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

Type	Performance	Surface	Isolation	Application
AMC-7	Scientific	White epoxy powder	2Hz/7Hz	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 75kg load version option**
- **No rocking or wobble unlike other brands of platform**
- **One platform size suits majority of microscopes**

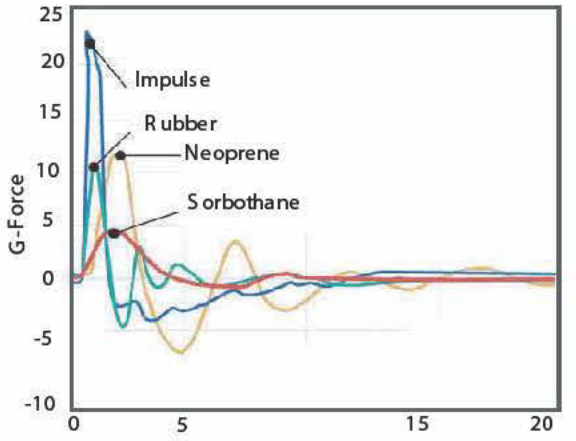
These platforms remove the unwanted vibrations which limit the performance of microscopes. Their T shaped profile allows users to place their arms on either side of the platform, while the rear section is wide enough to accomodate most makes of microscope.

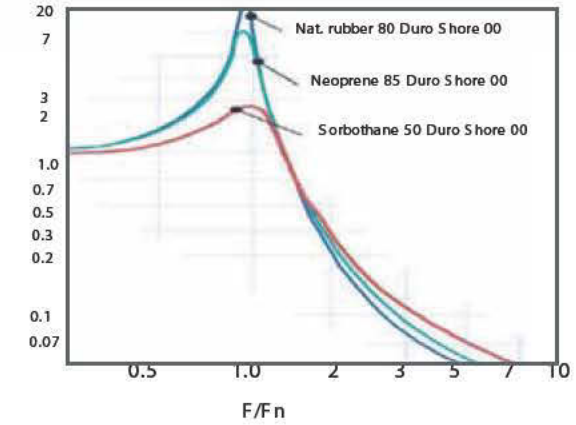
Platforms are made from high grade steel parts welded together for rigidity and coated with a tough epoxy powder white finish. They are resistant to most forms of biological and chemical attack and isolators are simply removed making cleaning easy.

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 orneorprene 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 improvesimage quality by protecting microscopes from both horizontal and vertical vibrations eminating from sources such as floors, walls and benching and caused by traffic, lifts, rotating machinery and numerous other sources

Cat. #	Description	Qty.
6719	EMS AMC-7 Microscope Platform	each
6732	L-Option for 75-kilo Capacity	each





Ratio of Excitation Frequency to Natural Frequency

Specifications

Dimensions (L x W x H)	565 x 380 x 45 mm
Load Capacity	25kgs; 75kgs with Option L
Platform Height	25 mm
Isolators	3 off elastomeric
Isolation performance	
50Hz	97 percent horizontal; 95 percent vertical
100Hz	99 percent horizontal; 98 percent vertical
Natural Frequency	2Hz horizontal; 7Hz vertical
Surface Finish	White powder epoxy
Construction	Steel
Bacterial Resistance	No growth
Fungal Resistance	No growth
Heat Aging	Stable
Working Temperature	-20°C to 160°C
Weight	10Kgs

NEW PRODUCTS BULLETIN

January 2013

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NEW PRODUCTS
DIGITAL MICROSCOPES

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!

change the way you work!

Small Footprint

Specially designed to fit nicely inside cell culture hoods and biosafety cabinets, EVOS makes delicate cell isolation and other sensitive procedures easier, safer, and more efficient. You can now work comfortably and effortlessly for extended periods of time inside controlled environments with precision and accuracy.

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

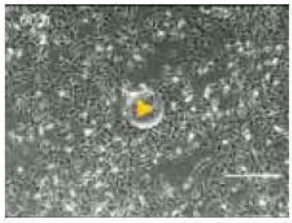
mercury-free energy-efficient

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 transfection 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 fl microscope
- Allows users to adjust illumination intensity for both images prior to launching acquisition sequence

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EVOS® fl

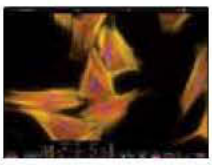
- Fluorescence, brightfield, phase contrast
- Patented LED fluorescence light cube technology
- Supports up to 4 fluorescence channels at a time
- 15-inch high-resolution LCD display
- Monochrome and color camera options
- Fits inside cell culture hoods and biosafety cabinets
- Integrated computer and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

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

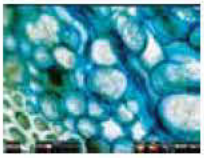
Throw away the definition of "microscope"… and start over. Science needs tools that help set the pace, not hold it back. Isn't it time the equipment works for you – so you can get your data quickly and move on?
The ground-breaking design and revolutionary performance features of the EVOS fl microscope 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

Optics	Infinity-corrected optical system; RMS-threaded objectives with 45 mm parfocal distance		
Objectives (available)	**Magnification**	**N.A.**	**WD**
	2X	0.06	5.1 mm
	4X Ph	0.13	16.9 mm
	10X Fl	0.30	8.3 mm
	20X Fl	0.45	7.1 mm
	40X Fl	0.65	2.8 mm
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
	CFP:	442 nm excitation	510 nm emission
	YFP:	500 nm excitation	542 nm emission
	Texas Red:	585 nm excitation	624 nm emission
	Cy5:	628 nm excitation	692 nm emission
	Cy7:	731 nm excitation	825 nm emission
	QDots:	All available wavelengths	
Contrast Methods	Fluorescence and transmitted light (brightfield and phase contrast)		
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, 480 µm/rotation		
	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® ICX285AQ 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!



Effortless, affordable cell-culture imaging

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

Optics	Infinity-corrected optical system; RMS-threaded objectives with 45 mm parfocal distance		
Objectives (available)	**Plan Achromat**		
	Magnification	**N.A.**	**WD**
	2X	0.06	5.1 mm
	4X Ph	0.13	16.9 mm
	10X Ph	0.25	6.9 mm
	20X Ph	0.40	6.8 mm
	40X Ph	0.65	3.1 mm
Objective Turret	4-position; manual control		
Illumination	LED (50,000+ hour life); adjustable intensity		
Contrast Methods	Transmitted light (brightfield and phase contrast)		
Condenser	3-position turret for brightfield and phase contrast		
Condenser WD	60 mm		
Stage*	Fixed and mechanical stage (with X-Y axis controls and vessel holder framework) available *Mechanical stage also available for order separately		
LCD Display	12.1-inch color, 1024 x 768 pixels; adjustable tilt		
Camera	1/2-inch; 2048 x 1536 pixel; 3.1 MP COLOR		
Image Acquisition	Embedded operating system with software for image capture and save via mouse or front-mounted manual buttons onto USB flash drive		
Captured Images	24-bit color TIFF, JPG or BMP (2048 x 1536 pixel)		
Output Ports	2 USB 2.0		
Power Supply	AC adapter; Input 100–240V, 47–63Hz; 0.58A max; Output 12 VDC/2.0A 24W max		
Dimensions	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)		
Weight	• With fixed stage: 9.1 kg (20.1 lbs) • With mechanical stage: 10.0 kg (22.1 lbs)		

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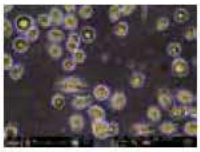
EVOS® xl

- 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

Quality. Flexibility. Design. Capability.

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

Optics	Infinity-corrected optical system; RMS-threaded objectives with 45 mm parfocal distance		
Objectives (available)	**Magnification**	**N.A.**	**WD**
	2X	0.06	5.1 mm
	4X Ph	0.13	16.9 mm
	10X Ph	0.25	6.9 mm
	20X Ph	0.40	6.8 mm
	40X Ph	0.65	3.1 mm
Objective Turret	5-position; front-mounted manual control		
Contrast Methods	Transmitted light (brightfield and phase contrast)		
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, 480 µm/rotation		
	Interchangeable vessel holders available for most common shapes and sizes*		
LCD Display	15-inch color, 1024 x 768 pixels; adjustable tilt		
Camera	2048 x 1536, 3.2 µm/pixel; 3.1 MP COLOR		
Image Acquisition	Built-in computer; Intel® Atom processor 1.6 GHz; integrated software for image acquisition via mouse		
Captured Images	Color TIFF, PNG, JPG or BMP (2048 x 1536 pixels)		
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	14.2 kg (31.4 lbs)		

Throw away the definition of "microscope" and start over...

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)

Cat. #	Description	Qty.
6500-XL	Evos-XL Base Microscope System Package	each

EVOS xl core

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)

Cat. #	Description	Qty.
6500-XLCORE	Evos-XL/Core Base Microscope System Package	each

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 (Ph/Fluor, 4x, 10x, 20x, 40x)
GFP, RFP, DAPI Light Cubes

Cat. #	Description	Qty.
6500-FL	Evos-FL Base Microscope System Package	each

Build-Your-Own Scope

Cat. #	Description	Qty.
AME-3300	**EVOS xl** — Includes on-board computer and integrated imaging software, LED illumination; 3.1 megapixel color camera; 15 in. high definition display; No objectives; No arm rest	each
AMEX-1000	**EVOS core xl**, no objectives	each
AMF-4300	**EVOS fl Base** — Includes on-board computer and integrated imaging software; Brightfield and phase contrast; Adjustable intensity LED; No objectives; No light cubes	each
AMEFC-4300-US	**EVOS fl 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	each

Options and Accessories

Cat. #	Description	Qty.
AMEP-4712	Attachable Mechanical Stage; For use with EVOS xl core	each
AMEP-4618	Arm Rest Accessory Kit, attaches to either side of stage; For use with EVOS xl and EVOS fl (standard on EVOS cl)	each

Extended Warranties

Cat. #	Description	Qty.
AME-EXTW2-US	EVOS xl 2-Year Extended Warranty	each
AME-EXTW4-US	EVOS xl 4-Year Extended Warranty	each
AMF-EXTW2-US	EVOS fl 2-Year Extended Warranty	each
AMF-EXTW4-US	EVOS fl 4-Year Extended Warranty	each

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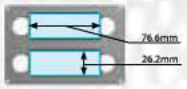
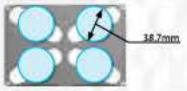
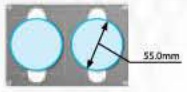
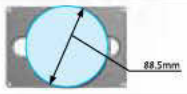
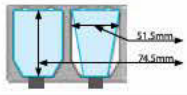
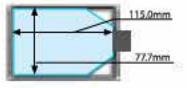
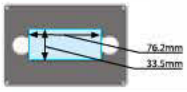
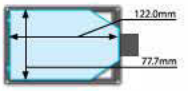
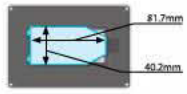
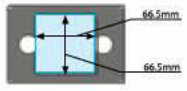
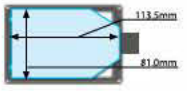
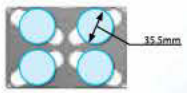
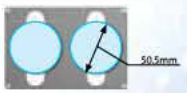
EVOS Digital Microscopes (continued)

Ordering Information (continued)

Cat. #	Description	Qty.
Objectives		
For use with fl models		
AMEP-4622	Magnification: 4x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.13; WD: 19.7mm	each
AMEP-4623	Magnification: 10x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.30; WD: 8.3mm	each
AMEP-4624	Magnification: 20x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.45; WD: 7.1mm	each
AMEP-4625	Magnification: 40x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.65; WD: 2.8mm	each
For use with fl and xl models		
AMEP-4626	Magnification: 60x; Plan: LWD - FL; Imaging Medium: Air; NA: 0.75; WD: 2.2mm	each
For use with xl models		
AMEP-4631	Magnification: 2x; Plan: LWD; Imaging Medium: Air; NA: 0.06; WD: 5.1mm	each
AMEP-4632	Magnification: 4x; Plan: LWD - PH; Imaging Medium: Air; NA: 0.13; WD: 16.9mm	each
AMEP-4681	Magnification: 10x; Plan: LWD - PH/FL; Imaging Medium: Air; NA: 0.25; WD: 9.2mm	each
AMEP-4682	Magnification: 20x; Plan: LWD - PH/FL; Imaging Medium: Air; NA: 0.40; WD: 3.1mm	each
AMEP-4683	Magnification: 40x; Plan: LWD - PH/FL; Imaging Medium: Air; NA: 0.65; WD: 1.6mm	each
AMPFOP-050	OBJ 50X PLAIN ACRO	each
AMPF-OP100	100X PLAN OIL 1.25NA100X PLAN	each
AMEP-4698	20X PLAN FL 0.50 NA CS CORRECT	each
For use with fl and xl models		
AMEP-4700	Magnification: 100x; Plan: LWD - FL; Imaging Medium: Oil; NA: 1.28; WD: 0.21mm	each
Fluorescent Light Cubes, for use with EVOS fl		
AMEP-4650	DAPI Fluorescent Light Cube	each
AMEP-4651	GFP Fluorescent Light Cube	each
AMEP-4652	RFP Fluorescent Light Cube	each
AMEP-4653	CFP Fluorescent Light Cube	each
AMEP-4654	YFP Fluorescent Light Cube	each
AMEP-4655	Texas Red Fluorescent Light Cube	each
AMEP-4656	CY5 Fluorescent Light Cube	each
AMEP-4667	CY7 Fluorescent Light Cube	each
AMEP-4668	BFP Fluorescent Light Cube	each

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

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 fluouresence and or bright images are stored.

