Pioneer

Free Cooling Box

KCB-03B

Service Manual

Edition No: V1.0

united elements
distribution

Contents:

1. Application

KCB-03B is a compact free air cooler, specifically designed to control the internal environment of communications enclosures. It is designed to remove excess heat from temperature sensitive electronic equipment where the temperature is required to be maintained within defined limits to achieve optimum performance and to maximize component life.

2. Technical data

Version	Unit	KCB-03B
Maximum air flow	m³/h	2790
Cooling capacity at Δt=4°C	kW	3.69
Cooling capacity in W/K	W / K	923
Fan nominal voltage	V	48V DC
Fan nominal operating current	A	3.7
Fan power consumption at nominal voltage	W	178
Filter	class	G4+G2
Filter area	m²	0.35
Height	mm	470
Width	mm	470
Depth	mm	460
Weight	Kg	32

Special voltages available on request

3. Assembly

Mechanical design, electrical connection and possible repair works must only be carried out by qualified personnel. Only use original spare parts!

3.1 Assembly instructions

Prior to mounting, ensure that

- The site of base station shelter and hence the arrangement of Free Cooling Box, is selected in such a way as to ensure good ventilation;
- The location is free from excessive dirt and moisture;
- The mains connection ratings, as stated on the name plate of the unit, are available;
- The ambient temperature does not exceed +65℃;
- The packaging shows no signs of damage;
- All components are adequately secured;
- The contact surfaces are clean and even;
- The distance of the units from the wall should not be less than 200 mm;
- Air inlet and outlet are not obstructed;

3.2 Assembly

- Make 2 cutouts and 16 rivet nuts M6/M8 in the side of the base station shelter, as shown in figure 3.1 and figure 3.2.
- The cutouts on the side of the base station shelter must be clean.
- Screw the units as shown in figure 3.3 and figure 3.4.
- Keep the KCB air outlet toward the heat-producing telecom equipments.
- The exhaust damper and cowl should be located in the top of the shelter, and diagonal arrangement with the main unit.
- There should be enough space at the front of main unit to disassemble and clean the filter (>=400 mm).

Fig. 3.2 Mounting Cutout

430

430

≥N

Ground

(F) Air Inlet (Inside Wall)

524

430

35

180

180

430

6-Mounting Hole
M6/M8

≥500(N)

Ground

(E) Air Inlet (Outside Wall)

Roof

200~600

488

400

44

220

44

20

180

4-Mounting Hole (M6/M8)

(H) Air Outlet (Inside Wall)

Roof

200~600

488

400

44

220

44

20

180

4-Mounting Hole (M6/M8)
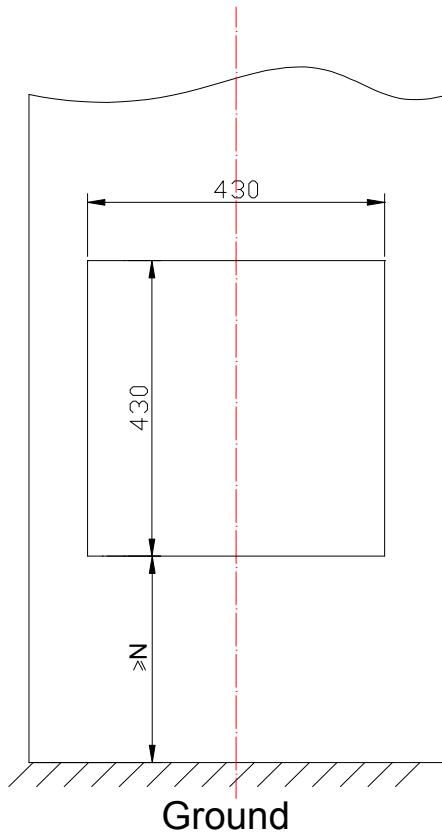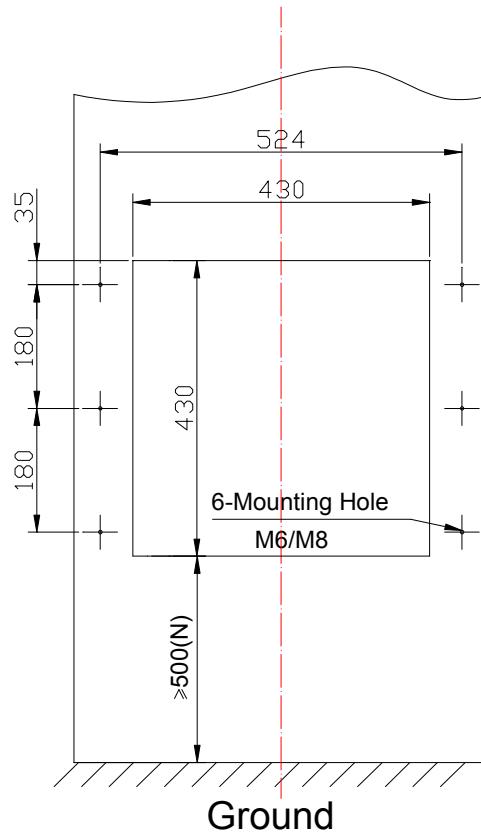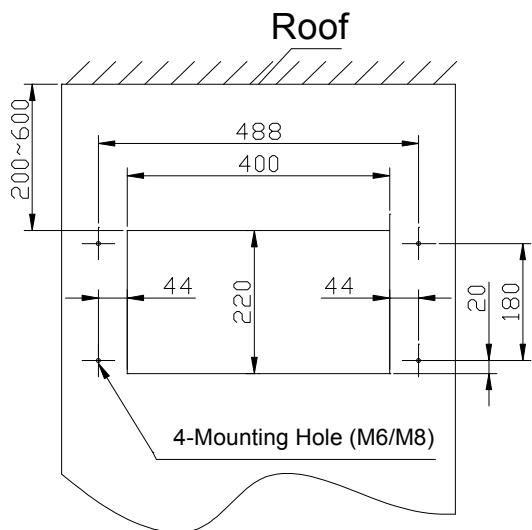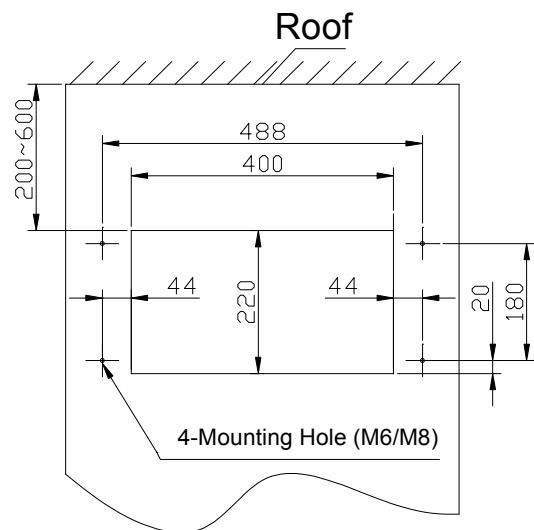
(G) Air Outlet (Outside Wall)

