

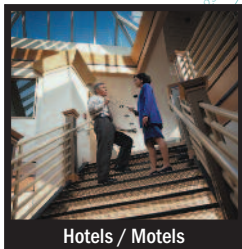


DEDICATED OUTDOOR AIR SYSTEMS

Air Source Equipment for DOAS Applications



Office Environments



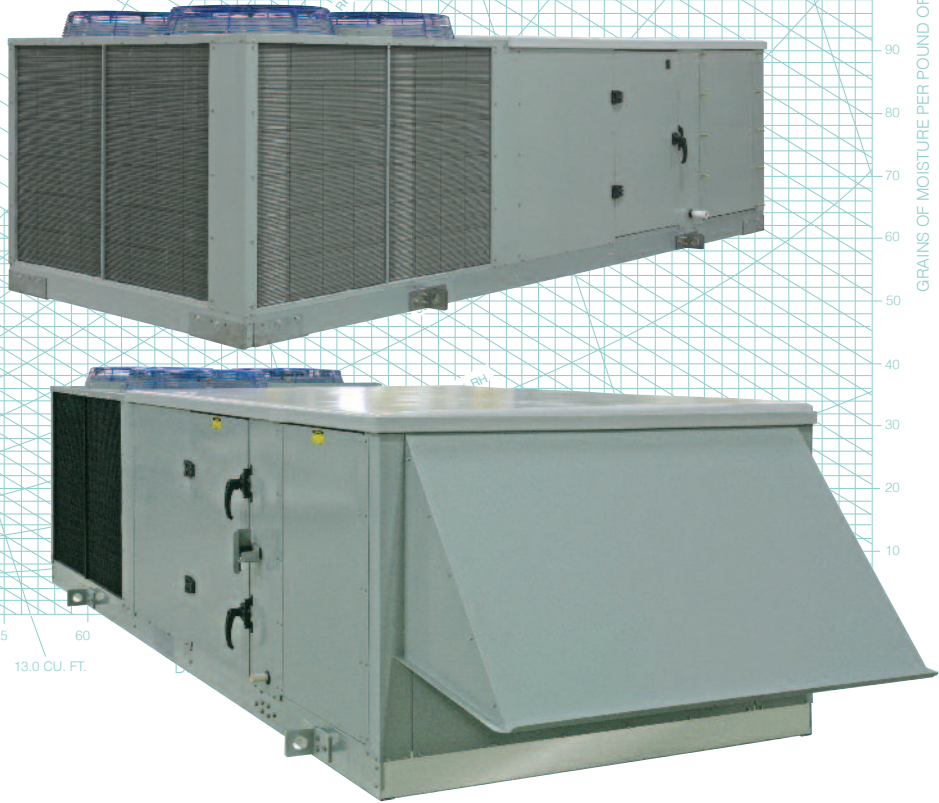
Hotels / Motels



Educational Environments



Medical/Nursing



Desert Aire's Aura™ Series dehumidifiers provide you the most complete solution for your dedicated outdoor air system (DOAS) and high outside air system (HOAS) applications. 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



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.

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.

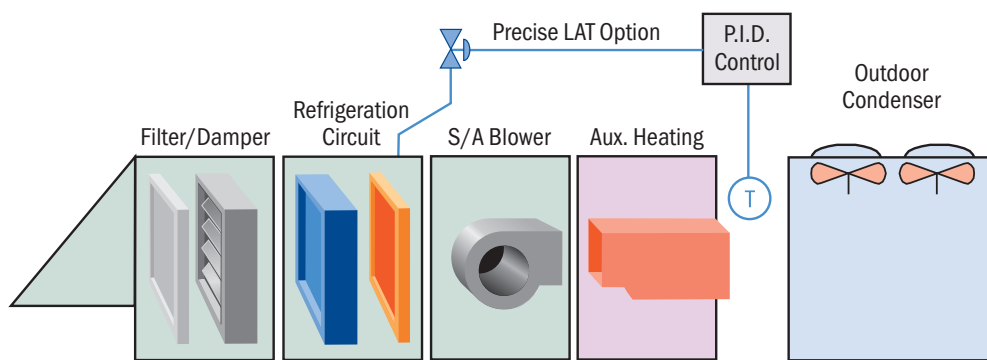


Figure 1 - Basic Refrigeration Circuit Diagram

DESIGN OPTIONS

Desert Aire's Aura™ Series offers the widest range of performance options while maintaining its main focus: Meeting the target dewpoint while attaining the lowest operational cost. In addition, the many options help to reduce the operating cost of the remainder of the building's sensible cooling and heating systems. The design engineer has the ability to configure the system with the following configuration options:

- **DOAS or HOAS** - System is flexible in the amount of outside air delivered
- **Control Strategy** - Multiple choices allow better energy efficiency
- **Auxiliary Heating** - Many options including:
 - Gas (natural or LP)
 - Electric
 - Hot water or Steam Coils
- **Miscellaneous Options** - fan discharge direction, coated coils and better filtration are just a few of the many additional configuration options available for inclusion on the Aura™ Series.

CONDENSER DESIGN

Each unit includes a hot gas reheat coil that is integrated into the refrigeration circuit along with a modulating control system to maintain the choice of control algorithm. This coil reheats the leaving air to the precise temperature required and rejects any remaining energy to a second condenser.

The air-cooled condensers are packaged with the dehumidifier on a single skid.



Figure 2 - Packaged System

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 galvalume 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 the gas or electric heating elements.

For more information visit www.desert-aire.com



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.



Figure 4 - Filter Rack With MERV 13 Filters Installed.

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.

