

# AIRSYS




## **FREECOOL-AD**

Adiabatic Evaporation Cooling Unit

Cooling Capacity: 34kW  
Air volume: 18,000 m<sup>3</sup>/h

[www.air-sys.uk](http://www.air-sys.uk)



Evaporative cooling is perhaps the most efficient option for today's critical environments, including data centres, switchrooms, and telephone exchanges. By replacing conventional air conditioning technology with an adiabatic approach, we can reduce energy consumption by up to 90%.

# Unit Identification

01	02	03	04	05	06	07	08	09	10	11	12
FREECOOL - AD	.	ID	.	DN	20	F2	A2	.	400/3/50	.	XXX

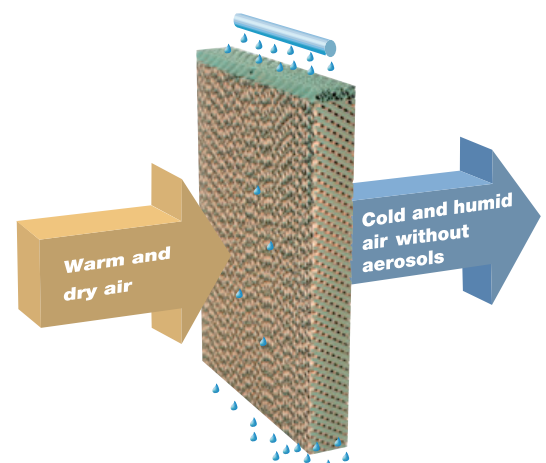
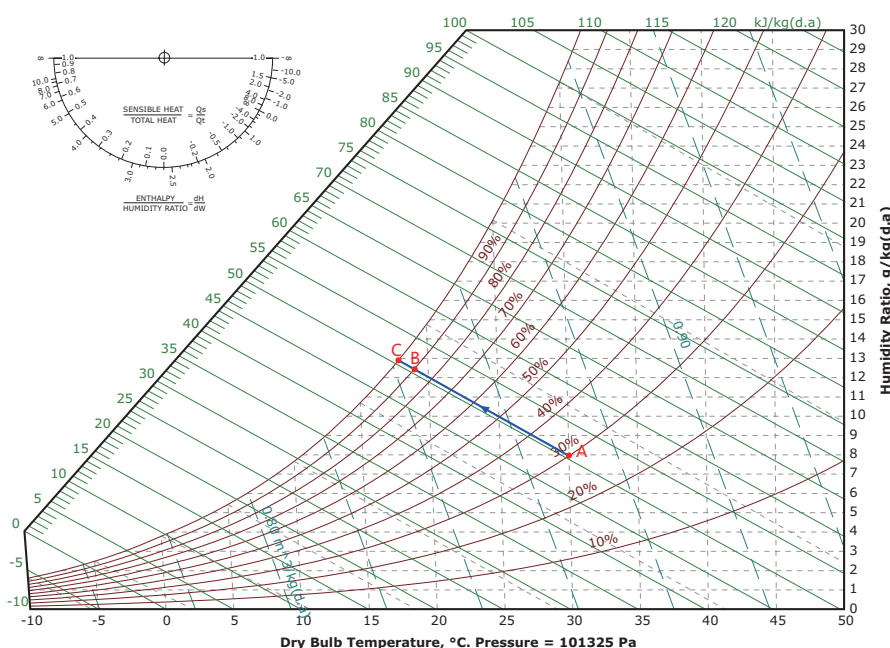
01	FREECOOL - AD	Product series name: FREECOOL-AD: Intelligent control adiabatic evaporation cooling unit.
02	.	Separator Character ""
03	ID	Installation type: The unit is installed indoors, abbreviated as "ID".
04	.	Separator Character ""
05	DN	Air scheme: down flow
06	20	Nominal air flow: 18000 m <sup>3</sup> /h
07	F2	Fan quantity
08	A2	Cabinet size code
09	.	Separator Character ""
10	400/3/50	Power source:Voltage/Phase/Frequency
11	.	Separator Character ""
12	XXX	Code for custom design, 3 alphanumeric code

# Why adiabatic cooling?

Adiabatic evaporative cooling provides an inexpensive means of removing heat from IT equipment, whilst maintaining close temperature control. External wall space is required for installing the units and venting heat from the space, making the system ideal for exchanges and data centres, and with no mechanical cooling fitted, Adiabatic Evaporation Cooling can also benefit the electrical profile of the building and reduce energy tariffs.

