

High quality, productivity and hygiene in pharmaceutical production



Dry air for today's pharmaceutical production

Pharmaceutical products are sensitive products: powders, tablets, capsules and diagnostic strips often lose quality and shelf life when they come into contact with moisture in the air. They stick together, become moldy or break apart. Machines and pipes become clogged and production, transport and storage are impeded. This is a cost and time intensive situation that can be avoided.

Solution: Munters Dehumidification

The most effective way to protect raw materials and products during production, storage and transport is to control the surrounding environment. The key is the continuous regulation and monitoring of air humidity during all



production processes, from raw material to end product, maintaining optimum conditions all year round.

Munters can provide custom-designed air dehumidification solutions for every single area of production. Whether in silos, production facilities, warehouses or transport, air humidity is consistently and precisely controlled.



Munters systems provide considerable energy and cost savings, incorporating environmentally friendly technology. Production capacity as well as hygiene conditions improve considerably thanks to the effect of controlled humidity.



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Improved storage and transport of raw materials

Raw Materials: Storage and Conveying	Products	Situation	Solutions	Benefit
 	Hygroscopic (products that absorb moisture) bulk solids such as: <ul style="list-style-type: none">• Powders• Granulate	<p>Storage and conveying / pneumatic transport of sensitive raw materials</p> <p>Risk of dampening of products through transport system air</p> <p>Risk of bacterial growth</p> <p>Danger of condensation on silo walls due to:</p> <ul style="list-style-type: none">• Air introduced through transport air• Moisture migration from product dampness• Consequences of condensation of air humidity upon cooling (e.g. at night)• Product clumping / caking• Propagation of infectious micro-organisms at increased temperatures• No complete emptying possible• Pourability is lost	<p>With correct moisture conditions the powder flows smoothly, preventing agglomeration and clogging of the transport system. The transport system air can be effectively pre-dried.</p> <p>Dehumidification of the silo header reduces the risk of caking and bacterial growth.</p> <p>Provides free-flowing transport for processing with dry air.</p>	<ul style="list-style-type: none">• Dry, pourable product• High product quality remains intact• Improved hygiene in silos• Smoother and faster transport• Reduced need for cleaning, resulting in less waste with fewer, shorter shut-downs• Hygienic storage and transport

Increased Productivity, Quality & Hygiene

Weighing, Mixing & Blending	Products	Situation	Solutions	Benefit
 	Hygroscopic bulk solids such as: <ul style="list-style-type: none"> • Powders • Granulate 	<p>Precise weighing and mixing is essential to ensure accurate dosage.</p> <p>Incorrect and variable humidity levels can interfere with the delicate balance of dose control and consistency.</p> <p>Uncontrolled humidity causes risk of:</p> <ul style="list-style-type: none"> • Variation in tablet weight • Inaccurate product dose • Agglomeration and sticking • Clogging of machines 	<p>By controlling the humidity the product and material is kept in prime condition.</p> <p>Procedures such as weighing, mixing and blending under controlled humidity conditions allows subsequent stages of production to progress with confidence.</p> <p>When the moisture content and humidity level are correct, problems with agglomeration and sticking are prevented.</p>	<ul style="list-style-type: none"> • Consistent humidity conditions all year round • Precise dosing • Perfect granulation • Smooth powder flow • No clogging of machines, so less need for cleaning and shutdowns • Increased productivity • Significantly less waste • Hygienic conditions without micro-organism growth

Clean rooms, Laminar Flow Cabinets, R&D	Products	Situation	Solutions	Benefit
 	All hygroscopic materials, such as: <ul style="list-style-type: none"> • Ingredients • Powders • Granulates • Tablets • Gelatin capsules • Medicated candy • Diagnostic strips 	<p>Clean rooms are required to have a specific air pressure, temperature and relative humidity (RH) level at all times. The required pressure has to be maintained to prevent contamination of the products.</p> <p>In laminar flow cabinets the potential for contamination demands strict control of air quality as well.</p> <p>R&D departments formulating new products are identifying the ideal climate for large scale manufacturing of the products. Climate conditions have to be strictly controlled to be reproducible, preventing reduction in product quality.</p>	<p>Dehumidification solutions in clean rooms and laminar flow cabinets ensure that the relative humidity is kept constant, regardless of the ambient conditions.</p> <p>Hereby the moisture absorption by hygroscopic active ingredients is eliminated, and the product stability remains intact.</p> <p>By creating the correct atmospheric conditions, R&D departments are able to predict the precise large scale production performance.</p>	<ul style="list-style-type: none"> • Stable humidity conditions all year round • Reproducible test results and conditions • Hygienic conditions without micro-organism growth • Reduced waste • More comfortable working conditions