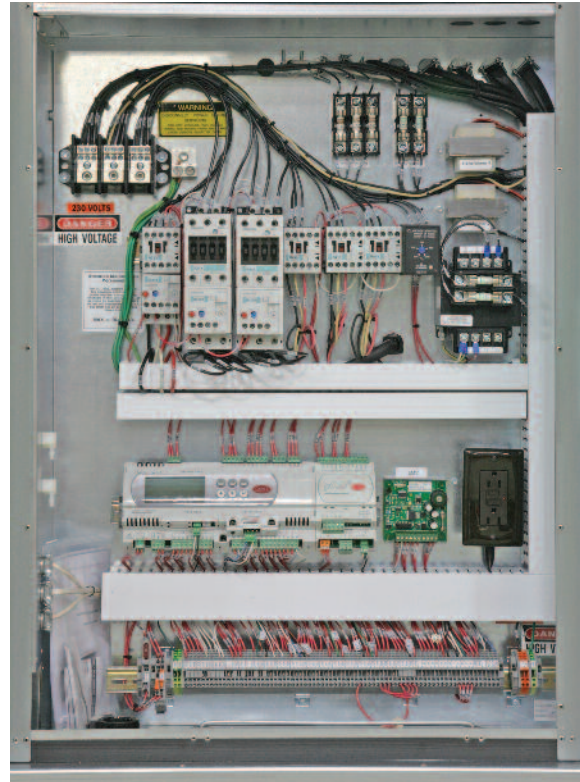



Figure 5 - Electrical Panel Detail

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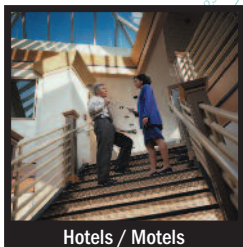


DEDICATED OUTDOOR AIR SYSTEMS

Q-Pump Inverter+™ for Water Source DOAS Applications



Office Environments



Hotels / Motels



Educational Environments



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.

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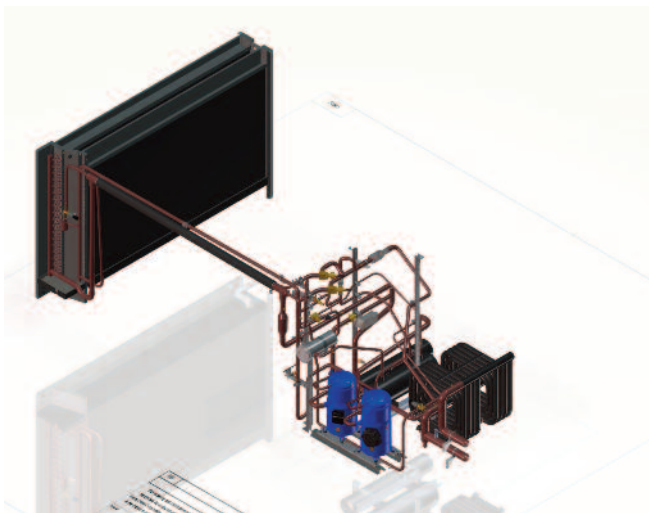


Figure 1 - Basic Refrigeration Circuit Diagram

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)

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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 patent 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. 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.

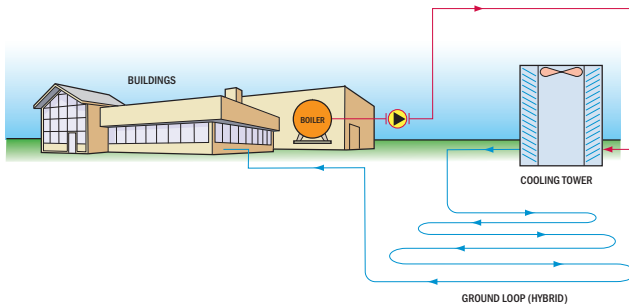


Figure 2 - Hybrid Loop with Boiler and Cooling Tower

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 active, 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

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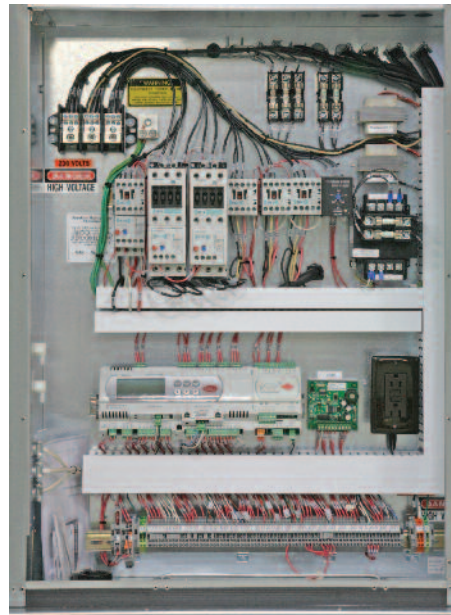


Figure 5 - Electrical Panel Detail

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LEAVING AIR TEMPERATURE CONTROL

LEAVING AIR TEMPERATURE CONTROL OPTIONS

Supply Air Control Strategy

DX-DOAS and DX-HOAS units can use three unique methods to control supply air temperature. The first and simplest strategy is referred to as Supply Air Temperature Control. This method maintains a constant supply air temperature (SAT) regardless of the season and space requirements.

However, two other strategies can achieve greater energy efficiency – Zone Reset of Supply Air Temperature Control as well as Outdoor Air Reset of Supply Air Temperature Control. Both of these methods allow the design engineer to integrate the loads of the DX-DOAS and the main air handler. Because supply air temperature can be varied by the DX-DOAS, the main air handler can be downsized to save compressor and fan energy since the latent load is minimized or eliminated for this sensible cooling system.

Supply Air Temperature Control

In this basic mode, the unit always maintains the supply air setpoint value, regardless of the outdoor or inside room temperature. This fundamental control allows the outdoor air to be conditioned to a neutral temperature (e.g. 72° F) in all seasons. The main air handler for the space controls the actual space temperature. This strategy uses a duct-mounted discharge temperature sensor to provide a feedback signal to the PID controller and maintain a precise SAT regardless of the conditions of the entering air. The SAT on the system is maintained at $\pm 0.2^\circ \text{F DB}$ when the compressor is running.

