



Lyovapor™ Solutions

Mastering Freeze-Drying Excellence



Empowering Laboratories

with versatile solutions

Numerous industries harness the power of our innovative Lyovapor™ solutions, from pharma to academia. Our instruments have been crafted with care and are designed for durability, prepared to tackle even the most demanding applications.

	Pharmaceutical	Biotechnology	Chemical
			
Applications	Discovery of pharmaceutical ingredients, drug delivery, vaccines, wound dressings.	Peptides, proteins, bacteria, viruses, hormones, enzymes, antibodies, serum.	Organic and inorganic substances, nanotechnology.
Methods	Drying of target compounds, encapsulated materials, formulation in final container.	Gentle drying for maintaining overall structure and functionality.	Loss-free and non-destructive drying.

	Testing	Food	Natural extracts
			
	Environmental samples, quality control, pathological samples.	Fruits, meat, beverages, dairy products, "smart-food".	Nutraceuticals and molecules from plant extracts.
	Sample preparation for analytical investigations and storage.	Drying for safe storage, adding new product characteristics.	Gentle drying.

The Lyovapor™ line of high-performance instruments covers applications for all industries, and the choice of instrument depends on a range of factors, such as the drying process, the solvents being removed, and sample quantities.

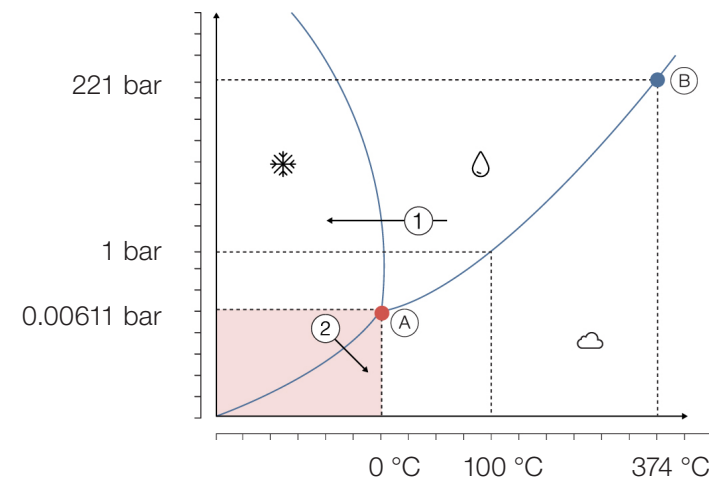
- The Drying Process: Advanced drying processes may require more precise control of parameters and the ability to dry samples quickly.
- Removed Solvents: The type of solvent being removed, such as aqueous or organic, and solvent mixtures may require specific instruments.
- Sample Quantities: The amount of sample to be dried influences the choice of sample containers and the size of the instrument required.

These parameters influence the configuration of an instrument's ice condenser, drying chamber, and vacuum pump.

Freeze-Drying Foundations

Mastering the magic of molecular transformation

Freeze-drying, also known as lyophilization, is a specialized, gentle drying process particularly suitable for heat-sensitive, high-value products. This process involves first freezing a liquid or wet sample — usually a water-based solution — and then directly converting the frozen solvent into gas, bypassing the liquid phase entirely, through a process called sublimation. Low temperatures and precise control over temperature and pressure are critical for sublimation to occur effectively. The following phase diagram shows how temperature and pressure affect the transitions between different states of matter.



Phase diagram of water.

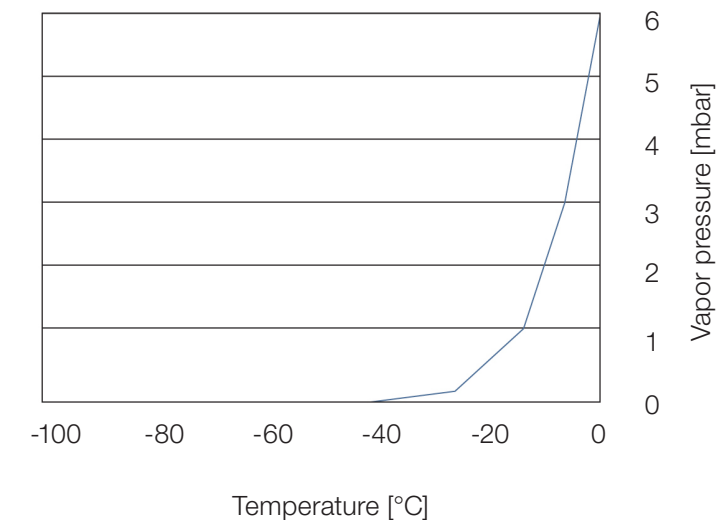
- ① Choose freezing temperature based on the solvents and solutes present.
- ② Initiate sublimation by lowering the pressure.
- (A) Triple point.
- (B) Critical point.

