

# Elsa Cryo-Transfer Holder

## Model 698

The Elsa™ cryo-transfer holder is a next generation, a single-tilt liquid nitrogen holder designed for the frost-free transfer of a sample at liquid nitrogen temperature into a transmission electron microscope (TEM). This holder is primarily used for imaging radiation-sensitive, frozen-hydrated specimens for single particle cryo-electron microscopy (cryo-EM).

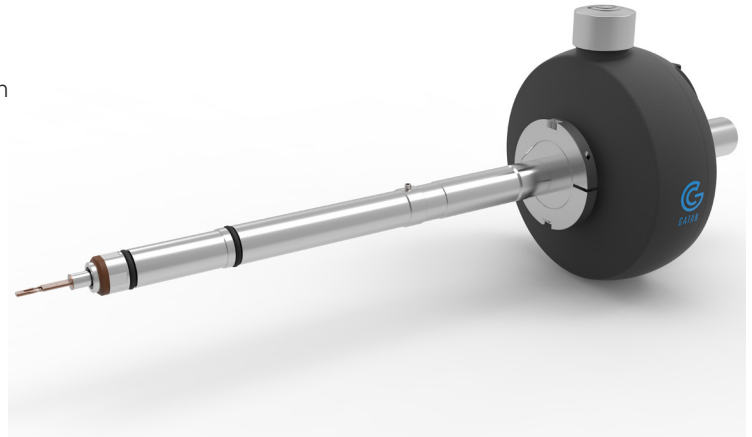
### Benefits

- **Larger dewar, redesigned from the ground up:** Increases the liquid nitrogen volume by 2.5x
- **Extended hold time:** Allows >9 h below -145 °C and >8 h of stable, high-resolution imaging
- **<1.5 nm/min drift rate:** Ensures that images quality is high during data collection
- **Resolve <2.3 Å features:** Enables high-resolution imaging even under cryo-conditions
- **Centrosymmetric design:** Reduces settling and drift, during tomography, by removing the shift in the center of gravity during a stage tilt

This holder comes with two different tip configurations. The ultra-low profile uses the Gatan Quickload™ clipping-free mechanism to secure the specimen and provide the highest tilt range of any side entry cryo-transfer holder available today ( $\pm 80^\circ$  tilt). While the standard tip, which is often considered the easiest for novice users, uses a clipping mechanism to secure the sample.

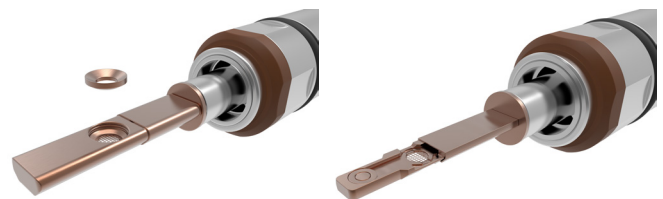
The Elsa holder is specifically designed to provide a larger liquid nitrogen reservoir, with a hold time of more than 9 h. This allows researchers to perform longer, unsupervised data collection to support overnight or more complex cryo-experiments.

In addition, the Elsa holder utilizes a high-resolution cable, so that the holder can be set to maintain a constant temperature throughout the course of an experiment without compromising performance. This helps to minimize specimen drift, reducing the time needed to wait for the stage to stabilize before one can collect an image. This high-resolution cable also enables researchers to easily resolve features at <2.3 Å resolution isotropically.



A lightweight cryo-workstation provides low-temperature specimen loading to protect the frozen-hydrated grid. A one-piece cryo-shield encapsulates the frozen-hydrated grid to provide protection against damage caused by warming and frost formation during transfer from the workstation to the electron microscope.

The centrosymmetric design makes it easier for both novice to expert cryo-electron microscopists to use. As you rotate or tilt the holder, there is a minimal weight shift in the center of gravity that reduces settle and drift during tomography experiments. As a result, all skillsets can acquire higher quality, clearer images.



**Figure 1.** Samples can be mounted on a standard profile holder (left) that uses a clipping or the ultra-low profile holder (right) that addresses high tilt applications using a clipping-free design.