This method enables the DX-DOAS system to deliver neutral air while the main air handler must be sized for the zone's full load.

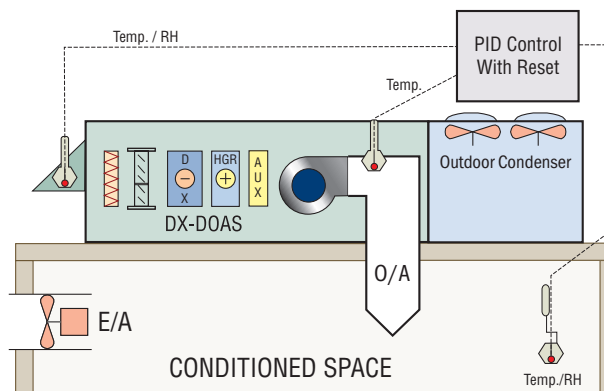


Figure 1 - Zone Reset Control Configuration

Zone Reset of Supply Air Temperature Control

This strategy combines a wall-mounted zone sensor with a duct-mounted sensor to provide supplemental sensible heating or cooling to the conditioned space (see figure 1). The zone sensor completes a feedback loop to the controller such that the supply air temperature setpoint is adjusted to maintain a targeted zone temperature due to changing conditions in the zone. When the system's compressors are energized, the controller will vary the amount of hot gas being rejected to the reheat coil. In the auxiliary heating mode it varies the auxiliary heating output. The controller varies the supply air temperature within a fixed range (e.g., 60° to 95° F) to maintain a room's setpoint (conditional upon system's capacity).

In this strategy, the DX-DOAS unit becomes the first stage cooling or heating system with the main air handler being the second stage. This is best applied if rooms have similar load characteristics. While a DX-DOAS primarily focuses on dehumidifying and reheating the air, the unit provides a secondary benefit in the cooling mode. Should the space temperature rise above the setpoint, the system can switch to the cooling mode and reject the resulting heat to the condenser. Because the DX-DOAS assumes a large portion of the cooling load, the size of the main air handler can be reduced proportionally to provide second stage cooling.

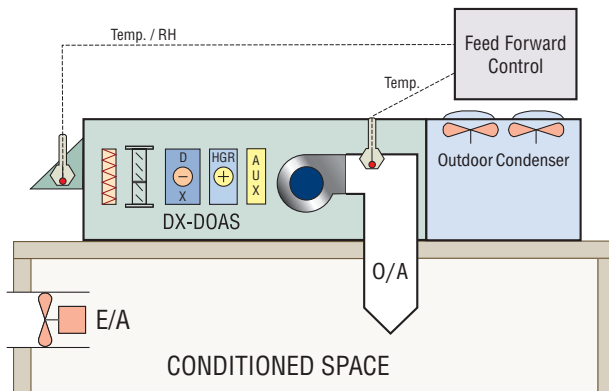


Figure 2 - Outdoor Air Reset Control Configuration

Outdoor Air Reset

This strategy uses feed-forward logic in that the controller resets SAT based on the outdoor air temperature. (See Figure 2.) As outdoor air becomes warmer and more humid, the DX-DOAS will identify that the space needs cooling and thus lower the SAT of the system. If the outdoor air turns cooler, it will reset the SAT to a warmer temperature. Four temperature ranges are established. All reset setpoints are adjustable between 60° and 95° F, but cannot overlap.

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AUXILIARY ELECTRIC HEAT

OPTIONAL AUXILIARY ELECTRIC HEATING OPTIONS

Desert Aire provides auxiliary electric heating options for the Aura™ Series that are sized to meet the winter heating requirements of the outside air.

These heating elements are utilized when the outside air temperature for a DOAS unit or mixed air temperature for a HOAS unit drops below the low economizer set point. The heaters are not allowed to operate when the unit is in the cooling or dehumidification mode.

Desert Aire sizes the heating elements to precisely match the load requirement of the system. The heaters are automatically controlled by the units microprocessor to maintain an exact leaving air temperature. An SCR controller is used for the electric heat option to vary the heat output.

Design Specifications

The following list highlights the noteworthy features of the Aura™ Series electric heaters:

- System Single Point Power to Dehumidifier
- NiCr 60 Corrosion-Resistant Element
- Welded Construction Using 20 MSG Galvanized Steel
- Automatic Reset High Temperature Limit Safety Switch
- Manual Reset High Maximum Temperature Limit Safety Switch
- Air Flow Pressure Switch
- Fusing as Required for Each 48 Amp Circuit
- Fused Circuits per N.E.C., UL, and CSA

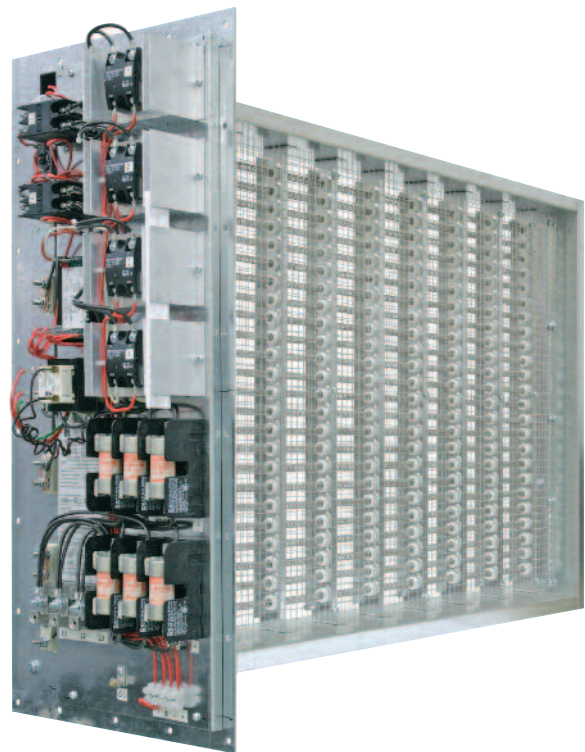



Figure 1 - Detail of Electric Heating Element for Aura™ Series Unit

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AUXILIARY GAS HEATING OPTION

MULTIPLE GAS HEATING OPTIONS

Desert Aire provides multiple gas heater options for its Aura™ Series product line that are sized to meet the winter heating requirements of the outside air. Both natural gas and LP gas burner options are available. These heating elements are utilized when the outside air temperature for a DOAS unit or mixed air temperature for a HOAS unit drops below the low economizer set point. The heaters are not allowed to operate when the unit is in the cooling or dehumidification mode.

