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Munters Dehumidification Solution for Lithium Battery Industry
Guarantee Large-scale Production of Lithium Batteries without Interruption



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Company Introduction

About Munters

Founded in 1955, Munters Corporation has been devoted to air treatment with its main products including dehumidification systems, humidifiers, evaporative cooling systems and gas-liquid separators (Mist Eliminators).

Since its foundation, Munters has been the industry leader with its highly efficient and energy-saving customized air treatment solutions.

With innovative technology and rich experience, professional engineers at Munters have helped customers from all walks of life to build ideal application environment, especially in the lithium battery, pharmaceutical and food industries.

Corporate Vision

Your perfect climate.

Our Mission

Munters' vision is to be a global leading supplier of energy efficient solutions for air treatment and climate control technologies.

Facts & Figures

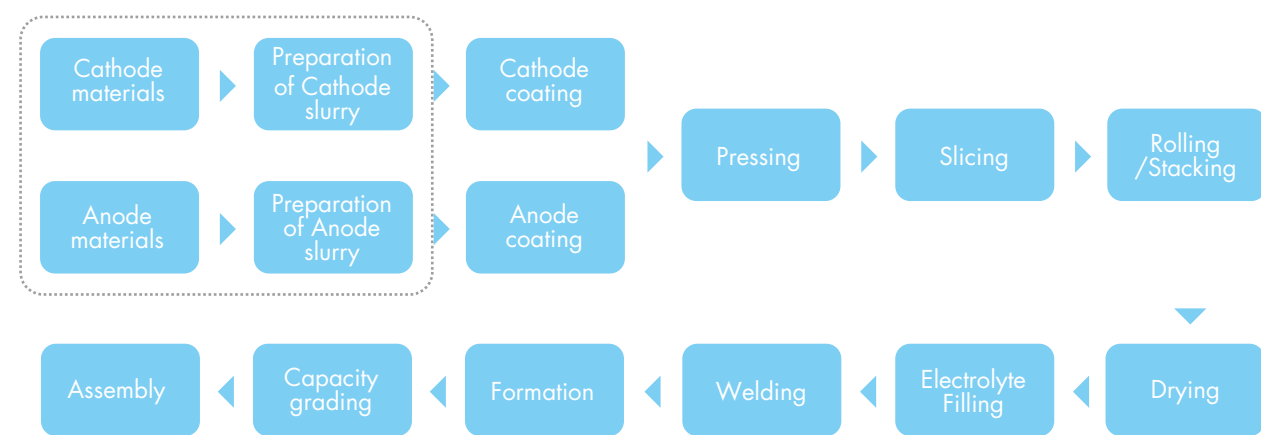
- Global presence with sales and manufacturing in 30 markets
- About SEK 7 billion in annual net sales
- Around 3,900 employees
- 19 manufacturing plants, 7 smaller assembly hubs, and 55 sales and service centers
- Installed base of more than 320,000 air treatment systems



• Data covered in this manual dated to the end of March in 2018

Importance of Humidity Control

Lithium-ion batteries are very sensitive to air humidity in the production process, and some Cathode and Anode materials used in processing technology have strong water absorption. When the positive and negative materials absorb moisture, the quality of batteries will be seriously affected, resulting in the increasing of defective products. The electrolyte solution of lithium-ion batteries is more sensitive to moisture. Some substances in the electrolyte solution will react with moisture in the air, which leads to various problems such as the reduction of electrolyte content, generation of undesirable gas, poor consistency of batteries and unqualified quality of batteries.



Lithium Battery Processing Process

Munters dehumidification system is used in the production process of 50% of the world's lithium batteries.

The proven Munters desiccant rotor dehumidification solution for lithium battery industry has been widely used by lithium battery manufacturers across the world. Featuring robust housing and reliable airtightness, patented desiccant rotor design and energy-saving technology, unique low dew point equipment production capacity, strict production management and factory inspection, Munters desiccant dehumidification system can ensure stable operation and energy efficiency, so as to meet the humidity requirements of our customers in various production processes.

