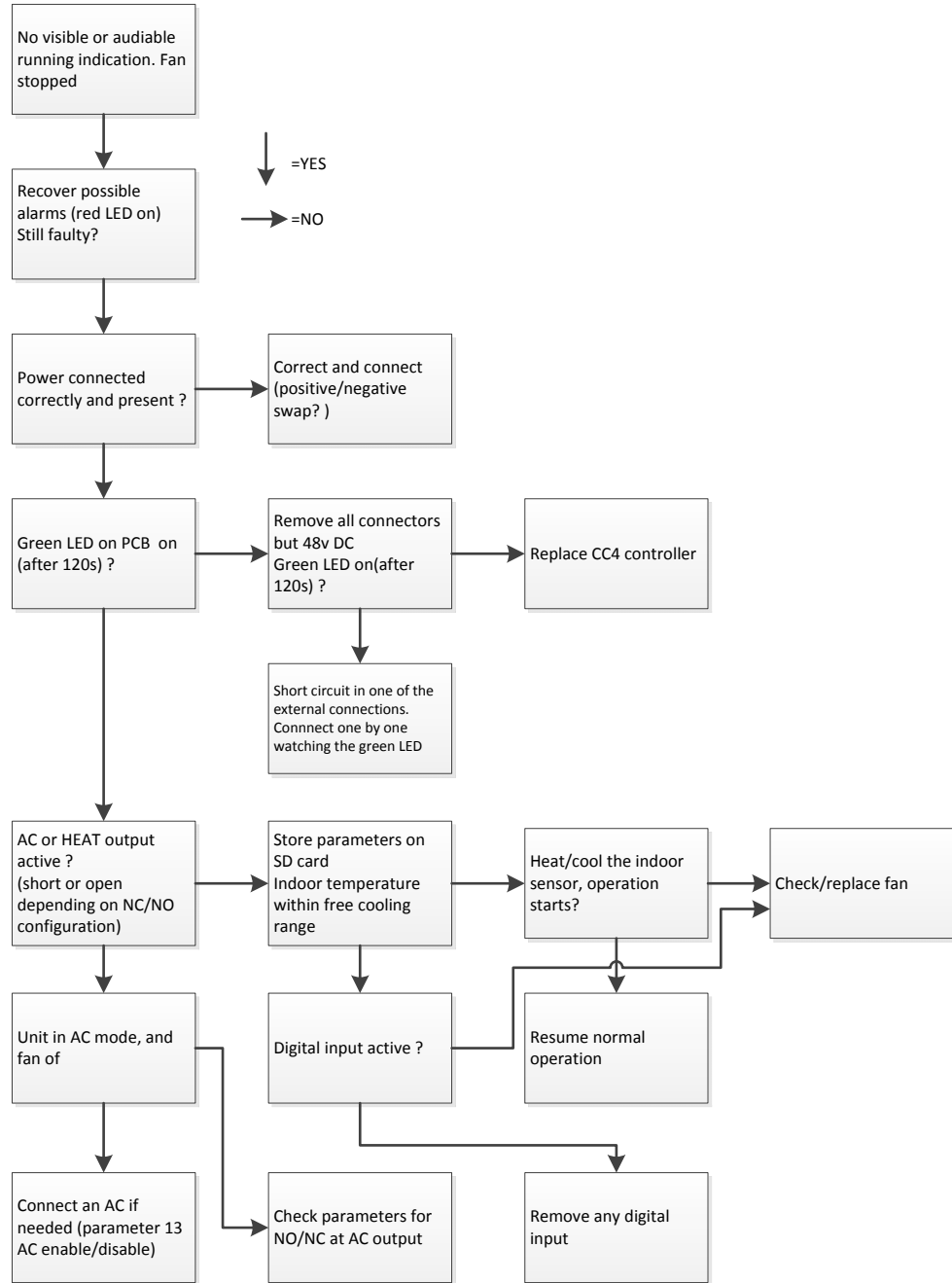
Phase	Description
1	Is the fan clean and free of any corrosion?
2	Is all wiring and insulation undamaged?
3	Are all connectors secured properly and in good conditions?
4	Are the filter present, placed correctly and locked?

