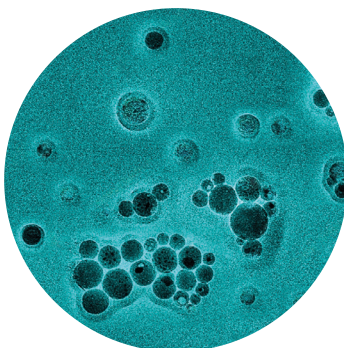




LIOMASH

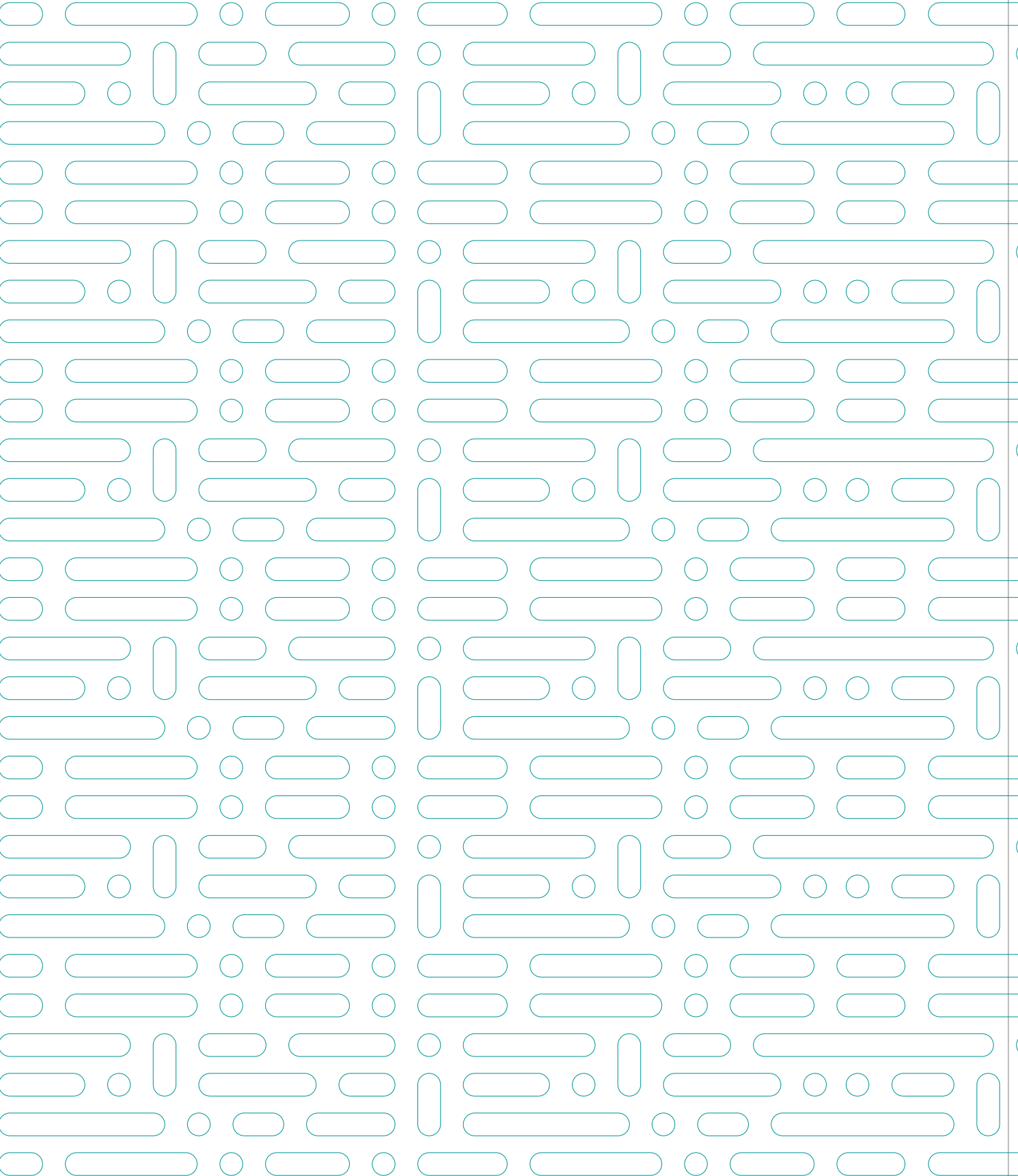
THE NEW STANDARD FOR RUSSIAN LYOPHILIZATION

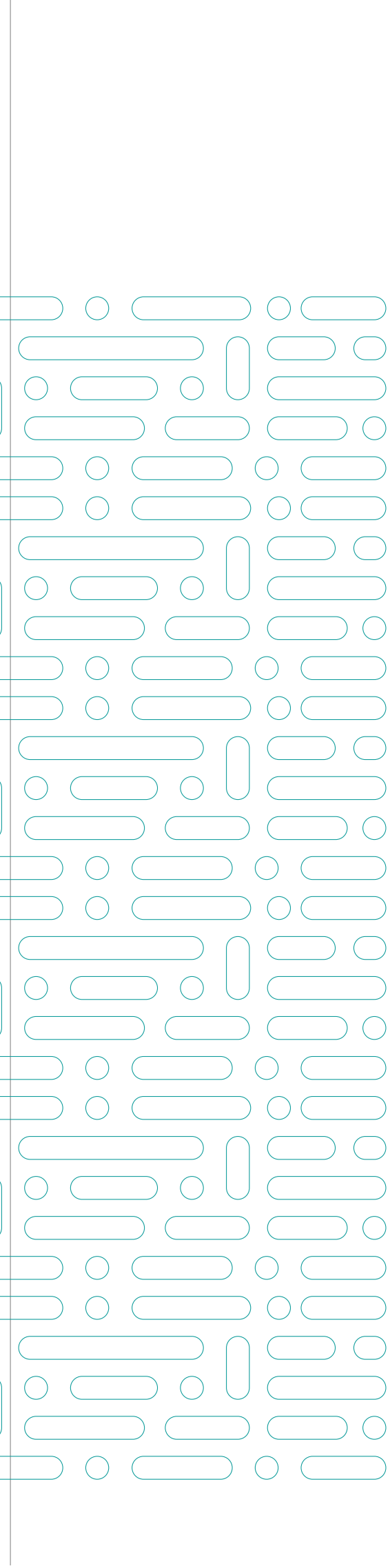


FREEZE DRYERS

Pharmaceuticals
Biotechnology
Food Products
Agriculture

**WE GET STRAIGHT TO
THE POINT!**





WE HELP PRESERVE WHAT MATTERS MOST

LIOMASH is a Russian manufacturer of lyophilization (freeze-drying) equipment, providing a full range of solutions, including consulting, engineering, implementation, and ongoing support.