The Munters offers a wide range of desiccant dehumidification systems for lithium battery industry with flexible functional segments and control options, which can be used for dehumidification of glove box or drying room where dozens of people work together. Under the premise of meeting the basic performance requirements, Munters can also provide customers with customized overall solutions, including the design and consultation of wall requirements, engineering installation, air duct material and air inlet layout.



Technical Advantages of Munters

Stable production and reliable quality

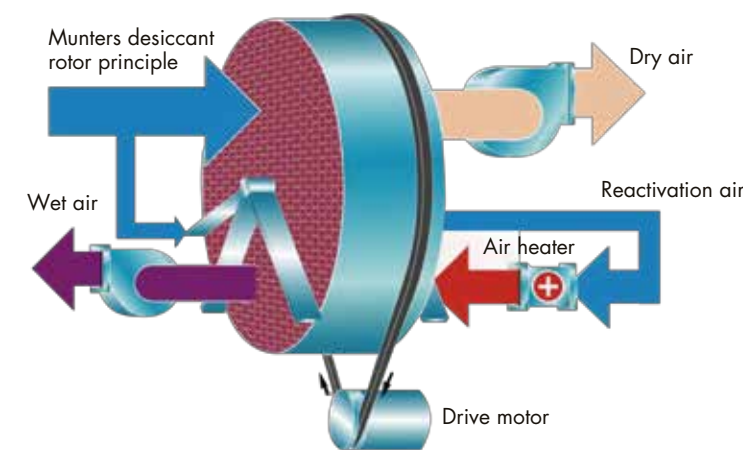
Adhering to our operation philosophy- environmental protection, Munters is the inventor and industry leader of desiccant rotor dehumidification technology. ISO9001 and ISO14001 certified Munters plants worldwide provide customers with highly efficient and environment-friendly dehumidification solutions with sustainable production processes. Munters has patented desiccant rotor technology and energy reuse technology, which not only reflects Munters consistent environmental protection philosophy, but also

has excellent dehumidification performance, helping customers improve productivity and reduce energy consumption. With authoritatively certified non-toxic, fungicidal and fireproof properties, Munters desiccant rotor can help customers improve indoor air quality and cleanliness level. All Munters products have passed strict factory inspection to ensure continuous stable operation with low energy consumption.



Munters desiccant rotor principle

- Desiccant is used to absorb moisture in the air to dehumidify the humid air.
- At the heart of these dehumidifiers Munters patented product—a continuously rotating rotor with desiccant.
- The 360° rotor is divided into two sectors, of which the sector of 270° is for processing and sector of 90° is for reactivation.
- When the wet air passes through the processing sector of the rotor, it gives off its moisture to the desiccant.
- When the rotor rotates to the reactivation sector, the high-temperature reactivation air passes through the rotor and the moisture on the desiccant is carried away by the reactivation air.
- The desiccant on the rotor is reactivated, and the newly dried desiccant can absorb moisture once again.
- The rotor keeps running at a low speed with uninterrupted dehumidification and reactivation to provide users with continuous dry air.