Fig. 3.1 Install Location

Cowl
(Optional)

(Optional)

Telecom Equipment
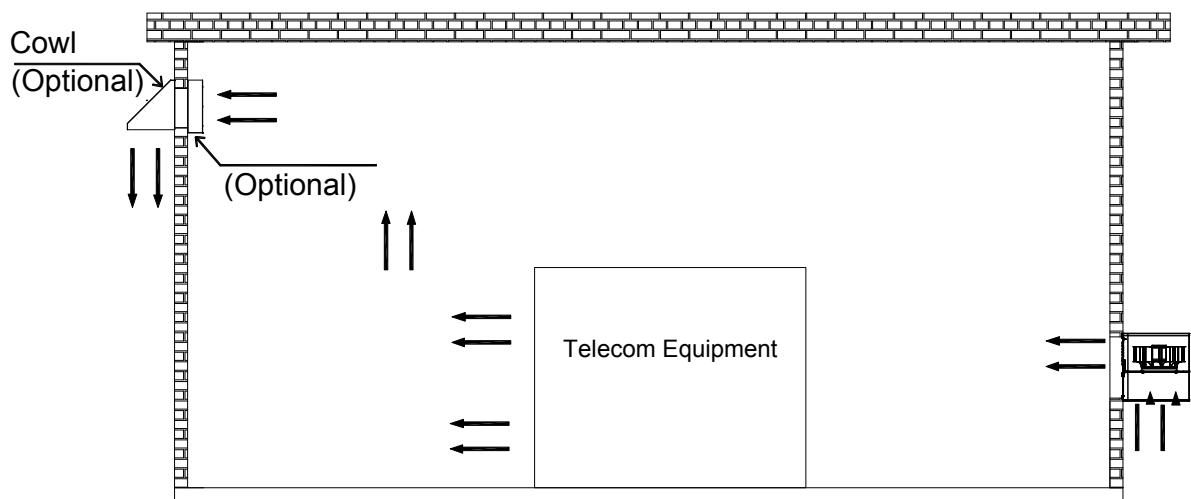
Fig. 3.3 Assemble the main unit and intake cowl
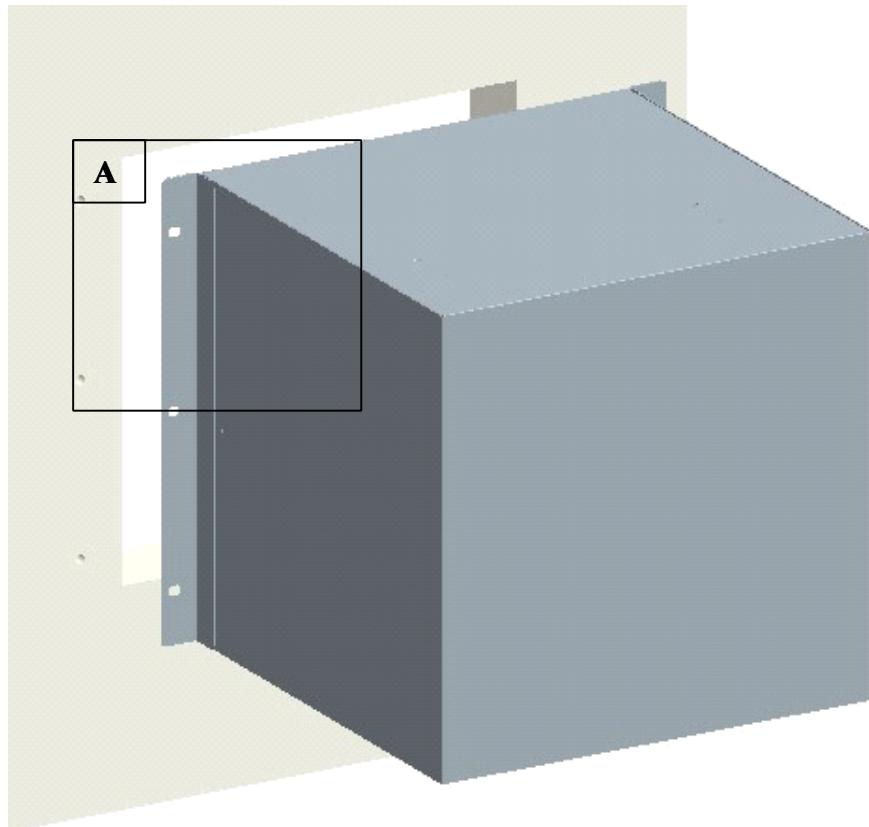
Self-tapping Screw (For Shelter)   Expansion Bolt (For Brick Wall)
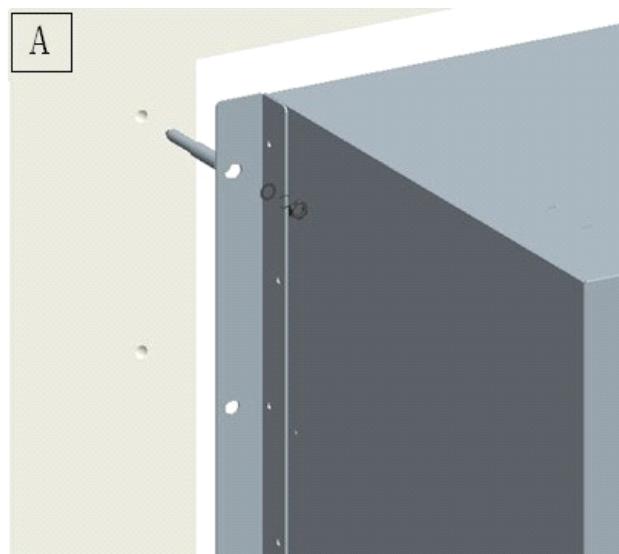
Fig. 3.4 Assemble exhaust cowl

