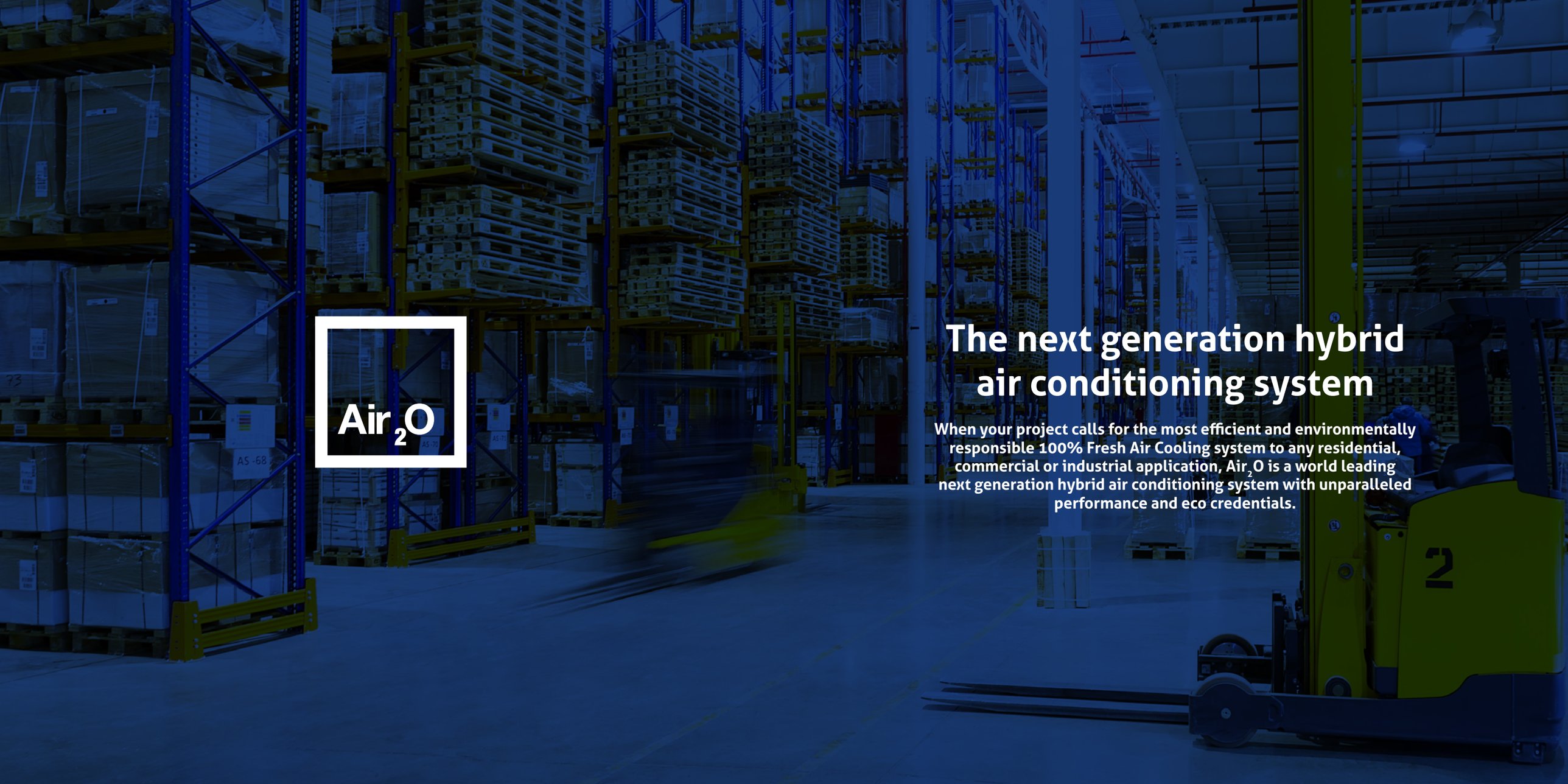
Intelligent cooling

metco qatar



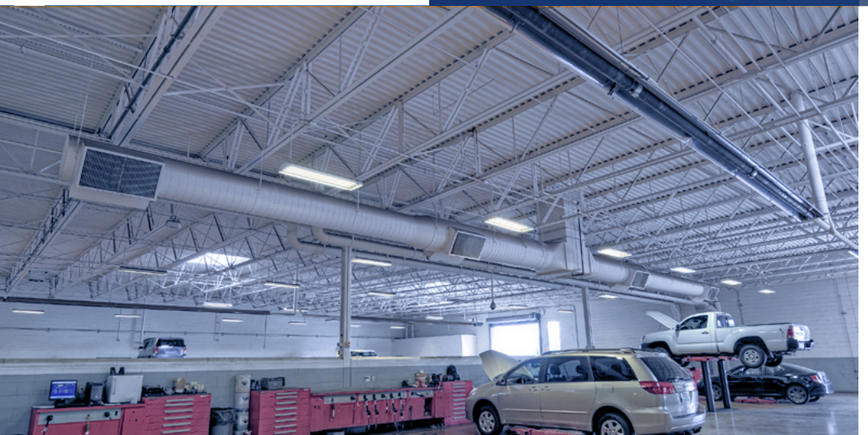
The next generation hybrid air conditioning system

When your project calls for the most efficient and environmentally responsible 100% Fresh Air Cooling system to any residential, commercial or industrial application, Air_2O is a world leading next generation hybrid air conditioning system with unparalleled performance and eco credentials.









The way forward

Air_2O is the next generation hybrid air conditioning system, utilizing a unique combination of indirect and direct evaporative cooling to achieve 80% energy saving over Dx compressor based systems.

Air_2O's unique ability to become hybrid and incorporate traditional Dx or chilled water cooling means Air_2O can be employed the world over to provide energy efficient cooling without compromise.

