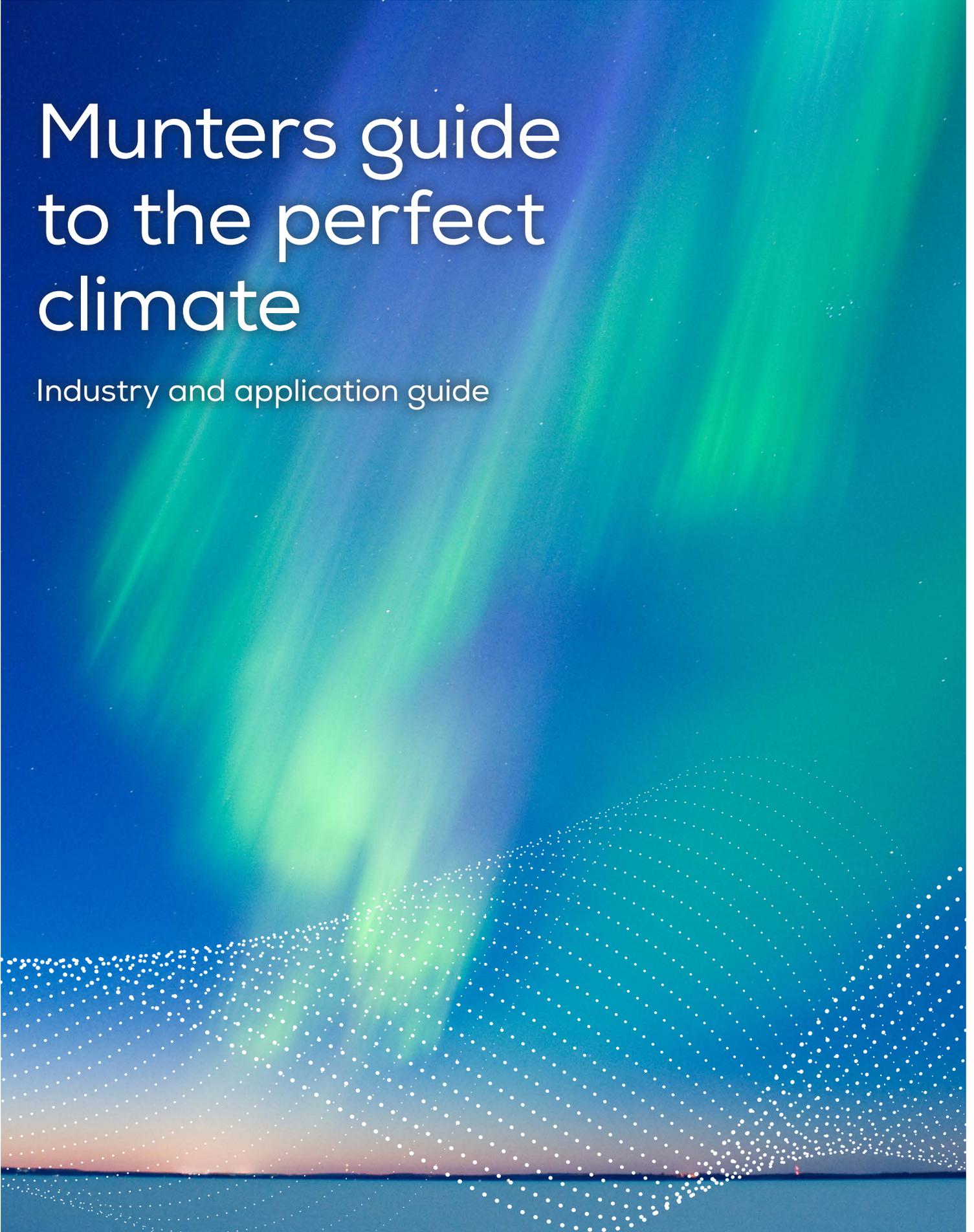


# Munters guide to the perfect climate

Industry and application guide



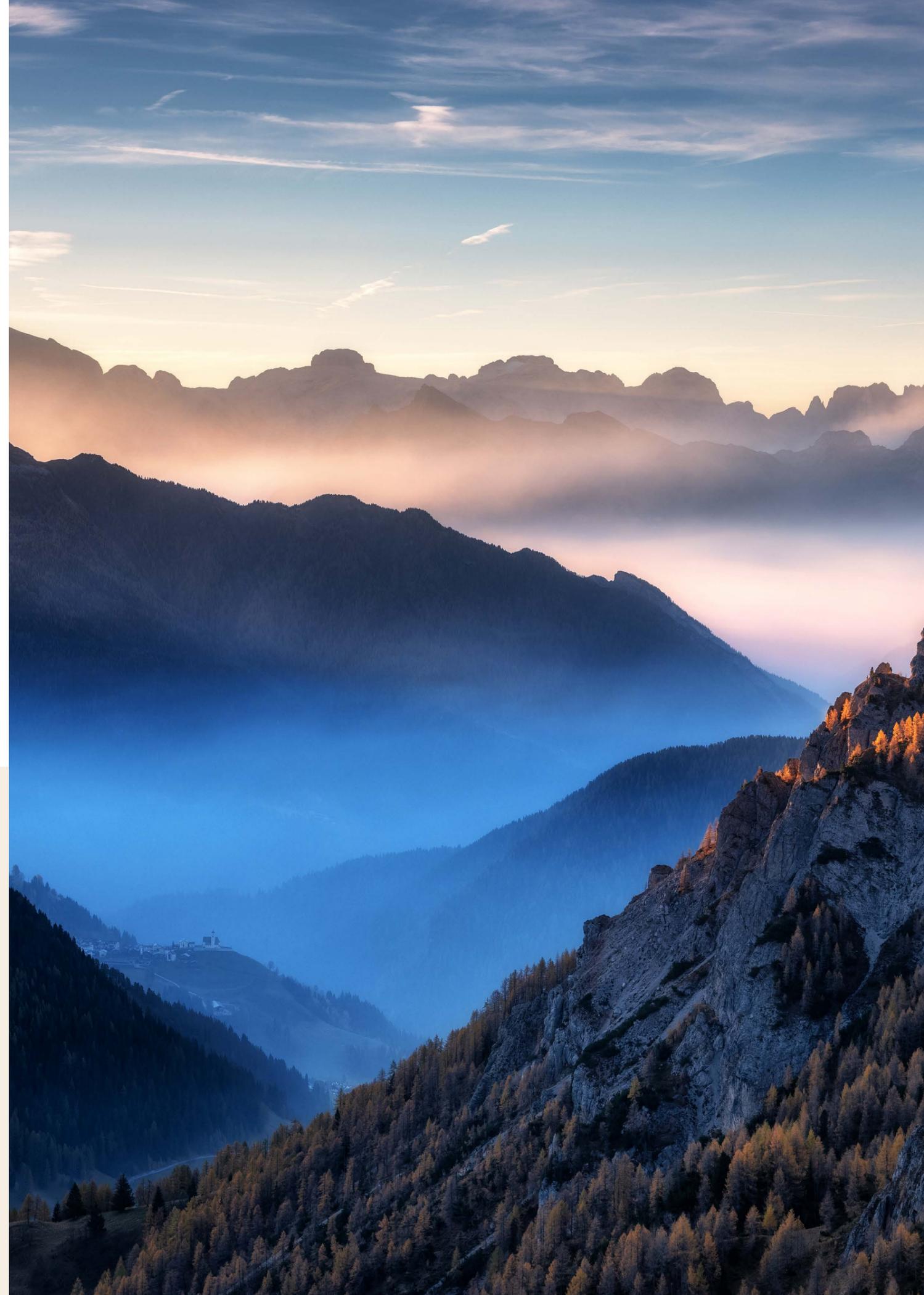
# Your perfect climate

Desiccant dehumidification solutions can help most industries control indoor climate conditions to enhance their environmental profile and boost profitability. Dehumidification systems support many different applications and remove unwanted moisture from a building's internal environment to help control relative humidity and dew point. In commercial and industrial applications, dehumidifiers help control condensation, which secures your product's moisture content, enables smooth process operations, and maximises production efficiency.

Use this comprehensive, easy-to-follow guide to learn more about how dehumidification can contribute to your industry and/or application. Just find your challenge, application, or industry to learn more about climate control solutions that can help you achieve the perfect climate.

