the first-of-its-kind, compact, easy to use, stand-alone glow discharge system

EMS GloQube™
Glow Discharge System for TEM Grids
Unique Dual Chamber Processing, Safe Handling of Reagents

The GloQube has two independent vacuum chambers: a clean chamber, designed for applications requiring hydrophobic/hydrophilic conversion, typically using air as the process gas; and a vapor chamber, designed for use with reagents such as methanol and alkylamine. With operator safety firmly in mind, reusable septum-sealed reagent vials are used. Loading and removing reagents is convenient and reliable – the vial, located in its holder, is inserted into a shielded needle using a simple bayonet fitting. To prevent accidental damage, the high voltage lead is shielded. The plasma current is variable by adjustment of the vacuum level using an argon leak valve with the plasma voltage being preset. For maximum sputter coating efficiency, the gas injector system ensures that argon gas enters the chamber close to the plasma discharge. Venting is to argon.

The primary application of the EMS GloQube™ is the hydrophilization (wetting) of carbon-coated TEM support films and grids which otherwise have the tendency to be hydrophobic. Glow discharge treatment with air will make film surfaces negatively charged and hydrophilic and allow the easy spread of aqueous solutions. This and other processes are outlined below.

Glow Discharge Process

<table>
<thead>
<tr>
<th>Surface State</th>
<th>Charge</th>
<th>Atmosphere</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrophilic</td>
<td>Negative</td>
<td>Air</td>
<td>Carbon-coated TEM grids</td>
</tr>
<tr>
<td>Hydrophilic</td>
<td>Positive</td>
<td>Air – with magnesium acetate post-treatment</td>
<td>Nucleic acid adhesion to carbon films</td>
</tr>
<tr>
<td>Hydrophilic</td>
<td>Positive</td>
<td>Alkylamine</td>
<td>Proteins, antibodies and nucleic acids</td>
</tr>
<tr>
<td>Hydrophilic</td>
<td>Negative</td>
<td>Methanol</td>
<td>Positively charged protein molecules (e.g. ferritin, cytochrome c)</td>
</tr>
</tbody>
</table>
**Touch Screen Control – Rapid Data Input, Simple Operation**

The intuitive touch screen allows multiple users to rapidly input and store preferred process “recipes”. Typical default glow discharge protocols are loaded as standard. Additionally, help files and useful maintenance data such as system on time and time since last clean are readily available to the operator. An Ethernet communications port is included for software updates.

**Easy Sample Loading, Fast Turnaround Times**

Each chamber can accommodate two 25 x 75 mm glass microscopes slides. Loading could not be easier using draw-style chamber doors and specimen stages. The stages are height adjustable and fitted with removable glass slide holders. For additional convenience – and to allow easy access for chamber cleaning – the stages can be completely removed.

**Vacuum, Automatic Valving and Controlled Venting**

The GloQube™ has automatic valving between chambers which maintains cleanliness by preventing cross-contamination. At the end of a process run, automatic soft venting to atmosphere through filtered inlets ensures TEM grids are not disturbed. The GloQube™ requires a single vacuum pump working in the 0.1 to 1 mbar range. A typical pump time to operational vacuum is 60 seconds.