Freeze-drying water-based formulations is possible because water has a significant vapor pressure even when frozen. Specifically, 6.11 mbar (= 6.11 hPa) at its triple point. At this pressure, there's a lively exchange of water molecules between the ice and the surrounding atmosphere, i.e., between solid and gaseous phases. In a freeze-dryer, these water molecules are removed by resublimation onto cooling surfaces, causing the amount of ice to decrease gradually. To maintain the sublimation process, any heat lost during sublimation must be replaced. This is achieved using temperature-regulated shelves where the product is housed.

The optimal condenser temperature for a freeze-drying system should be selected according to the critical temperature of the sample — such as the collapse temperature of the frozen concentrate solution — and the type of solvent used. The condenser must be 15–20 °C colder than the sample temperature for optimal performance. When working with aqueous samples, a condenser temperature of -55 °C is adequate for most cases, and a colder condenser will not speed up the drying process. Extra-cold condensers, such as those at -85 °C and -105 °C, are specifically designed to process solvents with lower freezing points or their mixtures with water.

Temperature alone does not control the freeze-drying rate. The driving force behind sublimation is the vapor pressure difference between the frozen sample's sublimation surface and the condenser's ice layer. If the sample isn't actively heated during freeze-drying, its temperature will depend on the pressure set in the chamber. Meanwhile, the condenser's coil temperature determines the ice vapor pressure at its surface. This relationship can be visualized by plotting pressure against temperature, as illustrated below.

Reducing the temperature rapidly decreases vapor pressure until it reaches a plateau. To increase the vapor pressure difference — and thus accelerate drying — it's more efficient to increase the product's temperature rather than to reduce the condenser temperature further. This can be illustrated by calculating the difference in vapor pressure between -40 °C for frozen water and -55 °C for the ice condenser (0.109 mbar) compared to -20 °C for frozen water and -55 °C for the ice condenser (1.019 mbar).



Relationship between ice temperature and the vapour pressure above it.



Elevating Laboratory Performance With unmatched flexibility

We proudly present our full suite of Lyovapor™ instruments dedicated to the sophisticated demands of laboratory freeze-drying, from the L-210 for standard applications to the flagship L-300. Additionally, our latest innovation, the L-250, is expertly crafted to bridge the gap and introduce cutting-edge, energy-efficient cooling technology solutions.



Fit for purpose

Modular configurations for a wide range of applications

- The Basic and Pro versions accommodate different sample types in flasks, vials or trays to meet diverse requirements.
- Upgrade your instrument with drying chambers or the Pro control unit whenever you choose.
- With the method editor, an automated freeze-drying run with a programmed protocol and endpoint determination is possible.



Maximize your process efficiency
Digital innovation and automation

- BUCHI Infinite-Control™ enables remote monitoring and control of the instrument anytime, anywhere.
- The L-300's automatic defrosting feature reduces downtime by eliminating the need for manual de-icing of the ice condenser, saving your precious time.
- The Freeze-drying instrument and vacuum pump can automatically start up, making the instrument operational within minutes.

