

pilot scale freeze dryer for use in pharmaceutical plants

Pilot-type freeze dryer is a kind of in-situ freeze drying equipment designed for pilot stage, which combines laboratory precision with industrial-level control capability, and is widely used in the fields of biopharmaceuticals, food engineering, traditional Chinese medicine research and development, and life sciences.

Pilot Scale Freeze Dryer

The pilot scale freeze dryer adopts in-situ lyophilization technology, enabling fully automatic control from pre-freezing through sublimation and final drying. This avoids contamination and material loss during transfer, ensuring stable and consistent product quality. Ideal for transitioning from laboratory to small batch industrial production, it provides a robust platform for new product development and process validation.

Core Features

1. **Full-automatic programming control:** PLC system with touch human-machine interface, customizable and savable freeze-drying programs, supports 40 temperature control parameter settings for variable/complex processes.



2. **Powerful data recording:** FAT32 file system with USB export; continuously saves over 3 months of operation data for batch recording and quality tracing.
3. **High-precision temperature control:** Silicone oil circulating temperature control, error $<1^{\circ}\text{C}$, stable and uniform temperature for reliable process optimization.
4. **Silent and efficient:** Imported silent compressor and high-efficiency drying filter, low noise, long life, strong system stability.
5. **Transparent visual window:** High-transparency organic glass door for real-time observation of material status.
6. **Cold trap split structure:** Physical isolation of cold trap and drying chamber, higher water capture efficiency, reduced cross-contamination, faster drying.
7. **Intelligent frost management:** Automatic defrost function, reduces manual maintenance.
8. **Inert gas filling interface:** Nitrogen and other gases can be injected post-drying to improve product storage stability.
9. **Tray structure optimization:** Square stainless steel trays, regular shape, corrosion-resistant, easy material distribution and cleaning.

Performance Advantages

1. **Pilot mass production support:** Suitable for grams to kilograms batches, various bottle/tray specifications.
2. **Flexible program settings:** Adaptable for process exploration and batch verification.
3. **Multi-layer temperature monitoring:** Independent probe in each partition layer, real-time multi-layer curve reading for heat analysis.
4. **Multiple data security mechanisms:** Password management, anti-tampering, operation log for process safety and traceability.
5. **Easy maintenance:** Full stainless steel design, dust/corrosion resistant, easy daily cleaning and upkeep.

Working Principle

1. **Pre-freezing:** Shelves cool and freeze material in the drying chamber, forming stable ice crystals.
2. **Sublimation drying:** Under high vacuum, ice crystals sublime directly to water vapor, rapidly captured by the cold trap.
3. **Resolution drying:** Further reduces combined water content, stabilizing product residual water rate.

The entire process occurs in a closed environment, avoiding microbial or external contamination, ideal for biological substances.

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Model	FDP20S	FDP20T	FDP30S	FDP30T	FDP50S	FDP50T	FDP100S	FDP100T
Type	standard	Top press	standard	Top press	standard	Top press	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	0.2 square meters		0.36 square meters		0.5 square meters		1 square meters	
Power	3.5kw	4.5kw	3.5kw	4.5kw	6.5kw	7.5kw	9.5kw	10.5kw
Ice condenser	6.5kg per 24 hours				10kg per 24 hours		15kg per 24 hours	

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Model	FDP20S	FDP20T	FDP30S	FDP30T	FDP50S	FDP50T	FDP100S	FDP100T
capacity								
Shelf	300x400x13mm				300x450x13mm		550x480x13mm	
Shelf quantity	2+1		3+1		4+1		4+1	
Material loading capacity	4.5L		7L		10L		20L	
Distance between shelves	145mm		90mm		90mm		90mm	
Temperature uniformity	±1°C							
Cooling method	air cooling							

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Model	FDP20S	FDP20T	FDP30S	FDP30T	FDP50S	FDP50T	FDP100S	FDP100T
External dimensions	1340x930x1340,1630mm				1340x1015x1460,1780mm		1630x1030x1610,1910mm	
Power supply	220Vac, 50Hz or 380Vac, 50Hz							
Number of vials loaded	468xφ22mm 864xφ16mm 1584xφ12mm	or	702xφ22mm 1296xφ16mm 2376xφ12mm	or	1040xφ22mm 1944xφ16mm 3456xφ12mm	or	2016xφ22mm 3944xφ16mm 7020xφ12mm	or