Desiccant Rotor Principle

Munters Dehumidification Solutions

Humidity/Process Requirements 40~50% RH

Problems

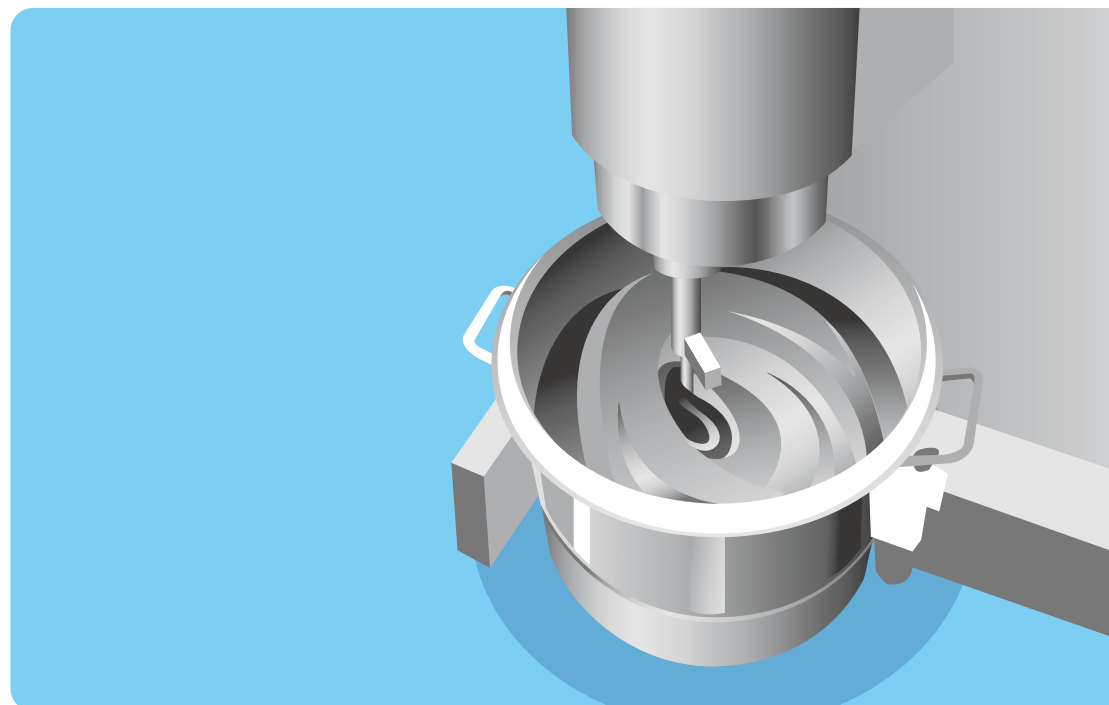
- Large energy consumption of traditional dehumidification
- Great fluctuation of temperature and humidity
- Slow response of humidity control

Munters Solutions

- Low temperature reactivation energy saving programs with energy saving up to 30%-50%
- Precise control of temperature and humidity
- Quick response to ensure stable process environment

Customer Benefits

- Effective reduction of operating energy consumption
- Significant improvement of product quality
- Stable production throughout the year and improved production efficiency



Munters Dehumidification Solutions

Humidity/Process Requirements 10~30% RH

Problems

- Serious waste of energy in conventional rotor dehumidification
- Failure to achieve low humidity that meet the process requirements
- High temperature of reactivation exhaust air and short service life of the rotor

Munters Solutions

- Application of unique PowerPurge™ with energy saving up to 40%
- Stable low humidity air supply
- Unique rotor material +PP optimization program to extend the service life of the rotor

Customer Benefits

- Lower energy consumption and higher efficiency
- Raised conformity rate
- Reduced maintenance frequency and cost



