

Specifications

	Type	Cryogen	Temp range	Hold time**
UHRST	Single-tilt	Nitrogen	-175°C to +50°C*	4 hours
CHDT	Double-tilt	Nitrogen	-175°C to +50°C*	4 hours
UHRTR	Tilt rotate	Nitrogen	-175°C to +50°C*	4 hours
HC3500	Single-tilt + Electrical***	Nitrogen	-150°C to +250°C	4 hours
HCHST	Single-tilt	Helium	20K to 100K	1.5 hours
HCHDT	Double tilt	Helium	20K to 100K	1.5 hours
HCHTR	Tilt-rotate	Helium	25K to 100K	1.5 hours
ULTST	Single-tilt	Helium	5K to 20K	1.5 hours
ULTDT	Double-tilt	Helium	5K to 20K	1.5 hours
TAC200	2-blade a/c	Helium	< 30K	3 hours

* high resolution performance only at low temperatures.
 ** approximate operational hold-time at base temperature and zero tilt.
 *** 4 electrical connections to specimen area.

All TEM cooling holders are supplied with temperature sensor; heater, screwed insert and digital temperature controller, tip protection sleeve with pump-out fitting and pump-out tool.

All double-tilt and tilt-rotate holders are supplied with motorised 2nd tilt or rotate, with digital readout of 2nd axis tilt or rotate angle. Rotation angle range (tilt-rotate holders) is +/- 110 degrees.

In addition, helium cooled TEM holders (and TAC200) are supplied with helium transfer tube, flow pump and controller.

Options

BSI beryllium insert, supplied in place of standard insert (not for HC3500).
 ECS electrical connections (2) to specimen area (1-tilt cooling holders).
 High vacuum pumping system for periodic pumping of dewar vacuum space, also for tip protection sleeve.
 Special cooling holders e.g. for bulk specimens.
 Helium and nitrogen storage dewars.

Important

Compatibility and tilt angles depend on TEM model and polepieces fitted - please discuss with Gatan UK.

† Acknowledgement: Image courtesy of NIRIM, Japan, showing fluxons and vortex interactions in a superconducting specimen.



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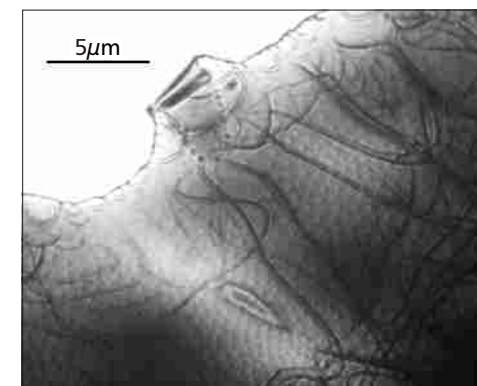
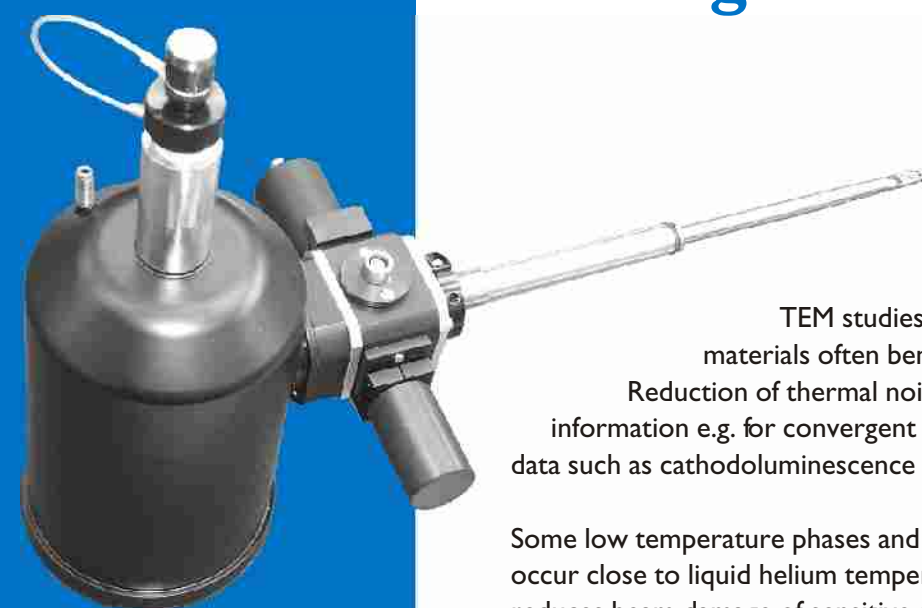
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**1- & 2- tilt
 Tilt-rotate
 Ultra-low
 temperature**



Fluxons at <7K†

**Cooling Holders
 for TEM**

Specimen cooling

TEM studies of semiconductor and other materials often benefit from specimen cooling. Reduction of thermal noise improves crystallographic information e.g. for convergent beam studies and spectroscopic data such as cathodoluminescence analysis.

Some low temperature phases and superconductor transitions only occur close to liquid helium temperatures. Specimen cooling also reduces beam damage of sensitive samples for both imaging and microanalysis.



TEM cooling holders

Gatan's UK developed TEM cooling holders offer un-rivalled low temperature specifications together with high stability, high resolution imaging performance.

1-tilt, 2-tilt and tilt-rotate designs are available.

