

Industrial Freeze Dryer

Optimizing Progress with Flexibility



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Company Profile

BioMatrix is a supplier of high-end process equipment and integrated solutions for the global biopharmaceutical industry. With over a decade of industry experience, we specialize in providing vacuum freeze-drying systems that meet international standards and deliver high efficiency and reliability.

We possess a deep understanding of cGMP, FDA, and EU regulatory requirements. By combining advanced freeze-drying technology, intelligent automation systems, and professional project management, we deliver full-process services—from solution design, equipment customization, and installation commissioning to validation and training.

To date, BioMatrix has delivered freeze-drying equipment to multiple countries worldwide, covering a full range of products from R&D to industrial scale. We not only supply equipment but also provide continuous technical support, compliance validation, and lifetime service, helping our clients achieve automation, digitalization, and compliance in their production processes.



Product Overview

Freeze-drying is a critical process for maintaining the activity, stability, and long-term shelf life of biological products, playing an increasingly vital role in the manufacture of high-value drugs such as vaccines, antibodies, and cell therapies. With the rapid growth of the global biopharmaceutical industry and increasingly stringent regulatory requirements, companies demand higher performance, compliance, and production continuity from their lyophilization equipment.

The **LYOPHARMA** Production Freeze-Drying System integrates the technical essence of both pilot and industrial-scale solutions, providing a complete workflow from process development to large-scale manufacturing. The system offers the following core advantages: An industrial-grade dual-circulation silicone oil system ensures shelf temperature uniformity $\leq \pm 1^\circ\text{C}$ for consistent batch drying, while intelligent vacuum control optimizes sublimation and preserves product activity.

Designed in full compliance with cGMP, FDA 21 CFR Part 11, and EU Annex 11, the system features automatic CIP/SIP and a 316L stainless steel chamber capable of pure steam sterilization for aseptic production.

It seamlessly integrates with isolators, RABS, and automated loading/unloading systems, enabling hands-free operation from filling to capping. The modular layout supports both split and integrated configurations to flexibly adapt to capacity and facility needs.

We provide full IQ/OQ/PQ validation support and on-site assistance, complemented by a remote HMI for real-time monitoring, diagnostics, and updates — ensuring reliable, continuous production.

LYOPHARMA is more than a freeze-dryer—it is a comprehensive solution encompassing process design, compliance validation, and production support. We are committed to supporting our clients with reliable technology and professional expertise, accelerating time to market and safeguarding the security and stability of the global pharmaceutical supply chain.



Applications

Our industrial-grade freeze-drying solutions are dedicated to the most demanding fields where process stability, product activity, and regulatory compliance are critical:

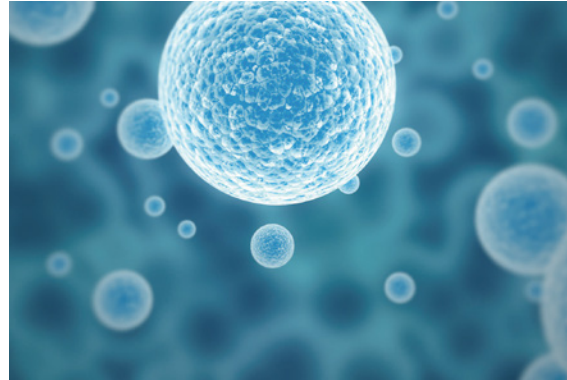


Biopharmaceuticals & Sterile Injectables

- Monoclonal Antibodies (Oncology/Autoimmune Therapeutics)
- Viral Vaccines (mRNA, Live-Attenuated)
- Gene Therapy Vectors (AAV for Rare Diseases)
- Recombinant Proteins (Insulin, Growth Hormones)
- Blood Products & Enzymes (Coagulation Factors)

In Vitro Diagnostic Reagents

- PCR Reagents (Lyophilized Master Mix Beads)
- Rapid Test Kits (Lateral Flow Components)
- Diagnostic Enzymes (HRP for ELISA)
- Antigens/Antibodies (Chemiluminescence Reference Materials)



Health & Veterinary Biologics

- High-Activity Probiotics (Bifidobacterium, Lactobacillus)
- Functional Food & Medical Nutrition Ingredients
- Livestock & Pet Vaccines (Canine Distemper Vaccine)

Components

Modern industrial vacuum freeze-drying has evolved into a highly integrated intelligent system. BioMatrix solutions are built on six core subsystems working in synergy, ensuring efficiency, reliability, and compliance across the entire process—from pretreatment and freeze-drying to cleaning and data traceability. Each subsystem is designed and validated to pharmaceutical industry standards, together forming a robust foundation for your freeze-drying process.