Features:

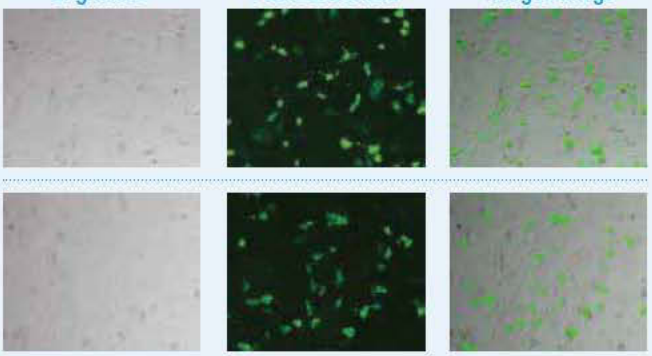
- Communication through wireless data transfer
- Plug and Play Technology
- Dark-Room free
- One-Touch image capturing
- LCD Touch Screen
- Stand Alone unit

Applications:

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

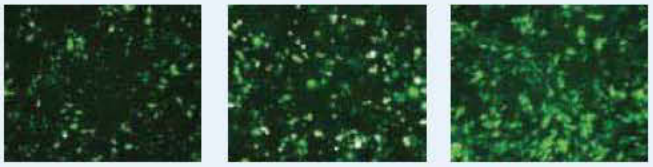
Live Cell Imaging

Bright field | Fluorescent field | Merged image



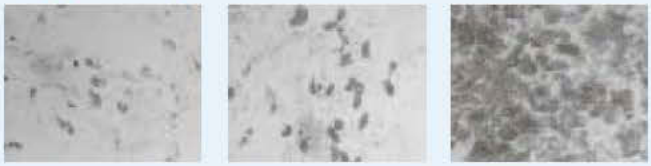
The U20S cells were transfected by NEON transfection system (from Invitrogen) using 0.5Ug mlhe GFP-MLPH plasmid & GFP-Rab plasmid. Images captured 24 hours aftertransfection.

GFP images of 3 different cell types



The NIH3T3,COS7,C2C12 cells were transfected by NEON transfection system (from Invitrogen] using 0.5U9 of the EGFP-NI plasmid. Images captured 24 hours after transfection.

Adipogenesis images



Examples ollhe differentiated adipocyte images for6, 11,21 days. All images were captured by JuLI™.

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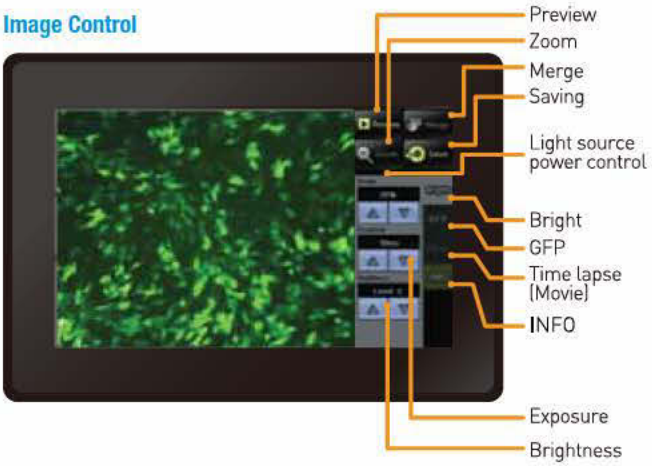
JuLI™ The Smart Fluorescent Cell Analyzer (continued)



Specifications:

Power	AC 100-240V , 50-60 Hz
CPU	AMD AU1250
Magnification	200x
Filter	Excitation/Emission/Dichroic Filter
Light Source	White/Blue LED (488nm)
Optional	White Green LED (532nm) White/Red LED (630nm)
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

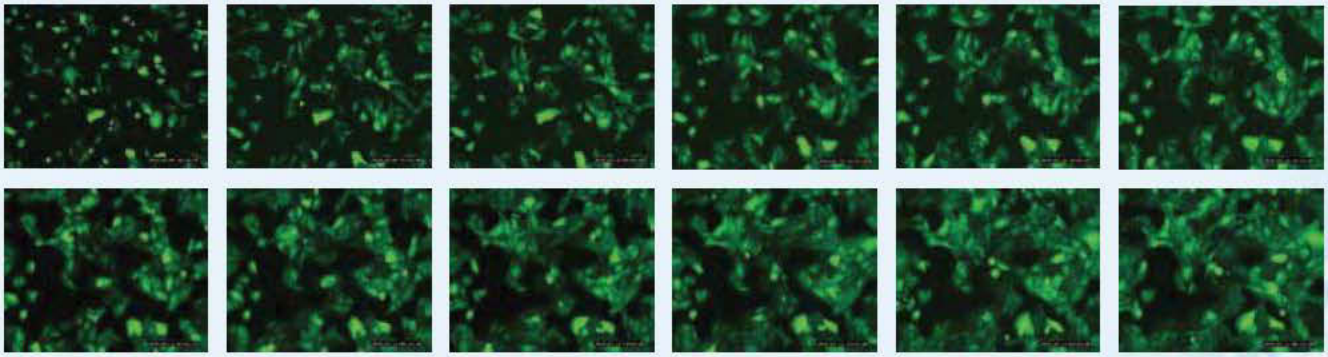
Ordering Information

Cat. #	Description	Qty.
9200	JuLI™ Cell Analyzer	each

Time-Lapse imaging in bright field

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

Time-Lapse imaging in fluorescent field



Examples of 58-hour time-Lapse imaging of U20S (GFP stabLe celllinel changing shapes. All images were captured at 15-minute interval.

EMS is proud to introduce...

NIGHTSEA™ Fluorescence Viewing Systems

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.

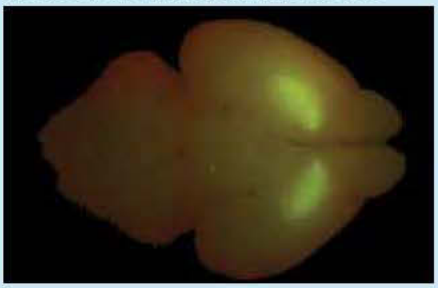
New technology from NIGHTSEA™ now extends fluorescence to standard routine stereo microscopes, where its specificity and sensitivity provide an ideal assist for life science applications.

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.

Juvenile zebrafish with and without GFP labeling.

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.



GFP-labeled dorsal striatum in mouse brain.
© NIGHTSEA/Charles Mazel. Sample photographed at laboratory of Stefano Vicini, Georgetown University.

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 micoscope needed**

Economical — More Glow for the Dough...

- **Stretch your lab budget — get the most out of your lab equipment!**
- **Inexpensive enough for classroom use**

Grows as your lab grows...

- **Buy just what you need now (1, 2, or 3 different wavelength sets)**
- **Add more as your needs expand**

The Stereo Microscope Fluorescence Adapter system consists of:

- **Flexible gooseneck lamp base with power supply**
- **Light head**
- **Ring adapter for microscope**
- **Barrier filter**
- **Filter shield**

The light head, barrier filter, and filter shield are interchangeable so that you can easily switch between excitation/emission light+filter combinations.

Once you are set up for one excitation/emission wavelength combination, additional combinations can be added by purchasing a kit that consists of a light head, barrier filter, and viewing shield. These three elements can be removed and replaced in seconds, and color coding ensures that you are using the right combination. The barrier filter clicks on to the ring adapter magnetically, so it is easy to remove it to switch back to white light viewing.

Specifications

Filter Set	Excitation	Emission	Fluorophores
RB — Royal Blue	440 – 460nm	500nm LP	GFP, eGFP, fluorescein, …
CY — Cyan	490 – 515nm	550nm LP	YFP, Venus, Lucifer Yellow…
GR — Green	510 – 540nm	600nm LP	DsRed, dTomato, …

Microscope Mounting Adapter — fits up to 67mm standard

Ordering Information

Cat. #	Description	Qty.
Adapter system: *Full system with one illumination color consisting of: Lamp Base with Power Supply • Light Head-Royal Blue, Cyan, or Green • Microscope Mounting Adapter • Barrier Filter • Viewing Shield*		
SFA-RB	Full System with Royal Blue	each
SFA-CY	Full System with Cyan	each
SFA-GR	Full System with Green	each
Add-On Sets: *Each add on excitation/emmission set it consists of: Light Head • Barrier Filter • Viewing Shield • Padded Storage Box*		
SFA-LFS-RB	Add-On Light and Filter Set, Royal Blue	each
SFA-LFS-CY	Add-On Light and Filter Set, Cyan	each
SFA-LFS-GR	Add-On Light and Filter Set, Green	each

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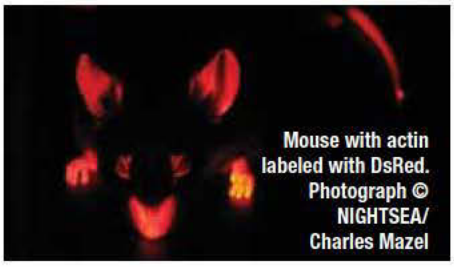
NIGHTSEA™ Fluorescence Viewing Systems (continued)

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 DsRed. 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	Two high intensity 3W LED Royal Blue - 440 - 460nm Green - 510 - 540nm
Filter Glasses	500nm LP for green fluorescence, 600nm LP for red fluorescence
Burn Time	4 hours at full power
Lamp Life	>10,000 hours
Battery	4 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

VG1

VG2

VG3

NIGHTSEA Barrier Filter Glasses

Styles 1 and 2 fit over eyeglasses, Style 3 does not

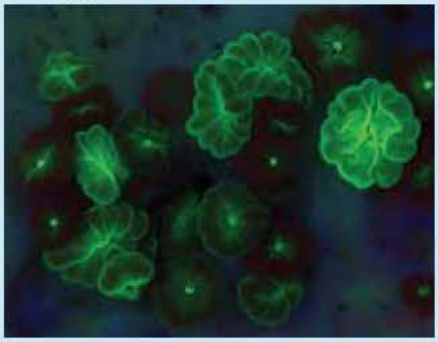
Glasses meet ANSI Z87.1 impact standards for safety glasses

Ordering Information

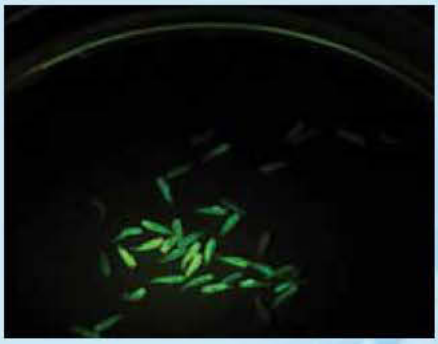
Cat. #	Description	Qty.
DFP-1	DFP Flashlight plus yellow and red filter glasses plus carrying case	each
BLS1	BlueStar light plus style VG1 filter glasses	each
BLS2	BlueStar light plus style VG2 filter glasses	each
BLS3	BlueStar light plus style VG3 filter glasses	each
VG1	Yellow filter glasses, style 1	each
VG2	Yellow filter glasses, style 2	each
VG3	Yellow filter glasses, style 3	each
RG2	Red filter glasses, style 2	each

Fluorescing YFP-transgenic *C. elegans* photographed using the NIGHTSEA Stereo Microscope Fluorescence Adapter. Photograph © NIGHTSEA/Charles Mazel

GFP-tagged *Drosophila* larva. Photograph © NIGHTSEA/Charles Mazel



Coral polyps - fluorescence. © Wade Cooper



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

NEW PRODUCTS
FLUORESCENCE ENHANCING SLIDES

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 fluorecence 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 (Dielectic) provides a bare SiO_2 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 SiO_2 surface ready to apply AziGrip4™ 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 SiO_2 Surface. However you may also have the slide with the Biofunctional coating (AziGrip4™)

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

0° - 3° 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)

Active area
63mm x 22mm

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

Chemical composition of the top surface
Clean, dielectric, SiO_2 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 SiO_2 (HF, NaOH, KOH) can destroy the enhancement effect of the BrightSlide™

