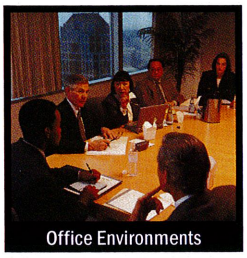
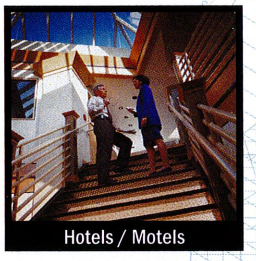
AURA™ by Desert Aire

DEDICATED OUTDOOR AIR SYSTEMS

Q-Pump Inverter+™ for Water Source DOAS Applications


Office Environments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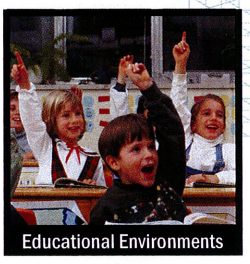
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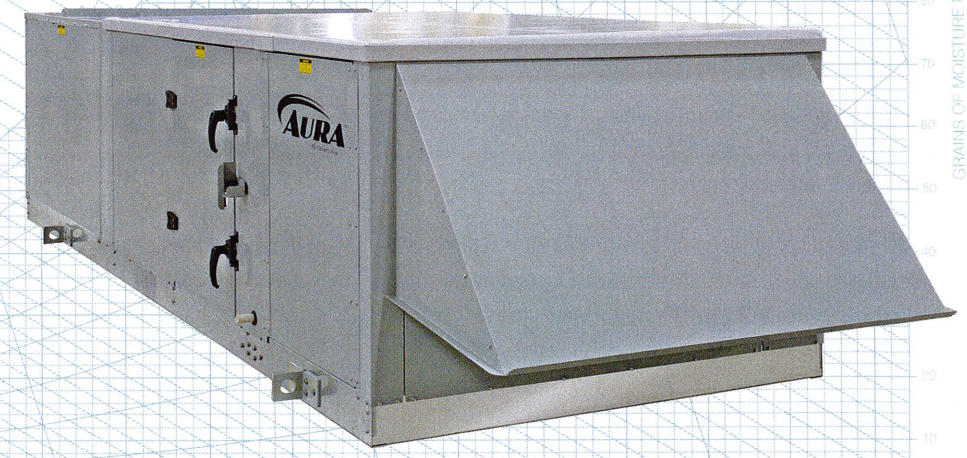


Medical/Nursing

Desert Aire's Aura™ Series Q-Pump Inverter+™ dehumidifiers provide you the most complete solution for your dedicated outdoor air system (DOAS) and high outside air system (HOAS) applications that are being installed on a geothermal, hybrid or tower/boiler loop. Our many options allow you to design the highest energy saving solution for your compliance to ASHRAE 62.1 code ventilation requirements for new construction and renovation projects. This system allows the engineer to separate the latent load of the building and deliver conditioned air to the space which will optimize the performance of the building's heating and cooling systems. Rely on Desert Aire for a total solution for your complete outside air needs.

OPTIMIZING SOLUTIONS THROUGH SUPERIOR DEHUMIDIFICATION TECHNOLOGY

DESERT AIRE
POOL DEHUMIDIFICATION
DEDICATED OUTDOOR AIR SYSTEMS

Indoor Air Quality (IAQ)

Issues of Indoor Air Quality (IAQ)

Several HVAC trade and professional organizations, including ASHRAE, have documented the need for suitable indoor air quality. A primary requirement for maintaining proper IAQ is through the introduction of varying amounts of outdoor air. The down side of adding outdoor air is that it also admits excess moisture into the facility. If this condition is not controlled, it can create an environment for mold, mildew, viruses and other potentially hazardous organisms to flourish. The key to preventing mold formation and growth is to control the relative humidity within the space. A standard air conditioner cannot achieve this since it controls only temperature. Instead, a system must be implemented that can provide full control of both temperature and relative humidity.