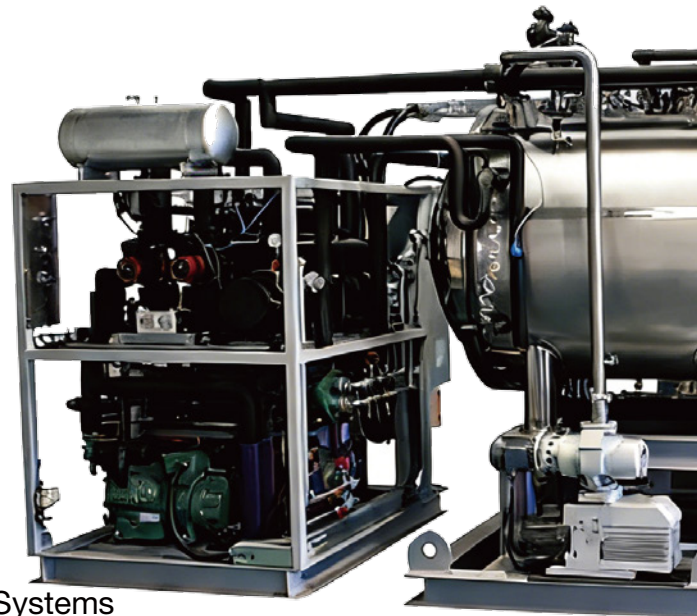
Refrigeration System

- High-efficiency screw compressors
- Ultra-low temp (-55°C)
- Eco-friendly refrigerants
- Stable & energy-saving



Vacuum System

- Oil-free vacuum pumps
- Fast & stable vacuum (<1 Pa)
- Contamination-free operation



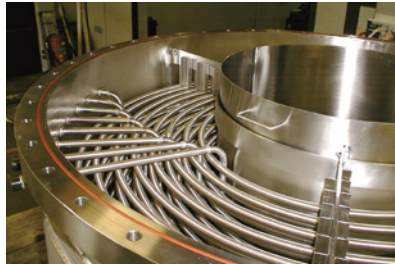
Pneumatic and Hydraulic Systems

- Precise shelf/piston control
- Reliable valve actuation
- GMP-grade reliability



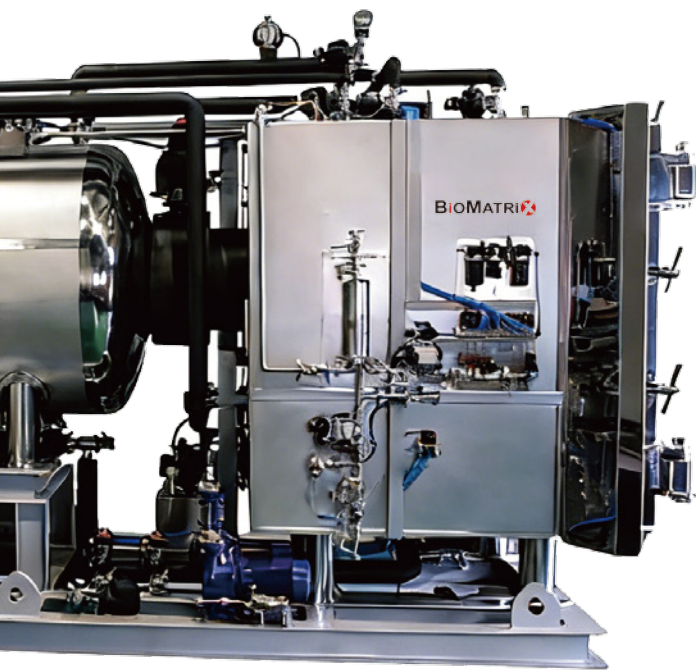
Automatic Cleaning and Sterilization System

