NEW PRODUCTS BULLETIN

Electron Microscopy Sciences

January 2013

FEATURING...

EVOS
Digital Microscopes

JuLi
Smart Fluorescent Cell Analyzer

Quantifoil
Holey Carbon Film

EMS Freeze Substitution Kit

and more...
High-performance anti-vibration platform for microscopes

The EMS AMC-7 Microscope Platform

Key Features

- Contoured shape ideal for working with microscopes
- Unique elastomer isolator removes up to 99 percent of vibrations
- Loads to 25kgs with 75kgs load version option
- No rocking or wobble unlike other brands of platform
- One platform size suits majority of microscopes

These platforms remove the unwanted vibrations which limit the performance of microscopes. Their T shaped profile allows users to place their arms on either side of the platform, while the rear section is wide enough to accommodate most makes of microscope.

Platforms are made from high grade steel parts welded together for rigidity and coated with a tough epoxy powder white finish. They are resistant to most forms of biological and chemical attack and isolators are simply removed making cleaning easy.

The platform top plate incorporates three elastomeric isolators which remove over 97 percent of horizontal vibrations at 50Hz and over 95 percent of vertical vibrations greatly improving instrument performance. These isolators are available in two load ranges, up to 25kgs and from 25 to 75kgs. Isolators are simply secured by a single thumbscrew and require no adjustments for varying loads.

Sorbothane elastomer isolators have outstanding damping performance compared to isolators that use springs, rubber or neoprene and so eliminate any rocking or wobble that is a major problem with other brands of platform. Sorbothane rapidly damps down disturbances to the microscope, such as when it is being touched during operation. It greatly improves imaging quality by protecting microscopes from both horizontal and vertical vibrations emanating from sources such as floors, walls and benches and caused by traffic, lifts, rotating machinery and numerous other sources.

<table>
<thead>
<tr>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (L x W x H)</td>
</tr>
<tr>
<td>Load Capacity</td>
</tr>
<tr>
<td>Platform Height</td>
</tr>
<tr>
<td>Isolators</td>
</tr>
<tr>
<td>Isolation performance</td>
</tr>
<tr>
<td>Natural Frequency</td>
</tr>
<tr>
<td>Plate</td>
</tr>
<tr>
<td>Surface Finish</td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Bacterial Resistance</td>
</tr>
<tr>
<td>Fungal Resistance</td>
</tr>
<tr>
<td>Heat Aging</td>
</tr>
<tr>
<td>Working Temperature</td>
</tr>
<tr>
<td>Weight</td>
</tr>
</tbody>
</table>

Table:

<table>
<thead>
<tr>
<th>Catalog #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6749</td>
<td>EMS AMC-7 Microscope Platform</td>
<td>each</td>
</tr>
<tr>
<td>6792</td>
<td>L-Option for 75kgs Capacity</td>
<td>each</td>
</tr>
</tbody>
</table>
Table of Contents

EMS AMC-7
Microscope Platform ................................ see Inside Front Cover  
EVOS® Digital Microscopes ................................ 2–7
   EVOS® fi .................................................. 3
   EVOS® xl core ........................................... 4
   EVOS® xl .................................................. 5
Ordering Information ........................................... 6–7
JuLi™ the Smart Fluorescent Cell Analyzer ................. 8–9
NIGHTSEA™ Fluorescence Viewing Systems .......... 10–11
BrightSlide™ D .................................................. 12–13
Tissue Tek SmartWrite™ Color Slide Printer ............ 14–15
Bio-Pure™ Surfactant Wipes ................................ 15
Amber Clens .................................................. 15
Peak™ ABC Lupe ............................................. 15
QUANTIFOIL® Holey Carbon Films .................... 16–17
C-flat™ Holey Carbon Grids ................................ 18–19
Apiezon Products ............................................ 20–23
   Apiezon PFPE 501 Grease ......................... 20
   Apiezon AP100 Grease ............................. 20
   Apiezon Grease, Type I ......................... 21
   Apiezon Grease, Type M ...................... 21
   Apiezon Grease, Type N ...................... 21
   Apiezon Grease, Type H ...................... 21
   Apiezon Grease, Type T ...................... 21
   Apiezon Grease, Type AP101 ............... 21
   Vacuum Grease Properties .................. 22
   Apiezon Vacuum Sealing, Mounting, and Etching Waxes 23
   Apiezon Q Compound .......................... 23
ACLR® Fluoropolymer Films ................................ 24
Omiprobe Accessories & Consumables ................... 25
   Omni Grids ........................................ 25
   Omni Grids Storage Box .................... 25
Immuno Stain Moisture Chamber ...................... 26
Differential Quick Staining Kit (Modified Giemsa) ...... 26
Held Secure™ Slide/Cassette Storage System .......... 26
Correlative Microscopy Coverslips® .................. 27
Combination Scales ..................................... 27
PP3010T Cryo-SEM Preparation System ............... 28–31
Specimen Stages ...................................... 32
Vacuum Pumps .......................................... 33
Oil Mist Filters ......................................... 33
EMS Freeze Substitution Kit .......................... 34–35
Incubators ................................................. 36–37
   Compact Low Cost Incubators ............... 36
   Isotemp Standard Lab Incubators ............ 36
   General Protocol Microbiological Incubators 37
   Advanced Protocol Microbiological Incubators 37
The C-Chip ........................................ see Outside Back Cover
Now available from EMS...

**EVOS® Digital Microscopes**

The ground-breaking design and revolutionary performance features of the EVOS® microscope line make high-quality imaging easier than ever before. Featuring LED illumination, integrated hardware/software, no bulbs, no alignment, no on-going costs or maintenance, EVOS® microscopes offer extraordinary comfort and ease of use. These instruments can be used in a hood or anywhere in the lab. The following three products are conveniently put together to offer the most common needs of most users. To top it off, you can also build a customized EVOS® microscope and order individual parts applicable to your unique needs!

**Patented LED Light Cubes**

At the heart of EVOS is its unique patented LED light cube (US Patent 7,502,164) that outputs high intensity over a short light path (see light path at right) for maximally efficient fluorophore excitation.

- Precise digital illumination level controls
- Supports up to 4 fluorescence channels simultaneously
- 50,000+ hour lifetime
- Instant ON/OFF, no shutters
- Environmentally safe, non-hazardous, mercury-free LED bulbs
- 15X less power consumption than conventional fluorescence microscopes
- Easy installation and no maintenance

**Applications and Software**

EVOS microscopes are equipped with an integrated computer and imaging software that were designed and programmed for real-life imaging. Everything you need to acquire, manipulate, save, and transfer an image can be done right from the microscope in one place, with one instrument. A toolbar provides an ever-growing list of added features – time-lapse video, cell counting, image overlays, automated transection images, scalebar, and the list continues to grow...

**Time-Lapse**

- Set interval and duration of a time-lapse experiment
- One channel per experiment, 10-seconds minimum acquisition interval
- Stable, consistent LED illumination over the duration of the experiment
- Pause during acquisition to review collected image sequence, adjust stage or illumination settings, etc.
- Create AVI movie files that can be played on any computer with one click

**Manual Cell-Counting**

- Count up to six cell types
- Assign numbers for each cell type and place over each cell when counted
- Numbers can be repositioned, deleted, hidden, and captured with each saved image
- Place gridlines and results table with saved image

**Transfection Analysis**

- Capture and overlay one transmitted light image and one fluorescent image with 1-click
- Works with any one of the fluorescent light cubes installed on EVOS II microscope
- Allows users to adjust illumination intensity for both images prior to launching acquisition sequence
EVOS® Fl

- Fluorescence, brightfield, phase contrast
- Patented LED fluorescence light cube technology
- Supports up to 4 fluorescence channels at a time
- 15-inch high-resolution LCD display
- Monochrome and color camera options
- Fits inside cell culture hoods and biosafety cabinets
- Integrated computer and advanced imaging software/features

Your science is hard.
Your microscope should be easy...

Throw away the definition of “microscope”… and start over. Science needs tools that help set the pace, not hold it back. Isn’t it time the equipment works for you – so you can get your data quickly and move on? The ground-breaking design and revolutionary performance features of the EVOS Fl microscope make high-quality fluorescence imaging easier than ever. Capture, overlay and save multi-channel fluorescence images in just seconds — in one place, with one instrument.

**Technical Specifications EVOS Fl**

<table>
<thead>
<tr>
<th>Optics</th>
<th>Infinity-corrected optical system, RMS-threaded objectives with 45 mm parfocal distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnification</td>
<td>N.A.</td>
</tr>
<tr>
<td>2X</td>
<td>0.06</td>
</tr>
<tr>
<td>4X Ph</td>
<td>0.13</td>
</tr>
<tr>
<td>10X Fl</td>
<td>0.30</td>
</tr>
<tr>
<td>20X Fl</td>
<td>0.45</td>
</tr>
<tr>
<td>40X Fl</td>
<td>0.65</td>
</tr>
</tbody>
</table>

**Objective Turret**
- 5-position; front-mounted manual control

**Light Cubes**
- DAPI: 357 nm excitation, 447 nm emission
- GFP: 470 nm excitation, 525 nm emission
- RFP: 531 nm excitation, 593 nm emission
- CF: 442 nm excitation, 510 nm emission
- YFP: 500 nm excitation, 542 nm emission
- Texas Red: 586 nm excitation, 624 nm emission
- Cy5: 620 nm excitation, 692 nm emission
- Cy7: 731 nm excitation, 625 nm emission
- QDots: All available wavelengths

**Contrast Methods**
- Fluorescence and transmitted light (brightfield and phase contrast), slider with diffuser block and meniscus filters

**Condenser**
- 3-position turret for brightfield and phase contrast, slider with diffuser block and meniscus filters

**Condenser WD**
- 60 mm

**Mechanical Glide Stage**
- X-Y axis fine-positioning controls; 69 mm (2.7-in) per rotation
- 110 mm x 110 mm (4.3-in x 4.3-in) range of motion
- Z-axis focusing controls, 400 μm/revolution
- Interchangeable vessel holders available for most common shapes and sizes

**LCD Display**
- 15-inch color, 1024 x 768 pixels; adjustable tilt

**Camera**
- High-sensitivity monochrome, 1280 x 960, 3.75 μm/pixel; (Sony® ICX445 CCD)
- Also available with color camera (Sony® ICX281AQ CCD)

**Image Acquisition**
- Built-in computer; Intel® Atom processor 1.6 GHz
- Integrated software for image acquisition via mouse

**Captured Images**
- 16-bit monochrome TIFF or PNG (12-bit dynamic range)
- 24-bit color TIFF or PNG, JPG, BMP

**Output Ports**
- 3 USB and 1 DVI

**Power Supply**
- AC adapter; Input: 100-240V, 50-60Hz; Output 5 VDC/4.15A

**Dimensions**
- Operating height: 57.8 cm (22.75-in)
- Storage/transport height: 32.4 cm (12.75-in)
- Depth: 47.0 cm (18.5-in); Width: 35.5 cm (14.0-in)

**Weight**
- 15.3 kg (33.7 lbs)

High-quality fluorescence imaging has never been easier!
EVOS™ xl core

- Brightfield and phase contrast
- Designed for repeated-use in routine tissue culture/live cell applications
- LED illumination for transmitted light
- 12-inch high-resolution LCD display
- Fits inside cell culture hoods and biosafety cabinets
- Embedded operating system with basic imaging features for capture and save to USB flash drive
- Affordable, unmatched price-to-performance value

Comfort without Compromise

The EVOS xl core makes cell culture microscopy remarkably easy. Uncomfortable eyepieces have been replaced with a high-resolution camera and display, but not only that... the LCD display is up high for easy viewing and the stage and controls are placed low so your hands can rest on the table.

Need To Save Images?
With the EVOS xl core microscope, images can be saved with the push of a button to a USB flash drive - no need to wrestle with computers, cables or external software.

Need To Move It Around?
The all-in-one design is lightweight and boasts a small footprint. You can throw it in a hood or move it to an open space on the bench. Better yet, there is no alignment, no bulbs to change and the flip of one switch turns everything on.

EVOS xl core allows you to concentrate on what’s important – your work. It’s easy, affordable and powerful. Now, that’s comfort without compromise!

- ALL-IN-ONE digital microscope workstation
- Eyepieces are replaced with a 12.1-inch high resolution display
- High performance phase contrast optics are integrated with a high-resolution digital camera
- Integrated imaging software runs everything via mouse or with fingertip controls
- Images can be saved to a USB flash drive

Technical Specifications EVOS xl core

<table>
<thead>
<tr>
<th>Optics</th>
<th>Infinity-corrected optical system; RMS-threaded objectives with 45 mm parfocal distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives (available)</td>
<td>Plan Achromat Magnification N.A. WD</td>
</tr>
<tr>
<td>2X</td>
<td>0.06</td>
</tr>
<tr>
<td>4X Ph</td>
<td>0.13</td>
</tr>
<tr>
<td>10X Ph</td>
<td>0.25</td>
</tr>
<tr>
<td>20X Ph</td>
<td>0.40</td>
</tr>
<tr>
<td>40X Ph</td>
<td>0.65</td>
</tr>
<tr>
<td>Objective Turret</td>
<td>4-position; manual control</td>
</tr>
<tr>
<td>Illumination</td>
<td>LED (50,000+ hour life); adjustable intensity</td>
</tr>
<tr>
<td>Contrast Methods</td>
<td>Transmitted light (brightfield and phase contrast)</td>
</tr>
<tr>
<td>Condenser</td>
<td>3-position turret for brightfield and phase contrast</td>
</tr>
<tr>
<td>Condenser WD</td>
<td>60 mm</td>
</tr>
<tr>
<td>Stage*</td>
<td>Fixed and mechanical stage (with X-Y axis controls and vessel holder framework) available</td>
</tr>
<tr>
<td>*Mechanical stage also available for order separately</td>
<td></td>
</tr>
<tr>
<td>LCD Display</td>
<td>12.1-inch color, 1024 x 768 pixels; adjustable tilt</td>
</tr>
<tr>
<td>Camera</td>
<td>1/2-inch; 2048 x 1536 pixels; 3.1 MP COLOR</td>
</tr>
<tr>
<td>Image Acquisition</td>
<td>Embedded operating system with software for image capture and save via mouse or front-mounted manual buttons onto USB flash drive</td>
</tr>
<tr>
<td>Captured Images</td>
<td>24-bit color TIF, JPEG or BMP (2048 x 1536 pixel)</td>
</tr>
<tr>
<td>Output Ports</td>
<td>2 USB 2.0</td>
</tr>
<tr>
<td>Power Supply</td>
<td>AC adapter; Input 100-240V, 47-63Hz; 0.59A max; Output 12 VDC/2.0A 24W max</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Operating Height: 55.3 cm (21.8-in) Storage/Transport Height: 34.3 cm (13.5-in) Depth: 40.6 cm (16.0-in) Width: 31.8 cm (12.5-in)</td>
</tr>
<tr>
<td>Weight</td>
<td>≤ 9.1 kg (20.1 lbs)</td>
</tr>
</tbody>
</table>

Effortless, affordable cell-culture imaging
EVOS xl

- Brightfield and phase contrast
- LED illumination for transmitted light
- 15-inch high-resolution LCD display
- Fits inside cell culture hoods and biosafety cabinets
- Integrated computer and advanced imaging software and features
- More optics selection than EVOS xl core
- Optional arm rest (on either side of microscope) for cell isolation procedures


The EVOS xl digital inverted microscope combines advanced ergonomic design, an on-board microprocessor, LED illumination, fully integrated color camera, and a highly streamlined user interface to deliver unprecedented flexibility and ease-of-use.

EVOS xl is designed to make cell culture microscopy as comfortable, reliable and effective as possible. Our commitment to this design is visible in every feature—from the high-resolution 15-inch LCD display to the compact footprint and integrated computer and imaging system.