Desert Aire combines different burner sizes to precisely match the load of the system. This may be in a single heater module or in multiple modules. A modulating gas valve is automatically controlled by the unit's microprocessor to maintain an exact leaving air temperature. If multiple burner sets are utilized, then a veneer sequence is used where the base burner is modulated and the others are staged. The system's overall turn down ratio is a function of the number of heating modules and is summarized in the table below:

Tons	Quantity Heaters	Natural Gas	LP Gas
2 to 30 tons	1	5 to 1	5 to 1
20 to 30 tons	2	10 to 1	10 to 1



Figure 1 - Detail of Gas Heat Compartment on Aura™ Series Unit

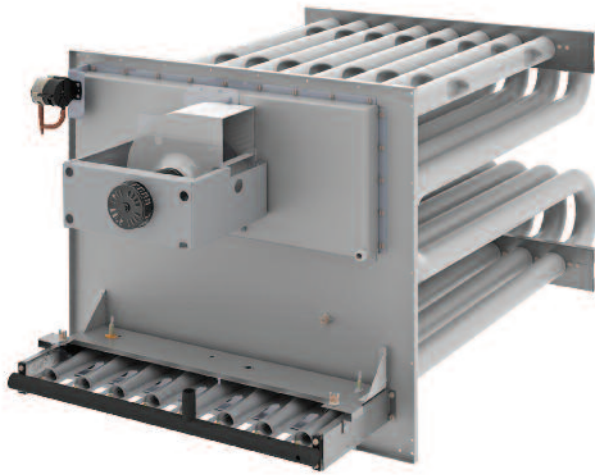


Figure 2 - Detail of Gas Heat Burner Assembly

The gas module shall provide a minimum combustion efficiency of 80%, and listed for operation downstream of refrigeration or cooling system, and provide means for removal of condensate that occurs in the heat exchanger during cooling operation. They are listed for outdoor installation without the need for additional power ventilation.

Heat exchanger shall be tubular in design and constructed of Type 304L stainless steel and employ (integral formed dimple restrictors, formed turbulators) to provide for an unobstructed drainage path for condensate and provide a positive pitch to promote drainage.

Additionally the gas module shall employ:

- Patented inshot gas burners, with integral carryovers, capable of operation at 5:1 turndown with modulating controls
- A combustion blower to provide for positive venting of flue gases
- Pressure switch to prove air supply for combustion
- Direct spark ignition of gas burners with remote flame sensor to prove carryover across all burners
- An automatic reset type high limit switch to limit maximum outlet air temperature to less than 250° F
- Manual reset flame rollout switch
- Listed Combination Gas Valve incorporating redundant safety shut-off valve, manual shut-off , and gas regulator which regulates gas pressure to burner supply manifold.
- Direct Spark ignition control design certified by a Recognized National Testing Laboratory and incorporating a LED diagnostic light and alarm capable contact

The completed heater assembly shall be factory fire tested prior to shipment.


Gas Utility

- 13.5" w.c. (1/2 PSI) Maximum Inlet Pressure
- Minimum Inlet Pressure
 - 5.0" w.c.- Natural Gas
 - 11.0" w.c.- Propane Gas

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ENERGY RECOVERY OPTION

ENTHALPY WHEEL = ENERGY COST SAVINGS

Desert Aire's enthalpy wheel recovers a significant amount of energy from exhaust air. This wheel is a rotary counter flow air-to-air device that transfers both sensible and latent heat between air streams. Filtered outdoor air encounters the upper half of the wheel while exhaust air flows through the lower half of the wheel. As the wheel constantly rotates during ventilation, it recovers valuable energy. Except for its rotation, the wheel is a passive device. Its function basically reverses between summer and winter. Figure 2 on page 2 shows the differences. For more information, read Desert Aire's Technical Bulletin 19 -Energy Recovery Wheel Technology.



Figure 1 - Enthalpy Wheel Installed in a Desert Aire Aura™ Unit

Desert Aire's wheels contain a patented molecular sieve coating that selectively adsorbs and desorbs water molecules in the air. This thin molecular sieve coating permanently adheres onto a sea water resistant aluminum alloyed that is composed of wave and flat, continuously wound layers to guarantee laminar flow and low static pressure loss. The wheel matrix, or its total mass, provides for highly effective sensible and latent energy exchange.

Most other media will have the desiccant coated, bonded or synthesized onto the matrix. The desiccant material must usually be applied as a thick coating layer that is subject to delaminate or erode off the media through the normal life expectancy of the wheel. In contrast, the desiccant on Desert Aire's media is designed to permanently adhere to the surface of the aluminum alloyed.

Our design offers excellent face flatness to minimize wear of the inner seal surfaces and reduce cross leakage while offering a minimum life expectancy of 15 years. Our wheel frames are constructed of evenly spaced spokes, a galvanized steel band and an aluminum center hub. Frame component sizes and number of parts vary with wheel size.

We use a fractional horsepower AC drive motor and a durable multilink drive belt as our standard drive system.

It is not uncommon for frost to develop on the wheel under extremely cold winter conditions. The wheel can cool down to below 32°F and will then freeze moisture from the exhaust stream. Frost may reduce the airflow, but it will not damage the wheel. Desert Aire offers an optional electric heater to preheat the outdoor air and prevent the exhaust air from freezing.