Air_2O IDEC Technology has a truly global reach, with applications and solutions the world over, regardless of environment or climate. Using intelligent control systems and innovative, efficient cooling technologies to save up to 80% on energy usage when compared to traditional cooling systems. From comfort cooling large office spaces in Europe to thermal energy recovery of Shopping Malls in the Middle East, outdoor cooling of football stadiums and theme parks in Asia or pharmaceutical storage and process cooling in the USA. Whatever the application or requirement Air_2O has a system to accommodate.

Air_2O's cutting edge design software is developed specifically to take the guess work out of the design and plant selection phase, giving you all the information needed to confidently design a solution for any application.

Air_2O Efficiency

An Air Conditioning system that utilizes IDEC technology with a +9 COP and +30 EER. Delivering 100% fresh air, and energy saving up to 80% over compressor based systems.

To save as much energy as possible Air_2O air conditioning units can operate in three different stages: Free cooling, Direct evaporative cooling and Indirect/Direct evaporative cooling, depending on the outdoor temperature and relative humidity. The combination of these three stages, maximizes the energy savings.

80% Economical up to 80% saving on energy consumption.

Environmentally friendly as no harmful gases are used in the process.

O_2 100% healthy, oxygen rich fresh air. No recycling stale air.

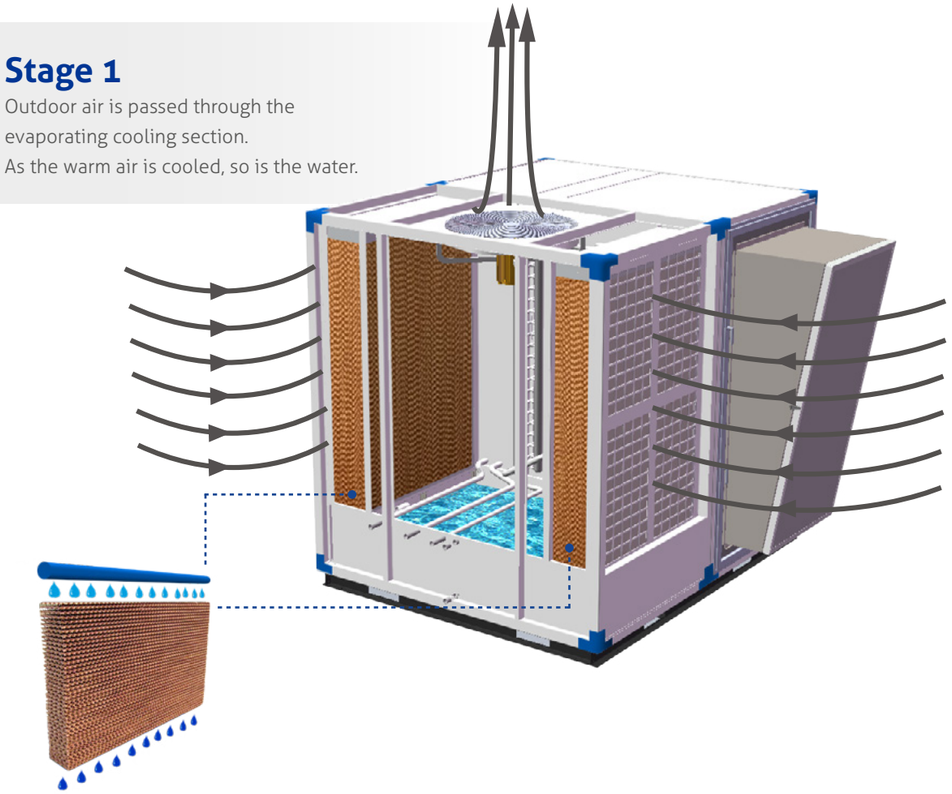
Effective delivery with temperatures as low as 50°F (10°C)

Two Stage Cooling **How it Works**

At it's heart Air_2O uses a two stage evaporative cooling solution.

Stage 1

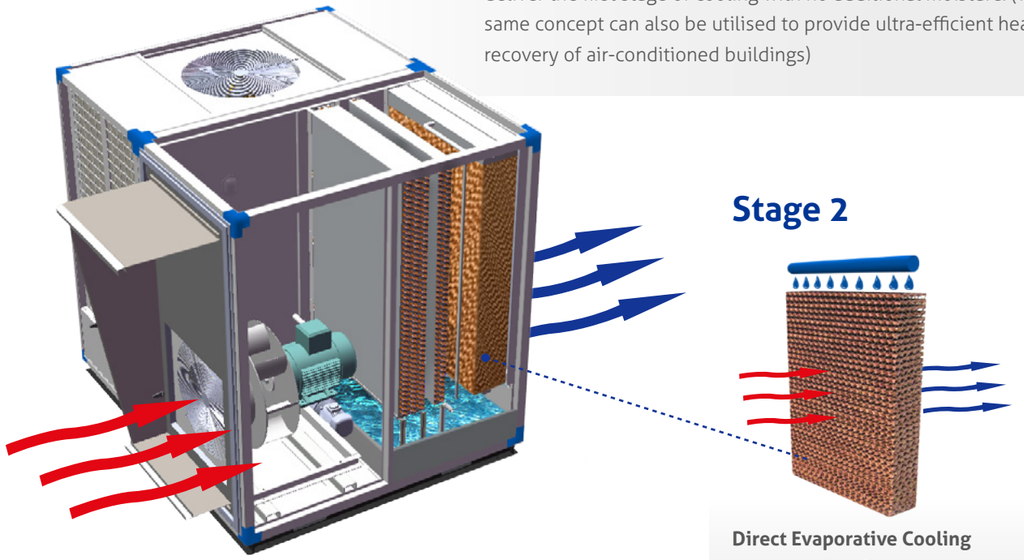
Outdoor air is passed through the evaporating cooling section.
As the warm air is cooled, so is the water.



