# vacuum pilot scale lyophilizer for use in food factories

Vacuum pilot scale lyophilizer is a small and high performance equipment designed for pilot scale freeze drying process. It adopts the international mainstream in-situ freeze drying technology, which can realize the whole process of automation operation from sample pre-freezing, drying to pressure plugging.

## Vacuum Pilot Scale Lyophilizer

The vacuum pilot scale lyophilizer is designed for product development and process optimization in biomedicine, food engineering, traditional Chinese medicine, cosmetics, and other industries. It is ideal for parameter exploration and verification before scaling up to pilot or industrial production.

## Features

1. **Intelligent control system:** Advanced PLC programmable logic controller with high-definition touch screen, full process programming and monitoring, real-time temperature/pressure curve drawing, and automatic operation report generation.
2. **Powerful data management:** FAT32 file system for large-capacity data storage, saves historical data for over 90 days, USB interface for one-key export.

3. **Multi-program operation mode:** Manual/automatic operation, 40 preset process programs (each with 40 temperature settings) for enhanced adaptability.
4. **High-performance refrigeration:** International brand low-noise compressor and dry filtration system, high cooling efficiency and stability, extended equipment life.
5. **High-precision temperature control:** Silicone oil heat-conducting medium for rapid and uniform heat/cold exchange, ±1°C accuracy for consistent drying.
6. **Transparent observation window:** High-translucency organic glass door for real-time sample observation during freeze-drying.
7. **Flexible cavity structure:** Standard and pressure plug type cavities for general lyophilization and sealing packaging processes.

## Equipment Advantages

1. **In-situ freeze-drying:** No manual transfer needed, reduces contamination, enhances cleanliness, meets GMP and FDA standards.
2. **Modular design, easy maintenance:** Independent modules for easy repair/replacement, stainless steel cavity for corrosion resistance and easy cleaning.
3. **Strong flexibility and compatibility:** Suitable for powder, liquid, solution, extract, or vials in freeze-drying experiments.

4. **Support extended functions:** Optional eutectic point test and connection to freeze-drying vials for expanded sample formats and capacity.

## Working Principle

The core principle is vacuum freezing sublimation drying, where water is sublimated from solid ice to vapor in a low temperature vacuum, bypassing the liquid phase. This enables efficient and contamination-free drying.

1. **Pre-freezing:** Material is cooled below freezing on the shelf, moisture freezes.
2. **Primary drying (sublimation):** Under vacuum, shelf is heated, ice sublimates to vapor and is trapped by the cold trap.
3. **Secondary drying (desorption):** Residual moisture is removed, lowering moisture content.
4. **Optional pressure plug sealing:** Pressure plug equipment closes vials in vacuum, preventing secondary contamination.

## Chamber Types

1. **Standard type:** Without automatic pressure stopper function.
2. **Up-pressing type:** With automatic stopper, shelf presses vial stoppers after freeze-drying to seal.

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| **Model** | **FDP200S** | **FDP200T** |
|---|---|---|
| Type | standard | Top press |
| Tray temperature | ⩽-50°C to +70°C | |
| No-load condenser temperature | ⩽-80°C | |
| Vacuum degree | less than 10 Pa | |
| Freeze drying area | 2 square meters | |
| Power | 15kw | 16kw |
| Ice condenser capacity | 40kg per 24 hours | |
| Shelf | 500x700x13mm | |
| Shelf quantity | 6+1 | |
| Material loading capacity | 40L | |
| Distance between shelves | 90mm | |

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| **Model** | **FDP200S** | **FDP200T** |
|---|---|---|
| Temperature uniformity | ±1°C | |
| Cooling method | air cooling | |
| External dimensions | 1260x3105x2077,2565mm | |
| Power supply | 380Vac, 50Hz | |
| Number of vials loaded | 4100xϕ22mm or 7800xϕ16mm or 14400xϕ12mm | |