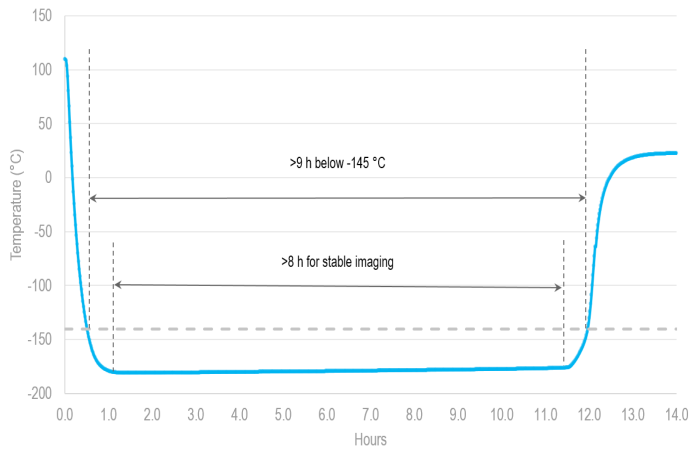
## Applications

- Cryo-EM
- Cryo-tomography
- Electron crystallography
- Nanoparticle imaging

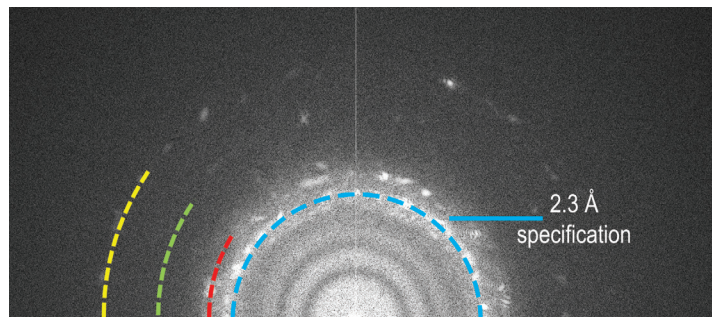
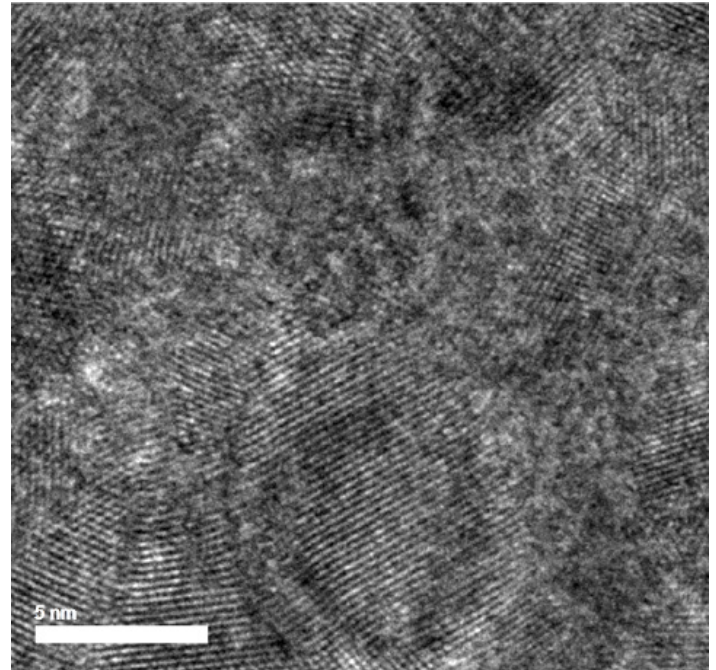
## Specifications

|  |                  |
|--|------------------|
| Drift rate at 0° tilt (nm/min)                 | <1.5             |
| Isotropic resolution at 0° tilt (Å)            | 2.3              |
| Observable area at 0° tilt (mm <sup>2</sup> )  | 4.1              |
| Standard specimen cup/holder tip material      | Beryllium copper |
| Capacity                                       |                  |
| Diameter (mm)                                  | 3                |
| Max. grid thickness (µm)                       | 300              |
| Cryogen  | Liquid nitrogen  |
| Operating temperature (°C)                     | Less than -170   |
| Time to reach min. operating temperature (min) | <40              |
| Dewar capacity (mL)                            | 250              |
| Time to resolution specifications (min)        | 60 – 90          |
| Hold time for high resolution (h)              | >8               |
| Hold time below -145 °C (h)                    | >9               |

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 without notice.