Stage 1

Indirect Evaporative Cooling

This cool water is then transfered to a high efficiency heat exchanger, over which the primary outdoor air is passed, to deliver the first stage of cooling with no additional moisture. (The same concept can also be utilised to provide ultra-efficient heat recovery of air-conditioned buildings)



Stage 2

Direct Evaporative Cooling

The air is then further cooled as it passes the second cooling stage.

The combination of these two stages delivers the highest performing evaporative cooling system available in the world today. Making it possible to replace compressor based DX systems with Indirect/Direct (IDEC) systems with a fraction of the power consumption.

Features +

Standard Features
5 times more efficient than 14 SEER/ 2.5 COP

Utility Connections Made Easy
Electric utility knockouts are provided through the side of the unit. Utility connections can be made quickly and with a minimum amount of field labour.

Water Arrester
Utilizing a unique water arrester louver, placed in the primary air flow, the unit eliminates any water carry over in the primary supply air.

Cooling Media
All the cooling media are installed in aluminum cassettes for easy removal and replacement.

Water Sump
The bottom section of the unit is constructed from a non-corrosive, stainless steel, long-lasting, water tight pan, sectioned into 3 compartments. 2 of which are positioned below the 3 cooling media to collect and facilitate the return of the water back to the pump.

Fan System
Th unit operates over a wide range of design conditions with an electrically commutated fan motor. The unit can easily match many types of application and can provide greater on site flexibility to match comfort requirement.

Control Circuit
A printed circuit board containing diagnostic indication, a low voltage terminal strip, LCD display and multi function keys. Various connections are provided to simplify the field interface of external controls. The control system is located behind an isolated maintenance panel to allow the access cover to be removed for trouble shooting and maintenance without affecting normal system operation. All wiring internal to the unit is colour coded.

Protected Pump
The primary pump is protected for both thermal cut out and damage caused by operation without the correct system water level, by water level sensors in the unit sump tank.

System Integration
The unit is designed to integrate fully with any existing thermostat or BMS.

Durable Finish
With a heavy duty cabinet with Pentapost construction made to ensure durability and electro-static-paint provides a better paint bond, which resists corrosion and rust creep, ensures less fading when exposed to sun, neutral colour blends into surrounding areas

Replacement Parts
The unit components require no specialized training to remove or replace meaning no need to stock specialist parts.

Benefits

Lower Installation Cost
Installation time and costs are reduced by easy power and control wiring connections. The base dimension means less space is required on the ground or roof. Installation options are ducted thermostatically controlled state of the art.

A computerized process system is used to ensure smooth operation, and provides Auxiliary functionality. All units are completely wired and tested before shipment undergoing rigorous quality control procedures to ensure unit performance.

Exclusive Design
With the combined heat rejector cooling and heat exchanger approach, the unit provides at least twice the effectiveness of standard thermal wheel systems. Ensuring operation at high levels of efficiency.

Low Operating Sound Level
The cross directional air flow carries the normal operating noise down and away from the surroundings. The rigid filter panel effectively isolates air noise.

Low Maintenance
The self- drain coil and self-purge/dry procedures along with permanently lubricated fan bearings drastically reduce the need for maintenance, increasing the longevity and efficiency of the unit.

Unique Indirect Coil
The system incorporates a unique coil with copper tubes an enhanced aluminum fin construction that improves heat transfer for maximum efficiency and durability, and is designed in such a way to facilitate self-drainage, providing protection against freezing.

Optional Accessories
UV water filtration built in. VFD to optimize CFM.
Air O Thermostat, optimized for the unit.

Self-Purge
The system can be calibrated to self-purge at set intervals, in order to control TDS build up. The system also utilizes a media drying procedure at intervals to increase the longevity of the cooling media.

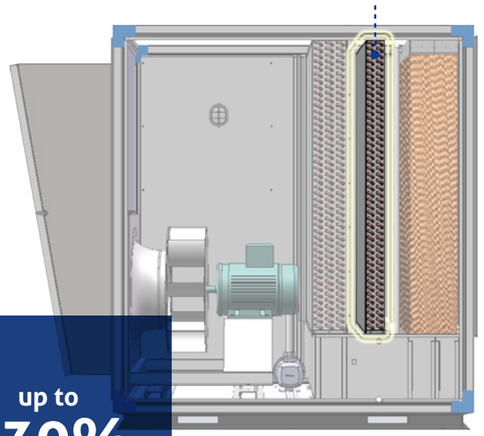
Easy Service Access
Service panels allow easy access to the units internal components, making component removal / replacement and servicing simple.

Hybrid Intelligence

Air$_2$O systems integrate several cost efficient technologies to deliver energy efficient cooling without compromise

Air$_2$O has a unique ability to become hybrid and incorporate traditional refrigerant or chilled water-cooling coils.