Summertime Operation

In summer, ventilation air transfers its heat to the mass of the wheel. When the wheel turns into the exhaust air stream, it releases its heat. This significantly cools ventilation air even before it reaches the evaporation coil. But the wheel also assists with dehumidification. Its media is impregnated with a water-selective desiccant (4Å molecular sieve) that captures moisture from outdoor air. When the wheel turns into the flow of drier exhaust air, moisture is released. This reduces the moisture load on the dehumidification coil.

Wintertime Operation

In winter, sensible heat is transferred from warm exhaust air to cooler ventilation air. This heat transfer works in verse to that of summer because the exhaust air is much warmer than the incoming air from outdoors.

The transfer of moisture is also reversed. The wheel recovers moisture from the exhaust air and deposits it into the dry, cold incoming air.

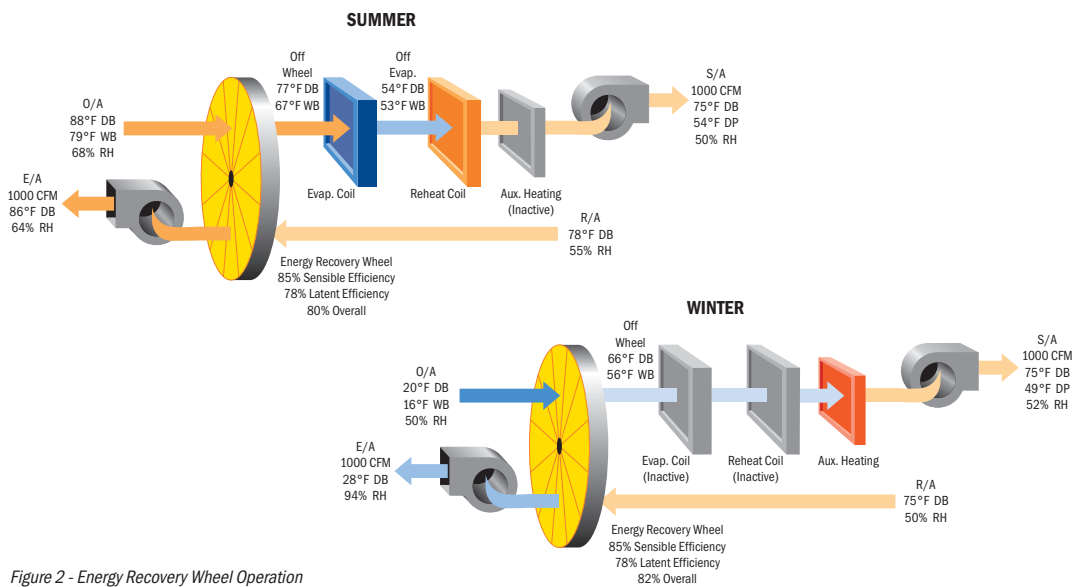


Figure 2 - Energy Recovery Wheel Operation

Reduced Loads

The energy recovered by the wheel significantly reduces sensible heating and cooling loads. Likewise, the load on the refrigerant dehumidification system is also reduced allowing you to use a smaller TotalAire™ dehumidifier.

While the wheel cannot meet the full moisture load alone, it can greatly reduce peak loads on the dehumidifier, especially when there is a large difference in moisture content between the air streams. Dehumidification through refrigeration is a standard industry approach.

However, integrating an energy recovery wheel into this type of system allows the dehumidifier to work more efficiently. The wheel significantly decreases the dehumidifier size required to ensure a complete year-round solution. Its impact is so great that it reduces the required compressor capacity by approximately half.

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RECIRCULATION OPTIONS

DEMAND CONTROL OPTIONS SAVE ENERGY

High Outdoor Air Systems (HOAS)

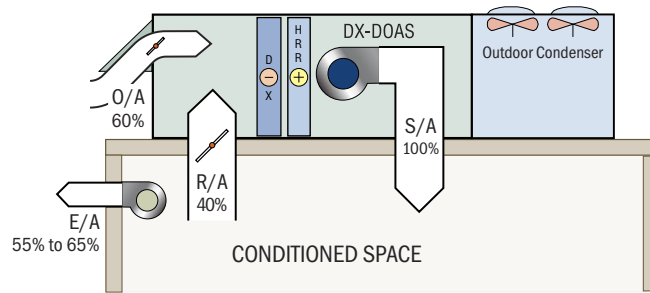


Figure 1 - High Outside Air System schematic with example of 60% outside air

There are many applications that require a single air handler to function as both the outside air source in addition to its function of providing the appropriate sensible cooling and heating. This occurs in many renovation projects that are attempting to bring a building up to the current recommended ASHRAE 62.1 ventilation code but do not have room for a dedicated outside air system and a conventional unitary device. This requires outside air volumes

as a percentage of supply air volume greater than 50%. The HOAS system during occupied times provides the desired volume of code ventilation with the remainder of the supply air requirements being made up with recirculated air from the zone.

The system must be designed to remove the outdoor air's moisture, but also incorporate a specialized sequence of operation to provide heating and cooling to the space. Most conventional rooftop unitary equipment cannot handle outside air volumes above 30% and specialty equipment such as the Aura Series are required. In addition, the building must have an exhaust air system that is balanced with the volume of outside air to provide the desired pressurization in the space

Night Setback Strategy

During the unoccupied mode, the basic night setback strategy is to close the outdoor air damper and turn off the blower to save energy. However, in some humid environments, there is still a high infiltration rate of moist outdoor air into buildings during unoccupied times creating excessive humidity levels.

