

# QG-3100



## High Volume Grid Staining With Flexible Protocols

- Fast, Reliable, Reproducible
- Minimizing Sample Contamination and Solution Waste
- Closed flow system provides clean conditions and exclusion of air
- Staining procedures are reliable and reproducible
- Exposure to staining solutions is minimized
- Extremely low operation costs
- Individual staining procedures may be easily configured
- Simple maintenance due to freely accessible tubing and valves
- Automated programmable stainer for use with heavy metal stains such as lead citrate and uranyl acetate.

### THE NEED

Since most organic materials produce only low-contrast results in transmission electron microscopy (TEM), staining procedures are needed to increase the image contrast. Staining involves treatment with solutions that contain heavy metal salts (e.g. uranium, lead, osmium or tungsten), which attach to certain cellular components (peptides, lipids, nucleic acids etc.). These salts contain ions with a high number of protons. When the electron beam passes through a sample area decorated with such ions, it increases image contrast.

### PROBLEMS WITH MANUAL STAINING

All TEM preparation procedures require very clean conditions, as even minor contaminations are visible in the high magnifications of the TEM. Lead citrate solutions are very sensitive to exposure to carbon dioxide, because this results in a precipitation of fine particles of lead carbonate, which instantly damages the sample. Therefore, the staining process must exclude atmospheric air.

In many labs, TEM staining is accomplished by hand. The grids are placed on small drops of staining solutions and washed between and after staining steps. It is very difficult to avoid contamination. Sometimes samples are lost. Processing grids by hand can also be very time consuming, and the number of grids that can be stained simultaneously is limited. Furthermore, manual staining increases the risk of exposing the user to potentially harmful substances.

### SOLUTION

The QG-3100: this automatic stainer increases both the staining quality and the yield by minimizing contamination, while saving time and reducing waste. Through the unit's unique design, which uses a peristaltic pump and pinch valves, the solutions are isolated to the tubing and grid chamber. Liquids flow in only one direction. In addition to minimizing contamination, this design significantly reduces the time and waste associated with other techniques.

### OPEN, FLEXIBLE DESIGN

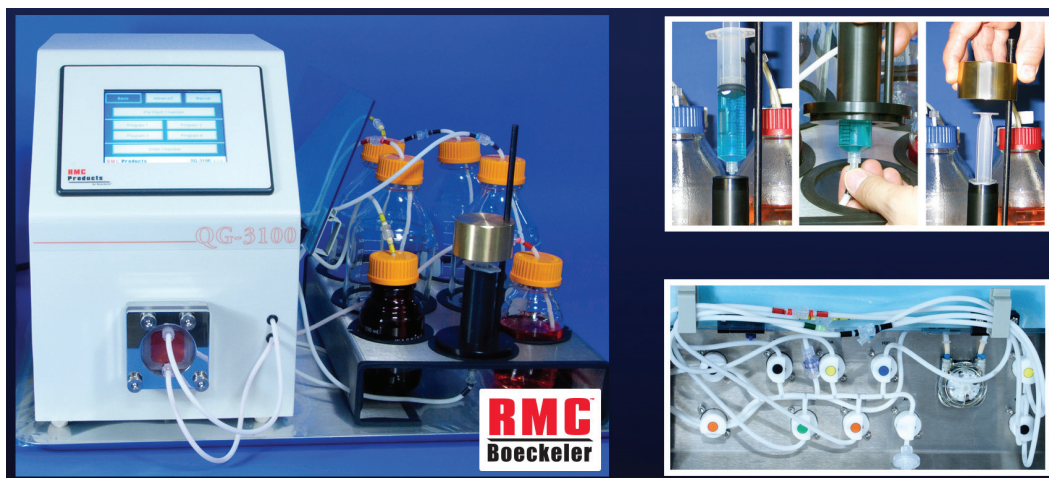
All components exposed to the staining solutions are easy to replace. Maintenance is simple and may be performed by the user. Extra input and output channels, freely programmable routines and an exchangeable grid chamber allows the realization of various laboratory tasks (e.g. graded ethanol series).

