FREECOOL-HD
Intelligent Control Free Cooling Unit
Air Volume: 2400~21600 m³/h
FREECOOL intelligent ventilation unit is applied in small/medium data center and electronic equipment room. The unit introduces outdoor fresh air with lower temperature to cool equipment room. By using the FREECOOL-HD unit, the running hours of other air conditioning units can be highly reduced, achieving power energy saving around 30-90%. The FREECOOL-HD unit using EC fans can adjust the air volume automatically according to the temperature difference with the lowest power consumption.

FREECOOL-HD unit with large air volume, high cooling density and luxuriant control functions, can meet all the precision control requirement of temperature and cleanliness in equipment room.

FREECOOL-HD without refrigeration system realizes easy installation and convenient maintenance. The unit is available in 2 different air flow schemes: up flow and down flow, and 2 installation positions: outdoor and indoor, offering more options for different customers.

### Unit identification

<table>
<thead>
<tr>
<th>FREECOOL-HD</th>
<th>ID</th>
<th>SPL</th>
<th>O</th>
<th>48</th>
<th>F2</th>
<th>220/1/50</th>
<th>XXX</th>
</tr>
</thead>
</table>

- **Special design code**
- **Separator**: `.`
- **Unit power supply**
  - 220/1/50: 220V AC, single phase 50Hz, Alternative current supply
  - 380/3/50: 380V AC, 3 phase 50Hz, Alternative current supply
- **Separator**: `.`
- **Fan quantity in the unit**: F1 means the unit is equipped with 1 fan; F2 means the unit is equipped with 2 fans.
- **Nominal air volume with the unit**: 100m³/h, that means: “48” stand for the air nominal air flow is 1.3m³/s
- **Air scheme**
  - O: up flow
  - U: down flow
- **Separator**: `.`
- **Unit structure**
  - SPL: Split unit, the unit is manufactured as parts, one of which is main unit with fan and the other is air outlet.
- **Separator**: `.`
- **Installation type**
  - INDOOR: The unit is indoor installed, abbreviated as “ID”
  - OUTDOOR: The unit is outdoor installed, abbreviated as “OD”. If outdoor installed unit is required, please feel free to contact us.
- **Separator**: `.`
- **Product series name**
  - FREECOOL-HD series fresh air free cooling unit, can be abbreviated as “FCU”
Working range

Working Environment
Temperature: -30°C~55°C
Humidity: 5~95%
Storage Environment
Temperature: -40°C~70°C
Humidity: 5~95%

Applications
Small to mid-size switching room for telecommunication
Small to mid-size data center and computer room
UPS and battery room
Industrial process control center

Product configuration

Standard components
Unit base and frame:
Unit base is made of folded sheet steel coated with black epoxy resin powder.
Unit frame is made of folded sheet steel and assembled by bolts or rivets. The surface of unit frame is coated with black epoxy resin powder.
Backward curved, centrifugal fan directly coupled with 220V or 380VAC motor.
G4 disposable filters
G2 nylon pre-filter
Control box, includes: controller, contactor, relay and circuit breaker etc.
Micro control system, include:
  Micro-processor
  Room Temperature sensor (3 pcs)
  Temperature sensor at air outlet

Optional components
G4 washable main air filter
Pressure transducer
Differential pressure switch for filter clogged.
Electric heater
Supply air temperature
Gravitational Pressure Relief Valve (air discharge)
Electric motorized air discharge valve
Electric motorized non-return valve
Air inlet louver
Mounting plinth
Head Blower
RS232 communication interface card
RS485 communication interface card
Clock card
Contactor for existing air conditioners (For existing air conditioners)
Additional room temperature sensor
Humidity sensor
Operation principle

When FCU are applied in data center, FCU will be the main cooling providers which will control air conditioners to work in cooperate, supplying required cooling capacity.

When the outdoor temperature is lower than room temperature, FCU turns on to bring fresh air outdoor to cool the room. When FCU cannot provide enough cooling capacity, FCU will turn on the air conditioner to supply cooling in assist.

When air conditioner fails and the room temperature is higher than emergency setting temperature, FCU will switch on in emergency mode.

Below drawings show the air flow path of both over flow and under flow FCU unit.

Product highlights

High energy efficiency
Using the FREECOOL-HD unit, the running hours of other air conditioning units can be highly reduced.

Good structure design and easy maintenance
The main components such as: fans, motor, damper, controller and other related components can be accessed and maintained in front of the unit.

Strong structure
The unit passed a transportation test to confirm the structure is strong enough to be able to transport on low grade ways.

Corrosion-proof
The unit framework is provided with corrosion protection treatment. The treatment is sufficient to provide protection for 15 years life cycle for inland installation.
If necessary, the treatment for sea air environment can be supplied as option.
EC fan
Fan is a core component in the unit. FREECOOL-HD unit is equipped with EC centrifugal fan with the following features:

High efficiency of motor
Fan rotation speed is adjustable; the energy consumption at low rotation speed is much lower than the high speed. When air conditioner fails and the room temperature is higher than emergency setting temperature, FCU will switch on in emergency mode. Comparing with axial fan, it would not lose much air volume due to pressure drop.

Random restart when power recovered
After a power failure, when the power is recovered, the unit will restarts automatically with a random time delay between 1 to 60 seconds to avoid many equipment started at the same time.

Control to the other air conditioner
The FREECOOL-HD unit is able to control other air conditioner. When the FREECOOL-HD unit can fully meet the cooling demand of base station, the controller can send a signal to stop the other air conditioner in the site.

Completely auto protection
The controller monitors the running status of all the components and will stop the running of relative component and raise an alarm if any failure.