About the Company	4
LIOMASH Machine Family	6
LAB Series	8
PROM Series	12
LIO-CONTROL	16
LIOMASH Service	20
Completed Projects	22
Contacts	26

3-1000

kg

35+

cities

A machine for every application and production stage.

Projects completed in 35+ cities across Russia, as well as in Kazakhstan, Kyrgyzstan, and Uzbekistan.

2012

year

18

months warranty

Experience in industrial equipment manufacturing.

Design and Engineering Bureau



IT Development Department



Manufacturing Facility



Quality Control Department and Testing Facility



Service and Customer Support



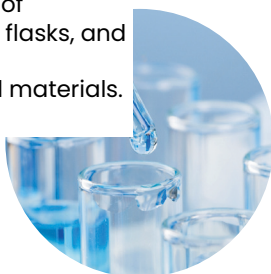
Information Center and Knowledge Base



WE ARE A DEVELOPER, MANUFACTURER, AND STRATEGIC PARTNER FOR THOSE LOOKING TO SUCCESSFULLY LAUNCH FREEZE-DRYING PRODUCTION IN RUSSIA

Pharmaceuticals

Reliable and consistent drying of pharmaceuticals in ampoules, flasks, and dishes. Production of vaccines, pharmaceuticals, and medical materials.



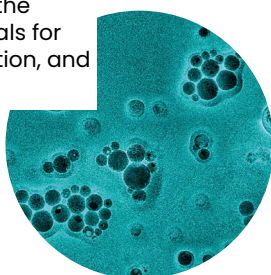
Food Industry

Preservation of valuable product properties without loss of vitamins, flavor, or aroma. A high-margin and in-demand method of raw material processing.



Biotechnology

A gentle method for preserving the unique properties of raw materials for subsequent storage, transportation, and use.



Dietary Supplements and Nutraceuticals

Development of unique and effective products with distinctive competitive advantages.



Secondary Processing

Production diversification. The ability to process returned products and food industry waste into new in-demand products for other markets.

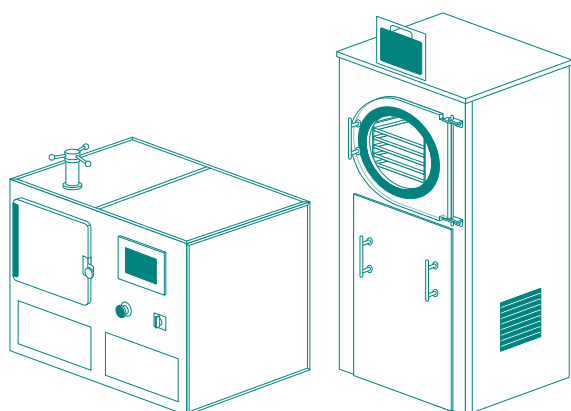


Livestock and Agriculture

The ability to process blood and by-products into in-demand products for new markets.



FROM EXPERIMENTATION TO COMMERCIAL SCALE — WE HAVE THE RIGHT SOLUTION

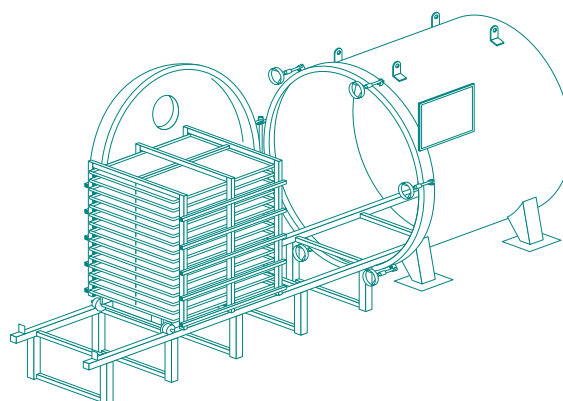


Small-Scale Machines

Formulation Development
Experimentation

LAB 1/4/7/10

	LAB 1	LAB 4	LAB 7	LAB 10
Raw Material Load	1 kg	4 kg	7 kg	10 kg
Shelf Area	0.12 m ²	0.4 m ²	0.7 m ²	1.2 m ²
Minimum Pressure	2 Pa	50 Pa	50 Pa	50 Pa
Maximum Shelf Temperature	70°C	70°C	70°C	70°C

