



INNOVATIVE PRODUCTS FOR SEMICONDUCTOR, LIFE SCIENCE, LABORATORY AND PHARMACEUTICAL PROCESSES

POLOS[®] PHOTOLITHOGRAPHY

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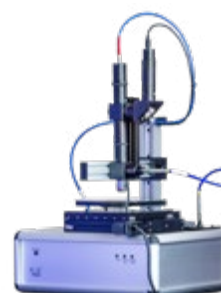
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WAFER HANDLING

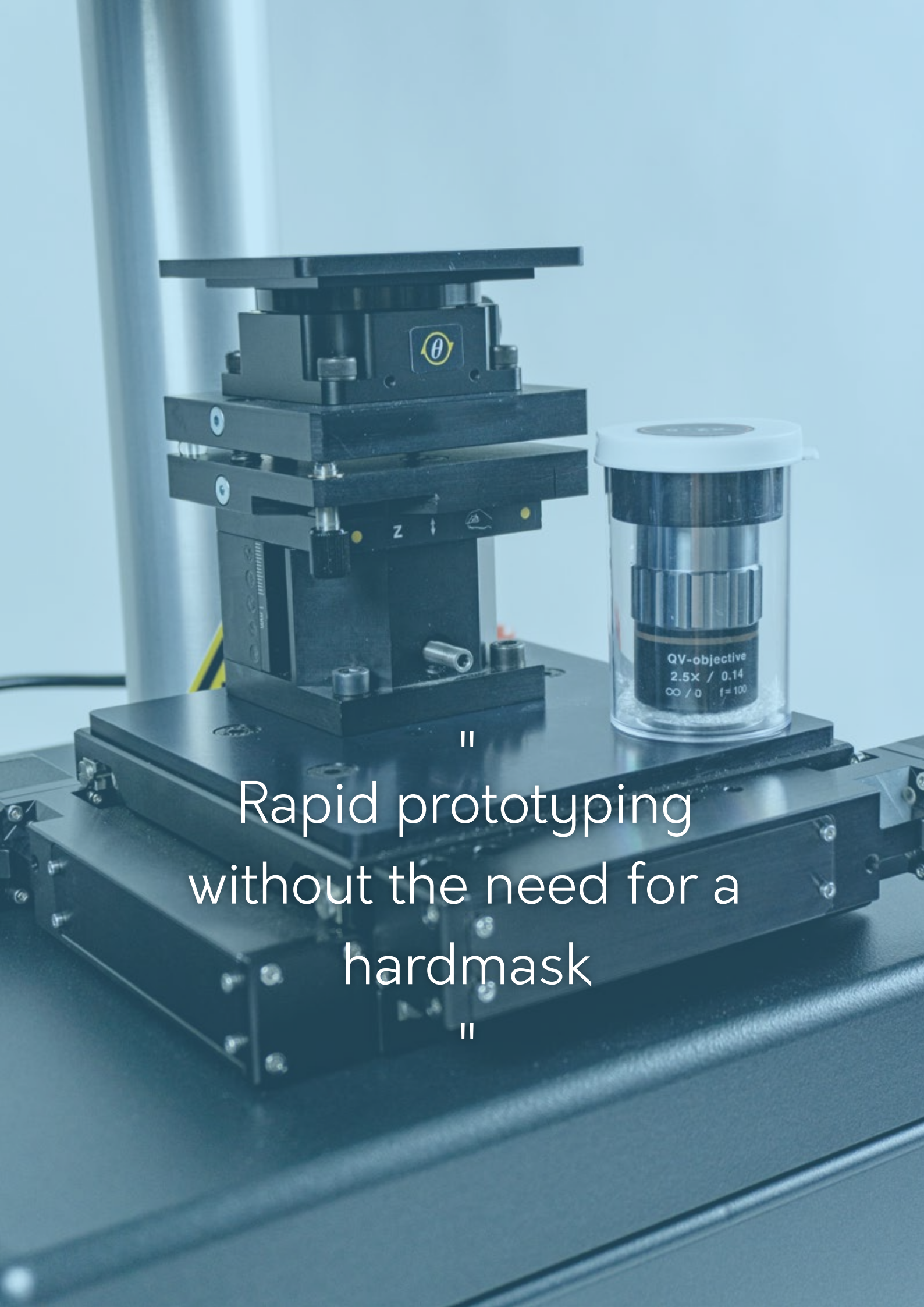
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MASKLESS LITHOGRAPHY SYSTEM COMPARISON



