Dehumidification Division – Industrial

HoneyCombe Wheels & Desiccant Options

Munters

Munters Invented HoneyCombe® Technology

Today, it is generally accepted that all high performance industrial dehumidifiers employ desiccant wheel technology. This simple and effective technology was first pioneered by Munters Corporation more than 50 years ago, when HoneyCombe dehumidifiers were first introduced. These rotors were developed by the world famous Swedish scientist, Carl Munters (the inventor of Styrofoam and foam rubber), in conjunction with the American founder of Cargocaire, Commander Oliver Colvin.

HoneyCombe rotor technology has since been advanced greatly. Thanks to decades of Munters research and development, the users of Munters dehumidifiers can select from six desiccant formulations. Working closely with Munters engineers, customers now can optimize performance while minimizing operating expenses – no matter what their application.

More Than 100,000 HoneyCombe Rotors In Service

Munters industrial dehumidifiers, with patented HoneyCombe rotors, have become interwoven into the fabric of American life. Today, a Munters dehumidifier protects the space shuttle before launch, while another safeguards Air Force One while on the ground. Our equipment prevents mold and mildew growth at the country's largest breweries. It helps keep snack foods fresh and helps make chocolate bars taste better. Millions of tablets, as well as other pharmaceutical preparations, could not meet FDA requirements without our equipment in the plant. Plastic bottles can be made faster…and at a lower cost…thanks to Munters dehumidifiers. Clean rooms turn out state-of-the-art electronics, and biotechnology makes new advances every day using Munters equipment. Poultry and meat processors operate without condensation, jet fighters fly more missions, and historic motion pictures are being preserved for posterity because of Munters dehumidifiers. Munters' continuing research and development efforts mean that thousands of other applications, as diverse as these, enjoy both dependability and flexibility in meeting their humidity control needs. But no matter what the application, complex or simple, Munters dehumidification equipment serving it has HoneyCombe rotor technology at its heart.

American Made Under ISO 9001:2000 Certification

Munters makes all of the HoneyCombe rotors at its American manufacturing center in Amesbury, Massachusetts. Under ISO 9001:2000 certification, Munters continues to set the world's standards for rotor production, and is the only producer of both desiccant wheels and dehumidifi-

Worldwide, more than 100,000 Munters HoneyCombe rotors have been used over the past 50 years. From a broad range of manufacturing processes to the protection of America's space shuttles, Munters dehumidifiers with Honeycombe rotors have been the equipment of choice.

cation systems in the Americas.

All Munters rotors are made of a non-metallic, ceramic composite. They are engineered to provide superior strength and durability, and be impervious to water. In fact, Munters rotors may be washed with a hose without jeopardizing structural integrity. (See Cleaning and Maintenance, page 7.)

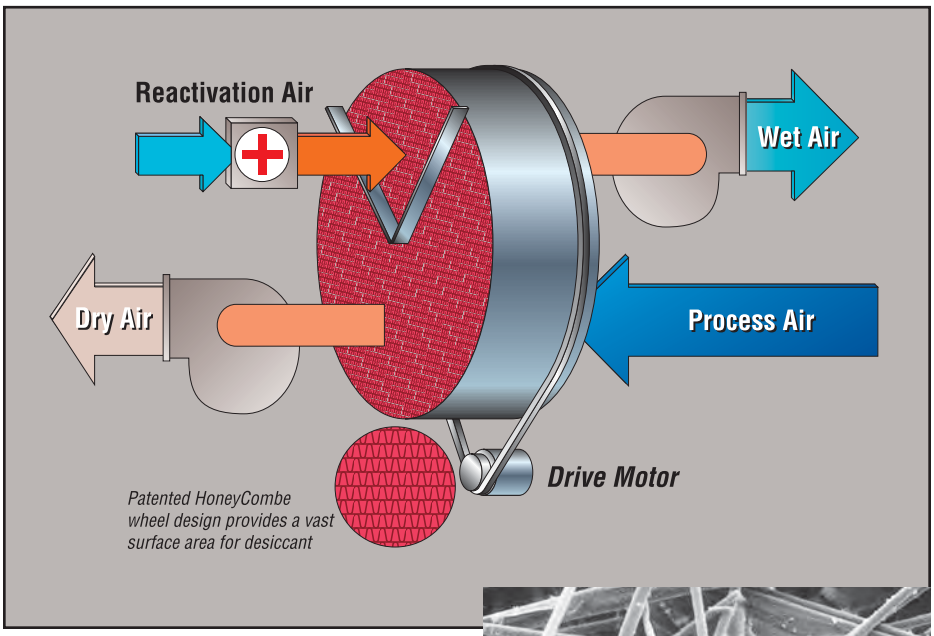
Munters wheels are characterized by smooth, regular surfaces throughout the HoneyCombe structure, even desiccant dispersion, and strong, accurately machined wheel casings. Munters' unique manufacturing processes assure that the desiccant is an integral part of the HoneyCombe structure.