Munters Dehumidification Solutions

Humidity/Process Requirements -30~-70C° Dp

Problems

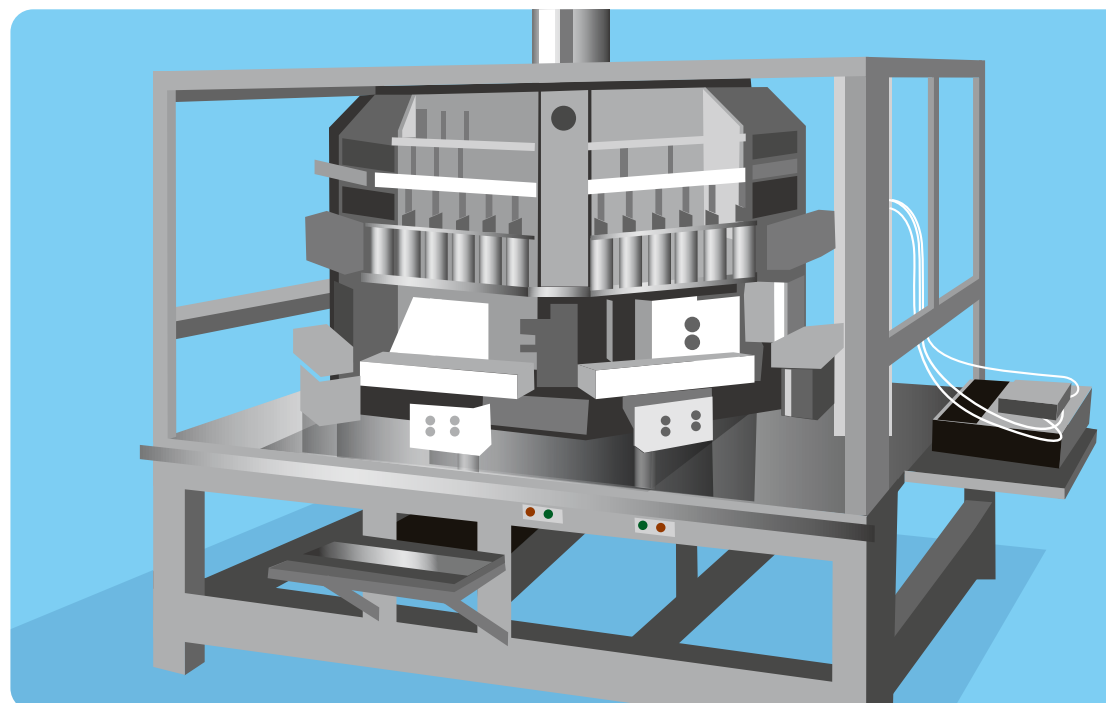
- Failure to achieve low dew point that meet the process requirements;
- Large temperature fluctuation of outlet dew point
- Large space with less personnel and high energy consumption

Munters Solutions

- High quality rotor and high efficiency and low humidity Purge with energy saving up to 15%-30% and ultra-low dew point air supply
- Precise control and stable air supply
- Independent control of temperature, humidity and cleanliness, saving energy and cost

Customer Benefits

- Improved battery quality
- Ensuring battery consistency
- Substantial reduction of investment and operating costs



Munters Service

Munters GREENDRY rotor dehumidification systems are specially designed for the lithium battery industry, and adopt Munters unique frame-free configuration design, which improves the dehumidification, durability and air-tightness. The lowest dew-point temperature of air supply can reach -80°C, meeting the strict requirements of the lithium battery industry on ambient humidity. In addition, the GREENDRY series desiccant rotor dehumidification system can also save up to 30% extra energy by using the patented PowerPurge™ energy reactivation technology.



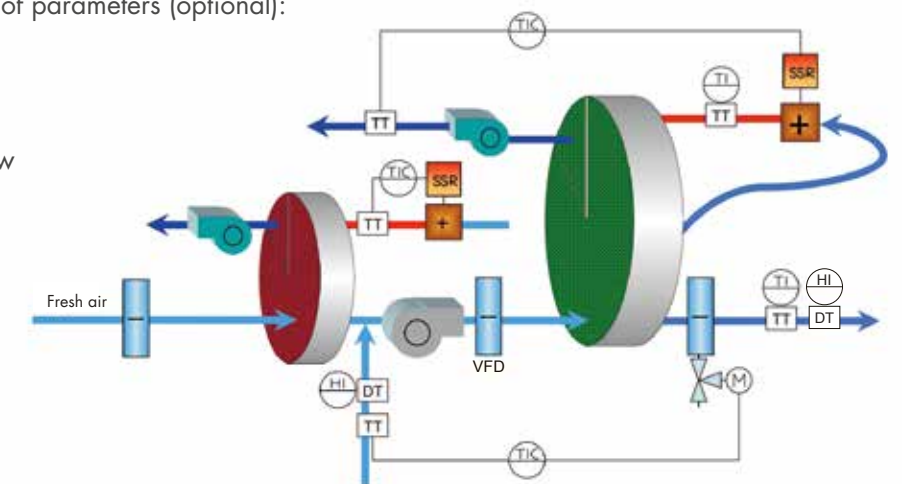
Product Features

- High efficiency, energy saving and low operating cost.
- Unique frame-free configuration and hermetically sealed overall foam design with excellent dehumidification performance
- Real time control of equipment operating status
- Multiple reactivation modes (electrical reactivation, gas reactivation and steam reactivation)
- Low maintenance frequency
- Simple and easy operation
- Large overhaul space