Increased Productivity, Quality & Hygiene

Product Drying: Fluid-bed & Spray Towers, Coating



Products	Situation	Solutions	Benefit
<ul style="list-style-type: none">• Granulates• Solutions and pastes• Coated products	In drying systems such as spray towers and fluid-beds both the drying time and product quality is affected by the varying outdoor climate conditions.	Dry air is added to the drying system itself, creating a 'micro-climate' securing a constant and low humidity, which keeps powder quality constant.	<ul style="list-style-type: none">• Year-round consistent production• Production increase of 15-20%• Shorter drying times• Easier to comply with GMP regulations• Energy savings of 10-15%
	In spray towers injecting hot air introduces a large quantity of water.	The dry air shortens the drying time without adding excess heat, allowing the drying of heat sensitive materials without degrading them.	
	The coating process can become almost impossible during some summer periods with the risk of large wastage caused by uneven or incomplete coating. <ul style="list-style-type: none">• Products do not dry evenly• Drying times are not constant• Risk of product waste	Munters systems can deliver air at dew points as low as -100°F, enabling significantly improved coating / drying processes compared to traditional systems which use only cooling. Sorption drying reduces the energy needed.	

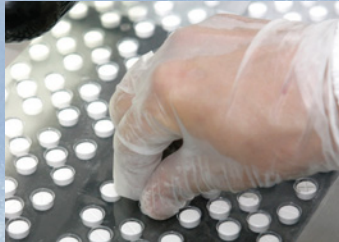
Tableting, Milling, Mixing & Compressing



Products	Situation	Solutions	Benefit
<ul style="list-style-type: none">• Tablets• Medicated candy• Suppositories• Effervescent• Gelatin capsules	Hygroscopic pharmaceutical products demand strict control of the production climate.	Perfect conditions are created by dehumidifying the entire production premises or by adding the dry air directly into the process.	<ul style="list-style-type: none">• Year-round consistent production - irrespective of the season• High productivity• Reduced energy costs• Improved hygiene and safety
	Both temperature and humidity are essential parameters, and cooling systems are insufficient to control these factors. At low dew points coil freezing creates problems and their drain pans may compromise hygiene and safety.	The required low humidity of 20% RH for tableting, compressing etc. is easily obtained by a Munters system.	
	Energy costs for cooling systems can be high and the delivered condition is not always constant as it varies with the changing outside climatic conditions.	At low dew points dehumidification is superior to cooling, with tighter control and less energy consumption.	

Optimizing finishing processes

Filling & Packing



Products	Situation	Solutions	Benefit
<ul style="list-style-type: none"> • Tablets • Medicated candy • Suppositories • Effervescent • Gelatin capsules • Diagnostic sticks • Glass ampoules 	<p>Filling and packing of hygroscopic products must be done under strictly controlled humidity conditions to avoid undesired moisture absorption.</p> <p>If the products are exposed to high humidity at this stage, the result can be damaged, swelling and sticking products or a reduction in the shelf life.</p> <p>Products such as freeze-dried glass ampoules require humidity levels below 6% RH during sealing. Trying to obtain such conditions by cooling would create problems with frost build-up and high energy demands, without even creating the correct conditions.</p>	<p>Dehumidification of the ambient air (entire space) or development of a dry air veil over the packaging area of each individual machine.</p> <p>The correct humidity secures the high product quality with the prescribed effect on the patient as well as a long shelf life.</p> <p>Improved hygienic conditions when microbiological growth is reduced to an absolute minimum.</p>	<ul style="list-style-type: none"> • Year-round constant climate conditions • No disruption of packing lines caused by sticky products • Higher production throughput • Improved hygiene • High quality is ensured • Longer product shelf life


