Liquid Desiccant Air Conditioning Systems

High-Efficiency Industrial Dehumidification
High-Efficiency External Air Dehumidification
Energy-Efficient Heat Pump Drying

For Industries Use Only

www.asciences.com
About ASC

Demand for industrial dehumidification can be traced back to print drying processes in the 1910s. In the 1930s American General Corporation, Dr. Russel Bichowsky, proposed to develop a large-capacity dehumidifying technology with extensive industrial applications. Decades later, drying and dehumidification now play important roles in industrial processes, biotechnological and medical development, and commercial buildings despite contributing immensely to energy consumption.

In 1984, Professor James R. Beckman of Arizona State University and technical expert Mr. Walter F. Albers discovered a breakthrough technology through a series of salt solutions and mass and heat transfer tests along with Dewvaporation experiments (desalination technology) belonging to the United States Department of Energy. This technology aimed to increase efficiency by at least 40%-70% compared to traditional dehumidification designs.

It is thus our pleasure to introduce ASC, which has 27 years of experience in high efficiency dehumidification technology. It can be easily applied to industrial processes and commercial environments to provide low-cost green technology with long lifecycles. We also provide innovative and sustainable added value for your products and services.
Features of LDAC
Stable, Efficient, Safe, Comprehensive

Stable Management
- Easily operated and maintained with one start/stop key and a modular design, complete with a PLC microcomputer operating and early warning system.
- No complex moving parts or mechanical design— the system is driven by only five components: fans, pumps, industrial-grade Copeland compressor (optional).
- Effectively reduce burden on electrical equipment using advanced dehumidification technology with a self-cleaning function, round-the-clock operability, and long lifecycle.

Flexible and Efficient Installation
- 3.5 times lifecycle and 30%-40% lower long-term operating costs than traditional air-conditioning, and 55%-65% lower than standard systems, and can be powered by electricity, exhaust heat (cold) source, renewable energy and heat pump.
- Directly replace old air-conditioning systems or supplement existing ones.

Safer Operation
- Environmentally friendly technology uses natural energy-saving dehumidification solutions and prevents moisture dissipation and evaporation without worrying about safety regulations—sustainable, environmentally-friendly, zero-loss, and zero-pollution.
- Solution-based dehumidification air-conditioning systems achieve precise humidity control and balanced energy consumption through the introduction of external air, and improves air quality by filtering 99% of viruses, bacteria, microbes, dust, odor, AMC, etc. In addition, it also can inhibit 100% of mold growth, ensure indoor CO2 concentration at lower level and improve health of operator.

Improved Functionality
- Independently adjust temperature and humidity (both humidification & dehumidification) rather than rely on traditional energy-inefficient air-conditioning that uses low temperature to reduce humidity. Solution-based dehumidification is a powerful tool to precisely control the humidity.
- Achieve remote management and control using international open standard in communication protocol.

Excellent Systems
- Stable
- Safe
- Energy saving
- Efficient

Hassle-free!

Outstanding Performance
- Dehumidification
- Desiccation
- Humidification
- Humidity control

All-in-one!
**Excellent Efficiency**

Suitable for environments that demand constant temperature and humidity or low humidity such as industrial buildings, factory processes, museums, storage spaces, clean rooms, biotechnological and medical environments, creating comfortable ambient in commercial buildings, etc.

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**Operating Principle**

**Liquid Desiccant Dehumidification Process**

Desiccant solution is natural, highly stable, safe, and a strong absorbent—it efficiently absorbs ambient humidity due to low surface vapor pressure.

**Regeneration Process**

To maintain operation and performance of the desiccant solution, heat is applied to raise surface vapor pressure above the water vapor pressure of air (the reverse of the differential pressure gradient driving dehumidification). Subsequently, water evaporates into the air and the solution becomes concentrated and is regenerated. The latent heat of vaporization of water is usually absorbed by the intercooler heat exchanger (section effector).

The regeneration process only require a low heat source, which can be recovered from waste heat above 55°C, solar energy, heat pumps, boilers, steam, and steam condensate.
1. High humidity air enters the liquid desiccant air conditioning unit.

2. Humidity from the air is removed by the desiccant solution which is composed of a salt solution in water.

3. Dry and cool air leaves the air conditioning unit to provide room cooling and dehumidification.

4. The liquid desiccant, which is now saturated with moisture from the treated air, is sent to the regenerator.

5. A heat source warms the liquid desiccant in the regenerator where the moisture is released to the exhaust air.

6. The economizer increases the heat transfer efficiency and reduces the energy consumption of the liquid desiccant system.
Easily Achieves 2g / kg Dry Air (DA)

In industrial process, DA is essential for the production of high-quality products. Traditional air-conditioning employs overcooling to remove excess moisture. By lowering the temperature to dew point, moisture-carrying potential of air is reduced, thus achieving dehumidification. However, this requires the air to be reheated afterwards to a suitable indoor temperature, which doubles energy consumption.