In contrast, many competitive products have gaps between the media and the casing, plugged or damaged media, surface damage, inferior welds, or use fillers to correct manufacturing flaws. These imperfections inhibit the performance of the dehumidifier and should be avoided when selecting a rotor.

Unlike some competitive rotors, all structural fibers are at least five microns in diameter, and therefore not breathable. For added safety, HoneyCombe wheels are designed not to emit smoke or to support fire if accidentally exposed to high temperatures or flame.

How a HoneyCombe Rotor Works

The operation of a HoneyCombe dehumidifier is based on the principle of sorption. Sorption is the adsorption or the absorption process by which a desiccant removes water vapor directly from the air. When the air to be dried passes through the HoneyCombe rotor, the desiccant removes the water vapor directly from the air and holds it while the wheel rotates. As the moisture-laden desiccant passes through the reactivation sector, the water vapor is transferred to a heated air stream, which is exhausted to the outside. The process is continuous, allowing for uninterrupted dehumidification.



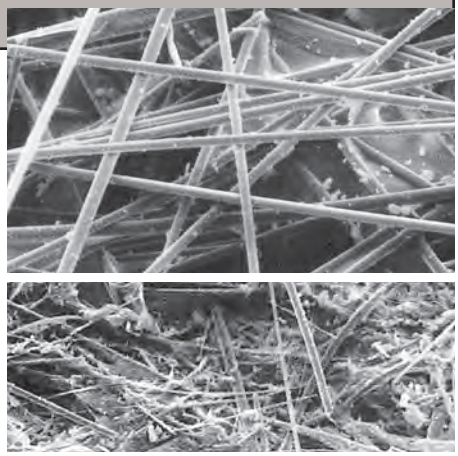
Munters HoneyCombe: A Truly Remarkable Design

Munters state-of-the-art rotor designs incorporate an advanced knowledge of chemistry, thermodynamics, as well as material technology.

Throughout more than 50 years of research and development, Munters has obtained more than 25 patents in desiccant technology and has several more currently pending. As the industry leader, we offer more desiccant options than any competitor. All of our desiccant formulations have been tested by both laboratory research and extensive "real time" applications throughout the world.

All rotors manufactured by Munters use the same high-efficiency, mass transfer surface whose development has been pioneered in thousands of demanding applications. Our proprietary ceramic HoneyCombe structure provides an ideal, lightweight framework that assures optimum exposure of the desiccant to the air stream. This ensures highly efficient moisture sorption within a small area, allowing a compact dehumidifier design.

Drying performance is not simply dependent on the rotor design and desiccant formulation. It also relates to how the wheel functions together with the other components of the dehumidifier. Worldwide, more than 100,000 Munters rotors have been in service during the past 50 years. Careful monitoring of this vast on-site customer group, along with continuous laboratory testing, has led to dehumidifier advancements only available in Munters equipment.



Electron microscope photography shows Munters' uniform diameter extruded glass fibers (top photo). These fibers, of greater than five microns in size, preclude breathability and associated health hazards. Note a competitor's structure (bottom photo) using random diameter, spun Kaolin fibers. Magnification of both photos is 200x.