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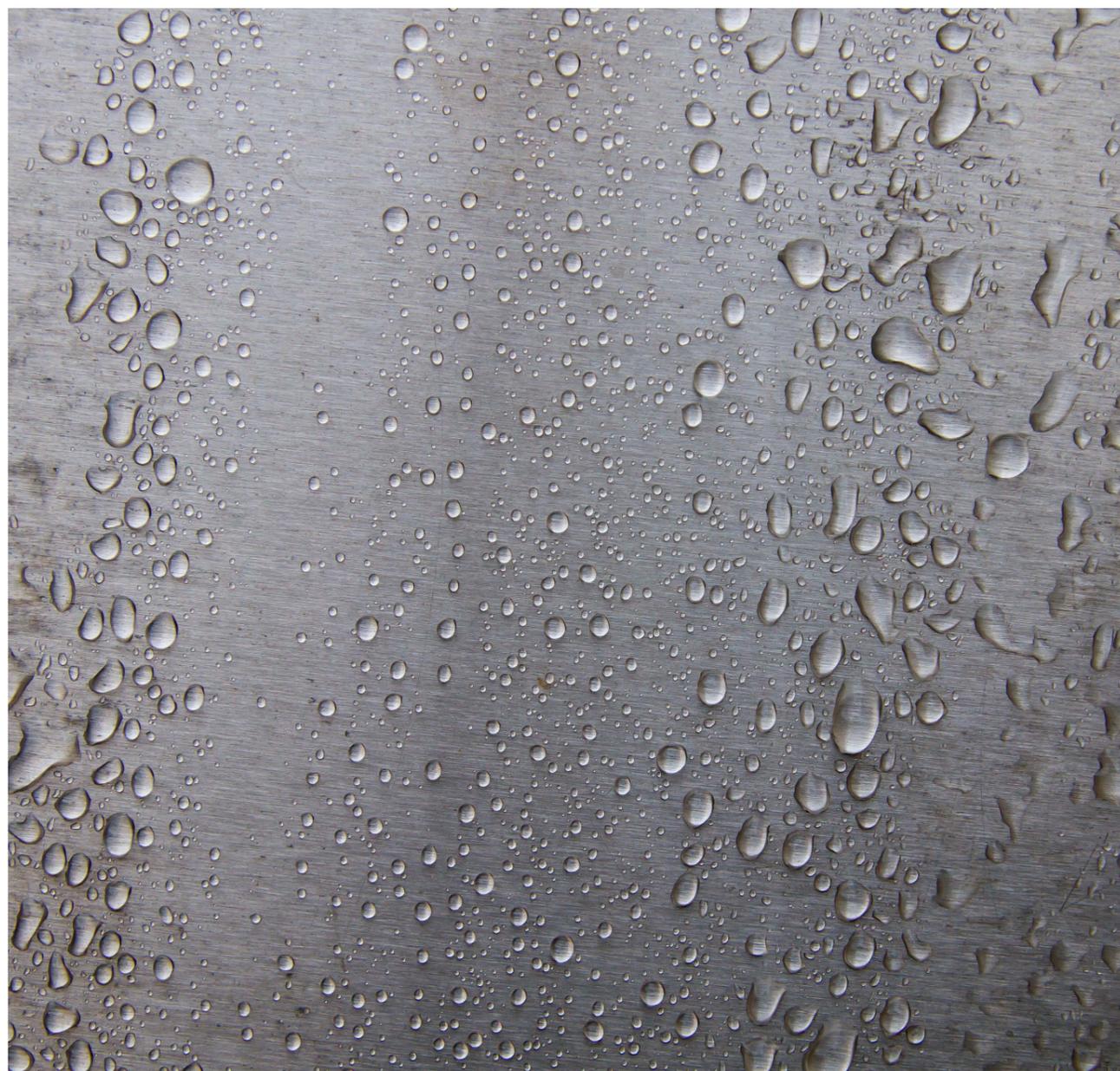


# Challenges

## Take control of your climate

From food to archives to utilities, data centers or defence, nearly all industries have climate control challenges. Moisture, temperature and air quality are all factors that can impact processes throughout the world. And without proper humidity control, excess environmental moisture can lead to unexpected downtime, defective products, safety and health issues, and financial losses.

But you can address the unique climate challenges you face with a tailored Munters dehumidification solution. Proven, energy-efficient air treatment from Munters will help you optimize your indoor climate for long-term, sustainable business.



## Bacterial growth, mould and fungus

Moist air which is laden with bacteria can increase the potential for contamination in production and storage. When the humidity level is higher than 70% RH, mold, fungus, and mildew flourish.

From raw materials, production, packaging through transport and storage. All products and buildings are affected by high relative humidity. The product's lifetime and quality can be significantly improved with dehumidification.

### Proven applications

- Museums and Libraries
- Archives
- Leisure
- Food and pharma

## Chemical reactions

Moisture or water vapour is one of the components which can cause an undesired chemical reaction. For instance, lithium (used in the production of lithium batteries) will react violently with water vapour. This is why production of lithium batteries can only be done in an extremely dry (dehumidified) area. Also explosives and propellants are known to be sensitive to chemical reactions with moisture.

Controlling humidity using dehumidification will prevent undesired reactions that might lead to an unstable product, danger of explosion, or the forming of unwanted and dangerous chemical compounds, for instance hydrogen gas.

### Proven applications

- Manufacture of lithium batteries
- Ammunition storage
- Semi-conductors
- Film storage

## Condensation

When water evaporates it becomes water vapour. When this comes into contact with cool surfaces, condensation forms. This could drip onto walls, ceilings, and products, which will increase the risk for product contamination, as well as for a decrease in safety and product quality.

Dehumidification systems create low humidity atmospheres to prevent this contamination and to reduce the medium for mould and microbe formation. Using a Munters condensation control dehumidifier means decreased product spoilage, a reduction in corrosion and building fabric deterioration.

