# GloQube® Plus
Glow Discharge System for TEM Grids and Surface Modification

## Specifications

<table>
<thead>
<tr>
<th>Note: The pump data is for the Pfeiffer DUO 6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glow Discharge Processes</td>
</tr>
<tr>
<td>Plasma current</td>
</tr>
<tr>
<td>HV power supply</td>
</tr>
<tr>
<td>Maximum voltage</td>
</tr>
<tr>
<td>Electrode polarity – clean chamber</td>
</tr>
<tr>
<td>Electrode polarity – vapor chamber</td>
</tr>
<tr>
<td>Sample stage</td>
</tr>
<tr>
<td>Sample stage operational heights</td>
</tr>
<tr>
<td>Pump hold time</td>
</tr>
<tr>
<td>Process time</td>
</tr>
<tr>
<td>Safety</td>
</tr>
<tr>
<td>Chamber vent inlets</td>
</tr>
<tr>
<td>On-board reagent storage</td>
</tr>
<tr>
<td>High voltage safety interlocks</td>
</tr>
<tr>
<td>Vacuum</td>
</tr>
<tr>
<td>Vacuum control</td>
</tr>
<tr>
<td>Working vacuum range</td>
</tr>
<tr>
<td>Pump min. requirements</td>
</tr>
<tr>
<td>Pumping time</td>
</tr>
<tr>
<td>Vacuum isolation</td>
</tr>
<tr>
<td>Dimensions</td>
</tr>
<tr>
<td>Instrument size</td>
</tr>
<tr>
<td>Instrument weight</td>
</tr>
<tr>
<td>Pump*</td>
</tr>
<tr>
<td>Pump weight</td>
</tr>
<tr>
<td>Footprint with pump</td>
</tr>
<tr>
<td>Communications</td>
</tr>
<tr>
<td>Interface</td>
</tr>
<tr>
<td>Power requirements</td>
</tr>
<tr>
<td>Instrument power rating</td>
</tr>
<tr>
<td>Pump power rating</td>
</tr>
</tbody>
</table>

## Ordering Information

<table>
<thead>
<tr>
<th>Cat No.</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GloQube Plus</td>
<td>Dual chamber glow discharge system, Model #025235. Accessory kit, including: mains power lead, rotary pump, power lead, oil mist filter and clamp, 750 mm long flexible stainless steel vacuum tube with clamps, fuse, glass vials, vial caps and sealing washers, needle (spare). Vacuum pump to be ordered separately.</td>
<td>each</td>
</tr>
<tr>
<td>Vacuum Pumping</td>
<td>91003</td>
<td>5 m³/hr Pfeiffer DUO 6 two-stage rotary vacuum pump with oil mist filter</td>
</tr>
<tr>
<td>Vacuum Pumping</td>
<td>96001</td>
<td>Vacuum Pump Exhaust Filter including adapter (1/4&quot; female NPT to 1/4&quot; BSPT with 1/4&quot; NPT plug)</td>
</tr>
</tbody>
</table>

## 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 |

## Specifications

**Note:** The pump data is for the Pfeiffer DUO 6. Glow Discharge Processes

| Plasma current | 1-50 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") with location for two 25 x 75 mm (1" x 3") glass slides |
| Sample stage operational heights | Adjustable 12.5 mm (0.5"), 22.5 mm (0.9") or 35 mm (1.38") |
| Pump hold time | 0-72 hours |
| Process time | 1-600 seconds |

## Safety

- Chamber vent inlets: Filtered air inlets with slow vent options to minimize sample disturbance
- On-board reagent storage: Reagents are contained in sealed glass vials to minimize exposure to hazards
- High voltage safety interlocks: Hardware safety interlocked and software for process control

## Vacuum

- Vacuum control: Integrated piriani gauge
- Working vacuum range: 0.1 to 1 mbar
- Pump min. requirements: 5 m³/hr inlet flange: KF 16.
- Pumping time: Typical pump time to an operational vacuum of 0.1 mbar in 60 seconds
- Vacuum isolation: Isolation valves to switch vacuum and prevent process chamber cross-contamination

## Dimensions

| Instrument size | 336 mm H x 364 mm D x 336 mm H |
| Instrument weight | 19.4 kg |
| Pump* | 391 mm W x 127 mm D x 177 mm H |
| Pump weight | 16 kg |
| Footprint with pump | 366 mm W x 600 mm D x 336 mm H |

## Communications

| Interface | USB |

## Power requirements

- 120 V 60 Hz, 15 A or 230 V 50 Hz, 10 A
- Instrument power rating: 100-240 V AC 60/50 Hz 700 VA, including pump, IEC inlet
- Pump power rating: 115/230 V 60/50 Hz 450 W

---

Front Cover Micrographs:
Top: Pseudomonas fluorescens
Middle: Trematodes. Photo: Yann Quilichini (Microscopy Platform of the University of Corsica - Corte)
Bottom: Longitudinal Section of Myelin Sheath – Nerve Cup (dense area myelin sheath). Photo: Nacer Benmeradi (R & D - DeltaMicroscopies-France)
Rapid, reliable results...