Desiccant Options

In order to meet our customers' varying performance requirements, Munters offers a choice of six desiccant wheels – Titanium silica gel, lithium chloride, GTR, HPX, HCR and molecular sieve. For more than 50 years, Munters has conducted extensive research and development to improve the desiccant wheel. Munters six desiccant options provide the widest range of dehumidification available in the market today. All Munters wheels are backed by a five-year warranty. Your Munters sales engineer is uniquely qualified to recommend the best choice for your specific application.

Titanium Silica Gel

Titanium silica gel is an adsorbent. Water is attracted and held to the walls of many fine pores within the material. Munters has developed a patented method for manufacturing titanium silica gel in HoneyCombe wheel form, which results in a strong and stable structure, yielding ideal drying performance in a wide range of applications.

Advantages:

- ☑ MOISTURE REMOVAL CAPACITY
  Titanium silica gel can hold up to 40% of its dry weight in water when in equilibrium with air at saturation.
- ☑ NON-OVERLOADING DESICCANT
  Because titanium silica gel is a solid, insoluble desiccant, it is not possible to "wash out" the desiccant from the wheel. This means no special precautions are required even when it is exposed to air at 100% relative humidity.
- ☑ STABILITY
  Silica gel does not undergo any chemical or physical change during the adsorption process. It is inert, stable, and non-toxic.
- ☑ WASHABILITY
  The permanent nature of the desiccant makes it possible to literally wash a wheel in water if dust or other particulate block the air passageways.
- ☑ CHEMICAL RESISTANCE
  Titanium silica gel is a stable material and is resistant to most chemicals. In particular, it is resistant to acids and sulfur products which may be found in the combustion products of a direct-fired gas burner.

Lithium Chloride

Lithium chloride is an extremely powerful absorbent that takes full advantage of the HoneyCombe, resulting in the most economical system on an operating cost basis.

Advantages:

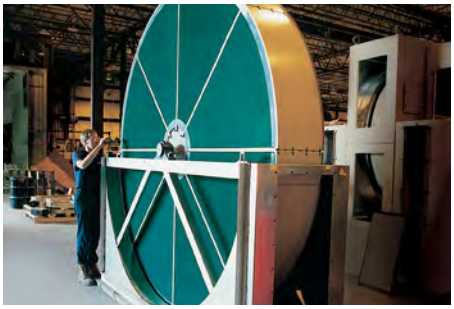
- ☑ MOISTURE REMOVAL CAPACITY
  Lithium chloride can attract and hold over ten times its weight in water and is one of the most hygroscopic compounds in existence. It has the best moisture removal capacity over the broadest range of inlet air conditions.
- ☑ BACTERIOSTATIC
  The bacteriostatic properties of lithium chloride can significantly reduce the number of organisms which may be carried in the air stream.
- ☑ STABILITY
  As a salt having very stable chemical qualities, lithium chloride is not dependent on a pore system for its water absorption capability. Lithium chloride is unaffected by most air stream pollutants and resistant to many contaminants like petroleum vapor, solvents and phenols.
- ☑ EFFICIENCY
  The ability of the lithium chloride to both absorb and release large amounts of water from a small amount of desiccant creates a tremendous drying capacity. Thus for each unit of energy input, a greater percentage goes to the useful work of removing water rather than heating and cooling the structure.

GTR

Munters proprietary GTR wheel is an adsorbent that outperforms standard desiccants by as much as 60%. The GTR is especially effective in applications that utilize 100% outside air.

Advantages:

- ☑ UNIQUE STRUCTURE
  The GTR desiccant is specially formulated to achieve performance on warm, moist airstreams that is not achievable with other desiccant formulas.
- ☑ MOISTURE REMOVAL CAPACITY
  The GTR desiccant provides exceptional moisture removal without the requirement of pre-cooling. The GTR desiccant wheel can remove as much as 100 gr/lb of moisture from an untreated airstream.
- ☑ NON-OVERLOADING DESICCANT
  Because GTR is a solid, insoluble desiccant, it is not possible to "wash out" the desiccant from the wheel. This means no special precautions are required even when it is exposed to air at 100% relative humidity.
- ☑ STABILITY
  The GTR desiccant does not undergo any chemical or physical change during the adsorption process.
- ☑ WASHABILITY
  The permanent nature of the desiccant makes it possible to literally wash a wheel in water if dust or other particulate block the air passageways.