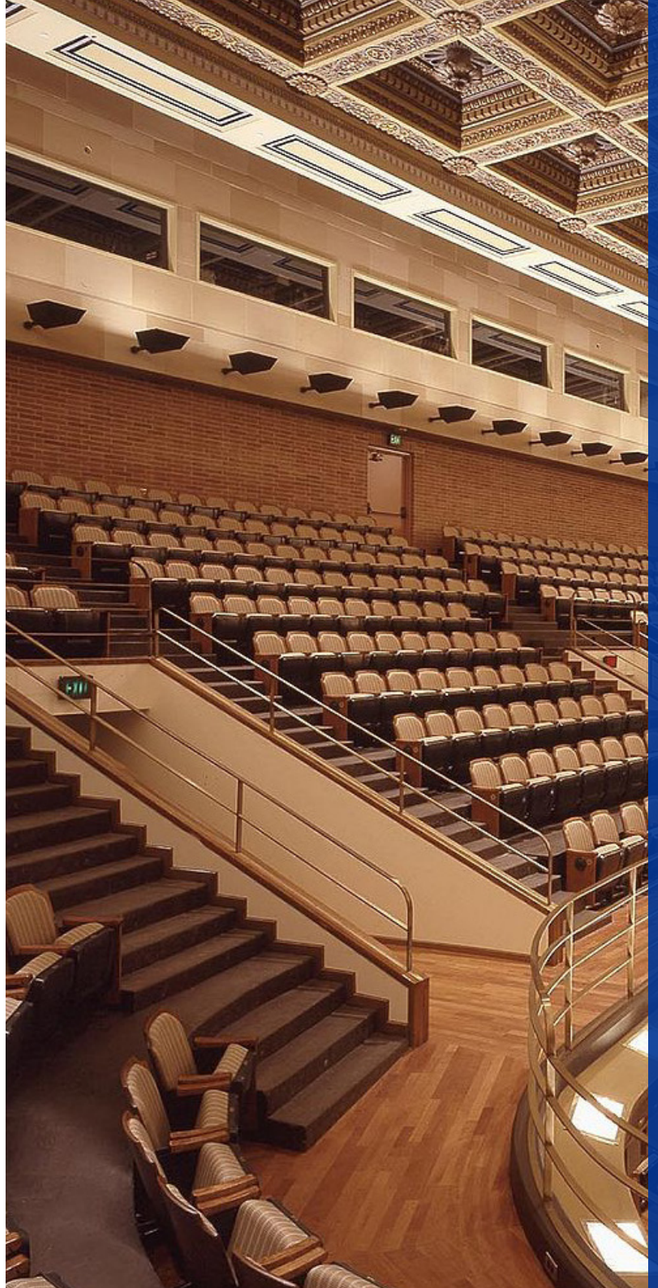
Hybrid - Dx/chilled water/hot water coil



up to
130%
WB efficiency

Air$_2$O's equally unique and intelligent control system can automatically respond to external weather conditions, switching its cooling strategy from evaporative cooling to air-conditioning only when needed.

This ensures consistent performance, high efficiency and significant energy savings, meaning Air$_2$O hybrid cooling technology can be applied anywhere in the world, providing energy efficient cooling without compromise.



Standard Technical Features Include:

- Built-in economiser function
- High efficiency direct drive plug fan
- High efficiency secondary axial fan with low noise design
- Separate primary and secondary water circuits for optimum efficiency
- Peak power consumption 400 to 450 watts per ton
- 480, 380, 220v 50/60 Hz single or three phase power
- All stainless steel water reservoirs
- Single point electric connections
- Single point water inlet and drain connections
- 24-volt control panel compatible with any type of thermostat
- Automatic water quality management system, field adjustable for specific site requirements
- Water limit switches for pump protection

Applications

Residential

Air_2O superior cooling technology provides cool, fresh and clean air to any home. Air_2O outperforms traditional conventional direct evaporative (swamp) coolers by some 40% and removes the problems of high humidity, sometimes associated with direct evaporative coolers, to provide energy efficient cooling without compromise. Rebates are available in many U.S. states for the implementation of Air_2O technology.

Outdoors

Operating on 100% fresh air Air_2O is the superior outdoor cooling technology being utilized in the world today. Air_2O cooling technology is the outdoor cooling of choice for Universal Studios in Singapore, Aspire, Qatar and Al Maktoum Hospital, Dubai.

Commercial & Public Buildings

Air_2O superior cooling technology provides cool, fresh and clean air to any commercial space or office building. In locations where high volumes of fresh air are required to meet the demands of occupants and local design codes, Air_2O technology far outperforms a traditional air conditioning approach.

Shopping Malls

In applications such as shopping malls, where a high introduction of fresh air is required together with cooling, Air_2O superior cooling technology can efficiently meet the cooling and fresh air demand. In such venues Air_2O technology far outperforms a traditional air conditioning approach.

Data Centres

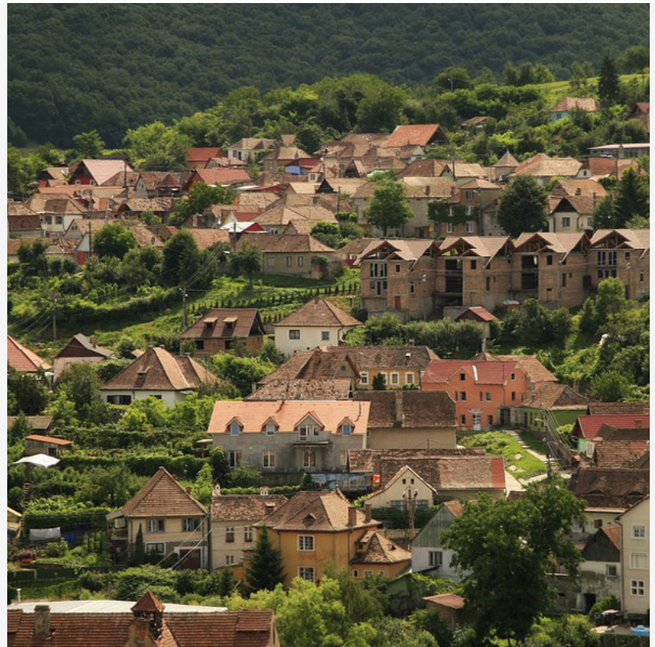
Following revised ASHRAE temperature and humidity guidelines for data centres, alternative and more efficient cooling technologies can now be utilized. Air_2O cooling technology can be applied within Data Centres/Server Rooms around the world, providing significant energy savings. Furthermore Air_2O technology can also be used as a 100% recycle system, removing the issue of poor indoor air quality that can be created by 100% fresh air systems.

Industrial Buildings

Air_2O superior evaporative cooling technology is, in many cases, the only practical method of delivering efficient comfort cooling to these large facilities. Delivering both ventilation and cooling Air_2O can efficiently cool large spaces or provide spot/local cooling to specific areas or locations within your factory, warehouse or production facility.

Schools, Colleges & Universities

Many studies have been done to reflect the positive impact the introduction of fresh air has on student concentration levels and subsequent performance. Air_2O cooling technology can provide efficient, cool, fresh and invigorating conditions to any educational establishment.