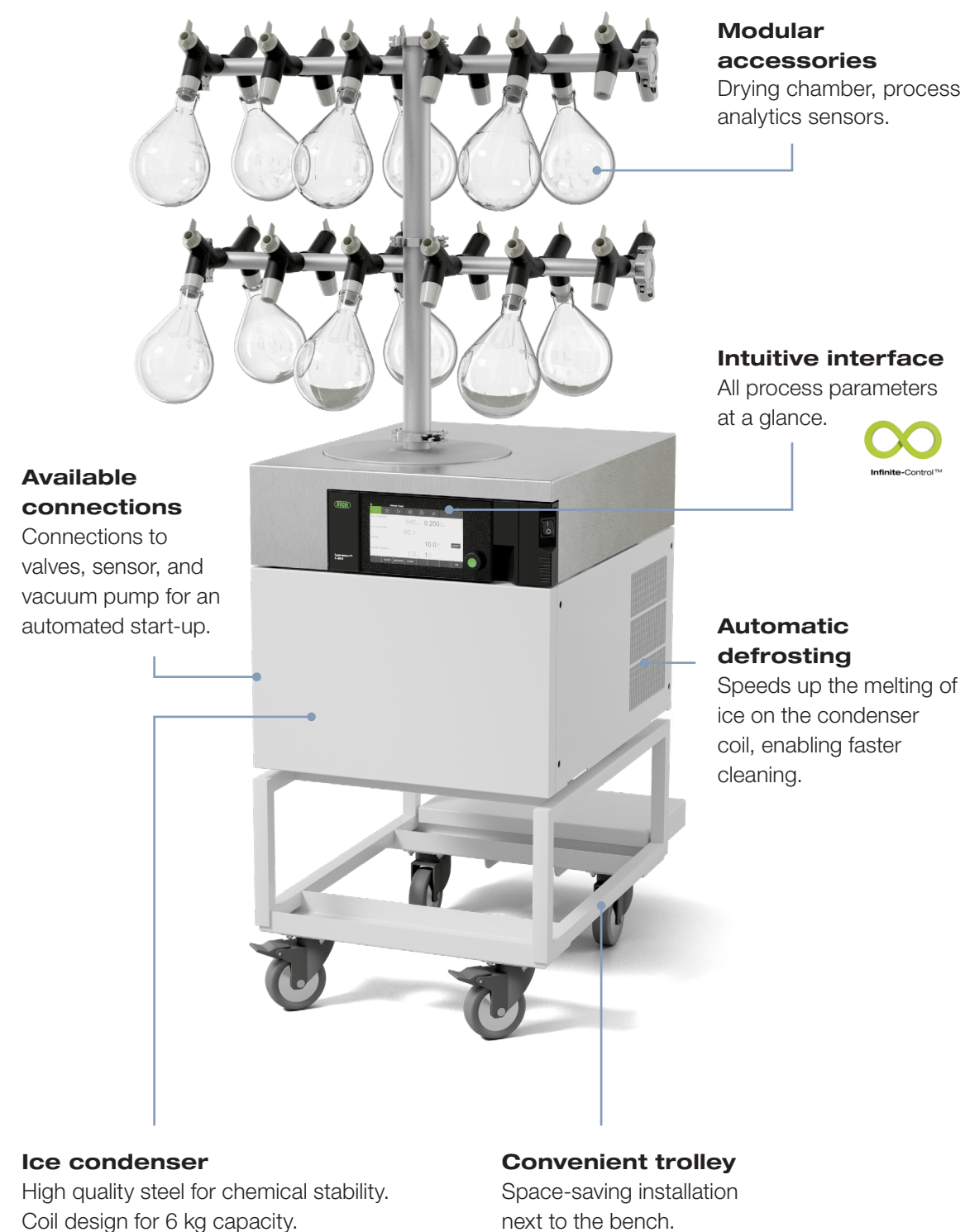


Reliable results

Powerful cooling design for a fast and safe drying process

- The outstanding cooling performance of the ice condenser coil ensures complete solvent recovery, making it particularly effective for the parallel drying of multiple samples.
- Sample integrity is guaranteed throughout the entire drying process.
- Three ice condenser temperature options are available, tailored to suit applications involving water and organic solvents with low freezing points.

Lyovapor™ L-210



Essential Freeze-Dryer

Sustainable, flexible, and reliable

Introducing the Lyovapor™ L-210, equipped with our cutting-edge EcoStream™ and Infinite-Control™ technologies. The ice condenser temperature of -55 °C is suitable for standard samples containing water. Furthermore, it offers a wealth of features and flexibility, including a variety of drying chamber options that are as varied as your application needs.



EcoStream™ Innovation

- Natural coolants with a global warming potential (GWP) of 3 help to minimize environmental impact.
- A ground-breaking cooling design enables the condenser to quickly reach temperatures as low as -55 °C, so you can start your process without delay.
- Exceptional cooling performance allows for complete solvent collection of large water-based sample quantities.



Time-Saving Features

- Live graphic of process parameters on instrument display.
- Advanced process analytics via endpoint determination of primary and secondary drying.
- Method programming and sample protective state enables an automatic freeze-drying run and process interruption if the sample temperature rises above the set collapse temperature.
- Hot gas feature speeds up the melting of ice layers on the ice condenser coil.