Model	Print UV Standard	BEAM	BEAM XL	NanoWriter	NanoWriter Advanced
PC with software	Included				
Resolution	1,5 µm, 3 - 6 - 15 µm option	0.8 µm	0.8 µm	0.8 - 1.5 - 2.5 µm 5 µm option	0.3 - 0.6 - 0.9 µm 5 µm option
Max substrate size	100 x 100 mm	100 mm x 100 mm	150 mm x 150 mm	100 x 100 mm	
Max exposed area	70 x 70 mm	106 mm x 106 mm	155 mm x 155 mm	110 x 110 mm	
Max layer thickness	400 µm	10 µm	10 µm	Few microns	
Light-source wavelength	385 nm	405 nm	405 nm	405 nm (375 nm option)	
Optional light-source wavelength	N/A	375 nm	375 nm	375 nm	
Auto-focus wavelength	Manual focus @ 525 nm	+/- 100 µm	+/- 100 µm	650 nm	
Grayscale levels	256	upon request	upon request	4095	
Light-source lifetime	> 8.000 hours	> 20.000 hours	> 20.000 hours	> 20.000 hours	
Alignment	Topside	Topside	Topside	Topside/BSA	
Alignment resolution	2 µm	0.1 µm	0.1 µm	0.5 µm	
Writing speed	75 mm²/min	2 mm/s or better	2 mm/s or better	200 mm/s	
Writing speeds @ highest res.	6 mm²/min	N/A	N/A	4 mm²/min	1.4 mm²/min
Writing speeds @ lowest res.	140 mm²/min	5 µm resolution @ 80 mm²/min	5 mm²/min	35 mm²/min	
File format	GDSii, DXF, CIF, OAS, TIFF, PNG, BMP	BMP, PNG, TIFF, GDS	BMP, PNG, TIFF, GDS	BMP, TIFF, GDSII, CIF, DXF	
Dimensions (W x D x H) in mm	520 x 520 x 690	330 x 310 x 340	370 x 360 x 340	580 x 600 x 708	600 x 600 x 750
Weight	100 kg	20 kg	30 kg	260 kg	
Facilities	Only electricity	Electricity	Electricity	Electricity & compressed air. Vacuum pump included.	
Room temp. regulation needs	N/A	N/A	N/A	+/- 1 °C	
Warranty	1 year	1 year	1 year	1 year	
Warranty option	+2 years	+2 years	+2 years	1 year	



||
Rapid prototyping
without the need for a
hardmask
||

POLOS® PRINT UV STANDARD

The POLOS® Print UV Standard can produce any 2D shapes at micron resolution without the need for a hard-mask. It is a maskless lithography tool, based on a Digital Micromirror Device projection technology (DMD). The tool is compatible with a wide range of resists and substrates.