Dehumidification

All Aura™ units are designed around a reliable, efficient dehumidification system. There are two main reasons for using the dehumidifier as a base to build a complete ventilation system:

- Significant additional energy costs will result if the latent cooling provided by a standard air handler is used for dehumidification. In contrast, dehumidifiers are the **only** efficient means to regulate moisture removal.
- Aura™ dehumidifiers are configured for the easy addition of optional components needed for a complete solution, options that offer effective solutions that are not otherwise available.

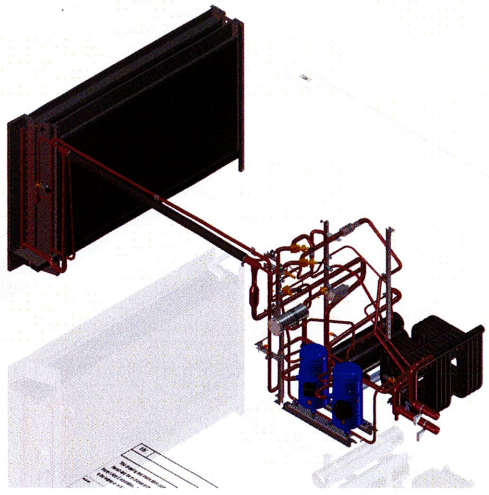

Figure 1 - Basic Refrigeration Circuit Diagram

Aura™ units are engineered and manufactured for excellent performance, dependability and serviceability. Specially designed evaporator coils provide maximum moisture removal. Components are carefully selected for reliable long-term operation.

Dedicated Outdoor Air Systems (DOAS)

The most energy efficient method to remove moisture is through the use of a dedicated outdoor air system that lowers the dew point temperature of supply air to below 55° F. This also helps remove existing moisture from inside a facility. A DOAS design can also be optimized to remove maximum moisture at the lowest electrical consumption rate (Moisture Removal Efficiency, MRE) at both full and part-load conditions. Desert Aire manufactures DOAS units under our Aura™, TotalAire™ and VerticalAire™ product lines.

High Outdoor Air Systems (HOAS)

If the application requires an air handler to accept outside air volumes of 50% to 100% of the supply air volume, conventional sensible heating and cooling units cannot be used. The system must be designed to remove the outdoor air's moisture, but also incorporate a specialized sequence of operation to provide the appropriate sensible cooling and heating. A HOAS design can also be optimized to remove maximum moisture at the lowest electrical consumption rate (Moisture Removal Efficiency, MRE) during both full and part-load conditions. Desert Aire manufactures HOAS units under our Aura™, TotalAire™ and VerticalAire™ product lines.

Q-Pump Inverter+™ Provides Highest COP

Q-PUMP INVERTER+™ - 100% OUTDOOR AIR SYSTEM

Desert Aire's *Q*-Pump Inverter+™ system has been designed with a unique refrigeration circuit and components to achieve the highest Moisture Removal Efficiency (MRE) and Coefficient of Performance (COP) in the industry. This system is protected by several patents applications. The unit includes several innovations including:

- **Variable speed driven compressor**
- **Patent pending non-reverse cycle valve arrangement**
- **Patent pending precision capacity control valve and algorithm**
- **Electronic expansion valves**
- **Liquid-Suction heat exchanger**

Desert Aire's Q-Pump Inverter+™ dehumidifier uses a unique method of heating 100% outdoor winter air without the need for a separate auxiliary heat source such as a gas furnace. The unit constantly monitors off evaporator and supply air conditions to command the compressor capacity to meet the user defined setpoints programmed. At off-peak conditions, the power consumption is reduced exponentially by modulating the compressor command to meet the incoming air loads. The system optimizes the output to achieve the desired leaving air conditions.