Modular Design for Maximum Flexibility

- A 6 kg ice capacity accommodates a diverse range of samples.
- Several drying chambers accommodate a wide range of applications.
- Easy installation on a bench, trolley, or fume hood.
- Upgrade from a Basic to a Pro instrument as your application needs change.

Lyovapor™ L-250

Modular accessories

Drying chamber with matching endpoint determination technique.

Touchscreen interface

Intuitive operation and data logging.



Vacuum regulation

Adaptable to your application, from ultimate vacuum to precise control suitable for vial applications.

Automatic defrosting

Speeds up the melting of ice on the condenser coil, enabling faster cleaning.

Convenient trolley

Space-saving installation next to the bench.

Ice condenser

High quality steel for chemical stability and coil design for 5 kg capacity.

The Green Freeze-Dryer

The standard for performance and eco-friendliness

We are proud to introduce the Lyovapor™ L-250 with EcoStream™ technology: The greenest freeze-drying option for your laboratory. The L-250 embodies BUCHI's commitment to enhancing the sustainability of laboratory processes worldwide. Our innovative cooling technology manages to reduce the environmental footprint of the instrument without compromising our commitment to quality and reliability.



EcoStream™ Innovation

- Achieve a condenser temperature of -85 °C with our ground-breaking compressor design.
- Low global warming potential (GWP) of 4 with natural coolants reducing the environmental impact.
- Lower the amount of heat output and noise emissions in your lab.



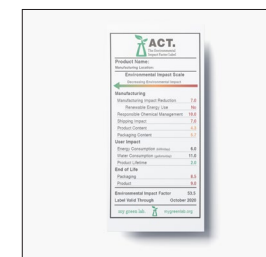
Save energy, enhance performance

- Profit from reduced electrical energy consumption due to the smart compressor design.
- The stable ice condenser temperature allows for complete solvent collection, for large sample quantities, accompanied by endpoint determination.
- Benefit from reliable freeze-drying for water and organic-based solvents.



Embrace efficiency and elevate control

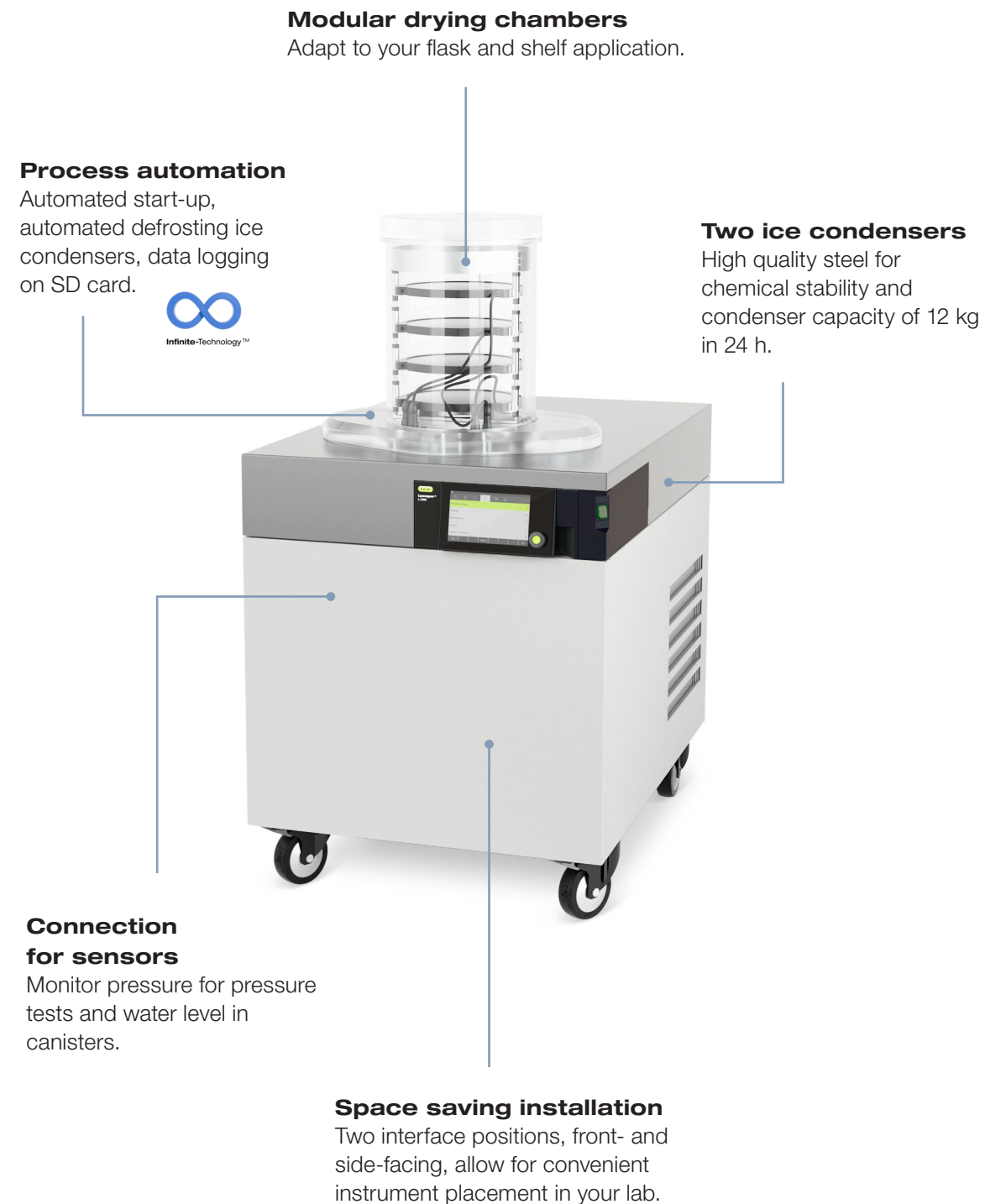
- Live graphic of process parameters on instrument display.
- Easy installation on a bench, trolley, or fume hood.
- Sample protective state is activated if the sample temperature rises above the set collapse temperature, safeguarding precious samples.
- Upgrade from a Basic to a Pro instrument as your application needs change.
- Hot gas feature speeds up the melting of ice layers on the ice condenser coil.