Troubleshooting

Introduction

Operating errors may occur. Follow this flowcharts for a possible solution

Fault:
Fan off



Continued overleaf

Spare part list

Illustration

Available spare parts for Flexibox 810:

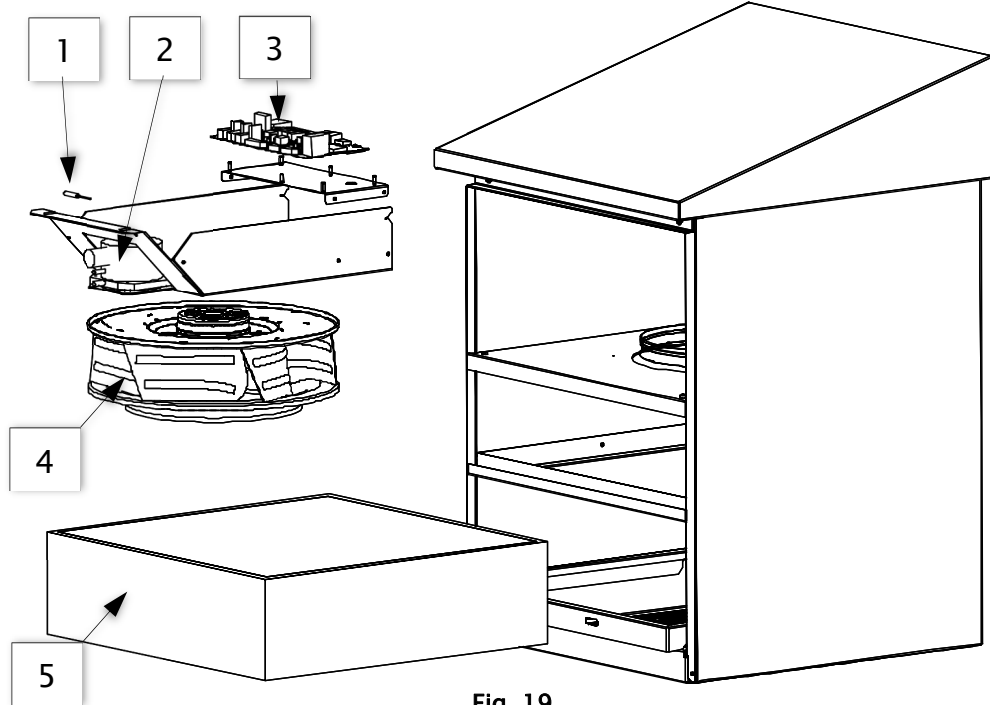


Fig. 19

List

List of spare parts including spare part numbers:

Pos.	Description	No.
1	Temperature sensor 2600 mm cord (indoor and ambient)	036761
2	Filter guard monitor	840020
3	CC4 controller for Flexibox 810 (NC configuration)	099362
4	Fan for Flexibox 810	077161
-	See accessory list on page 6 Damper motor LM72A, 48v DC (not illustrated)	075254

Replacing parts

Introduction This section covers the replacement of parts

WARNING Never carry out any installation, maintenance or service, without disconnecting the AC power supply, by means of the external power supply disconnecting devices.

Parts replacement Follow these steps to replace various parts

Step	Action	Illustration
1	Switch of the DC power and unplug all cables but earth.	
2	Remove the 2 pcs. TX20 screws at top front and remove the cover.	
3	Remove the 2 pcs. TX20 screws marked on the illustration and remove the safety grill.	
4	Remove the tubes from the filter guard sensor housing.	
5	Loosen the four screws holding the air inlet ring, approx. 10 mm.	
6	Remove the two M5nuts using an 8 mm wrench.	
7	Pull out the fan assembly.	
8	Exchange any component necessary.	
9	Re-assembly in opposite order, leaving the cover open.	
10	Inspect the unit according list on page 32.	
11	Close the cover and test the unit.	

Fig. 20

Continued overleaf

Technical data

Introduction

This section covers technical data and dimensions for Flexibox 810.

Technical data Flexibox 810

This table shows the technical data for the Flexibox 810

Specification	Unit	810
Nominal air flow	m ³ /h	2020
Maximum air flow	m ³ /h	2430
Nominal Cooling capacity in W / K ($\Delta t=1^{\circ}\text{C}$) Estimated	W / K	670
Boost mode Cooling capacity	W / K	810
Controller		CC4
Fan nominal voltage	DC	48V DC
Fan max. current	A	5,9
Fan max. power consumption	W	281
Nominal Fan power consumption (@ 80% fan speed)	W	148
Nominal sound pressure @1m distance from shelter	dB(A)	67
Filter	Class	G4 Compact
Filter area	m ²	0,75
Height	mm	758
Width	mm	503
Depth	mm	500
Weight	Kg	25,5