### Proven applications

- Cold and chill stores
- Free flowing powders
- Food processing
- Pharmaceutical processing
- Ice rinks and sports halls
- Water treatment works



### Corrosion

Corrosion, or the oxidation of metal, is heavily influenced by the presence of moisture in the air. A high relative humidity causes a thin layer of water vapor molecules to settle on the surface of the metal.

Dehumidification can lower relative humidity to 45–50% without any problem, stopping corrosion. This will dramatically reduce damage and maintenance costs.

#### Proven applications

- Steel storage
- Military equipment and Vehicles
- Leisure
- Suspension bridges
- Water treatment works



### Ice build up

Ice and frost build up effects productivity, quality and safety.

A dehumidification solution will help to maintain the highest safety levels by stopping ice and condensation in their tracks. No ice means workers won't slip and equipment won't be damaged by falling ice. No mist means reduced accidents due to reduced visibility. The improved climate conditions also enhance the efficiency of evaporators and freezer equipment by preventing ice occurring, ensuring better performance, reducing defrost cycles and saving on maintenance costs.

Eliminating fog and mist inside cold stores will improve visibility and safety.

#### Proven applications

- Cold stores
- Freezers/spiral freezers



### Moisture absorption

The climate needs to be strictly controlled during production, packing and storing of hygroscopic products. Moisture absorption can disturb the precise function of a final product, just as the shelf life is affected if the product takes up moisture during production. Some products need to be produced and packed in environments with relative humidity levels below 25% RH.

Munters dehumidification systems are the simplest, most precise way of achieving and controlling the accurate humidity conditions required.

#### Proven applications

- Manufacture and packing of hygroscopic materials
- Pneumatic conveying
- Silos
- Tableting
- Timber and paper storage



### Mechanical properties

Materials are in balance with their surroundings. In wet climates materials will take up more moisture from the air, in dry climates the opposite occurs. In some cases this can influence the mechanical properties of materials. Paper that is too wet will not be straight anymore. Some types of moisture-sensitive glue will lose their bonding power, and nylon will absorb so much moisture that product size and tolerance is impacted.

#### Proven applications

- Manufacture and packing of hygroscopic materials
- Pneumatic conveying
- Silos
- Tableting
- Timber and paper storage



### Product caking/sticking

Many powders and products attract and retain moisture. When these products are stored in silos or bins, or transported in pneumatic conveying systems, moisture can cause these ingredients to stick to silo walls and cause blockages. Lower productivity, higher production costs and reduced product quality are the results of these problems.

Dehumidification is a simple and effective way to prevent condensation, sticking or lumping. This translates into higher productivity, lower production costs, lower down time, better hygiene and a higher product quality. Hammer rash in silos can also be prevented.

#### Proven applications

- Materials handling
- Conveying
- Packing
- Silos
- Food powders
- Pharmaceuticals
- Chemicals



### Close control

Munters provide complete packaged climate control solutions, providing precise humidity and temperature control with varying levels of filtration.

The combination of desiccant and cooling work in harmony together with accurate controls.

#### Proven applications

- Archives
- Test chambers
- Pharmaceuticals (Active Pharmaceutical Ingredients – API)



### Conveying lines

When hygroscopic ingredients and powders absorb moisture they become sticky and build up inside the conveying lines. The resulting flow problems slow the process, create hygiene concerns and eventually cause costly downtime.

Pre-drying the air using a Munters dehumidifier ensures that the products are transported in a dry environment. The result is quick and continuous problem-free conveying with no unscheduled production stops.

#### Proven applications

- Chemicals
- Food
- Pharmaceuticals
- Packing
- Weighing
- Cooling tunnels



### Product coating

Coating processes can be shortened and made more consistent by adding dry air. Regardless of the season, climate conditions in coaters will be stable all year round thereby securing optimal conditions. Productivity increases and energy costs may be cut. The risk of contamination of the conditioning system by any wet return air would be eliminated by using a Munters desiccant dehumidification system.

You will enjoy consistent, year-round production, which can even increase by 15–20%. Shorter drying times and GMP regulation compliance are also gained thanks to Munters dehumidification.

#### Proven applications

- Confectionery
- Tableting



### Product drying

The most common method for product drying is to introduce hot air, thus evaporating the moisture contained within the product. However this is not ideal as the increase in heat and humidity increases the risk of mould and fungus growth. This in turn can cause corrosion to machinery and the extra heat can damage the product being dried.

By using Munters dehumidifiers the conditions can be kept constant to prevent these destructive conditions from occurring.

#### Proven applications

- Food
- Pharmaceutical products
- Chemical
- Film



### Spray drying

Spray drying is common practice all over the world for a variety of products. In hot and humid conditions, the spray drying process is susceptible to seasonal fluctuations. Changes in the ambient weather influence the conditions of the inlet air to the drying process and the consequences are low drying capacity, heavy process fluctuations and difficulties in drying the more sensitive products.