Technical Specifications EVOS xl

<table>
<thead>
<tr>
<th>Optics</th>
<th>Infinity-corrected optical system; RMS-threaded objectives with 45 mm parfocal distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives (available)</td>
<td></td>
</tr>
<tr>
<td>Magnification</td>
<td>N.A.</td>
</tr>
<tr>
<td>2X</td>
<td>0.06</td>
</tr>
<tr>
<td>4X Ph</td>
<td>0.13</td>
</tr>
<tr>
<td>10X Ph</td>
<td>0.25</td>
</tr>
<tr>
<td>20X Ph</td>
<td>0.40</td>
</tr>
<tr>
<td>40X Ph</td>
<td>0.65</td>
</tr>
<tr>
<td>Objective Turret</td>
<td>5-position; front-mounted manual control</td>
</tr>
<tr>
<td>Contrast Methods</td>
<td>Transmitted light (brightfield and phase contrast)</td>
</tr>
<tr>
<td>Condenser</td>
<td>3-position turret for brightfield and phase contrast, slider with diffuser block and meniscus filters</td>
</tr>
<tr>
<td>Condenser WD</td>
<td>60 mm</td>
</tr>
<tr>
<td>Mechanical Glide Stage</td>
<td>X-Y axis fine-positioning controls; 89 mm (2.7-in) per rotation; 110 mm x 110 mm (4.3-in x 4.3-in) range of motion</td>
</tr>
<tr>
<td>2-axis focusing controls, 480 µm/rotation</td>
<td>Interchangeable vessel holders available for most common shapes and sizes*</td>
</tr>
<tr>
<td>LCD Display</td>
<td>15-inch color, 1024 x 768 pixels; adjustable tilt</td>
</tr>
<tr>
<td>Camera</td>
<td>2048 x 1536, 3.2 µm/pixel; 3.1 MP COLOR</td>
</tr>
<tr>
<td>Image Acquisition</td>
<td>Built-in computer; Intel® Atom processor 1.6 GHz; integrated software for image acquisition via mouse</td>
</tr>
<tr>
<td>Captured Images</td>
<td>Color TIFF, PNG, JPG or BMP (2048 x 1536 pixels)</td>
</tr>
<tr>
<td>Output Ports</td>
<td>3 USB and 1 DVI</td>
</tr>
<tr>
<td>Power Supply</td>
<td>AC adapter; Input: 100–240V, 50–60Hz; Output 5 VDC/6.5A</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Operating height: 57.8 cm (22.75-in); Storage/transport height: 32.4 cm (12.75-in); Depth: 47.0 cm (18.5-in); Width: 35.5 cm (14.0-in)</td>
</tr>
<tr>
<td>Weight</td>
<td>14.2 kg (31.4 lbs)</td>
</tr>
</tbody>
</table>

Throw away the definition of “microscope” and start over...
**NEW PRODUCTS**
**DIGITAL MICROSCOPES**

**EVOS® Digital Microscopes (continued)**

**Ordering Information**

**Pre-Configured Scopes** We have put together the most popular scope configurations for your convenience...

**EVOS® xl**

Evos-XL includes the following:
- Digital Inverted Microscope
- On Board Computer
- Integrated Imaging Software
- LED Illumination
- 3.1 Megapixel Color Camera
- 15" High Definition display
- 4 Objectives (4x, 10x, 20x, 40x)

**EVOS® xlCore**

Evos-XL/Core includes the following:
- Digital Inverted Microscope
- Embedded operating system with integrated imaging software
- Mechanical Stage
- LED Illumination
- 3.1 mega pixel color camera
- 12.1" high definition display
- 4 Objectives (4x, 10x, 20x, 40x)

**EVOS® FL**

Evos-FL includes the following:
- Digital Inverted Fluorescence Microscope
- On Board computer and integrated imaging software
- Brightfield and Phase contrast
- Adjustable intensity LED
- Objectives (PI/Fluor, 4x, 10x, 20x, 40x)
- GFP, RFP, DAPI Light Cubes

---

**Build-Your-Own Scope**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AME-3300</td>
<td>EVOS xl Includes on-board computer and integrated imaging software; LED Illumination; 3.1 megapixel color camera; 15&quot; high definition display; No objectives; No arm rest</td>
<td>each</td>
</tr>
<tr>
<td>AMEX-1000</td>
<td>EVOS core xl, no objectives</td>
<td>each</td>
</tr>
<tr>
<td>AMF-4300</td>
<td>EVOS II Base — Includes on-board computer and integrated imaging software; Brightfield and phase contrast; Adjustable intensity LED; No objectives; No light cubes</td>
<td>each</td>
</tr>
<tr>
<td>AMEFC-4300-US</td>
<td>EVOS II Base, US — Includes on-board computer and integrated imaging software; Color camera, two vessel holders; Brightfield and phase contrast; Adjustable intensity LED; No Objectives; No light cubes</td>
<td>each</td>
</tr>
</tbody>
</table>

**Options and Accessories**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMEP-4712</td>
<td>Attachable Mechanical Stage; For use with EVOS xl core</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4618</td>
<td>Arm Rest Accessory Kit, attaches to either side of stage; For use with EVOS xl and EVOS II (standard on EVOS cl)</td>
<td>each</td>
</tr>
</tbody>
</table>

**Extended Warranties**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AME-EXTW2-US</td>
<td>EVOS xl 2-Year Extended Warranty</td>
<td>each</td>
</tr>
<tr>
<td>AME-EXTW4-US</td>
<td>EVOS xl 4-Year Extended Warranty</td>
<td>each</td>
</tr>
<tr>
<td>AMF-EXTW2-US</td>
<td>EVOS II 2-Year Extended Warranty</td>
<td>each</td>
</tr>
<tr>
<td>AMF-EXTW4-US</td>
<td>EVOS II 4-Year Extended Warranty</td>
<td>each</td>
</tr>
</tbody>
</table>
### Digital Microscopes (continued)

#### Ordering Information (continued)

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMEP-4622</td>
<td>Magnification: 4x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.13; WD: 19.7mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4623</td>
<td>Magnification: 10x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.30; WD: 8.3mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4624</td>
<td>Magnification: 20x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.45; WD: 7.1mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4625</td>
<td>Magnification: 40x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.65; WD: 2.6mm</td>
<td>each</td>
</tr>
<tr>
<td><strong>For use with ii and iii models</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMEP-4626</td>
<td>Magnification: 6x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.75; WD: 2.2mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4631</td>
<td>Magnification: 2x; Plan: LWD; Imaging Medium: Air; NA: 0.06; WD: 5.1mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4632</td>
<td>Magnification: 4x; Plan: LWD - PH; Imaging Medium: Air; NA: 0.13; WD: 16.9mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4681</td>
<td>Magnification: 10x; Plan: LWD - PH/FL; Imaging Medium: Air; NA: 0.25; WD: 9.2mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4682</td>
<td>Magnification: 20x; Plan: LWD - PH/FL; Imaging Medium: Air; NA: 0.40; WD: 5.1mm</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4683</td>
<td>Magnification: 40x; Plan: LWD - PH/FL; Imaging Medium: Air; NA: 0.65; WD: 1.6mm</td>
<td>each</td>
</tr>
<tr>
<td>AMPPOP-050</td>
<td>OBJ 50X PLAIN ACRO</td>
<td>each</td>
</tr>
<tr>
<td>AMPF-OP100</td>
<td>100X PLAN OIL 1.25NA100X PLAN</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4698</td>
<td>20X PLAN FL 0.50 NA CS CORRECT</td>
<td>each</td>
</tr>
<tr>
<td><strong>For use with ii and iii models</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMEP-4700</td>
<td>Magnification: 100x; Plan: LWD - FL; Imaging Medium: Oil; NA: 1.28; WD: 8.21mm</td>
<td>each</td>
</tr>
<tr>
<td><strong>Fluorescent Light Cubes, for use with EVOS ii</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMEP-4650</td>
<td>DAP Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4651</td>
<td>GFP Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4652</td>
<td>RFP Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4653</td>
<td>CFP Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4654</td>
<td>YFP Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4655</td>
<td>Texas Red Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4656</td>
<td>CY5 Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4667</td>
<td>CY7 Fluorescent Light Cube</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-4688</td>
<td>BFP Fluorescent Light Cube</td>
<td>each</td>
</tr>
</tbody>
</table>

**Vessel Holders**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMEP-VH001</td>
<td>Slide Vessel Holder; Holds two 25mm x 75mm microscope slides, chamber slides</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH002</td>
<td>35mm Petri Dish Vessel Holder; Holds four 35mm petri dishes</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH003</td>
<td>60mm Petri Dish Vessel Holder; Holds two 60mm petri dishes</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH004</td>
<td>100mm Petri Dish Vessel Holder; Holds one 100mm petri dish</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH005</td>
<td>25cm T-Flasks Vessel Holder; Holds two 25cm³ flasks, rectangular or triangular</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH006</td>
<td>75cm T-Flasks Vessel Holder; Holds one 75cm³ flask</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH007</td>
<td>Hemacytometer Vessel Holder; Holds one standard hemacytometer; Use with C-Chip</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH008</td>
<td>Vessel Holder - 1 BD T-75 FLX; Holds one 75cm² BD/Greiner T-75 flask</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH009</td>
<td>Vessel Holder - Universal; Holds all vessel types (universal)</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH010</td>
<td>Vessel Holder - 2 BD T-25 Flask; Holds one 25cm² BD/Greiner T-25 flask</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH011</td>
<td>Vessel Holder - 66mm Square Tray; Holds one 66mm square tray</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH012</td>
<td>Slide Holder - SPL T-75 Flask; Holds one SPL T-75 Flask</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH013</td>
<td>Vessel Holder - 4 PETRI 35 EU; Holds four 35mm petri dishes (EU)</td>
<td>each</td>
</tr>
<tr>
<td>AMEP-VH014</td>
<td>Vessel Holder - 2 PETRI 50 EU; Holds two 50mm petri dishes (EU)</td>
<td>each</td>
</tr>
</tbody>
</table>
JuLi™ The Smart Fluorescent Cell Analyzer

A digital microscope that can fit inside an incubator. All of the sudden you are able to watch and make a video of cells growing. Live cell imaging that allows you to study cellular function.

With its compact design the unit fits almost anywhere and allows for the capture of live cell images and movies: Sequential time-lapse fluorescence and or bright images are stored.

Features:
- Communication through wireless data transfer
- Plug and Play Technology
- Dark-Room free
- One-Touch image capturing
- LCD Touch Screen
- Stand Alone unit

Applications:
- Live Cell Imaging (time-lapse)
- Cell migration assay
- Cell Based Assay optimization
- Cell culture quality control
- Proliferation ASSAY

Live Cell Imaging

Bright field  Fluorescent field  Merged image

The U2OS cells were transfected by NEON transfection system (from Invitrogen) using 0.5μg of the GFP-MTH1 plasmid & GFP-Rab plasmid. Images captured 24 hours after transfaction.

GFP Images of 3 different cell types

The NIH3T3, COS7, C2C12 cells were transfected by NEON transfection system (from Invitrogen) using 0.6μg of the EGFP-N1 plasmid. Images captured 24 hours after transfaction.

Adipogenesis images

Examples of the differentiated adipocyte images for 6, 11, 21 days. All images were captured by JuLi™.
JuLi™ The Smart Fluorescent Cell Analyzer (continued)

Specifications:
- Power: AC 100-240V, 50-60 Hz
- CPU: AMD AU1250
- Magnification: 200x
- Filter: Excitation/Emission/Dichroic Filter
- Light Source: White/Blue LED (468nm)
- Optional: White Green LED (532nm)
- Camera: CMOS 1.3M Pixels (1280 x 1024)
- Display: 7" TFT-LCD (WVGA, 800 x 480)
- Weight: 5 kg
- Size: 240 x 350 x 320 mm
- Data Storage: SD Card 8 G

Ordering Information

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9200</td>
<td>JuLi™ Cell Analyzer</td>
<td>each</td>
</tr>
</tbody>
</table>

Time-Lapse imaging in bright field

Examples of 12-hour time-lapse imaging of the HeLa cells changing shapes. All images were captured at 5-minute intervals.

Time-Lapse imaging in fluorescent field

Examples of 58-hour time-lapse imaging of U2OS (GFP stable cell line) changing shapes. All images were captured at 15-minute intervals.
EMS is proud to introduce...

**Overview**

Over 90% of research microscopes destined for biological labs are now purchased with fluorescence attachments. Clearly, fluorescence has become the tool of choice for studying many animal models on upright and inverted research stands.

New technology from NIGHTSEA™ now extends fluorescence to standard routine stereo microscopes, where its specificity and sensitivity provide an ideal assist for life science applications.

**Fluorescence-Aided Dissection of FP-Labeled Structures**

The most common application of NIGHTSEA lights for researchers using fluorescent proteins is in sorting out which members of the next generation are fluorescent and which are not. Whether working with mouse pups, Drosophila larvae, zebrafish (below), or other organisms, the lights make it easy to see which offspring have inherited the fluorescence trait and which have not.

Some researchers are going beyond just identifying labelled subjects and using fluorescence to actively aid in extracting GFP-tagged structures. In one case the researchers needed to extract only the GFP-tagged dorsal striatum from within mouse brains. They likened this to “isolating a lump of oatmeal from within a larger lump of oatmeal”. When they switched from doing the dissection in white light to using the NIGHTSEA flashlight and glasses they could easily see which portion of the brain to target. It made the dissection both faster and more accurate.

**NIGHTSEA™ Fluorescence Viewing Systems**

**NIGHTSEA™ Stereo Microscope Fluorescence Adapter**

Adapt your existing lab stereo microscopes for fluorescence

This simple system is excellent for:
- Quick screening of your fluorescent genotypes – *Drosophila*, *zebrafish*, *C. elegans*, ...
- Genotype sorting
- Fluorescence-aided dissection, injection, or micromanipulation
- Freeing up your research-grade fluorescence microscopes for more demanding work
- New faculty start-up budgets
- Bringing fluorescence into the teaching laboratory

NIGHTSEA's new Stereo Microscope Fluorescence Adapter adapts just about any stereo microscope (dissecting microscope) for fluorescence with no modification to the microscope itself. The modular design lets you easily switch between several different excitation/emission combinations to work with a variety of fluorescent proteins and other fluorophores.

**Fluorescence isn't just for research microscopes anymore...**
- Now sort on your laboratory-level stereos
- Use fluorescence to facilitate micromanipulation and dissection
- Expand fluorescence from your research lab to your classroom

**Modular...**
- Installs in seconds — just clicks into place
- Interchangeable excitation/emission combinations
- Move from microscope to microscope
- No modification to your microscope needed

**Economical — More Glow for the Dough...**
- Stretch your lab budget — get the most out of your lab equipment!
- Inexpensive enough for classroom use

**Specifications**

<table>
<thead>
<tr>
<th>Filter Set</th>
<th>Excitation</th>
<th>Emission</th>
<th>Fluorophores</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB — Royal Blue</td>
<td>440 – 460nm</td>
<td>500nm LP</td>
<td>GFP, eGFP, fluorescein, ...</td>
</tr>
<tr>
<td>CY — Cyan</td>
<td>490 – 515nm</td>
<td>550nm LP</td>
<td>YFP, Venus, Lucifer Yellow, ...</td>
</tr>
<tr>
<td>GR — Green</td>
<td>510 – 540nm</td>
<td>600nm LP</td>
<td>DsRed, dTomato, ...</td>
</tr>
</tbody>
</table>

**Microscope Mounting Adapter** — fits up to 67mm standard

**Ordering Information**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFA-RB</td>
<td>Full System with Royal Blue</td>
<td>each</td>
</tr>
<tr>
<td>SFA-CY</td>
<td>Full System with Cyan</td>
<td>each</td>
</tr>
<tr>
<td>SFA-GR</td>
<td>Full System with Green</td>
<td>each</td>
</tr>
<tr>
<td>SFA-LFS-RB</td>
<td>Add-On Light and Filter Set, Royal Blue</td>
<td>each</td>
</tr>
<tr>
<td>SFA-LFS-CY</td>
<td>Add-On Light and Filter Set, Cyan</td>
<td>each</td>
</tr>
<tr>
<td>SFA-LFS-GR</td>
<td>Add-On Light and Filter Set, Green</td>
<td>each</td>
</tr>
</tbody>
</table>
NIGHTSEA™ Fluorescence Viewing Systems (continued)

NIGHTSEA™ Fluorescence Excitation Flashlights

Rapid screening of your fluorescent transgenic experiments

Mouse with actin labeled with GFP. Photograph © NIGHTSEA/Charles Mazel

Mouse with actin labeled with DaRed. Photograph © NIGHTSEA/Charles Mazel

NIGHTSEA DFP-1™ Dual Fluorescent Protein Flashlight

The DFP-1 Dual Fluorescent Protein Flashlight includes both blue and green high intensity LEDs so that you can screen for green (GFP, eGFP) and red (DsRed, TdTomato) fluorescence.

The light comes with two pairs of barrier filter glasses and a convenient carrying case.

The glasses are well matched to the excitation so that they block the reflected excitation light while transmitting the fluorescence with high efficiency, providing excellent viewing contrast.

Specifications:
- Bulb Type: High Intensity 1W LED
  - Royal Blue: 440 - 460nm
  - Green: 510 - 540nm
- Filter Glasses: 500nm LP for green fluorescence, 600nm LP for red fluorescence
- Burn Time: 6 hours at full power
- Lamp Life: >10,000 hours
- Battery: 3 C-cell

NIGHTSEA BlueStar™

The BlueStar flashlight combined with the matched barrier filter glasses is a convenient, powerful tool for exciting fluorescence in many subjects.

The BlueStar uses the latest in high intensity LED technology combined with specialized optics to produce an ultra-tight, ultra-bright 10-degree beam pattern for maximum excitation of fluorescence. Comes with adjustable, cushioned wrist lanyard, rubber glare guard. Made in USA.

Specifications:
- Bulb Type: High Intensity 1W LED
  - Royal Blue: 440 - 460nm
- Burn Time: 6 hours at full power
- Lamp Life: >10,000 hours
- Battery: 3 C-cell

NIGHTSEA Barrier Filter Glasses

- Styles 1 and 2 fit over eyeglasses, Style 3 does not
- Glasses meet ANSI Z87.1 impact standards for safety glasses

Ordering Information

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFP-1</td>
<td>DFP Flashlight plus yellow and red filter glasses plus carrying case</td>
<td>each</td>
</tr>
<tr>
<td>BLS1</td>
<td>BlueStar light plus style VG1 filter glasses</td>
<td>each</td>
</tr>
<tr>
<td>BLS2</td>
<td>BlueStar light plus style VG2 filter glasses</td>
<td>each</td>
</tr>
<tr>
<td>BLS3</td>
<td>BlueStar light plus style VG3 filter glasses</td>
<td>each</td>
</tr>
<tr>
<td>VG1</td>
<td>Yellow filter glasses, style 1</td>
<td>each</td>
</tr>
<tr>
<td>VG2</td>
<td>Yellow filter glasses, style 2</td>
<td>each</td>
</tr>
<tr>
<td>VG3</td>
<td>Yellow filter glasses, style 3</td>
<td>each</td>
</tr>
<tr>
<td>RG2</td>
<td>Red filter glasses, style 2</td>
<td>each</td>
</tr>
</tbody>
</table>

Collection of Stage 37-38 X. laevis, messenger RNA injected ubiquitous GFP and membrane RFP viewed through shield filter for sorting. Photograph © NIGHTSEA/Charles Mazel

Electron Microscopy Sciences In PA: (215) 412-8400 • Toll-Free (800) 523-5874
Fax (215) 412-8450 or 8452 • email: sgkcock@aol.com or staceiesm-secure.com • www.emsdiasum.com
EMS is proud to introduce

**BrightSlide™ D**

**Fluorescence Enhancing Slides and Versatile, (bio)-functionalized coatings for Glass, Metal Oxides and ITO**

**Fluorescence Enhancing Slide**

Fluorescence systems (e.g. microscopes) are today widely used in the life science research. For many applications an increased sensitivity compared to existing glass slides is required. The BrightSlide™ technology uses a proprietary dielectric coating to significantly enhance the signal intensity of fluorescence molecules from the surface. It can be read out with all systems that illuminate and detect from the top. The technology makes use of purely optical principles and substitutes conventional glass substrates.

The BrightSlide™ D (Dielectric) provides a bare SiO₂ surface.