**EMS GloQube-D and Optional Pfeiffer DUO 6 Rotary Pump**
### Ordering Information

<table>
<thead>
<tr>
<th>Cat No.</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS-Glo-2</td>
<td>EMS GloQube, Dual-chamber glow discharge system. Accessory kit, including: mains power lead, rotary pump power lead, oil mist filter and clamp, 700 mm long flexible stainless steel vacuum tube with clamps, fuses, glass vials, vial caps and sealing washers, needle (spare). Vacuum pump to be ordered separately.</td>
<td>each</td>
</tr>
<tr>
<td>91003</td>
<td>5 m³/hr Pfeiffer DUO 6 two-stage rotary vacuum pump with oil mist filter</td>
<td>each</td>
</tr>
<tr>
<td>96000</td>
<td>Oil mist filter (spare)</td>
<td>each</td>
</tr>
<tr>
<td>EMS-Glo-11</td>
<td>Microscope Slide Tray</td>
<td>each</td>
</tr>
<tr>
<td>EMS-Glo-12</td>
<td>Glass Vial</td>
<td>10gka</td>
</tr>
<tr>
<td>EMS-Glo-13</td>
<td>Glass Vial Caps</td>
<td>3pk</td>
</tr>
<tr>
<td>EMS-Glo-14</td>
<td>Needle</td>
<td>each</td>
</tr>
<tr>
<td>EMS-Glo-15</td>
<td>Door Seal</td>
<td>each</td>
</tr>
</tbody>
</table>

### Specifications

#### Power and Processes

- **Plasma current:** 1-40 mA
- **HV power supply:** 30 W
- **Maximum voltage:** 800 V
- **Electrode polarity – clean chamber**
  - DC glow positive
  - DC glow negative
- **Electrode polarity – vapor chamber**
  - DC glow positive
  - DC glow negative
- **Sample stage**
  - 125 x 100 mm
  - 4.9” x 3.94”
  - 90° x 90°
  - 1/4” x 1/4”
- **Sample stage operational heights**
  - Adjustable: 12.5 mm (0.5”), 22.5 mm (0.9”), or 35 mm (1.38”)
- **Pump hold time requirement**
  - 0-24 hours
- **Process time**
  - 1-600 seconds

#### Safety

- **Chamber vent inlets**
  - Filtered air inlets with slow vent to minimize sample disturbance

#### On-board reagent storage

- Reagents (e.g. methanol or alkylamine) are contained in reusable sealed glass vials to minimize exposure to hazards.

#### High voltage safety interlocks

- Hardware safety interlocked and software safety interlocks for process control

#### Vacuum

- **Vacuum control**
  - Integrated pinch gauge
- **Working vacuum range**
  - 0.1 to 1 mbar
- **Vacuum pump**
  - Minimum requirements: 6 m³/hr, 3600 l/min, 0.03 mbar ultimate vacuum.
  - Inlet flange: KF 16
- **Pumping time**
  - Typical pumping time to an operational vacuum of 0.27 mbar in 60 seconds
- **Vacuum isolation**
  - Isolation valves to switch vacuum and prevent process chamber cross-contamination

#### User Interface

- **User interface**
  - Full graphical interface with touch screen buttons and controls. In addition to displaying profiles, parameters, help screen and maintenance information are available.

#### Profiles and profile logging

- Capability to store 100 user profiles (name, date, time, vacuum, current and polarity)

#### Dimensions and Communications

- **Chamber size**
  - 100 mm W x 100 mm H x 127 mm D
  - 3.94” x 3.94” x 5”
- **Instrument size**
  - 336 mm H x 364 mm D
  - 13.2” x 14.3”
- **Instrument weight**
  - 19.5 kg (42.9 lbs)
- **Pump**
  - Optional pump
    - 391 mm W x 127 mm D x 177 mm H
    - 15.4” x 5” x 7”
  - Pump weight
    - 16 kg (35.3 lbs)
- **Footprint with optional pump**
  - 386 mm W x 600 mm D x 336 mm H
  - 14.4” x 23.6” x 13.2”
- **Power requirements**
  - 120 V 60 Hz, 15 A or 230 V 50 Hz, 10 A
  - Instrument power rating:
    - DC glo-100-240 AC 60/50 Hz 700 VA
    - Including pump, IEC inlet
    - Optional pump power rating
      - 715/230 V 60/50 Hz 500 W
  - Communication port
    - Ethernet port for instrument software updates

### Vacuum Pumping

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### Options, accessories and spares

- **EMS-Glo-11** Microscope Slide Tray
- **EMS-Glo-12** Glass Vial
- **EMS-Glo-13** Glass Vial Caps
- **EMS-Glo-14** Needle
- **EMS-Glo-15** Door Seal