- Auto CIP/SIP cycles
- Validated sterilization
- Full cGMP compliance



Ice Condenser

- Ultra-low temperature (-75°C)
- High ice trapping capacity
- Maintaining system vacuum



SCADA Control System

- Automated process control
- Real-time data monitoring
- Full data traceability



Vacuum Drying Chamber

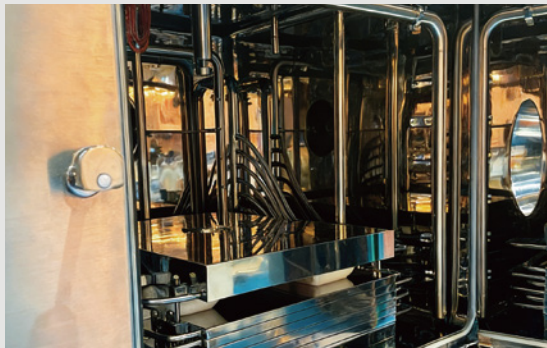
- High-precision manufacturing (<1.0mm flatness)
- Ultra-high vacuum (<1.0 Pa)
- Ensuring product uniformity



Automatic Loading/Unloading System

- Intelligent and unmanned operation
- Customizable layout adaptation
- Ensuring aseptic transfer

Advantages



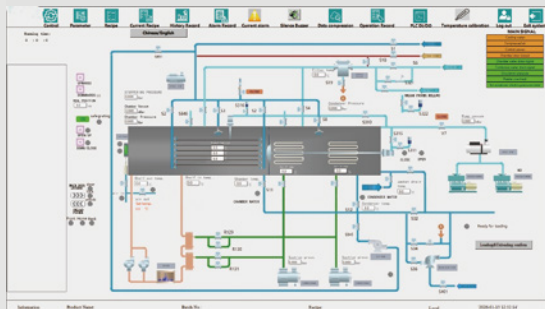
Unmatched Temperature Control

- Shelf uniformity $\leq \pm 1^\circ\text{C}$
- Flatness $< 1\text{ mm}$
- Dual-circuit silicone oil system



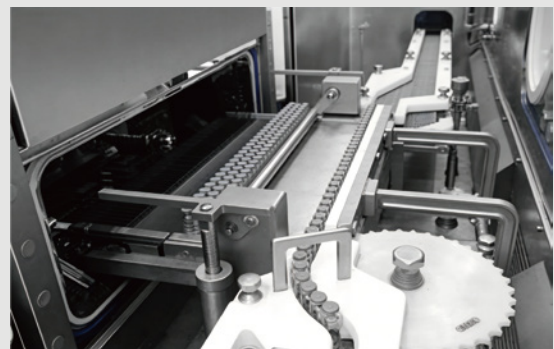
High-Capacity Performance

- Ice capacity up to 1000 kg
- Condenser $\leq -75^\circ\text{C}$
- Ultimate vacuum $< 1.0\text{ Pa}$



Intelligent Control & Data

- Industrial PLC & SCADA
- cGMP, FDA 21 CFR Part 11, EU Annex 11
- Full audit trail & data integrity



Automated Load/Unload

- Integrated RBR & AGV systems
- Compatible with isolators/RABS
- Hands-free operation from filler to capper



Complete Validation Support

- Full FAT/IQ/OQ/PQ packages
- On-site CSV assistance
- Guaranteed compliance handover