**Benefits**

- Better signal to noise ratio
- Less sample material can be used
- More genes can be detected
- Existing instrument platform can be used
- Purely optical amplification of fluorescence signal
- Dielectric, high quality SiO₂ surface ready to apply AziGrip™ or customer bio-functional coating (use your own bio-functional coating, no change of chemical protocol required)

**Applications**

- Universal detection platform for fluorescence detection on planar surfaces, e.g. fluorescence detection of ultra thin samples
- Differential gene expression using Cy3 and Cy5 labels simultaneously
- Gene expression using Cy3 or Cy5 labels independently

The BrightSlide™ D (Dielectric) comes standard as a bare SiO₂ Surface. However you may also have the slide with the Bio-functional coating (AziGrip™)

The following is the standard configurations of the slides

1. **BrightSlide™ D**

   **Specification**

   Fluorescence Enhancing Slide optimized for 488nm and 590nm excitation wavelengths (other wavelengths on request)

   Both polarizations (s and p-polarization) can be used for excitation and emission

   0º - 3º angle of incidence for excitation light

   Ultralow fluorescence background

   Durable and chemically resistant label with a unique serial number

   Suitable for most of commercially available fluorescence microscopes with illumination and detection from the top

   **Substrate material**

   D263T eco (other materials on request)

   **Substrate format**

   75 ±0.05mm x 25 ±0.05mm x 1.1 ±0.1mm (other formats on request)

2. **BrightSlide™ DB**

   **Specification**

   Fluorescence Enhancing Slide with Bio-functional coating on the top

   Suitable for most of commercially available fluorescence microscopes with illumination and detection from the top

**AziGrip4™ Bio-Functional Coatings**

Versatile, (bio)-functionalized coatings for Glass, Metal Oxides and ITO

The AziGrip4™-Bio-functional coating platform is a versatile tool for functionalizing surfaces for Life Science, Fluorescence and Medical Applications. Glass, metal oxides, ITO and plastics can be treated in order to bind different amounts of macromolecules, tune specific cell adhesion, reduce non-specific binding background, provide better signal-to-noise ratios and patterned surfaces with multi-functionalities.

**Benefits**

- Provides amino or carboxy functionalized surfaces for high density binding of biomolecules through standard procedures (EDC/NHS)
- Enables direct linking of macromolecules without further functionalization
- Improves adhesion of cells by use of specific binding sequences
- Simplifies depositions of phospholipid by-layers
- Reduces unwanted, non-specific binding to improve signal-to-noise

**Applications**

- Diagnostics
- Bio-analytics
- Lab-on-a-chip
- Fluorescence microscopy
- Cell culture
- Support for lipidic membranes and other emerging applications

**Active area**

63nm x 22nm

**Cosmetic**

5/2x0.4, C2x0.4; E1.0 according to DIN ISO 10110

**Chemical composition of the top surface**

Clean, dielectric, SiO₂ surface ITO and/or AziGrip4™ bio-functional coating on request

**Environmental stability**

Stable against temperatures up to 200°C

All strongly oxidizing cleaning protocols can be used

All organic solvents can be used

Chemical reagents which etch SiO₂ (HF, NaOH, KOH) can destroy the enhancement effect of the BrightSlide™

**Storage**

Store in clean environment at room temperature
BrightSlide™ D (continued)

Durable and chemically resistant label with a unique serial number

Optical coating
Optimized for 488nm and 590nm excitation wavelengths (other wavelengths on request)
Both polarizations (s and p-polarization) can be used for excitation and emission
0° - 3° angle of incidence for excitation light
Ultraslow fluorescence background

Bio-functional coating
Full surface monolayer with integrated functionality (patterned coating on request)
1-2 nm dry coating thickness
Robust and chemically stable (increased stability in comparison to aminopropyl(poly)siloxane)

Substrate material
D263T eco (other materials on request)

Substrate format
75 ±0.05mm x 25 ±0.05mm x 1.1 ±0.1mm (other formats on request)

Active area
63mm x 22mm

Optical coating
2x0.4; C2x0.4; E1.0 according to DIN ISO 10110
Chemical composition of the top surface
Optical coating
Clean, dielectric, SiO₂ surface (ITO coating on request)

Bio-functional coating
AziGrip™ with Amine functional group (other AziGrip™ bio-functional coatings, e.g. brush-like hydrophilic, brush-like non-fouling, hydrogel-like, with Carboxy, Epoxy, Biotin, NTA, NHS, Cholesterol, ss-DNA or Peptide bio-functionality on request)
Environmental stability (optical coating only)
Stable against temperatures up to 200°C
All strongly oxidizing cleaning protocols can be used
All organic solvents can be used
Chemical reagents which etch SiO₂ (HF, NaOH, KOH) can destroy the enhancement effect of the BrightSlide™

Storage
Store in clean environment at room temperature

Technical Data
- Substrate material D263T eco, other materials on request
- Substrate format 75mm x 25mm x 1.1mm, other formats on request
- Active area 63mm x 22mm
- Fluorescence enhancement optimized for one to three customer specific dyes on one slide
- Both polarizations (s and p-polarization) can be used for excitation and emission
- 0° - 3° angle of incidence for excitation light
- Ultraslow fluorescence background
- Ultraclean SiO₂ surface
- Laser scribed, durable and chemically resistant label with a unique serial number
- Suitable for most of commercially available fluorescence microscopes with illumination and detection from the top
- Stringent batch to batch reproducibility
- Packed under clean-room (class 100) conditions

Ordering Information

<table>
<thead>
<tr>
<th>EMS #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>63426-D</td>
<td>BrightSlide™D</td>
<td>each</td>
</tr>
<tr>
<td>63426-D-10</td>
<td></td>
<td>10/pack</td>
</tr>
<tr>
<td>63426-D-100</td>
<td></td>
<td>100/pack</td>
</tr>
<tr>
<td>63426-DB</td>
<td>BrightSlide™DB</td>
<td>each</td>
</tr>
<tr>
<td>63426-DB-10</td>
<td></td>
<td>10/pack</td>
</tr>
<tr>
<td>63426-DB-100</td>
<td></td>
<td>100/pack</td>
</tr>
</tbody>
</table>

A. Sketch of the AziGrip™ Bio-functional coating: Two different polymers (non-fouling and bio-functionalized) are linked to the substrate via the AziGrip™ molecules and form a hydrophilic brush with an end bio-functionalization suitable for use as biosensor, or as specific adhesive site for cell surfaces.

B. Application example: Adhesion sites of Fibroblasts grown on 5 x 5 μm adhesive pattern separated by 1 μm Ato633-fluorescently labeled grid.

Courtesy of F. Anderegge, ETH Zurich

AziGrip™ is a Trademark of SuSOS AG
EMS is proud to introduce the amazing...

● **Tissue Tek SmartWrite™ Color Slide Printer**

On-Demand Color Slide Printing is what you get with this unit

**Key Features and Benefits**
- High resolution color printing - reduces need for managing multiple color slide inventory, lowering costs
- On-demand slide printing - streamlines workflow and reduces specimen identification errors
- Small footprint - fits perfectly on a microtome work station or next to a cytology slide processor
- Prints directly onto slides - eliminates errors from hand writing and label application
- Scannable 2D and 1D bar code, alphanumeric and graphic printing capabilities - optimizes flexibility for now and in the future
- Optional SmartWrite™ Software - provides configurable label design and is interfaceable to LIS systems
- Print resistant to Xylene, alcohol, histology reagents, stains, heat, and chemicals*. Ensures reliable identification of slides now and in the future

**Specifications**

**Electrical**
- Power: AC100-240VAC, 50/60 Hz, 60 watts

**Environmental**
- Operational Ambient Temp.: 10 - 40 degrees C (50 - 105 F)
- Operational/Relative Humidity: 30 - 85% (non-condensing)

**Storage**
- Ambient Temp.: -10 - 60 degrees C (14 - 140 F)
- Relative Humidity: 10 - 85% (non-condensing)

**Physical**
- Height: 8.6" (218.4mm)
- Width: 7.08" (179.0mm)
- Depth: 12.68" (319.5mm)
- Weight: 16.8 lbs. (7.62 kg)

**User Interface**

- Power Button: One power switch with LED indicator, located on the upper right side of the control panel on the front of the instrument
- Slide Feed Button: One button with LED indicator located on the upper right side of the control panel on the front of the instrument beneath the power button
- Lid Open Button: One button located on the upper left side of the instrument
- Blue Slide: Illuminates blue slide holder indicating

**Holder Light**
- Proper loading

**Diagnostic Function**
- Self diagnosis, error messages and codes

**Functional Printing Technology**
- Thermal transfer

**Print Speed**
- Up to 9 slides/minute (monochrome)
- Up to 5 slides/minute (solid colors)
- Up to 4 slides/minute (blended colors)

**Print Resolution**
- 300 dpi

**Ink Type**
- Resin thermal transfer

**Ribbon Types**
- CMYK: 1000 prints; Black: 5000 prints

**Printable Colors**
- Multiple solid colors: others available via software

**Slide Types**
- 3" x 1" standard or positive charged, smooth surface white frosted end, clipped corners

**Slide Capacity**
- 100 slides - Blue Slide Holder

**Output Tray Capacity**
- 15 slides

**Construction**
- Steel frame with powder-coated steel and plastic covers

**Data Interface**
- USB 2.0

**Printer Drivers**
- Windows™ XP/Vista/7

**Warranty**
- One year parts and labor

**Applications**
- On demand slide printing — color or black labels printed directly onto slides

**Ordering Information**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>66455</td>
<td>Slide Printer</td>
<td>each</td>
</tr>
<tr>
<td>66456</td>
<td>Scanner With Stand</td>
<td>each</td>
</tr>
<tr>
<td>66457</td>
<td>SmartWrite Software</td>
<td>each</td>
</tr>
<tr>
<td>66458</td>
<td>PC with touchscreen, mouse and keyboard</td>
<td>each</td>
</tr>
<tr>
<td>66459</td>
<td>Slide Holder, Blue</td>
<td>each</td>
</tr>
<tr>
<td>66456-BL</td>
<td>Print Cartridge, Black</td>
<td>6/case</td>
</tr>
<tr>
<td>66456-CO</td>
<td>Print Cartridge, Color</td>
<td>6/case</td>
</tr>
</tbody>
</table>

* CAUTION: Contact with the Tissue-Tek® SmartWrite™ color printed label while wet with organic solvents will result in loss of printed information
Optional Accessories for Tissue Tek SmartWrite™

Shuttle® Computer X50V2 PLUS Touch Screen PC

Specifications

- RAM: 1GB PC3-10600 1333MHz DDR3 SODIMM NON- ECC
- Hard Drive: 250GB SATA 5400 RPM 8MB 2.5
- OS Windows®: 7 Home Premium 32 BIT. Includes: Windows® 7 Home Premium 32 BIT Recovery DVD
- Form Factor: All-in-one PC
- Net Weight: 3.5kg
- Dimension: (W) 15.4” x (H) 12.8” x (D) 1.4”
- Processor: Intel® Atom™ D510 Dual Core CPU (1.66 GHz). CPU on board
- Memory: 2 GB [Supports up to 4 GB DDRII, Max 2 x 2GB]
- Chipset: NM10
- VGA: Intel® GMA 3150 with a powerful 400MHz core, Dynamic Video Memory Technology (DVMT) 4.0, Intel® ClearVideo Technology
- Ethernet: JMC261 IEEE 802.3u 100Base-T specification compliant, 10Mbps/100Mbps. Support Wake-on-LAN function
- Storage Interface Support: 2.5” Hard Drive
- Power: 40W Power Adapter, 110-240VAC
- LCD Panel: 15.6” 16:9 Wide Panel, 1366 x 768 pixels
- Touch Screen: Single Touch
- Web Cam: 1.3M Fixed
- MIC: Electret Condenser Microphone
- Left Side: Power-on button, Stylus pen port, USB port x 2, DC-input for power supply
- Right Side: 4 in 1 Card reader, USB port x 2, Headphone, Mic, LAN port
- Back Panel: D-sub port x 1, Serial port x 2 (optional), Parallel port x 1 (optional), Kensington lock
- Audio: ID792HD61 2 Channel High, 2W x 2 Stereo speaker
- Accessories: Quick Guide x 1, 65W Power Adapter x 1, power cord x 1, Driver CD x 1
- Wireless LAN: IEEE 802.11b/g/n
- Card Reader: 4 in 1 Card Reader [support SD/MMC/MS/MS-pro]
- Software: Shuttle Control AP

Bio-Pure™ Surfactant Wipes
Durable and biodegradable

For ease in removing dirt, grease and grime these General Laboratory wipes are ideal for cleaning lab benches, door handles, pipet tips, keyboards and instrument knobs. They are lint free and they will not scratch surfaces yet they are extremely durable and will not fall apart. These wipes are 100% Biodegradable with a very low carbon footprint.

EMS # | Description | Qty
---|---|---
68651-12 | Bio-Pure™ Surfactant Wipes | pack

Amber Clens
Anti-Static Foam Cleaner

A multipurpose anti-static foaming cleaner. Ideal for general cleaning on a wide variety of Laboratory, Industrial, aerospace and commercial equipment. Removes tough, stubborn stains such as grease, grime, and Dirt

Anti-static formulation, reduces the attraction of airborne dust

EMS # | Description | Qty
---|---|---
68651-13 | Amber Clens, 400 gms | each

DataLogic® Gryphon™ GD4430-HCK1 2D Barcode Scanner

Specifications

Decoding Capabilities

1D: Linear Codes Autodiscriminates all standard 1D codes including GS1 DataBar™ linear codes
2D: Aztec Code, China Han Xin Code, Data Matrix, MaxiCode, QR Code

Electrical

Current: Operating (Typical): 160 mA @ 5VDC, Standby (Typical): 65 mA @ 5VDC

Input Voltage: 4.2 – 5.25 VDC

Reading Ranges

Typical Depth of Field:
- Code 29: 10 to 30.0 cm / 0.1 to 1.8 in
- Code 39: 10 to 45.0 cm / 0.4 to 1.8 in
- Data Matrix: 10 to 15.0 cm / 0.4 to 0.6 in
- Data Matrix: 10 to 30.0 cm / 4.0 to 1.8 in
- EAN-13: 10 to 45.0 cm / 0.4 to 1.8 in
- PDF417: 10 to 70.0 cm / 3.4 to 2.8 in
- QR Code: 10 to 30.0 cm / 4.0 to 1.8 in

Reading Performance

Image Capture: Graphic Formats: BMP, JPEG, TIF, GIF, Encapsulated: 256, 16, 2
Image Sensor: Wide VGA 752 x 480 pixels
Light Source Aiming: 650 nm VLD
Motion Tolerance: 25 IPS
Print Contrast: 25% Ratio (Min)
Reading Angle: +/- 40°, Roll (Tit): 180°, Pitch: +/- 40°
Reading Indicators: Beep (Adjustable Tone), DataLogic ‘Green Spot’, Good Read Feedback, Good Read LED
Resolution (Max.): 1D Linear: 0.012 mm/4 mils; Data Matrix: 0.017 mm/7 mils; PDF417: 0.012 mm/4 mils

Special
- Disinfectant-Ready enclosures treated with anti-microbial additives; Highly visible 4-Dot aimper with center cross for targeted scanning

Peak™ ABC Lupe
Seven kinds of magnifying power

The Peak ABC Lupe is a precision folding lube consisting of A lens (12X), B lens (3X) and C lens (6X). With these three lenses combined, seven kinds of magnifying power are available.

The lens is made from high quality glass optics and the body is made of aluminum.

The magnification desired will be available from the combination table shown on the back of the lube

Specifications

Magnification: 3X, 6X, 9X, 12X, 14X, 16X, 18X
Effective Aperture
- A lens: 14 mm (12X)
- B lens: 20 mm (6X)
- C lens: 28 mm (3X)
Size: 60 x 39 x 24 mm
Net Weight: 76 g

EMS # | Description | Qty
---|---|---
68160 | ABC Lupe | each
**C-flat™ Holey Carbon Grids for cryo-TEM**

The premier holey carbon grid for cryo-transmission electron microscopy

---

**Overview**

C-flat™ is an ultra-flat, holey carbon-coated TEM support grid for transmission electron microscopy (TEM). Unlike competing holey carbon films, C-flat™ is manufactured without plastics, so it is clean upon arrival and the user has no residue to contend with.

---

**The C-flat™ Advantage**

C-flat™ leads to better data sets.

Made with patented technology, C-flat™ provides an ultra-flat surface that results in better particle dispersion and more uniform ice thickness. Patterning is done using deep-UV projection lithography, ensuring the most accurate and consistent hole shapes and sizes down to submicron features. The precise methods by which C-flat™ is manufactured eliminate artifacts such as excess carbon and edges around holes.

C-flat™ is affordable

C-flat™ is available in 25, 50, and 100 packs at a per-grid price less than competing products.

---

**Applications**

C-flat™ holey carbon grids provide the ideal specimen support to achieve high resolution data in cryo-TEM making them an ideal choice for single particle analysis, cryo electron tomography and automated TEM analysis.

Cryo-electron tomography (cryoET) and Single Particle Analysis (SPA):

Numerous researchers have reported that the ultra-flat surface of C-flat™ leads to even ice thickness and uniform particle distribution within the hole areas. This optimal particle distribution results in superior data being collected as compared with other holey support films. 2µm hole sizes are standard but custom hole sizes are available so C-flat™ can accommodate the common magnifications used for quantitative TEM analysis.

Automated TEM:

C-flat™ provides a regular array of analysis sites compatible with automated data collection software such as LEICA. This compatibility, in combination with the more uniform ice thickness and particle distribution reported by numerous researchers, results in more high-quality target sites per grid.

---

**Publications using C-flat™**


Anchi Cheng, Denis Fimm, James Pulokas, Clinton S. Potter and Bridget Carragher


**Product Line**

C-flat™ is a holey carbon film supported by a standard TEM grid. C-flat™ products are fully specified by 4 parameters: the hole diameter and pitch of the holey carbon film and the material type and mesh size of the TEM grid. The following image illustrates these parameters:

**Standard Products**

The breadth of applications in cryo-TEM necessitate a wide range of holey carbon film patterns. And now, with the recent expansion of the product line, a C-flat™ holey carbon film is available for almost any application. Whether 600nm holes are needed for very high magnifications with ultra-high resolution cameras or large open areas are needed for larger specimens, C-flat™ is the perfect holey carbon grid.

C-flat™ is immediately available in several standard array patterns including hole diameters/hole spacings of 0.6/2, 1/1, 1.2/1.4, 1.2/1.3, 2/1, 2/2, 2/4, 4/2, and a multihole pattern. C-flat™ is supported by your choice of a 200 mesh or 400 mesh copper TEM grid and sold in quantities of 25, 50, or 100.

---

**Articles**


C-flat™ Holey Carbon Grids for cryo-TEM (continued)

**Ordering Information**

The complete line is available as well in an extra thick version (approx. carbon has 40nm thickness).