CONFIGURATION	
Light source	Exposure: 385 nm Alignment: 590 nm
Minimum feature size	1.5 µm
Alignment accuracy	2 µm
Maximum exposure area	70 x 70 mm²
Substrate size	Up to 4" (100 mm) wafers or 5" square substrates
Writing speed	75 mm²/min
System dimensions	52 (w) x 69 (h) x 52 (d) cm

APPLICATIONS

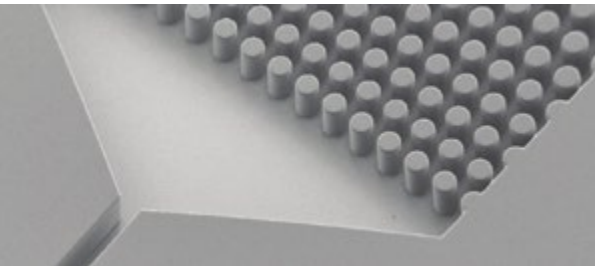
- Microfluidics
- Microelectronics
- Optoelectronics
- Spintronics
- 2D Materials
- Biotechnologies

KEY FEATURES

- Writing resolution down to 1.5 µm
- Adjustable writing field and resolution with exchangeable objectives
- Compatible with CAD files and bitmap images
- Compatible with i, h and g-line photoresists
- Compatible with a wide range of substrates (silicon, glass, metal, plastic etc.)
- Compatible with any sample size up to 5" square substrates
- Camera feedback for alignment steps

KEY BENEFITS

- Time and money saving thanks to the absence of a hardmask
- Intuitive alignment method with a direct overlay of the design on the sample
- Table-top, with a very small footprint
- Technology well suited for microelectronics, 2D-materials, microfluidics, optoelectronics, optics or any other 2D micro-fabrication applications



SOFTWARE PACKAGE	
All-in-one PC	With Windows 10, 24" full HD
Phaos software	Machine control, step-and-repeat, automatic dose test, stitching, alignment Conversion of standard CAD formats (gdsii, dxf, cif, oas) to machine format. CAD software included

OPTIONS AND ACCESSORIES

- Multiple-sample holder (glass-slide, 4" wafer etc.)
- Objectives (see below)

OPTICS POLOS® PRINT UV ADVANCED				
Objective	1X	2.5X	5X	10X
Writing field (mm)	10.56 x 5.9	4.2 x 2.4	2.1 x 1.2	1.06 x 0.59
Smallest feature (µm)	15	6	3	1.5

POLOS® NANOWRITER

The POLOS® NanoWriter is a versatile UV laser writer with high precision components specifically designed to give the user the highest degree of freedom to create microstructures in photosensitive layers. The POLOS® NanoWriter includes a 405 nm optical module capable of writing structures as small as 0.8 µm.

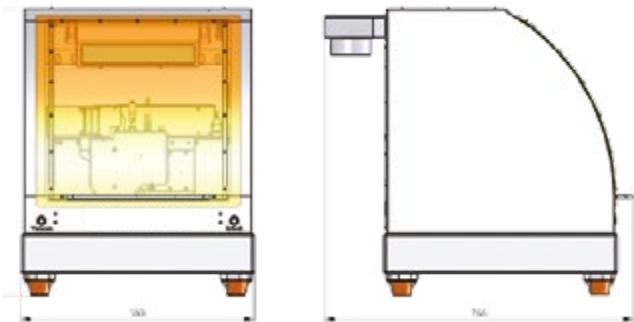


This user-friendly tool supports up to 4095 levels of grayscale or pure binary mode and allows for 2.5D optical structures, surface structures as well as mask projects. Real-time laser-controlled autofocus and laser intensity control ensure high-quality imaging during the entire exposure process. The control electronics are all mounted within the frame, except for the control PC. This Microsoft Windows-based desktop PC and all required software is included in the package.