## How does it work?

In the adiabatic evaporative cooling process, warm, dry air enters the unit in an unsaturated condition (Point A). The air then passes through the water-moistened pad, and is cooled adiabatically, shown travelling up the wet bulb line to Point C (saturation line). Although the Relative Humidity within the pad is approximately 100%, the process is not perfect, leading to certain losses in the cooler. Therefore, if we consider a 90% efficiency, we can reach Point B and obtain the supply air condition for IT environments.



# About Legionella

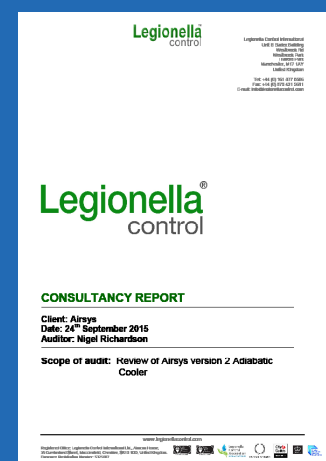
- Named after an outbreak of severe pneumonia which affected a meeting of the American Legion in 1976.
- It is an uncommon but serious disease.
- It is not caught from other people, but by breathing in tiny droplets of contaminated water.
- The most common sources of legionella are in man-made water systems including cooling towers and evaporative condensers, hot and cold water systems, spa pools etc.
- There is a reasonably foreseeable legionella risk when the water system has a water temperature between 20~45°C.

# Preventing legionnaires disease

The primary measures in preventing Legionnaires' disease include:

- Water is drained at regular intervals to prevent stagnation and monitor water salinity;
- Wet pad face velocity is lower than 2.4m/s in order to reduce the release of aerosols from the adiabatic evaporation pad;
- Water operating temperature is lower than 21 °C (initial setting, adjustable);
- Water scale (caused by high mineral content within the water) is monitored and the water sump emptied and rinsed once the set value has been reached;
- All surfaces in contact with water (except the adiabatic evaporation pad) are plastic or stainless steel to avoid corrosion;
- Adiabatic evaporation pad dry mode (takes place every 24 hours) ensures the pad surface is completely dry, reducing the risk of breeding bacteria;
- Drain cycles are dictated by the local water quality e.g. in regions with a high water hardness, empty after each filling;  
In regions with a medium water hardness, empty after every second filling;  
In regions with a low water hardness, empty after every third filling.

Legionella Control International are world-leading in the field of legionella risk management. AIRSYS have received a positive evaluation report for FREECOOL-AD units from LCI.





# Engineered features

## 1 High energy efficiency

Using adiabatic evaporation pads to cool fresh outdoor air, the run hours compared to other conventional air conditioning equipment, will be significantly reduced.

## 2 Good structural design for easy maintenance

The main components such as supply fans, motor, damper, controller and other items are all easily accessible and maintained from the front of the unit.

## 3 Easy installation, supply air arrangement flexibility

FREECOOL-AD units are modular in design, ensuring simplified transportation and ease of installation on site. The supply air box is separate from the main unit, allowing flexibility to choose up flow or down flow arrangement, according to the need of each individual site installation.

## 4 Corrosion-proof

The standard unit framework is supplied 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 an option.

## 5 Fan technology

The supply fans are core components of the FREECOOL-AD unit; an oversized EC fan allows the maximum speed to be kept under 68% of its maximum. This reduces both the generated noise and energy consumption.