HPX

Munters unique HPX wheel is an adsorbent that provides very low dew points (-70°F and lower). This desiccant is used under the advice of a Munters engineer for specialty applications.

Advantages:

- ☑ APPLICATION
  The HPX desiccant is used for manufacturing spaces and processes that require extremely low humidity levels. For example, HPX desiccant rotors are used to maintain manufacturing environments between 1% and 2% relative humidity at 70°F for the production of lithium batteries.
- ☑ UNIQUE STRUCTURE
  The HPX desiccant provides high performance drying under specific conditions that cannot be reached with standard desiccant formulas.
- ☑ MOISTURE REMOVAL CAPACITY
  The HPX desiccant was designed for low dewpoint applications by engineering the desiccant pore system to maximize water pickup and efficiency.
- ☑ STABILITY
  The HPX desiccant does not undergo any chemical or physical change during the adsorption process.
- ☑ WASHABILITY
  The permanent nature of the desiccant makes it possible to literally wash the wheel in water if dry dust or other particulate block the air passageways.

HCR

Munters proprietary HCR wheel is an adsorbent wheel that is designed to use low temperature air for reactivation. The wheel is standard in Munters HCU dehumidifiers. HCU dehumidifiers use refrigeration waste heat for desiccant reactivation.

Advantages:

- ☑ APPLICATION
  The HCR desiccant is specially formulated to use low temperature reactivation air. It is typically partnered with a refrigeration system that provides cooling, dehumidification and the heat required to reactivate the desiccant.
- ☑ MOISTURE REMOVAL CAPACITY
  When combined with refrigeration, the HCR rotor can remove as much as 120 gr/lb of moisture from an airstream. Use of refrigeration waste heat for reactivation results in an extremely energy efficient desiccant system.
- ☑ NON-OVERLOADING DESICCANT
  Because HCR is a solid, insoluble desiccant, it is not possible to “wash out” the desiccant from the wheel. This means no special precautions are required even when it is exposed to air at 100% relative humidity.
- ☑ STABILITY
  The HCR desiccant does not undergo any physical or chemical change during the adsorption process.
- ☑ WASHABILITY
  The permanent nature of the desiccant makes it possible to literally wash the wheel in water if dry dust or other particulate block the air passageways.

Molecular Sieve

Molecular sieve is a solid adsorbent for reaching extremely low dew points (-40°F to -80°F). It is efficient at high temperatures and is not sensitive to microporic clogging by pollutants.

Advantages:

- ☑ ZEOLITIC STRUCTURE
  A zeolitic molecular sieve is a crystalline material of aluminum silicate which is capable of separating molecules of different sizes. Small molecules, such as water molecules, are adsorbed, while large molecules pass through the wheel.
- ☑ MOISTURE REMOVAL CAPACITY
  Because water molecules are polar and the molecular sieve has a high surface energy, water molecules adsorb at low water vapor pressures. As a result, molecular sieve materials are suitable for applications that require a very low level of humidity. For the same reason, the molecular sieve has a better sorption capacity at higher temperatures than other sorbents.
- ☑ STABILITY
  Molecular sieve does not undergo any chemical or physical change during the adsorption process. Molecular sieve is inert, stable and non-toxic.
- ☑ WASHABLITY
  The permanent nature of the desiccant makes it possible to literally wash the wheel in water if dry dust or other particulate block the air passageways.

Munters Innovations in Technology

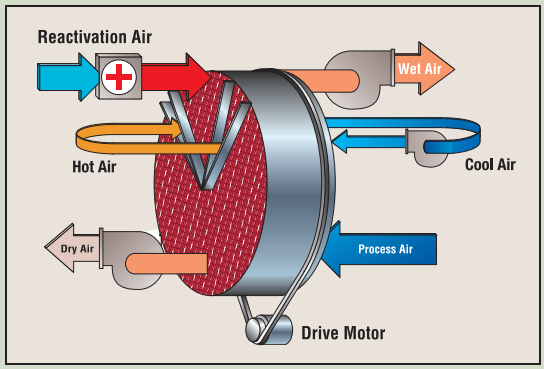
Munters invests significantly in the research and development of new technologies in order to provide its customers with the most recent advancements within the desiccant dehumidification field. A dedicated research and development team has allowed Munters to continuously offer new and innovative solutions to their customers. Munters most recent developments focus on energy efficiency and reduced environmental impact.