Dimensions

This illustration shows the Flexibox 810 dimensions

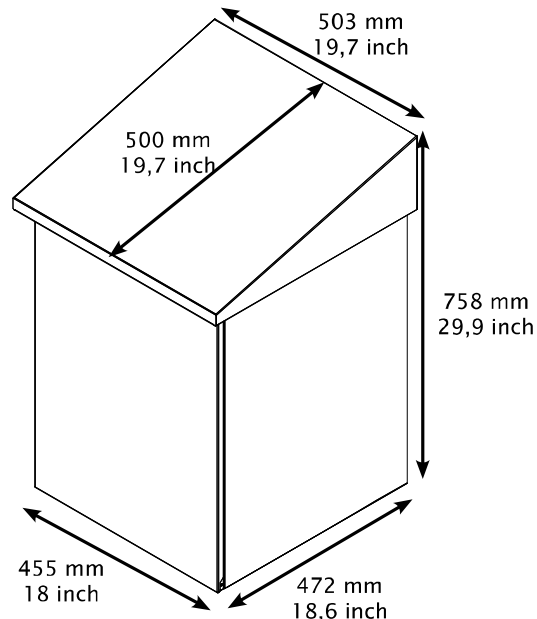


Fig. 21

Technical data, *continued*

EC-Declaration of Conformity



Dantherm A/S, Marienlystvej 65, DK-7800 Skive hereby declare that the Flexibox 810 is in conformity with the following directives:

2006/42/EC	Directive on the Safety of Machines
2014/35/EU	Low Voltage Directive
2014/30/EU	EMC Directive
2014/26/EU	RoHS Directive
1907/2006/EC	REACH Regulation

- and are manufactured in conformity with the following standards:

EN 12100-1:2011	Machine safety
EN 60 950-1:2006	Safety
EN 62 368-1:2014	Safety
EN 61 000-6-2:2005	Immunity
EN 61 000-6-3:2007	Emission

Skive, 12.10.2018

Recycling

The unit should be recycled according to national rules and procedures to protect the environment. Please consult your local authorities for further information.

Continued overleaf

Technical data

Introduction

The tables below show the factory supplied settings.

Default parameters Flexibox 810 – NC

```

°Dantherm A/S., Skive, 7800 DENMARK
Controller - Flexibox 810 SW Ver - 2.0
-----
*special configuration Flexibox 810 *
*Poweride* updated 25.10.18 by KH
-----
Device: Flexibox 810,
-----
Cooling Fan Configuration

```

	Fan 1	Fan 2	Fan 3
1.OFF Temp	[xT0] [-40-80]: 26.0	:-4.0	:26.0
2.IDLE ON Temp	[xT1] [-40-80]: 28.0	:1.0	:28.0
3.IDLE entry Temp	[xT2] [-40-80]: 28.0	:18.0	:29.0
4.SET POINT Temp	[xTs] [-40-80]: 28.0	:21.0	:31.0
5.HIGH SPEED Temp	[xT3] [-40-80]: 32.0	:26.0	:51.0
6.EXTND HS entry Temp	[xT4] [-40-80]: 35.0	:30.0	:51.0
7.EXTND HS exit Temp	[xT5] [-40-80]: 33.0	:28.0	:51.0
8.BOOST entry Temp	[xT6] [-40-80]: 40.0	:36.0	:56.0
9.BOOST exit Temp	[xT7] [-40-80]: 38.0	:31.0	:51.0
10.IDLE RPM	[xR1] [0-9999]: 500	:500	:500
11.HIGH SPEED RPM	[xR3] [0-9999]: 1800	:1800	:1800
12.EXTND HS RPM	[xR2] [0-9999]: 0	:1550	:1600
13.IDLE Duty Cycle	[xD1] [0-100]: 20	:20	:30
14.HIGH SPEED Duty Cycle	[xD3] [0-100]: 80	:80	:80
15.EXTND HS Duty Cycle	[xD2] [0-100]: 65	:65	:80
16.BOOST Duty Cycle	[xD4] [0-100]: 100	:100	:100
17.Dead Band RPMCycle	[DBx] [100-1000]: 100	:100	:100
18.Override - Digi.1	[x/0-100]: 0	:x	:x
19.Override - Digi.2	[x/0-100]: x	:x	:0
20.Override - Sensor Fail	[x/0-100]: 100	:x	:x
21.Sens.Sel. OB/RM/AM/SP/CD	[0-4]: 1	:1	:4
22.Tacho pulse/rev	[Tpx] [1-8]: 3	:3	:3
23.Tacho Control Ena/Dis	[Tcx] [0/1]: 0	:0	:0
24.Ctrl type [0-10V/PWM]	[Ctx] [0/1]: 0	:0	:0
25.Enable	[xFe] [0/1]: 1	:0	:0

```

-----
Damper Configuration

```

	Damper 1	Damper 2
1.LOWER Close Temp	[dT0] [-40-80]: 26.0	: 26.0
2.SET POINT	[dT5] [-40-80]: 28.0	: 28.0
3.UPPER Open Temp	[dT1] [-40-80]: 33.0	: 33.0
4.UPPER Close Temp	[dT2] [-40-80]: 35.0	: 35.0
5.EMGNCY Open Temp	[dT3] [-40-80]: 40.0	: 40.0
6.Override - Digi.1	[x/0/1]: 0	: 1
7.Override - Digi.2	[x/0/1]: x	: x
8.Override - Sensor Fail	[x/0/1]: 0	: 0
9.Sens.Sel. OB/RM/AM/SP/CD	[0-4]: 1	: 1
10.Damper Run dur. Sec.	[30 - 300]: 120	: 120
11.Enable	[xDe] [0/1/2]: 1	: 1

```

-----
Compressor/AC-Unit Configuration