Dehumidification creates consistent air conditions all year round. This makes the spray drying process easier to control, protecting product quality, and avoiding product sticking. Powder loss is reduced and plant downtime is kept to a minimum.

#### Proven applications

- Food e.g. dairy powders
- Pharmaceutical
- Chemical



### Waste heat

Utilise heat generated from sources such as CHP. This can come in the form of low pressure hot water (LPHW), typically 85°C.

Heat utilised to reactivate climate control systems delivers conditioned air year round into desired areas. Results include lower energy costs by improved efficiency and reduced chiller load.

#### Proven applications

- Various applications

# Industries

## Your perfect climate

All industries operate in complex, demanding environments. But, innovative, efficient and sustainable Munters dehumidification solutions can provide a stable environment with lower energy consumption, when compared to other technologies.

Innovative, efficient and sustainable solutions that control indoor temperature and humidity can create a healthy environment, reduce energy costs, ensure product quality and extend equipment life expectancy.

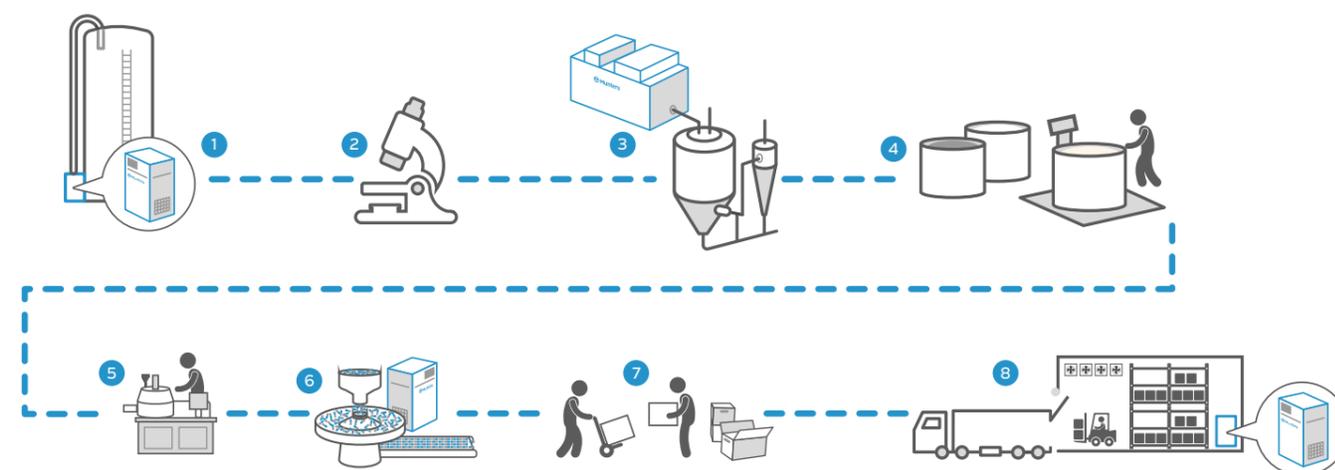


# Your perfect climate for the pharmaceutical industry

Climate control is an important factor for reliable and predictable pharmaceutical production. From R&D labs to bulk production, Munters systems can:

- Stabilise conditions year round
- Improve weighing and dosing operations (by controlling moisture content of ingredients)

- Reduce effects of moisture in formulations
- Ensure GMP/SOP compliance
- Increase production capacity
- Ensure resilience and uptime



### 1. Silos & Conveying

- Prevent condensation that causes sticking
- Improve powder flow
- Reduce cleaning

### 2. Clean rooms & R&D

- Stable, year round conditions
- Reduce waste

### 3. Drying

- Faster drying in spray towers and fluid beds
- Energy saving up to 25%
- Consistent conditions – no seasonal fluctuations

### 4. Sorting/Weighing/Mixing

- Less blocking in machinery caused by condensation
- Ensure consistent moisture content for accurate weighing

### 5. Milling & Compressing

- High productivity
- Reduce energy consumption
- Improve dosing accuracy

### 6. Tableting

- Prevent product sticking
- Less stoppages
- Higher production throughput
- Less waste
- Fixed moisture content