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Cat. #</th>
<th>Hole Size</th>
<th>Hole Spacing</th>
<th>TEM Mesh</th>
<th>TEM Grid</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF-1.2/1.3-2C</td>
<td>CF213-25</td>
<td>1.2 µm</td>
<td>1.3 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-1.2/1.3-2C</td>
<td>CF213-50</td>
<td>1.2 µm</td>
<td>1.3 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-1.2/1.3-2C</td>
<td>CF213-100</td>
<td>1.2 µm</td>
<td>1.3 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-2/0.5-2C</td>
<td>CF205-25</td>
<td>2.0 µm</td>
<td>0.5 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-2/0.5-2C</td>
<td>CF205-50</td>
<td>2.0 µm</td>
<td>0.5 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-2/0.5-2C</td>
<td>CF205-100</td>
<td>2.0 µm</td>
<td>0.5 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-2/0.5-4C</td>
<td>CF405-25</td>
<td>2.0 µm</td>
<td>0.5 µm</td>
<td>400</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-2/0.5-4C</td>
<td>CF405-50</td>
<td>2.0 µm</td>
<td>0.5 µm</td>
<td>400</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-2/1-2C</td>
<td>CF212-25</td>
<td>2.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-2/1-2C</td>
<td>CF212-50</td>
<td>2.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-2/1-2C</td>
<td>CF212-100</td>
<td>2.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-2/1-4C</td>
<td>CF412-25</td>
<td>2.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-2/1-4C</td>
<td>CF412-50</td>
<td>2.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-2/1-4C</td>
<td>CF412-100</td>
<td>2.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-2/2-2C</td>
<td>CF222-25</td>
<td>2.0 µm</td>
<td>2.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-2/2-2C</td>
<td>CF222-50</td>
<td>2.0 µm</td>
<td>2.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-2/2-2C</td>
<td>CF222-100</td>
<td>2.0 µm</td>
<td>2.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-2/2-4C</td>
<td>CF242-25</td>
<td>2.0 µm</td>
<td>4.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-2/2-4C</td>
<td>CF242-50</td>
<td>2.0 µm</td>
<td>4.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-2/2-4C</td>
<td>CF242-100</td>
<td>2.0 µm</td>
<td>4.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-4/1-2C</td>
<td>CF241-25</td>
<td>4.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-4/1-2C</td>
<td>CF241-50</td>
<td>4.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-4/1-2C</td>
<td>CF241-100</td>
<td>4.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-4/1-4C</td>
<td>CF441-25</td>
<td>4.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-4/1-4C</td>
<td>CF441-50</td>
<td>4.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-4/1-4C</td>
<td>CF441-100</td>
<td>4.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-4/2-2C</td>
<td>CF242-25</td>
<td>4.0 µm</td>
<td>2.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-4/2-2C</td>
<td>CF242-50</td>
<td>4.0 µm</td>
<td>2.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-4/2-2C</td>
<td>CF242-100</td>
<td>4.0 µm</td>
<td>2.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-4/2-4C</td>
<td>CF244-25</td>
<td>4.0 µm</td>
<td>2.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-4/2-4C</td>
<td>CF244-50</td>
<td>4.0 µm</td>
<td>2.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-4/2-4C</td>
<td>CF244-100</td>
<td>4.0 µm</td>
<td>2.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-MH-2C</td>
<td>CF2MH-100</td>
<td>Multihole*</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
<td></td>
</tr>
<tr>
<td>CF-MH-4C</td>
<td>CF4MH-25</td>
<td>Multihole*</td>
<td>400</td>
<td>Cu</td>
<td>25/pk.</td>
<td></td>
</tr>
<tr>
<td>CF-MH-4C</td>
<td>CF4MH-50</td>
<td>Multihole*</td>
<td>400</td>
<td>Cu</td>
<td>50/pk.</td>
<td></td>
</tr>
<tr>
<td>CF-MH-4C</td>
<td>CF4MH-100</td>
<td>Multihole*</td>
<td>400</td>
<td>Cu</td>
<td>100/pk.</td>
<td></td>
</tr>
<tr>
<td>CF-1/1-2C</td>
<td>CF21-25</td>
<td>1.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-1/1-2C</td>
<td>CF21-50</td>
<td>1.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-1/1-2C</td>
<td>CF21-100</td>
<td>1.0 µm</td>
<td>1.0 µm</td>
<td>200</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
<tr>
<td>CF-1/1-4C</td>
<td>CF41-25</td>
<td>1.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>25/pk.</td>
</tr>
<tr>
<td>CF-1/1-4C</td>
<td>CF41-50</td>
<td>1.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>50/pk.</td>
</tr>
<tr>
<td>CF-1/1-4C</td>
<td>CF41-100</td>
<td>1.0 µm</td>
<td>1.0 µm</td>
<td>400</td>
<td>Cu</td>
<td>100/pk.</td>
</tr>
</tbody>
</table>

* C-flat™ mounted on a stub using carbon tape and imaged with a Field Emission Scanning Electron Microscope.

* The Multihole device has a staggered pattern of six features consisting of three circle patterns of 1 micron, 1.4 micron and 2 micron diameter and three ellipse patterns of 1x4 microns, 1.4x5.6 microns and 2x8 microns.
QUANTIFOIL® is a perforated support foil with pre-defined hole size, shape and arrangement. It has advantages in electron microscopy (EM) or low-energy electron point source (LEEP) microscopy when compared with conventional holey foil.

QUANTIFOIL® is offered with circular and square, orthogonal arranged holes. Films with different hole sizes and bar widths are available. Carbon is the standard material that makes the foil.

QUANTIFOIL® is a superior quality of holey carbon film, which facilitates the use of automation in TEM (The Imaging Technology Group of Dr. Bridget Carragon, University of Illinois at Urbana-Champaign, has developed a system, called LegoS, for automatically acquiring images from a transmission electron microscope).

The surface properties of QUANTIFOIL holey carbon support film, especially the wetting properties, may have to be adapted according to one's particular requirements. Untreated aging QUANTIFOIL® tends to be hydrophobic. Hydrophilicity of the foil can be achieved by glow discharging in residual air or by metal coating.

QUANTIFOIL® in low-energy electron point source (LEEP) microscopy. Quantifoil® with a regular pattern is required in order to be able to distinguish an object, which is spanned over a hole. An object cannot be discriminated from the support in the case of conventional holey support film. (H.-W. Fink & C. Schonenberger, University of Basel, used QUANTIFOIL® for the measurement of electrical current through DNA molecules.)

The foil is ~12 nm thick and mounted on either copper, nickel or gold grids with either square or round holes of different sizes. Holey films with 2µ round holes are used at magnifications between 30,000x and 40,000x.

QUANTIFOIL® is generally delivered as a carbon foil; it can be reinforced with plastic film. The standard thickness for the carbon foil is 12 nm; other thicknesses between 10 and 25 nm can be made upon request.

QUANTIFOIL® is supplied with 200 mesh copper, nickel or gold grids. Other meshes are also available upon request as a special order. All special orders are available in quantities of a minimum of 100 grids or multiples of 100.

QUANTIFOIL® with Circular Holes

QUANTIFOIL® with circular holes is used in cryo-electron tomographic reconstruction. The roundness of the holes is advantageous with respect to the formation of an ice layer of constant thickness. The whole size chosen depends on the magnification used, and on whether or not one wishes to include support film in the image. Assessment of the image quality is easier when foil is included in the picture, because the power spectrum of a foil is stronger than that of unsupported ice.

QUANTIFOIL® R 3.5/1 QUANTIFOIL® R 3.5/1 may be preferred over foils with smaller holes if the carbon film should be outside the frame of the image. This option can be desirable in the case of extended objects, such as filamentous objects, for example.

QUANTIFOIL® R 1/4 QUANTIFOIL® R 1/4 may be preferred over R 1.2/1.3, when an increased tolerance with respect to the position of beam, and a larger beam diameter are desired, such as in the case of automated image acquisition.

QUANTIFOIL® R 0.6/1 Hole size is 0.6 µ. Space between holes is 1 µ. Center to center is 1.6 µ (hole size may be as large as 1 µ).

QUANTIFOIL® R 5/20 Hole size is 5 µ. Space between holes is 20 µ. Center to center is 25 µ.

QUANTIFOIL® R 2/4 QUANTIFOIL® R 2/4 may be preferred over R 2/2, when an increased tolerance with respect to the position of beam, and a larger beam diameter are desired, such as in the case of automated image acquisition.

QUANTIFOIL® R 2/2 Holey films with 2 µ circular holes are used at magnifications between 30,000x and 40,000x.

QUANTIFOIL® R 2/1 QUANTIFOIL® R 2/1 has more open area than R 2/2. It is used when focusing is carried out on the edge of a hole burnt in the ice in a neighboring hole instead of on the foil adjacent to the hole.

QUANTIFOIL® R1.2/1.3 A foil with ~1.2 µ circular holes and a spacing of ~2.5 µ between the holes. This type is used at magnifications around 50,000x.

QUANTIFOIL® with Square Holes

QUANTIFOIL® with square holes and relatively narrow bars can be used in EM to support a thin carbon film, which by itself is too fragile to span a grid square. Alternatively, this holey film can directly support an object that is larger than the holes.

QUANTIFOIL® S 7/2 QUANTIFOIL® S 7/2 constitutes an optimum between a maximum of open area on the one hand, and mechanical stability on the other hand.

QUANTIFOIL® with Different Hole Shapes

QUANTIFOIL® Multi A QUANTIFOIL® Multi A is a holey film, which consists of various pattern hole sizes, shapes and arrangements is repeated. In addition to round holes, the pattern includes oval-shaped ones, which appear round at high tilt angles (~70°). The diameters of the round holes are about 1, 1.4 and 2 µ, and the bar widths range from 0.5 to 4 µ. The oval holes in the foil have a dimension of 8 x 2 µ and 4 x 1 µ.

QUANTIFOIL® with Hexagonal Geometry

This type of QUANTIFOIL® is meant for slot grids. It was especially designed for supporting serial thin sections. It offers an optimum between mechanical stability on the one hand and background-free area on the other hand. The foil is thin enough to allow those parts of the sections that lie on the bars to be interpreted. In this way, the information in the sections can be interpreted to the maximum.

QUANTIFOIL® Hex 15 A foil with hole size of 26 µ (diameter of inscribed circle) and a repeating distance of 41 µ, the side length of the holes and the bar width are 15 µ.
## QUANTIFOIL® Ordering Information

<table>
<thead>
<tr>
<th>Hole Shape</th>
<th>Grid Type</th>
<th>Hole Size</th>
<th>Period</th>
<th>Cat. # 200 Mesh</th>
<th>Cat. # 300 Mesh</th>
<th>Cat. # 400 Mesh</th>
<th>Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 3.5/1</td>
<td>Copper</td>
<td>3.5µm</td>
<td>4.5µm</td>
<td>0256CR-35</td>
<td>0256CR-35</td>
<td>0460CR-35</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>3.5µm</td>
<td>4.5µm</td>
<td>0256NR-35</td>
<td>0256NR-35</td>
<td>0456NR-35</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>3.5µm</td>
<td>4.5µm</td>
<td>0256AR-35</td>
<td>0256AR-35</td>
<td>0460AR-35</td>
<td>100pk</td>
</tr>
<tr>
<td>R 1/4</td>
<td>Copper</td>
<td>1µm</td>
<td>5µm</td>
<td>0256CR-14</td>
<td>0256CR-14</td>
<td>0456CR-14</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>1µm</td>
<td>5µm</td>
<td>0256NR-14</td>
<td>0256NR-14</td>
<td>0456NR-14</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>1µm</td>
<td>5µm</td>
<td>0256AR-14</td>
<td>0256AR-14</td>
<td>0460AR-14</td>
<td>100pk</td>
</tr>
<tr>
<td>R 0.6/1</td>
<td>Copper</td>
<td>0.6µm</td>
<td>1.6µm</td>
<td>0256CR-06</td>
<td>0256CR-06</td>
<td>0456CR-06</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>0.6µm</td>
<td>1.6µm</td>
<td>0256NR-06</td>
<td>0256NR-06</td>
<td>0456NR-06</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>0.6µm</td>
<td>1.6µm</td>
<td>0256AR-06</td>
<td>0256AR-06</td>
<td>0460AR-06</td>
<td>100pk</td>
</tr>
<tr>
<td>R 5/20</td>
<td>Copper</td>
<td>5µm</td>
<td>25µm</td>
<td>0256CR-520</td>
<td>0256CR-520</td>
<td>0456CR-520</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>5µm</td>
<td>25µm</td>
<td>0256NR-520</td>
<td>0256NR-520</td>
<td>0456NR-520</td>
<td>50pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>5µm</td>
<td>25µm</td>
<td>0256AR-520</td>
<td>0256AR-520</td>
<td>0460AR-520</td>
<td>100pk</td>
</tr>
<tr>
<td>R 2/4</td>
<td>Copper</td>
<td>2µm</td>
<td>6µm</td>
<td>0256CR-4</td>
<td>0256CR-4</td>
<td>0456CR-4</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>2µm</td>
<td>6µm</td>
<td>0256NR-4</td>
<td>0256NR-4</td>
<td>0456NR-4</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>2µm</td>
<td>6µm</td>
<td>0256AR-4</td>
<td>0256AR-4</td>
<td>0460AR-4</td>
<td>50pk</td>
</tr>
<tr>
<td>R 2/2</td>
<td>Copper</td>
<td>2µm</td>
<td>4µm</td>
<td>0256CR2</td>
<td>0256CR2</td>
<td>0456CR2</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>2µm</td>
<td>4µm</td>
<td>0256NR2</td>
<td>0256NR2</td>
<td>0456NR2</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>2µm</td>
<td>4µm</td>
<td>0256AR2</td>
<td>0256AR2</td>
<td>0460AR2</td>
<td>50pk</td>
</tr>
<tr>
<td>R 2/1</td>
<td>Copper</td>
<td>2µm</td>
<td>3µm</td>
<td>0256CR1</td>
<td>0256CR1</td>
<td>0456CR1</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>2µm</td>
<td>3µm</td>
<td>0256NR1</td>
<td>0256NR1</td>
<td>0456NR1</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>2µm</td>
<td>3µm</td>
<td>0256AR1</td>
<td>0256AR1</td>
<td>0460AR1</td>
<td>50pk</td>
</tr>
<tr>
<td>R 1.2/1.3</td>
<td>Copper</td>
<td>~1.2µm</td>
<td>~2.6µm</td>
<td>0256CR1,3</td>
<td>0256CR1,3</td>
<td>0456CR1,3</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>~1.2µm</td>
<td>~2.6µm</td>
<td>0256NR1,3</td>
<td>0256NR1,3</td>
<td>0456NR1,3</td>
<td>25pk</td>
</tr>
<tr>
<td>S 7/2</td>
<td>Copper</td>
<td>7 x 7µm</td>
<td>9µm</td>
<td>0256S7</td>
<td>0256S7</td>
<td>0456S7</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>7 x 7µm</td>
<td>9µm</td>
<td>0256SN7</td>
<td>0256SN7</td>
<td>0456SN7</td>
<td>25pk</td>
</tr>
<tr>
<td></td>
<td>Gold</td>
<td>7 x 7µm</td>
<td>9µm</td>
<td>0256SA7</td>
<td>0256SA7</td>
<td>0456SA7</td>
<td>25pk</td>
</tr>
<tr>
<td>Multi A</td>
<td>Copper</td>
<td>—</td>
<td>0.5 x 2.0mm slot grids</td>
<td>0256CMX-HEX</td>
<td>0256CMX-HEX</td>
<td>0456CMX-HEX</td>
<td>100pk</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>—</td>
<td>0.5 x 2.0mm slot grids</td>
<td>0256MNMA-HEX</td>
<td>0256MNMA-HEX</td>
<td>0456MNMA-HEX</td>
<td>100pk</td>
</tr>
</tbody>
</table>
EMS is happy to announce the addition of many new Vacuum greases and waxes to their already expansive line.

- **Apiezon PFPE 501 Grease**
  - High temperature lubricating vacuum grease, inert
  - EMS is happy to announce the release of a brand new revolutionary Grease specifically for high temperature.
  - PFPE 501 is a chemically inert, high temperature and extreme pressure lubricant. With an upper operating temperature of 250°C and vapor pressure of $1.3 \times 10^{-16}$ at 25°C, it is robust, versatile and can be used for sealing and lubricating under the most extreme operating conditions. This includes environments where aggressive chemicals and strong oxidising agents are regularly used.

- **Apiezon AP100 Grease**
  - Silicone-free ultra high vacuum lubricating grease
  - Apiezon AP100 Grease is a silicone-free vacuum grease and lubricant. Containing PTFE, AP100 exhibits extremely high levels of lubricity and has been shown to provide eight times the level of lubrication offered by standard, petroleum-based lubricating greases.
  - Apiezon AP100 is designed for use at ambient temperatures (generally between 10 to 30°C / 50 to 86°F). If you are looking for a grease capable of performing at higher temperatures, Apiezon AP101 or Apiezon H Grease may be more appropriate.

**Benefits of Apiezon AP100 Grease**
- Has anti-seize properties, making it an effective protector and lubricant in ultra-high vacuums
- Exhibits extremely high levels of lubricity
- Demonstrates an extremely low vapor pressure of $7 \times 10^{-11}$ Torr at 20°C
- Recommended for use at ambient temperatures
- Does not suffer from contamination problems associated with silicone based greases such as "creep" or "carry over"
- Easy to clean and remove using hot water and an aqueous glassware detergent, hydrocarbon or chlorinated solvents

**Applications of Apiezon AP100**
The unique properties of Apiezon AP100 lubricating vacuum grease mean it is frequently used to protect stepping motors and gearboxes from corrosion and abrasion, particularly when they are subjected to high load conditions. AP100 is also used to prevent seizure in stopcocks, taps and small metal fastenings.

The creep resistance of Apiezon AP100 benefits scientific and semiconductor users alike. AP100 helps to increase the accuracy of analytical techniques and improve yields in semiconductor manufacture by contamination avoidance.

In addition, AP100 is used for surface coating applications where silicone contamination can lead to poor surface adhesion and incomplete coating defects.