**Figure 2.** The Elsa cryo-transfer holder allows you to double your experiment time: >9 h below -145 °C with >8 h of stable imaging.



**Figure 3.** A high-resolution image of gold lattice at cryo-temperatures using the Elsa cryo-transfer holder (top). The holder shows excellent resolution and drift that allows high-resolution features (blue 2.3 Å, red 2.0 Å, green 1.45 Å, yellow 1.2 Å) to be readily visible (bottom).

## Ordering

| Model   | Description  |
|---------|--|
| 698.STP | Elsa Cryo-Transfer Holder (Standard Profile, Workstation)  |
| 698.ULP | Elsa Cryo-Transfer Holder (Ultra-Low Profile, Workstation) |
| 1905    | Temperature controller                                     |

## Other products to consider

- K3™ and K2® direct detection cameras
- GIF Quantum® LS imaging filter
- Latitude® S low-dose automation software
- Cryoplunge™ 3 system
- Turbo pumping station

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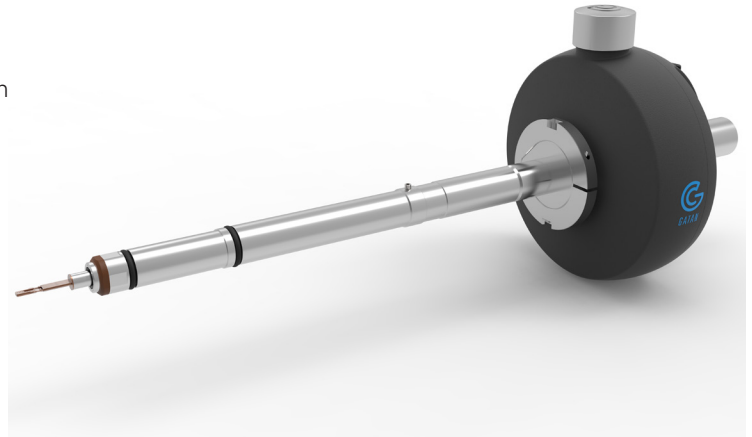
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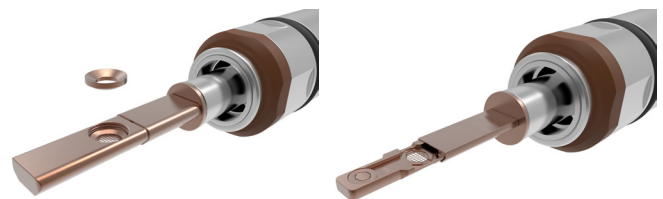
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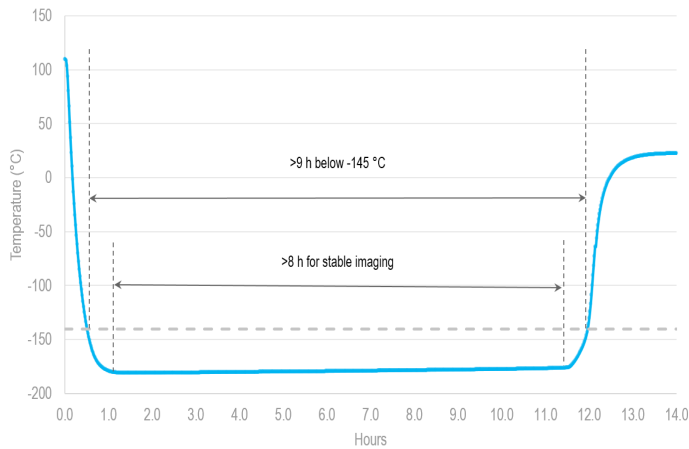
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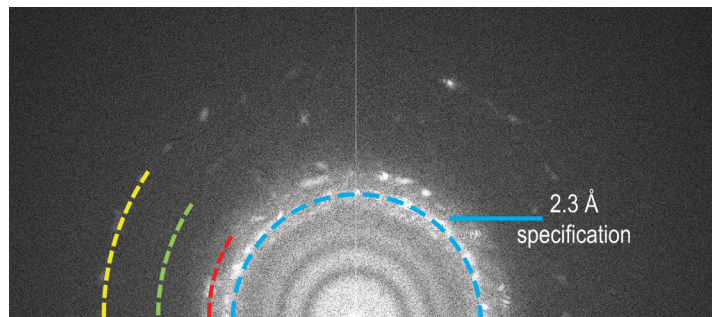
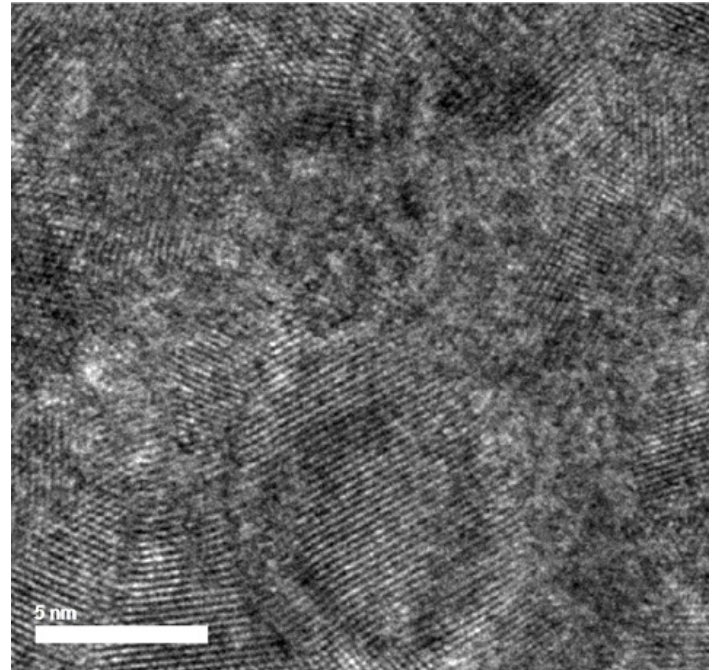
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- GIF Quantum® LS imaging filter
- Latitude® S low-dose automation software
- Cryoplunge™ 3 system
- Turbo pumping station