The system utilizes an Electronic Expansion Valve (EXV) to insure the best performance and operation at low outside air temperatures while reducing the set-up time. At typical airflows for DOAS, our basic system is effective down to 0°F winter design temperature. With an optional enthalpy wheel, the system is effective down to minus 10°F.

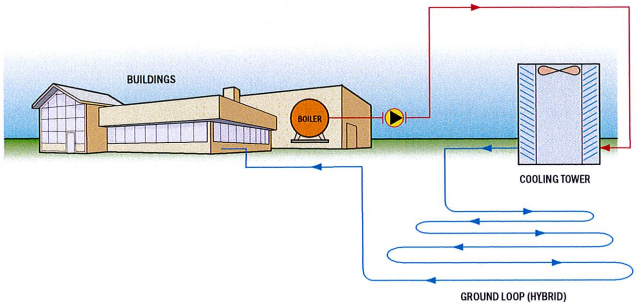

Figure 2 - Hybrid Loop with Boiler and Cooling Tower

The key difference between Desert Aire's Q-Pump Inverter+™ and standard 4-way reversing valve heat-pumps is refrigerant flow through the heat exchangers. Reversing flow creates less than optimal heat exchanger effectiveness and requires compromises in design. Desert Aire's unique valve arrangement and flow path allow for thermal counter-flow heat exchange in all modes of operation. Air-side coils are not repurposed and can be optimized for their intended purpose. This increases heat exchanger effectiveness while allowing velocities for oil return without compromise.

The air-side evaporator, when operating, acts only as an evaporator and is always in counter flow. Similarly, the air-side condenser acts only as a condenser and is always in counter flow. The unique valve arrangement and variable capacity compressor technology allow the water-side heat exchanger to operate in counter flow regardless of its application as an evaporator or a condenser. The result of all heat exchange taking place in a counter flow arrangement is more effective heat transfer in all modes of operation.

CONCLUSION

If feasible, the installation of a heat pump into an HVAC application provides many advantages. First and foremost, this type of system provides such an efficient exchange of energy that a facility can expect an average of 50% savings in heating and cooling bills with respect to the 100% outside air dehumidifier.

While the concept of a heat pump is simple, the application requires precise, flawless engineering. Because Desert Aire's Aura™ dehumidifiers are specifically designed for energy recovery, a Q-Pump Inverter+™ can be easily incorporated into the system. Desert Aire's Q-Pump Inverter+™ provides these unique benefits:

- Lowest operating cost by utilizing dedicated evaporators for the dehumidification and heat extraction
- Control of heating set-points at the lowest entering air conditions
- Automatic adjustment of system set-up using electronic expansion valve

Air Separated Coils

If a hot gas reheat coil is installed too close to the evaporator coil, re-hydration can occur. Water on the surface of the evaporator coil can be blown onto the hot gas reheat coil. This will convert it back into vapor which will then be returned to the space. This completely negates all dehumidification efforts and fails to meet basic IAQ design requirements. Consequently, the system will remove less moisture at a higher electrical cost. That's the reason we design our IAQ units with adequate separation between the outlet face of the evaporator coil and the inlet face of the hot gas reheat coil to prevent re-hydration.

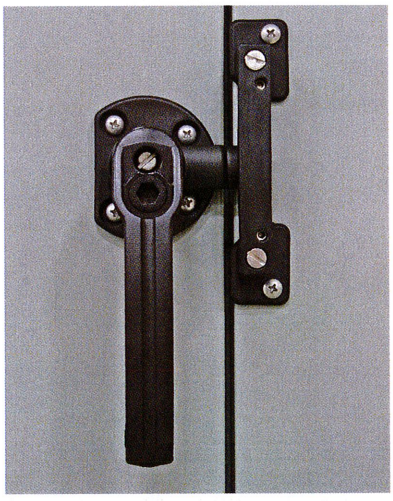

Figure 3 - Panel Latches

Cabinet and Construction

The Aura™ Series features a double wall construction cabinet with a powder coated galvanneal steel outer wall and a sturdy galvanized inner panel. Hinged access doors allow easy access to internal components within each section. Each door has an adjustable cam operated latch and weatherproof compression gaskets between the door and unit casing to produce an airtight seal. The outdoor cabinet includes a rain hood and outside air dampers with actuator. The system eliminates standing roof seams by using a fully weatherproof membrane roof which is sloped to the non-service side for water drainage. The roofing membrane is a thick laminate which is UV resistant and UL-790 approved.

