

## COOLSTAGE

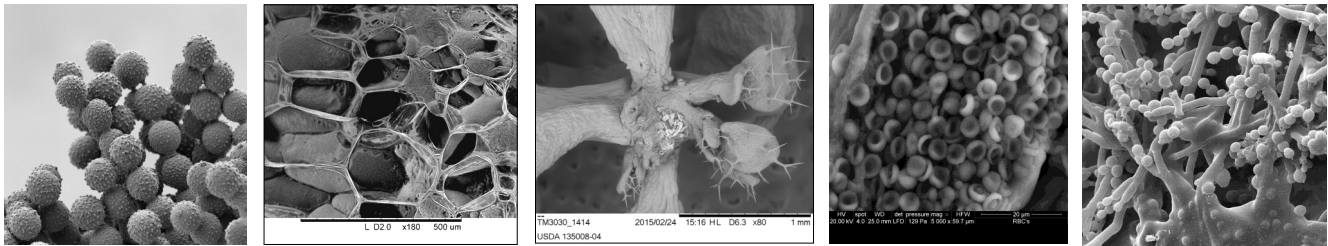
### SEM Peltier Heating & Cooling

With increased use of Low Vacuum or Variable Pressure microscopes many microscopists appreciate the need to prevent dehydration of wet samples.

Saturated vapour pressure of water decreases considerably with temperature. At room temperature water will very quickly evaporate causing considerable changes to the specimen structure. By cooling a wet specimen water evaporation may be slowed or depending on chamber pressure stopped altogether.

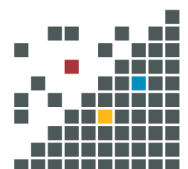
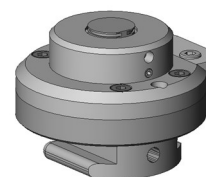
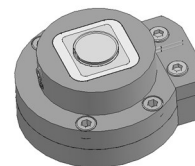
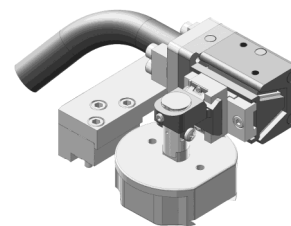
Using Coolstage with a wet-SEM provides the ability to study the interaction of liquid water with materials and to maintain the structure of fauna and flora by preventing dehydration. In order to image liquid water it is useful to cool the specimen to just above 0°C so that the water vapour pressure in the microscope is minimised. In a dry low vacuum environment operating the SEM at low vacuum pressures and cooling the specimen to around -25°C, dehydration can be substantially reduced.

- Standard: -25°C to +50°C
- Enhanced: -25°C to +160°C
- Ultra: -50°C to + 50°C



### Applications & Features

- Water action on cement & pharmaceuticals
- Water transport through fibers
- Low melting point materials eg. Chocolate,
- Dairy products
- High vapour pressure polymers
- Reduce heating from FIB
- Formation of ice
- Plant surfaces and internal structures
- Fauna microstructures
- Water action on seeds
- Slime studies
- Heat & cool samples
- Keep wet samples hydrated
- Extend imaging time
- Control dehydration and produce condensation
- Available for LV & HV SEMs



Advantages of this procedure are clear to see, by cooling a specimen in low vacuum changes in specimen structure due to dehydration can be minimised and viewing time before specimen drying occurs can be extended.

Deben Coolstage systems are available for all common high and low vacuum SEMs. Systems are mounted via a free chamber port and can be easily fitted and removed by the user.

Systems are fully self-contained and comprise a thermally isolated specimen holder with either a single or dual stage Peltier device, dual temperature sensor, vacuum feed-through flange, water chiller/power supply unit and keypad for digital temperature readout and control. No external water supply or chiller is required.

A stage mounted specimen holder is water cooled from the self-contained closed loop chiller box which can be positioned approximately 2m away from the SEM.

Temperature of the specimen holder is accurately monitored and controlled by microprocessor. A small keypad with bright display allows the user to set the required temperature and displays target and current temperatures simultaneously.

The specimen holder is designed to minimise image drift due to temperature change, giving a stable image at high magnification. Specimens with height up to 5mm and diameter of 10mm can be easily observed. Flat and dished specimen holders are supplied with the dished holders especially suited to observing liquids.

An integrated RS-232 or USB interface allows temperature to be set and read from the SEM by using Deben software or on certain SEMs using integrated software control through the SEM interface.

## Specifications

- Available systems:
  - Standard: -25°C to +50°C
  - Enhanced: -25°C to +160°C
  - Ultra: -50°C to +50°C
- Temperature accuracy: +/-1.5°C or 2%, whichever the greatest
- Temperature display resolution: 0.1°C
- Temperature stability: +/-0.2°C
- Temperature display resolution: 0.1°C
- Maximum cooling/heating rate: 12°C per minute
- Keypad/display for temperature display and control
- Simultaneous display of actual and target temperature
- Vacuum feed-through flange with all connections
- Design optimised for minimal image drift
- Microprocessor controlled
- Supplied with 10x standard specimen stubs & 10x dished specimen stubs
- RS-232 interface (USB optional) for remote readout and control
- 100V, 115V or 230V
- CE & RoHS compliant