Storage
Store in clean environment at room temperature

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**
- **Provides patterned surfaces with multi-functionalities**

Applications

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

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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

Ultralow 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 aminopropylpolysiloxane)

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

Chemical composition of the top surface
Optical coating
Clean, dielectric, SiO_2 surface (ITO coating on request)

Bio-functional coating
AziGrip4™ with Amine functional group (other AziGrip4™ 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)

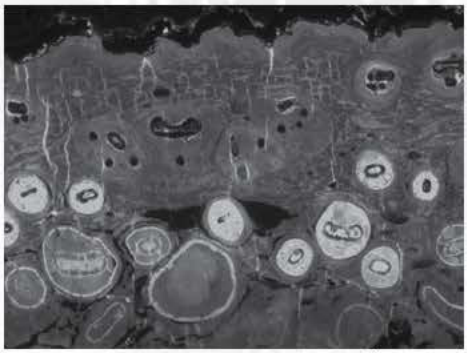
Environmental stability (optical coating only)
Stable against temperatures up to 200°C
All strongly oxidizing cleaning protocols can be used
All organic solvents can be used

Chemical reagents which etch SiO_2 (HF, NaOH, KOH) can destroy the enhancement effect of the BrightSlide™

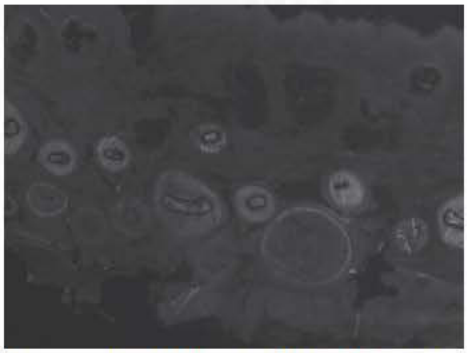
Storage
Store in clean environment at room temperature

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**
- **Ultralow fluorescence background**
- **Ultraclean SiO_2 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**



Enhancement of the fluorescence on BrightSlide™ Image of 150nm thick section of biological material using BrightSlide™

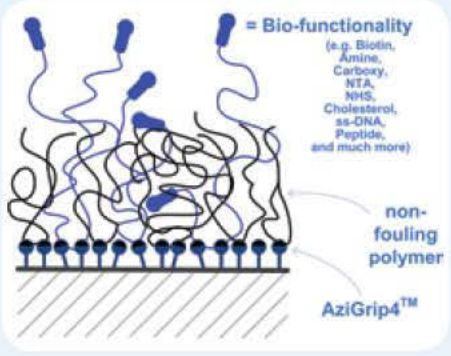


Fluorescence signal on standard, glass slide Image of 150nm thick section of biological material using standard, glass slide

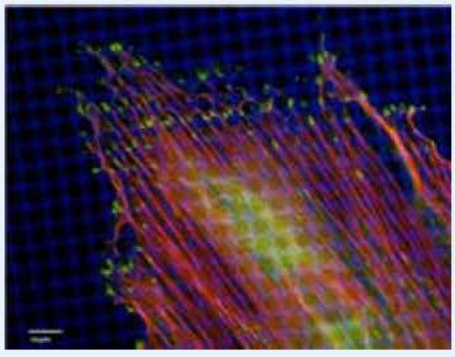
Ordering Information

EMS #	Description	Qty
63426-D	BrightSlide™D	each
63426-D-10		10/pack
63426-D-100		100/pack
63426-DB	BrightSlide™DB	each
63426-DB-10		10/pack
63426-DB-100		100/pack

A



B



A. Sketch of the AziGrip4™ Bio-functional coating Two different polymers (non-fouling and bio-functionalized) are linked to the substrate via the AziGrip4 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 Fibroblast grown on 5 x 5 µm adhesive pattern separated by 1 µm Atto633-fluorescently labeled grid.

Courtesy of F. Anderegg, ETH Zurich

AziGrip4™ 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)
Storage Relative Humidity	10 - 85% (non-condensing)
Physical	
Height	8.6" (218.4mm)
Width	7.08" (179.8mm)
Depth	12.58" (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 contol panel on the front of the instrument
Slide Feed Button	One button with LED indicator located on the upper right side of the contol 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 proper loading
Holder Light	
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

Standard Accessories

One Operating Manual,
One Quickstart Guide,
One Printer Driver,
One Blue Slide Holder,
One Black Print Cartridge,
One Color Print Cartridge,
One Print Head Cleaning Pen,
One USB Cable,
One Power Cord,
One Power Converter

Optional Accessories

2D Bar Code Scanner with Stand
Tissue-Tek® SmartWrite™ Software,
Touch Screen PC,
Blue Slide Holder one,
Black Print Cartridge 6/case,
Color Print Cartridge 6/case

Ordering Information

Cat. #	Description	Qty.
65455	Slide Printer	each
65456	Scanner With Stand	each
65457	SmartWrite Software	each
65458	PC with touchstone, mouse and keyboard	each
65459	Slide Holder, Blue	each
65455-BL	Print Cartridge, Black	6/case
65455-CO	Print Cartridge, Color	6/case

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

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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	3.6kg
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 Slot (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. 10MB/s,100MB/s. Support Wake-On-LAN function
Storage Interface Support	2.5" Hard Drive
Power	40W Power Adapter. I nput: 100- 240V AC
LCD Panel	15.6" 16:9 Wide Panel, 1366 x 768 pixels
Touch Screen	Single Touch
Web Cam	1.3M Pixel
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	IDT92HD81 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

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 @ 5 VDC; Standby/Idle (Typical): 65 mA @ 5 VDC
Input Voltage	4.2 - 5.25 VDC

Reading Ranges

Typical Depth of Field	Minimum distance determined by symbol length and scan angle. Printing resolution, contrast, and ambient light dependent.
Code 39	5 mils: 4.0 to 19.0 cm / 1.6 to 7.5 in
Code 39	10 mils: 1.0 to 30.0 cm / 0.4 to 11.8 in
Data Matrix	10 mils: 2.0 to 16.0 cm / 0.8 to 6.3 in
Data Matrix	15 mils: 0 to 23.6 cm /0 to 9.3 in
EAN-13	13 mils: 1.5 to 40.0 cm / 0.6 to 15.7 In
PDF417	10 mils: 0.5 to 22.0 cm / 0.2 to 8.6 in
QR Code	10 mils: 3.0 to 12.5 cm / 1.2 to 4.9 in

Reading Performance

Image Capture	Graphic Formats: BMP, JPEG, TIFF; Greyscale: 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 Pitch	+/- 40°; Roll (Tilt): 180°; Skew (Yaw): +/- 40°
Reading Indicators	Beeper (Adjustable Tone); Datalogic 'Green Spot' Good Read Feedback; Good Read LED
Resolution (Max.)	1D Linear: 0.102 mm/4 mils; Data Matrix: 0.178 mm/7 mils; PDF417: 0.102 mm/4 mils

Special

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

Bio-Pure™ Surfactant Wipes

Durable and biodegradeable

For the ease in removing dirt, grease and grime these General laboratory wipes are ideal for cleaning lab benches, door handles, pipettors, 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
68551-12	Bio-PureTM 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
68551-13	Amber Clens, 400 gms	each

Peak™ ABC Lupe

Seven kinds of magnifying power

The Peak ABC Lupe is a precision folding lupe, 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 lupe.

Specifications

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

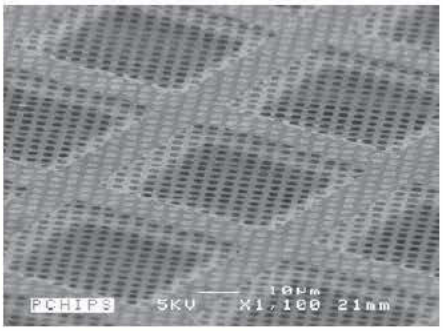
EMS #	Description	Qty.
68160	ABC Lupe	each

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 patent pending 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 elminate 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 Leginon. 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™:

Does contamination buildup limit through put for automated cryoEM? , Journal of Structural Biology, Volume 154, Issue 3, June 2006, Pages 303-311 Anchi Cheng, Denis Fellmann, James Pulokas, Clinton S. Potter and Bridget Carragher

Automated cryoEM data acquisition and analysis of 284 742 particles of GroEL , Journal of Structural Biology, In Press, Uncorrected Proof, Available online 22 May 2006, Scott M. Stagg, Gabriel C. Lander, James Pulokas, Denis Fellmann, Anchi Cheng, Joel D. Quispe, Satya P. Mallick, Radomir M. Avila, Bridget Carragher and Clinton S. Potter

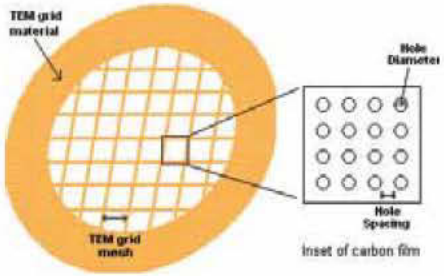
Product Line

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:

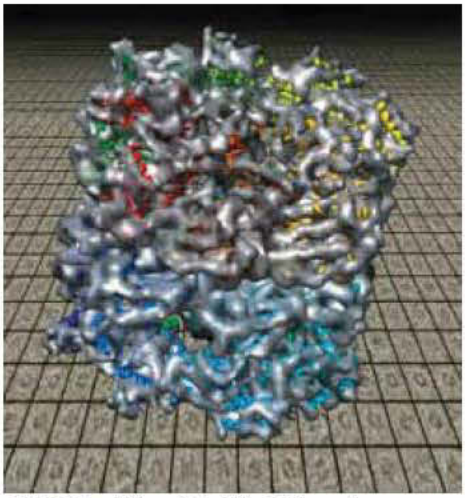
Standard Products

The breadth of applications in cryoTEM 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.



Frozen-Hydrated Bacteriophange Capsid (data acquired on CF-1.2/1.3-4C)



250,000 particles of GroEL in 24 hours. Image Courtesy of Scott Stagg and Mike Pique NRAMM, The Scripps Research Institute (data acquired on CF-2/2-4C)

Articles

An improved holey carbon film for cryo-electron microscopy. Quispe J, Damiano J, Mick SE, Nackashi DP, Fellmann D, Ajero TG, Carragher B, Potter CS, (2007). Microscopy and microanalysis, 13(5), 365-371.

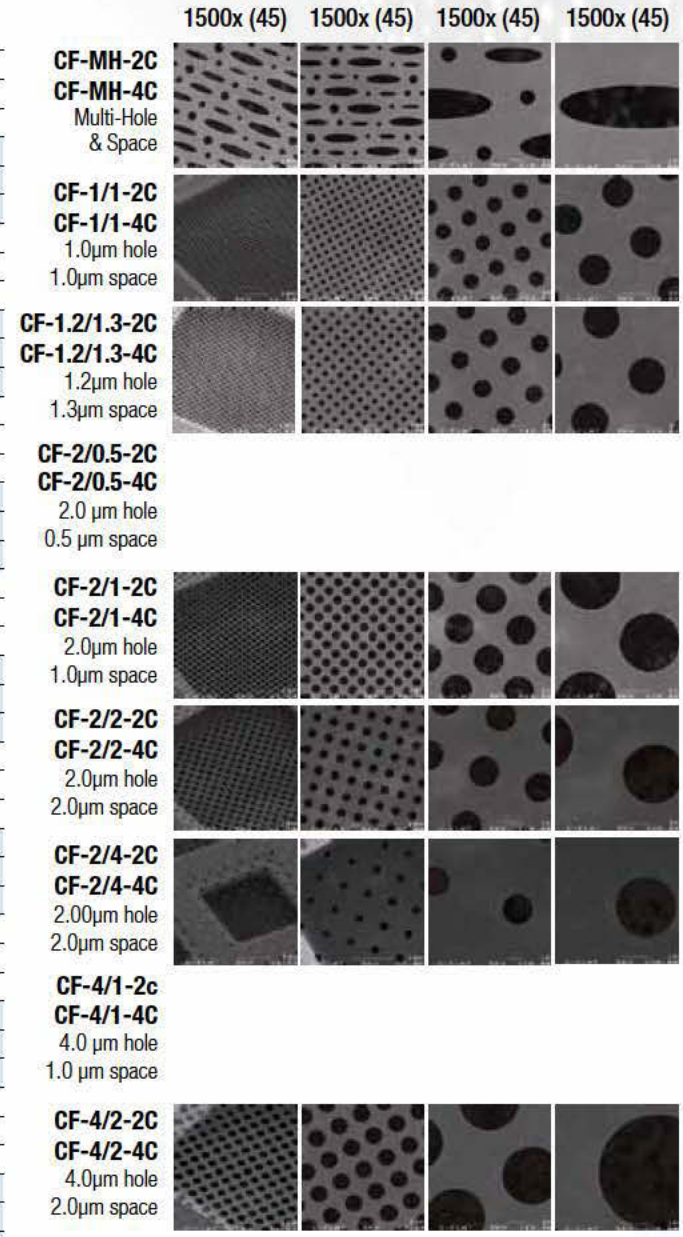
Improving the technique of vitreous cryo-sectioning for cryo-electron tomography: electrostatic charging for section attachment and implementation of an anti-contamination glove box. Pierson J, Fernández JJ, Bos E, Amini S, Gnaegi H, Vos M, Bel B, Adolfsen F, Carrascosa JL, Peters PJ., J Struct Biol. 2010 Feb;169(2): 219-25. Epub 2009 Oct 12.