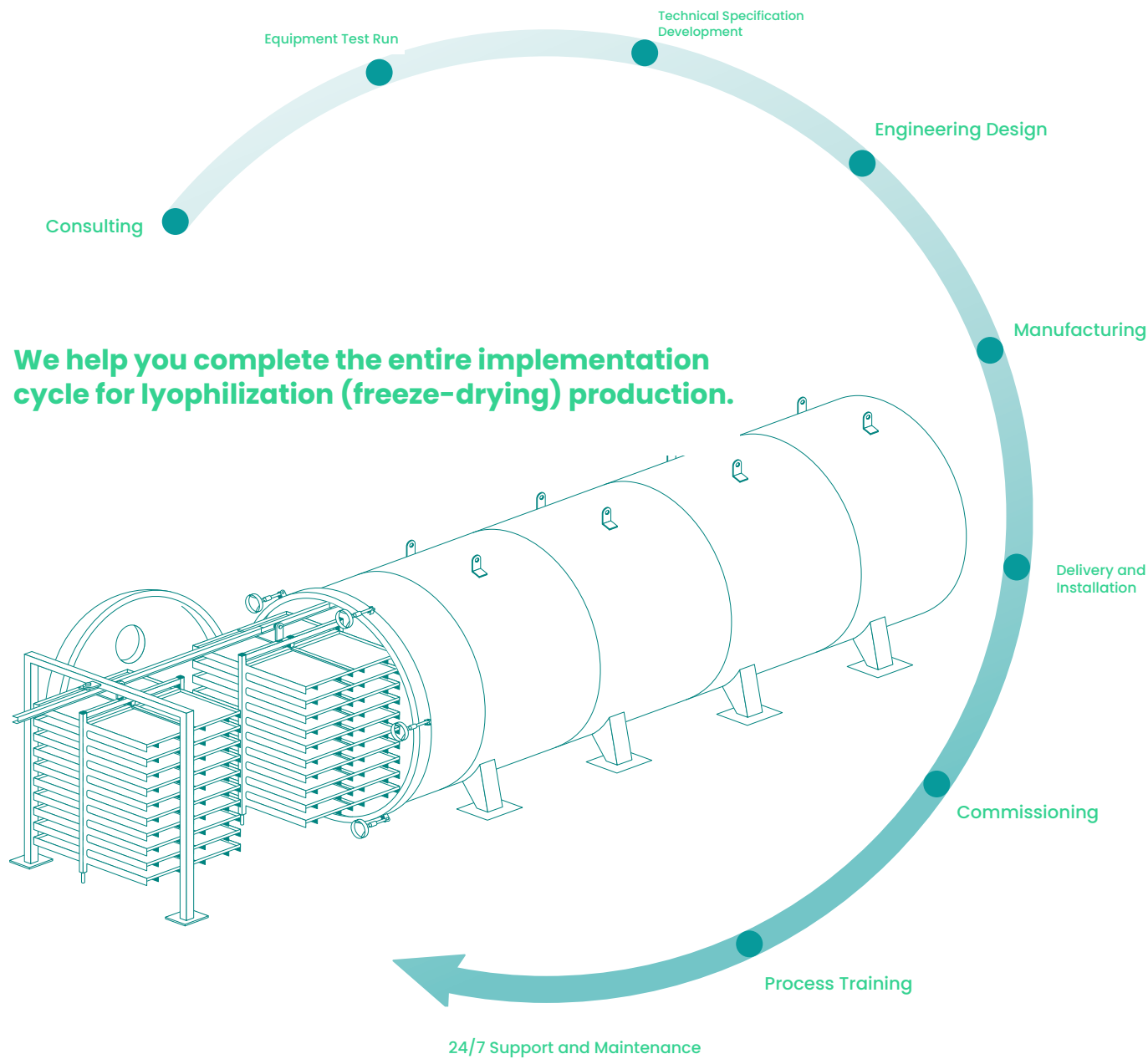


Mid-Size Machines

Pilot Production

PROM 2/5/10/20

	PROM 2	PROM 5	PROM 10	PROM 20
Raw Material Load	25 kg	50 kg	100 kg	200 kg
Shelf Area	2.5 m ²	5 m ²	10 m ²	20 m ²
Minimum Pressure	50 Pa	50 Pa	50 Pa	50 Pa
Maximum Shelf Temperature	80°C	80°C	80°C	80°C



Large-Scale Machines

Industrial Production, Commercial-Scale Volumes

PROM 30/50

	PROM 30	PROM 50
Raw Material Load	300 kg	500 kg
Shelf Area	30 m²	50 m²
Minimum Pressure	50 Pa	50 Pa
Maximum Shelf Temperature	80°C	90°C

LAB Series

Validation of the technology and economics of future production using test batches

Dedicated condenser; freeze-drying is 40% faster than with Harvest Right-type freeze dryers.



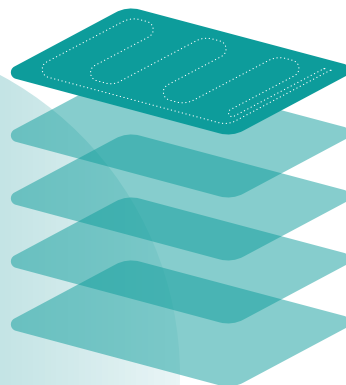
Water trap allows oil changes no more frequently than once every 1,000 operating hours.



User-friendly control system with precise vacuum and temperature control.

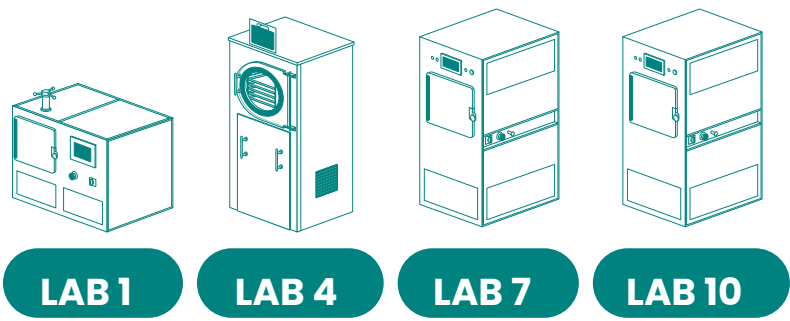


Liquid-Based Shelf Heating System — Uniformity and Stability. Circulation of the heat-transfer fluid across the entire shelf surface ensures uniform temperature distribution, guaranteeing consistent product freezing and freeze-drying without localized overheating.



Meets sanitary requirements. Easy to clean after each drying cycle.



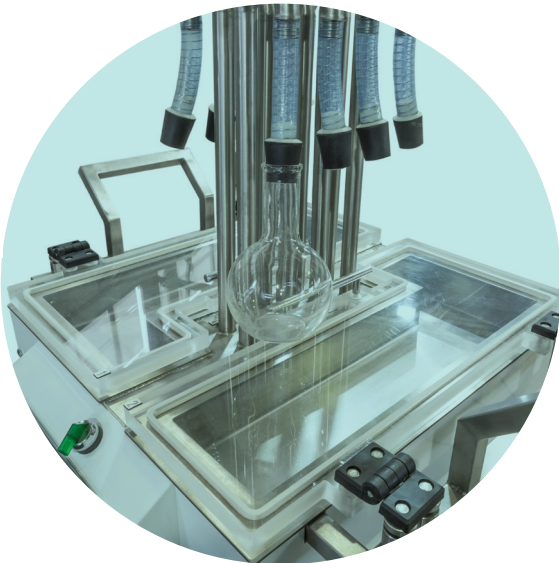


Dimensions H × W × D, mm	1170×1065×826	1800×620×760	1700×740×1100	1700×740×1100
Empty Machine Weight, kg	up to 200	up to 200	up to 250	up to 300
Shelf Area, m²	0.06	0.11	0.14	0.1
Total Shelf Area, m²	0.12	0.44	0.7	1
Shelf Size, mm	200×300	315×330	360×360	360×360
Tray/Shelf Material	Stainless steel, 316L	AISI 304	AISI 304	AISI 304
Number of Shelves	2+1	4	7	10
Nominal Chamber Pressure, Pa	2	from 50	from 50	from 50
Minimum Condenser Surface Temperature, °C	-80	-40	-40	-40
Maximum Shelf Temperature, °C	80	70	70	70
Maximum Power Consumption, kW	3	2	2	5
Power Supply	220 V, 50 Hz	220 V, 50 Hz	380 V, 50 Hz	380 V, 50 Hz
Condenser Ice Capacity, kg	1	4	7	10

The freeze dryer can be manufactured with the required configuration for pharmaceutical and biotechnology laboratories.