Certified sustainability for your lab

The Lyovapor™ L-250 has achieved the ACT Label, a certification granted by My Green Lab® indicating the instrument's environmental impact across its lifecycle. This encompasses the manufacturing process, material selection, and shipping to electrical consumption, use of chemicals, and recyclability during disposal. This certification highlights BUCHI's sustainability initiatives and aids customers in their journey to establish eco-friendly labs.

Lyovapor™ L-300



First Freeze-Dryer for Continuous Sublimation

Ultimate efficiency with Infinite-Technology™

The Lyovapor™ L-300 features our revolutionary Infinite-Technology™ and is the first dual condenser freeze-drying system that offers unlimited ice capacity. Perform continuous sublimation thanks to the two condensers that work alternately and are automatically cleaned. The L-300 also features Infinite-Control™ to monitor the entire process from the instrument or laptop.



Featuring dual condensers

- Infinite ice capacity for large sample batches.
- Stable process parameters, including cooling temperature and vacuum pressure with Smart-Switch.
- Lyophilization of water and organic-based solvents allows for sample flexibility at -105 °C.
- The stable ice condenser temperature allows for complete solvent collection.



Save time and costs

- Automated, hygienic steam cleaning.
- Minimize downtime with dual condensers, ensuring continual operation.
- Advanced process analytics via endpoint determination using temperature difference tests, pressure difference tests, and pressure rise tests reduces run time.



Unparalleled flexibility

- The manifold drying chamber accommodates large sample quantities with up to 36 manifold connections, making it ideal for increasing sample volumes.
- Various drying chambers allow for increased sample flexibility.
- Enjoy high process reproducibility with a shelf temperature variation of ± 1 °C.
- Technology with high convenience: You can upgrade from a Basic to a Pro instrument as your application needs change.

Freeze-Drying with Infinite-Control™

Seamless control, everywhere, every time



Infinite-Control™ technology, a digital feature standard across our entire Lyovapor™ range, includes remote process control and monitoring via interface and software. Effortlessly create and run methods, log data, and record charts in real time. Use the software to monitor the performance of your Lyovapor™ from your workplace. You can also rely on our sample protective state that ensures your valuable products are treated with the utmost care. We have prioritized convenience at every step to provide user-friendly controls that guarantee a flawless experience with your lyophilization instrument.



Instrument control

- Live graphic of process parameters on instrument display.
- Enhance sample integrity with the sample protection state.
- Endpoint determination tracks sublimation progress to reduce the process time automatically.



Software control

- Allows for data recording and customized reports.
- User-friendly operation to create and start methods.
- Provides real-time diagrams and schematics of the process.
- Control and monitor the process in real-time.