3. 4. 1   3. 4. 2
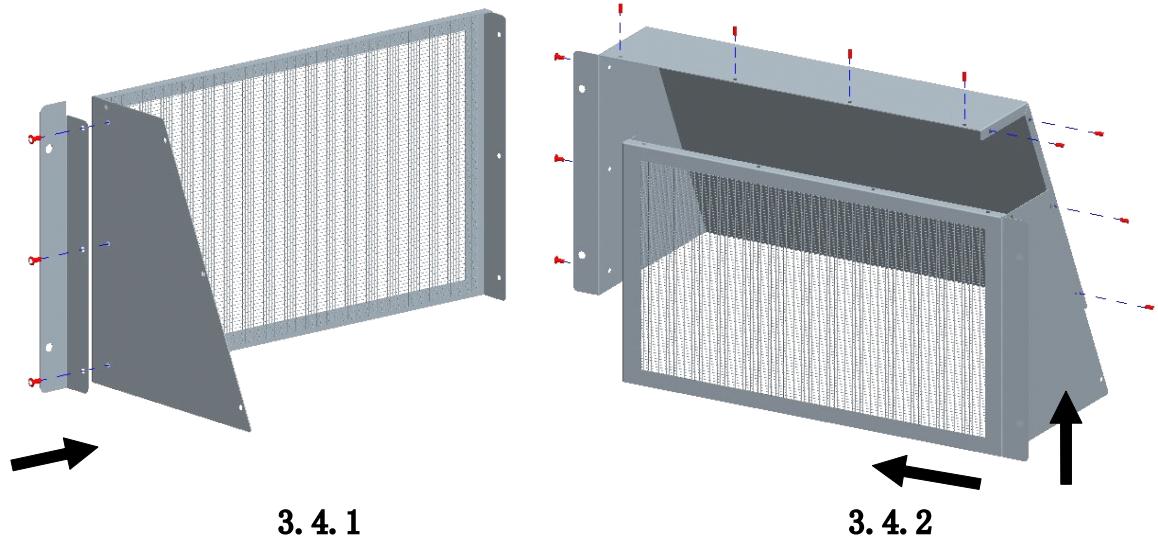
Fig. 3.5 Assemble the exhaust damper and exhaust cowl
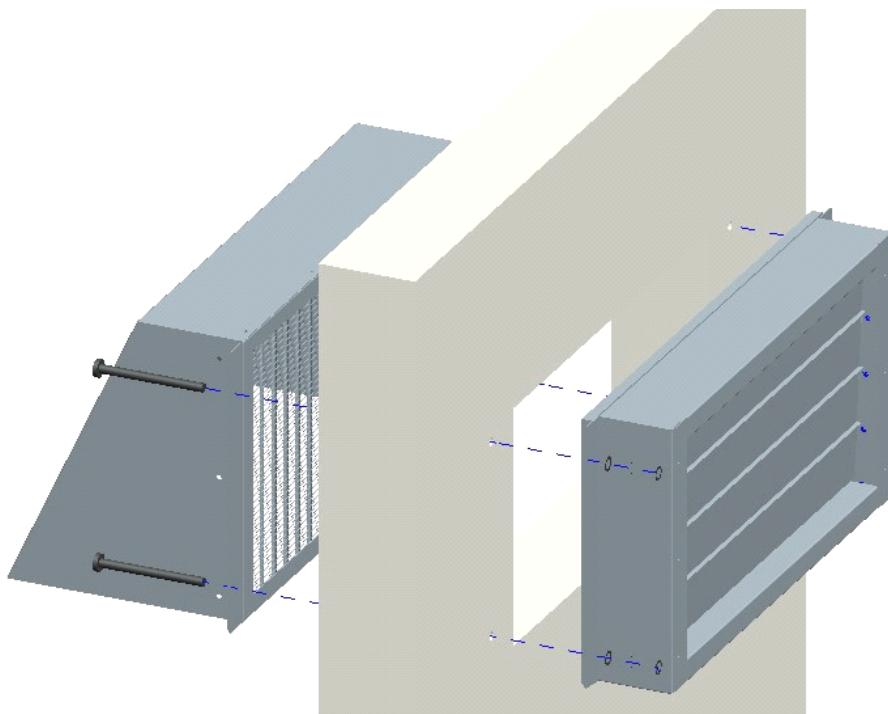
4. Electrical connection