Heat Recovery & FAHU

When utilized for heat recovery in hot climates, Air_2O technology is at least twice as efficient as traditional heat recovery methods such as a thermal wheel. It is equally effective in humid, semi-humid and dry climates, with 50% less static pressure through the heat recovery process, providing the highest possible efficiency within heat recovery technology. Air_2O technology is the worlds most efficient FAHU.

ACSESS™

Revolutionary Supervisory Control System

Engineers design their cooling system based on one single extreme condition, whether in the summer or the winter, the ASHRAE Design Condition.

But in reality, we live in spectrum of conditions that vary between hot, mild, cold, dry and wet.
Depending on the specific condition, we could use a different cooling strategy, including Traditional Direct Expansion (DX) AC, Direct Evaporative, Indirect Evaporative, Indirect/Direct (IDEC) and/or Economizer... (true hybrid operation).

The main problem is how to control all those systems together, the ACSESS™ Control System provides true hybrid operation for a variety of cooling equipment. ACSESS™ control provides the most efficient cooling strategy at any given time and therefore greatest cost reduction on a real-time operating basis.

The system uses a psychometric calculation to determine and then select the best cooling approach at any point in time. Psychometric calculations are based on

- 1993 ASHRAE Handbook: Fundamentals
- The ASAE D271 Standard Psychometric Data

Air
Condition
Smart
Energy
Saving
System

Operations

The control system creates a virtual psychometric chart with consideration of specific elevation entered by the user. Thus, the control strategy is location specific anywhere in the world. This allows the system to instantly plot an effective comfort zone for that location based on a series of desired indoor environmental input parameters, including indoor temperature and humidity.

The system then uses state-of-the art electronic controls and sensors to plot the outdoor condition on the virtual psychometric chart.

The ACSESS™ system combines outdoor conditions and the established comfort zone to instantly select the most efficient cooling strategy, thus assuring the highest equipment efficiency. As ambient conditions or comfort zone inputs change, the system will recalculate and choose the best available cooling strategy. Depending on the equipment, these strategies can include fresh air cooling (economizer), direct evaporative, indirect evaporative, IDEC,and/or DX standard air conditioning.

Air_2O CRS System Variants

Standard SERIES

S SERIES

Air_2O's Standard CRS series offers a range of packaged IDEC (Indirect-Direct Evaporative Cooling) systems providing efficient cooling at up to 80% less energy than traditional Dx systems, with zero GWP, CFC'S and HFC's.

HYBRID SERIES

H SERIES

Air_2O technology has the unique ability to become hybrid, and the Hybrid (H) CRS series offers a range of packaged fully hybrid IDEC (Indirect-Direct Evaporative Cooling) units incorporating a traditional Dx refrigerant system, providing efficient cooling at up to 80% less energy than conventional stand alone Dx systems,

Energy Recovery SERIES

ER SERIES

Air_2O's Energy Recover (ER) CRS series, offers a range of packaged IEC (Indirect Evaporative Cooling) Energy Recovery systems, providing ultra efficient energy recovery.

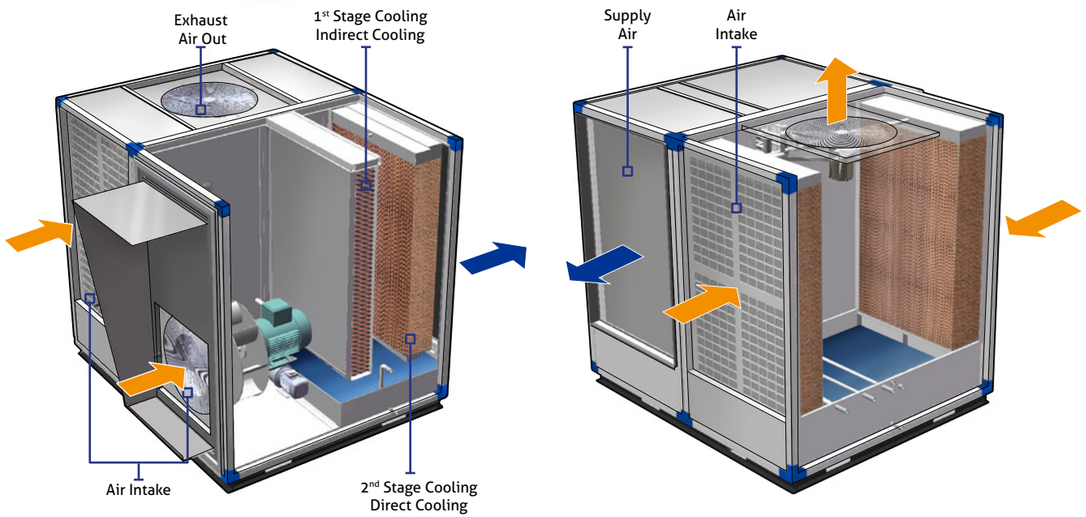
SEMI HYBRID SERIES

SH SERIES

Air_2O's Semi Hybrid (SH) CRS series offer a range of packaged IDEC (Indirect-Direct Evaporative Cooling) systems incorporating a chilled water or hot water coil to provide a truly year round solution whilst consuming up to 80% less energy than traditional systems.

Standard SERIES

STANDARD CRS



System Operation

At its heart, Air_2O IDEC technology utilizes a two stage evaporative cooling solution - in the first stage, outdoor air is passed through the Heat Rejecter section of the unit, which houses an evaporative cooling system optimised to cool water. As the warm air passes the wetted media, some water is evaporated and the resulting enthalpy change cools the water.

This cooled water is then transfered to a high efficiency heat exchanger within the supply section of the unit, over which the primary supply air is passed, to deliver the first stage of cooling with no added moisture -Indirect Evaporative Cooling. The air is further cooled as it passes the second cooling stage - Direct Evaporative Cooling.

The combination of these two stages delivers the highest performing evaporative cooling system in the world today.