GloQube® Plus

Glow Discharge System for TEM Grids and Surface Modification

The GloQube® Plus is a cost-effective, compact and easy-to-use glow discharge system, designed to fulfill the needs of laboratories with TEM. The primary application of the GloQube Plus is to modify the surface of TEM grids in a way that it meets requirements for successful imaging of a variety of macromolecules. Integrated into one system, the two chambers enable the user maximum flexibility to choose which sample preparation technique they want to use: glow discharge in air or in-chemical vapor, without downtime for cleaning or the risk of contamination and loss of samples.

The in-chemical vapor glow discharge doesn’t just help with retaining molecules on the TEM grids, but it also allows the user to control the orientation and conformation. With automatic vapor control, the system ensures accurate concentrations of chemical vapor in the plasma, producing reliable and reproducible results. Two chambers designed into one easy to use package provides a smaller footprint for the workflow space and no cross-contamination between the chambers.

Benefits

• Short in-air cycle time
• Second chamber for separating in-air and in-chemical vapor processes
• No cross-contamination between chambers due to post-process flow cycle
• Automatic vapor delivery ensures reliable and reproducible results
• Purge cycles reduce water vapor and oxygen concentrations, ensuring excellent yield of specifically orientated macromolecules
• Adjustable slow vent time to minimize sample disturbance
• Optional fast vent for rapid process times
• Safe handling of reagent
• Three level adjustable height sample stage ensures repeatable results

Glow Discharge Process

<table>
<thead>
<tr>
<th>Surface State</th>
<th>Surface Charge</th>
<th>Atmosphere</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrophilic</td>
<td>Negative</td>
<td>Air</td>
<td>Hydrophilisation and cleaning of carbon coated TEM grids</td>
</tr>
<tr>
<td>Hydrophilic</td>
<td>Positive</td>
<td>Air*</td>
<td>Nucleic acid adhesion to carbon films</td>
</tr>
<tr>
<td>Hydrophilic*</td>
<td>Positive</td>
<td>Alkylamine</td>
<td>Controlled orientation and improved adhesion of negatively charged proteins, antibodies and nucleic acids</td>
</tr>
<tr>
<td>Hydrophilic*</td>
<td>Negative</td>
<td>Methanol</td>
<td>Controlled orientation and improved adhesion of positively charged protein molecules (e.g. ferritin, cytochrome c)</td>
</tr>
</tbody>
</table>

GloQube Plus Start-up Screen

Touch screen control – rapid data input, simple operation

New user interface has been extensively updated.

- Capacitive touch screen has improved sensitivity for ease of use
- User interface software has been completely revised, using a modern smartphone-style interface
- Comprehensive context-sensitive help screen
- USB interface allows easy software updates and backing up/copying of recipe files to USB stick
- Process log files can be exported using USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters
- 16GB flash memory can store over 1000 recipes
- Dual-core ARM processor for a responsive display

Easy sample loading

Each of the twin chambers can accommodate two 25 x 75 mm glass microscope slides or TEM grid holders. Loading could not be easier using a drawer-style chamber door and specimen stages. The stages are height adjustable and fitted with removable glass slide holders. The door and stages can be completely removed for convenience and to allow easy access for chamber cleaning.

Twin chambers prevent cross contamination

The GloQube Plus uses a single door with two independent vacuum chambers and adjustable sample stages. The in-air chamber is for simple glow discharge hydrophilic applications, while the in-chemical vapor chamber is designed for hydrophobic (negative or positive) conversions, typically using reagents such as methanol and amylamine. By utilizing purge and flush cycles, we ensure contamination from the vapor chamber does not affect the in-air chamber.

For health and safety reasons when using the in-vapor chamber with chemicals the pump exhaust must be vented to a suitable external extraction system.