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)

Product Code	Cat. #	Hole Size	Hole Spacing	TEM Mesh	TEM Grid	Qty.
CF-1.2/1.3-2C	CF213-25	1.2 µm	1.3 µm	200	Cu	25/pk.
	CF213-50	1.2 µm	1.3 µm	200	Cu	50/pk.
	CF213-100	1.2 µm	1.3 µm	200	Cu	100/pk.
CF-1.2/1.3-4C	CF413-25	1.2 µm	1.3 µm	400	Cu	25/pk.
	CF413-50	1.2 µm	1.3 µm	400	Cu	50/pk.
	CF413-100	1.2 µm	1.3 µm	400	Cu	100/pk.
CF-2/0.5-2c	CF205-25	2.0 µm	0.5 µm	200	Cu	25/pk
	CF205-50	2.0 µm	0.5 µm	200	Cu	50/pk
	CF205-100	2.0 µm	0.5 µm	200	Cu	100/pk
CF-2/0.5-4C	CF405-25	2.0 µm	0.5 µm	400	Cu	25/pk
	CF405-50	2.0 µm	0.5 µm	400	Cu	50/pk
	CF405-100	2.0 µm	0.5 µm	400	Cu	100/pk
CF-2/1-2C	CF212-25	2.0 µm	1.0 µm	200	Cu	25/pk.
	CF212-50	2.0 µm	1.0 µm	200	Cu	50/pk.
	CF212-100	2.0 µm	1.0 µm	200	Cu	100/pk.
CF-2/1-4C	CF412-25	2.0 µm	1.0 µm	400	Cu	25/pk.
	CF412-50	2.0 µm	1.0 µm	400	Cu	50/pk.
	CF412-100	2.0 µm	1.0 µm	400	Cu	100/pk.
CF-2/2-2C	CF-222C-25	2.0 µm	2.0 µm	200	Cu	25/pk.
	CF-222C-50	2.0 µm	2.0 µm	200	Cu	50/pk.
	CF-222C-100	2.0 µm	2.0 µm	200	Cu	100/pk.
CF-2/2-4C	CF-224C-25	2.0 µm	2.0 µm	400	Cu	25/pk.
	CF-224C-50	2.0 µm	2.0 µm	400	Cu	50/pk.
	CF-224C-100	2.0 µm	2.0 µm	400	Cu	100/pk.
CF-2/4-2C	CF242-25	2.0 µm	4.0 µm	200	Cu	25/pk.
	CF242-50	2.0 µm	4.0 µm	200	Cu	50/pk.
	CF242-100	2.0 µm	4.0 µm	200	Cu	100/pk.
CF-2/4-4C	CF442-25	2.0 µm	4.0 µm	400	Cu	25/pk.
	CF442-50	2.0 µm	4.0 µm	400	Cu	50/pk.
	CF442-100	2.0 µm	4.0 µm	400	Cu	100/pk.
CF-4/1-2C	CF241-25	4.0 µm	1.0 µm	200	Cu	25/pk
	CF241-50	4.0 µm	1.0 µm	200	Cu	50/pk
	CF241-100	4.0 µm	1.0 µm	200	Cu	100/pk
CF-4/1-4C	CF441-25	4.0 µm	1.0 µm	400	Cu	25/pk
	CF441-50	4.0 µm	1.0 µm	400	Cu	50/pk
	CF441-100	4.0 µm	1.0 µm	400	Cu	100/pk
CF-4/2-2C	CF422-25	4.0 µm	2.0 µm	200	Cu	25/pk.
	CF422-50	4.0 µm	2.0 µm	200	Cu	50/pk.
	CF422-100	4.0 µm	2.0 µm	200	Cu	100/pk.
CF-4/2-4C	CF424-25	4.0 µm	2.0 µm	400	Cu	25/pk.
	CF424-50	4.0 µm	2.0 µm	400	Cu	50/pk.
	CF424-100	4.0 µm	2.0 µm	400	Cu	100/pk.
CF-MH-2C	CF2MH-25	Multihole*		200	Cu	25/pk.
	CF2MH-50	Multihole*		200	Cu	50/pk.
	CF2MH-100	Multihole*		200	Cu	100/pk.
CF-MH-4C	CF4MH-25	Multihole*		400	Cu	25/pk.
	CF4MH-50	Multihole*		400	Cu	50/pk.
	CF4MH-100	Multihole*		400	Cu	100/pk
CF-1/1-2C	CF21-25	1.0 µm	1.0 µm	200	Cu	25/pk.
	CF21-50	1.0 µm	1.0 µm	200	Cu	50/pk.
	CF21-100	1.0 µm	1.0 µm	200	Cu	100/pk.
CF-1/1-4C	CF41-25	1.0 µm	1.0 µm	400	Cu	25/pk.
	CF41-50	1.0 µm	1.0 µm	400	Cu	50/pk.
	CF41-100	1.0 µm	1.0 µm	400	Cu	100/pk.



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® – Holey Carbon Films

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 (LEEPS) microscopy when compared with conventional holey film.

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 Carrageen, University of Illinois at Urbana-Champaign, has developed a system, called Leginon, 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. Hydrophillicity of the foil can be achieved by glow discharging in residual air or by metal coating.

QUANTIFOIL® in low-energy electron point source (LEEPS) 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.

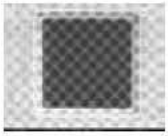
***QUANTIFOIL®** is generally delivered as a carbon foil; it can be reinforced with plastic film. The standard thickness for the carbon foil is 12 nm; other thicknesses between 10 and 25 nm can be made upon request.*

***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

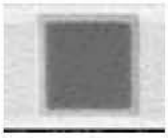
QUANTIFOIL® with circular holes is used in cryo-electron tomographic reconstruction. The roundness of the holes is advantageous with respect to the formation of an ice layer of constant thickness. The whole size chosen depends on the magnification used, and on whether or not one wishes to include support 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.

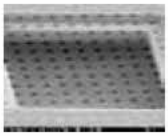
QUANTIFOIL® R 0.6/1

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

QUANTIFOIL® R 5/20

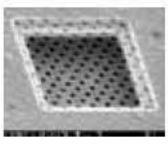
Hole size is 5µ. Space btween holes is 20µ. Center to center is 25µ

QUANTIFOIL® R 2/4



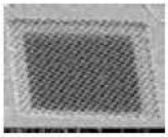
QUANTIFOIL® R 2/4 may be preferred over R 2/2, when an increased tolerance with respect to the position of beam, and a larger beam diameter are desired, such as in the case of automated image acquisition.

QUANTIFOIL® R2/2



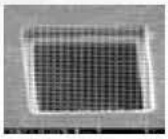
Holey films with 2 µm circular holes are used at magnifications between 30.000x and 40.000x.

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

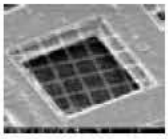


A foil with ~1.2 µm circluar holes and a spacing of ~2.5 µm between the holes. This type is used at magnifications around 50.000x.

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. Alter-natively, this holey film can directly support an object that is larger than the holes.

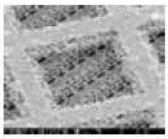
QUANTIFOIL® S 7/2



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

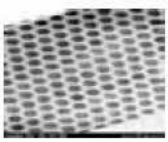


QUANTIFOIL® Multi A is a holey film, which consists of various pattern hole sizes, shapes and arrangements is repeated. In addition to round holes, the pattern includes oval-shaped ones, which appear round at high tilt angles (~70°). The diameters of the round holes are about 1, 1.4 and 2µ, and the bar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

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 backgroundfree 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 µm (diameter of inscribed circle) and a repeating distance of 41 µm, the side length of the holes and the bar width are 15 µm.

QUANTIFOIL® Ordering Information

Hole Shape	Grid Type	Hole Size	Period	Cat. # 200 Mesh	Cat. # 300 Mesh	Cat. # 400 Mesh	Pack
R 3.5/1	Copper	3.5µm	4.5µm	Q225CR-35	Q325CR-35	Q425CR-35	50/pk
				Q250CR-35	Q350CR-35	Q450CR-35	100/pk
	Nickel	3.5µm	4.5µm	Q225NR-35	Q325NR-35	Q425NR-35	50/pk
				Q250NR-35	Q350NR-35	Q450NR-35	100/pk
	Gold	3.5µm	4.5µm	Q225AR-35	Q325AR-35	Q425AR-35	50/pk
				Q250AR-35	Q350AR-35	Q450AR-35	100/pk
R 1/4	Copper	1µm	5µm	Q225CR-14	Q325CR-14	Q425CR-14	50/pk
				Q250CR-14	Q350CR-14	Q450CR-14	100/pk
	Nickel	1µm	5µm	Q225NR-14	Q325NR-14	Q425NR-14	50/pk
				Q250NR-14	Q350NR-14	Q450NR-14	100/pk
	Gold	1µm	5µm	Q225AR-14	Q325AR-14	Q425AR-14	50/pk
				Q250AR-14	Q350AR-14	Q450AR-14	100/pk
R 0.6/1	Copper	0.6µm	1.6µm	Q225CR-06	Q325CR-06	Q425CR-06	50/pk
				Q250CR-06	Q350CR-06	Q450CR-06	100/pk
	Nickel	0.6µm	1.6µm	Q225NR-06	Q325NR-06	Q425NR-06	50/pk
				Q250NR-06	Q350NR-06	Q450NR-06	100/pk
	Gold	0.6µm	1.6µm	Q225AR-06	Q325AR-06	Q425AR-06	50/pk
				Q250AR-06	Q350AR-06	Q450AR-06	100/pk
R 5/20	Copper	5µm	25µm	Q225CR-520	Q325CR-520	Q425CR-520	50/pk
				Q250CR-520	Q350CR-520	Q450CR-520	100/pk
	Nickel	5µm	25µm	Q225NR-520	Q325NR-520	Q425NR-520	50/pk
				Q250NR-520	Q350NR-520	Q450NR-520	100/pk
	Gold	5µm	25µm	Q225AR-520	Q325AR-520	Q425AR-520	50/pk
				Q250AR-520	Q350AR-520	Q450AR-520	100/pk
R 2/4	Copper	2µm	6µm	Q225CR-4	Q325CR4	Q425CR4	25/pk
				Q250CR-4	Q350CR4	Q450CR4	50/pk
				Q2100CR-4	Q3100CR4	Q4100CR4	100/pk
	Nickel	2µm	6µm	Q225NR-4	Q325NR4	Q425NR4	25/pk
				Q250NR-4	Q350NR4	Q450NR4	50/pk
				Q2100NR-4	Q3100NR4	Q4100NR4	100/pk
	Gold	2µm	6µm	Q225AR-4	Q325AR4	Q425AR4	25/pk
				Q250AR-4	Q350AR4	Q450AR4	50/pk
				Q2100AR-4	Q3100AR4	Q4100AR4	100/pk
R 2/2	Copper	2µm	4µm	Q225CR2	Q325CR2	Q425CR2	25/pk
				Q250CR2	Q350CR2	Q450CR2	50/pk
				Q2100CR2	Q3100CR2	Q4100CR2	100/pk
	Nickel	2µm	4µm	Q225NR2	Q325NR2	Q425NR2	25/pk
				Q250NR2	Q350NR2	Q450NR2	50/pk
				Q2100NR2	Q3100NR2	Q4100NR2	100/pk
	Gold	2µm	4µm	Q225AR2	Q325AR2	Q425AR2	25/pk
				Q250AR2	Q350AR2	Q450AR2	50/pk
				Q2100AR2	Q3100AR2	Q4100AR2	100/pk
R 2/1	Copper	2µm	3µm	Q225CR1	Q325CR1	Q425CR1	25/pk
				Q250CR1	Q350CR1	Q450CR1	50/pk
				Q2100CR1	Q3100CR1	Q4100CR1	100/pk
	Nickel	2µm	3µm	Q225NR1	Q325NR1	Q425NR1	25/pk
				Q250NR1	Q350NR1	Q450NR1	50/pk
				Q2100NR1	Q3100NR1	Q4100NR1	100/pk
	Gold	2µm	3µm	Q225AR1	Q325AR1	Q425AR1	25/pk
				Q250AR1	Q350AR1	Q450AR1	50/pk
				Q2100AR1	Q3100AR1	Q4100AR1	100/pk
R 1.2/1.3	Copper	~1.2µm	~2.5µm	Q225CR1.3	Q325CR1.3	Q425CR1.3	25/pk
				Q250CR1.3	Q350CR1.3	Q450CR1.3	50/pk
				Q2100CR1.3	Q3100CR1.3	Q4100CR1.3	100/pk
	Nickel	~1.2µm	~2.5µm	Q225NR1.3	Q325NR1.3	Q425NR1.3	25/pk
				Q250NR1.3	Q350NR1.3	Q450NR1.3	50/pk
				Q2100NR1.3	Q3100NR1.3	Q4100NR1.3	100/pk
S 7/2	Copper	7 x 7µm	9µm	Q225CS7	Q325CS7	Q425CS7	25/pk
				Q250CS7	Q350CS7	Q450CS7	50/pk
				Q2100CS7	Q3100CS7	Q4100CS7	100/pk
	Nickel	7 x 7µm	9µm	Q225NS7	Q325NS7	Q425NS7	25/pk
				Q250NS7	Q350NS7	Q450NS7	50/pk
				Q2100NS7	Q3100NS7	Q4100NS7	100/pk
	Gold	7 x 7µm	9µm	Q225AS7	Q325AS7	Q425AS7	25/pk
				Q250AS7	Q350AS7	Q450AS7	50/pk
				Q2100AS7	Q3100AS7	Q4100AS7	100/pk
Multi A	Copper	—	—	Q225CMA	Q325CMA	Q425CMA	25/pk
				Q250CMA	Q350CMA	Q450CMA	50/pk
				Q2100CMA	Q3100CMA	Q4100CMA	100/pk
	Nickel	—	—	Q225NMA	Q325NMA	Q425NMA	25/pk
				Q250jNMA	Q350NMA	Q450NMA	50/pk
				Q2100NMA	Q3100NMA	Q4100NMA	100/pk