Other benefits of the EC centrifugal fan include:

- High efficiency motor
- Infinitely adjustable speed; energy consumption at low speeds is significantly lower than at high speed
- Increased and more consistent airflow volume, when compared to axial-style fans.

## 6 Strong structure

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

## 7 Filter pressure transducer

The pressure drop across the air filter is continuously monitored, to check cleanliness and provide prior warning for replacement.

## 8 Water level sensor

The water level in the sump is monitored to avoid the risk of flooding and also to prevent the pump idling.

## 9 Supply air humidity control

A humidity sensor can prevent high-humidity conditions from occurring within the IT room. Adiabatic mode will turn off when the IT space air humidity is higher than the programmable limit set within the unit controls. Once the IT space is below the upper humidity limit, evaporative cooling is permitted again automatically.

## 10 Intelligent control

FREECOOL-AD units are fully controlled by a microprocessor; all components operate automatically to achieve maximum energy savings without manual monitoring and input. Similarly, all alarms and protective measures are automated, main components such as fans, motor, damper, controller and other items are all easily accessible and maintained from the front of the unit.

## 11 Auto restart

Once the power has been restored (following an outage), the unit will restart automatically with an adjustable time delay between 1 to 60 seconds to avoid multiple units starting at the same time.

## 12 Data log

The data controller has a large internal memory to log up to 100 historic alarms.

## 13 Remote control and monitoring (optional)

The unit can be installed with a RS232 or RS485 communication card to enable remote control and monitoring by a BMS with open communication protocol.

## 14 pCOWeb internet communication (optional)

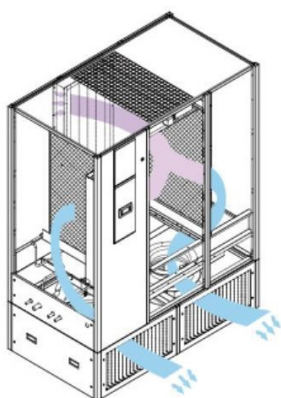
The unit can be equipped with a pCOWeb internet communication card with TCP/IP protocol and Ethernet to enable remote control and monitoring. Each computer can be connected to the web server by the Ethernet network to view the working status and control the unit remotely.

# Working Flow Schematic Diagram



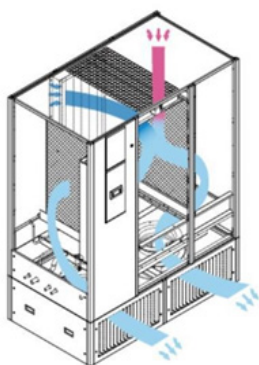
Free Cooling

This is the standard optimum cooling mode as the unit utilizes the outside air to cool the room via variable speed EC supply fans. The fan speed modulates with the room cooling demand to provide the most energy efficient method of cooling. When the ambient temperature is 5°C or more below the indoor temperature, fresh air free cooling will supply 100% of the cooling capacity.



Direct Adiabatic Evaporation Cooling

When the outside ambient temperature is above 20°C the adiabatic function is activated. The units' own internal intelligent control then monitors the room humidity, and when this pre-set value falls outside of acceptable limits, the adiabatic function is stopped and the room air is extracted until the humidity values fall back inside the programmable limit. The EC fans continue to run to ensure make-up air is still introduced to the room.



Free Cooling at extreme low outdoor temperature

During periods of extreme low outdoor temperatures, the return air damper will modulate to temper the outside air with warmer inside air. This is to maintain design supply air temp in low ambient conditions.