Discover more:

[Infinite-Control™ & Infinite-Technology™](#)

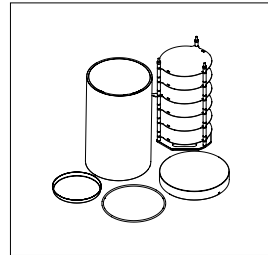


Technical data

Lyovapor™

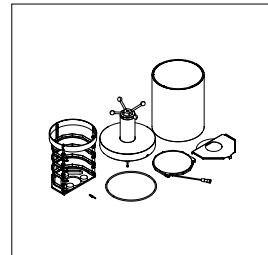
	Lyovapor™ L-210	Lyovapor™ L-250	Lyovapor™ L-300
Lowest ice condenser temperature at 25 °C	-55 °C	-85 °C	-105 °C
Dimension (WxDxH in mm)	503 x 585 x 510	503 x 645 x 510	710 x 1,000 x 900
Weight (kg)	67	67	272
Connection voltage	200–240 ± 10% VAC	200–240 ± 10% VAC	380–400 V 3N~
Rated power consumption	1,300–1,800 VAC	1,300–1,800 VAC	5,000–6,000 VA
Frequency	50–60 Hz	50–60 Hz	50–60 Hz
Environmental conditions	5 °C–30 °C, max. relative humidity 80%	5 °C–30 °C, max. relative humidity 80%	15 °C–30 °C, max. relative humidity 80%
Minimum clearance on all sides	30 cm	30 cm	40 cm
Noise level	< 60 dB(A)	< 60 dB(A)	< 68 dB(A)
Minimum system vacuum (with vacuum pump / without samples)	0.03 mbar	0.03 mbar	0.03 mbar
Global Warming Potential (GWP)-Refrigerant	3	4	3,559
Leak rate	Max. 10.10 mbar × L / h	Max. 10.10 mbar × L / h	Max. 10.10 mbar × L / h

Accessories



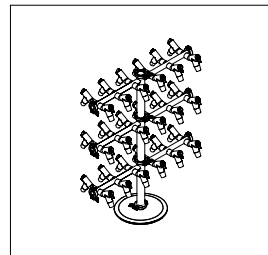
Heating shelves

The temperature-controllable heating shelves, adjustable up to 60 °C (+/-1 °C), expedite your freeze-drying process, with options for either 4 or 6 shelves. Additionally, these shelves can be integrated with sample temperature sensors for enhanced monitoring.



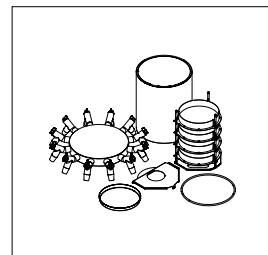
Stoppering top cover

A stoppering cover seals the vial under a vacuum, ensuring that sensitive samples remain dry and contamination-free during storage. Combined with heated and non-heated shelves.



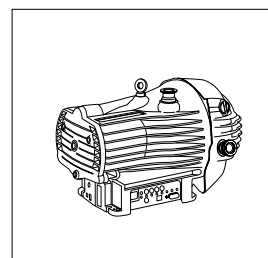
Manifold racks

Connect your samples in flasks of any kind to the manifold rack. BUCHI offers manifolds with 12, 24, and 36 positions.



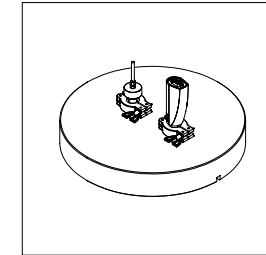
Manifold top cover

To use shelves and manifolds, combine them with the manifold top cover for the acrylic glass chamber.



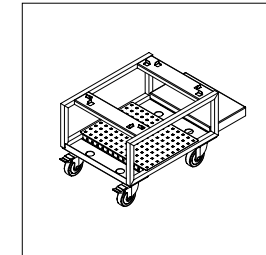
Vacuum pumps

BUCHI offers oil pumps as well as dry pumps for all your applications needs.



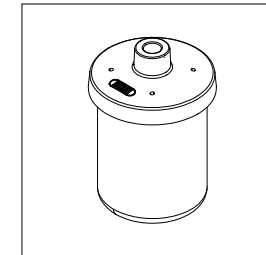
Sensors

The Lyovapor™ is equipped with sensors that accurately monitor temperature and/or pressure throughout the freeze-drying process, ensuring optimized operation and accurate endpoint determination using capacitive and Pirani pressure gauges, along with sample temperature probes.