---

**Why Use Apiezon PFPE 501 Grease?**
- PFPE based
- High temperature lubricant
- Used in oxygen rich environments
- Ultra high vacuum
- Chemically inert
- Extreme pressure
- Wide temperature range

**Benefits of Apiezon PFPE 501 Grease?**
- Extended equipment life
- High temperature lubricant
- Reduced equipment downtime
- Lower service costs
- Life-time lubrication
- Guaranteed Apiezon quality
- Expert technical support

**Typical Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLGI No.</td>
<td>2</td>
</tr>
<tr>
<td>Penetration PSD</td>
<td>280</td>
</tr>
<tr>
<td>Typical working temperature</td>
<td>-15 to 250 °C</td>
</tr>
<tr>
<td>Radiation</td>
<td>5 to 482 °F</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>$&lt;1.3 \times 10^{-16}$ Torr at 25°C</td>
</tr>
<tr>
<td>Relative density</td>
<td>2.003</td>
</tr>
<tr>
<td>4 ball wear scars (mm)</td>
<td>0.94</td>
</tr>
<tr>
<td>ASTM D2266 (40kg)</td>
<td>0.94</td>
</tr>
</tbody>
</table>

**Vapor Pressure of PFPE 501 Grease over working temperature range**
Apiezon Greases

Apiezon Greases are unique products, designed for use in high vacuum work:

- Excellent lubricants.
- High purity, low vapor pressure - non-contamination in analysis.
- The working temperature range of each grease is dependent on the grade that is used.
- Easily applied, easily cleaned off.
- Silicone free. This benefits scientific users because the risk of sample contamination and consequently the risk of interference in analytical techniques such as infra-red or mass spectrometry, etc. is avoided.
- Approved by NASA and NATO

Apiezon Grease, Type L

Grease L is a petroleum hydrocarbon grease, containing no additives. Very low vapor pressure (@20°C of 8x10⁻⁸ torr), high vacuum grade. Type L is widely used in the stationary phase of gas liquid chromatography, and may be used on all ground joints in a vacuum system (not for stopcocks). Its solubility is as follows: in Ethanol at 20°C<0.003%, 60°C<0.005%; 100°C<0.011%; 150°C<0.011%. Grease L softens and melts at about 47°C and is not recommended for joints where temperatures exceed more than 30°C in use. Grease T is recommended for these higher temperatures.

60702 Apiezon Grease L 25g tube

Apiezon Grease, Type M

Similar to grease type L, but it contains more wax. Grease M has an estimated vapor pressure @ 20°C of 2x10⁻⁹ torr, higher than Type L. Type M is recommended for applications where a grease of moderately low vapor pressure is required; such as for sealing ground joints on the backside of oil diffusion pumps.

60700 Apiezon Grease M 25g tube

Apiezon Grease, Type N

Similar to Type L and Type M, but Type N grease has a special additive which gives it a tenacious, rubbery consistency and provides an extra cushioning effect which absorbs vibrations in equipment, making N grease invaluable in fragile glass to glass joints, like burette taps, which continually risk fracture. Grease N is widely recognized and recommended as the cryogenic vacuum grease of choice.

60701 Apiezon Grease N 25g tube

Apiezon Grease, Type H

Type H grease is designed for high temperatures -10 to +240°C in a wide range of applications in both science and industry. With good “friction”, grease H is ideal for use with laboratory glassware, but combined with properties of high thermal conductivity, it is the perfect choice for the electronics and space industries where heat sink media require adhesion.

Grease H is a filled hydrocarbon which exhibits excellent thermal conductivity, and strong absorption properties. The capability to absorb greasy or chemical impurities on metal and glass surfaces is a value “tool” required by electronic industries.

60703 Apiezon Grease, Type H 25g tube

Apiezon Grease, Type T

Type T is designed for lubricating glass taps and for general purposes. Has a melting point of 125°C and has an estimated vapor pressure @ 20°C of 5x10⁻⁹ torr. Although type T is useful at higher temperatures, it can also be used at ambient temperatures.

60704 Apiezon Grease T 25g tube

Apiezon Grease, Type AP101

Type AP101 is an excellent general purpose, hydrocarbon grease, which is intended for a variety of industrial and scientific applications.

- Anti-Seize Properties: The AP 101 contains PTFE which confers superior anti-seize properties providing long lasting lubrication and ensuring smooth operation of stop cocks and taps. The value of AP 101 anti-seize properties are not limited to laboratory or glassware use, but are equally effective when used on metal equipment which may be subject to seizure or corrosion.
- Non silicone Grease: Being hydrocarbon based AP 101 does not suffer from the problems of “creep” or “carry over” which is traditionally associated with silicone greases. It reduces sample contamination and the risk of interference in analytical techniques such as infra-red and mass spectrometry.
- Wide temperature range: It can be used over a very wide range of temperatures, possessing its optimum consistency over the -15 to +150°C temperature range, but is usable down to -40°C and, for limited periods, up to +180°C.
- Solvent resistant: Both PTFE and the lithium stearate gel base in AP 101 are insoluble in many solvents. They ensure that AP 101 shows resistance to water, alcohols, ketones and esters. In addition AP 101 resists attack from aqueous acid and alkali solutions, alcoholic alkali solutions and corrosive gases.
- Under vacuum: AP 101 exhibits good vacuum properties, down to 10⁻⁴ torr.
- Easily remove AP 101 by wiping it with a soft cloth. Any residues of grease can be washed away with an aqueous glassware detergent.

60706-01 Apiezon Grease AP101 50 g
60706-40 Apiezon Grease AP101 4 kg
Apiezon Greases (continued)

**Vapor Pressure of Type H Grease over working temperature range**

**Vapor Pressure of AP100 Grease over working temperature range**

**Vapor Pressure of Types L,M,N, and AP100 Greases over working temperature range**

**Vapor Pressure of AP101 Grease over working temperature range**

---

**Complete List of Vacuum Grease Properties**

<table>
<thead>
<tr>
<th>Typical Property</th>
<th>AP101</th>
<th>AP100</th>
<th>Type H</th>
<th>Type L</th>
<th>Type M</th>
<th>Type N</th>
<th>Type T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main areas of application</td>
<td>General</td>
<td>Lubricating</td>
<td>High Temp</td>
<td>High Vacuum</td>
<td>General Vacuum</td>
<td>Cryogenic</td>
<td>Medium Temp</td>
</tr>
<tr>
<td>Typical Working Temperature Range</td>
<td>40°C</td>
<td>10°C</td>
<td>10°C</td>
<td>10°C</td>
<td>10°C</td>
<td>10°C</td>
<td>10°C</td>
</tr>
<tr>
<td></td>
<td>40°F</td>
<td>10°F</td>
<td>10°F</td>
<td>10°F</td>
<td>10°F</td>
<td>10°F</td>
<td>10°F</td>
</tr>
<tr>
<td>Dropping Point</td>
<td>&gt;200°C</td>
<td>42-52°F</td>
<td>&gt;392°C</td>
<td>108-126°C</td>
<td>doesn’t melt</td>
<td>108-126°C</td>
<td>108-126°C</td>
</tr>
<tr>
<td>ASTM D 566-02 (IP 132/96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor Pressure @ 20°C / 68°F, Torr</td>
<td>&lt;1.0 x 10⁻⁶</td>
<td>7.0 x 10⁻¹¹</td>
<td>1.7 x 10⁻⁸</td>
<td>7.0 x 10⁻¹¹</td>
<td>1.7 x 10⁻⁸</td>
<td>6.0 x 10⁻¹⁰</td>
<td>4.6 x 10⁶</td>
</tr>
<tr>
<td>Relative Density @ 20°C / 68°F</td>
<td>0.981</td>
<td>1.042</td>
<td>0.918</td>
<td>0.896</td>
<td>0.894</td>
<td>0.911</td>
<td>0.912</td>
</tr>
<tr>
<td>Resistant to Radiation</td>
<td>N/R</td>
<td>N/R</td>
<td>N/R</td>
<td>N/R</td>
<td>N/R</td>
<td>N/R</td>
<td>N/R</td>
</tr>
<tr>
<td>Lubricity 4 Ball Test</td>
<td>450 kg</td>
<td>450 kg</td>
<td>250 kg</td>
<td>150 kg</td>
<td>150 kg</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>ASTM D 2596 (IP 239/97), kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outgassing characteristics</td>
<td>TML</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>ASTM E 966-90/2000x1</td>
<td>&lt;0.1%</td>
<td>&lt;0.1%</td>
<td>&lt;0.1%</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Viscosity of Molten Grease, cS @ 50°C/122°F</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>766</td>
<td>413</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Viscosity of Molten Grease, cS @ 100°C/212°F</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>62.3</td>
<td>29.8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Coefficient of Expansion</td>
<td>0.00066</td>
<td>N/A</td>
<td>N/A</td>
<td>0.00076</td>
<td>0.00075</td>
<td>0.00072</td>
<td>0.00073</td>
</tr>
<tr>
<td>Thermal Conductivity, w/m °C @ 20°C</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>0.216</td>
<td>0.194</td>
<td>0.194</td>
<td>N/A</td>
</tr>
<tr>
<td>Thermal Conductivity, w/m °C @ 260°C</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>0.095</td>
<td>N/A</td>
</tr>
<tr>
<td>Specific Heat, J/g</td>
<td>N/A</td>
<td>N/A</td>
<td>1.7</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Electrical Strength, V/mil (0.001)</td>
<td>N/A</td>
<td>N/A</td>
<td>730</td>
<td>850</td>
<td>820</td>
<td>730</td>
<td>N/A</td>
</tr>
<tr>
<td>Volume Resistivity, Ω cm</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1.2 x 10¹⁶</td>
<td>2.6 x 10¹⁶</td>
<td>2.0 x 10¹⁶</td>
<td>2.3 x 10¹²</td>
</tr>
<tr>
<td>Permittivity</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>2.3</td>
<td>2.1</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Loss Tangent</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>


**Apiezon Vacuum Sealing, Mounting, and Etching Waxes**

The Apiezon range of waxes features three products including the popular Apiezon Wax W, also known as ‘Black Wax’. All three waxes in the Apiezon range can be used as permanent or semi-permanent vacuum sealants or mounting media. Apiezon Wax W is also a perfect etch resist.

**Why Use Apiezon Waxes?**
- Versatile products suitable for a multitude of uses
- Etch resist (Wax W only)
- First-rate vapour pressure characteristics
- High purity combined with powerful “gettering” & clean meltdown properties
- Excellent waterproof media
- Easy to use and to remove
- 10 year shelf life

---

**Apiezon Q Compound**

Apiezon Q Compound is an effective temporary vacuum sealant that is used as a short term solution in situations which do not allow for the immediate dismantling of a system for repair.

**Why Use Apiezon Q Compound?**
- Temporary vacuum sealant
- Versatile product suitable for a multitude of uses
- Excellent waterproof medium
- Easy to use and to remove
- 10 year shelf life

---

**Apiezon Waxes and Q Compound Applications**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cat. #</th>
<th>Description</th>
<th>Cat. #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Vacuum Sealing/Mounting Wax, Etch Resist</td>
<td>60710</td>
<td>Apiezon Wax W</td>
<td>60710</td>
</tr>
<tr>
<td>Medium Hardness Vacuum Sealant/Mounting Wax</td>
<td>60711</td>
<td>Apiezon Wax W100</td>
<td>60711</td>
</tr>
<tr>
<td>Soft Vacuum Sealant/Mounting Wax</td>
<td>60712</td>
<td>Apiezon Wax W40</td>
<td>60712</td>
</tr>
<tr>
<td>Vacuum Sealing Compound</td>
<td>60713</td>
<td>Apiezon Q Compound</td>
<td>60713</td>
</tr>
</tbody>
</table>

---

**Waxes and Q Compound Properties**

<table>
<thead>
<tr>
<th>Typical Property</th>
<th>Wax W</th>
<th>Wax W100</th>
<th>Wax W40</th>
<th>Q Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Softening Point</td>
<td>°C</td>
<td>80-90</td>
<td>50-60</td>
<td>40-50</td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>176-194</td>
<td>122-140</td>
<td>104-122</td>
</tr>
<tr>
<td>Estimated Vapor Pressure @ 20°C / 68°F, torr</td>
<td>4.5 x 10⁴</td>
<td>4.5 x 10⁴</td>
<td>6 x 10⁴</td>
<td>1 x 10⁴</td>
</tr>
<tr>
<td>Temperature for Application</td>
<td>°C</td>
<td>130</td>
<td>110</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>266</td>
<td>230</td>
<td>194</td>
</tr>
<tr>
<td>Working Temperature Range</td>
<td>°C</td>
<td>-10-75</td>
<td>-10-45</td>
<td>-10-35</td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>14-186</td>
<td>14-113</td>
<td>14-95</td>
</tr>
<tr>
<td>Water Permeability g/cm/hr/mm Hg @ 25°C</td>
<td>0.8 x 10⁴</td>
<td>1.6 x 10⁴</td>
<td>1.6 x 10⁴</td>
<td>N/A</td>
</tr>
<tr>
<td>Pack</td>
<td>N/A</td>
<td>250 g tin</td>
<td>250 g tin</td>
<td>1 Kg</td>
</tr>
<tr>
<td>1 Kg block</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>25 x 20 g sticks</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Thermal/Electrical Properties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Conductivity @ 20°C, w/m</td>
<td>°C</td>
<td>0.189</td>
<td>0.170</td>
<td>0.177</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Specific Heat @ 25°C, J/g</td>
<td></td>
<td>1.8</td>
<td>2.7</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Loss Tangent</td>
<td></td>
<td>0.015</td>
<td>0.016</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Permittivity</td>
<td></td>
<td>2.8</td>
<td>2.7</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Volume Resistivity, Ω cm</td>
<td></td>
<td>6.31 x 10¹⁵</td>
<td>1.64 x 10¹⁵</td>
<td>5.06 x 10¹⁵</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
ACLAR®—Fluoropolymer Films

An Embedding/Cell Growing Film

ACLAR® is made from fluorinated-chlorinated resins. There are four basic film types—the homopolymer ACLAR® Rx Series, the copolymers ACLAR® 22A and 33C and the new ACLAR® Co. (Honewell/Allied Signal). The chemical make-up of all ACLAR® products provide an exceptional moisture barrier. ACLAR® is crystal clear, biochemically inert, highly resistant to most chemicals and sterilizable by heat or radiation. ACLAR® is used widely in pharmaceutical, medical, sensitive electronics and military packaging.

ACLAR® 33C is a copolymer film consisting primarily of chlorotrifluoroethylene (CTFE). It offers an outstanding moisture barrier, excellent chemical resistance and minimal dimensional change (2%), making it the best choice for use in microscopy.

ACLAR® UltRx 2000 is a 2.00 mil (51 micron) PCTFE homopolymer, high performance barrier film for the pharmaceutical and medical markets. It thermoforms well on conventional blister packaging equipment and provides the best barrier of any clear film.

Features:
- Crystal clear, high UV transparency – ideal for use in UV curing of embedding resin in microscopy.
- Chemically stable and biochemically inert – the product of choice for growing cell cultures.
- Low dielectric constant, high electric strength and dissipation factor – offers excellent cell attachment even through lengthy processing procedures.
- Low surface energy – separates easily from epoxy

ACLAR® Physical Data

ACLAR® 33C (These are only typical values and are not to be interpreted as product specifications):

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity @ 73°F – 50% RH</td>
<td>7.8 mil</td>
<td>ASTM D1505</td>
</tr>
<tr>
<td>Yield</td>
<td>1.677 in/lb, 2.383 m/kg</td>
<td></td>
</tr>
<tr>
<td>Haze</td>
<td>&lt;4.5%</td>
<td>ASTM D1003</td>
</tr>
<tr>
<td>Crystalline Melting Point @ 73°F</td>
<td>403°F</td>
<td>ASTM D4591</td>
</tr>
<tr>
<td>Dimensional Stability MD @ 10 min. @ 300°F MD</td>
<td>&lt;2%</td>
<td>ASTM D1204</td>
</tr>
<tr>
<td>Tensile Strength MD @ 10 min. @ 300°F TD</td>
<td>3000-4600 psi</td>
<td>ASTM D882</td>
</tr>
<tr>
<td>Elongation (MD/TD)</td>
<td>50-125%</td>
<td>ASTM D882</td>
</tr>
<tr>
<td>Modulus, Secant MD @ 10 min. @ 300°F TD</td>
<td>185,000-200,000 psi</td>
<td>ASTM D882</td>
</tr>
<tr>
<td>Tear Strength, Gravels MD @ 10 min. @ 300°F TD</td>
<td>425-525 g/ml</td>
<td>ASTM D1004</td>
</tr>
<tr>
<td>Water Vapor Transmission Rate @ 100°F/100% RH</td>
<td>0.003 gm/100 in/day, 0.047 gm/m²/day</td>
<td>ASTM F1249</td>
</tr>
<tr>
<td>Thermal Conductivity</td>
<td>4.7 x 10-4 cal·cm²/sec·°C</td>
<td></td>
</tr>
<tr>
<td>Flammability</td>
<td>Nonflammable</td>
<td></td>
</tr>
<tr>
<td>Oxygen Index</td>
<td>100</td>
<td>ASTM D2683</td>
</tr>
</tbody>
</table>

ACLAR® UltRx 2000

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity @ 73°F – 50% RH</td>
<td>2.0 mil</td>
<td>ASTM D1505</td>
</tr>
<tr>
<td>Yield</td>
<td>6.587 in/lb, 9.343 m/kg</td>
<td></td>
</tr>
<tr>
<td>Haze</td>
<td>&lt; 1%</td>
<td>ASTM D1003</td>
</tr>
<tr>
<td>Crystalline Melting Point @ 73°F</td>
<td>412°F</td>
<td>ASTM D4591</td>
</tr>
<tr>
<td>Dimensional Stability MD @ 10 min. @ 300°F MD</td>
<td>&lt;6%</td>
<td>ASTM D1204</td>
</tr>
<tr>
<td>Tensile Strength MD @ 10 min. @ 300°F TD</td>
<td>7,000-10,000 psi</td>
<td>ASTM D882</td>
</tr>
<tr>
<td>Elongation (MD/TD)</td>
<td>150-200%</td>
<td>ASTM D882</td>
</tr>
<tr>
<td>Modulus, Secant MD @ 10 min. @ 300°F TD</td>
<td>175 - 250%</td>
<td>ASTM D882</td>
</tr>
<tr>
<td>Surface Tension (Treated Side)</td>
<td>42 dyne/cm</td>
<td>ASTM D2578</td>
</tr>
<tr>
<td>Water Vapor Transmission Rate @ 77°F (25°C/60% RH)</td>
<td>0.0012 gm/100 in/day, 0.0186 gm/m²/day</td>
<td>ASTM F1249</td>
</tr>
<tr>
<td>@ 86°F (30°C/60% RH)</td>
<td>0.0025</td>
<td>ASTM F1249</td>
</tr>
<tr>
<td>@ 10°F (4°C/75% RH)</td>
<td>0.0066</td>
<td></td>
</tr>
<tr>
<td>@ 100°F (37°C/100% RH)</td>
<td>0.0077</td>
<td></td>
</tr>
</tbody>
</table>