2-tilt and tilt-rotate holders are provided with a motorised 2nd tilt/rotation angle drive, controller and digital readout.

All holders are supplied with a tip protection sleeve and a pump-out tool, to allow the holders to be kept clean and under vacuum.

Temperature control is achieved via a sensor and heater mounted near the specimen insert. A sophisticated digital temperature controller is provided with the system.

Nitrogen cooling holders

A special low mass nitrogen dewar provides a long operational hold time from a small volume of nitrogen. Excellent cryogenic design prevents boiling, thus avoiding vibration effects. The internal vacuum is enhanced by a charcoal sorb, which can be regenerated during pumping.

The cooled specimen insert is thermally isolated from the tip of the holder, allowing rapid stabilisation and low thermal drift. Quick, positive specimen fixing and good thermal contact is achieved using a screwed clamp ring.

A multi-functional materials characterisation holder is available, providing heating, cooling and electrical connections to the specimen area.

UHRST

UHRST is a 1-tilt, nitrogen cooled TEM holder with base temperature of -175°C .

CHDT

CHDT is a 2-tilt, nitrogen cooled TEM holder with motorised 2nd tilt.

UHRTR

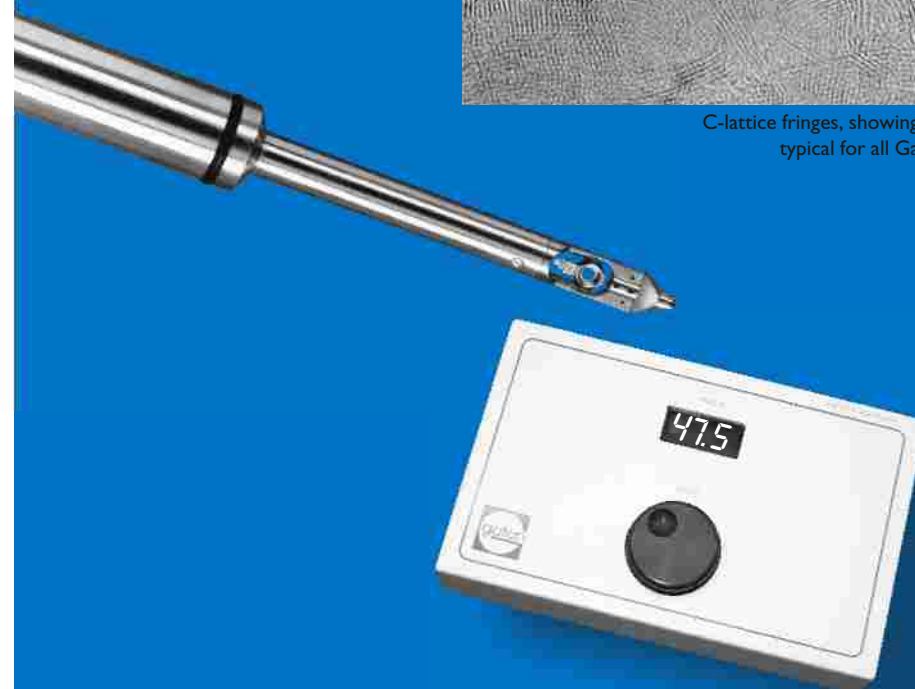
UHRTR is a tilt-rotate, nitrogen cooled TEM holder with motorised rotation.

HC 3500

HC 3500 is a multi-functional materials characterisation TEM holder, with a temperature range of -150°C to $+250^{\circ}\text{C}$ and 4 electrical connections to the specimen area.



C-lattice fringes, showing 0.34nm resolution, typical for all Gatan cooling holders



Helium cooling holders

A 'vapour shielded' helium dewar design is used, utilising the cooling effect of the exhausting helium gas, thus avoiding the added weight and complication of an additional nitrogen dewar. Two different cryogenic designs are available, offering either a wide operating temperature range or an ultra low base temperature.

Following transfer of liquid helium via the vacuum insulated transfer tube and flow pump provided, the tube is removed and an internal circulation of helium is created within the holder. Cooldown and stabilisation is rapid, allowing the operator 1.5 hour's operation at base temperature before refilling.

A twin blade helium cooled anti-contaminator is available to trap gas molecules that might otherwise condense on the cold specimen.

HCHST

HCHST is a 1-tilt helium holder, recommended for operation in the temperature range 20K to 100K.

HCHDT

HCHDT is a 2-tilt helium holder, with temperature range 20K to 100K, and motorised 2nd tilt.

HCHTR

HCHTR is a tilt-rotate helium holder, with a temperature range of approx 25K to 100K, and motorised specimen rotation.

ULTST

ULTST is an ultra low temperature 1-tilt helium holder, suitable for use in the temperature range 5K to 20K.

ULTDT

ULTDT is an ultra low temperature 2-tilt helium holder, with temperature range 5K to 20K, and motorised 2nd tilt.

TAC200

TAC200 is a retractable, twin blade, helium cooled anti-contaminator to be used in conjunction with helium cooled TEM specimen holders.

Options

Options for cooling holders include a beryllium sample insert, for microanalysis, and electrical connections to the specimen region (1-tilt holders). Special versions of the holders can be produced e.g. to accept bulk samples.

Cryotransfer systems and nitrogen cooled anti-contaminators are available, also nitrogen cooling holders can be combined with vacuum transfer technology (see separate brochure).