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A GUIDE TO COMMERCIAL FREEZE DRYING

12.2023

FREEZE DRYING

Introduction

Freeze-Drying 101

Freeze drying or lyophilization, is the process of removing moisture from a product without compromising the quality or structure of the product. The typical freeze-dried process starts by placing frozen items in a vacuum chamber and the surrounding pressure is reduced. This causes the frozen water in the product to transition from a solid to a gas, a process known as sublimation. The water vapor is then collected and removed from the chamber, leaving behind a dehydrated product that can be stored for long periods of time without refrigeration. The end result is a product that retains its original shape, texture, and flavor, making freeze drying an ideal preservation method for many types of food.

Why Freeze Dry?

One of the many benefits of freeze drying is the ability to preserve perishable products for long periods of time while maintaining their nutritional value, flavor, and shape. Several processors are currently using freeze drying methods for fruits, vegetables, dairy, various proteins, and pharmaceuticals. They can achieve levels of water content so low that there is minimal microbial growth which is critical to shelf life.

We continue to find new ways to improve the drying process of various products across many industries. Unfortunately, alternative preservation methods tend to rely on high temperatures or chemical preservatives which can lead to significant degradation of the product with a shortened shelf life.

Many processors that ship directly to customers enjoy cost savings due to the significant reduction in weight. Most freeze dried food items do not need to be refrigerated, which can have a significant impact on the distribution process.

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Common misconception:

All Freeze Dryers are created equal.

Truth: No, they are not. Freeze drying equipment is available in different designs, with varying capacities, functionality, and features.

To choose the best option for your needs, keep the following key points in mind:

Scalability	Vacuum Components	Controls	Refrigeration/Cooling Components
Freeze drying equipment comes in a range of sizes and capacities, from small-scale hobby units to large capacity industrial-scale systems for production plants. It's important to consider not only what your current capacity expectations are, but also whether this option allows for pain-free growth.	A reliable vacuum system is essential for establishing and sustaining necessary vacuum conditions throughout the freeze-drying process. The Leybold dry screw design is proven to be a superior freeze drying option.	Freeze drying equipment can offer varying degrees of control and automation. Industrial systems, like Parker's controls, can provide accurate management over factors like cold plate temperatures, pressure, product temperature, product heat controls, refrigeration performance, and drying time. Additionally, these systems should offer recipe recall abilities, cycle performance indicators, and system alerts for potential concerns.	The refrigeration system in freeze drying equipment plays a pivotal role in cooling the product and condensing the vapors generated during the process. The efficiency and cooling capacity of the refrigeration system directly influence the batch times by aiding the system in its attempt to maintain the necessary pressures during the cycle.

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Key points cont.

Overall Design	Customization	Configuration	Reliability
The design of the freeze dryers plays a role in the efficacy and efficiency of the overall drying process. Factors such as the size and shape of the chamber, the type of condenser, the vacuum capabilities, and the method of heating and cooling all contribute to the overall performance of the freeze dryer. A well-designed freeze dryer can maximize the yield and provide a consistent quality product while minimizing processing time.	Whether you're working with delicate or dense materials, having the ability to adjust settings such as temperature, pressure and drying time can make all the difference in the final product. This flexibility in the control settings also allows for greater command over the process, allowing you to optimize your freeze-drying parameters for each unique product. With a customizable freeze dryer, you can confidently tackle a wide range of drying applications, from food preservation to pharmaceuticals and beyond.	Freeze drying equipment is available in a range of configurations, each with its unique advantages and suitable for different applications or product types. The tray dryer, for instance, is perfect for drying small to medium-sized products in batches. The liquid vile option is better suited for pharmaceuticals. Regardless of the configuration, freeze drying equipment has many advantages over other drying methods.	It's crucial to invest in a reliable machine capable of consistent daily performance to maximize the effectiveness of your freeze-drying operation. The functionality and reliability of the various components within the system will determine the success of your business. Each freeze-drying cycle requires extreme pressure and temperature changes which can place significant stress on the equipment so it's essential to choose a proven system with quality components that ensure the reliable operation of both the operating system and the chamber.

The bottom line:

When considering a freeze dryer purchase, it's essential to research the different types of equipment to determine which system will best suit your business needs. Every system has its own set of advantages and disadvantages. It's important to make an informed decision and consider your particular product's financial implications.

These financial implications should include the following: the ability of the freeze dryer to process your product in a way that creates the largest value and return on investment; the overall cost of running the freeze dryer (original purchase, preventative maintenance, component replacement, downtime, labor to operate); loss of business should your freeze dryer fail; and customer support response time from the provider.

By taking the time to research and choose the right reputable freeze dry supplier for your business needs, you can maximize your production output, minimize your costs, and provide your best return on investment.

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Another common misconception:

Shelf stability is lifelong.

Truth: No, but freeze drying reduces microbial growth and chemical reactions, inhibiting spoilage and microbial activity. It creates a low water activity state that minimizes changes in the product's properties during storage, such as particle aggregation, enzymatic degradation, and oxidation. What it does not do is keep outside factors from becoming an issue. There are many factors in play with storage, such as the actual product itself, the container it's in, or the humidity, or the lighting of the place it's stored. With that said, different types of storage containers should be used for different scenarios as well, so making sure that you research the best solutions for longevity is critical!

Investment

Obtaining an industrial freeze dryer may prove to be a costly endeavor. Ensuring that you receive the most value for your investment will help minimize downtime and boost productivity for your business. It's critical to consider much more than capacity and original pricing alone when modeling a return on investment. Your model should include preventative maintenance costs, component replacements, down time direct and indirect costs, along with necessary labor to operate the system. Parker Freeze Dry considers all these things when we handcraft our machines, making sure you are getting the best components and the highest quality freeze drying systems for your investment.

Unit	Batch Size	Carts/ Trays	Pricing (USD)*
Summit	97.5 lbs.	- / 15	$155,000
Parker 2	500 lbs.	2 / 84	$379,000
Parker 6	1500 lbs.	6 / 252	$559,000
Parker 10	2500 lbs.	10 / 420	$719,000
Parker 10R	2500 + lbs.	10 / 420	$879,000
Parker 16R	4000 + lbs.	16 / 572	$1,450,000

For Further Inquiries
www.ParkerFreezeDry.com | 100 Quality Park Rd. Beresford, SD 57004
*Information and pricing subject to change without notice.
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