Rapid Customization

- URS-driven design
- Integral or split layout
- Short delivery cycle



Sustainable Operation

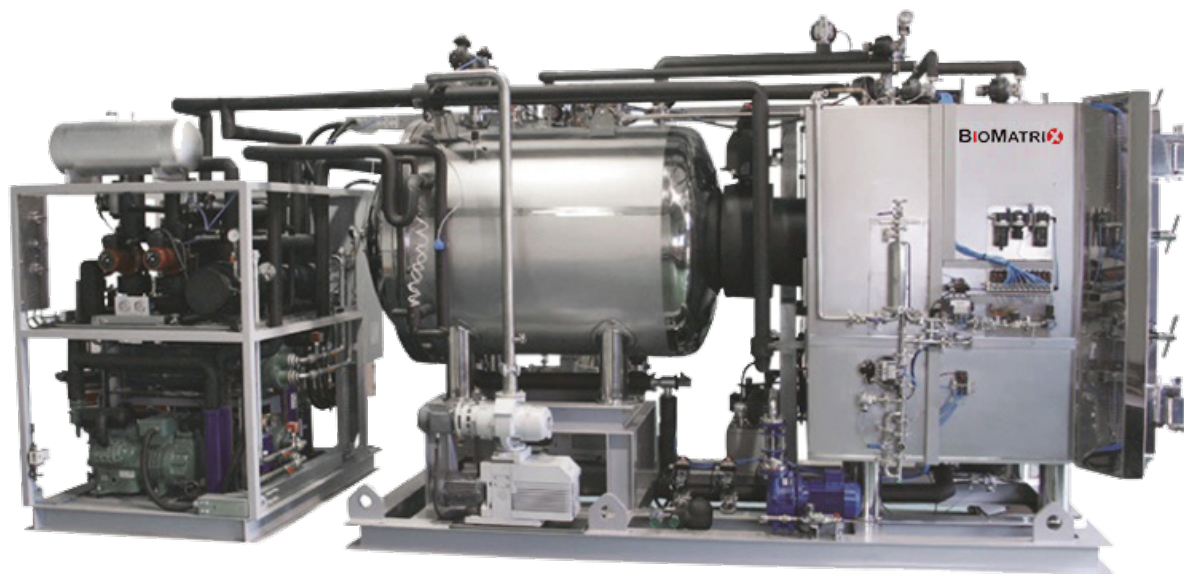
- Energy use reduced by $\leq 15\%$
- Dry, oil-free vacuum options
- Eco-friendly design



Global Service Network

- 300+ systems installed worldwide
- Support in 20+ countries
- 24/7 remote diagnostics

Industrial Freeze Dryer



Specifications

Model	LyoPharma-2	LyoPharma-3	LyoPharma-5	LyoPharma-10
Drying capacity(Liter)	40	60	100	200
Shelf area(m ²)	2.16	3.24	5.4	9.72
Shelf size(L*W*H)(mm)	900*600*20	900*600*20	1200*900*20	1200*900
Usable shelf No.	4	6	5	9
Vial loading quantity 16	9000	14000	20000	40000
Vial loading quantity 22	4500	7500	10000	20000
Inter-Shelf distance(mm)	90	90	90	100
Shelf ultimate cooling temperature(°C)	-55	-55	-55	-55
Condenser ultimate cooling temperature(°C)	-75	-75	-75	-75
Ultimate vacuum(Pa)	≤1	≤1	≤1	≤1
Installation dimension(L*W*H)(mm)	3200*1500*2200	4000*1500*2200	4500*1750*2200	6000*1750*3800
Weight(kg)	3500	4500	7500	10000
Power(KW)	22.0	28.0	40.0	63.0

Maximum Drying Capacity: 1000L

- Fully automatic vacuum stoppering
- Fully automatic freeze-drying, sterilization, and cleaning
- Unmanned computer operation, capable of storing over a thousand process recipes, compliant with GAMP regulations
- Shelf flatness less than 1mm, temperature uniformity within 1°C
- Equipped with energy-saving control functions, meeting environmental requirements
- Layout can be designed as integrated or split type as required, saving installation space