Manifold option for drying in flasks.

Ability to dry raw materials in flasks, vials, dishes, and beakers.



EASE AND SIMPLICITY OF OPERATION



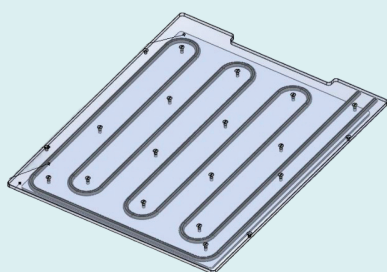
Compact, self-contained unit. All drying components are housed inside the main enclosure.

Optional feature — the ability to freeze raw materials directly inside the freeze-drying chamber.

Convenient, clearly organized control system with a touchscreen.

Simply load the raw material, close the door securely, select the required drying program, and start the process. The system does the rest automatically.

FLEXIBLE OPTIONS AND SETTINGS



Ability to freeze-dry the product using contact or radiant heating.

During the technical specification stage, you can equip the machine with additional options, from casters for easy movement to an inert gas injection system for the final drying stage.

- You can customize process control for your raw material type, whether you need to go through certain process stages smoothly or quickly.

PRECISE SENSORS FOR A SAFE PROCESS



High-precision pressure and temperature sensors allow monitoring of parameters at every stage of the drying cycle.

The automated system controls chamber pressure and prevents it from exceeding the preset limits.

The sensors detect errors during the drying process, log them in reports, and help prevent them from recurring.

LOW-MAINTENANCE OPERATION



After each cycle, the condenser should be defrosted and the meltwater drained.

The refrigeration system must be monitored to ensure proper operation.

- The oil level in the vacuum pump must be monitored and changed as follows: – first change after 100 hours of operation. – subsequent changes every 2000 hours.

THE ENTIRE PROCESS AT YOUR FINGERTIPS

Proprietary LIO-CONTROL Software Suite

Intuitive Interface
User-Friendly Settings
• Russian language

LIO-CONTROL

Remote access. Monitor the process remotely from anywhere, at any time.

The system is equipped with a memory card that stores data from every drying cycle.

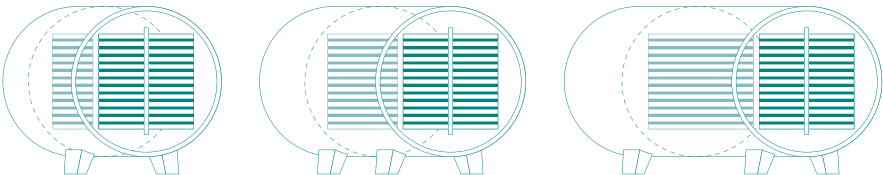
You can save all recipes and start the required one next time with a simple press of the "Start" button.



PROM Series

Mid- and Large-Size Machines in Convenient Capacity Increments

Pilot Production and Small-Batch Production



Mid-Size Machines

	PROM 2	PROM 5	PROM 10	PROM 20
Dimensions H × W × D*, mm	1900×900×1900	2400×1400×2100	2500×2200×6000	2500×2200×6000
Shelf Area, m²	0.41	1.6	1.4	1.4
Total Shelf Area, m²	2.5	5	10	20
Shelf Size, mm	690×650	900×900	625×1230	1250×1230
Tray/Shelf Material	AISI 304	AISI 304	AISI 304	AISI 304
Number of Shelves/Trays	6/12	8/32	14/42	14/84
Minimum Chamber Pressure, Pa	50	50	50	50
Minimum Condenser Surface Temperature, °C	-45	-45	-45	-45
Maximum Shelf Temperature, °C	80	80	80	80
Maximum Power Consumption, kW	12	27	45	70
Power Supply	380 V, 50 Hz	380 V, 50 Hz	380 V, 50 Hz	380 V, 50 Hz
Condenser Ice Capacity, kg	25	50	100	200
Noise Level, dB	75	75	75	75

* Dimensions are specified without the equipment compartment and control unit.

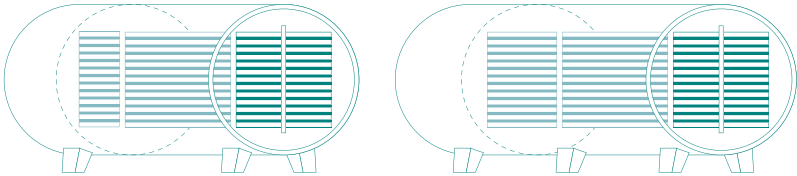


PROM machines can be customized to meet customer requirements.

Each machine is a complete system consisting of the freeze-drying chamber, equipment compartment, and control unit.

The machine and its configuration are designed based on the customer's facility and process line.

Industrial Production, Commercial-Scale Volumes



Large-Scale Machines

	PROM 30	PROM 50
Dimensions H × W × D*, mm	3100×2500×6500	3800×2850×9300
Shelf Area, m²	0.5	3
Total Shelf Area, m²	30	54
Shelf Size, mm	1500×1450	5800×510
Tray/Shelf Material	AISI 304	AISI 304
Number of Shelves/Trays	16/96	22/180
Minimum Chamber Pressure, Pa	50	50
Minimum Condenser Surface Temperature, °C	-45	-45
Maximum Shelf Temperature, °C	80	120
Maximum Power Consumption, kW	100	170
Power Supply	380 V, 50 Hz	380 V, 50 Hz
Condenser Ice Capacity, kg	300	500
Noise Level, dB	75	75

MEETING STRINGENT TECHNICAL REQUIREMENTS

Machines can be manufactured in accordance with GMP requirements and the customer's sanitary requirements.



Protection systems against voltage fluctuations and failures. Intelligent drying process control system.