Hole Shape	Grid Type	Hole Size	Description	Cat. #	Pack
HEX 15	Copper	26µm	0.5 x 2mm slot grids	Q225CR-HEX	50/pk
				Q250CR-HEX	100/pk

NEW PRODUCTS
VACUUM GREASES

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 vapour pressure of 1.3×10^{-12} 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.

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**

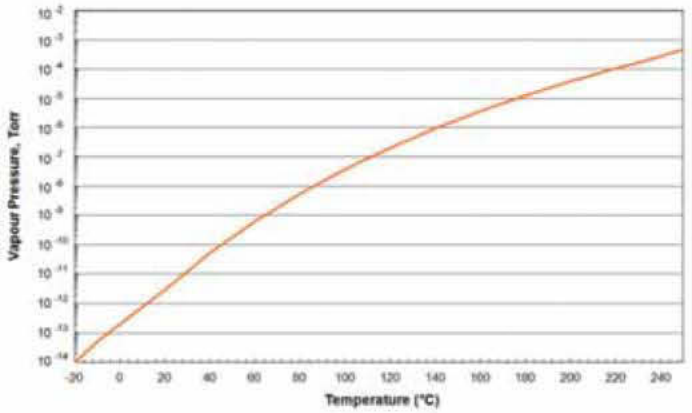
Benefits of Apiezon PFPE 501 Grease?

- **Extended equipment life**
- **High temperature lubricant**
- **Reduced equipment downtime**
- **Lower service costs**
- **Life-time lubrication**
- **Guaranteed Apiezon quality**
- **Expert technical support**

Typical Properties

NLGI No.	2
Penetration P60	280
Typical working temperature range	
°C	-15 to 250
°F	5 to 482
Vapor pressure @ 25°C / 77°F, Torr	$<1.3 \times 10^{-12}$
Relative density @ 25°C / 77°F	2.003
4 ball wear scar (mm) ASTM D2266 (40kg)	0.94
Outgassing characteristics ASTM.E 595-90	
TML	<1%
CVCM	<0.1%
Evaporation 24hrs @ 100°C / 212°F	0.02
Oil separation 24hrs @ 100°C / 212°F	2.10
Low temperature torque, g/cm	
25°C / 77°F Starting	162.3
25°C / 77°F Running	64.4

Vapor Pressure of PFPE 501 Grease over working temperature range



Cat. #	Description	Qty.
60708	Apiezon PFPE 501 Grese	100 g Tube

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

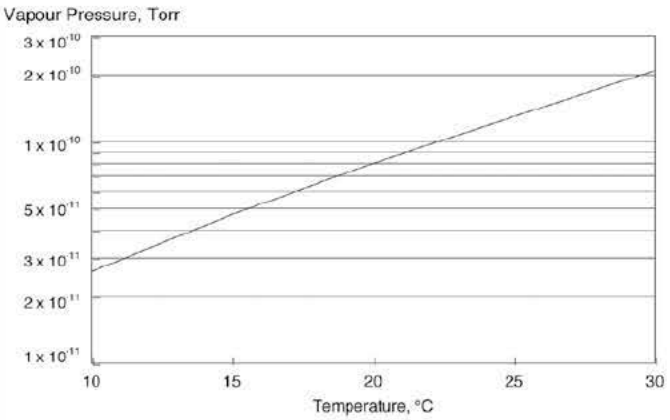
- **Has anti-seize properties, making it an effective protector and lubricant in ultra-high vacuums**
- **Exhibits extremely high levels of lubricity**
- **Demonstrates an extremely low vapour pressure of 7×10^{-11} Torr at 20°C**
- **Recommended for use at ambient temperatures**
- **Does not suffer 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

Vapor Pressure of AP100 Grease over working temperature range



Cat. #	Description	Qty.
60709	Apiezon AP100 Grese	100 g Tube

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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 $8x10^{-11}$ 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 it 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 backing side 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

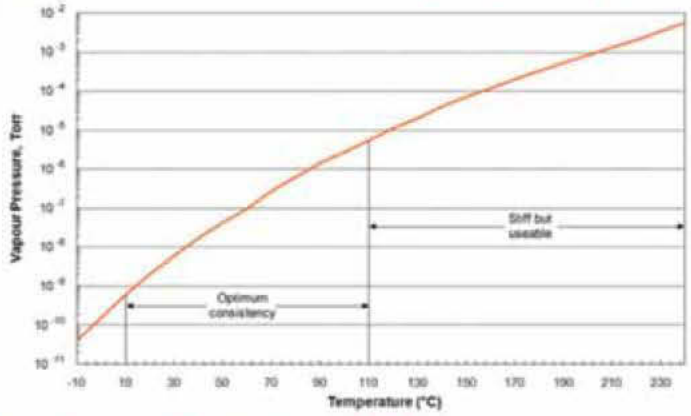
Type 101 is an excellent general purpose, hydrocarbon grease, which is intended for a variety of industrial and scientific applications.

- **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 most 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.**

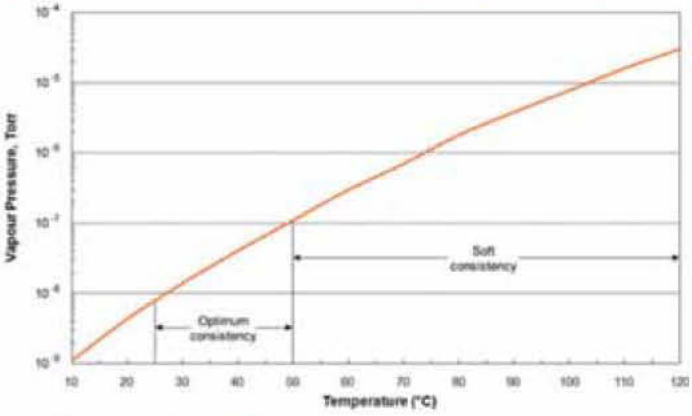
60706-01	Apiezon Grease AP 101	50 g
60706-40	Apiezon Grease AP 101	4 kg

Apiezon Greases (continued)

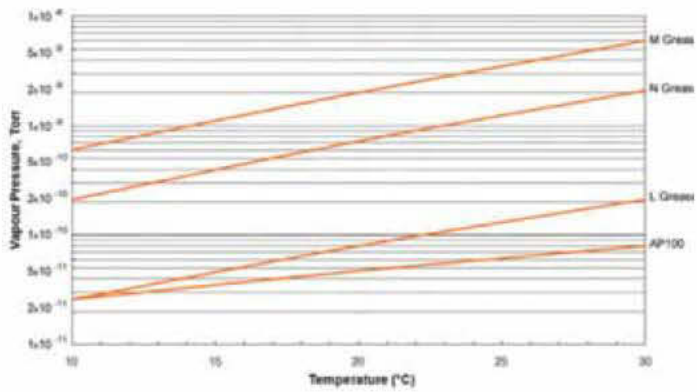
Vapor Pressure of Type H Grease over working temperature range



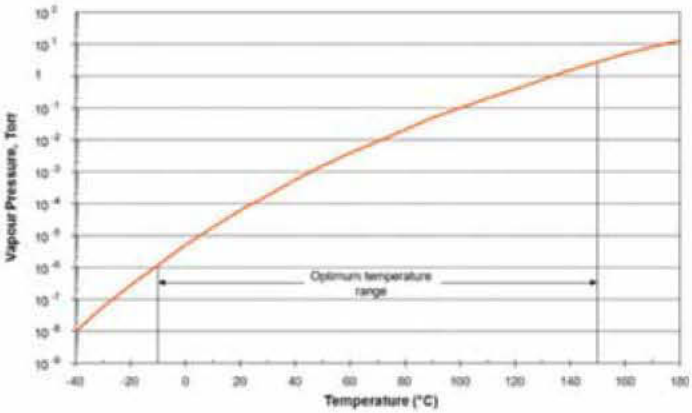
Vapor Pressure of AP100 Grease over working temperature range



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

Typical Property		AP101	AP100	Type H	Type L	Type M	Type N	Type T
Main areas of application		General	Lubricating	High Temp	High Vacuum	General Vacuum	Cryogenic	Medium Temp
Typical Working Temperature Range	°C	-40–180	10–30	-10–240	10–30	10–30	-269–30	10–120
	°F	-40–365	50–86	14–464	50–86	50–86	-452–86	50–248
Dropping Point —	°C	>200	42–52	doesn't melt	42–52	40–60	42–52	112–137
ASTM.D 566-02 (IP 132/96)	°F	>392	108–126		108–126	104–140	108–126	233–278
Vapor Pressure @ 20°C / 68°F, Torr		$<1.0 \times 10^{-5}$	7.0×10^{-11}	1.7×10^{-9}	7.0×10^{-11}	1.7×10^{-9}	6.0×10^{-10}	4.6×10^{-9}
Relative Density @ 20°C / 68°F		0.981	1.042	0.918	0.896	0.894	0.911	0.912
Resistant to Radiation		*N/R	*N/R	*N/R	Yes	Yes	*N/R	*N/R
Lubricity 4 Ball Test ASTM.D 2596 (IP 239/97), kg		450	450	250	150	140	150	N/A
Outgassing characteristics	TML	N/A	<1%	<1%	<1%	N/A	<1%	N/A
ASTM.E 595-93(2003)e1	CVCM	N/A	<0.1%	<0.1%	<0.1%	N/A	<0.1%	N/A
Viscosity of Molten Grease, cSt	@ 50°C/122°F	N/A	N/A	N/A	766	413	N/A	N/A
	@ 100°C/212°F	N/A	N/A	N/A	62.3	29.8	N/A	N/A
Coefficient of Expansion per °C over 20-30°C		0.00066	N/A	N/A	0.00076	0.00075	0.00072	0.00073
Thermal Conductivity, w/m °C	@ 20°C	N/A	N/A	N/A	0.216	0.194	0.194	N/A
	@ -269°C	N/A	N/A	N/A	N/A	N/A	0.095	N/A
Specific Heat @ 25°C, J/g		N/A	N/A	1.7	N/A	N/A	N/A	N/A
Electrical Strength, V/mil (0."001)		N/A	N/A	N/A	730	850	820	730
Volume Resistivity, Ω cm		N/A	N/A	N/A	1.2×10^{16}	2.6×10^{16}	2.0×10^{16}	2.3×10^{12}
Permittivity		N/A	N/A	N/A	2.3	2.1	2.3	2.3
Loss Tangent		N/A	N/A	N/A	<0.0001	<0.0001	<0.0001	<0.0001

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Known around the globe for their quality, consistency and versatility...