# Turbo Pumping Station

## Model 655

Turbo pumping station, model 655, is a self-contained, modular, bench top pumping station that is quiet, efficient and easy to use. It consists of the base unit that contains the vacuum pumps, gauges and electronics, with transmission electron microscope (TEM) holder and/or specimen storage modules attached to a specialized vacuum port located on the top surface of the instrument. The vacuum port contains two internal butterfly valves and an external dual port valve assembly.<sup>1,2</sup>

The model 655 holder module provides a multi-function work platform for TEM specimen holders. The holder is securely supported in the pumping station; the holder tip clearly visible within the Pyrex® tube of the module. This stable platform facilitates performing tasks such as regenerating the sorb material in the dewar of Gatan cryo-TEM holders, vacuum testing holders or vacuum storage of any holder when it is not being used in the electron microscope. The Pyrex tubes of the holder module also provide a window to observe the functionality of the holder; a useful testing and training tool.

The sample storage module includes two individual vacuum capsules, each of which contains a removable, 6-grid storage platform, thus allowing 12 specimens in total per module to be stored under vacuum.<sup>3</sup> The vacuum capsules can be individually vented or evacuated via an easy to operate slide valve. Vacuum tweezers facilitate insertion and removal of the stored specimens.

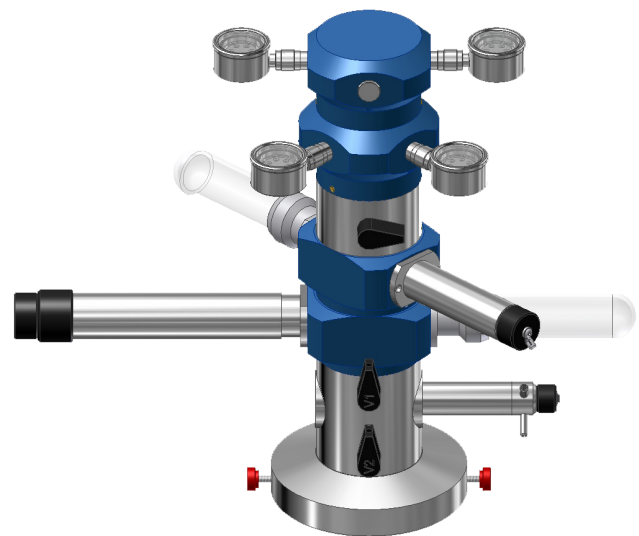
### Benefits

- **Rapid pumping speed:** Atmosphere to near base pressure typically in less than 2 minutes with pressure monitored by a cold cathode gauge
- **Clean vacuum:** State-of-the-art pumping system produces clean vacuum and maintains vacuum even with loss of electrical power
- **Modular design:** Accommodates up to a total of four TEM holders, four sample storage modules or a combination of both
- **Compact:** Small footprint, bench-top design
- **User friendly:** Easy to set up and maintain

<sup>1</sup> A second dual port valve assembly is required when more than two TEM holder modules are installed on the 655 with all four ports used for cryo holders. The second valve assembly allows all four holder dewars to be connected simultaneously.

<sup>2</sup> An additional butterfly valve can be ordered separately to isolate sample storage modules from TEM holder modules in systems configured with storage and holder modules.

<sup>3</sup> An additional vacuum capsule can be ordered separately to expand the capacity of one storage module to a maximum of eighteen specimens.



**Figure 1.** Configuration with two specimen holder and two sample storage modules.

### Applications

- Vacuum storage of TEM holders
- Testing TEM holders
- Evacuation of dewar type cryo-transfer and cooling holders
- Removing condensed water from holders
- Sample storage

## Specifications

|  |                                |
|--|--------------------------------|
| Vacuum system turbo drag pump backed by a 2-stage diaphragm pump (L/s) | 70                             |
| Base pressure  |                                |
| (Torr)   | $2 \times 10^{-6}$             |
| (Pa)   | $2.7 \times 10^{-4}$           |
| High vacuum gauge  | Cold cathode gauge             |
| Backing vacuum gauge   | Solid state sensor             |
| Pumping speed from atmospheric pressure                                |                                |
| (Torr)   | $\sim 5$ to $5 \times 10^{-6}$ |
| (Pa)   | $6.6 \times 10^{-4}$           |
| Footprint dimension (W x D x H, mm)                                    | 420 x 265 x 345                |
| Shipping weight (kg)   | 20                             |
| Power requirements (VAC, Hz)   | 100 – 240, 50/60               |
| Power consumption (W)  | 300                            |
| Capacity   |                                |
| Number of TEM holders  | 4                              |
| Number of sample storage modules                                       | 4                              |

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Figure 2. Configuration for two storage modules.

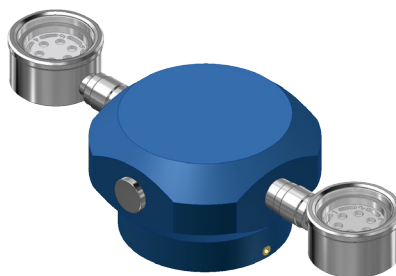


Figure 3. Specimen storage module.



Figure 4. Specimen storage capsule.

## Ordering

| Model | Description   |
|-------|---|
| 655   | Turbo pumping station with work column, CC gauge tube, one TEM holder module and one dual port valve assembly     |
| 655.S | Turbo pumping station with work column, CC gauge tube, one sample storage module and one dual port valve assembly |

## Other products to consider

- Gatan TEM specimen holders
- Solarus® advanced plasma cleaning system
- Cryoplunge™ 3 system
- Gatan Microscopy Suite® software