Machines can be manufactured from AISI 316 stainless steel.



Pharmaceutical machines feature a condenser sealing system in the event of a drying process failure.



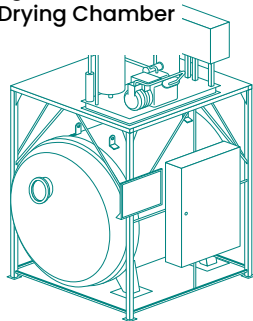
Ability to design and manufacture an automated freeze-drying line.



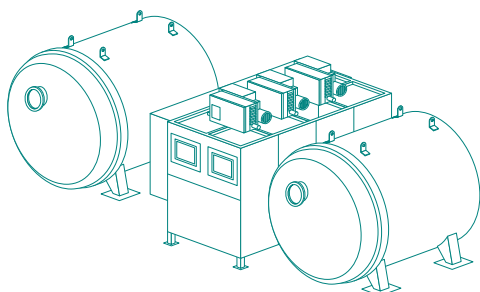
A unique condenser design that increases its surface area by 25% while maintaining a similar tube length.



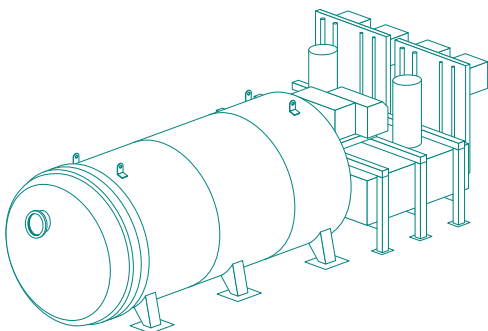
Example of Equipment Arrangement on a Platform Above the Freeze-Drying Chamber



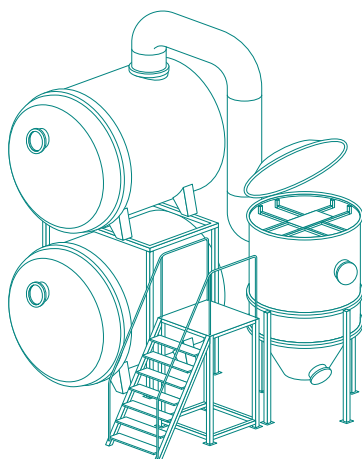
Example of Connecting Two Freeze Dryers to a Common Equipment Module



Example of Equipment Arrangement Behind the Freeze-Drying Chamber



Example of Vertical Arrangement of Freeze-Drying Chambers



ASSISTANCE WITH MACHINE DESIGN AND DEFINITION OF TECHNICAL REQUIREMENTS

Mechanical Design

Materials

Layout

System Requirements

Software Requirements

Service Requirements

WIDE RANGE OF DESIGN OPTIONS

- CIP cleaning system for the condenser vessel.

Doors on both sides of the chamber for pass-through loading and unloading.

Automatic door opening and tray loading/unloading.

Shelves with different heating methods: contact or radiant heating.

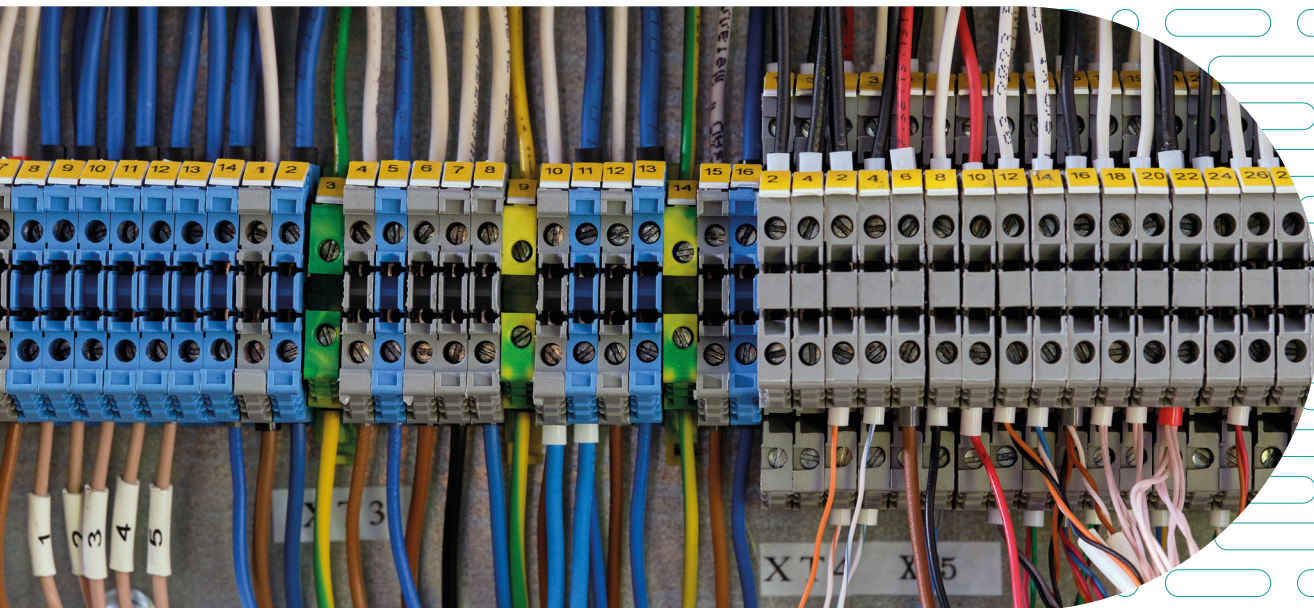
Vial Stoppering System Using Hydraulically Retractable Shelves.

Condenser Cooling Down to -75°C .

and much more.

LIO-CONTROL

LYOPHILIZATION PROCESS CONTROL SYSTEMS



In-House Development and Assembly

**Automation and Minimization of
Human Error**

**Precise Adaptability to Process
Requirements**



Vacuum Pump Protection System

An intelligent protection system prevents water vapor from entering the vacuum pump, allowing the vacuum pump oil change interval to be extended to 2,500 hours.



Precision Shelf Heating System

Precision shelf temperature control system. Shelf temperature accuracy of $\pm 0.3^{\circ}\text{C}$ is achieved through fast-response solid-state relays and PID control of the heating process.