In these instances, it is desirable to add a recirculation damper to the system and turn on the blower and compressors to remove the unwanted moisture during unoccupied times. This capability is available on Desert Aire's Aura™ series by adding the following components to the system:

- Supply fan VFD
- Differential pressure transmitter with sensors factory installed across reheat coil
- Modulating damper (w/ spring return) & actuator for outside air
- Modulating damper & actuator for recirculation air

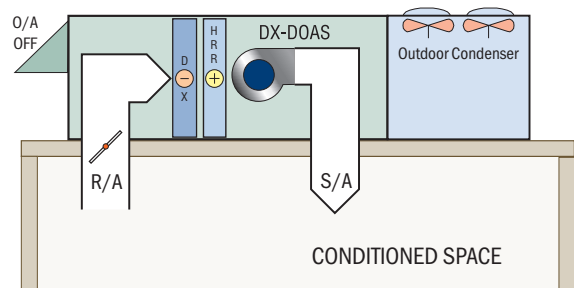


Figure 2 - Diagram of an Aura™ Series unit in night setback mode.

The Zone Reset of Supply Air Temperature Control package must be ordered to receive the zone sensors.

CO₂ Control Strategy

As engineers continue to meet ASHRAE 62 ventilation code air flow rates, they also are trying to minimize energy costs where ASHRAE 90.1, LEED programs, GSA P100, or other codes and standards are required. Using additional sophistication in the controls can be an excellent way to minimize energy cost while maintaining proper indoor air quality and building pressurization.

The Ventilation Rate procedure of ASHRAE 62 is a prescriptive procedure that indicates the outdoor air intake flow rate based on the level and type of occupancy as well as the floor area. The Ventilation Rate procedure allows for a dynamic reset of the outdoor air intake flow as operating conditions change. Although the floor area in any building is fixed, the level and type of occupancy may change from day to day or even throughout a single day.

One of the most effective methods of dynamically changing the flow rate based on occupancy is the utilization of CO₂ sensors. Although expected concentrations of CO₂ are not considered a direct contaminant, it is an excellent measurable “tracer gas” that indicates the number of occupants present and their activity level. CO₂ sensors are also relatively inexpensive and durable devices.

This non-wheeled system has been designed to save energy by introducing outside air at a rate that addresses the occupancy level of the zone based on the CO₂ level in the zone which is measured and calculated by the building management system. The addition of two CO₂ sensors and variable frequency drives work together to maintain constant total system air flow by recirculating zone air and introducing varying outdoor air flow rates. The BMS provides a signal that represents 0 to 100% OSA damper opening. It should be noted that the minimum outside air setting value for occupied times is determined by the test and balance commissioning contractor and is provided to the controls contractor for entry into the BMS.

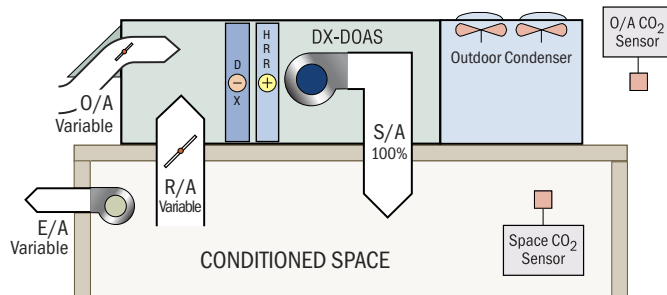


Figure 3 - DOAS CO₂ Control

When a change in CO₂ is sensed due to occupants entering or exiting the breathing zone, the outdoor air dampers account for this change in occupancy. The outdoor air flow rate will vary between the minimum flow rate programmed and 100% outdoor air as needed, always optimizing the indoor air quality and energy use. The return air is used to maintain the supply air flow rate while the outdoor air flow rate varies. The constant supply air flow rate ensures that the duct system operates as intended.

It also ensures that diffusers are able to deliver ventilation air at the correct velocity so that it reaches the breathing zone at all times as required by ASHRAE 62.1.

Several components are added to maintain a constant supply air volume. The exhaust air fan (supplied by others) is controlled by the BMS in order to maintain building pressurization. The DOAS includes the following components:


- Supply VFD
- Modulating damper & actuator for outside air
- Modulating damper & actuator for recirculation air
- Differential pressure transmitter with sensors factory installed across reheat coil

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AUXILIARY HOT WATER HEAT

OPTIONAL HOT WATER HEATING OPTIONS

Desert Aire provides auxiliary heating options for its Aura™ Series product line that are sized to meet the winter heating requirements of the outside air.

These heating elements are utilized when the outside air temperature for a DOAS unit or mixed air temperature for a HOAS unit drops below the low economizer set point. The heaters are not allowed to operate when the unit is in the cooling or dehumidification mode. Desert Aire sizes the heating elements to precisely match the load requirement of the system. The heaters are automatically controlled by the unit's microprocessor to maintain an exact leaving air temperature. A customer supplied hot water control valve is modulated from the controller with a 0 to 10 VDC direct acting signal. Please refer to figure 1 for a typical installation.

HWC Design Inputs

The coil is selected for each customer's particular application based on the following criteria:

- Entering water temperature (EWT), typically between 140° F and 180° F
- Leaving water temperature (LWT), typically 20 degrees less than the EWT
- MBH capacity desired
- Entering air temperature (EAT), winter design for your area
- Leaving air temperature (LAT), typically neutral to a maximum of 100° F
- GPM flow rate desired
- If there are fluid pressure drop restrictions to be aware of.
- Type and concentration of glycol used

For freeze protection Desert Aire uses a capillary type temperature sensor which is attached across the downstream face of the coil. Freezestat is set at 38 deg F with an auto reset switch. If engaged the unit controls would respond by closing the outdoor air damper, open the return air damper (if applicable), de-energize the fan, open the hot water coil valve 100%, and log the alarm on the controller.

To size the control valve, please provide a qualified vendor the water temperature, flow rate (gpm) and the requirement for a 0 to 10VDC signal and they will select the appropriate valve to purchase.

Optional ElectroFin coil coating for sea coast construction is available.