Electrical control - flexible Management and Intelligent Monitoring

Munters dehumidification system adopts flexible and user-friendly SIEMENS intelligent logic controller, and can realize real-time detection and control over operating status. Meanwhile, LCD display allows easy monitoring of a full range of parameters (optional):

- Current operating status
- Reactivation temperature and over temperature alarm
- Reactivation air temperature and dew point temperature
- Reactivated thyristor regulation
- Filter differential pressure and alarm
- Running timer
- Process fan frequency conversion regulation and display of air volume
- Other spare interfaces for extension function



Excellent Technical Team

Munters technical team composed of experienced experts can not only provide customized design solutions as required by customers, but also can transform complex application solutions into fine production drawings, providing efficient and energy-saving dehumidification solutions for customers to ensure the uninterrupted production of customers.



More than 10 Years of Experience

With proven theoretical system and rich design experience, Munters technical team always pioneers the development of the industry and can quickly respond to the diverse needs of customers.

Independent Innovation

Munters has heavily invested in research and development to independently design a variety of innovative and professional dehumidification system for the lithium battery industry, and continuously shorten the supply cycle. For example, the GREENDRY series upgrade the performance and appearance of Munters dehumidification products to a new level, which is highly in line with the multiple demands of lithium battery customers for performance, energy consumption and supply cycle.



Global Resource Pool

Focused on air treatment for more than 60 years, Munters has successfully delivered thousands of applications for well-known customers in the lithium industry worldwide. These proven successful cases are shared with the global technical team through Munters well-established internal platform.

Training

Regularly trained Munters technicians can ensure the leadership in the technology, so as to provide customers with the best solutions. In addition, the latest dehumidification technologies can be shared with customers in the lithium battery industry through seminars, helping them to produce world-leading lithium battery products.



Professional Selection Software

Based on the database shared by Munters worldwide, Munters is constantly perfecting its unique rotor selection software. The software includes Munters global rotor products, can quickly and accurately calculate rotor performance according to customers' needs, and facilitate application engineers to provide high-efficiency and energy-saving solutions to customers in time.

Munters Service



Munters Service is dedicated to help our customers optimize the value of their equipment through planned maintenance programs. Drawing on over 60 years of experience, Munters has developed customizable service programs that extend the life of your equipment, optimize its performance, and ensure continuous operation while saving energy.

Munters Service Products

- Installation Support & Assembly Supervision
- Startup Services & Guaranteed Performance
- Maintenance: PrimaCaire® and ServiceCaire®
- Performance Check & Inspection
- Upgrades, Reconditioning/ Repairs
- Energy Audits
- Training Services
- Spare Parts

Extended Warranty - PrimaCaire®

Select PrimaCaire® to extend the warranty on your new equipment. Munters air treatment products are manufactured from high quality parts and undergo a thorough and complete testing before leaving our factory. Despite these extensive measures, it is still possible for components to fail during operation.

In order to minimize the failure rate, Munters offers a variety of warranty options, adapted to your specific requirements, all to secure your peace of mind.

- | | |
|--|---|
| • Extended warranty | ✓ |
| • Optional annual extended warranty period | ✓ |
| • Performance check & inspection | ✓ |
| • Service reports | ✓ |
| • Priority scheduling and quick response | ✓ |
| • Covers labor/parts | ✓ |

Maintenance - ServiceCaire®

Select ServiceCaire® for maximum protection of your equipment. Let Munters take care of your air treatment systems right from the start to help ensure years of successful operation. Regular performance checks determine the efficiency of the equipment; while maintenance plans and visits ensure stable equipment.

Munters offers both standard and customizable plans to suit a wide variety of different requirements and needs.

- | | |
|---|---|
| • Flexible maintenance options (e.g. 12/24/36 months plans) | ✓ |
| • Performance check & inspection | ✓ |
| • On-site training during ServiceCaire® visits | ✓ |
| • 10% discount on spare parts | ✓ |
| • Priority scheduling and quick response | ✓ |
| • Performance analysis reports | ✓ |

* Consult your local Munters Service Team to determine the best option for you.