Refrigeration System

Electronic expansion valves, high-speed controllers, and systems for controlling compressor and condenser fan motor speeds allow precise and flexible control of the freeze dryer's refrigeration system, achieving an optimal balance of power consumption while maintaining consistently accurate condenser surface temperatures.



High-Efficiency Shelf Cooling System

The shelf cooling system, thanks to a new shelf design manufactured using a modern hydroforming method, achieves higher precision in maintaining shelf temperature at both negative and positive temperatures. It is also possible to use any source of thermal energy for heating, not only electricity, which reduces process costs.



Emergency System

A "smart" system for resuming the lyophilization process after a power supply interruption. In automatic mode, after power is restored, the system evaluates the current lyophilization parameters, and if they remain within the set range, lyophilization continues in normal mode. If the power interruption caused an irreversible loss of quality in the product being freeze-dried, the process stops and the user receives a corresponding notification.



LIO-CONTROL

LIO-CONTROL SOFTWARE AND INTERFACE

Registered in the Russian Register of Domestic Software

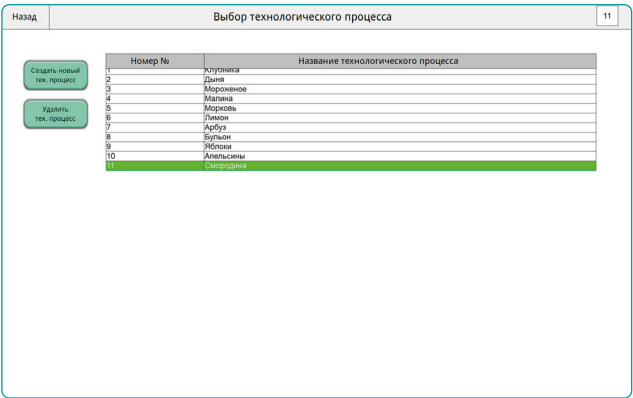
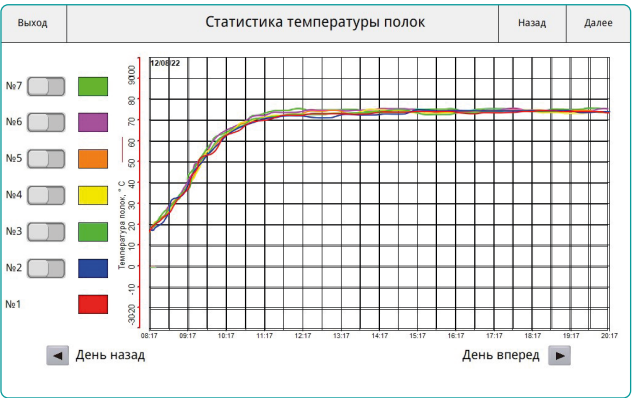
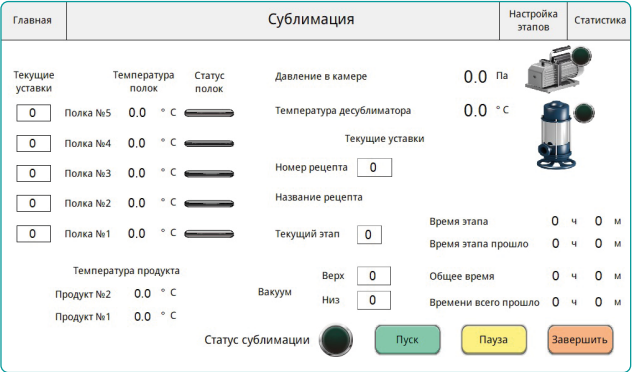
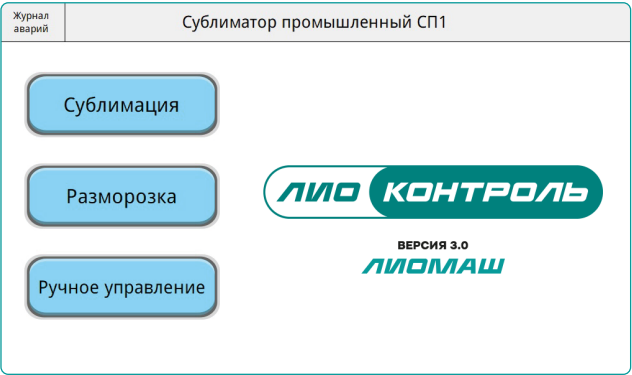


Stores Data from Every Drying Cycle

Generates lyophilization process graphs and stores process parameters both on the freeze dryer and in the cloud.

Works on Any Device

Enables remote monitoring and control of the freeze dryer from any Internet-connected device through a convenient web interface.



INTUITIVE AND USER-FRIENDLY

Developed in Russian. Any process stage can be configured for the required technology with just a few clicks. Clear visualization of process stages and process dynamics.

REMEMBERS SETTINGS AND SAVES RECIPES

The ability to save presets for an unlimited number of recipes and start the required one with a single click. The software maintains a log of faults and emergencies.

WE GET STRAIGHT TO THE POINT!

No Unnecessary Bureaucracy

Across Russia

We Provide Consulting and Support

We Support You Throughout the Entire Project Lifecycle

from Idea



Consulting and Technical Specification Definition

- Equipment Test Run
- Production Demonstration
- Demonstration of Completed Projects
- Detailed Discussion of the Task
- Process Consultation
- Contract Preparation



Design and Development

Development of Equipment Layout Plans

Development/Adaptation of Design Documentation to the Customer's Technical Requirements