# Technical Parameters

Unit model		20F2A2
Air supply arrangement (1)		DN
Cooling capacity (2)	kW	34
Free cooling capacity (3)	kW	32.2
Supply Fan		
Type		EC Centrifugal fan
Qty.	n.	2
Air volume	m <sup>3</sup> /h	18000
Input Power	kW	2.8
Current	A	4.5
Water consumption	kg/h	90.9
Water pump		
Type		Centrifugal Impeller Pump
Water flow	L/min	21.2
Input power	kW	0.12
Current	A	3.2
Power supply		
Power source		400V/3Ph/50Hz
Unit max. operating power input	kW	4.8
Unit max. operating current	A	7.7
Overall unit dimensions and weight (4)		
Width	mm	1900
Depth	mm	1056
Height	mm	2460
Weight	kg	575
Main unit dimensions and weight		
Width	mm	1900
Depth	mm	1056
Height	mm	1980
Weight	kg	385.5
Packaged main unit dimensions		
Weight	mm	2170
Depth	mm	1300
Height	mm	500
Weight	kg	514
Fan section dimensions and weight		
Width	mm	1900
Depth	mm	1050
Height	mm	500
Weight	kg	189.5
Packaged fan section section dimensions and weight		
Width	mm	2060
Depth	mm	1210
Height	mm	660
Weight	kg	226

(1)— DN: downflow.

(2)— The cooling capacity is closely related to temperature and humidity of inlet air. Cooling capacity at standard operating (@ Tindoor 25°C, @ outside air dry bulb temperature 30°C, RH30% adiabatic cooling mode).

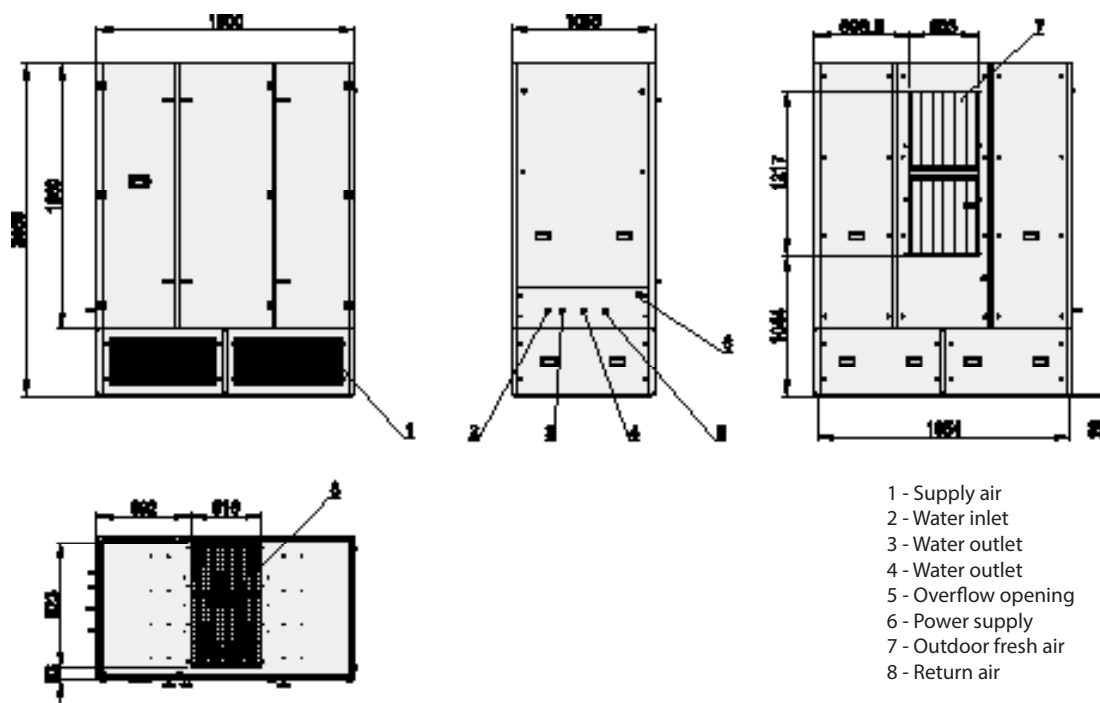
(3)— Indoor temperature and outdoor temperature difference ( $\Delta T$ ) is 5°C

(4)— Dimensions after main unit and fan section installed on site.



# Unit Dimension Drawing

20F2A2





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Product design and specification subject to change without prior notice.