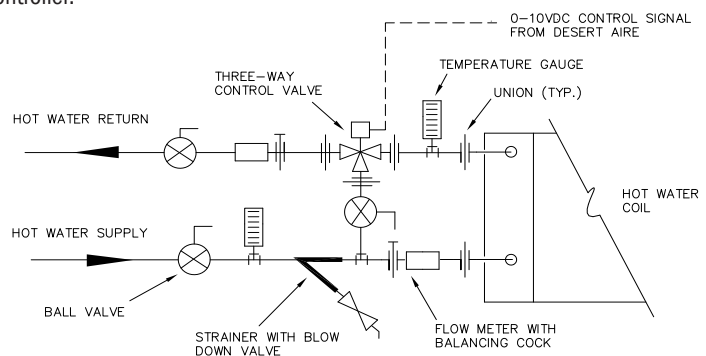



Figure 1 - Hot Water Piping Detail

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CURB OPTIONS

Introduction

Desert Aire offers as part of its Aura Series the matching curb for its dedicated outside air systems. Our two piece version is offered to provide the customer with an option to shield compressor sound from entering the space. Curb heights are available in 8", 12" and 14".

Base & Pedestal Options

Desert Aire has designed this curb to isolate the compressors from the opening in the roof. The pedestal creates a zone that is open to the outdoors rather than having the section under the condenser section open to the zone below. The installing contractor must align the two pieces at the jobsite and flash them independently.

- 18 ga. Galvanized steel construction.
- Knock down curb.
- Prime painted.
- Pressure treated 2x2 wood nailer.
- 1-1/2" thick 3lb/ft³ fiberglass perimeter insulation.
- Internal angle reinforcement.

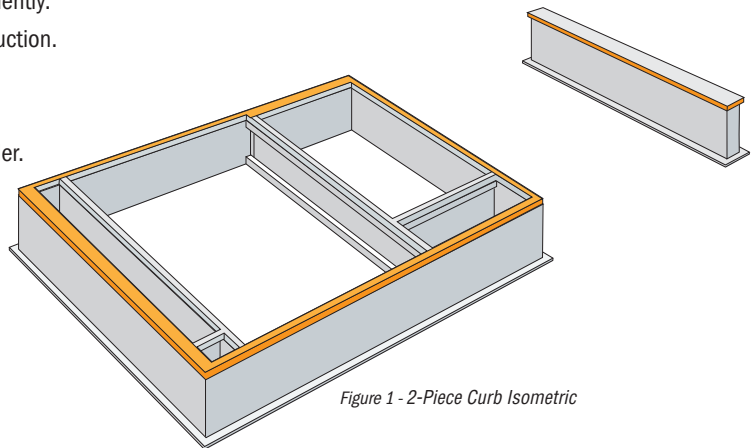


Figure 1 - 2-Piece Curb Isometric

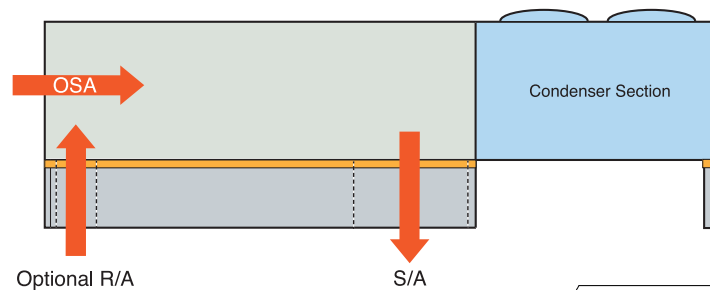


Figure 2 - 2-Piece Curb w/Unit

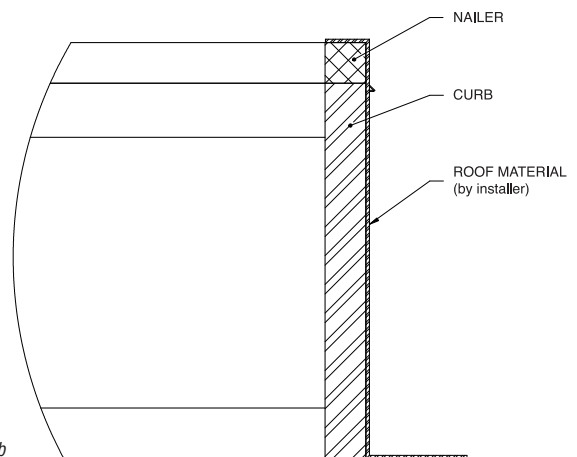


Figure 3 - Cross Section of Curb

Full Perimeter Option

The full perimeter curb option has a built in drain pan under the condensing section to allow any water that penetrates the unsealed base to be quickly removed. The drain pan also helps to reduce any noise from the compressors by adding one more layer between them and the zone below.

- 14 ga. Galvanized steel construction.
- Welded one piece curb.
- Prime painted after fabrication.
- Pressure treated 1x4 wood nailer.
- The curb has 1-1/2" thick 3lb/ft³ fiberglass perimeter insulation.
- The drain pan has 1" thick 3lb/ft³ fiberglass pan insulation.
- Internal angle reinforcement.
- Flashing / drip edge