Air_2O's equally unique intelligent control system, ACSESS, automatically responds to external weather conditions, continuously adapting its cooling strategy to run only the most efficient cooling systems for the ambient condition of the moment, This means that the higher energy systems are only used when needed, ensuring consistent performance, high efficiency and significant energy savings.

Features & Benefits

- High efficiency direct drive plug fan.
- High efficiency secondary axial fan with low noise design.
- Separate primary and secondary water circuits for optimum efficiency.
- 24 volt control panel compatible with any external interface / control / Thermostat.
- Automated water quality management system, field adjustable for specific site requirements.
- Water limit switches for pump protection.
- UV filtration.
- Penta Post construction.
- Built in economiser function.

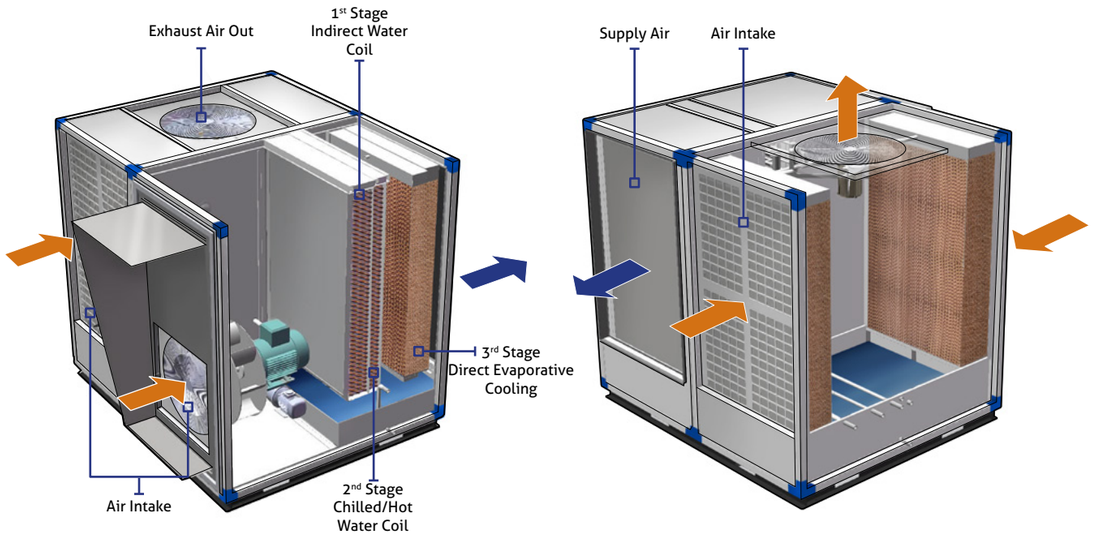
Standard Unit Sizes Available

	Volume (CFM)	Volume (m3/s)	Volume (m3/h)	Cooling Capacity* Room (Ton)	Cooling Capacity* Nominal (Ton)
S-CRS-2500	2500	1.18	4230	5	12
S-CRS-5000	5000	2.35	8460	10	24
S-CRS-7500	7500	3.53	12690	15	36
S-CRS-10000	10000	4.70	16920	20	48
S-CRS-12500	12500	5.88	21150	25	60
S-CRS-15000	15000	7.05	25380	30	72
S-CRS-20000	20000	9.40	33840	40	84
S-CRS-25000	25000	11.75	42300	50	96
S-CRS-30000	30000	14.10	50760	60	108
S-CRS-35000	35000	16.45	59220	70	120
S-CRS-40000	40000	18.80	67680	80	132
S-CRS-45000	45000	21.15	76140	90	144
S-CRS-50000	50000	23.50	84600	100	156

*Cooling capacity measured considering outdoor conditions 100°F (37°C) DBT and 70°F (21°C) WBT - Room Temperature 78°F (25°C) .

SEMI HYBRID SERIES

SEMI-HYBRID CRS



System Operation

At its heart Air_2O Semi Hybrid IDEC technology utilizes a two stage evaporative cooling solution, in conjunction with either a chilled water coil for additional cooling or hot water coil for heating. In the first stage, outdoor air is passed through the Heat Rejector section of the unit, which houses an evaporative cooling system optimised to cool water.

This cooled water is then transfered to a high efficiency heat exchanger within the supply section of the unit, over which the primary supply air is passed, delivering the first stage of cooling with no added moisture -Indirect Evaporative Cooling. The air is further cooled as it passes the second cooling stage - Direct Evaporative Cooling, or the chilled water coil.

Air_2O's equally unique intelligent control system, ACSESS, automatically responds to external weather conditions, continuously adapting its cooling strategy to run only the most efficient cooling systems for the ambient condition of the moment. This means that the higher energy systems are only used when needed, ensuring consistent performance, high efficiency and significant energy savings.

Features & Benefits

- Built in economiser function.
- High efficiency direct drive plug fan.
- High efficiency secondary axial fan with ow noise design.
- Separate primary and secondary water circuits for optimum efficiency.
- 24 volt control panel compatible with any external interface / control / Thermostat.
- Automated water quality management system, field adjustable for specific site requirements.
- Water limit switches for pump protection.
- UV filtration.
- Penta Post construction.