- The connected voltage and frequency must correspond to the values stated on the name plate.
- The KCB- must not have any additional temperature control connected before it.
- The location of the room temperature sensor should be able to correctly measure the room temperature, avoid putting it at the air outlet of air-conditions.

Observe the relevant regulations during installation!

Mains connection should be made   to   the connectors and breakers on KCB-   (see fig. 4.2).

- DC 48V connect to connector2 Pin1 and Pin2
- AC 220V connect to connector2 Pin9 and Pin10
- Actuator connect to connector2 Pin4,Pin5 and Pin6,color is black ,brown ,red in turn.
- Air-conditioner 1 connect to connector1 Pin1 and Pin2
- Air-conditioner 2 connect to connector1 Pin3 and Pin4
- Alarm1 connect to connector1 Pin5 and Pin6
- Alarm2 connect to connector1 Pin7 and Pin8
- Alarm3 connect to connector1 Pin9 and Pin10

Fig. 4.1 Flow chart

Base Station Shelter

Flow Chart

Fig 2. Connecto plug
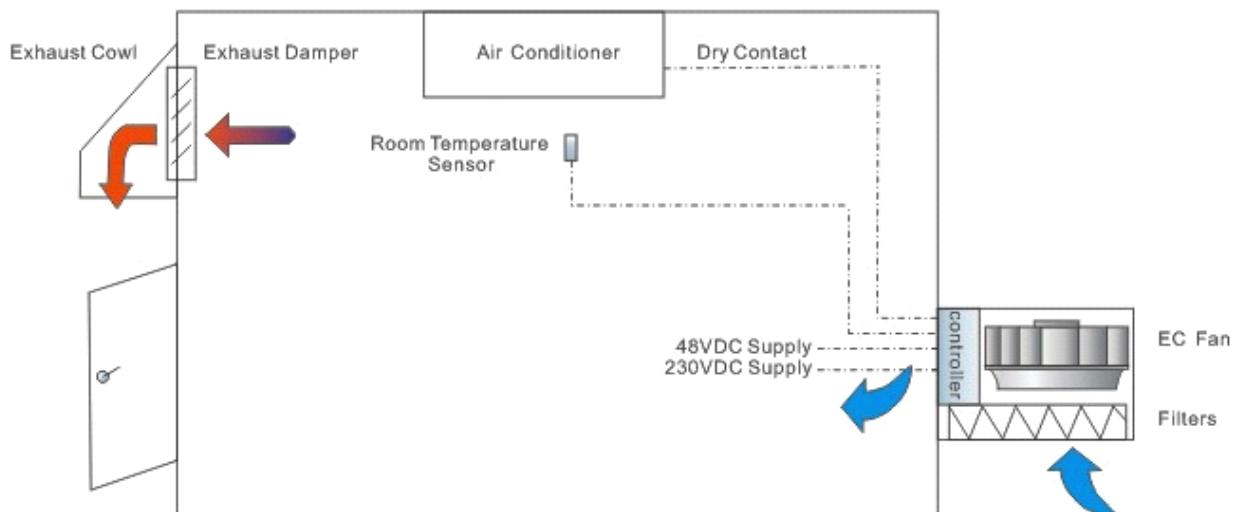
Connectors1   Connectors2
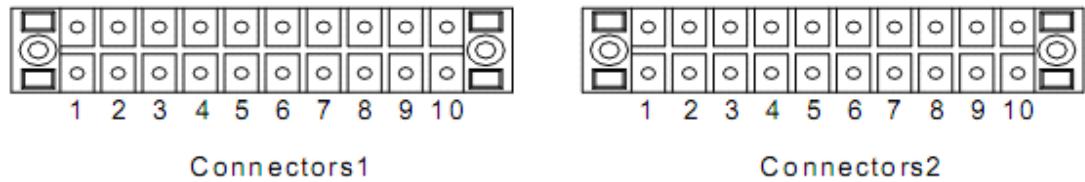
Pin-Layout:

Connector1:

Air-conditioner 1 control: Pin1
  (Dry contact/NO)   Pin2

Air-conditioner 2 control: Pin3
  (Dry contact/NO)   Pin4

Alarm 1 (KCB Failure):   Pin5
  (Dry contact/NC)   Pin6

Alarm 2 (KCB Failure):   Pin7
  (Dry contact/NC)   Pin8

Alarm 3 (High Temperature):   Pin9
  (Dry contact/NC)   Pin10

Connector2:

DC 48V input: Pin1   --   -48V   (-)
                         Pin2   --   BGND (+)

Actuator: Pin4   - -   Black
                         Pin5   - -   Brown
                         Pin6   - -   Red

220VAC/50Hz input: Pin9   --   N
                         Pin10   --   L

Notes:

1. All Alarms output (ALM 1, ALM 2, ALM 3) are NORMALLY CLOSE, A/C Control signals are NORMALLY OPEN (A/C 1, A/C 2).

2. The rated capacity of dry contact for alarm is 1A@120VAC/24VDC, for A/C control is 3A@250VAC/30VDC.

Fig 43 Detailed wirig diagram
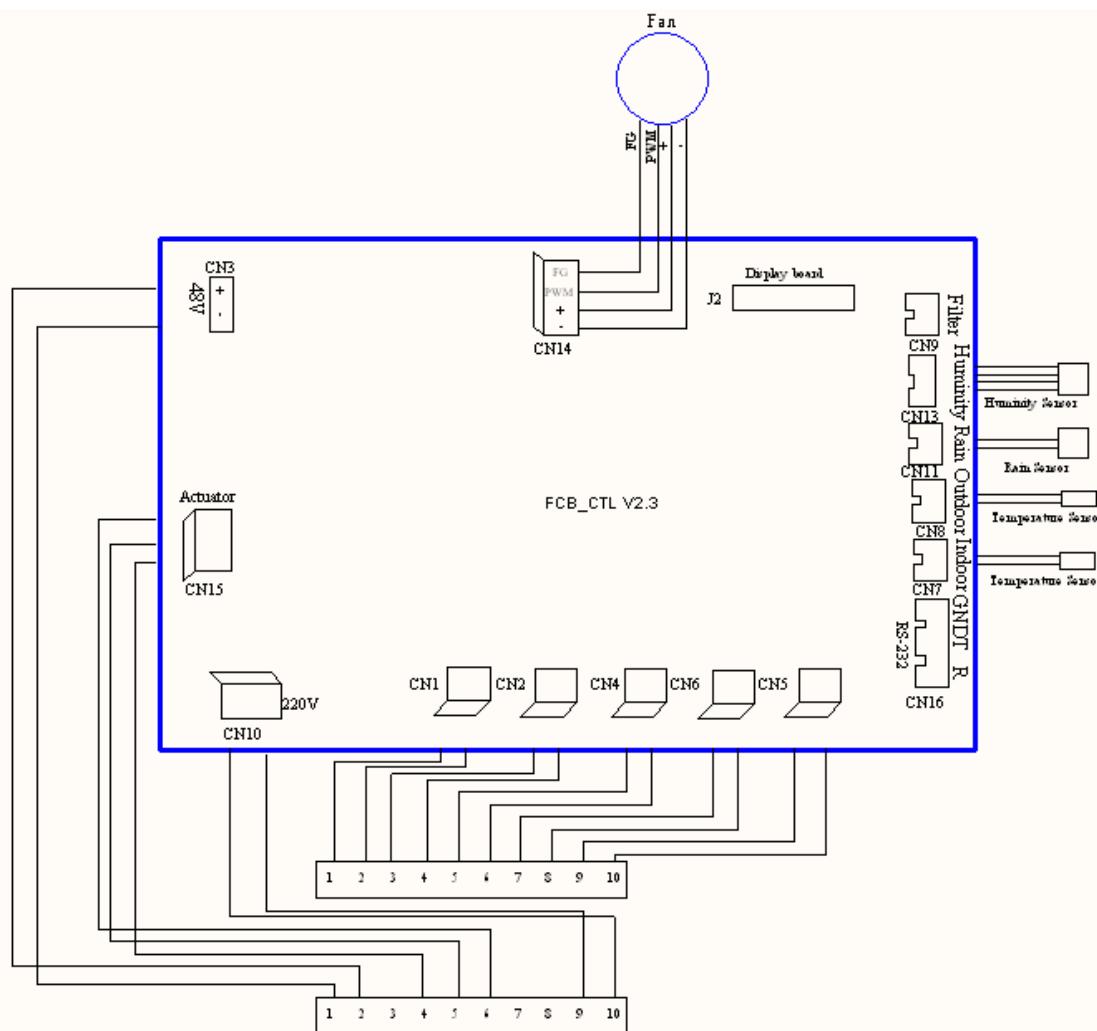
CN3	DC 48V INPUT
CN10	AC 220V INPUT
CN7	Room temperature sensor
CN8	Ambient temperature sensor
CN11	Rain water sensor
CN13	Humidity sensor
CN9	Filter monitor sensor
J2	Display Board
CN14	EC fan
CN15	Actuator
CN1	AC1
CN2	AC2
CN4	Alarm1
CN6	Alarm2
CN5	Alarm3

5.Commencing operation and control behavior

Following the completion of mounting, electrical connection can be made. The Free cooling box operates automatically, i.e. after electrical connection, the microcontroller will operate with **Auto Mode**.

5.1 Operation of the panel


```
Ti    28      RHin: 60%
To:   23      Mode:A
```
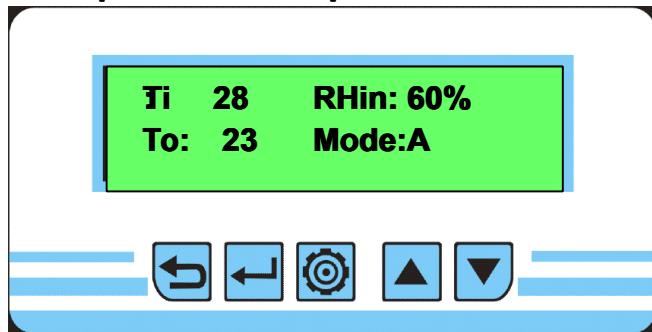
Fig. 5.1 Panel

⮌ :Exit ↵ :Enter ◎ :Function ▲ :UP ▼ :Down

Notes:

The default password is "1111".