### 7. Packing/Labeling

- Reduce packaging damage and collapse
- Improve label scanning

### 8. Cold storage

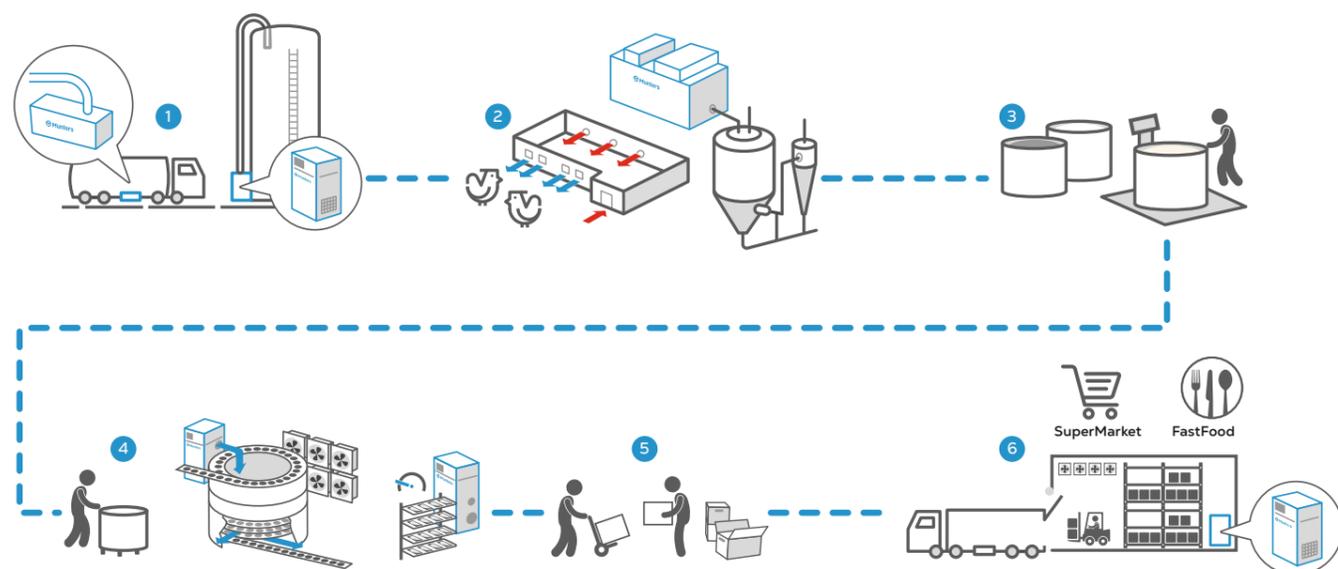
- Significantly reduce ice in spiral freezers and cooling tunnels
- Significantly reduce ice on products = improved quality
- Reduce cleaning requirements

# Your perfect climate for the food industry

From farm to fork, Munters climate control solutions are used throughout the food supply chain to:

- Optimise product quality
- Increase production efficiency

- Improve safety and hygiene
- Reduce wastage
- Save energy



## 1. Silos & Conveying

- Prevent condensation that causes sticking
- Improve powder flow
- Reduce cleaning

## 2. Drying

- Faster drying in spray towers and fluid beds
- Energy saving up to 25%
- Consistent conditions – no seasonal fluctuations

## 3. Sorting/Weighing/Mixing

- Less blocking in machinery caused by condensation

## 4. Freezing & Cold storage

- Significantly reduce ice in spiral freezers and cooling tunnels
- Significantly reduce ice on products = improved quality
- Reduce cleaning requirements

## 5. Packing/Labeling

- Reduce packaging damage and collapse
- Improve label scanning

## 6. Cold storage

- Reduce ice, frost and fog in cold stores
- Improve safety



## Archives

High and uncontrolled relative humidity causes damage to most materials. Archive stores contain a range of materials from documents, artifacts and textiles through to military archives and magazines holding ammunition and weapons.

Preventing corrosion, mould, mildew and/or fungus will significantly extend the life of valuable and precious assets. Preventing seasonal fluctuations in humidity will ensure requirements for PD5454 are met, as well as removing the need for heating in some areas.

### Proven applications

- Books, documents, paper
- Seeds
- Film, tape, video
- Works of art



## Automotive

The automotive industry needs to meet precise specifications when it comes to temperature and humidity. Complete cars, engines and parts are subjected to a large variety of testing in environmental chambers and wind tunnels.

Munters equipment enables the proper environment for testing, production and transportation of automotive components, allowing manufacturers to simulate any environmental conditions with dehumidification systems that can deliver air to ultra-low dewpoint conditions.

### Proven applications

- Emissions testing
- Glass coating, painting and drying
- Accoustic and test chambers
- Wind tunnels
- Laminating and Moulding
- Fabrication



## Chemical

Chemical and fine chemical manufacturing requires a multitude of equipment to ensure quality and consistency. Unwanted moisture due to high humidity levels can create a number of problems for chemical manufacturers and the users of their products.

Munters can create the proper environment for manufacturing, packaging, transporting and storing of humidity sensitive products.