Development/Adaptation of Software to the Customer's Technical Requirements



Manufacturing and Testing

Equipment Manufacturing in Accordance with the Technical Requirements

Component Quality Control

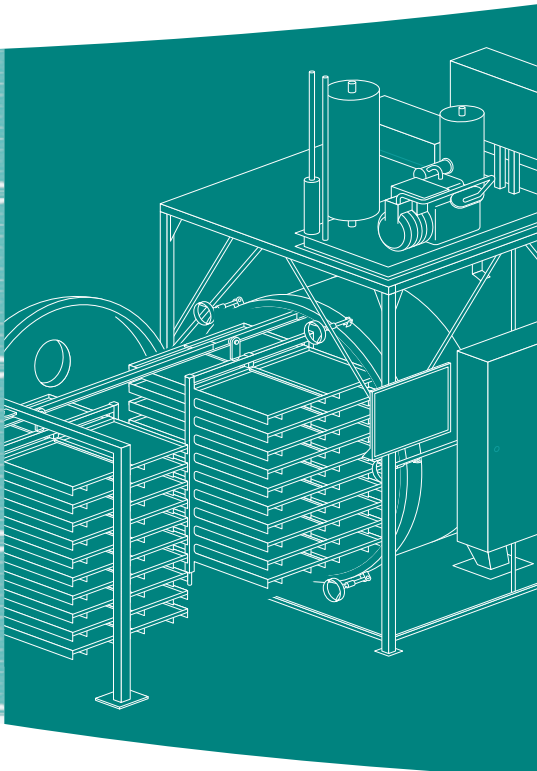
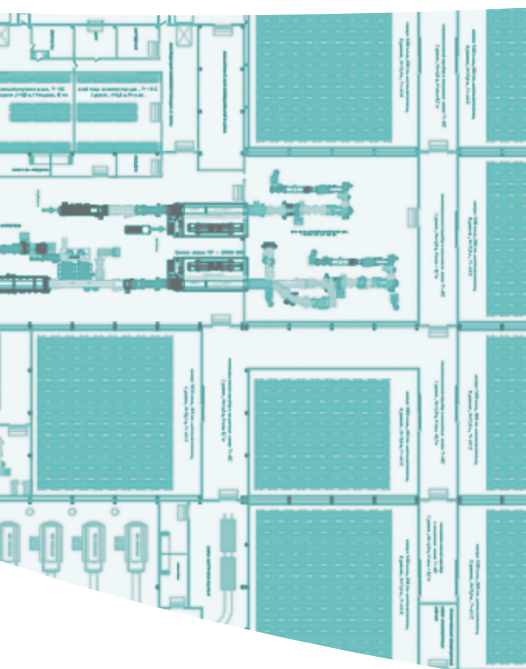
Assembly Quality Control

IT System Quality Control

In-House Testing

Product Testing

Commissioning and Fine-Tuning



TURNKEY PRODUCTION FACILITY

4 Delivery and Installation Supervision

Packaging of the Machine and Service Kit

Delivery by a Partner Carrier

On-Site Equipment Installation by the Installation Team

Commissioning

Process Training for the Customer's Personnel

Provision of Clear Operating Instructions

5 Service and Support

Access to a Support Chat for Resolving Operational Issues

Online Information and Support

Shipment of Spare Parts and Consumables

On-Site Service Team Dispatch in the Event of a Failure, Repair, or Malfunction

Assistance in Finding Qualified Service Specialists in Your Region

Regular Remote Software Updates



OUR MACHINES IN OPERATION AT CUSTOMER FACILITIES ACROSS THE COUNTRY

In 35+ cities across Russia

In 8 Russian regions and across the CIS

More than 100 completed projects of various scales

We are ready to share details of each project

IZHEVSK

Septem Vita

Production of functional products based on freeze-dried mare's milk and colostrum

The raw material is highly valuable and sensitive. Small batches require rapid processing. Freeze-drying is the only processing method that preserves the product's properties.

Special Options for These Machines: inert gas injection during the final drying stage special temperature sensors for liquids additional sensors on each shelf to monitor drying uniformity

8 machines

3 kg load each

4 machines

10 kg load each



CRIMEA

OREKHI KRYMA LLC

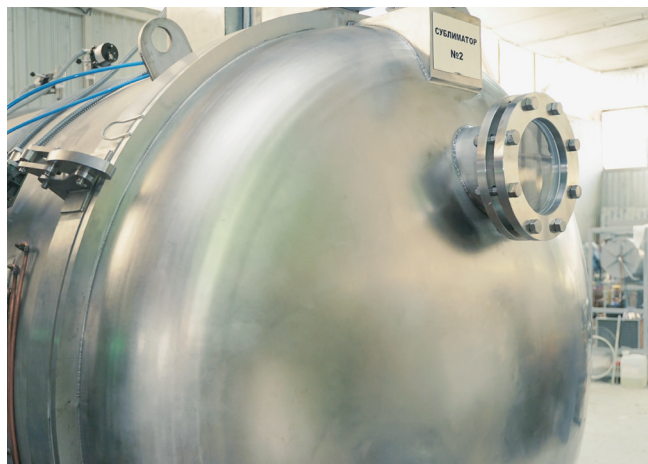
Freeze-Drying of Berries

Challenging raw material requiring a drying process that releases specific gases.

Special Machine Options:
Stainless Steel Construction

1 machine

200 kg load



MOSCOW

SVARSHCHITSA EKATERINA LLC

Freeze-Drying of Specialty Coffee

Special Machine Options:
Shelf cooling down to -50°C
Vacuum level down to 10 Pa
Pump-down to 133 Pa in 15 minutes.

1 machine

200 kg load



MOSCOW

ALGOY Company

Freeze-Drying of Cheese

Freeze-drying of premium cheese varieties.

Special Machine Options:
Shelf Cooling
Vacuum Level Down to 20 Pa
Fully Stainless Steel Construction

1 machine

100 kg load



BELGOROD REGION

EFKO LLC

Freeze-Drying of Sweet Protein, a Functional Alternative to Conventional Sugar

Challenging raw material requiring a drying process that releases specific gases.

Special Machine Options: Automatic Opening and Closing of Freeze-Dryer Chamber Doors Redundant Refrigeration and Vacuum Systems SIP Cleaning of the Entire Freeze-Drying Chamber Shelf Cooling Down to -50°C Vacuum Level Down to 20 Pa

2 machines

150 kg load



BASHKORTOSTAN

ECO Product LLC

Freeze-Drying of Kumis Made from Mare's Milk

Challenging, delicate raw material.