Ti -- Indoor Temperature

To -- Outdoor Temperature

RHin -- Indoor Relative Huidity

Mode -- Operating Mode

A -- Auto Mode

M -- Manual Mode

P – Power Failure

R -- Rain

The display terminal consists of a LCD display, normally indicates the indoor temperature, indoor relative humidity, outdoor temperature, and operation mode, press the up button

▲ or the down button ▼ to display the state of fans and air conditioner, When alarm active, it will display alarm codes.

5.2 Menu tree
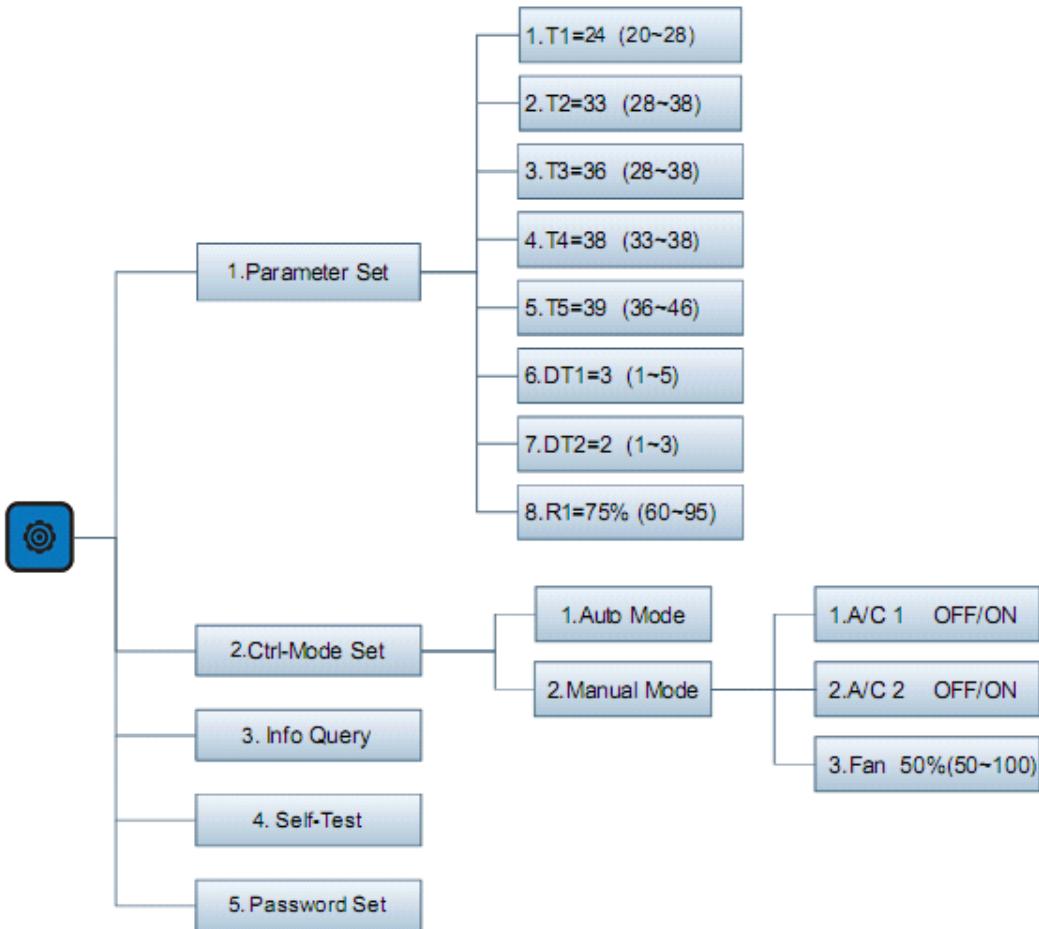
Fig. 5.2 Menu tree

5.3 Modify Parameter setting

5.3.1 Press the function button ⚙ to display the password interface, press the up button ▲ or the down button ▼ to change the number, and press the enter button ↵ to confirm the password, then enter the function menu **Parameter Set**.

5.3.2 Press the up button ▲ or the down button ▼ to select the parameter need to modify, and press the enter button ↵ to confirm;

5.3.3 Press the up button ▲ or the down button ▼ to modify the setting value, and press the enter button ↵ to confirm;

5.3.4 Press the exit button ↩ to return.

5.4 Changing the control mode

5.4.1 Press the function button ⬡ to display the password interface, press the up button ▲ or the down button ▼ to change the number, and press the enter button ↵ to confirm the password, then enter the function menu

Parameter Set. then press the up button ▲ or the down button ▼ to select the **Ctrl-mode Set** menu, and press the enter button ↵ to display the operation mode menu;

5.4.2 Press the up button ▲ or the down button ▼ to select the mode, and press the enter button ↵ to confirm;

5.4.3 When select **Manual Mode**, press the up button ▲ or the down button ▼ to select parameter, and press the enter button ↵ to confirm, press the up button ▲ or the down button ▼ to change the status of equipments, press the enter button ↵ to confirm, press the exit button ↩ to return.

5.4.4 Press the exit button ↩ to return.

5.5 Information query

5.5.1 Press the function button ⬡ to display the password interface, press the up button ▲ or the down button ▼ to change the number, and press the enter button ↵ to confirm the password, then enter the function menu

Parameter Set. then press the up button ▲ or the down button ▼ to select the **Info Query** menu, and press the enter button ↵ to display alarm code;

5.5.2 Press the exit button ↩ to return.

5.6 Self-test

5.6.1 Press the function button [icon] ,to display the password interface, press the up button [icon] or the down button [icon] to change the number, and press the enter button [icon] to confirm the password, then enter the function menu **Parameter Set**. then press the up button [icon] or the down button [icon] to select the the **Self-Test** function, and press the enter button [icon] to confirm;

5.6.2 Press the exit button [icon] to return.

5.7 Password Set

5.7.1 Press the function button [icon] to display the password interface, press the up button [icon] or the down button [icon] to change the number, and press the enter button [icon] to confirm the password, then enter the function menu **Parameter Set**.