### Proven applications

- Plastics
- Film drying
- Injection moulding
- Investment casting
- Lamination of glass and plastics



### Clothes and garment drying /drying rooms

Both military and civilian drying rooms can save a lot of money by drying clothes and uniforms with desiccant dehumidification. The process uses a dehumidifier with fan to quickly and efficiently dry clothing without the need for heating or tumble drying.

Simple installation and low energy consumption, this solution also prevents wear and tear on clothing and can be used for a range of applications. Proven to save up to 70% energy costs compared to heating, this solution dries faster than most other systems.

#### Proven applications

- Military uniforms and lifeguard outfits
- Outdoor activity centers and riding stables
- Schools, offices and sports clubs



### Data centres

The right indoor climate is essential for data centers. Efficiently maintaining the right conditions can improve reliability, reduce operating costs and ensure that the data center is run in a more sustainable way. The equipment within a data center generates a significant amount of heat, and operates most efficiently and reliably within certain temperature ranges. Incorrect moisture levels within data centers can lead to electrostatic discharge or corrosion, which can damage servers, while inadequate ventilation can compromise working conditions. Munters solutions can efficiently maintain the perfect indoor climate with proper ventilation and humidity control.



### Defence

The climate in and around military and aerospace equipment, systems and components has a direct influence on the quality and condition of the items. Controlled humidity environments save on maintenance costs, as well as ensuring equipment availability is increased. In addition, dry air reduces and even stops corrosion by lowering relative humidity levels to around 40–45%. On infrastructure as well as on items with organic material, mould and fungus growth will also be stopped. And ammunition chemical compound degradation is slowed down or can even be stopped, optimising their safe shelf life.

#### Proven applications

- Ammunition storage
- Controlled humidity storage (CHE)
- Assets in storage



### Electronics – low dewpoint battery production

The development and manufacturing of lithium batteries needs to take place in ultra low humidity dry rooms, regardless of whether it is a small R&D lab, a micro-environment or a large scale production facility.

Each dry room is unique, and is designed to ensure optimal climate conditions as low as -40°C dewpoint and less than 1% relative humidity. Munters has the experience and expertise to offer the best possible environment, with solutions customized to your needs.

#### Proven applications

- Research and development and universities
- Battery production
- Automotive – hybrid/electric
- Electric grid storage



### Leisure

Due to a high moisture load in many recreation and leisure facilities, traditional air handling units are unable to create a comfortable and healthy indoor climate. Many sports arenas and ice rinks rely on dehumidification to get the perfect environment for their facility, which keeps athletes safe from issues that can occur when there is unwanted moisture in the air.

Munters dehumidifications systems prevent condensation and corrosion, reduce damage to the building itself and cut energy costs.

#### Proven applications

- Ice rinks
- Indoor tennis courts
- Sports halls



### Museums, libraries and galleries

Consistent relative humidity will preserve artifacts and documents in museums, galleries and libraries. From small cabinets and display cases to storage and entire museums or libraries, dehumidification ensures consistent temperature and relative humidity control all year round while minimising energy consumption.

Munters dehumidification solutions can improve indoor air quality and prevent mould and corrosion.

#### Proven applications

- Fine art storage, museums, and galleries
- Libraries and document archives



### Utilities, power generation and mothballing

High humidity causes condensation, corrosion and rust, which in a power plant, causes problems with gas turbines, pumps, switch-gears and electronics operations. This could lead to start up failures after maintenance outages, with fines for non-delivery. The dry air ensures that the power plant is protected from corrosion and stays in perfect condition.

Munters dehumidification solutions keep mothballed power stations perfectly preserved, enabling quick start up from lay up/stand by.

#### Proven applications

- Nuclear decommissioning
- Turbine protection and boiler preservation
- Power plants under construction, operation, and maintenance



### Utilities – wind farms

For wind turbines, the aggressive environment in which these turbines are often sited requires special protection of the nacelle machinery and tower. Key areas of risk include water ingress through air intakes and corrosion caused by condensation.

Munters is a leading supplier to the world's wind turbine manufacturers. Our dehumidification solutions help preserve machinery and towers.

#### Proven applications

- Wind farms including offshore



### Supermarkets and retail

Excess amounts of humid air entering a retail space can create an uncomfortable store environment. Not only does humid air make consumers and employees feel cold and clammy, but it causes the store's HVAC systems to work harder in order to reach ideal temperatures, resulting in higher energy costs. HVAC designers are faced with the challenge to meet sensible and latent cooling requirements, while reducing carbon footprint and ensuring greater energy efficiency.

For the retail industry, Munters solutions offer a more efficient, high performing HVAC system that creates a comfortable, healthy environment for working and shopping.

#### Proven applications

- Supermarkets
- Distribution centres

# Munters Service portfolio

At Munters, we are committed to offering a complete portfolio of service offerings to support you throughout the entire lifecycle of your Munters equipment.