```

	Comp	A/C 1	A/C 2
1.ON Temp	[cT0] [-40-80]: 28.0	: 35.0	: 37.0
2.OFF Temp	[cT1] [-40-80]: 26.0	: 33.0	: 35.0
3.Override - Digi.1	[x/0/1]: 0	: 0	: 0
4.Override - Digi.2	[x/0/1]: x	: x	: x
5.Override - Sensor Fail	[x/0/1]: x	: x	: x
6.Sens.Sel. OB/RM/AM/SP/CD	[0-4]: 1	: 1	: 1
7.Min. ON duration Sec.	[60-1800]: 240	: 180	: 180
8.Restart time-out Sec.	[60-1800]: 100	: 180	: 180
9.Enable	[xAe] [0/1]: 0	: 1	: 1

Continued overleaf

Technical data, *continued*

, *continued*

```

-----
Heater Configuration

1.ON Temp           [hT0] [-40-80]: 12.0
2.OFF Temp          [hT1] [-40-80]: 14.0

3.Override - Digi.1      [x/0/1]: 0
4.Override - Digi.2      [x/0/1]: x
5.Override - Sensor Fail [x/0/1]: 0
6.Sens.Sel. OB/RM/AM/SP/CD [0-4]: 1
7.Enable             [xDe] [0/1]: 1

-----

System Control Configurations

1.Norm. Vdc Low Level      [Vl] [18-60]: 40
2.Norm. Vdc High Level     [Vm] [18-60]: 60
3.Temp Alarm Low Limit     [TL] [(-40)-80]: 0
4.Temp Alarm high Limit    [TH] [(-40)-80]: 50
5.Cooling Delta T          [Dt] [0-40]: 3
6.Neg. Cooln Delta override [Nco] [0/1]: 1
7.Cooln SetPt Offset       [SPofs] [(-10)-10]: 1
8.Dig.2 Func. Ovrride/SpOff [Fdig] [0/1]: 0
9.System Mode Fc/Std/Ps/Acon [Sysm] [0-3]: 2
10.Extrn AC Lead/Lag (Dis/Ena) [LLe] [0/1]: 1
11.Alarm1 NO/NC Type       [Alm1] [0/1]: 1
12.Alarm2 NO/NC Type       [Alm2] [0/1]: 1
13.Alarm1 delay sec        [Alm1 delay] [0-100]: 30
14.Alarm2 delay sec        [Alm2 delay] [0-100]: 30
15.Dig.1 NO/NC Type        [Dig1] [0/1]: 0
16.Dig.2 NO/NC Type        [Dig2] [0/1]: 0
17.Door Xtch. NO/NC Type   [Door] [0/1]: 0
18.Filter Grd NO/NC Type   [Filt] [0/1]: 0
19.Phase Monitor NO/NC Type [PHm] [0/1]: 0
20.Status Log Dis/Ena.     [Log] [0/1]: 1
21.Log interval in min.    [Int] [1-60]: 1
22.RS-485 Bus Pow. Dis/Ena [MBpow] [0/1]: 1
23.Modbus Baudrate(Rfr UM) [MBaud] [0-7]: 1
24.ModBus Slave Addr       [MBaddr] [1-247]: 2

25.Alarm Mapping           1.Alarm1  2.Alarm2
1.Pwr Save Mode [PSM] [0/1]: 0      : 0
2.Room Temp H/L [THL] [0/1]: 1      : 0
3.Fan 1          [F1] [0/1]: 1      : 0
4.Fan 2          [F2] [0/1]: 0      : 0
5.Fan 3          [F3] [0/1]: 0      : 0
6.Onbrd. Sens    [OS] [0/1]: 0      : 0
7.Room Sens      [RS] [0/1]: 1      : 0
8.Amb. Sens      [AS] [0/1]: 1      : 0
9.Supp. Sens     [SS] [0/1]: 0      : 0
10.Cond. Sens    [CS] [0/1]: 0      : 0
11.Digi.1 I/P    [D1] [0/1]: 0      : 0
12.Digi.2 I/P    [D2] [0/1]: 1      : 0
13.Door Xtch I/P [DX] [0/1]: 0      : 0
14.Filt Grd I/P  [FG] [0/1]: 1      : 0
15.Phase I/P     [PI] [0/1]: 0      : 0

```



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