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

Apiezon Wax W .....Hard Vacuum Sealing/ Mounting Wax, Etch Resist
Apiezon Wax W100 .....Medium Hardness Vacuum Sealant/ Mounting Wax
Apiezon Wax W40 .....Soft Vacuum Sealant/ Mounting Wax
Apiezon Q Compound .....Vacuum Sealing Compound

Ordering Information

Cat. #	Description	Qty.
60710	Apiezon Wax W	500 g
60711	Apiezon Wax W100	250 g
60712	Apiezon Wax W40	250 g
60713	Apiezon Q Compound	1 kg

Waxes and Q Compound Properties

Typical Property		Wax W	Wax W100	Wax W40	Q Compound
Approximate Softening Point	°C	80–90	50–60	40–50	40–50
	°F	176 –194	122–140	104–122	104–122
Estimated Vapor Pressure @ 20°C / 68°F, torr		4.5×10^{-9}	4.5×10^{-9}	6×10^{-8}	1×10^{-4}
Temperature for Application	°C	130	110	90	Ambient
	°F	266	230	194	
Working Temperature Range	°C	-10–75	-10–45	-10–35	-10–30
	°F	14–168	14–113	14–95	14–86
Water Permeability g/cm/hr/mm Hg @ 25°C		0.8×10^{-8}	1.6×10^{-8}	1.6×10^{-8}	N/A
Pack		1 Kg block 25 x 20 g sticks	250 g tin N/A	250 g tin N/A	1 Kg N/A
Thermal/Electrical Properties					
Thermal Conductivity @ 20°C, w/m	°C	0.189	0.170	0.177	N/A
Specific Heat @ 25°C, J/g		1.8	2.7	2.9	N/A
Loss Tangent		0.015	0.016	0.015	N/A
Permittivity		2.8	2.7	2.9	N/A
Volume Resistivity, Ω cm		6.31×10^{-15}	1.64×10^{-15}	5.06×10^{-15}	N/A

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® Cx. (Honeywell/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.
- Exhibits no detectable autofluorescence – ideal for fluorescent microscopy.
- A non-flammable, non-aging co-polymer – which is suited for sterilization by heat or UV.
- Crystalline melting point is 206°C (403°F) – stable in the SEM.
- Flexible and soft–can be sectioned without damage to the ultramicrotome knives.

ACLAR® Chemical Data

Chemicals	Average Weight Increase	Visible Effect on Sample
Acetone	.0.5%	None
Butyl Alcohol	–	None
Carbon Tetrachloride	1.6%	Slightly flexible
1,2-Dichloroethane	0.03%	None
Ethyl Acetate	6.0%	Very flexible
Ethyl Alcohol	None	None
Ethyl Ether	5.2%	Very flexible
Ethylene Oxide	4.0%	Very flexible
Formic Acid	None	None
Gasoline	None	None
All Acids (HCl, H_2SO_4..)	None	None
Methanol	None	None
Propylene Oxide	–	None
Toluene	1.1	Slightly flexible
Osmium Tetroxide	None	None
Plastisolve	–	None

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

ACLAR® 33C

Properties @ 73°F ~50% RH		Typical Value English	Typical Value Metric	Test Method
Specific Gravity		2.12		ASTM D1505
Yield	7.8 mil	1,677 in²/lb.	2.38m²/kg	
Haze		<4.5%		ASTM D1003
Crystalline Melting Point		403°F	206°C	ASTM D4591
Dimensional Stability 10 min. @ 300°F	MD	≤2%		ASTM D1204
	TD	≤2%		
Tensile Strength	MD	3000-4600 psi	21-32 MPa	ASTM D882
	TD			
Elongation	(MD/TD)	50-125%		ASTM D882
Modulus, Secant	MD	185,000-200,000 psi	1276–1379 MPa	ASTM D882
	TD			
Tear Strength, Graves	MD	425-525 g/mil	ASTM D1004	
	TD			
Water Vapor Transmission Rate @ 100°F/100% RH		0.003 gm/100 in²/day	0.047 gm/m²/day	ASTM F1249
Thermal Conductivity		4.7 x 10-4 cal-cm/cm²sec °C		
Flammability		Nonflammable		
Oxygen Index		100		ASTD D2683

Cat. #	Description	Pack
50425-10	ACLAR® Film, 8"x 10", 7.8 Mil	10/pk
50425-25	ACLAR® Film, 8"x 10", 7.8 Mil	25/pk

ACLAR® UltRx 2000

Properties @ 73°F ~50% RH		Typical Value English	Typical Value Metric	Test Method
Specific Gravity		2.11		ASTM D1505
Yield	2.0 mil	6,567 in²/lb.	9.34 m²/kg	
Haze		< 1 %		ASTM D1003
Crystalline Melting Point		412°	F 211°C	ASTM D4591
Dimensional Stability (10 min. @ 300°F/149°)	MD	≤ + 6 %		ASTM D1204
	TD	≤ - 6 %		
Tensile Strength	MD	7,000–10,000 psi	48–69 MPa	ASTM D882
	TD	4,500–7,500 psi	31–52 MPa	
Elongation	MD	150 - 200%		ASTM D882
	TD	175 - 250%		
Modulus, Secant	MD	170,000–200,000 psi	1172–1379 MPa	ASTM D882
	TD	170,000–200,000 psi	1172–1379 MPa	
Surface Tension (Treated Side)		≥ 42 dynes/cm		ASTM D2578
Water Vapor Transmission Rate		gms/100in²/day	gms/m²/day	ASTM F1249
@ 77°F (25°C)/60% RH		0.0012	0.0186	
@ 86°F (30°C)/60% RH		0.0025	0.0388	
@ 104°F (40°C)/75% RH		0.0066	0.102	
@ 100°F (37.8°C)/100% RH		0.0077	0.119	

Cat. #	Description	Pack
50426-10	ACLAR® 2 mil thick 210(W) x 297mm (L) (11.69" L x 8.27" Wide	10/pk
50426-25	ACLAR® 2 mil thick 210(W) x 297mm (L) (11.69" L x 8.27" Wide	25/pk

References:

1.Kingsley R.E, Cole N. L.: Preparation of cultured mammalian cells for transmission and scanning electron microscopy using ACLAR® film. Journal of Electron Microscopy Technique, 10, 77-85 (1988)
2.Mauve G.M., Brenham J.C., Beattie, M.S.: Ultrastructure of HRP-labeled neurons: a comparison of two sensitive techniques. Brain Research Bulletin, 10, 551 (1983)
3.Masurovsky E.B., Bunge R.P.: Aclar Film in Biological Electron Microscopy. Journal of Electron Microscopy Technique, 12, 172-173 (1989)
4.Masurovsky E.B., Bunge R.P.: Fluoroplastic coverslips for long-term nerve tissue culture. Stain Technology, 43, 3, 161–165 (1968)

Omni Grids

*This section is dedicated to the accessories and consumables from the Omniprobe family of Nanomanipulation Systems, including **AutoProbe™ 200, AutoProbe™ AutoProbe™ 250, 300, Short-Cut™, OmniGIS™ and SST™ 400-1.***

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 utermost 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

Copper 3-Post Lift-Out Grids, 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

Copper 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 glass vials.

75964-09	Copper 5-Post Lift-Out Grids	100/box

Copper 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 alighment 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

Omni Grid Storage Box

Storage box for 100 standard or haft grids—3 mm diameter –TEM grids. Box comes complete with base, lid and clips.

75965-01	Grid Storage Box	each

Omniprobe TEM Grid Comparison Chart

Part Number	Number of Posts	Material	Thickness (Nominal) Microns	Nominal Post Downset Microns	Unique Feature
75964-01	3	Copper	30	10	—
75964-02	3	Molybdenum	30	10	Top Downset only
75964-03	0	Beryllium	25	N/A	Half Ring
75964-04	5	Copper	40	10	5th Post is E
75964-05	4	Copper	30	10	—
75964-06	4	Molybdenum	30	10	Top DS Only
75964-07	3	Copper	30	5	Side Access
75964-08	3	Copper	30	5	—
75964-09	5	Copper	35	5	5th Post is "E"
75964-10	4	Copper	30	5	—

Immuno Stain 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 forcep).

The chamber is fabricated out of heavy-duty polystyrene 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.

Cat. #	Description	Qty.
62010-35	Immuno Stain Moisture Chamber Clear	each
62010-36	Immuno Stain Mositure Chamber, Amber	each
62010-37	Immuno Stain Mositure Chamber, Black	each

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 compete with a fixative for air dried cell suspensions and or touch preparation slides.

Applications:

- **Fine Needle Aspirations**
- **Frozen Sections**
- **Blood Smears**
- **Cytological Specimens**
- **Cytopreps**
- **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.

Cat. #	Description	Qty.
26096-25	Differential Quick Staining Kit	250 ml
26096-50	Differential Quick Staining Kit	500 ml
260096-75	Differential Quick Staining Kit	Gallon

Held Secure™ Slide/Cassette Storage System

A durable corrugated filing box kit for the proper filing, identification, and storage of glass slides or cassettes

Features

- **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

In/Out Cards come with each case and index cards come with each slide kit

Removable Tray labels

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

Electron Microscopy Sciences In PA: (215) 412-8400 • Toll-Free (800) 523-5874
Fax (215) 412-8450 or 8452 • email: sgkcck@aol.com or stacie@ems-secure.com • www.emsdiasum.com

Correlative Microscopy Coverslips®

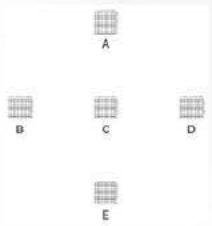
EMS introduces a simple coverslip with a grid image that allows cells to grow and later be analyzed under brightfield or fluorescence microscopy before being further processed and sectioned for EM or other analysis. These unique coverslips do all that.

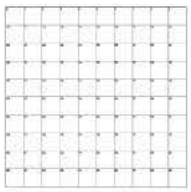
Applications:

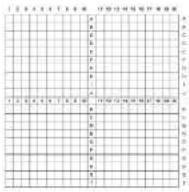
Light Microscopy, Fluorescence, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), High-Pressure Cryofixation

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 100C and negative liquid N_2)**
- **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**







66108-01 10x10 grids of 0.1mm squares at 5 positions. Indexed 1-10 along top and A-J down side

66108-03 10x10 grids of 1mm squares. Each square individually indexed 0-99

66108-02 20x20 grid of 0.5mm squares. Indexed 1-20 along top, A-T down side and on centre cross

How to choose the most appropriate coverslip for your application:

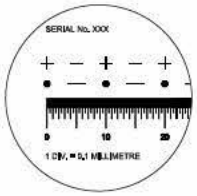
Catalog Number	Number of Squares	Surface covered	Unit size of each square	Average number of cells per square unit (eg HeLa Cell)
66108-01	100	5x1mm²	0.01mm²	2-3
66108-02	200	100mm²	0.5mm²	20-25
66108-03	100	100mm²	1mm²	40-50

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

Cat. #	Description	Qty.
66108-01	10x10 grid of 0.1mm squares at 5 positions	25/pk
66108-02	20x20 grid of 0.5mm squares	25/pk
66108-03	10x10 grid of 1mm squares, each square individually identified 0-99	25/pk

Combination Scales

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



The above are section images from the PS-XO 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

Cat. #	Description	Size	Qty.
68073-PS300	PS300-XO 300mm Combination Scale in 0.1mm Divisions, 1mm dots at 10mm centers, crosses at 10mm centers	330mm x 30mm x 6mm	each
68073-PS300-UK	Same as above with UKAS Certification of Calibration, 10 Points measured on Scale		each
68073-PS150	PS150-XO 150mm Combination Scale in 0.1mm Divisions, 1mm dots at 10mm centers, crosses at 10mm centers	180mm x 30mm x 6mm	each
68073-PS150-UK	Same as above with UKAS Certification of Calibration, 10 Points measured on Scale		each
68073-PS100	PS100-XO 100mm Combination Scale in 0.1mm Divisions, 1mm dots at 10mm centers, crosses at 10mm centers	130 mm x 30mm x 6mm	each
68073-PS100-UK	Same as above with UKAS Certification of Calibration, 10 Points measured on Scale		each

B. The Grid Dot Array

Green Float glass, high reflective Chrome image

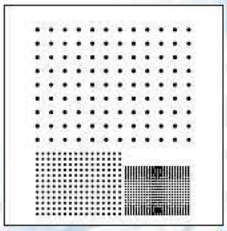
The ideal product for testing image area, distortion, field flatness and other parameters in optical and imaging systems. The three array areas give options for different magnifications or field size.

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



Cat. #	Description	Size	Qty.
68073-R76	Grid Dot Array, 3 image areas	101mm x 101mm x2.2mm	each

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 from 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

Remotely mounted turbomolecular pumping system

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™ works surface 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 gives 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" intuitive 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 set-up 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.

Specimen transfer device

When not in use, the cryo transfer device can be stored under vacuum in the pumped storage tube, located on the Prepdek® work surface

Transfer device, shuttle and universal specimen stub

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.