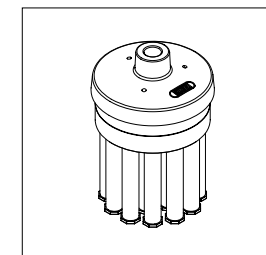
Trolley

With the convenient trolley accessory, you can effortlessly move and position the Lyovapor™ next to any laboratory bench, ensuring easy setup and mobility.



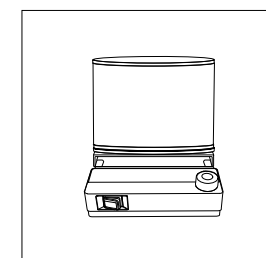
Beaker flasks

Improve accessibility to your dried samples using our range of beaker flasks, available in various sizes to suit your needs.



Ampul adapter

Use our available ampul adapters to connect ampuls to the manifold adapters.



Dewar accessory

Optimize your manifold applications by achieving a larger surface area and faster drying times thanks to our available Dewar accessory designed for precise sample preparation. Available together with Rotavapor® R-80 and R-300.

Lyovapor™ Product Overview

The best solution for every need



Lyovapor™ L-210 Lyovapor™ L-250 Lyovapor™ L-300

Basic Pro Basic Pro Continuous Pro

Ice condenser						
Temperature	-55 °C		-85 °C		-105 °C	
Application with organic solvents	-	-	•	•	•	•
Maximum sample loading	6 kg / 24 h		4 kg / 24 h		12 kg / 24 h	
Total ice capacity	6 kg		5 kg		Infinite	
EcoStream™ Technology	•	•	•	•	-	-
Defrosting by hot gas (optional)	•	•	•	•	-	-
Defrosting by water steam	-	-	-	-	•	•

Characteristics						
Heated shelves up to 60 °C	-	•	-	•	-	•
Product temperature	-	•	-	•	-	•
Pressure control by Pirani gauge	•	•	•	•	•	•
Pressure control by capacitive gauge	-	•	-	•	-	•
Pressure difference test	•	•	•	•	-	•
Pressure rise test	-	-	-	-	-	•
Temperature difference test	-	•	-	•	-	•



Lyovapor™ L-210 Lyovapor™ L-250 Lyovapor™ L-300

Basic Pro Basic Pro Continuous Pro

Drying Chambers						
Heated shelves	-	•	-	•	-	•
Manifold rack / Non-heated shelves / Stoppering cover	•	•	•	•	•	•

Control unit						
Method editor with graphical display	-	•	-	•	-	•
Touchscreen display	•	•	•	•	-	•
Shelf temperature control	-	•	-	•	-	•
Live graphic of running process	•	•	•	•	-	-
Data logging on SD card	-	•	-	•	-	•
Connection to software	-	•	-	•	-	•

The Lyovapor™ instrument comes in two versions tailored to your needs:

- Basic / Continuous: Drying of liquid and solid materials in flasks and trays.
- Pro: Sophisticated drying in vials and trays. It features method programming, endpoint determination, and a sample protective state that is activated if the sample temperature rises above the set collapse temperature.



Service & Training

BUCHI Service packages

BUCHI START – The highest efficiency from the very beginning

From a professional installation to a carefree agreement that will leave you with full cost predictability and the highest possible system efficiency. www.buchi.com/start

«Install»

- Product installation and testing.
- Hands-on training from a certified technician.
- Evaluation of the immediate surroundings of your new product.
- Best integration of your new product into the existing infrastructure.

«IQ / OQ»

- Product or system installation.
- Installation and Operational Qualification.

BUCHI EXACT – Certified accuracy for highest level of confidence

Receive comprehensive qualifications with all of your BUCHI products. We perform qualification services on a level that can only be achieved by the manufacturer. www.buchi.com/exact

«OQ»

- Our one-time OQ service will provide you with all the necessary documents and certificates.
- The service team will remind you about the option for a follow-up OQ before the certificates expire.

«OQ Circle»

Buying an OQ package will grant you an additional discount on the documents and offer you priority service with automated visit scheduling.