Data log
The controller has a bigger memory to log the running data of a year. All these data can also be sent to the remote control and monitoring system so that the customers can analyze the working performance and energy saving amount accordingly.

Remote control and monitoring (Optional)
The unit can be installed with a RS232 or RS485 communication card to realize remote control and monitoring by the BMS system with open communication protocol.

PCOWEB internet communication (Optional)
The unit can be equipped with a PCOWEB internet communication card with TCP/IP protocol and Ethernet work to realized remote control and monitoring. Each computer can be connected to the web server by Ethernet network and understand the working status and control the unit in time everywhere.

Humidity control (Optional)
Humidity sensor (optional) can prevent from introducing high humidity inside. With humidity sensor, free cooling unit will turn off when the humidity of outdoor air is higher than humidity limitation to avoid the BTS equipment working at high humidity air environment, which may cause failures and damages of electronic devices.

Intelligent Control
FREECOOL-HD unit is controlled by microprocessor. All the components in the unit work fully automatically, realizing maximum energy saving without manual operation. All protections and alarms are automatically raised.
Control functions

Parameters display
- Current control temperature set
- Outside air humidity
- Outside Air Temperature
- Supply Air Temperature
- Software Version

Working status display
- Main Fan Speed
- Main Fan Hours Run
- Heater working status (Option)
- Heater working hours (Option)
- Heater startup times (Option)

Alarm display
- Controller fail alarm
- Supply fan failure
- Filter clogged alarm
- Low temperature alarm
- High temperature alarm
- Fire/smoke alarm
- Temperature sensor failure

Other functions
- Maintenance Test
- Auto-Routining every 28 days

Remote control and monitoring

The remote monitoring and control system can be easily connected with the units to realize remote real-time monitoring and control and save the running data.

The unit can be remote controlled by many kinds of methods as follows:
- 4 kinds of wireless network connection with computer
- 3 kinds of local direct connection with computer
- 3 kinds of LAN network connection with computer

Diagram:
- Wireless connection types
- Local area network connection type
- Single unit direct connection types
- Units direct connection type
## Technical parameters

**FREECOOL-HD**

<table>
<thead>
<tr>
<th>Model</th>
<th>24F1 ID</th>
<th>48F2 ID</th>
<th>72F1 ID</th>
<th>144F2 ID</th>
<th>216F3 ID</th>
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</thead>
<tbody>
<tr>
<td><strong>Supply air scheme</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Air flow m³/h</td>
<td>2400</td>
<td>4750</td>
<td>7200</td>
<td>14400</td>
<td>21600</td>
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<tr>
<td>Air flow m³/s</td>
<td>0.67</td>
<td>1.3</td>
<td>2.0</td>
<td>4.0</td>
<td>6.0</td>
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<tr>
<td><strong>Cooling capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Delta t=5^\circ C ) kW</td>
<td>4.0</td>
<td>7.9</td>
<td>12.0</td>
<td>24.0</td>
<td>36.0</td>
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<tr>
<td>( \Delta t=10^\circ C ) kW</td>
<td>8.0</td>
<td>15.8</td>
<td>24.0</td>
<td>48.0</td>
<td>72.0</td>
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<tr>
<td>( \Delta t=12^\circ C ) kW</td>
<td>9.6</td>
<td>19.0</td>
<td>28.8</td>
<td>57.6</td>
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<td><strong>Power supply</strong></td>
<td>230V/1Ph/(50/60Hz)</td>
<td>400V/3Ph/(50/60Hz)</td>
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<tr>
<td>Qty. n.</td>
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<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>Fan</td>
<td>Single inlet backward curved centrifugal fan</td>
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<td>Power input kW</td>
<td>0.5</td>
<td>1.0</td>
<td>2.1</td>
<td>4.2</td>
<td>6.3</td>
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<tr>
<td>Current A</td>
<td>3.1</td>
<td>6.1</td>
<td>3.2</td>
<td>6.4</td>
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<tr>
<td>Noise (*) dB(A)</td>
<td>55</td>
<td>59</td>
<td>61</td>
<td>63</td>
<td>65</td>
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<tr>
<td><strong>Dimensions</strong></td>
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<tr>
<td>Width mm</td>
<td>700</td>
<td>1150</td>
<td>850</td>
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<td>Depth mm</td>
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<td>Height mm</td>
<td>1320</td>
<td>1320</td>
<td>1770</td>
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<tr>
<td>Weight kg</td>
<td>65</td>
<td>89</td>
<td>150</td>
<td>260</td>
<td>350</td>
</tr>
</tbody>
</table>

* The noise of 1 meter away from the unit

## Dimensions drawing

**Indoor installed up flow units**

**FCU.ID.SPL.O24F1**
Indoor installed up flow units   FCU.ID.SPL.O48F2

Indoor installed up flow units   FCU.ID.SPL.O72F1
Indoor installed down flow units FCU.ID.SPL.U24F1

Indoor installed down flow units FCU.ID.SPL.U48F2
Indoor installed down flow units FCU.ID.SPL.U72F1

Indoor installed down flow units FCU.ID.SPL.U144F2
Indoor installed down flow units FCU.ID.SPL.U216F3
AIRSYS is a cooling product and solution provider for ICT (Information & Communication Technology) industry. The products include:
- Air conditioner and Chiller for IT room and large data center
- Intelligent Control system (BAS) for IT room and data center
- Air conditioning equipments for telecom shelters
- Intelligent control system for shelter cooling.
- Air conditioner and heat exchanger for telecom cabinets

The solution include:
- Cooling system design
- System integration
- Installation and Commissioning
- Operation and Maintenance

AIRSYS is also a global leader in providing cooling solution for Medical Imaging System.

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