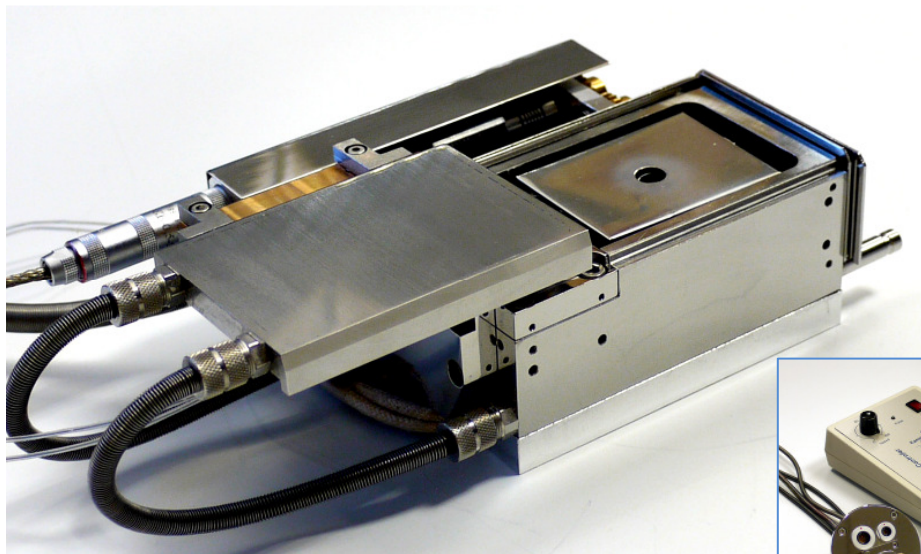


Materials Testing

Substages

Heating Module for the SEM – Type “Transfer Module” **Room Temperature to 1500° C** **Suitable for Humid, Corrosive, and Aggressive Environment,** **VP and ESEM Scanning Electron Microscopes**



Subject to change without notice



Brief Description

This substage (or “module”) for heating experiments (room temperature to 1500° C) was designed also for the use in a “variable pressure” type SEM. It is clamped to the SEM stage like a large specimen.

The module is suitable for corrosion experiments, and heating under gas and/or water vapor. As an option, a needle valve at the vacuum feed-through flange allows fine controlled “bleeding” of gas or of vapor into the heating chamber, during the heating process. This small chamber can be closed by a motorized “lid” during the heating experiment to protect the inside of the SEM. During heating experiments at very high temperatures the lid should be closed all the time. After completing the high temperature experiment the cover will be opened again to inspect the surface of the specimen after heating. If there is no gas flowing and the detectors afford it, heating can also be done with the “lid” open, to observe the surface changes.

The center piece of this module is an encapsulated ceramic resistance heater. The specimen holder can be made in many of useful shapes – flat or cup-shaped in the middle. Flat specimens up to 10 x 10 mm² can be held down with small tungsten springs. Much care was taken to avoid electrical fields that may disturb the SEM image.

The vacuum flange and attachment kit are in the shipment volume.

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Specifications

Heating Module 1500 °C for Experiments in Gaseous Environment (Optional).

Temperature Controller

The PID-temperature controller (usually equipped with a PC interface) pilots the temperature, according to the physical parameters required for the experiment. After an initial "learning"-routine, which is only done once, the heating rate can be selected. The controller will run up the temperature to the experiment value, and stop there without oscillations. Alternatively, the heating controller can also work by individual operator commands, changing the current in the heater and observes the changes on the specimen surface from step to step.

Attaching the Module to the SEM Stage

The heating module is mounted like a "large specimen" on the SEM stage. Together with the stage, the whole module will move in the specimen chamber. Most SEM are suitable for the heating module. The vacuum feedthrough for the SEM chamber, water tank and pump for the water cooling is part of the shipment volume.

Heating Under Gaseous Environment (Optional)

Some SEMs allow viewing under "poor vacuum" conditions or with several Torr of water vapor. The 300 and 500 degree versions will work under full atmospheric pressure at ambient air, and in vacuum likewise. Higher temperatures should be done in the "VP" (= "Variable Pressure") modus of the SEM; or under high vacuum. The module shown on the reverse side goes one step beyond this: corrosive and very "wet" environment may be created by admitting such gases to the small sub-step chamber of the heater. This gas inlet is controlled by a very precise needle valve, attached to the vacuum feedthrough at the SEM chamber wall. A fine stainless steel capillary feeds the gas into the heater chamber. The small heater chamber can be closed under vacuum with a motorized mechanism. Even strongly corrosive gases may be used while the cap of the heater chamber is closed.

The Module

Dimensions approx. 65 mm x 55 mm x 38 mm. The central furnace element has a multilayer reflection shield inside. For thermal isolation, the whole structure rests on sharp tips. This point contact, together with the shielding and the water cooled housing, keeps heat dissipation into the stage mechanics at bay. Compared to our 1050 °C heating module the lid of the 1500 °C module is water cooled too. This protects the SEM chamber inside (pole piece, detectors etc.) against thermal damages while doing long time experiments at high temperatures.

Related Products

Heating Modules with temperature range: RT to 300°, 500°, 800°, 1050 °C, depending upon the required version.

Micromanipulators (Prober-Modules) with integrated heating platforms: 300°, 500° or 800° C.

Fine positioning of the prober-needle at an accuracy of 10 nm.

Cryo Stages (Liquid Nitrogen or Helium), Cryo Modules as a substage (Liquid Nitrogen), Peltier Heating/Cooling Module.

Summary of Technical Specifications

Heating Module

Dimensions(L x W x H)	65 x 55 x 38 mm ³
Weight	appr. 1.2 kg (2.6 lb)
Specimen Size	e.g. 10 x 10 mm ²
Max. Heating ramp	5 °C/s
Temperature Sensor	W-25Re Type D
Temperature Range	RT - 1500 °C
Temperature Stability	1 °C

Controller

Dimensions	420 x 320 x 125 mm ³
Weight	7 kg (19.9 lb)
Input Voltage	115 V/230 V/AC 50-60Hz
Power cons.	500 W max.
Heating-Voltage	0-60 V/DC
Heating-Current	8.0 A
Interface	RS 485

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