References:
Omni Probe Accessories & Consumables

**Omni Grids**

- **Copper Lift-Out Grids**
  Custom copper lift-out grids specifically designed for in-situ lift-out. These grids include multiple indexed mounting locations with both vertical bars and "V" shaped attachment surfaces. 3mm diameter.
  - 75964-01 Copper Lift-Out Grids 100/vial

- **Molybdenum Lift-Out Grids**
  Custom molybdenum lift-out grids specifically designed for in-situ lift-out. These grids include multiple indexed mounting locations with both vertical bars and "V" shaped attachment surfaces. 3mm diameter.
  - 75964-02 Molybdenum Lift-Out Grids 25/vial

- **Beryllium Half-Ring Grids**
  Custom beryllium half ring grids. 3mm diameter.
  - 75964-03 Beryllium Half Ring Grids 10/pk

- **Copper 5-Post Lift-Out Grids**
  Custom copper 5-post lift-out grids specially designed for in-situ lift-out. These grids include multiple indexed mounting locations, all with vertical bars attachment surfaces. Now with lower profile sides for easier access to outermost posts. 3mm diameter.
  - 75964-04 Copper 5-Post Lift-Out Grids 100/vial

- **Copper 4-Post Lift-Out Grids**
  Custom copper 4-post lift-out grids specially designed for in-situ lift-out. These grids include multiple indexed mounting locations, two with vertical bars attachment surfaces and two with "V" shaped alignment surfaces. Sides have lower profile for easier access to outermost posts. 3mm diameter.
  - 75964-05 Copper 4-Post Lift-Out Grids 100/vial

- **Molybdenum 4-Post Lift-Out Grids**
  Custom Molybdenum 4-post lift-out grids specially designed for in-situ lift-out. These grids include multiple indexed mounting locations, two with vertical bars attachment surfaces and two with "V" shaped alignment surfaces. Sides have lower profile for easier access to outermost posts. 3mm diameter.
  - 75964-06 Mo 4-Post Lift-Out Grids 25/vial

**Copper 3-Post Lift-Out Grids**

- **Side Access**
  3 post copper lift-out grids, similar to 75964-01, in design but 35 micron thick with 1 edge lower for easy access. Packaged in glass vials.
  - 75964-07 Copper 3-Post Lift-Out Grids, Side Access 100/vial

- **Shallow Downset**
  3 post copper lift-out grids specifically designed for in-situ lift-out. These grids include multiple indexed mounting locations with both vertical bar and "V" shaped attachment surfaces. These grids have a shallower downset and slightly wider center post than 75964-01. Packaged in glass vials.
  - 75964-08 Copper 3-Post Lift-Out Grids, Shallow Downset 100/box

- **5 Post Lift-Out Grids**
  5 post copper lift-out grids specifically designed for in-situ lift-out. These grids include multiple indexed mounting locations, all with vertical bar attachment surfaces. Now with lower profile sides for easier access to outermost posts. 3mm dia. Packaged in plastic vials.
  - 75964-09 Copper 5-Post Lift-Out Grids 100/box

- **4 Post Lift-Out Grids**
  4 post copper lift-out grids specifically designed for in-situ lift-out. These grids include multiple indexed mounting locations, two with vertical bar attachment surfaces and two with "V" shaped alignment surfaces. Sides have lower profile for easier access to outermost posts. 3mm dia. Packaged in plastic vials.
  - 75964-10 Copper 4-Post Lift-Out Grids 100/box

**Omniprobe TEM Grid Comparison Chart**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Number of Posts</th>
<th>Material</th>
<th>Thickness (Nominal Microns)</th>
<th>Nominal Post Downset Microns</th>
<th>Unique Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>75964-01</td>
<td>3</td>
<td>Copper</td>
<td>30</td>
<td>10</td>
<td>Top Downset only</td>
</tr>
<tr>
<td>75964-02</td>
<td>3</td>
<td>Molybdenum</td>
<td>30</td>
<td>10</td>
<td>Top Downset only</td>
</tr>
<tr>
<td>75964-03</td>
<td>0</td>
<td>Beryllium</td>
<td>25</td>
<td>N/A</td>
<td>Half Ring</td>
</tr>
<tr>
<td>75964-04</td>
<td>5</td>
<td>Copper</td>
<td>40</td>
<td>10</td>
<td>5th Post in E</td>
</tr>
<tr>
<td>75964-05</td>
<td>4</td>
<td>Copper</td>
<td>30</td>
<td>10</td>
<td>Top Downset only</td>
</tr>
<tr>
<td>75964-06</td>
<td>4</td>
<td>Molybdenum</td>
<td>30</td>
<td>5</td>
<td>Side Access</td>
</tr>
<tr>
<td>75964-07</td>
<td>3</td>
<td>Copper</td>
<td>30</td>
<td>5</td>
<td>5th Post is &quot;E&quot;</td>
</tr>
<tr>
<td>75964-08</td>
<td>3</td>
<td>Copper</td>
<td>35</td>
<td>5</td>
<td>Side Access</td>
</tr>
<tr>
<td>75964-09</td>
<td>5</td>
<td>Copper</td>
<td>35</td>
<td>5</td>
<td>5th Post is &quot;E&quot;</td>
</tr>
<tr>
<td>75964-10</td>
<td>4</td>
<td>Copper</td>
<td>35</td>
<td>5</td>
<td>5th Post is &quot;E&quot;</td>
</tr>
</tbody>
</table>
**New Products**

**Immunostain Moisture Chamber**
This low-cost, high precision moisture chamber for ten slides is another innovative product from EMS

Each moisture chamber is divided into ten individual compartments with approximately half-inch empty space between the compartments. When the chamber lid is closed, eight barrier dividers are placed into the empty spaces between the microscope slide compartments completely isolating all compartments. This is a very desirable feature when doing immuno staining.

The microscope slides are placed on four pedestal posts and four corner posts each 0.460 inch (11.5 mm) high thus raising the surface of the slides approximately half-inch off the floor to keep the slides away from the water below and to make the slides easily retrievable (either by hand or by forcop).

The chamber is fabricated out of heavy duty polyurethane with an air-tight design to keep moisture in. The chambers are designed to be stackable in order to save counter and/or refrigerator space.

Available in clear, black and amber.

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>62010-35</td>
<td>Immunostain Moisture Chamber Clear</td>
<td>each</td>
</tr>
<tr>
<td>62010-36</td>
<td>Immunostain Moisture Chamber, Amber</td>
<td>each</td>
</tr>
<tr>
<td>62010-37</td>
<td>Immunostain Moisture Chamber, Black</td>
<td>each</td>
</tr>
</tbody>
</table>

**Held Secure™ Slide/Cassette Storage System**
A durable corrugated filing box kit for the proper filing, identification, and storage of glass slides or cassettes

- Designed to hold up to 2,000 slides or 500+ cassettes per box
- Partitioned Drawers for easy retrieval
- Double tabbed in back for additional safety
- Printing on box front designed for easy inventory identification
- Internal corrugated construction designed for multiple stacking
- Sold in unassembled cases of 10 boxes
- 50 In/Out Cards come with each Slide/Cassette case for slide retrieval documentation
- 25 Index Cards come with each Slide Kit for slide retrieval documentation
- Additional cards and removable tray labels available for bulk purchase
- Internal corrugated construction supports up to 250 lbs and the tray remains easily accessible
- Manufactured in the USA

The complete set comes unassembled in packages of 10.

Each tray has a double row for slide or cassette storage. The slide kit contains 4 trays and the cassette kit contains 8.

**Differential Quick Staining Kit**
(Modified Giemsa)
This kit is a Modified Giemsa Stain kit for quick turn around results

The kit may be used for rapid blood smears for differential assessment, as well as for the detection of H. Pylori microorganisms. The kit comes complete with a fixative for air dried cell suspensions and or touch preparation slides.

**Applications:**
- Fine Needle Aspirations
- Frozen Sections
- Blood Smears
- Cytological Specimens
- Cytogenetics
- Microorganism Detection
- Bone Marrow Biopsies

This stain offers results in 15 seconds.

The kit comes complete with 3 solutions and is available in 3 sizes.

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>26066-25</td>
<td>Differential Quick Staining Kit</td>
<td>250 ml</td>
</tr>
<tr>
<td>26066-50</td>
<td>Differential Quick Staining Kit</td>
<td>500 ml</td>
</tr>
<tr>
<td>260098-75</td>
<td>Differential Quick Staining Kit</td>
<td>Gallon</td>
</tr>
</tbody>
</table>

**Cat. # | Description | Qty.**
--- | --- | ---
63280-50 | File System Set for Slides | 10 Box/Case
63280-51 | File System for Cassettes | 10 Box/Case
63280-52 | Slide In/Out Cards | 1000/Case
63280-53 | Cassette In/Out cards | 1000/Case
63280-54 | Slide Index Cards | 500/Case
63280-55 | Removable Tray Labels | 500/Roll
**Correlative Microscopy Coverslips**

EMS introduces a simple coverslip with a grid image that allows cells to grow and later be analyzed under brightfield or fluorescence microscopy before being further processed and sectioned for EM or other analysis. These unique coverslips do all that.

**Applications:**
- Light Microscopy, Fluorescence, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), High-Pressure Cryofixation

**Features:**
- Reticle film has been thoroughly tested with cell culture
- Good growth of cell culture (equivalent to conventional media)
- Good adhesion to the substrate without cell polylysine
- Resistant to normal chemicals used in electron microscopy
- No oxygen retention, compatible resin LR White
- Good optical quality in brightfield & UV fluorescence
- Excellent transparency
- Does not deform at temperatures (positive 100°C and negative liquid N2)
- Rigid, does not float in the middle of culture
- Easy to handle and cut with a knife or micro-punch
- Simple sterilisation using alcohol or UV
- Detaches easily from resin after polymerisation
- Low cost

---

**Combination Scales**

*We are very pleased to add to our extensive line of Calibration products the following new Combination Scales*

**A. The New PS-XO Series**
All of the PS-XO series of Calibration Slides is Green Float Glass, Bright Chrome Image

1. **PS300-XO**
   - High definition 300mm scale in 0.1mm divisions with extended 0.5mm, 1.0mm and 5.0mm lines to allow calibrations in those increments too. Series of dots and crosses, at 10mm intervals, included for calibrations where these shapes are preferred. Supplied in polished wooden case.

   **Key Features**
   - 300mm high definition scale in 0.1mm divisions with additional dot and cross series at 10mm centers

2. **PS150-XO**
   - High definition 150mm scale in 0.1mm divisions with extended 0.5mm, 1.0mm and 5.0mm lines to allow calibrations in those increments too. Series of dots and crosses, at 10mm intervals, included for calibrations where these shapes are preferred. Supplied in polished wooden case.

   **Key Features**
   - 150mm high definition scale in 0.1mm divisions with additional dot and cross series at 10mm centers

3. **PS100-XO**
   - High definition 100mm scale in 0.1mm divisions with extended 0.5mm, 1.0mm and 5.0mm lines to allow calibrations in those increments too. Series of dots and crosses, at 10mm intervals, included for calibrations where these shapes are preferred. Supplied in polished wooden case.

   **Key Features**
   - 100mm high definition scale in 0.1mm divisions with additional dot and cross series at 10mm centers

---

**B. The Grid Dot Array**
Green Float glass, high reflective Chrome Image

The ideal product for testing image area, distortion, field flatness and other parameters in optical and imaging systems. The three array areas give options for different magnifications or field size.

The R76, a unique product with three dot arrays to suit different magnification or image areas.

**Key Features**
- 3 image areas, Dot size and pitch different in each area
- 12 x 9 array of 1mm dots at 5mm pitch
- 16 x 12 array of 0.5mm dots at 2mm pitch
- 24 x 18 array of 0.2mm dots at 1mm pitch

---

**How to choose the most appropriate coverslip for your application:**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Number of Squares</th>
<th>Surface covered</th>
<th>Unit size of each square</th>
<th>Average number of cells per square unit (eg HeLa Cell)</th>
</tr>
</thead>
<tbody>
<tr>
<td>66108-01</td>
<td>100</td>
<td>5x1mm²</td>
<td>0.05mm²</td>
<td>2-3</td>
</tr>
<tr>
<td>66108-02</td>
<td>200</td>
<td>100mm²</td>
<td>0.5mm²</td>
<td>20-26</td>
</tr>
<tr>
<td>66108-03</td>
<td>100</td>
<td>100mm²</td>
<td>1mm²</td>
<td>40-50</td>
</tr>
</tbody>
</table>

All of the coverslips are produced on a polyester based film, 0.18mm thick, 22 x 22mm, 25/pk. All other grid sizes and film sizes are available upon special order.

**Cat. # | Description | Qty.**
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>66108-01</td>
<td>10x10 grid of 0.1mm squares at 5 positions</td>
<td>25/pk</td>
</tr>
<tr>
<td>66108-02</td>
<td>20x20 grid of 0.5mm squares</td>
<td>25/pk</td>
</tr>
<tr>
<td>66108-03</td>
<td>10x10 grid of 1mm squares, each square individually identified 0-99</td>
<td>25/pk</td>
</tr>
</tbody>
</table>
PP3010T Cryo-SEM Preparation System

Overview
The PP3010T is a highly automated, easy to use, column-mounted, gas-cooled cryo preparation system suitable for most makes and models of SEM, FE-SEM and FIB/SEM. The PP3010T has all the facilities needed to rapidly freeze, process and transfer specimens. The cryo preparation chamber is turbomolecular pumped and includes tools for cold fracturing, controlled sublimation and specimen coating. The specimen can then be transferred onto a highly stable SEM cold stage for observation. Cold trapping in the cryo preparation chamber and SEM chamber ensures the whole process is frost free. Specimen process times are typically between five and ten minutes.

Key Features
- High resolution performance
- Large “recipe” driven touch screen interface
- Easy to use - extensive automation, on-screen help, videos, data logging and diagnostics
- Column-mounted preparation chamber - essential for frost-free transfer and ease of use
- Cold stage temperature down to -190°C, plus comprehensive cold trapping (not possible with conduction cooling)
- Turbo pumping system mounted off-column - less mass on the SEM
- Unsurpassed specimen visibility - large front window, top viewing ports, multiple LED chamber lighting
- Cameras in the preparation chamber and SEM - cumbersome binocular not needed
- Preparation chamber cooling - twenty-four hour hold time with a single fill of liquid nitrogen, allowing unattended overnight operation
- Automated start up, sublimation, and coating
- Fully compatible with SEM beam deceleration/stage bias modes up to 5kV
- Vacuum storage of the cryo transfer device; integrated valves enhances performance
- Typical vacuum when cold: 10-6mbar or better - specimen transfer into the SEM always high vacuum to vacuum
- Twin liquid nitrogen slushing and specimen handling system for pre-frozen specimens
- Fracturing/specimen manipulation device
- Prepdek™ workstation - self contained work area, extra bench space not required
- Specialized support backed up with a three-year warranty

Product Description
The PP3010T is a great leap forward in cryo-SEM technology. It combines the highest quality results with unparalleled ease of use.

The PP3010T is a column-mounted, gas-cooled cryo preparation system suitable for use with SEM, FE-SEM and FIB/SEM instruments. Control is via a large and intuitive touch screen mounted on the spacious Prepdek™ workstation, giving the operator instant access to, and control of, all the key operating parameters.

Visibility is a key feature throughout the whole system. CCD camera images form the preparation chamber and the SEM are displayed on the control screen - the image can be expanded to full screen when required. Five preparation chamber viewing windows give unsurpassed visibility of the specimen and chamber interior.

On-column preparation chamber with off-column cooling and pumping
The PP3010T conveniently combines the advantages of what are often referred to as ‘on-column’ and ‘off-column’ cryo preparation systems. The preparation chamber is directly attached to the SEM, but with the turbomolecular pumping and advanced SEM cooling system mounted remotely from the SEM. In this way, the mass and volume attached directly to SEM is kept to a minimum.

There are significant advantages of having the preparation chamber attached directly to the SEM. In particular, specimen transfer is always from high vacuum to high vacuum, which greatly reduces the risk of specimen contamination (frosting). In addition, it makes the system easier to use and allows the operator a more flexible approach to specimen preparation and observation. This is because during a single processing run it may be useful to move the specimen between the preparation chamber and the SEM cold stage - and vice versa - on a number of occasions.

Prepdek™ workstation and touch screen user interface
The Prepdek™ workstation has been designed to allow specimen mounting, freezing (and pre-frozen specimen manipulation) and transfer device storage on one ergonomically designed work surface. The control electronics are mounted in a sealed, but accessible, cabinet beneath the Prepdek™. A flexible LED light gives the user an excellent view of the preparation process.
PP3010T Cryo-SEM Preparation System (continued)

Conveniently set into the Prepdek™ worksurface is a pumped storage tube and allows the cryo transfer device to be stored under clean, dry vacuum conditions when not in use.

A variable position specimen shuttle mounting pillar provides a solid base for specimen mounting and includes a height gauge to ensure specimens are within the acceptable height range.

The control PC is mounted on a flexible arm and can be positioned to suit the user (eg angled towards the SEM operator during specimen observation - allowing key system parameters to be viewed at a glance).

The PP3010T is controlled using a 15" interactive colour touch screen, mounted on the user-friendly Prepdek™ workstation. The touch screen allows user-defined "recipes" to be rapidly entered and stored for instant future access. The screen can be set to suit different operator levels and preferences - eg analog or digital vacuum measurements.

CCD camera images of both the preparation chamber and SEM cold stages are displayed and can be expanded to fill the screen. Although many of the key steps in the specimen preparation process are automated (airlock pumping, sublimation, sputter coating, etc.), further help is instantly available through user-friendly videos. These guide the operator through the system setup and then each specimen processing step in a concise and logical way.

Handling and transferring specimens

The PP3010T Prepdek™ workstation is fitted with a slushy nitrogen freezing station, connected to the pumping system. Rapid freezing reduces ice crystal damage, which results in improved ultra-structural preservation.

For handling pre-frozen material, the Prepdek™ is also fitted with the Advanced Specimen Handling System, which allows specimens that have been frozen by alternative freezing methods (or stored field specimens) to be manipulated in liquid nitrogen and then transferred under vacuum into the PP3010T preparation chamber for subsequent processing and observation.

The vacuum transfer device is compact, vacuum tight and has a convenient bayonet connection to the specimen shuttle to ensure rapid transfer. In line with the automatic design of the PP3010T, when the vacuum transfer device is located on the preparation chamber, the airlock is automatically pumped.