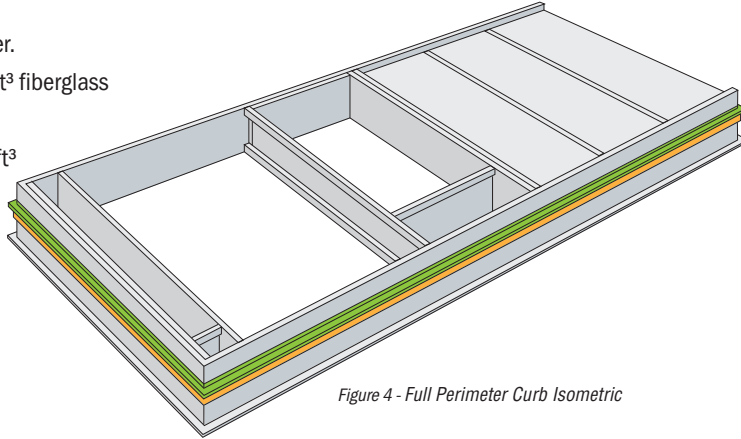


Figure 4 - Full Perimeter Curb Isometric

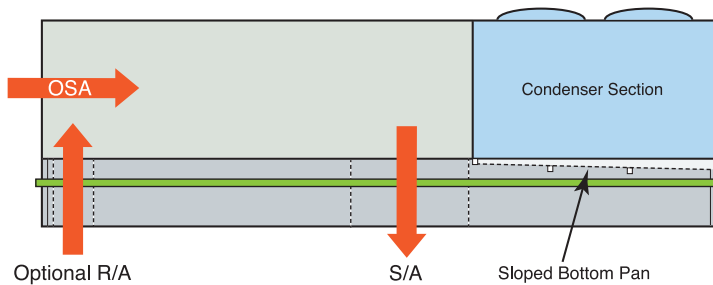


Figure 5 - Full Curb w/Unit

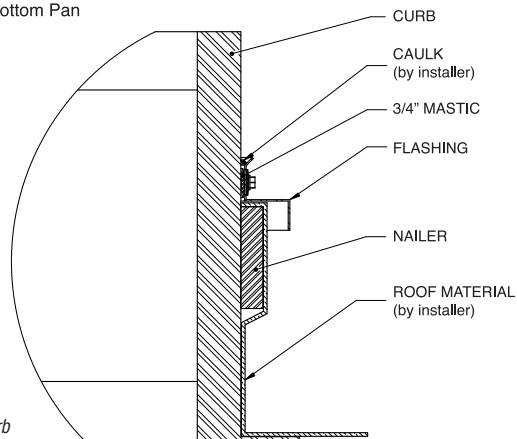


Figure 6 - Cross Section of Curb


AURA CURBS

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SELECT OPTIONS FOR AURA SERIES DEHUMIDIFIERS

AURA SERIES OPTIONS

AURA™ SERIES OPTIONS

Desert Aire offers a wide array of select options for its Aura™ Series product line. These options are available to promote increased operational efficiency of the unit, maximize protection from the outdoor elements and to improve the indoor environment that is being conditioned by Aura™ Series dehumidifiers. Consult your Desert Aire sales representative for additional information.

Side Discharge

- A side discharge for units without gas heat
- For use when down discharge not required

Protective Hail Guard

- Provides optimum protection for condenser coils from:
 - hail damage
 - similar debris damage
 - initial transportation damages

Spring Isolation Mount for Blower Assembly

- 1-inch springs
- Reduces sound and vibration transmission into the building for an improved environment.
- Springs are locked down during transit

Dirty Filter Switch

- Alerts maintenance personnel that filter replacement is required
- Insures optimal refrigeration operation

Voltage Monitor

- Protects the unit from dirty power (voltage variations and phase issues)
- Saves on potential expensive repair costs.

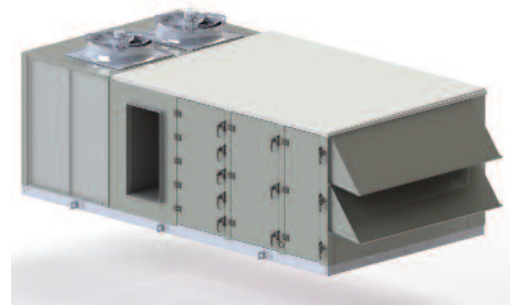


Figure 1 - Detail of Side Discharge Installed on Aura™ Series Unit

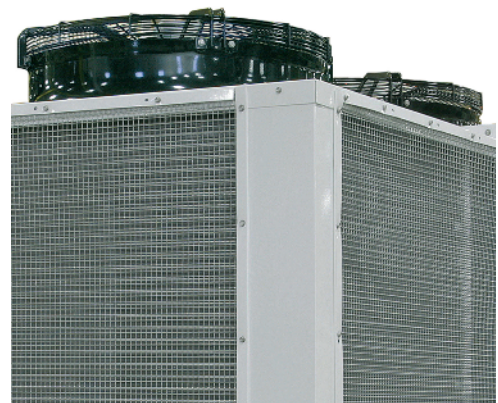


Figure 2 - Detail of Hail Guard Installed on Aura™ Series Unit

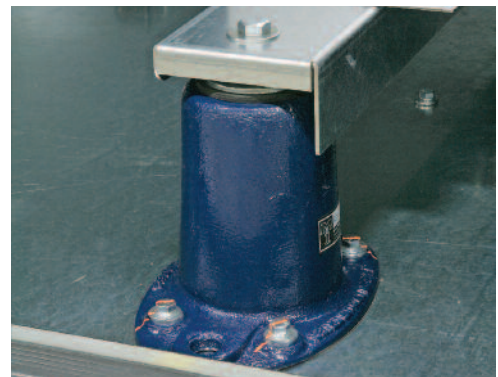


Figure 3 - Spring Isolation Mount Installed on Aura™ Series Unit

Mist Eliminators / Bird Screens

- Blocks snow from being blown into the intake section
- Breaks up water molecules suspended in heavy fog to prevent air filter collapse
- Acts as a preliminary filter that prevents insects, leaves, and other debris from entering unit.

Condensate Overflow

- Protects the unit from condensate overflow by implementing a unit shutdown in the event that the condensate drain is blocked. This prevents any potential water penetration into the building.
- Meets compliance of local building codes

Disconnect Switch

- Factory mounted and pre-wired to electrical panel in unit
- Saves field installation time



Figure 5 - Disconnect Switch Installed on Aura™ Series Unit




Figure 4 - Mist Eliminators / Bird Screens Installed on Aura™ Series Unit

AURA SERIES OPTIONS

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