PowerPurge™

PowerPurge is a third recirculating airstream within a desiccant dehumidifier that is used to reduce energy requirements and improve desiccant performance. PowerPurge reduces energy requirements in two ways.

The unique patented PowerPurge acts as an energy recovery system, collecting waste heat off of the hottest section of the desiccant wheel and using it to help with the regeneration. This reduces the energy required for reactivation while also reducing the discharge temperature of the process air, resulting in lower energy costs for post cooling.

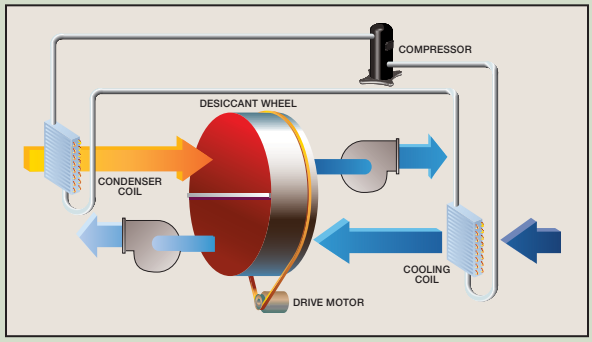
PowerPurge can also save on first cost. Equipping a desiccant system with PowerPurge can reduce the size of the desiccant rotor without diminishing the dehumidification capacity while still seeing a savings in energy costs. PowerPurge is available in Munters Integrated Custom Air Handling (ICA) products. The ICA is Munters' double wall, no through metal custom air handling product line.



Humidity Control Unit (HCU)

Conventional air conditioning systems reduce humidity under ideal conditions. Traditional A/C system design assumes the cooling process will remove any moisture needed to control humidity. They are not designed to control humidity as circumstances vary within the building or as temperatures rise and fall outside. Additionally, recent increases in make-up air requirements have changed sensible heat ratios to levels where these systems operate poorly. When fresh air is both cool and humid, cooling coils may not operate because the sensible heat load is low.

Munters Humidity Control Unit (HCU) provides operators the ability to independently control temperature and humidity. The HCU is designed to treat 100% make-up air and works in conjunction with your existing A/C system, air handling unit or energy recovery ventilator (ERV). It controls humidity on an as needed basis, when humidity levels exceed set point, and is controlled independently of temperature.



Munters HCU cost effectively eliminates humidity from building make-up air. Unlike systems that first cool the air to lower the humidity then reheat the air to create the desired temperature, Munters HCU removes humidity using both refrigeration and a desiccant rotor. The desiccant rotor is regenerated using recycled heat from the unit's cooling components, providing dry air to the A/C system at a low operating cost. The end result is a unit that controls humidity with a COP that is up to 65% higher than a typical air conditioning system.

Munters Service and Support

Today, many properly maintained Munters HoneyCombe rotors give a decade or more of continuous high performance. To help Munters customers achieve outstanding operational results from their dehumidifiers, we have created a nationwide service organization available on a 24-hour basis. Our factory-trained technicians know our equipment comprehensively and can provide you with the most current technical information, complete maintenance recommendations and comprehensive trouble shooting if required. They are supported by a full line of in-stock replacement parts.

Comprehensive Warranties

Munters provides a five-year performance warranty on every wheel it sells. Munters will repair or replace the rotor, at no cost, should structural defects occur within five years. Service agreements provide for regular factory maintenance and inspection of wheels as well as other dehumidifier components. Our service contract customers also receive discounted parts and labor, and performance evaluations which ensure maximum performance from Munters equipment.

No other manufacturer of dehumidification equipment backs its products and supports its customers like Munters. Call 24-hours-a-day at 1-888-DHWHEEL for emergency advice and service.

