

TEM TURBO CARBON COATER



COMPACT BENCH TOP HIGH VACUUM
CARBON COATING UNIT WITH ACCESSORIES
FOR TEM APPLICATIONS

TEM TURBO COATER

Introduction

The Agar TEM turbo coater has been designed to produce high quality thin carbon support films for TEM applications, specimen carbon coating and shadowing of grids.

The compact desk top design incorporates a turbo molecular pump which in addition to providing a rapid high vacuum environment has the advantages of not requiring cooling water or a long warm up period.

A number of accessories have been developed for use with the coater. These are designed to provide full range of facilities associated with TEM and SEM applications including metal evaporation, aperture cleaning, rotary shadowing, glow discharge and coating of irregular shaped samples.

Vacuum Chamber

A heavy duty Pyrex work chamber 150mm dia is sealed with wide section 'O' rings to the base plate and hinged top plate. The base plate contains the large area pumping port and feedthrough port for the optional film thickness monitor. An adjustable height specimen table is provided.

The telescopic top plate support enables the working distance from specimen to evaporation source to be varied when optional specimen platforms are fitted.

Pumping System

The pumping system comprises a turbo pump (80 litres/sec) backed by a two stage rotary pump. The turbo pump is mounted directly on to the coater chassis and has a large bore pumping line directly connected to the chamber. The rotary pump is mounted on an antivibration platform and is connected to the turbo pump by a short stainless steel bellows.

Operation of the system is automatic and the vacuum is continuously monitored via pirani and penning gauges with meter read out. Switchover between pirani and penning gauge display is automatic. Indicator lights mounted on the front panel display the turbo pump status.

For coating TEM samples where a relatively poor vacuum is desirable, the vacuum can be accurately controlled by the precision leak valve.

Carbon Rod Head

The heavy duty stainless steel source uses 6.15mm dia shaped carbon rods. The unique feedback controlled power supply gives a maximum current of 200A at 5V. A safety interlock prevents operation with the chamber at air.

All controls for carbon evaporation are mounted on the front panel. In the manual mode operation can be continuous or pulsed with voltage set via the variable control. In the automatic mode the desired voltage is entered via the digital set H.T. control and the period of evaporation set the digital timer.

Auxiliary Power Supply

The auxiliary power supply is required for the operation of the metal evaporation, glow discharge and aperture cleaning accessories. A "smart" cable is used to connect the power supply to the accessory in use. The cable recognises each of the accessories and activates the appropriate supplies and controls on the front panel of the cabinet.

Metal Evaporation Head

The metal evaporation head is mounted on to the standard top plate. It can be fitted instead of or in tandem with the carbon rod head. It is fitted with adjustable clamps which will accept a range of filament sizes.

Heating of the filament is controlled from the auxiliary power supply. The evaporation can be automatically terminated by using the digital timer.

A source shutte, safety interlock and thermal sensor to prevent overheating are all provided.

Glow Discharge Accessory

The glow discharge accessory is mounted on a separate top plate and can be fitted by tilting back the standard head. The top plate incorporates a support cradle onto which slides can be readily mounted.

Current can be selected digitally between 5-20mA and the discharge period set via the digital timer.

Aperture Cleaning

A separate top plate is also used for the aperture cleaning accessory. A molybdenum boat is suspended from top plate for easy external loading of apertures. Heating current and elapsed time are controlled from the auxiliary power supply.

Rotary Shadowing Table

The standard specimen platform can be replaced by the motorised rotary shadowing table. The table is mounted in a aluminium collar which locates onto the base plate. Four speeds of rotation are available and the platform can be tilted from 0-90°.

Rotary Planetary Stage

The motorised rotary planetary stage is intended for SEM samples coating. The four sample holders mounted onto a tilting platform describe a rotary planetary motion. Sample holders are interchangeable and can be selected to suit most types of SEM stubs or metallurgical mounts. Up to twenty-four pin type stubs can be coated at one time. Four speeds of rotation are available with a tilt range of 0-90°. The short working distance with high tilt can be used for maximising the coverage of highly topographic SEM samples. Using the long working distance with 0° tilt uniform thickness of coating is achieved for microprobe applications.

Film Thickness Monitor

The Agar film thickness monitor can be easily fitted to the coating unit for thickness measurement of carbon or metal evaporated films. A dual memory allows storage of different material densities whilst the tooling factor automatically compensates for differences between the measuring crystal and specimen position. A digital read out displays thickness directly in nanometres.

Specifications

Specimen chambers	150mm dia x 150mm high
Vacuum system	Integrated bench top pumping system Turbomolecular pump 80l/sec Two stage rotary pump Pirani gauge (ATM - 0.001mb) Penning gauge (10^{-2} to 5×10^{-6}) Precision needle valve All metal pumping lines
Carbon evaporation source	Dual 6.5mm carbon rod source Feedback controlled voltage supply Current metering 0-200A Auto/manual operation Pulse/continuous mode selection Digital timer
Auxiliary power supply	Metal evaporation and aperture cleaning 12V 0-9A in 1% steps. Glow discharge 850V 5,10,15,20mA "Smart" cable with vacuum interlock Digital timer Current metering
Metal evaporation head	Adjustable filament clamps Source shutter
Glow discharge	Top plate with specimen cradle "smart" cable connector
Aperture cleaning	Top plate with clamps for Mo boat 2"smart" cable connector
Rotary Shadowing table	Motorised rotary table Speed controller - 4 speed 0-90 tilt Mounting collar
Rotary planetary stage	Motorised 4 position rotary planetary motion tables (specify mounts) Speed controller - 4 speed 0-90° tilt Mounting collar Small height chamber 150 x 65mm
Film thickness monitor	Control unit Oscillator

	Crystal head and cables Thickness range 0-999.9nm
Dimensions	525mm wide x 295mm deep Bench space occupied including rotary pump 525mm wide x 600mm deep
Weight	45 Kgs