5.7.2 Press the up button [icon] or the down button [icon] to select the **Password Set** menu, and press the enter button [icon] to confirm;

5.7.3 Press the up button [icon] or the down button [icon] to modify the password, and press the enter button [icon] to confirm;

5.7.4 Press the exit button [icon] to return.

5.8 Parameter setting

Parameters	Default Value	Setting Range	Notes
T1	24°C	20°C～28°C	Fan on temperature (50% speed)
T2	33°C	28°C～38°C	Fan full-speed temperature & A/C OFF
T3	36°C	28°C～38°C	A/C1 on temperature
T4	38°C	33°C～38°C	A/C2 on temperature
T5	39°C	36℃～46℃	High temperature alarm value
DT1	3°C	1°C～5°C	FC ON temperature difference
DT2	2°C	1°C～3°C	FC OFF temperature difference

R1	75%RH	60~95%	Indoor relative humidity

Notes:

Parameters setting must be T1<T2<T3<T4<T5, DT1>DT2, *otherwise will can not be saved.*

5.8 Control behavior

Auto Mode

When the indoor humidity RHin<=70%,RH = R1(75%RH)-5%RH and Tin-Tout>=DT1, the unit running as show in fig. 5.3:
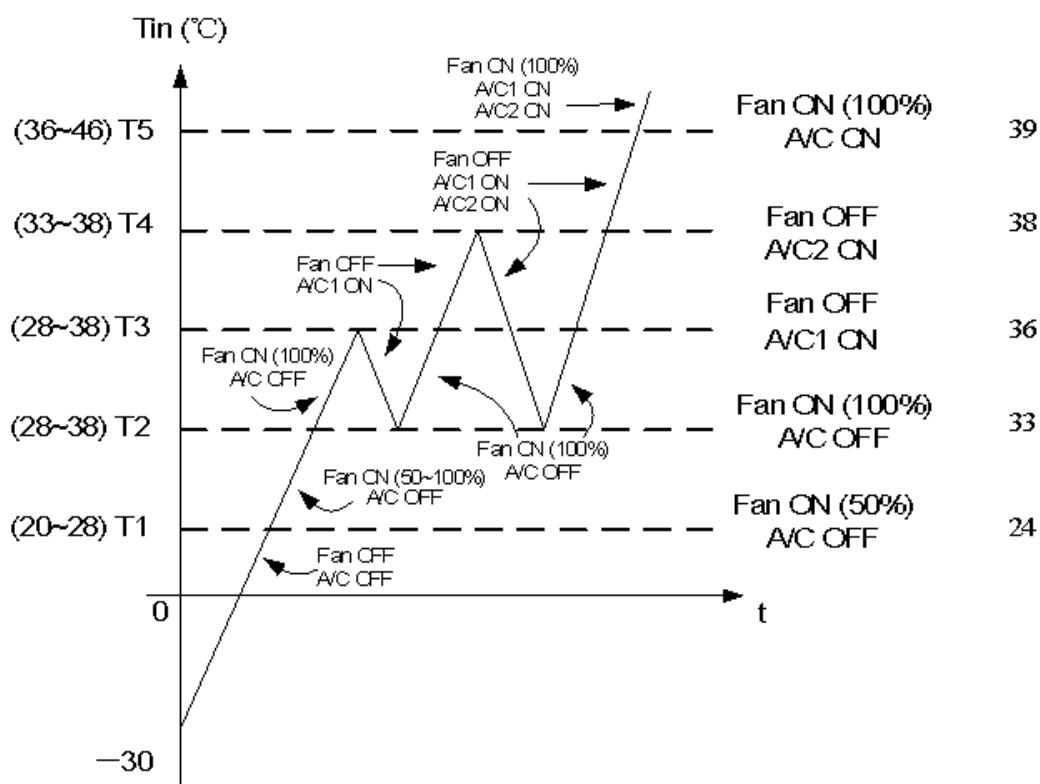
Fig. 5.3 Auto Mode

Internal fan: <24 °C   50%

24 ~33 °C   50~100%

>33 °C   100% or OFF

Manual Mode

In Manual Control Mode, can force to switch between FC Mode or A/C Mode.

Temperature Sensor Failure Mode

When the temperature sensor failure is detected, the controller will automatically operate at AC Mode.

Humidity Sensor Failure Mode

When the humidity sensor failure is detected, the KCB- controller will automatically operate at A/C Mode.

5.9 Alarm inquiry and display

If any of alarm active, the control board LED will blink, and the display panel LED backlight will blink and show the alarm code.

Alarm code and system message

Alarm code	System message
E1	Indoor high temperature
E2	Fan failure
E3	Indoor temperature sensor failure
E4	outdoor temperature sensor failure
E5	Humidity sensor failure
E6	220VAC failure
E7	Filter clogging
E8	48VDC too low or too high voltage failure Vdc<38&Vdc>58
E9	Raining

5.10   Alarm output

5.10.1 Alarm detection delay:

In order to avoid false alarms output, all alarms have to wait the time delay before output::

Alarm	Times	
Indoor high temperature	3 minute set	clear soon
Fan failure	1 minute set	clear soon
Indoor temperature sensor failure	1 minute set	clear soon
outdoor temperature sensor failure	1 minute set	clear soon
Humidity sensor failure	1 minute set	clear soon
220VAC failure	3 minute set	clear soon
Filter clogging	1 minute set	clear soon
48VDC too low or too high voltage failure	3minute set	clear soon
Raining	5 second set	clear soon

5.10.2 Dry contact alarm output:

The unit is permanently controlled by the microcontroller. Faults which can occur are immediately registered and will be passed on via the alarm output.