Pre-frozen specimens can be handled under liquid nitrogen for subsequent vacuum transfer into the PP3010T preparation

The cryo transfer device is compact and manoeuvrable

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.

Front-mounted fracturing and specimen manipulation tool

The PP33010T is fitted as standard with a front mounted fracturing/manipulation device. The ball-jointed mount offers flexible movement of the blade and allows the no.5 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.

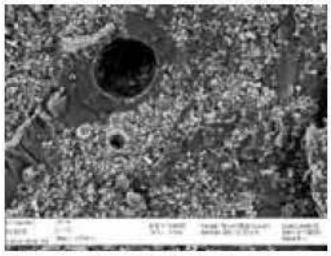
Automatic sublimation and sputtering

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.

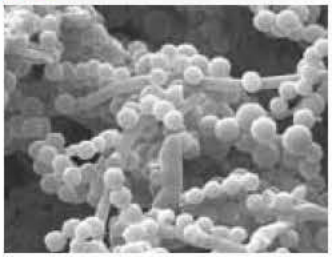
An optional terminating film thickness monitor (FTM) is available. The system is fully integrated – no external control boxes.

PP3010T Cryo-SEM Preparation System (continued)

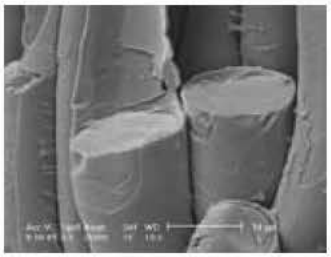
Cryo-SEM Micrographs



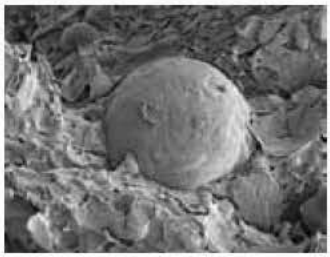
Cross-section of oil/water/rock.



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

	Standard?
Cryo preparation chamber (column-mounted)	
Built-in liquid nitrogen cooling dewar with a twenty-four hour run time between fills	Yes
Two integral gate valves (loading and SEM) with appropriate electrical interlocks. Air lock pumping is automatically activated when the specimen transfer device is attached	Yes
Variable temperature conduction cooled specimen stage (-185°C to 50°C)	Yes
Cold stage 'parking space' for a second specimen shuttle (allows a second specimen to be prepared in advance)	Yes
Large anti-contaminator (cold trap) plates above and below cold stage	Yes
Robust micrometer-fed fracturing knife (actively cooled)	Option
Side-mounted surface knife/probe (actively cooled). A range of scalpel blades can be fitted to suit different specimen requirements	Yes
Automatic sublimation (controlled and viewed on the touch screen)	Yes
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.) Sputtering controlled and viewed on the user touch screen	Yes
High purity argon gas canister (1L)	Yes
Carbon fiber evaporation head and power supply	Option
Large front viewing window (138 x 73mm) plus top and side viewing ports	Yes
Preparation chamber camera (CCD) mounted on a side port	Yes
Viewing port shutter - automatically closes during sputtering to ensure the port window is clear of sputtered material	Yes
Vacuum transfer device	Yes
Chamber illumination - three LEDs	Yes
SEM cooling dewar, SEM cold stage and cold trap (anticontaminator)	
Gas-cooled nitrogen cold stage assembly (-190°C to 50°C). Temperature stability of > 1°C	Yes
Separate gas-cooling circuits for SEM stage and SEM anti-contaminator	Yes
CHE2000 12L capacity, off-column cooling dewar with run time between fills of up to 24 hours	Yes
SEM CCD camera- viewed on the system control screen	Yes
LED lighting (interlocked)	Yes

	Standard?
Pumping system and controls	
Remotely-mounted turbomolecular-pumping system (70L/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	Yes
Single 90L/m rotary pump required	Order separately
System control and specimen handling	
Control via a colour user touch screen monitor (15") mounted on the Prepdek™ 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	Yes
Twin liquid nitrogen slushing and specimen handling system - ideal for handling pre-frozen specimens. Mounted on the Prepdek™	Yes
System electronics stored in a ventilated, sealed unit under the Prepdek™	Yes
Specimen shuttles (x2). 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	Yes
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-pressurising LN2 dewar and regulator (for storage and venting)	Option
Carbon fiber evaporation head	Option
Wide range of specimen holders and specimen stubs	Option

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 vacuums during operation are in the region of 10-6mbar 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.

Plunge freezing in slushy nitrogen.

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

CHE3010 heat exchanger and dewar. During operation the heat exchange is inserted into the dewar. Typically hold times are up to 24 hours

Cryo preparation chamber with cryo transfer device fitted

View during specimen transfer

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, Prepdek™ workstation with dual freezing and specimen manipulation facilities, automatic sputtering and sublimation. Touch screen user interface mounted on the PrepdekTM workstation. Transfer device, 2 x AL200077B and 1 x 10246 specimen shuttles, E7449-5 and E7402 specimen stubs. 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	RV5 90L/m 115/230V 50/60Hz rotary vacuum pump with oil mist filter	each
Options and accessories		
PP7450	Pressurised 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 blade. Note: the standard ball-joint mounted fracturing tool is fitted as standard. The 12145 can be fitted in addition	each
13060	Two-years spares/consumables kit	each
Specimen holders		
10245	Top-loading specimen shuttle for planchettes	each
10246	Top-loading specimen shuttle, to take a 10mm stub	each
10247	Top-loading specimen shuttle for rivets (vice style)	each
E7433	Rivet 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 (spare)	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 3mm slots (pack of 5)	each
E7407	Copper (Cu) stubs with 1 x 3mm slot (pack of 5)	each
32816510	Brass rivets for fracturing liquids (pack of 100)	each
Sputter targets and carbon fiber		
E7400-314A	Gold (Au) target 0.008" thick	each
E7400-314B	Gold/palladium (Au/Pd) (80:20) target 0.2mm thick	each
E7400-314C	Platinum (Pt) target 0.008" thick	each
E7400-314IR	Iridium (Ir) target 0.008" thick	each
E7400-314CR	Chromium (Cr) target 0.3mm thick	each
91047-1	Carbon fiber cord — high purity - 1m	each
91047-5	Carbon fiber cord — high purity - 5m	each

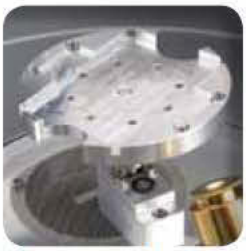
Specimen Stages for EMS Equipment

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).

4500-2, Tilt Angle

4500-3, 4" Wafer

4500-12, Rotary Planetary



4500-17, Glass Microscope

Cat. #	Stage Type	Description	Compatible Equipment	Qty.
4500-1	50mm	Standard stage with six stub positions for 15 mm or 6.5 mm or 1/8" pin stubs (same as #3330, 6401, 6552)	All EMS Series	each
4500-2	Tilt	Rotate-tilt stage with six stub positions for 15 mm or 6.5 mm or 1/8" pin stubs. Tilts Up to 90° from horizontal (same as #3340, 4519, 6400-S, 6551)	All EMS Series	each
4500-3	4" Wafer	Adjusts to accept 2", 3", 4" wafers. Comes with 4500-6, a 4" stub holder to accept up to 18 1/8 pin stubs (same as #6549)	All EMS Series	each
4500-4	6" Wafer	Adjusts to accept 4" & 6" wafers. Comes with 4500-7, a 6" stub holder to accept up to 27 1/8 pin stubs (same as #6547)	EMS 300	each
4500-5	8" Wafer	Adjusts to accept 6" & 8" wafers. Comes with 4500-8, an 8" stub holder to accept up to 54 1/8 pin stubs	EMS300TT EMS300RT	each
4500-6	4" Stub Holder	A 4" stub holder to accept up to 18 1/8 pin stubs	All EMS Series	each
4500-7	6" Stub Holder	A 6" stub holder to accept up to 27 1/8 pin stubs	EMS300TT EMS300RT EMS300TD	each
4500-8	8" Stub Holder	An 8" stub holder to accept up to 54 1/8 pin stubs	EMS300TT EMS300RT	each
4500-9	4" Wafer & Offset Gearbox	A combination of 4500-3 and a small gearbox to offset the sample position. Enable even coating of up to a 4" sample size. (same as #3360, 4522)	EMS150T EMS150R	each
4500-10	Fibre Stage	A stage accept single fibres or pins up to 1 mm diameter rotating horizontally to achieve all round coating	EMS150T EMS150R	each
4500-11	6" Square Wafer	Stage to accept 6" square wafer or Masks	EMS300TT EMS300RT	each
4500-12	Rota Cota	"Rota Cota" planetary stage with six stub positions for 15 mm or 6.5 mm or 1/8" pin stubs. Tilts up to 30° from horizontal (same as #4521, 6402, 6553)	EMS150T EMS150R	each
4500-13	8 Place Stub	8 places for 25 or 30mm Polished embedded samples. Includes a polished Brass Tally	All EMS Series	each
4500-14	14 Place Stub	14 places for 25 or 30mm Polished embedded samples. Includes a polished Brass Tally	All EMS Series	each
4500-15	9 Place Coverslip	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	All EMS Series	each
4500-16	4 Place 25mm Stub	4 Place 25mm Stub Stage with locking screws. May be fitted to 4500-12 rota cota stage	All EMS Series	each
4500-17	Slide Stage	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)	All EMS Series	each

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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: 0.28L/0.2L**

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

Cat. #	Description	Qty.
91004	Vacuum Pump E2M1.5	each
91004-E	Vacuum Pump E2M1.5, 220 Volts	each

Oil Mist Filter — for more information, see right		
91004-OMF	EMF 3 Oil mist Filter	each
91004-RMO	Replacment Mist and Odor Element for the EMF 3	each

Edwards RV Series Vacuum Pumps

Rotary vacuum pumps — double stage.

Edwards V3 Vacuum Pump

- **Speed - (Pneurop 6602)**
- **50 Hz operation - 2 ft^3min^{-1} (3.3 m3h-1)**
- **60 Hz operation - 2.3 ft^3min^{-1} (3.9 m3h-1)**
- **Ultimate Vacuum (Total Pressure) - High Vacuum Mode - 2 x 10^{-3} 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 (19.6 kg).

Cat. #	Description	Qty.
91003	Vacuum Pump RV3	each
91003-E	Vacuum Pump RV3, 220 Volts	each

Oil Mist Filter — for more information, see right		
91005-OMF	EMF 10 Oil Mist Filter	each
91005-RMO	Replacment Mist and Odor Element for the EMF 10	each

Edwards RV5 Vacuum Pump

- **4.1 cfm (117L/min) displacement**
- **Ultimate vacuum (without gas ballast) $1.5x10^{-3}$ torr.**
- **Max. inlet pressure for water vapor: 38 torr**
- **Max. water vapor pumping rate: 0.48 lb/h**
- **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)

Cat. #	Description	Qty.
91005	Vacuum Pump RV5	each
91005-E	Vacuum Pump RV5, 220 Volts	each

Oil Mist Filter — for more information, see right		
91005-OMF	EMF 10 Oil Mist Filter	each
91005-RMO	Replacment Mist and Odor Element for the EMF 10	each

Edwards RV8 Vacuum Pump

- **6.9 cfm (195 L/min) displacement**
- **Ultimate vacuum (without gas ballast) $1.5x10^{-3}$ torr.**
- **Max. inlet water pressure vapor: 29 torr**
- **Max. water vapor pumping rate: .48 lb/h**
- **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 (24 kg).

Cat. #	Description	Qty.
91025	Vacuum Pump RV8	each
91025-E	Vacuum Pump RV8, 220 Volts	each

Oil Mist Filter — for more information, see right		
91005-OMF	EMF 10 Oil Mist Filter	each
91005-RMO	Replacment Mist and Odor Element for the EMF 10	each

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.

