

# Temperature Controlled Sample Holder

Phenom-World has developed, together with its preferred development partner Deben, a Temperature Controlled Sample Holder to study vacuum-sensitive and vulnerable samples. The Temperature Controlled Sample Holder is able to control the temperature by cooling or heating the sample and therefore influence the humidity around it. This minimizes the charging effect of the electron beam and vacuum damage to the sample.

The Temperature Controlled Sample Holder is based on the Peltier principle and designed in a way that the temperature can be adjusted quickly and easily. The sample temperature is accurately monitored and controlled by a dedicated keypad controller. The temperature of the Temperature Controlled Sample Holder can be controlled from  $-25^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ , with an accuracy of  $\pm 1.5^{\circ}\text{C}$ . The temperature can be changed at a rate of max  $20^{\circ}\text{C}$  per minute, depending on the sample mass. The Temperature Controlled Sample Holder is water-cooled for excellent temperature stability by a self contained closed-loop water chiller box.

The low vacuum inside the Temperature Controlled Sample Holder, combined with a temperature of  $-25^{\circ}\text{C}$ , keeps the relative humidity at a constant high level. This results in slowing down water evaporation significantly and prolonging viewing time before specimen degeneration.

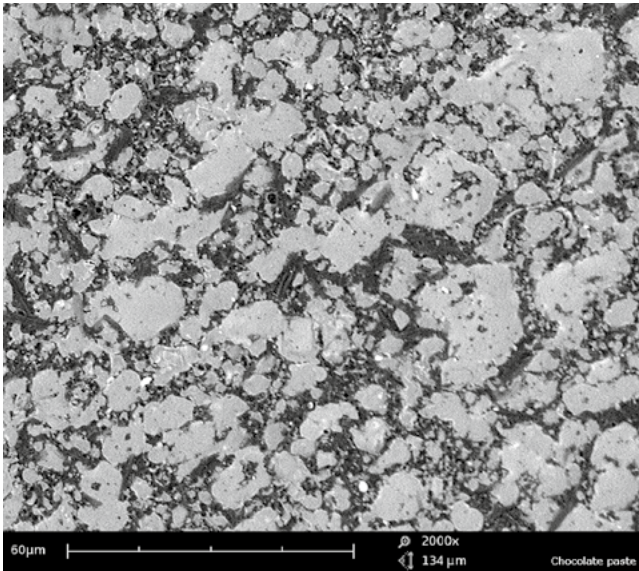
The interface shows the set and actual temperature. The Temperature Controlled Sample Holder can be retrofitted to all versions of the Phenom G2 system.



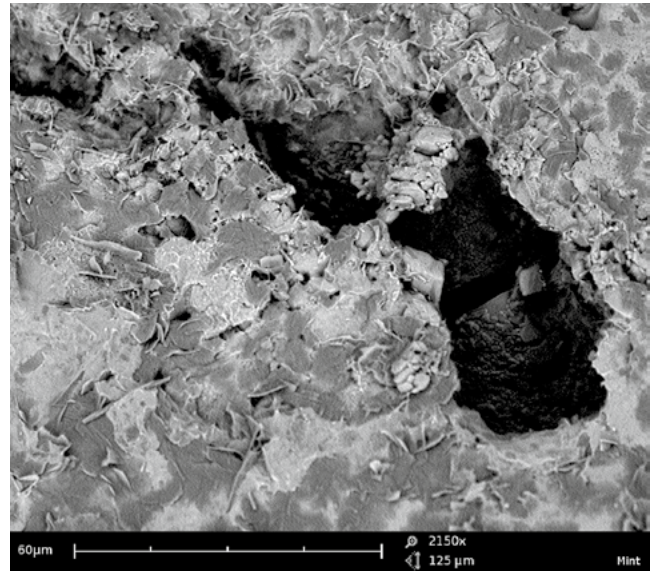
**Temperature Controlled Sample Holder**

#### **Benefits of the Temperature Controlled Sample Holder:**

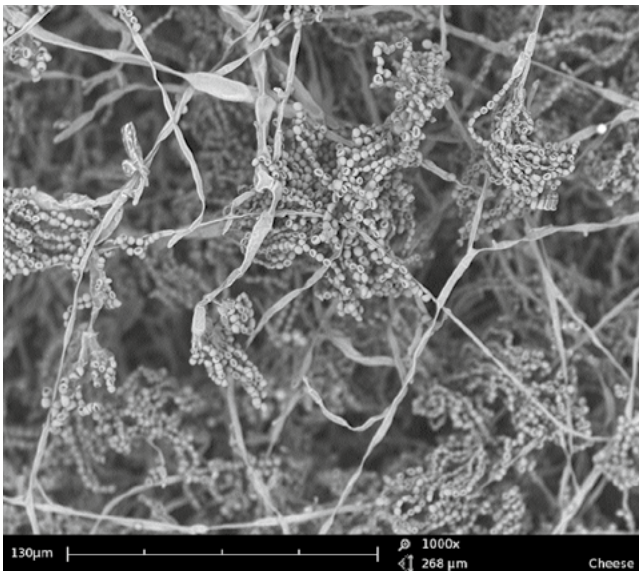
- The sample structure will keep its natural structure as less water will evaporate.
- Longer viewing time of biological and organic samples, without noticeable vacuum artifacts
- Reduced beam damage



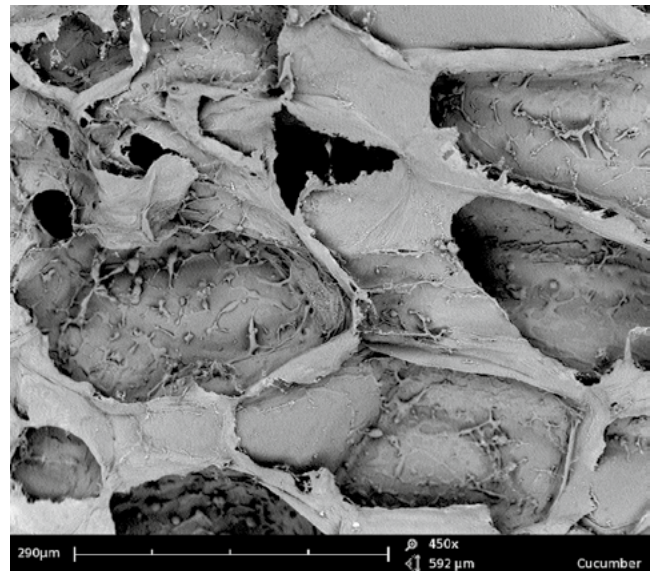
Fat distribution in chocolate paste at -25°C.



Surface of mint at -25°C. The crystals of the material can now be clearly seen.



Mold spores on blue cheese at -25 °C.



Cross-section of a cucumber at -25°C.

### Specifications

Temperature range	-25°C to +50°C
Temperature control	keypad with simultaneous display of set and actual temperature
Temp accuracy	±1.5°C
Temperature display Resolution	0.1°C
Maximum cooling rate	20°C/min
Max. distance to cooling unit	1.2 m
Sample size	25 mm (∅) x 5 mm (h)
Sample vacuum level	charge reduction mode
Dimensions and weight	
• Chiller unit	300 (w) x 310 (d) x 340 (h) mm, 15 kg
• Sample holder	60 (w) x 100 (d) x 70 (h) mm, 0.8 kg
Power	160 W



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