Cleaning and Maintenance

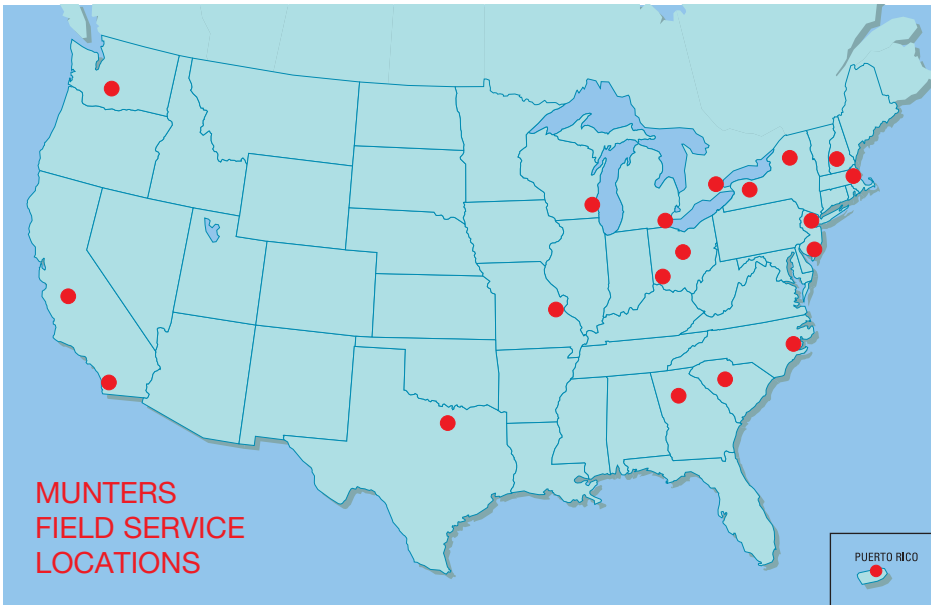
While Munters rotors may be readily cleaned should the application produce high concentrations of dust or other contaminants, the counterflow operation of the wheel in many cases provides self-cleaning. All Munters dehumidifiers are offered with filters, further limiting the effect of airborne particles. Should dust collect on the face of the wheel, it may be simply vacuumed away. In extreme cases where sticky particles such as soot, oil or fertilizer do attach to the media, the wheels are commonly cleaned by washing with water. However, it is strongly advised that before washing a wheel, a customer discuss his situation with the Munters service department to avoid reducing the effectiveness of the desiccant. If a customer should damage the desiccant, it may be possible to replenish the desiccant. This service and counsel on how to best preserve the desiccant for long life and maximum benefit is always available through our service department.

Munters Leads In Extended Surface Technology

The HoneyCombe structure at the heart of all Munters dehumidifier rotors is just one of a broad range of Munters media used throughout industry worldwide. Other Munters divisions offer similar corrugated/cross-fluted media, which are used in an impressive array of environmental control technologies. For example, Munters Zeol division makes equipment to remove harmful VOCs from industrial airstreams. Munters HumiCool division provides the media to cost-effectively humidify and cool office buildings, manufacturing areas and residences. In each case, Munters designs produce enormous surface areas inside relatively small volumes. As in Munters dehumidifiers, these vast surfaces create a continuous system of open, interconnected channels on which gases and liquids can interact for a desired result. Today, extended surface technology pioneered and advanced by Munters allows us to both work and live better.

For information on Munters products or the telephone number of your local sales representative, call 1-800-843-5360.

A national service organization provides 24-hour support for Munters wheels and dehumidifiers. Munters stocks wheels and parts at its Amesbury, MA facility, and other field service locations nationwide, allowing immediate emergency response.



Munters is a global leader in energy efficient air treatment solutions.

Munters manufactures engineered products that can economically control humidity and temperature, provide energy recovery, and/or utilize direct or indirect evaporative cooling for comfort, process and environmental protection. With permanent or temporary solutions, Munters offers a wide variety of options to meet specific climate, application and budget requirements. Munters has net sales approaching $1 billion USD with more than 20 manufacturing facilities across the globe and sales offices in over 30 countries. Munters employs approximately 4,300 people worldwide.

For more information see www.munters.us

Munters

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