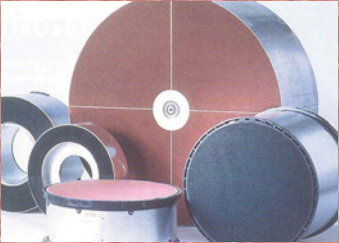
Improved product storage

Cold Storage Freezers



Products	Situation	Solutions	Benefit
<ul style="list-style-type: none"> • Raw materials • Semi-finished products • All types of wrapped / packed products ready for delivery 	<p>Storing raw materials, semi-finished products and the final product is a crucial phase where high humidity can deteriorate the valuable products.</p> <p>Pharmaceutical products are often stored at low temperatures (<50°F) or even below 32°F.</p> <p>When humid surrounding air meets with the cold air in freezers, the moisture condenses and freezes, forming problematic frost and ice on doors, floors, ceilings and products.</p>	<p>By dehumidifying the air before it enters the freezer, the moisture is removed before it can form frost and ice. Our IceDry units are specially designed for low temperature freezer areas.</p> <p>By dehumidifying a zone at the entrance to the freezer, condensation is prevented and ice build-ups will be kept at a minimum. Evaporators will not need to run defrost cycles as frequently and the costly manual removal of ice from product casing is eliminated.</p> <p>Hygienic conditions and employee safety are improved significantly.</p>	<ul style="list-style-type: none"> • High product quality is ensured • Optimum usage of installed cooling performance • Lower energy costs for the cooling system • Reduced need of cleaning and defrosting • Improved hygiene • Improved safety for employees & reduced risk of insurance claims • Dehumidifying void spaces around the cold store prevents building deterioration

Securing performance and optimizing energy

Munters Service Programs	Products	Situation	Solutions	Benefit
 	<ul style="list-style-type: none"> • Service contracts and extended warranties • Maintenance kits and parts • Energy and control optimization • Training 	<p>Interruption of production can easily lead to costly losses.</p> <p>To maintain product quality, production efficiency and optimize energy Munters After Sales options provide affordable insurance to keep systems in top condition.</p> <p>We offer various options to ensure systems are tuned correctly and require less energy.</p> <p>Reliability of equipment and fast actions in the event of a breakdown are important considerations when purchasing pharmaceutical plant equipment.</p>	<p>After commissioning, a service contract with Munters will secure optimum and trouble-free system performance.</p> <p>Regular inspection and maintenance is handled by our skillful service technicians, who are specially trained to optimize capacity and energy economy.</p> <p>Our global R&D department constantly develops techniques for optimization and improvement of capacities. Munters technicians all over the world are highly educated and ready to implement these improvements - meaning a long partnership you can count on!</p>	<ul style="list-style-type: none"> • Performance conforms to design • Extended system life • Uninterrupted production • Priority response in the event of a breakdown • Skilled in-house service staff working cross-borders and available globally • Service options to fit any installation • Optimal performance of equipment secured through regular maintenance • Energy savings • Optimizing equipment

Air dehumidification the Munters way

To ensure disturbance-free production during the entire year Munters has developed solutions for all production areas, from single machines to complete air dehumidification systems.

Central to the generation of dry air is the adsorption rotor, developed by Munters. Two completely separate air streams are guided through this adsorption rotor: the process air to be dehumidified flows through the rotor and then leaves the dehumidifier as dry air. In the reactivation section ambient air is heated and passed through the rotor to remove the moisture absorbed in the process side of the desiccant rotor. A third recirculating airstream called PowerPurge™ is used to reduce energy requirements and improve desiccant performance.

Sorption and desorption follow each other continuously, so that dry air is always available for production and always with consistent quality, independent of current ambient air conditions.

Sorption air dehumidifiers work at every temperature without freezing problems. Even at low temperatures, the sorption system achieves very high dehumidification performance and costs less to power than any other technology.

The use of Munters air dehumidification systems prevents quality losses and production disturbances caused by high air humidity in the entire production area.

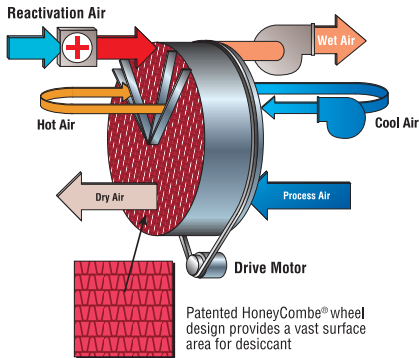
Our competence is your advantage!

Control of the relative and absolute air humidity for efficient and secure environmental conditions:

- For transport and storage of sensitive raw materials and products
- In the most diverse production processes

- In cool and deep-freeze facilities
- All the way through the phases of production to the storage of end products

Contact us – we will be happy to advise you!



Munters has developed individually conceptualized solutions for all production areas, from single machines to complete air dehumidification systems, in order to ensure disturbance-free production during the entire year.

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



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