

Freeze drying, or lyophilisation, is the process of freezing a material and then sublimating any frozen liquid from a solid directly to a gas; this can be achieved through the use of a vacuum pump connected to a freeze dryer. Freeze drying is commonly used as a method of preservation in food and pharmaceutical industries. It allows products to be easily stored and transported without having to be constantly refrigerated.

Application Note

Ensure that your vacuum pump is sized correctly for your freeze dryer. If the flow rate of the pump is too high then the vapour is pulled through the condenser too quickly which reduces the condensing efficiency.

Clean the freeze dryer's condenser after each run to prevent sublimation of frozen chemicals into the vacuum pump.

Recommended Products

For freeze drying (lyophilisation) applications a high vacuum levels is required, typically between 10-1 and 10-3 mbar. There are different pump types that can be employed; oil-sealed rotary vane pumps, Chemvac combination pumps, dry scroll pumps and specialist pump systems.

- **Rotary vane pump** for standard freeze drying applications.
- **Chemvac combination pumps** for freeze drying with high organic vapour or acidic vapour loads (e.g. TFA). A chemical duty diaphragm pump is used to degas the pump oil and keep the pump clean.
- **ChemStar Dry** for oil free chemical resistant solution with self-cleaning programme. Peak flow rate in the range of 0.1 - 10 mbar.

Pump Selection By Application

Application	CRVpro 4	CRVpro 6	CRVpro 8	CRVpro 16	ChemStar Dry
Freeze Dryer					
Ice holding capacity	up to 2 kg	X			
	up to 4.5 kg		X		
	up to 6 kg			X	X
	up to 8 kg			X	
	up to 12 kg			X	

For further information visit **Welch by Gardner Denver** at:

<https://www.camlab.co.uk/welch-m452.aspx>

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