HPM 010
High Pressure Freezing Machine

« The Golden Standard of High Pressure Freezing Machines. »
HPM 010
High Pressure Freezing Machine

« The Golden Standard of High Pressure Freezing Machines. »

KEY FEATURES

✓ Freezing of specimens up to 200µm thickness and 2mm diameter without visible ice crystal damage
✓ No need for cryoprotectants
✓ Cryofixation of suspensions, monolayer cell cultures and tissue
✓ Short handling time before freezing
✓ Reproducible freezing
✓ Easy one button operation

With over 100 installations world-wide, and more than 400 scientific publications to its credit, the HPM-010 is not only the pioneer of HP freezing, but the instrument of choice which allows freezing of aqueous samples up to 200µm thickness without visible ice crystal damage and without the use of cryoprotectants.

Excellent freezing of the specimens intended for examination in the electron microscope is one of the most important prerequisites for achieving reproducible results from the various subsequent cryopreparation methods.

The conventional freezing methods in use are plunge freezing, jet spray and cold block (slamming) cryofixation. However, due to the poor heat conductance of water, these methods can only satisfactorily freeze specimens measuring up to between 10 and 20µm.

Thicker specimens (such as tissue samples) could only be frozen in the past, if a cryoprotectant was added to lower the freezing point of the water. This method functions as follows:

At 2,100 bar the melting point of water drops from 0°C to -22°C. Under normal atmospheric conditions homogeneous nucleation (supercooling) begins at -40°C. Under high pressure this nucleation doesn’t begin until the water has reached -90°C (see H2O Phase Diagram).

At 2,100 bar water is 1,500 times more viscous than at atmospheric pressure, which drastically reduces the nucleation and thus the crystal growth rate. This means that the extremely high freezing rate (min. 10,000°C/s required for satisfactory freezing by the methods previously mentioned) is not necessary with the high pressure method. The high pressure method allows specimens up to 0.2mm thickness with a total volume of approx. 1mm³ to be vitrified or up to 0.5mm thickness to be adequately frozen at a low freezing rate of 200°C/s without requiring the addition of cryoprotectants.
HPM 010
High Pressure Freezing Machine

SPECIFICATIONS

Dimensions and Weight
Dimensions
Weight, approx. 450 kg

Working Data
Working pressure 2300 - 2600 bar
Maximum pressure 2800 bar
Duration of working pressure, at least 500 ms
Cooling time from 0°C to -50°C 10 ms
(measured between 3 mm copper disc)

Specimen Dimensions
Sample size, up to max. of 200μm thickness and 2mm diameter

Connection Data
Voltages, frequencies 3 x 380/220 V, 50 Hz or 3 x 208 V, 60 Hz
Power input, approx. 3kVA
Compressed air (5 bar) G 1/4" outer thread
LN2 (1 bar excess pressure) G 1/4" outer thread)
Heating water (rubber hose) Ø 7/14 mm

Operational Data
Hydraulic oil reservoir 40 liters
Hydraulic oil bias pressure 140 - 250 bar
LN2 Dewar (in system) 7 liters
LN2 consumption 10 - 20 liters/hour
Initial system cooling, approx. 15 min.
Max. processing sequence, approx. 40 shots/hour
Isopropyl alcohol reservoir, approx. 0.5 liters

Measurements in Millimeters

EDEN INSTRUMENTS
in Situ NanoCharacterization Solutions

66 Bis avenue de Verdun         33610 Cestas – France         Tel +33 (0)5 56 08 43 50         Mobile +33(0)6 08 06 70 81         www.eden-instruments.com