Automatic Valve

The automatic valve system allows greater control over the introduction of chemical vapor into the chambers. This results in reproducibility and repeatability of processing. The self-contained nature of the septum-sealed chemical vials and the delivery system ensures minimal operator contact and a high level of operator safety.**

** Chemical preparation and disposal should be carried out in a suitable fume hood

Process control

The GloQube Plus is an automated system, which has a recipe driven process control user interface for ease of use. Filtered inlet gases ensure that dedicate samples, such as carbon coated TEM grids, are not contaminated with particles or dust. The GloQube Plus requires a single vacuum pump working in the 0.1 to 1 mbar range and has a typical pump downtime to operational vacuum of 60 seconds and a total cycle time in air of usually less than two minutes*. A 750 mm flexible stainless vacuum hose is supplied with the GloQube Plus.

* Using a 30 second glow discharge process
Rapid, reliable results... GloQube® Plus

Glow Discharge System for TEM Grids and Surface Modification

The GloQube® Plus is a cost-effective, compact and easy-to-use glow discharge system, designed to fulfill the needs of laboratories with TEM. The primary application of the GloQube Plus is to modify the surface of TEM grids in a way that meets requirements for successful imaging of a variety of macromolecules. Integrated into one system, the two chambers enable the user maximum flexibility to choose which sample preparation technique they want to use. GloQube in-air or in-chemical vapor without downtime for cleaning or the risk of contamination and loss of samples.

The in-chemical vapor glow discharge doesn’t just help with retaining molecules on the TEM grids, but it also allows the user to control the orientation and conformation. With automatic vapor control, the system ensures accurate concentrations of chemical vapor in the plasma, producing reliable and reproducible results. Two chambers designed into one easy to use package provides a smaller footprint for the workspace and no cross-contamination between the chambers.

Benefits
- Short in-air cycle time
- Second chamber for separating in-air and in-vapor processes
- No cross-contamination between chambers due to post-process flush cycle
- Automatic vapor delivery ensures reliable and reproducible results
- Purge cycles reduce water vapor and oxygen concentrations, ensuring excellent yield of specifically oriented macromolecules
- Adjustable slow vent time to minimize sample disturbance
- Optional fast vent for rapid process times
- Safe handling of reagent
- Three level adjustable height sample stage ensures repeatable results

Glow Discharge Process

<table>
<thead>
<tr>
<th>Surface State</th>
<th>Surface Charge</th>
<th>Atmosphere</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrophilic</td>
<td>Negative</td>
<td>Air</td>
<td>Hydrophilisation and cleaning of carbon coated TEM grids</td>
</tr>
<tr>
<td>Hydrophilic</td>
<td>Positive</td>
<td>Air</td>
<td>Nucleic acid adsorption to carbon films</td>
</tr>
<tr>
<td>Hydrophilic**</td>
<td>Positive</td>
<td>Akyline</td>
<td>Controlled orientation and improved adsorption of negatively charged proteins, antibodies and nucleic acids</td>
</tr>
<tr>
<td>Hydrophilic**</td>
<td>Negative</td>
<td>Methanol</td>
<td>Controlled orientation and improved adsorption of positively charged protein molecules (e.g. ferritin, cytochrome c)</td>
</tr>
</tbody>
</table>

Applications

Hydrophilization and cleaning of TEM grids carbon support films* for better sample spreading

Improved adhesion and orientation of proteins, nucleic acids and antibodies

TEM grid preparation for nanoparticle studies

*Typically: Formvar®, Lacey Carbon, Holey Carbon, Continuous Carbon, Quantifoil®

Touch screen control – rapid data input, simple operation

New user interface has been extensively updated.

- Capacitive touch screen has improved sensitivity for ease of use
- User interface software has been completely revised, using a modern smartphone-style interface
- Comprehensive context-sensitive help screen
- USB interface allows easy software updates and backing up/copying of recipe files to USB stick
- Process log files can be exported via USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters.
- 16GB flash memory can store over 1000 recipes
- Dual-core ARM processor for a responsive display
- 16GB flash memory can store over 1000 recipes
- Capacitive touch screen has improved sensitivity
- USB interface allows easy software updates and backing up/copying of recipe files to USB stick
- Process log files can be exported via USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters.
- 16GB flash memory can store over 1000 recipes
- Dual-core ARM processor for a responsive display
- 16GB flash memory can store over 1000 recipes
- Capacitive touch screen has improved sensitivity
- USB interface allows easy software updates and backing up/copying of recipe files to USB stick
- Process log files can be exported via USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters.
- 16GB flash memory can store over 1000 recipes
- Dual-core ARM processor for a responsive display
- 16GB flash memory can store over 1000 recipes
- Capacitive touch screen has improved sensitivity
- USB interface allows easy software updates and backing up/copying of recipe files to USB stick
- Process log files can be exported via USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters.
- 16GB flash memory can store over 1000 recipes
- Dual-core ARM processor for a responsive display
- 16GB flash memory can store over 1000 recipes
- Capacitive touch screen has improved sensitivity
- USB interface allows easy software updates and backing up/copying of recipe files to USB stick
- Process log files can be exported via USB port in .csv format for analysis in Excel or similar. Log files include date, time and process parameters.
- 16GB flash memory can store over 1000 recipes
- Dual-core ARM processor for a responsive display

Easy sample loading

Each of the twin chambers can accommodate two 25 x 75 mm glass microscope slides or TEM grid holders. Loading could not be easier using a drawer-style chamber door and specimen stages. The stages are height adjustable and fitted with removable glass slide holders. The door and stages can be completely removed for convenience and to allow easy access for chamber cleaning.