BUCHI CARE – Unbeatable Reliability

Maintaining a heavily used device requires different parts and inspection frequencies than units that are operated occasionally. Our approach takes factors like these into consideration to provide you with an optimal yet cost-efficient solution. www.buchi.com/care

BUCHI ACADEMY – Increase your know-how, get the edge over your competition

Expert know-how is provided by the application chemists in our competence centers in Flawil, Beijing and Mumbai and the locally available experts at our market organizations. Our scientific support offers pre-sales feasibility studies, tailored solution offers, after sales onsite support, regular basic to advanced courses and on demand customized training. www.buchi.com/academy

Pharma & Chemistry

Freeze-Drying for R&D Discovery

Synthesis, Extraction

Concentration

Cold Extraction / Soxhlet

Evaporation



Rotavapor®

Rotavapor®

SyncorePlus

Application

The search for active pharmaceutical ingredients (APIs) and chemical compounds typically begins with a synthesis or an extraction step. Reflux synthesis and Soxhlet extraction can be performed via a rotary evaporator.

Since both synthesis and extraction require large amounts of solvent, a concentration step is required prior to downstream processing. Here, rotary evaporation is used to remove the solvent and concentrate the compound of interest. The use of parallel evaporation can speed up the concentration of multiple samples simultaneously.

Features

- Reflux condenser for reflux synthesis.
- Soxhlet accessory for Soxhlet extraction.
- One instrument fits several application.

- Evaporating flask sizes ranging from 50—5000 mL for single-sample use.
- Fully communicating system to avoid downtime: solvent library, dynamic distillation, leak test, foam sensor.
- Dewar accessory for freeze-drying sample preparation.

- Multiple samples in the range of 0.5–500 mL.
- Flushback module enables optimal analyte recovery and ensures highly reliable results.
- Interchangeable racks and volume versatility.

Separation

Drying

Analysis

Flash and Prep Chromatography

Freeze-Drying

Melting Point



Pure & Pure Essential, Sepiatec SFC, Consumables

Lyovapor™

Melting Point

Application

Flash, prep HPLC, and prep SFC are commonly used to purify target compounds: flash is used as a pre-purification step, whereas prep HPLC and prep SFC increase the purity of the target compound to the maximum.

Subsequently, molecules of interest are highly diluted and must be concentrated before proceeding with the next steps. Freeze-drying can be used to remove solvent from heat sensitive products with minimal damage.

Melting point analysis can be used to perform quality control and assess the purity of novel compounds.

Features

- Flash instruments for basic or advanced applications.
- Flash and prep HPLC in one system (optionally).
- Integrated UV and ELS detection (optionally).
- Compatible with a wide range of flash cartridges, prep HPLC & prep SFC columns and glass columns.

- L-210: high-quality freeze-drying of samples (-55 °C, 6 kg).
- L-250: freeze-drying of solvent mixtures (-85 °C, 5 kg).
- L-300: continuous sublimation with two alternately working and automatically cleansed condensers at -105 °C.
- Easy control and monitoring of the freeze-drying process.

- Automatic determination of melting and boiling points for up to 3 samples in parallel.
- Compliant with pharmacopeia methods (EU, USA, JP).
- Observation and replay of the phase transition using a color display and video recording.

Core messages to our customers

BUCHI creates added value

“Quality in your hands” is the guiding principle that shapes our philosophy and our actions. It challenges us to provide outstanding services that are precisely tailored to your needs. This means that we must stay in close contact with our customers. That is why we keep in touch and continue to work very hard to understand you and your business even better.

We help you by providing high-quality products, systems, solutions, applications and services that offer you added value. This allows you to focus entirely on your processes and your work.



Competent

We have the technological expertise and decades of experience needed to provide competent support and work with you to continually improve our services.



Reliable

We guarantee the quality and functionality of our equipment and will continue to help you quickly and efficiently whenever something does not operate to your satisfaction.



Safe

By collaborating closely with you, we do everything in our power to make our products, systems, solutions, applications and services as safe as possible for people and the environment.



Cost-effective

We strive to create a high level of economic benefit and maximum added value for you.



Global

As an international family-owned business with own subsidiaries and qualified distributors, we have a presence wherever you are located.



Easy

We support you by providing carefully designed solutions as well as instruments and systems that are easy to operate.



Sustainable

We support environmentally friendly processes and manufacture products that have a long service life. We utilize advanced technologies to leave the smallest environmental footprint possible.

We are represented by more than 100 distribution partners worldwide.
Find your local representative at:

www.buchi.com

Quality in your hands