After ultramicrotomy, most sections require contrasting with lead and uranyl salts. As well as being hazardous if not handled correctly, both can cause precipitates during the contrasting process. To provide a safe and healthy environment, RMC Boeckeler developed the QG-3100, capable of contrasting up to 40 grids in one run. It is simple to use, programmable and cost efficient.

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The QG-3100 conveniently accepts a variety of prepared staining solutions and protocols, determined by end-user requirements as opposed to other proprietary and expensive stains.

Björn Quast and Alexander Gruhl, two experienced TEM users at the Freie Universitaet Berlin, originally developed this device with a clear focus on the end user: ease-of-use and low costs of ownership



QG3100 - EM STAINER (SHOWN WITH BOTTLES AND RACK)

# Workflow Instruments

## QG3100 EM Stainer

distributed by



### STAINING COSTS (PER STAINING)

- Lead citrate solution Very low costs, since the user can buy these solutions in their raw form
- Uranyl acetate solution from any chemistry dealer. No expensive pre-packaged chemicals are required

### WASTE (PER STAINING, USING DEFAULT PROTOCOLS)

- Waste lead citrate / H<sub>2</sub>O 100 ml
- Waste uranyl acetate / H<sub>2</sub>O 100 ml
- Waste HNO<sub>3</sub> / H<sub>2</sub>O 200 ml

### PROCESSING TIMES

- Wash cycle time 5 min + 5 min
- Staining time (typ.) 60-90 min

### OTHER

- Standard grid holder 40 grids
- Staining times customizable Yes
- Freely programmable staining and processing protocols Yes
- Optional inputs for alternative staining/washing solutions 2
- Handling User interaction possible at any time may continue program or switch to manual control of pump and valves
- At end of processing Chamber remains filled, grids immersed
- Servicing Easily accessible tubing, servicing possible by user

### SUPPLIED WITH

- Main staining unit complete with peristaltic pump control valves
- Touch screen controller/monitor
- Quick release processing chamber with grid loading plate
- Grid loading/unloading tools
- Cleaning holder
- Filling syringe with weighted dispenser
- Waste storage bottles with rack
- Interconnect tubing
- Drip tray

### SPECIFICATIONS

- Dimensions: 460mm x 255mm x 360mm (Main Unit) / 18"(L) x 10"(W) x 14"(H)  
510mm x 640mm x 360mm (including bottles) / 20"(L) x 25"(W) x 14"(H)
- Weight (Main unit): 11.4kg / 25lb
- Weight (w/ bottles and rack): 18.2kg / 40 lb
- Power: 100-240VAC, 60 amps, 36 watts

<u>PART #</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
<b>QG3100</b>	<b>AUTOMATED EM STAINER</b>	<b>1</b>
- 50154	Power Supply	1
- QG-3000-003-900	Chamber Assembly	1
- QG-3000-008-900	Sample Loading Plate	1
- QG-3000-009-900	Extra Tube Set	1
- QG-3000-005-201	Bottle Rack	1
- EW-34514-25	Bottle, 1000mL with LL and Tube	4
- EW34514-23	Bottle, 250mL, with LL and Tube	2
- EW34514-22	Bottle, 250mL, Amber, with LL and Tube	1
- QG-3000-004-100	Syringe Holder	1
- 002-25F	Tray	1
- QG-3000-004-104	Brass Weight	1
<b>QG-3000-ACC</b>	<b>ACCESSORY KIT</b>	<b>1</b>
- 68882	Plastic Box	1
- EW-07287-07	Tweezer Set	1
- XQ-DD	Syringe, 20mL	3
- 0.22 µm Filter	0.22 Micron Filter	1
- 9464K13	O-Ring	2
- QG3000-003-110	Grid Plate	2
- XFTLL-9	Luer Connector	1
- XMTLL-9	Luer Connector	1

**SHIPPING SPECIFICATIONS**

- Dimensions:	660mm x 660mm x 660mm / 26" x 26" x 26"
- Net weight:	26.5kg / 58lbs
- Gross weight:	31.5kg / 67 lbs

**CONTRASTING SYSTEM OPTIONAL ACCESSORIES**

- 3100	Replacement tube kit for QG3100
- 3105	Grid holding plate for QG3100