The PP3010T is supplied with universal 10mm specimen stubs with surface slots, holes and a flat area - useful for most specimen types, because the holes and slots can be used for liquids and to hold solid material for cross-section fracturing. Blank stubs are also included. A range of optional holders are available, including shuttles for large specimens and top-loading holders for high pressure freezing rivets and planchettes.

Cryo preparation chamber

The PP3010T preparation chamber is connected directly to the SEM and includes facilities for preparing all types of specimens. The chamber is fitted with two fully integrated and interlocked gate valves. The outer load-lock valve includes a pumped airlock which accepts the cryo transfer device; the inner SEM valve ensures rapid high-vacuum to high-vacuum specimen exchange.

Specimen stage cooling is by an integral liquid nitrogen dewar which has an all-day run time (up to 24 hours) on a single fill (0.75L) of liquid nitrogen. The stage has a dovetail fitting to accept a cryo shuttle and specimen and can be precisely controlled over a temperature range from 100°C to -190°C or lower. Large gas cooled cold traps located above and below the specimen stage ensure clean, high vacuum conditions in the chamber.

High visibility

The PP3010T has superb chamber visibility. In addition to the large front window there are additional top and side windows. The specimen stage is lit by three LEDs, which avoids the problem of the fracturing knife "shadowing" the specimen during cryo fracturing.

A CCD camera allows the specimen stage to be viewed on the control touch screen. Twin manipulators (actively cooled) are available and allow a range of specimen types to be fractured.

The PP3010T is fitted as standard with a front mounted fracturing/manipulation device. The ball-jointed mount offers flexible movement of the blade and allows the 10/6 scalpel to be used both as a surface pick (probe) and a fracturing knife. Alternative blades can be fitted (not supplied).

An optional micrometer advanced fracturing tool (12145) is available (in addition to the standard side-mounted tool).

Fractured fragments are captured in the large cold trap located below the specimen stage.

Automatic sublimation and sputtering

Sublimation and sputtering are fully automatic. The high resolution sputter coater is specifically designed for cryo applications and will give fine grain films that are essential for FE-SEM applications. A platinum (Pt) target is fitted as standard; other metals include gold (Au), gold/palladium (Au/Pd), chromium (Cr) and iridium (Ir). An optional carbon fiber evaporation head can be fitted.

An optional terminating film thickness monitor (FTM) is available. The system is fully integrated - no external control boxes.
**PP3010T Cryo-SEM Preparation System (continued)**

**Cryo-SEM Micrographs**

- Cross-section of oil/water/rock.
- Cryo prepared image of blue stilton cheese (Penicillium roqueforti).
- Cross-section through plant palisade cells.
- Cross-section image through sunscreen (courtesy of FEI Company and University of Utrecht).

**Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Standard?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryo preparation chamber (column-mounted)</td>
<td>Yes</td>
</tr>
<tr>
<td>Built-in liquid nitrogen cooling dewar with a twenty-four hour run time between fills</td>
<td>Yes</td>
</tr>
<tr>
<td>Two integral gate valves (loading and SEM) with appropriate electrical interlocks. Air lock pumping is automatically activated when the specimen transfer device is attached</td>
<td>Yes</td>
</tr>
<tr>
<td>Variable temperature conduction cooled specimen stage (-185°C to 50°C)</td>
<td>Yes</td>
</tr>
<tr>
<td>Cold stage ‘parking space’ for a second specimen shuttle (allows a second specimen to be prepared in advance)</td>
<td>Yes</td>
</tr>
<tr>
<td>Large anti-contaminator (cold trap) plates above and below cold stage</td>
<td>Yes</td>
</tr>
<tr>
<td>Robust micrometer-fed fracturing knife (actively cooled)</td>
<td>Option</td>
</tr>
<tr>
<td>Side-mounted surface knife/probe (actively cooled). A range of scalpel blades can be fitted to suit different specimen requirements</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic sublimation (controlled and viewed on the touch screen)</td>
<td>Yes</td>
</tr>
<tr>
<td>Fully automatic, high resolution sputter coater with platinum (Pt) target. Other targets, including gold (Au), gold/palladium (Au/Pd), chromium (Cr) and iridium (Ir), are available as options.</td>
<td>Yes</td>
</tr>
<tr>
<td>Sputtering controlled and viewed on the user touch screen</td>
<td>Yes</td>
</tr>
<tr>
<td>High purity argon gas carri isor (1L)</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbon fiber evaporation head and power supply</td>
<td>Option</td>
</tr>
<tr>
<td>Large front viewing window (138 x 73mm) plus top and side viewing ports</td>
<td>Yes</td>
</tr>
<tr>
<td>Preparation chamber camera (CCD) mounted on a side port</td>
<td>Yes</td>
</tr>
<tr>
<td>Viewing port shutter - automatically closes during sputtering to ensure the port window is clear of sputtered material</td>
<td>Yes</td>
</tr>
<tr>
<td>Vacuum transfer device</td>
<td>Yes</td>
</tr>
<tr>
<td>Chamber illumination - three LEDs</td>
<td>Yes</td>
</tr>
<tr>
<td>SEM cooling dewar, SEM cold stage and cold trap (anticontaminator)</td>
<td>Yes</td>
</tr>
<tr>
<td>Gas-cooled nitrogen cold stage assembly (-190°C to 50°C)</td>
<td>Yes</td>
</tr>
<tr>
<td>Temperature stability of &gt; 1°C</td>
<td>Yes</td>
</tr>
<tr>
<td>Separate gas-cooling circuits for SEM stage and SEM anti-contaminator</td>
<td>Yes</td>
</tr>
<tr>
<td>CHE2000 D2L capacity, off-column cooling dewar with run time between fills of up to 24 hours</td>
<td>Yes</td>
</tr>
<tr>
<td>SEM CCD camera - viewed on the system control screen</td>
<td>Yes</td>
</tr>
<tr>
<td>LED lighting (interlocked)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Pumping system and controls**

- Remotely-mounted turbomolecular pumping system (7OL/s).
- Includes: anti-vibration base, vacuum buffer tank, vacuum valves and stainless steel bellows connection to the preparation chamber. Typical preparation chamber vacuum: 10-6mbar
- Single 90L/m rotary pump required
  - [Yes](#)
  - Order separately

**System control and specimen handling**

- Control via a colour user touch screen monitor (15”) mounted on the Prepdex™
  - Multi-ability user interface screen (expert/novice)
  - Quick, easy overview of system status
  - User-definable ‘recipes’ can be stored
  - Quick access to videos outlining preparation techniques and system maintenance
  - Fully automatic sputtering
  - Automatic sublimation
  - Quick, easy overview of system status
  - CCD camera image of preparation chamber and microscope chamber
  - Twin liquid nitrogen slushing and specimen handling system - ideal for handling pre-frozen specimens. Mounted on the Prepdex™
    - [Yes](#)
    - System electronics stored in a ventilated, sealed unit under the Prepdex™
      - Specimen shuttles (2): E7449-9 multi-specimen stubs (pack of 10) and E7402 blank aluminium (Al) stubs (pack of 10).
      - Other shuttles and stubs available - see Ordering Information

**Installation and training**

- Installation and training at the customer site
  - Contact EMS

**Support and other information**

- Comprehensive start-up kit with key spares
  - [Yes](#)
- Three-year warranty
  - [Yes](#)
- SEM column interfaces and SEM stage adaptor (tailored to each microscope)
  - [Yes](#)
- Some options and accessories (see Ordering Information for full list)
- Terminating film thickness monitor (FTM)
  - Option
- Self-pressure LN2 dewar and regulator (for storage and venting)
  - Option
- Carbon fiber evaporation head
  - Option
- Wide range of specimen holders and specimen stubs
  - Option

**Electron Microscopy Sciences** In PA: (215) 412-8400 • Toll-Free (800) 523-5874
Fax (215) 412-8450 or 8452 • email: slglock@gol.com or stacie@ems-secure.com • www.emsdiasum.com
PP3010T Cryo-SEM Preparation System (continued)

Cryo preparation chamber pumping

The preparation chamber is pumped by a remotely-positioned 70L/s turbomolecular pumping system. Typical preparation chamber vacuum during operation are in the region of 10-6 mBar or better. Positioning the turbomolecular pump away from the SEM ensures total elimination of mechanical vibration and significantly reduces the cryo system mass that is connected to the SEM. A vacuum buffer tank allows the rotary pump to be automatically switched off for most of the time. The pumping system is connected to the preparation chamber by flexible stainless-steel bellows.

A 1,389L/s rotary vacuum pump is required to "back" the turbomolecular pump and for slushing and rough pumping operations. The rotary pump can be located up to five metres from the system, allowing remote location if required. Dry pumping alternatives are available.

SEM cold stage, cold trap and cooling system

A highly stable, thermally isolated, liquid nitrogen gas-cooled stage attaches to the SEM stage. The SEM stage and cold trap are cooled by two separate cold gas circuits - both capable of reaching temperatures down to -190°C. This configuration allows the operator to select stage and cold trap temperatures that are optimised for specific specimens. For example, for some non-biological materials it is useful to hold the specimen at very low temperatures - a cold stage temperature of -175°C and a cold trap temperature of -190°C.

The SEM cold stage has a temperature range of +100°C to -190°C and a temperature stability of < 1°C.

Off-column cooling

The cold nitrogen gas-cooling dewar for the SEM stage and cold trap is remotely positioned (typically on the floor behind the SEM). The system will run for up to 24 hours between fills.

Nitrogen gas cooled cold stage – temperature range down to -190°C

Gas-cooled SEM cold trap (temperatures down to -190°C). Tailor-made to suit each SEM.

Ordering Information

Note: For a full quotation, including on-site installation and customer training, please contact us.

PP3010T Cryo-SEM preparation system for SEM, FE-SEM and FIB/SEM applications. Including: column-mounted cryo-preparation chamber with off-column turbo pumping system: SEM cold stage and cold trap, PrepStation® workstation with dual freezing and specimen manipulation facilities, automated sputtering and sublimation. Touch screen user interface mounted on the PrepStation workstation. Transfer device, 2 x AL200077B 1 x 10246 specimen shuttles, E7449-5 and E7402 specimen stations. Microscope interfaces, start-up kit, mounting media and operation manual each.

Pumping

The PP3010T requires one 90L/m rotary pump (dry pumps available on request.

91005 RVG 90L/m 115/230V 50/60Hz rotary vacuum pump with oil mist filter each.

Options and accessories

PP7450 Pressured dewar (75L) for LN2 storage and venting gas supply each.

10998 Carbon fiber evaporation head including 1m high purity carbon fiber each.

10999 Film thickness monitor (FTM) each.

12145 Micrometer controlled fracturing device with tool steel blades. Note: the standard ball-joint mounted fracturing tool is fitted as standard. The 12145 can be fitted in addition each.

12060 Two-years spares/consumables kit each.

Specimen holders

10204 Top-loading specimen shuttle for planchettes each.

10246 Top-loading specimen shuttle, to take a 1.0mm stub each.

10247 Top-loading specimen shuttle for stubs (like style) each.

E7433 Upright holder specimen stub, screw-down style (for use with 10246) each.

E7449-5 Universal specimen stub with surface holes and slots (pack of 5) each.

E7401 Specimen stub shuttle (spares) each.

E7402 Aluminum (Al) stubs (pack of 10) each.

E7403 Copper (Cu) stubs (pack of 10) each.

E7405 Screw down stub for thin, hard specimens each.

E7406 Copper (Cu) stubs with 3 x 5mm slots (pack of 5) each.

E7407 Copper (Cu) stubs with 1 x 5mm slots (pack of 5) each.

32816510 Brass rods for fracturing liquids (pack of 100) each.

Sputter targets and carbon fiber

E7400-314A Gold (Au) target 0.008” thick each.

E7400-3148 Gold/palladium (Au/Pd) 99.99% target 0.2mm thick each.

E7400-314C Platinum (Pt) target 0.008” thick each.

E7400-314CR Iridium (Ir) target 0.008” thick each.

91047-1 Carbon fiber cord — high purity - 1m each.

91047-5 Carbon fiber cord — high purity - 5m each.
### Specimen Stages for EMS Equipment

The EMS line of specimen stages meets most requirements. All are easy change, drop-in style (no screws) and are height adjustable (except rotary planetary stage).

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Stage Type</th>
<th>Description</th>
<th>Compatible Equipment</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4500-1</td>
<td>50mm</td>
<td>Standard stage with six stub positions for 15 mm or 6.5 mm or 1/6&quot; pin stubs (same as #3300, 6401, 6552)</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-2</td>
<td>Tilt</td>
<td>Rotate-tilt stage with six stub positions for 15 mm or 6.5 mm or 1/6&quot; pin stubs. Tilt up to 90° from horizontal. (same as #3340, 6419, 6400 S, 6551)</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-3</td>
<td>4&quot; Wafer</td>
<td>Adjusts to accept 2&quot;, 3&quot;, 4&quot; wafers. Comes with 4500-6, a 4&quot; stub holder to accept up to 18 1/8 pin stubs (same as #6349)</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-4</td>
<td>6&quot; Wafer</td>
<td>Adjusts to accept 4&quot; &amp; 6&quot; wafers. Comes with 4500-7, a 6&quot; stub holder to accept up to 27 1/8 pin stubs (same as #6347)</td>
<td>EMS 300</td>
<td>each</td>
</tr>
<tr>
<td>4500-5</td>
<td>8&quot; Wafer</td>
<td>Adjusts to accept 6&quot; &amp; 8&quot; wafers. Comes with 4500-8, an 8&quot; stub holder to accept up to 54 1/8 pin stubs</td>
<td>EMS300TT, EMS300RT</td>
<td>each</td>
</tr>
<tr>
<td>4500-6</td>
<td>4&quot; Stub Holder</td>
<td>A 4&quot; stub holder to accept up to 18 1/8 pin stubs</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-7</td>
<td>6&quot; Stub Holder</td>
<td>A 6&quot; stub holder to accept up to 27 1/8 pin stubs</td>
<td>EMS300TT, EMS300RD</td>
<td>each</td>
</tr>
<tr>
<td>4500-8</td>
<td>8&quot; Stub Holder</td>
<td>An 8&quot; stub holder to accept up to 54 1/8 pin stubs</td>
<td>EMS300TT, EMS300RT</td>
<td>each</td>
</tr>
<tr>
<td>4500-9</td>
<td>4&quot; Wafer &amp; Offset Gearbox</td>
<td>A combination of 4500-3 and a small gearbox to offset the sample position. Enable even coating of up to a 4&quot; sample size. (same as #3360, 4522)</td>
<td>EMS150T, EMS150R</td>
<td>each</td>
</tr>
<tr>
<td>4500-10</td>
<td>Fibre Stage</td>
<td>A stage accept single fibres or pins up to 1 mm diameter rotating horizontally to achieve all round coating.</td>
<td>EMS150T, EMS150R</td>
<td>each</td>
</tr>
<tr>
<td>4500-11</td>
<td>6&quot; Square Wafer</td>
<td>Stage to accept 6&quot; square wafer or Masks</td>
<td>EMS300TT, EMS300RT</td>
<td>each</td>
</tr>
<tr>
<td>4500-12</td>
<td>Rota Cota</td>
<td>&quot;Rota Cota&quot; planetary stage with six stub positions for 15 mm or 6.5 mm or 1/6&quot; pin stubs. Tilt up to 30° from horizontal. (same as #4521, 6402, 6553)</td>
<td>EMS150T, EMS150R</td>
<td>each</td>
</tr>
<tr>
<td>4500-13</td>
<td>8 Place Stub</td>
<td>8 places for 25 or 30mm Polished embedded samples. Includes a polished Brass Tally.</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-14</td>
<td>14 Place Stub</td>
<td>14 places for 25 or 30mm Polished embedded samples. Includes a polished Brass Tally.</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-15</td>
<td>9 Place CoverSlip</td>
<td>A Stage to accept 9 20X20 cover slips. The top part of stage lifts off and has a mechanism to lift the cover slips for easy removal</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-16</td>
<td>4 Place 25mm Stub</td>
<td>4 Place 25mm Stub Stage with locking screws. May be fitted to 4500-12 rota cota stage.</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
<tr>
<td>4500-17</td>
<td>Slide Stage</td>
<td>Microscope slide stage for up to two 75 mm x 25 mm slides or eight stub positions for pin stubs. (same as #3370, 4520, 6403, 6554)</td>
<td>All EMS Series</td>
<td>each</td>
</tr>
</tbody>
</table>
### Edwards E2M1.5 Vacuum Pumps

This miniature two stage pump features an alternative inlet connection position at the side of the pump so that overall installation height can be reduced to a minimum when required.

- 1.3 cfm (190L/min) displacement
- Ultimate vacuum (without gas ballast): 1.1x10⁻³ torr.
- Max. inlet pressure for water vapor: 11.3 torr
- Max. water vapor pumping rate: 0.035 lb/hr
- Oil capacity Max/Min: 0.20L/0.2L

Ultra Grade 19 Oil is recommended for use with the E2M1.5. Weight: 50 lbs (22kg)

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>91004</td>
<td>Vacuum Pump E2M1.5</td>
<td>each</td>
</tr>
<tr>
<td>91004-E</td>
<td>Vacuum Pump E2M1.5, 220 Volts</td>
<td>each</td>
</tr>
</tbody>
</table>

### Oil Mist Filters

We are pleased to announce that we are now offering not only the vacuum pumps but to help you deal with exhaust mist from the pump sticking to any surfaces that it touches and becoming a dust magnet.

Mist filters capture oil mist from the outlet of pumps, which would otherwise be ejected into the atmosphere. This may happen when you use gas ballast or when you pump high gas throughputs. You can also return oil trapped in the mist filter back to the pump, although you must ensure that the process gases will not contaminate the pump or pump oil.

For the E2M1.5 use the EMF3. For the RV3, RV5, and RV8 use the EMF 10.

### Edwards RV Series Vacuum Pumps

**Rotary vacuum pumps — double stage.**

#### Edwards V3 Vacuum Pump

- Speed: (Pneupump 6602)
- 50 Hz operation: 2 ft³/min⁻¹ (3.3 m³/h⁻¹)
- 60 Hz operation: 2.3 ft³/min⁻¹ (3.9 m³/h⁻¹)
- Ultimate Vacuum (Total Pressure): High Vacuum Mode - 2 x 10⁻⁹ mbar
- Inlet connection: NW25

In high vacuum mode it is ideal for backing turbo pumps, analytical instruments, and electron microscopes. Configurable for high throughput mode. Weight: 43 lbs (19.6kg).