The dry contact alarm will be triggered, if any of alarm active. .

The alarm functions as follows:

Storage conditions: Open contact

Operation: Closed contact

Alarm: Open contact

5.11   Self-test step:

Step	Times
Lcd display on	5 seconds
Lcd display off	5 seconds
FC on & in fan 50%	10 seconds
FC on & in fan 70%	10 seconds
FC on & in fan 100%	10 seconds
AC1 on	30 seconds
AC2 on	30 seconds
Alarm1 on	10 seconds
Alarm2 on	10 seconds
Alarm3 on	10 seconds
Sensor test	30 seconds
KCB alarm display	30 seconds

5.2   Password reset

When you forget the password, you can press the function button [icon] and the enter

button [icon] at the same time for about 15 seconds, then you can see the lcd display" - - - -",the password will be modify to "0000".

6. Maintenance

The maintenance-free fan fitted in the unit has sealed ball-bearings and are therefore protected against dust and humidity. The life expectancy is at least 30,000 operating hours. The free cooling box is thus largely maintenance free. All that may be required from time to time is that the component of filter cleaned by compressed air. To disassemble the filter, see fig. 6.1.

Attention!

Prior to any maintenance work, the power to the free cooling box must be disconnected.
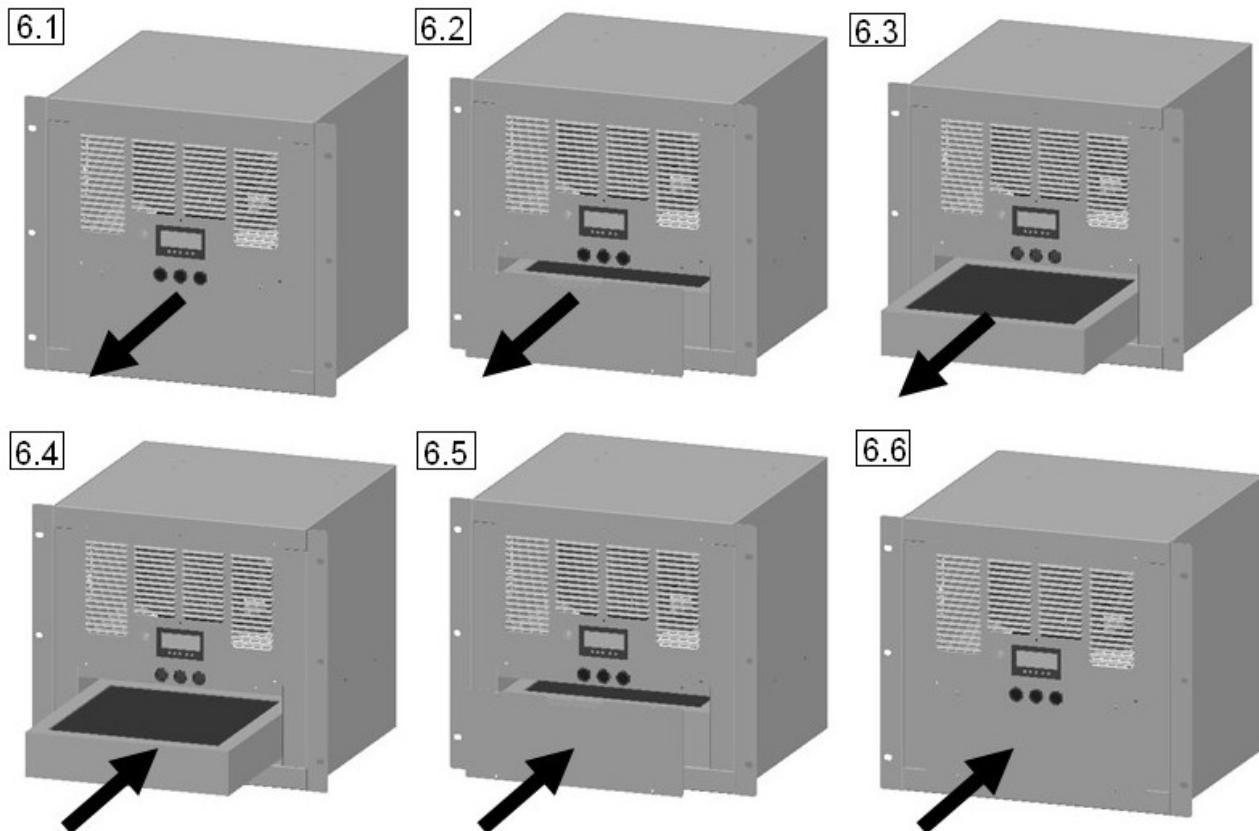
Fig. 6.1 Disassembly filter

7. Supply includes

1 x Free cooling box

1 x Filter-G4 I…………………………………………………………..**(Optional)**

1 x Filter-G2 I…………………………………………………………..**(Optional)**

1 x Indoor temperature sensor

1 x Cowl…………………………………………………………….**(Optional)**

1 x Exhaust damper(pneumatic   or Actuator)………………**(Optional)**