#### Commissioning support

Our trained service technicians make sure your equipment is operating as designed so your investment gets the best possible start. We offer everything from basic unit start-up to extensive turnkey installations.

#### Maintenance

Keep your equipment running like new with on-site visits by factory-trained technicians and regular rotor performance checks.

#### Retrofit and upgrade

Boost energy efficiency and capacity with our retrofit solutions for equipment already in operation.

Upgrade controls, replace your rotor or upgrade your fan to maximize performance, save money and energy. Munters also custom fabricates zeolite blocks for replacement of all zeolite and carbon rotor systems.

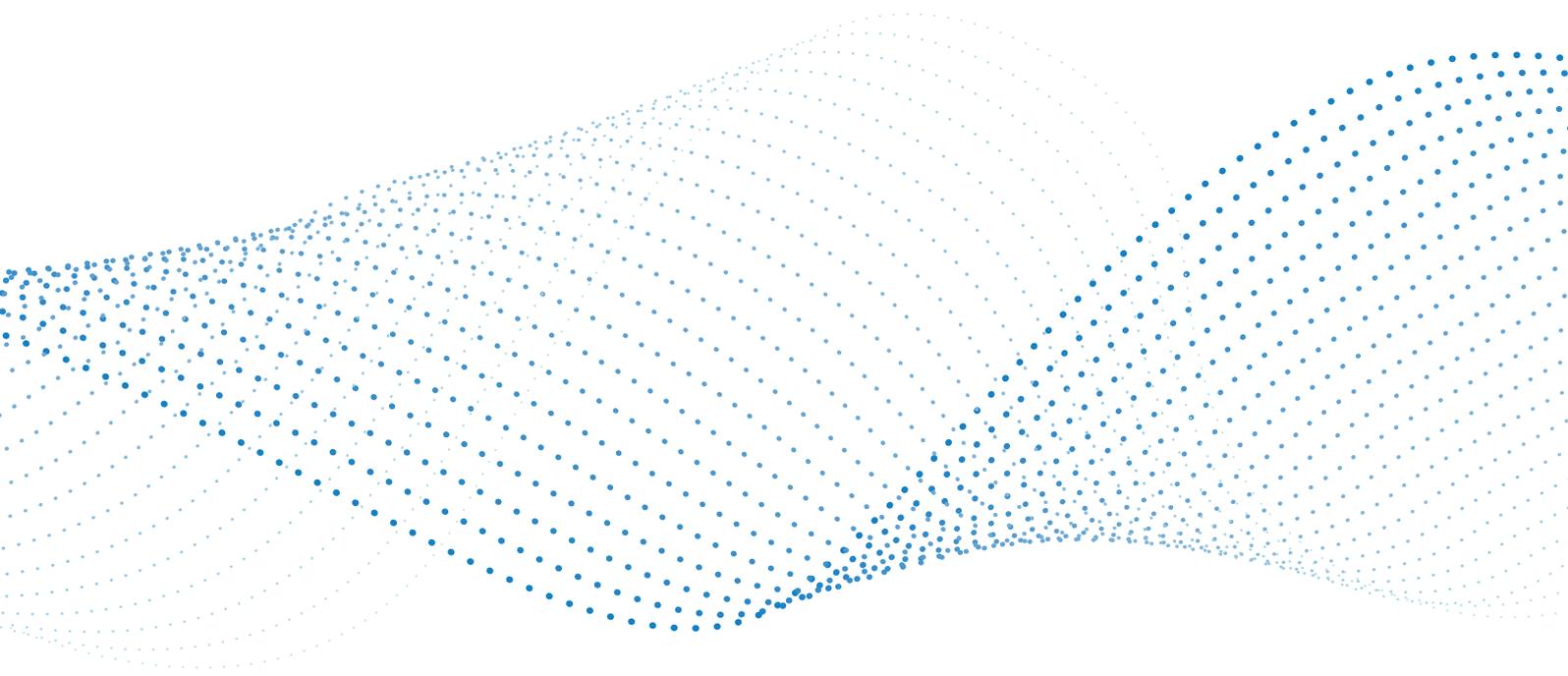
#### Munters Service Agreements

Ensure that your Munters equipment always performs according to specifications. Munters Service Agreements, tailored to your needs, offer industry-leading lifecycle care for your equipment – and peace of mind for yourself.

#### Munters Genuine Parts

We use only Munters Genuine Parts, which are designed, tested, and verified to ensure that each part meets or exceeds specifications. Convenient service kits are made to make maintenance simple.





Munters is a global leader in energy-efficient air treatment and climate solutions. Using innovative technologies, Munters creates the perfect climate for customers in a wide range of industries.

Munters has been defining the future of air treatment since 1955. Today, around 4,000 employees carry out manufacturing and sales in more than 30 countries.

For more information, please visit [www.munters.com](http://www.munters.com)