K750X and K775X

Freeze dryers for electron microscopy (EM) specimen preparation

K750X: Peltier cooled, rotary pumped freeze dryer
K775X: Liquid nitrogen cooled, turbo pumped freeze dryer

◄ *The K750X features:*

- Thermoelectric cooling and heating

The K775X features: ►

- Turbomolecular pumping
- Liquid nitrogen fed cold stage – temperatures below -80°C
- Liquid nitrogen "auto-top-up" (option)

The K750X / K775X common features:

- Automatic drying cycle - unattended operation
- Accurate time and temperature monitoring
- Liquid nitrogen slushing chamber option
- Programmable, multi-segment sequence control for temperature and time

Quorum Technologies

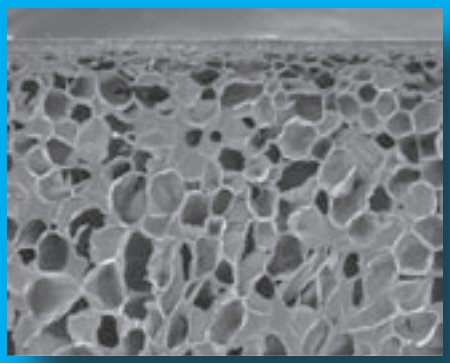
Aname Official Distributor

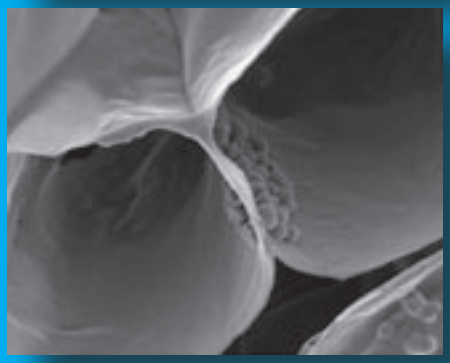
K750X & K775X: The Freeze Drying Method

Freeze drying significantly reduces the distortion and shrinkage effects that occur when a wet specimen dries by normal evaporation. Distortion is due to the forces of surface tension that occur when going from a liquid to a vapour phase, such as from water to water vapour – the normal situation for biological specimens.

Freeze drying overcomes this problem by careful sublimation of frozen specimens under vacuum – a process that avoids the liquid phase and thereby reduces distortion effects. The rate of sublimation is a function of temperature and vacuum with typical drying times being several hours or longer.

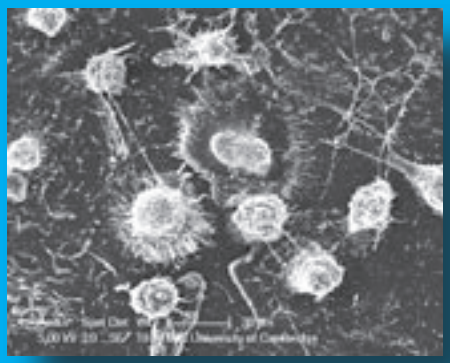
Applications

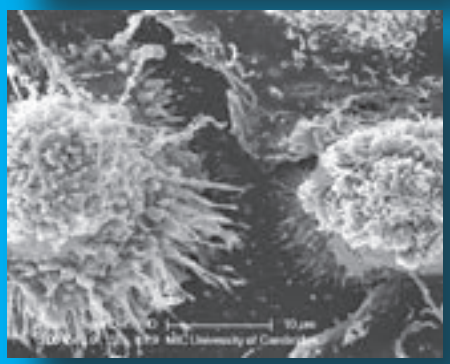




Examples of freeze dried apple

(Courtesy of Dr. Eric Curry, USDA, ARS, Tree Fruit Research Laboratory, Wenatchee, WA USA)





Human monocyte derived macrophages, freeze dried using the K775X and coated with carbon

(Images courtesy of Dr Jeremy Skepper of the Multi-Imaging Centre, University of Cambridge)

Main features

The choice of K750X or K775X

Ideally freeze drying should be carried out at temperatures below the recrystallisation point of ice, but this would require inordinately long drying times. In practice temperatures of -60°C (possible if back-up water cooling at 15°C is used – see E4860 recirculating chiller option) have been found to give reasonable results under vacuums achievable with a two-stage rotary vacuum pump. For these applications the K750X Peltier cooled, rotary pumped freeze dryer can be used.

For many applications, however, it is necessary to dry at temperatures below -80°C with lower sublimation rates suitable for delicate specimens. This requires better vacuum than can be obtained using a rotary vacuum pump alone, plus the lower temperatures associated with liquid nitrogen. For such applications the K775X liquid nitrogen cooled, turbomolecular pumped K775X is recommended.