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**

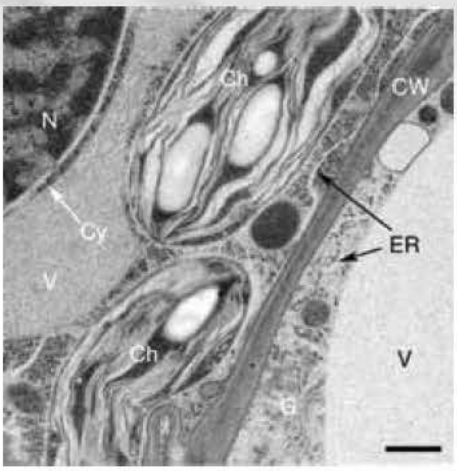
EMF 10

The EMF10 mist filter is suitable for use with RV3, RV5 and RV8 pumps. They are very efficient at 99.999% DOP test 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

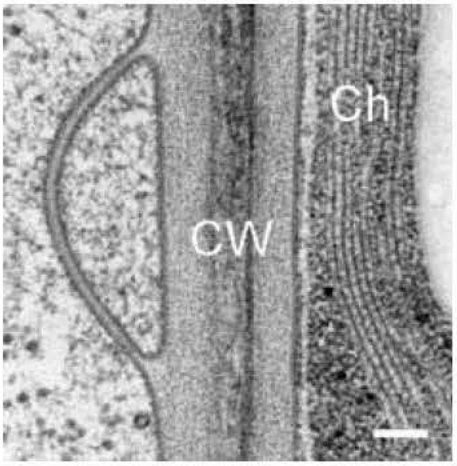
- **Protection from oil mist emissions as required by COSHH and health and safety regulations**
- **Use of optional oil return kits results in reduced oil level maintenance and savings in pump oil**
- **If the oil element becomes blocked, an integral pressure relief valve opens**

Cat. #	Description	Qty.
91004-OMF	EMF 3 Oil Mist Filter	each
91004-RMO	Replacment Mist and Odor Element for the EMF 3	each
91005-OMF	EMF 10 Oil Mist Filter	each
91005-RMO	Replacment Mist and Odor Element for the EMF 10	each

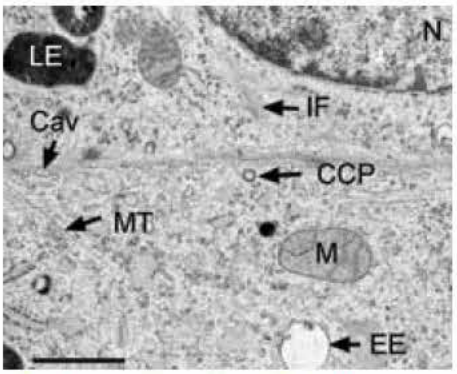


Tobacco leaf prepared by the quick FS method (Webb & McDonald, 2011).

Abbreviations: N = nucleus; Ch = chloroplast; CW = cell wall; Cy = cytoplasm; ER = endoplasmic reticulum; V = vacuole; and, G = Golgi apparatus. Bar = 0.5 µm.



Tobacco leaf prepared as above showing details of the cell wall (CW) and chloroplast (Ch) and cell membranes. Bar = 100 nm.



A BHK cell processed in 90 minutes by the quick FS method.

Abbreviations: CCP = clathrin-coated pit, Cav = caveolae, EE = early endosome, IF = intermediate filaments, LE = late endosome, M = mitochondrion, MT = microtubule. Bar = 1 µm.

Modified from McDonald and Webb (2011).

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.I. Webb[1] 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:

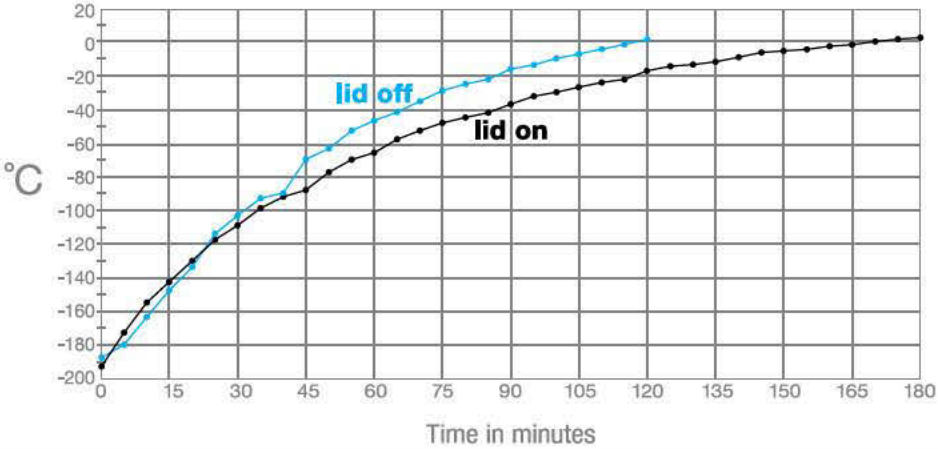
1. EMS 111 Platform Shaker
2. EMS 002 Ice Chest
3. EMS 003 Heater Block
4. EMS 004 Temperature Probe
5. EMS 005 Cryo Tubes
6. EMS 006 Data Logger

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, hood air flow can have a definite influence on the shape of the curves.



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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 methods, 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 cryotubes 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.I. Webb** * Electron Microsocpe Laboratory, University of California , Berkley, CA and ** Centre for Microscopy an Microanalysis, University of Queensland, Queensland, Australia

References:

McDonald, K, Webb, R. (2011) Freeze Substitution in 3 hours or less. J Microscopy **243**, 227-233

Dubochet, J. (2007). The physics of rapid cooling and its implications for cryoimmobilization of cells. Meth. Cell Biol. **79**, 7-21.

Buser, C., & Walther, P. (2008). Freeze substitution: the addition of water to polar solvents enhances the retention of structure and acts at temperatures around -60°C. J. Microsc. **230**(2), 268-277.

EMS 111 Platform Shaker

EMS 002 Ice Chest

EMS 003 Heater Block

EMS 005 Cryo Tubes

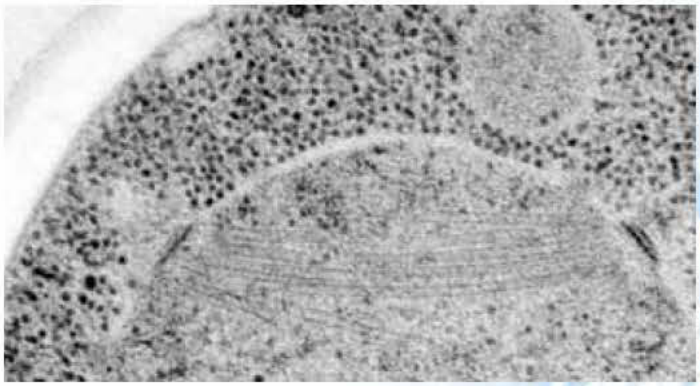
EMS 004 Temperature Probe

EMS 006 Data Logger

Ordering Information

Cat. #	Description	Qty.
34500	EMS Freeze Substitution Kit ***(available with or without Shaker – please specify)***	Kit
34502	EMS 111 Platform Shaker ***(please specify 115 or 220 Volt)***	each
34503	EMS 002 Ice Chest	each
34504-B	EMS 003 Heater Block, 12mm	each
34504-R	EMS 003 Heater Block, 13mm	each
34505	EMS 004 Temperature Probe	each
34506	EMS 005 Cryo Tubes	each
34507	EMS 006 Data Logger	each

Mitotic spindle microtubules and spindle pole bodies in the budding yeast, *Saccharomyces cerevisiae.*



Compact Low Cost Incubators

Low Cost Incubator for Clinic or Classroom!

Product Description

- Mechanical Convection Technology
- Controller with LED display
- High temperature accuracy
- Easy-to-use interface
- Internal light and window facilitate observation
- Footprint: 1.3 sq.ft (.12 sq. m)
- Number of shelves (supplied/max.): 2/3
- Maximum shelf load: 4.4 lb. (2 kg)

Applications

Bacteriological Cultures, Hematology Studies, Chick Embryo Studies

Product Specifications

Model #	Operating Temp Range °C	Temp Control at 37°C	Temp Uniformity T at 37°C	Chamber Volume cu. ft. (L)	Chamber Dimensions Inches (mm) W	H	D	Overall Dimensions Inches (mm) W	H	D
IMC18	Ambient 17° to 40°C	±.2°C	±1.2°C	0.65 (18)	11.4 (290)	7.1 (180)	12.2 (310)	18.5 (470)	10.2 (260)	16.3 (415)

Ordering

Cat. #	Model #	Electrical (50/60 Hz) Volts	Amps	Watts	Ship Wgt. lbs (kg)	Plug	Qty.
63151-10	IMC18	100-240V	.85-.45	45	15.9 (7.2)	US	each

Isotemp 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
- Overtemperature value is automatically set at 3°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

Big three-character LED display

- Digits display actual temperature to nearest 0.1°C
- Display shows current value for set point temperature
- HEAT indicator light cycles on and off to show when incubator heaters are on
- ALARM indicator lights up if temperature exceeds overtemperature limit; backup controller maintains temperature at 3°C above setpoint; safety backup built into software

Small, medium and large workload capacities

- Mounting holes at 2 in. (5cm) intervals on the chamber walls for shelf placement
- Small incubator holds a maximum of five shelves, medium incubator holds eight, and large incubator holds eleven

Low-maintenance incubators with inner and outer doors

- Cabinet has durable, enamel-coated steel exterior
- Extruded aluminum trim has acrylic powder coating
- Chamber is easy-to-clean stainless steel
- Low-watt-density heater elements are designed for long life
- Silicone gasket on outer door and 3 in. thick (7.6cm) fiberglass insulation throughout prevent heat loss
- Outer door opens to 180° for unhindered access and features two grabber-type latches
- Inner door is tempered glass
- Steel shelves are 17.37 in. wide and 16.75 in. front-to-back (44 x 42.5cm)
- Black synthetic rubber feet keep incubator from slipping and maintain a space between incubator and benchtop for ventilation

Operating Specifications

- Convection Technology: Dual Convection
- Temperature range: ambient +5° to 105°C
- Timer: weekly/real time/hour
- Maximum Shelf Load: 44 lbs. (25 kg)
- Plug Type: Nema 5-15

†Value assumes fan is off. With fan at full speed, uniformity is ±0.2°C (51028066), ±0.3°C (51028067), and ±0.4°C (51028068).

Product Specifications

Model #	Operating Temp Range °C	Temp Control at 37°C	Temp Uniformity T at 37°C	Chamber Volume cu. ft. (L)	Chamber Dimensions Inches (mm) W	H	D	Overall Dimensions[3] Inches (mm) W	H	D
Small	30°-75°C	±0.1°C	±0.7°C	2.5 (70.8)	18 (46)	18 (46)	13.5 (34)	23.5 (60)	26 (66)	26 (66)
Medium				3.75 (106.2)	18 (46)	18 (46)	20 (51)	23.5 (60)	26 (66)	33 (84)
Large				5.0 (141.6)	18 (46)	18 (46)	26.5 (67)	23.5 (60)	26 (66)	39 (99)

Ordering

Cat. #	Model	Recovery[2] min.	Air Changes per hr	BTU per hr (75°C)	Electrical[4] (60 Hz) Volts	Amps	Watts	Ship Wgt. lbs (kg)	Qty.
63155-10	small	2	6	290	120	2.2	260	115 (52)	each
63155-20	medium	2	4	360	120	2.2	260	130 (59)	each
63155-30	large	2	3	430	120	2.7	320	145 (66)	each

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 (AISI 430)

Operating Specifications

- Convection Technology: Gravity Convection
- Controller: Microprocessor control with vacuum fluorescent display
- Temperature range: ambient +5° 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)

Exceptionally small footprint compared to other manufacturers.

Product Specifications

Model #	Number of Shelves (supplied/max)	Chamber Volume cu. ft. (L)	Chamber Dimensions Inches (mm) W	H	D	Overall Dimensions Inches (mm) W	H	D
51028063	2/13	2.6 (75)	16.3 (414)	13.9 (354)	20.0 (508)	22.2 (565)	20.9 (530)	28.3 (720)
51028064	2/16	4.0 (117)	16.3 (414)	18.3 (464)	23.9 (608)	22.2 (565)	25.2 (640)	32.3 (820)
51028065	2/19	6.9 (194)	23.2 (589)	18.3 (464)	27.9 (708)	29.1 (738)	25.2 (640)	36.2 (920)

Ordering

Cat. #	Model #	Electrical (50/60 Hz) Volts	Amps	Watts	Ship Wgt. lbs (kg)	Qty.
63153-10	51028063	120	2.5	300	88 (40)	each
63153-20	51028064	120	4.5	540	112 (51)	each
63153-30	51028065	120	6	720	143 (65)	each

Internal socket allows the use of equipment, such as shakers or stirrers, inside the unit

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 (AISI 304)
- 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

Operating Specifications

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

†Value assumes fan is off. With fan at full speed, uniformity is ±0.2°C (51028066), ±0.3°C (51028067), and ±0.4°C (51028068).

Internal socket

Easy to clean

Internal glass door

Product Specifications

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

Ordering

Cat. #	Model #	Electrical (60 Hz) Volts	Amps	Watts	Ship Wgt. lbs (kg)	Qty.
63154-10	51028066	120	5	600	99 (45)	each
63154-20	51028067	120	7	840	123 (56)	each
63154-30	51028068	120	8.5	1020	154 (70)	each

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:

Measurements	25 (W) x 75(L) x 1.6 (T) mm
Chamber Volume	10 micro liters
Chamber Depth	100, 200 or 10 Micron (Depends on model)

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

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