Special Machine Options:

Remote Access Function
Shelf Freezing Function Down to -30°C
Additional Set of Trays
Tray Rack Carts

3 machines

300 kg load



KAZAKHSTAN

MAYAK-GROUP LLP

Freeze-Drying of Berries

Freeze-Drying of Blueberries (a challenging product to freeze-dry)

Freeze-Drying of Meat

Freeze-Drying of Fruits and Vegetables

Special Machine Options:

Remote Access Function
Nozzle System for SIP Cleaning
Shelf Freezing Function Down to -30°C
Additional Set of Trays

1 machine

300 kg load



2025 REFERENCE LIST

1. Yug Rusi Oil Extraction Plant LLC — LAB 4 and PROM 10
2. OREKHI KRYMA LLC — PROM 20
3. Service LLC — LAB 4
4. Horticulture Center ANO — PROM 40
5. FreezeDry LLC — PROM 20 and PROM 40
6. KazBAD LLP — PROM 10
7. Natural Products of the Arctic LLC — LAB 4
8. Capital Sugar Company LLC — LAB 4
9. Lio-Product LLC — LAB 4
10. Region Capital LLC — PROM 30
11. Flash LLC — PROM 20
12. Peasant Farm Starcev — LAB 4 × 8 units, LAB 10 × 4 units, PROM 5
13. Individual Entrepreneur Rogov — LAB 4
14. FOODEXCO LLP — PROM 10
15. Individual Entrepreneur Yambusheva — LAB 4
16. Smart LLC — PROM 1 and PROM 20
17. Planta Plus LLC — PROM 5
18. Grafenika LTD (Israel) — LAB 10
19. EMEFLAB LLC — LAB 4
20. MBS-Technology LLC — PROM 5
21. EFKO LLC — PROM 15 × 2 units
22. Eventus Plus LLC — PROM 20
23. Agroalliance Agricultural Cooperative — LAB 10
24. ECO Product LLC (Baymak) — PROM 30 × 3 units
25. ORION Chemical Company — PROM 2
26. LIOTECH LLC — PHARM 1
27. MAYAK-GROUP LLP (Kazakhstan) — PROM 30 and LAB 7
28. Research and Production Center for Biogenic Technologies LLC —
PROM 30 × 4 units
29. Tentorium LLC — PROM 20
30. Maydan LLC (Belarus) — PROM 30
31. Individual Entrepreneur Berezin — PROM 5

Customer references
are available upon
request.

LIOMASH SPECIALISTS TO BRING YOUR IDEAS TO LIFE



**Ramis Rashidovich
Siraziev**

Director



**Ivan Mikhailovich
Golenkovsky**

Chief Engineer



**Bogdan Andreevich
Chuchkanov**

Technical Director



Anton Petrovich Umnov

Head of MCS

Contacts

Sales Department

Sales Manager: "Lyophilization Equipment"

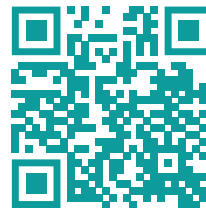
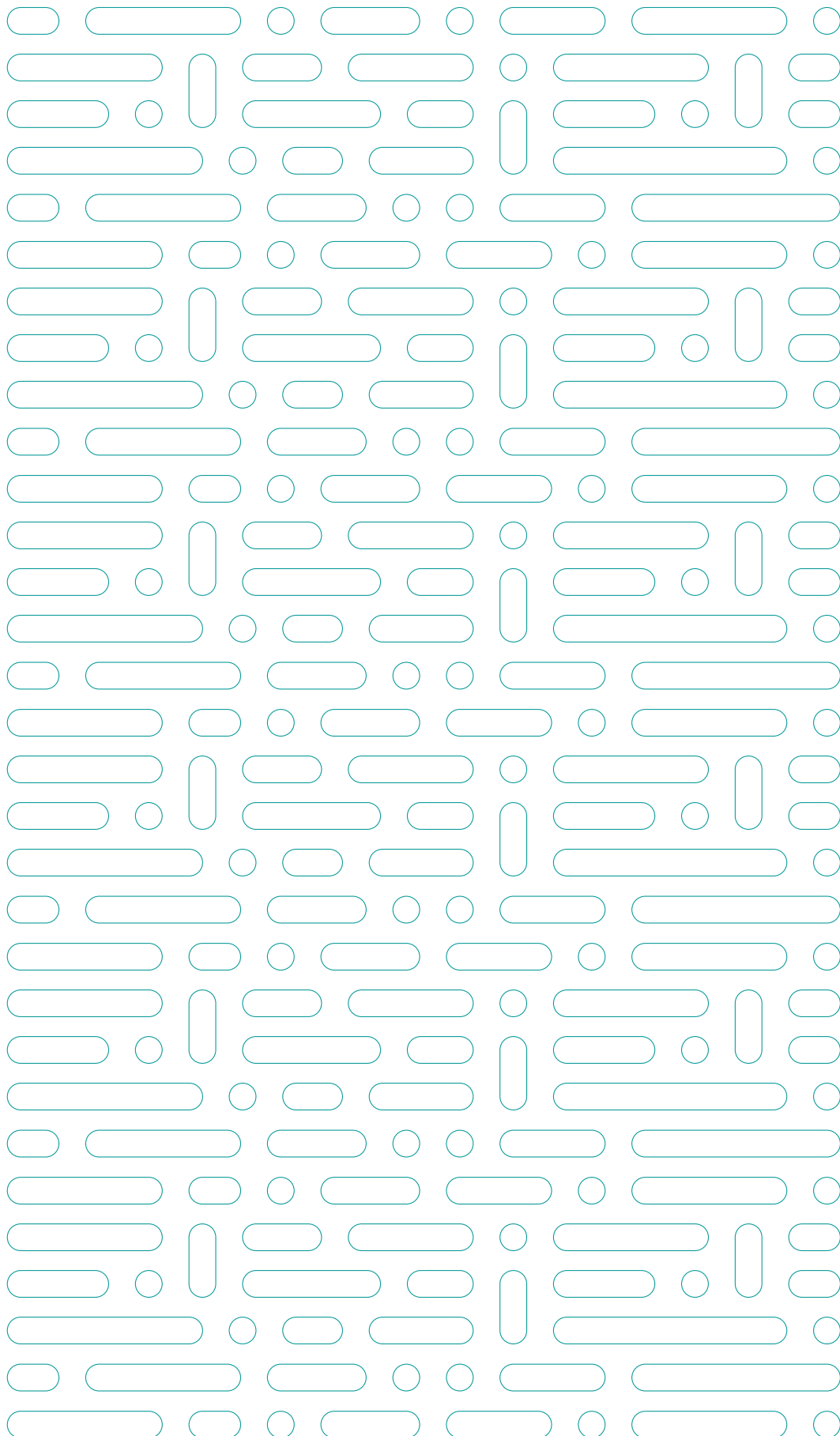
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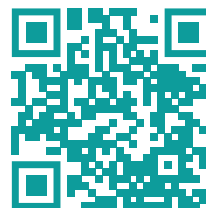
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