Alternatively, the desiccant wheel system requires extensive preliminary designing of the desiccant wheel, which incurs additional investment, places a burden on renewable energy sources, and also accumulates maintenance costs.

However, you now have a new option—energy-efficient liquid desiccant system. It has a moderate dew point, does not require reheating, cuts desiccant wheel regeneration costs by 50%, and is inexpensive to maintain!
Psychrometric Chart Comparison

OA–B–C–TA  Traditional Dehumidification System Process Path
OA–D–TA  Desiccant Wheel Dehumidification System Process Path
OA–TA  LDAC System Process Path
Comfort Zone

LDAC System Applicable Zone

OA–B–C–TA  Traditional Dehumidification System Process Path
OA–D–TA  Desiccant Wheel Dehumidification System Process Path
OA–TA  LDAC System Process Path
Comfort Zone
Features

Durable External Housing
Multi-layered protection against corrosion and extreme conditions guarantees long lifecycle

Heat Exchanger
Highly efficient heat recovery for complete regeneration of desiccant solution

PP Tank
Built-in molded PP storage tank with seamless welding on PP piping joint—no risk of solution leakage

High-Quality Solution Pump
Solution and dehumidification pumps use high-quality international standards products, ensuring reliable operation

Pump Module
Temperature and humidity are independently adjustable using a cold source (12°C and above) or exhaust heat-driven heat pumps during cooling, dehumidification, and regeneration to save energy.

Scroll Compressor
Efficient and environmentally-friendly refrigerant scroll compressor

Built-in molded PP storage tank with seamless welding on PP piping joint—no risk of solution leakage

Durable External Housing
Multi-layered protection against corrosion and extreme conditions guarantees long lifecycle

High-Quality Solution Pump
Solution and dehumidification pumps use high-quality international standards products, ensuring reliable operation

Scroll Compressor
Efficient and environmentally-friendly refrigerant scroll compressor

Heat Exchanger
Highly efficient heat recovery for complete regeneration of desiccant solution
Intelligent Control System and Interface

Description

1. Built-in PLC unit control does not require additional systems.
2. The system employs real-time monitoring of outside air, supply air, and return air using temperature and relative humidity sensors with precision of ± 0.5°C ± 3% respectively for automatic adjustment to achieve optimum performance.
3. The unit is equipped with a large touchscreen human-machine interface that is capable of displaying on-site parameters, operational control functions, monitoring operational status, diagnosing faults, etc.
   A) Monitored parameters: outside, supply and return air temperature and humidity, status of major components and cumulative operating hours of compressors.
   B) Parameter settings: determine unit operating mode and parameters for desired air conditions.
   C) Timer: unit can be programmed to turn on and off automatically according to a specified schedule.
   D) Historical line-chart: track past statistics of outside, supply and return air temperature and humidity using a historical line-chart.
   E) Units are equipped with remote interfaces for control and monitoring, allowing you to start/stop the unit, access data, monitor, and manage units remotely. For your convenience, the controllers are equipped with powerful data analysis capabilities, real-time monitoring of each project unit’s operation to track energy consumption, and an early warning system to facilitate timely maintenance.
4. The communication interfaces allow units to receive instructions from a building management system (BMS) for monitoring and controlling and provide real-time updates on operational status and information to facilitate real-time adjustments (optional) using open standard communication interface (RS485) and communication protocols (Modbus-RTU).
5. In case of fire, each unit is equipped with an i/o point that can be triggered by an emergency fire control system to shut down the system.
6. Air quality monitoring systems can be customized to use IAQ, CO2, VOC, and other sensors depending on our customers’ needs.
### Performance Specifications ASC-HLD

**ASC-HLD - 1 - COD - 30 - H R**

- **Installation:** L – Left air inlet, R – Right air inlet
- **Exhaust outlet direction:** V – Vertical (top) exhaust, H – Horizontal exhaust
- **Rated supply air capacity:** *100 CMH (m³/h)
- **External air conditions:** COD - Cooling-Only Dehumidification, CHD - Cooling and Heating Dehumidification
- **1:** Full heat recovery, **0:** No heat recovery
- **HLD:** Heat pump with Liquid Desiccant unit, **LD:** Liquid Desiccant-only unit

#### Aqua Sciences, ASC

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1. Measured under summer conditions: outside air dry bulb temperature at 36.0°C, wet bulb temperature at 29.7°C; return air dry bulb temperature at 26.0°C, wet bulb temperature at 20.2°C; supply air dry bulb temperature at 20°C, wet bulb temperature at 14.5°C.
2. Measured under winter conditions: outside air dry bulb temperature at -5.0°C, wet bulb temperature at -7.0°C; return air dry bulb temperature at 20.0°C, wet bulb temperature at 13.8°C; supply air dry bulb temperature at 20.0°C, wet bulb temperature at 13.1°C.
3. The company reserves the right to modify the abovementioned dimensions and appearances and customize models based on manufacturing blueprint or drawing.
# External Dimensions

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