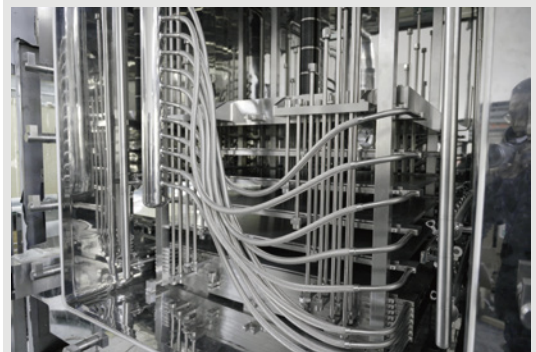
Specifications

Model	LyoPharma-20	LyoPharma-30	LyoPharma-40	LyoPharma-50
Drying capacity(Liter)	400	600	800	1000
Shelf area(m ²)	19.80	30.00	42	49.5
Shelf size(L*W*H)(mm)	1500*1200	2000*1500	2000*1500	2200*1500
Usable shelf No.	11	10	14	15
Vial loading quantity 16	80000	120000	175000	200000
Vial loading quantity 22	40000	60000	85000	100000
Inter-Shelf distance(mm)	100	100	90	90
Shelf ultimate cooling temperature(°C)	-55	-55	-55	-55
Condenser ultimate cooling temperature(°C)	-75	-75	-75	-75
Ultimate vacuum(Pa)	≤1	≤1	≤1	≤1
Installation dimension(L*W*H)(mm)	7500*2000*4200	7600*3000*4200	7600*3200*4500	9600*2300*4700
Weight(kg)	17500	25000	30000	35000
Power(KW)	120.0	147.0	179	215

Optional Configuration



External CIP water tank



Hydraulic stopping system



Mushroom valve isolation device



Oil free vacuum pump system



Rotary vane vacuum pump



Screw compressor



SIP system



Sub door(Pizza door) system

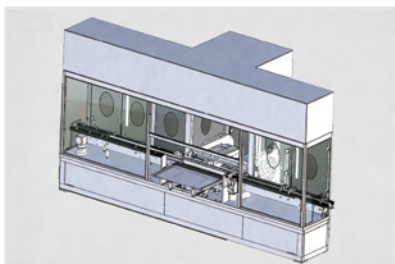
Freeze Dryer Automatic Loader

Fully Automatic Fixed Vial Row-by-Row System (RBR)

Automatically connects the filler to the freeze dryer's pizza door, and conveys vials to the capper after unloading (vials are pushed/pulled row by row);

Optional sterile isolator or Rabs system for high-level aseptic protection;

Fully automatic operation with no manual intervention.



Model	Applicable vial (ml)	Loading height	Loading speed (Based on 2mlvials)	Shelf size (mm)
AL-R900	1-100ml	950±50mm	200vpm	1200*900mm
AL-R1200	1-100ml	950±50mm	300vpm	1500*1200mm
AL-R1500	1-100ml	950±50mm	300vpm	1800*1500mm

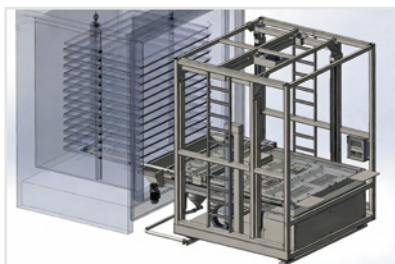
Fixed Tray Loading System / Mobile AGV System

Automatically loads trays into the freeze dryer (via pizza door) from the filler/dosing system, and conveys to the capper (for vials) or packaging unit (for bulk materials) after unloading (trays move row by row);

No change parts required, suitable for applications with multiple vial sizes—ideal for sterile API or bulk material processes;

Optional sterile isolator or Rabs system for high-level aseptic protection;

Supports fully or semi-automatic operation for flexible production needs.



Model	Applicable vial (ml)	Loading height	Tray size (mm)	Shelf size (mm)
AL-T900	1-100ml	950±50mm	300*400mm	1200*900mm
AL-T1200	1-100ml	950±50mm	300*400mm	1500*1200mm
AL-T1500	1-100ml	950±50mm	300*500mm	1800*1500mm

Service

1.GMP-Integrated Process

We build GMP compliance into every phase from design to validation ensuring ready-to-use pharmaceutical-grade systems.

2.End-to-End Expert Team

One team handles your entire project: design, production, validation, and support for seamless execution.