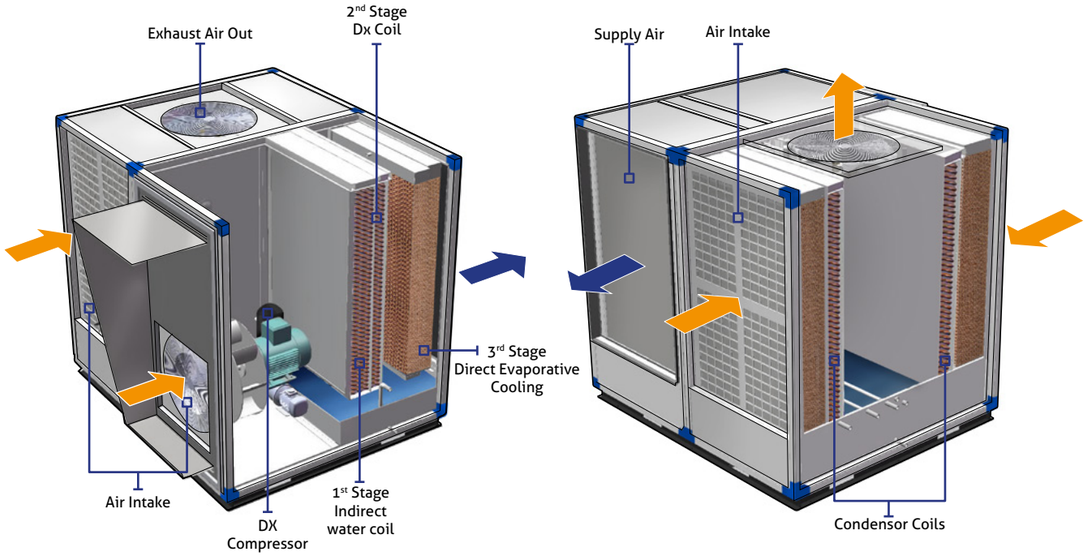
Semi Hybrid Unit Sizes Available

	Volume (CFM)	Volume (m3/s)	Volume (m3/h)	Cooling Capacity Room (Ton)	Cooling Capacity Nominal (Ton)
SH-CRS-2500	2500	1.18	4230	15	22
SH-CRS-5000	5000	2.35	8460	30	44
SH-CRS-7500	7500	3.53	12690	45	66
SH-CRS-10000	10000	4.70	16920	60	88
SH-CRS-12500	12500	5.88	21150	75	110
SH-CRS-15000	15000	7.05	25380	90	132
SH-CRS-20000	20000	9.40	33840	105	154
SH-CRS-25000	25000	11.75	42300	120	176
SH-CRS-30000	30000	14.10	50760	135	198
SH-CRS-35000	35000	16.45	59220	150	220
SH-CRS-40000	40000	18.80	67680	165	242
SH-CRS-45000	45000	21.15	76140	180	264
SH-CRS-50000	50000	23.50	84600	195	286

*Cooling capacity measured considering outdoor conditions 100°F (37°C) DBT and 70°F (21°C) WBT - Room Temperature 78°F (25°C) .

HYBRID SERIES

HYBRID CRS



System Operation

Air_2O Hybrid IDEC technology combines a two stage evaporative cooling solution with an integrated Dx system. Utilizing Air_2O's equally unique intelligent control system, ACSESS, automatically responds to external weather conditions, continuously adapting its cooling strategy to run only the most efficient cooling systems for the ambient condition of the moment. This means that the higher energy systems are only used when needed, ensuring consistent performance, high efficiency and significant energy savings.

Conditioning the ambient supply air with the indirect coil as the first stage of cooling significantly reduces the size of the evaporator coil, saving energy and increasing efficiency.

The condensor coils, located within the heat rejecter section of the unit, ensure the air onto the coil is always pre cooled to the WB temperature of the ambient, dramatically increasing their efficiency when compared to traditional condenser systems.

The combination of these innovations deliver the highest performing Hybrid Evaporative Cooling system in the world today.

Features & Benefits

- Built in economiser function
- High efficiency direct drive plug fan.
- High efficiency secondary axial fan with low noise design.
- Separate primary and secondary water circuits for optimum efficiency.
- 24 volt control panel compatible with any external interface / control / Thermostat.
- Automated water quality management system, field adjustable for specific site requirements.
- Water limit switches for pump protection.
- UV filtration.
- Penta Post construction.
- Integrated Dx System.

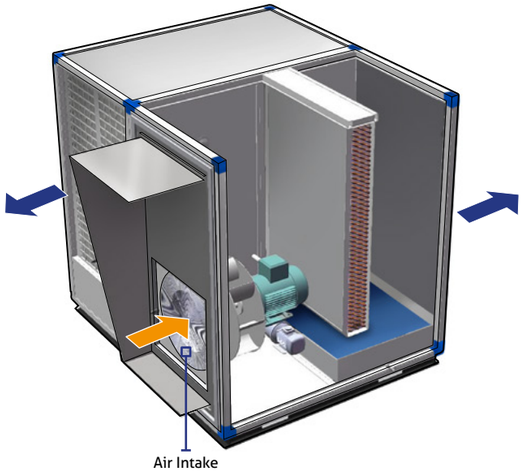
Hybrid Unit Sizes Available

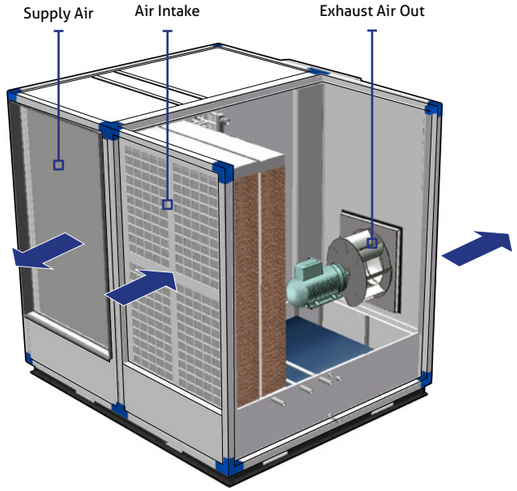
	Volume (CFM)	Volume (m3/s)	Volume (m3/h)	Cooling Capacity Room (Ton)	Cooling Capacity Nominal (Ton)
H-CRS-2500	2500	1.18	4230	10	17
H-CRS-5000	5000	2.35	8460	20	34
H-CRS-7500	7500	3.53	12690	30	51
H-CRS-10000	10000	4.70	16920	40	68
H-CRS-12500	12500	5.88	21150	50	85
H-CRS-15000	15000	7.05	25380	60	102
H-CRS-20000	20000	9.40	33840	70	119
H-CRS-25000	25000	11.75	42300	80	136
H-CRS-30000	30000	14.10	50760	90	153
H-CRS-35000	35000	16.45	59220	100	170
H-CRS-40000	40000	18.80	67680	110	187
H-CRS-45000	45000	21.15	76140	120	204
H-CRS-50000	50000	23.50	84600	130	221

*Cooling capacity measured considering outdoor conditions 100°F (37°C) DBT and 70°F (21°C) WBT - Room Temperature 78°F (25°C) .