The system uses an easily serviced plenum fan that provides uniform air distribution across all elements.

Filtration

Outdoor air contains many airborne particles and pollutants. Filtration is essential to prevent dirt from accumulating on coils and contaminating indoor spaces. When 1-inch or 2-inch wide filters are used, they must be frequently replaced. Therefore, our IAQ units are equipped with a minimum of 4-inch, MERV 8, pleated filters to reduce filter maintenance. Optional prefilters and higher efficiency MERV 13 filters are available as an option.

Coil Coatings

Sea coast coil coatings are available. Desert Aire uses ElectroFin™ coil coatings to provide long life in corrosive environments.

Building Management Integration

The unit's controller has the following BMS choices:

- **LonWorks® compatible.**
- **BACnet™ MSTP compatible.**
- **BACnet™ Ethernet compatible.**
- **Modbus® compatible.**

Complete Solutions for 100% Outdoor Air

Solving the 100% outdoor air problem is easy with an Aura™ Series dehumidifier and the expertise of a Desert Aire representative. Complete solutions addressing moisture, cooling and heating loads while recovering and saving energy will help ensure proper indoor air quality and comfort. Contact Desert Aire for assistance when you need complete solutions for conditioning ventilation air.

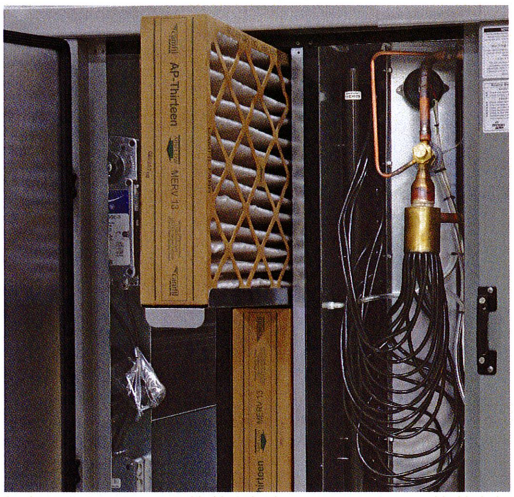

Figure 4 - Filter Rack With MERV 13 Filters Installed.

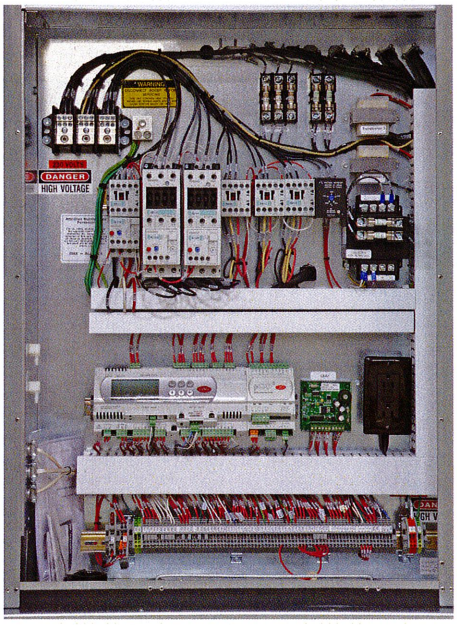

Figure 5 - Electrical Panel Detail

Optimizing Solutions Through Superior Dehumidification Technology

N120 W18485 Freistadt Road, Germantown, WI 53022 sales@desert-aire.com

Ph: (262) 946-7400 - www.desert-aire.com

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