3.Advanced Manufacturing & Testing

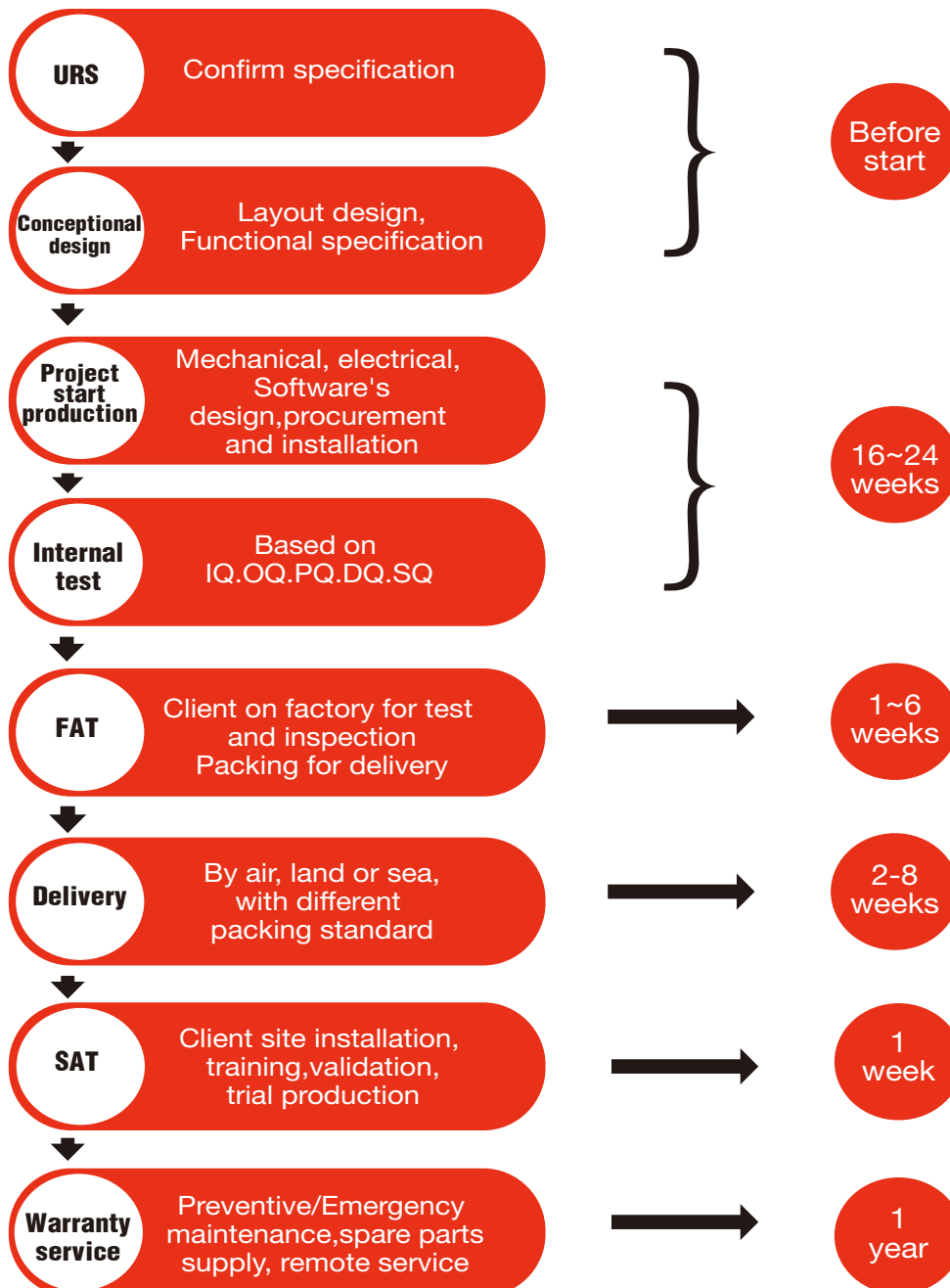
Modern facilities and precision instruments deliver reliable, high-performance freeze-drying equipment.

4.Global Certification Ready

We provide documentation and support for international standards.

5.Tailored Automation

Custom automated loading/unloading systems for vials and trays, enabling sterile, unmanned operations.



Biomatrix Product Line



Biological Safety Cabinet



Clean Bench

Sterility Assurance



Sterilizer



ULT Freezer



Cell Preservation



Controlled-Rate Freezer



LN2 Tank



Hive Incubator

Cell Culture



Shaking Incubator



Bioreactor / Fermenter

Scale-up



Industrial Fermenter



Disc Stack Centrifuge

Harvest



Tubular Centrifuge



High Pressure Homogenizer

Disruption Clarification



Tangential Flow Filtration



Isolator

Formulation



Lyophilizer





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