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>91003</td>
<td>Vacuum Pump RV3</td>
<td>each</td>
</tr>
<tr>
<td>91003-E</td>
<td>Vacuum Pump RV3, 220 Volts</td>
<td>each</td>
</tr>
</tbody>
</table>

#### Edwards RV5 Vacuum Pump

- 4.1 cfm (117L/min) displacement
- Ultimate vacuum (without gas ballast): 1.5x10⁻⁵ torr.
- Max. inlet pressure for water vapor: 38 torr
- Max. water vapor pumping rate: 0.48 lb/hr
- Motor: 1/2 hp
- Oil capacity Max/Min: 0.7L/0.42L

Ultra Grade 19 Oil is recommended for use with the RV5. Weight: 43 lbs (19.6kg)

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>91005</td>
<td>Vacuum Pump RV5</td>
<td>each</td>
</tr>
<tr>
<td>91005-E</td>
<td>Vacuum Pump RV5, 220 Volts</td>
<td>each</td>
</tr>
</tbody>
</table>

#### Edwards RV8 Vacuum Pump

- 6.9 cfm (195 L/min) displacement
- Ultimate vacuum (without gas ballast): 1.5x10⁻⁵ torr.
- Max. inlet water pressure vapor: 29 torr
- Max. water vapor pumping rate: 48 lb/hr
- Motor: 3/4 hp
- Oil capacity Max/Min: 0.75L/0.43L

Ultra Grade 19 Oil is recommended for use with the RV8. Weight: 50 lbs (24kg).

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>91025</td>
<td>Vacuum Pump RV8</td>
<td>each</td>
</tr>
<tr>
<td>91025-E</td>
<td>Vacuum Pump RV8, 220 Volts</td>
<td>each</td>
</tr>
</tbody>
</table>

### EMF3

- Protection from oil mist emissions as required by COSHH and health and safety regulations
- Use of optional oil return kits results in reduced oil level maintenance and savings in pump oil
- If the oil element becomes blocked, an integral pressure relief valve opens

The EMF10 mist filter is suitable for use with RV3, RV5 and RV8 pumps. They are very efficient at 99.9999% DOP (Dust Oiling Particulate) and are also azide proof. The white bottom half of the body is semi-transparent, allowing the oil level to be monitored. The EMF filters have a unique odor element which neutralizes the smell of oil mist.

Supplied with NW25 clamp, centering ring and ‘O’ ring, NW25 to 3/4 inch BSP adaptor

### EMF 10

- Protection from oil mist emissions as required by COSHH and health and safety regulations
- Use of optional oil return kits results in reduced oil level maintenance and savings in pump oil
- If the oil element becomes blocked, an integral pressure relief valve opens

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>91004-OMF</td>
<td>Oil Mist Filter</td>
<td>each</td>
</tr>
<tr>
<td>91004-RMO</td>
<td>Replacement Mist and Odor Element</td>
<td>each</td>
</tr>
</tbody>
</table>
In three hours or less, Freeze Substitution is possible...

EMS Freeze Substitution Kit

Freeze Substitution is a process for low temperature dehydration and fixation of rapidly frozen cells that usually takes days to complete. With the amazing work of K.L. McDonald and R.J. Webb, they have now introduced a new method for freeze substitution with a basic kit that we are proud to offer.

With this unique kit researchers are now able to achieve excellent freeze substitution results in as little as 90 minutes for cells of small volume such as bacteria and tissue culture cells. For those cells of greater volume or that have significant diffusion barriers such as cuticles or thick cell walls, one can extend the time to 3 hours simply by putting a lid on the box.

The EMS Kit consists of the following:

1. EMS 111 Platform Shaker
2. EMS 002 Ice Chest
3. EMS 003 Heater Block
4. EMS 004 Temperature Probe
5. EMS 005 Cryo Tubes
6. EMS 006 Data Logger

How does it work?

1. Cool the metal block by submerging completely in liquid nitrogen in the ice bucket. Leave for 5 minutes or until the “boiling” stops.
2. In a separate box, transfer samples into cryovials with frozen fixative, keeping everything at liquid nitrogen temperatures. Seal tightly and be very sure that there is no liquid nitrogen trapped in the vial. Trapped liquid can cause the vials to explode upon warming. It is best to use a room temperature lid when sealing the tube.
3. Put the vials with samples into holes in the cooled metal block.
4. Go to a PC (Macs won’t work) that has the Lascar datalogger software installed and name and start the program.
5. Pour off the liquid nitrogen from the block and box, making sure not to let the cryovials come out of the holes in the block.
6. Arrange the block so the cryovials are horizontal and put the tops of the vials against one side of the foam box. Use a piece of foam or wadded up paper behind the block so it keeps the vials from falling out of the block during shaking.

Warming Curve With and Without Use of Lid

Typical temperature curves using the EMS Freeze Substitution Kit. With the lid OFF the time to 0°C is about 2 hours. With the lid ON the time is about 3 hours. Results may vary depending on the particular setting of the shaker. For example, head air flow can have a definite influence on the shape of the curves.
EMS Freeze Substitution Kit (continued)

7. Turn on the shaker at 100-125 rpm and allow it to gradually warm until the temperature is at least 0°C before removing the vials for rinsing and resin infiltration. This operation should take place in a fume hood in case there is any leakage of osmium-acetone from poorly sealed vials. Freeze substitution will take about 2 hours with the lid off, and about 3 hours with the lid on (though this may vary from lab to lab).

8. Remove the vials from the metal block and place them onto a rocker at room temperature and wait until they come to about 20°C, then stop the datalogger and save the files.

9. Rinse out the fixative with 3-4 rinses in acetone and proceed to infiltration and embedding. Take care opening the vials as pressure built up inside can cause a spray of the freeze substitution media.

**NOTE: No dry ice is required for this procedure**

**Why does it work?**

- In well-frozen samples the water molecules are not likely to move around very much, even as the temperatures rise to a point where you would expect hexagonal ice (Dubochet, 2007).
- Agitation should speed up the substitution of acetone for water molecules in much the same way that agitation speeds up development of film.
- Water in the substitution mixture does not appear to slow down substitution as was once believed. In fact, it is known to help membrane contrast (Buser and Walther, 2008).

**Does it work for all samples?**

- If a sample can be successfully freeze substituted by the old method, then the quick FS method should work just as well.
- McDonald and Webb have used this procedure with complete success for over a year and a half for all the samples they have freeze substituted.
- If samples show evidence of ice damage then it is because they were damaged during freezing and not during freeze substitution.

**SAFETY REMINDERS**

- The equipment should be used in a fume hood in case there is a leak of osmium-acetone during a run. We suggest doing a trial run with acetone only in the cryovials to make sure that they are sealed correctly.
- When sealing cryotubes that contain frozen fixative and sample, use a warm cap so that the O-ring is flexible and gives a good seal.
- Take care when removing the caps after a FS run because there is some pressure built up inside the cryovials and you can spray osmium/acetone on your hands if you are not careful. Cover the cap with a piece of lab tissue when removing and wear gloves.

**Acknowledgements:**

1. K.L. McDonald and R.J. Webb** ** Electron Microscope Laboratory, University of California, Berkeley, CA and ** Centro for Microscopy an Micranaalyis, University of Queensland, Queensland, Australia

**References:**


**Ordering Information**

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>34500</td>
<td>EMS Freeze Substitution Kit (available with or without Shaker - please specify)</td>
<td>Kit</td>
</tr>
<tr>
<td>34502</td>
<td>EMS 111 Platform Shaker (please specify 115 or 220 Volt)</td>
<td>each</td>
</tr>
<tr>
<td>34503</td>
<td>EMS 002 Ice Chest</td>
<td>each</td>
</tr>
<tr>
<td>34504B</td>
<td>EMS 003 Heat Block, 12mm</td>
<td>each</td>
</tr>
<tr>
<td>34504H</td>
<td>EMS 003 Heat Block, 18mm</td>
<td>each</td>
</tr>
<tr>
<td>34505</td>
<td>EMS 004 Temperature Probe</td>
<td>each</td>
</tr>
<tr>
<td>34506</td>
<td>EMS 005 Cryo Tubes</td>
<td>each</td>
</tr>
<tr>
<td>34507</td>
<td>EMS 006 Data Logger</td>
<td>each</td>
</tr>
</tbody>
</table>

Mitotic spindle microtubules and spindle pole bodies in the budding yeast, *Saccharomyces cerevisiae.*
### Iso-temp Standard Lab Incubators

Incubators with gravity flow circulation provide accurate, efficient heating for routine laboratory procedures: drying and staining of slides, paraffin embedding, tissue culture work, incubation of antibody tests, microbiological determinations, crystallization studies and more. Electrical receptacle inside (5A at 120V) to plug in a stirrer, shaker or other apparatus. Includes: Small (2.5 cu. ft.) and medium (3.75 cu. ft.) incubators each come with one plated-steel shelf; large (5.0 cu. ft.) incubator comes with two shelves.

#### Product Description

- Easy to operate:
  - Microprocessor control
  - Controls are conveniently located at the top of the incubator chamber
  - Keypad with arrow keys to increase or decrease set point temperature in 0.1°C increments
  - Over-temperature value is automatically set at 0°C above setpoint
  - PID controller comes with fixed parameters so no tuning is required
  - Circuit breaker protects incubator from power surges; battery backup
  - Designed to stack two units

- LED DISPLAY
  - Big three-character LED display
  - Digits display actual temperature to nearest 0.1°C
  - Display shows current value for set point temperature

- Operating Specifications
  - Convection Technology: Dual Convection
  - Temperature range: ambient +5°C to 105°C
  - Timer: weekly/real time/hour
  - Maximum shelf Load: 44 lbs. (20 kg)
  - Plug Type: Nema 5-15

#### Product Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Operating Temp Range °C</th>
<th>Temp Control at 37°C</th>
<th>Temp Uniformity at 37°C</th>
<th>Chamber Volume cu. ft. (L)</th>
<th>Chamber Dimensions Inches (mm)</th>
<th>Overall Dimensions Inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>30°C-75°C</td>
<td>±0.1°C</td>
<td>±0.7°C</td>
<td>2.5 (70.8)</td>
<td>18 (46)</td>
<td>18 (46)</td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td>3.75 (106.2)</td>
<td>18 (46)</td>
<td>18 (46)</td>
</tr>
<tr>
<td>Large</td>
<td></td>
<td></td>
<td></td>
<td>5.0 (141.6)</td>
<td>18 (46)</td>
<td>18 (46)</td>
</tr>
</tbody>
</table>

#### Ordering

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Model #</th>
<th>Recovery min.</th>
<th>Air Changes per hr</th>
<th>BTU per hr (75°C)</th>
<th>Volts</th>
<th>Amps</th>
<th>Watts</th>
<th>Ship Wgt. lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63155-10</td>
<td>small</td>
<td>2</td>
<td>6</td>
<td>290</td>
<td>120</td>
<td>2.2</td>
<td>260</td>
<td>115 (62) per each</td>
</tr>
<tr>
<td>63155-20</td>
<td>medium</td>
<td>2</td>
<td>4</td>
<td>360</td>
<td>120</td>
<td>2.2</td>
<td>280</td>
<td>130 (60) per each</td>
</tr>
<tr>
<td>63155-30</td>
<td>large</td>
<td>2</td>
<td>3</td>
<td>430</td>
<td>120</td>
<td>2.7</td>
<td>320</td>
<td>145 (68) per each</td>
</tr>
</tbody>
</table>

1. Rated average uniformity per ASTM E 1292 Method.
2. Door open 30 seconds at 37°C.
3. Length includes thickness of door; does not include handle.
4. Internal accessory outlet will increase current usage by 5A if utilized at its rating.
General Protocol Microbiological Incubators

Product Description
- Gravity convection provides gentle air flow and minimal drying out
- Intuitive user interface for setting temperature
- Large, easy to read vacuum fluorescent display
- Internal glass door allows sample viewing without impacting temperature
- Exceptionally small footprint
- Easy to clean, corrosion-resistant stainless-steel interior (AS1 430)

Operating Specifications
- Convection Technology: Gravity Convection
- Controller: Microprocessor control with vacuum fluorescent display
- Temperature range: ambient +5°C to 75°C
- Temperature uniformity at 37°C: ±0.2°C (60, 100, 180L) ±0.4°C (400, 750L)
- Temperature Stability at 37°C: ±0.6°C (60, 100, 180L) ±0.4°C (400L) ±1.3°C (750L)
- Maximum Shelf Load: 55 lbs. (25kg) (60, 100, 180L) 66 lbs. (30kg) (400, 750L)

Product Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Number of Shelves (supplied/max)</th>
<th>Chamber Volume cu. ft. (L)</th>
<th>Chamber Dimensions Inches (mm)</th>
<th>Overall Dimensions Inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>W H D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51028063</td>
<td>2/13</td>
<td>2.6 (79)</td>
<td>16.3 (414) 13.9 (354) 20.0 (508)</td>
<td>22.2 (565) 20.9 (530) 28.3 (720)</td>
</tr>
<tr>
<td>51028064</td>
<td>2/16</td>
<td>4.0 (117)</td>
<td>16.3 (414) 18.3 (464) 23.9 (608)</td>
<td>22.2 (565) 25.2 (640) 32.3 (820)</td>
</tr>
<tr>
<td>51028065</td>
<td>2/19</td>
<td>6.9 (194)</td>
<td>23.2 (589) 18.3 (464) 27.9 (708)</td>
<td>29.1 (738) 25.2 (640) 36.2 (920)</td>
</tr>
</tbody>
</table>

Ordering

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Model #</th>
<th>Electrical (50/60 Hz)</th>
<th>Watts</th>
<th>Ship Wgt. lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63153-10</td>
<td>51028063</td>
<td>120 2.5 300</td>
<td>86 (40)</td>
<td>each</td>
</tr>
<tr>
<td>63153-20</td>
<td>51028064</td>
<td>120 4.5 540</td>
<td>112 (51)</td>
<td>each</td>
</tr>
<tr>
<td>63153-30</td>
<td>51028065</td>
<td>120 6 720</td>
<td>143 (65)</td>
<td>each</td>
</tr>
</tbody>
</table>

Advanced Protocol Microbiological Incubators

Product Description
- Dual convection for application versatility-fan speed adjustable from 0 to 100%
- Advanced digital timer for daily or weekly ON/OFF cycles
- Easy to clean, corrosion-resistant stainless-steel interior (AS1 304)
- Intuitive user interface for setting temperature
- Large, easy to read vacuum fluorescent display

Operating Specifications
- Convection Technology: Dual Convection
- Controller: Microprocessor control with vacuum fluorescent display
- Temperature range: ambient +5°C to 105°C
- Temperature uniformity at 37°C: ±0.6°C
- Temperature Stability at 37°C: ±0.1°C
- Timer: weekly / real time / hour
- Maximum Shelf Load: 44 lbs. (25 kg)
- Plug Type: Nema 5-15

Product Specifications

<table>
<thead>
<tr>
<th>Model #</th>
<th>Number of Shelves (supplied/max)</th>
<th>Chamber Volume cu. ft. (L)</th>
<th>Chamber Dimensions Inches (mm)</th>
<th>Overall Dimensions inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>W H D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51028066</td>
<td>2/13</td>
<td>2.3 (66)</td>
<td>14.5 (368) 13.9 (354) 20.0 (508)</td>
<td>22.2 (565) 20.9 (530) 28.3 (720)</td>
</tr>
<tr>
<td>51028067</td>
<td>2/16</td>
<td>3.67 (104)</td>
<td>14.5 (368) 18.3 (464) 23.9 (608)</td>
<td>22.2 (565) 25.2 (640) 32.3 (820)</td>
</tr>
<tr>
<td>51028068</td>
<td>2/19</td>
<td>6.3 (178)</td>
<td>21.4 (543) 18.3 (464) 27.9 (708)</td>
<td>29.1 (738) 25.2 (640) 36.2 (920)</td>
</tr>
</tbody>
</table>

Ordering

<table>
<thead>
<tr>
<th>Cat. #</th>
<th>Model #</th>
<th>Electrical (60 Hz)</th>
<th>Watts</th>
<th>Ship Wgt. lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>63154-10</td>
<td>51028086</td>
<td>120 5 600</td>
<td>99 (40)</td>
<td>each</td>
</tr>
<tr>
<td>63154-20</td>
<td>51028087</td>
<td>120 7 840</td>
<td>129 (63)</td>
<td>each</td>
</tr>
<tr>
<td>63154-30</td>
<td>51028088</td>
<td>120 8.5 1020</td>
<td>154 (70)</td>
<td>each</td>
</tr>
</tbody>
</table>
The worlds first truly disposable Hemacytometer

The C-Chip

This disposable Hemacytometer offers precise volume control and is easy to use

Features:
- Quartz grade optical plastic
- Precise design leads to highly reproducible results
- Two counting chambers fitted with clearest grid pattern rich in contrast
- Exposure to infectious material is reduced due to its closed system
- Continuous sample containment
- Light and unbreakable compared to glass
- No need for cover slips
- Time and cost saving
- For single use

Applications:
- Blood Analysis: Blood Cell Counting
- Cell Culture: Cell Concentration measurement/Cell Viability Test
- Microbiology: Bacteria and Fungal Spore Counting
- IVF, IUI: Sperm Counting

Specifications:

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Depth (micron)</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamber Volume</td>
<td>10 micro liters</td>
<td></td>
</tr>
<tr>
<td>Chamber Depth</td>
<td>100, 200 or 10 Micron (Depends on model)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EMS Cat. #</th>
<th>Description</th>
<th>Depth (micron)</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>63508-01</td>
<td>Neubauer Improved, 100 Tests</td>
<td>100</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-02</td>
<td>Neubauer</td>
<td>100</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-03</td>
<td>Fuchs Roseithel</td>
<td>200</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-04</td>
<td>Semen Test</td>
<td>10</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-05</td>
<td>No Grid for CASA</td>
<td>10</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-06</td>
<td>Burker</td>
<td>100</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-07</td>
<td>Burker Turk</td>
<td>100</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-08</td>
<td>Thoma</td>
<td>100</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-09</td>
<td>Thoma New</td>
<td>100</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-10</td>
<td>Malassez</td>
<td>200</td>
<td>50 slides (2 tests/slide)</td>
</tr>
<tr>
<td>63508-11</td>
<td>Petroff Hauser</td>
<td>10</td>
<td>50 slides (2 tests/slide)</td>
</tr>
</tbody>
</table>