Working with the K775X

The K775X achieves low temperatures by using a liquid nitrogen cold stage – fed from an integral vacuum dewar which is capable of giving several hours holding time between 'top ups'. For extended drying periods, the optional EK4100 'auto top-up' system, consisting of a level sensor and free-standing 60L pressurised dewar, will allow several days unattended operation.

Pre-frozen specimens are loaded onto the cooled stage of the drying chamber through the lid, using a specimen transfer holder (two holders are provided – for TEM grids and for SEM specimen stubs).

The K775X uses a built-in 60L/s turbomolecular pump which gives an operating vacuum that is normally in the region of 1 x 10^{-2}mbar to 1 x 10^{-5}mbar.

The K775X has controls for time and temperature and at the end of the drying cycle can allow specimens to assume room temperature (or to be warmed) prior to embedding.

Working with the K750X

The K750X uses a similar basic sequence to the K775X, but with cooling limited to higher temperatures associated with Peltier cooling. The process also takes place under rotary pumped vacuum (typically down to 1 x 10^{-2}mbar).

K750X and K775X – automatic operation

Both temperature and time can be pre-selected and the drying cycle completed automatically. A microprocessor-controlled 10-segment sequence allows 10 time periods and temperature settings to be programmed to achieve a range of drying protocols. Up to 10 different protocols can be stored for future use.

K750X and K775X – specimen freezing options

The vacuum chamber of the K750X/K775X can be used to prepare supercritically cooled liquid nitrogen slush (a mixture of liquid and solid), which will give faster specimen freezing than normal "boiling" liquid nitrogen. A suitable liquid nitrogen container is required.

Alternatively the optional EK4180 stand-alone liquid nitrogen slusher can be used. Note: an additional rotary vacuum pump is required.

Main picture:
K775 with optional EK4100 auto top-up dewar
Bottom image: K750X

K750X Ordering Information

For a full quotation, please contact us or our local distributor

EK3145	K750X Peltier-cooled, rotary-pumped EM freeze dryer

Requirement

EK3180	RV5 90L/m Edwards rotary vacuum pump with oil mist filter

Options

E4860 /24V	0.2 HP recirculating heater/chiller (400W) with high pressure pump
E4860 /110V	As above but for 110V operation
EK4180	Stand-alone liquid nitrogen slusher, including polystyrene pots Note: separate rotary pump required (see EK3175)
EK3175	RV3 30L/m Edwards rotary pump with oil mist filter (for use with EK4180)

K750X Specification

Instrument case:	450mm W x 350mm D x 175mm H
Instrument weight:	18Kg
Work chamber:	Borosilicate glass 165m Ø x 125mm H
Safety shield:	Polycarbonate cylinder
Timer:	0-999 hours
Specimen stage:	-60°C to +60°C
Temperature controller and monitor:	-90°C to +90°C, display resolution 0.1°C
Vacuum gauge range:	Atmosphere to $1x10^{-2}$mbar
Vacuum pump	90L/m or greater (see EK3180). (order separately)
Water cooling:	Water cooling at nominal 15°C (E4860 recommended)
Electrical supply:	230V/50Hz (6A maximum including pump), 115V/60Hz (12A maximum including pump)
Supplied with:	Vacuum hose and connectors, moisture trap and operating manual

K775X Ordering Information

For a full quotation, please contact us or our local distributor

EK3147	K775X Liquid nitrogen cooled, turbo-pumped EM freeze dryer

Requirement

EK3175	RV3 50L/m Edwards rotary pump with oil mist filter

Options

E4100	Liquid nitrogen "auto 'top-up' system with 60L pressurised dewar
EK4180	Stand-alone liquid nitrogen slusher, including polystyrene pots Note: an additional rotary pump is required (see EK3175)

K775X Specification

Instrument case:	450mm W x 350mm D x 175mm H
Instrument weight:	18Kg
Work chamber:	Borosilicate glass 165m Ø x 125mm H
Safety shield:	Polycarbonate cylinder
Timer:	0-999 hours
Specimen stage:	-140°C to +40°C. Initial cool down to -140°C in approximately 45 minutes – final temperature can be lower
Vacuum range:	$1x10^{-2}$mbar to $1x10^{-5}$mbar
Vacuum:	60L/s built-in air cooled turbomolecular pump
'Backing' rotary pump:	50L/m or greater (see EK3175)
Electrical supply:	230V/50Hz (6A maximum including pump), 115V/60Hz (12A maximum including pump)
Supplied with:	Vacuum hose and connectors, moisture trap and operating manual

For full specifications, please see our website

Distributed by:

Quorum Technologies Ltd