Double Tilt Liquid Nitrogen Cryo-Transfer Holder
Model 915

Double tilt liquid nitrogen cryo-transfer holder, model 915, combines both analytical and cryo-transfer capabilities. It is used to observe the structure of frozen hydrated crystalline specimens, reduce unwanted thermal effects in various analytical techniques and to facilitate energy dispersive x-ray spectroscopy (EDS), and electron energy loss spectroscopy (EELS) analyses by reducing contamination and mass loss.

A lightweight cryo-workstation provides a protected environment for loading the frozen-hydrated specimen grid. The holder is cooled via a well-insulated, lightweight, bubble-free liquid nitrogen dewar. The high mechanical stability of the dewar helps to minimize drift during use. Precise temperature control of the specimen is achieved through a conductor rod connecting the specimen holder tip to the liquid nitrogen dewar which contains an electric heater to control the specimen temperature. The temperature of the holder is monitored by a calibrated silicon diode that provides a sensitive, linear response for precise temperature control of the specimen.

Excellent thermal contact between the specimen and the beryllium specimen cradle is achieved using a Hexring® mechanism and anti-twist washer, which are made of beryllium, for analytical applications. The ToggleTilt™ β-drive mechanism provides robust operation for tilting the specimen, with no mechanical binding of the specimen cradle at the tilt limits. β-tilt is accomplished via TEM control or the Gatan Accutroller system for β-tilt maximums of ±30° or ±45° respectively.[1, 2]

A one-piece cryo-shield encapsulates the frozen-hydrated grid, protecting it from contamination during atmospheric transfers between the cryo-workstation the electron microscope stage. The entire tip of the model 915 holder is cooled to the minimum operating temperature during use, ensuring stable specimen temperature and low drift performance.

Benefits

- **ToggleTilt β-drive:** provides robust operation with no mechanical binding of the specimen cradle at tilt limits
- **Analytical design:** Specimen cradle, Hexring, and anti-twist washers are made of beryllium
- **Low drift design:** High mechanical stability by conduction cooling from well-insulated, bubble-free dewar

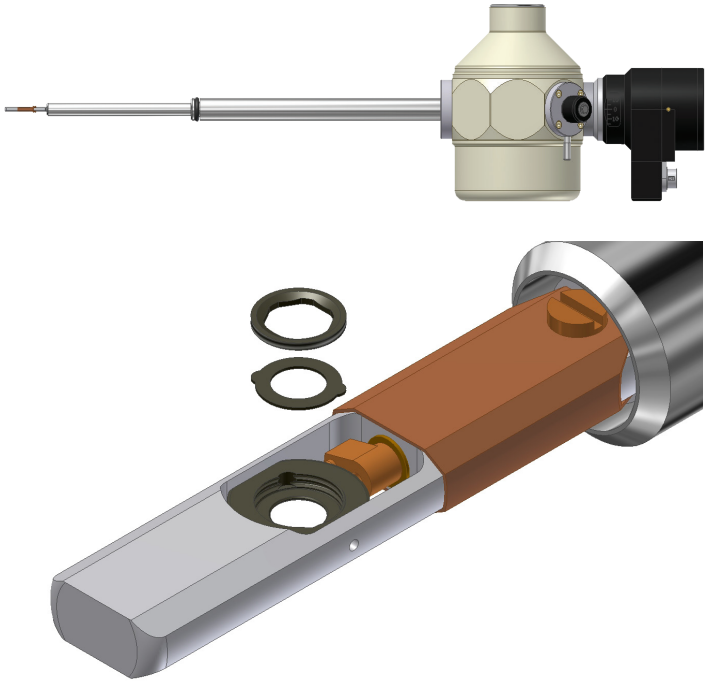

Figure 1. Model 915 double tilt liquid nitrogen cryo-transfer holder.

- **Precise temperature measurement:**
  Temperature of the holder is monitored by a calibrated silicon diode that provides a sensitive, linear temperature response
  The conductor rod connecting the specimen holder tip to the liquid nitrogen dewar contains an electric heater to change the specimen temperature
- **Frost-free specimen transfer**:
  Lightweight cryo-workstation provides low-temperature specimen loading to protect the frozen-hydrated grid
  One-piece cryo-shield encapsulates the frozen-hydrated grid provides protection against damage caused by warming and frost formation during transfer from the workstation to the electron microscope

[1] The beryllium Hexring mechanism and anti-twist washer are fragile.

[2] Tilt ranges and compatibility of specimen holders vary according to the TEM manufacturer, model, pole piece gap and the presence of in-gap accessories.

Applications

- Electron diffraction. EELS and EDS analysis of frozen hydrated crystalline specimens

Specifications

Drift rate at 0° tilt (nm/min)	1.5
Resolution at 0° tilt (nm)	0.34
Observable area at 0° tilt (mm^2) Diameter (mm)	3.24 2.03
Observable area at 60° α tilt (mm^2)	0.79
Observable area at 45° β tilt (mm^2)	1.84
Specimen cradle material	Beryllium
Standard holder tip material	Aluminum
Faraday cup	Not available
Capacity Number of grids Diameter (mm) Max. grid thickness (µm)	 1 3 100
Cryogen	Liquid nitrogen
Min. operating temperature (°C)	Less than -170
Time to reach min. operating temperature (min)	~30
Dewar capacity (mL)	175
Hold time at min. operating temperature (h)	3.5–4

Specifications provided herein are approximate and are intended only as guidelines. Drift rate and high-resolution performance are dependent upon ambient conditions and installation of the TEM pursuant to the manufacturer's specifications. Specifications are subject to change.

Figure 2. Model 915 holder in the workstation.

Ordering

Model	Description
915.MA	Double Tilt Liquid Nitrogen Cryo-Transfer Holder, Model 915 (Motorized Tilt)
915.F	Double Tilt Liquid Nitrogen Cryo-Transfer Holder, Model 915 (JEOL Only, FasTEM)
902	Accutroller System

Other products to consider

- Solarus® II plasma cleaner
- Turbo pumping station, model 655
- Gatan Microscopy Suite® software

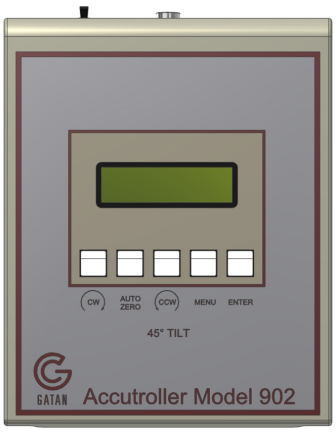

Figure 3. Accutroller model 902 software.

DS-915-FL12-CA-DEC18