Energy Recovery SERIES

ENERGY RECOVERY CRS





System Operation

Air_2O ER systems use Evaporative Heat Recovery (the term we use when we employ direct evaporative cooling in the exhaust air stream).

Return air is cooled adiabatically by means of a direct evaporative cooling pad. The water utilised is cooled to within approximately 0.5°c of the return air wet bulb temperature.

This cool water is then transferred to the high efficiency heat exchanger facing the intake (outdoor) air.

The high Delta T this creates provides higher heat transfer and higher energy recovery with only 50% of the Static pressure of a traditional Thermal wheel approach.

The result of this innovative approach to thermal energy recovery means Air_2O ER systems are at least twice as effective as thermal wheels and the highest performing evaporative recovery system in the world today.

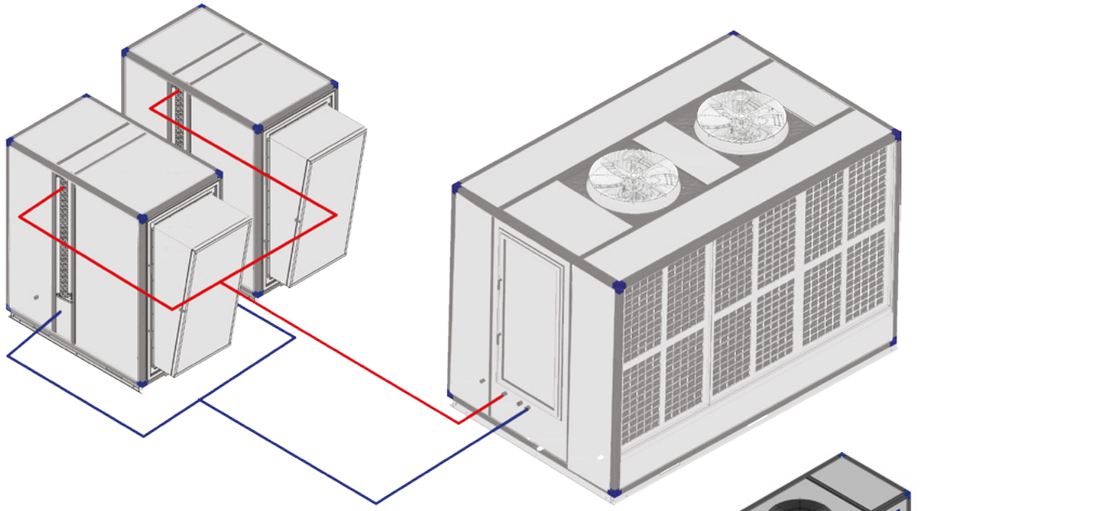
Features & Benefits

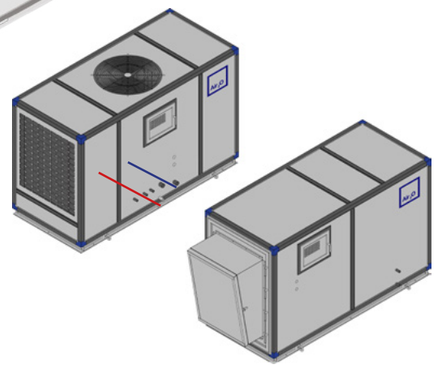
- Built in economiser function.
- High efficiency direct drive plug fan.
- 24 volt control panel compatible with any external interface / control / Thermostat.
- Automated water quality management system, field adjustable for specific site requirements.
- Water limit switches for pump protection.
- UV filtration
- Penta Post construction

Energy Recovery Unit Sizes Available

	Volume (CFM)	Volume (m3/s)	Volume (m3/h)
ER-CRS-2500	2500	1.18	4230
ER-CRS-5000	5000	2.35	8460
ER-CRS-7500	7500	3.53	12690
ER-CRS-10000	10000	4.70	16920
ER-CRS-12500	12500	5.88	21150
ER-CRS-15000	15000	7.05	25380
ER-CRS-20000	20000	9.40	33840
ER-CRS-25000	25000	11.75	42300
ER-CRS-30000	30000	14.10	50760
ER-CRS-35000	35000	16.45	59220
ER-CRS-40000	40000	18.80	67680
ER-CRS-45000	45000	21.15	76140
ER-CRS-50000	50000	23.50	84600

CRS Split Variants





All Air_2O model variants are available in SPLIT configuration, giving the consultant, contractor or facilities manager the ability to design and incorporate Air_2O technology in a modular format, where multiple smaller supply sections can be fed from a single larger heat rejection unit (similar to a traditional condenser farm arrangement) or in applications or environments where space to accommodate the units is limited, in retrofits for example.

The SPLIT variants of the Various CRS ranges take full advantage of the same great benefits with in Air_2O's packaged IDEC, Hybrid, Semi Hybrid and Energy Recovery systems whilst providing added flexibility and versatility.

System Operation

Air_2O SPLIT systems incorporate all of the great innovations within the Air_2O packaged systems and utilize a simple control interface connection and associated interconnecting pipework.

"Air_2O ensures visitors to Universal Studios Singapore stay cool and comfortable during their visit, with only 20% of the energy used compared with traditional air conditioners."

Carlx F. Cruz
C3 Engineering Pre. Ltd., Singapore

e. info@air2o.com

w. www.air2o.com