Twin chambers prevent cross contamination

The GloQube Plus uses a single door with two independent vacuum chambers and adjustable sample stages. The in-air chamber is for simple glow discharge hydrophilic applications, while the in-vapor chamber is designed for hydrophobic (negative or positive) conversions, typically using reagents such as methanol and amylamine. By utilizing purge and flush cycles, we ensure contamination from the vapor chamber* does not affect the in-air chamber.

For health and safety reasons when using the in-vapor chamber with chemicals the pump exhaust must be vented to a suitable external extraction system.

Automatic Valve

The automatic valve system allows greater control over the introduction of chemical vapor into the chamber. This results in reproducibility and repeatability of processing. The self-contained nature of the septum-sealed chemical vials and the delivery system ensures minimal user contact and a high level of operator safety.**

** Chemical preparation and disposal should be carried out in a suitable fume hood

Process control

The GloQube Plus is an automated system, which has a recipe-driven process control user interface for ease of use. Filtered inlet ensures that delicate samples, such as carbon coated TEM grids, are not contaminated with particles or dust. The GloQube Plus requires a single vacuum pump working in the 0.1 to 1 mbar range and has a typical pump downtime to operational vacuum of 60 seconds and a total cycle time in air of usually less than two minutes*. A 750 mm flexible stainless vacuum hose is supplied with the GloQube Plus.

* Using a 30 second glow discharge process
GloQube® Plus
Glow Discharge System for TEM Grids and Surface Modification

Specifications

Note: The pump data is for the Pfeiffer DUO 6

Glow Discharge Processes

Plasma current 1-50 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”) with location for two 25 x 75 mm (1” x 3”) glass slides
Sample stage operational heights Adjustable 12.5 mm (0.5”), 22.5 mm (0.9”) or 35 mm (1.38”)
Pump hold time 0-72 hours
Process time 1-600 seconds

Safety
Chamber vent inlets Filtered inlet and outlet vents to minimize sample disturbance
On-board reagent storage Reagents are contained in sealed glass vials to minimize exposure to hazards
High voltage safety interlocks Hardware safety interlocked and software for process control

Vacuum
Vacuum control Integrated pirani gauge
Working vacuum range 0.1 to 1 mbar
Pump min. requirements 5 l/min inlet flange: KF 16
Pumping time Typical pump time to an operational vacuum of 0.1 mbar in 60 seconds
Vacuum isolation Reagents are contained in sealed glass vials to minimize exposure to hazards

Dimensions
Instrument size 336 mm H x 364 mm D x 336 mm H
Instrument weight 19.4 kg
Pump size 391 mm W x 127 mm D x 177 mm H
Pump weight 16 kg
Footprint with pump 366 mm W x 600 mm D x 336 mm H

Communications
Interface USB
Power requirements 120 V 60 Hz, 15 A or 230 V 50 Hz, 10 A
Instrument power rating 100-240 V AC 60/50 Hz 700 VA, including pump, IEC inlet
Pump power rating 115/230 V 60/50 Hz 450 W

Ordering Information

Cat No. Description Qty.
91003 GloQube Plus Dual chamber glow discharge system, Model K025235 each
96001 GloQube Plus Accessory kit, including: mains power lead, rotary pump power lead, oil mist filter and clamp, 750 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. each
EMS-Glo-11 GloQube Plus Microscope Slide Tray each
EMS-Glo-12 GloQube Plus Glass Slide each
EMS-Glo-13 GloQube Plus Glass Slide Caps 3/pk each
EMS-Glo-14 Needle each
EMS-Glo-15 Door Seal each

Glow Discharge System for TEM Grids and Surface Modification

Front Cover Micrographs:
Top: Pseudomonas fluorescens
Middle: Arcella vasicola, Photosynthetic algae (Microscopy Platform of the University of Corsica - Corte)
Bottom: Longitudinal Section of Mouse Skeletal Muscle - Nerve Cup (dense area myelin sheath). Photo: Nacer Benmeradi (R & D - DeltaMicroscopies - France)