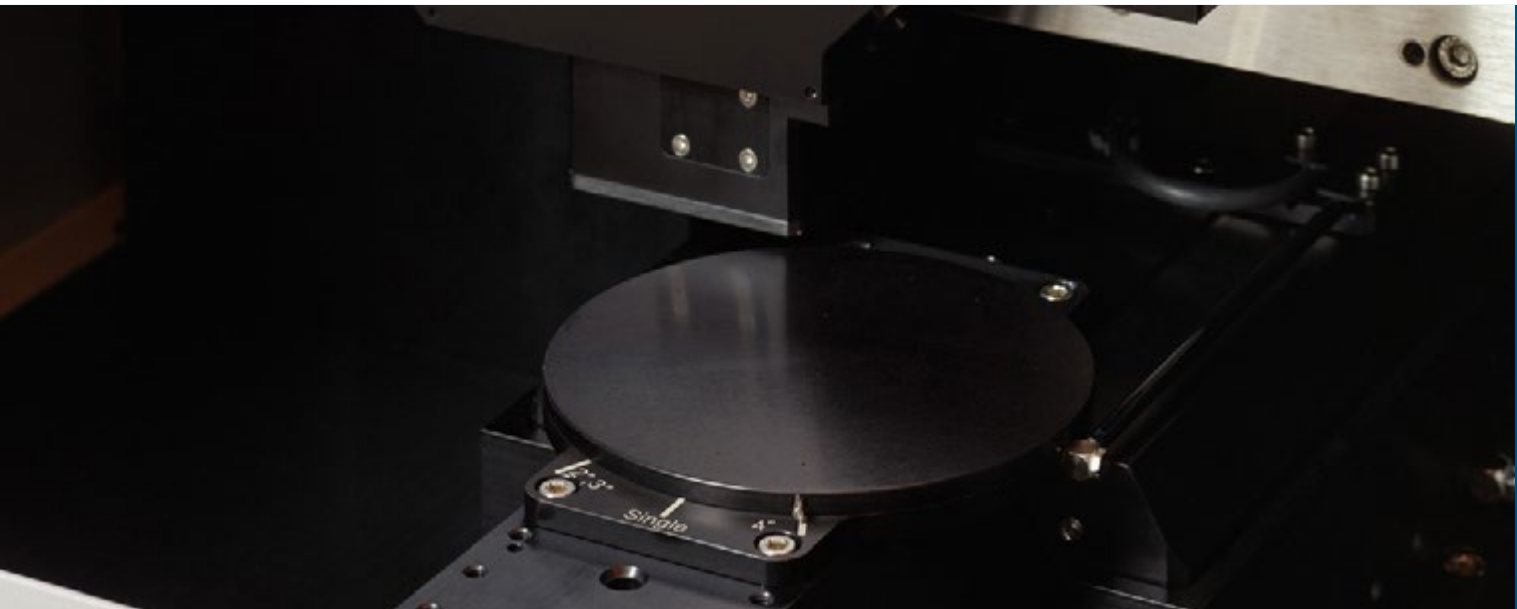
CONFIGURATION	
Max. writeable size	4" x 4"
Stroke scan & step	Max. 115 mm
Repeatability	< 50 nm RMS
Encoder resolution	2.5 nm
Scan speed	Max. 200 mm/s
Straightness axis	< 1 µm over 100 mm
Wafer thickness	0 - 10 mm
Max. substrate size	Min. 5 x 5 mm, max. 125 x 125 mm
Exposable area	Max. 110 x 110 mm (speed dependent)
Dimensions (mm)	580 (w) x 708 (h) x 600 mm (d) (excluding optional air duct)
Weight (kg)	260
Compressed air:	5 - 7 Bar, Air quality according ISO8573-1:2010 class 3 or better.

KEY BENEFITS

- High quality, cost-efficient maskless lithography tool
- Writing resolution down to 0.8 µm
- 375 nm laser source available for i-Line resists
- Compact optical module: use a spare optical unit for revolutionary machine downtime reduction
- User-friendly operation



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OPTICAL PROPERTIES	
Laser source	Standard 405 nm, GaN laser diode. 375 nm optional
Lifetime	>10.000 hours
Write modes	0.8 μm , optional 1.5 μm and 2.5 μm FWHM
Working distance	0.9 mm
Intensity	Max. 3 mW in the spot. Software controllable
Grayscale control	4095 levels
Autofocus	800 Hz bandwidth, 650 nm red laser controlled +/-0.3 mm height variation with auto height tracking Fast voice coil actuator for accurate real time Z correction
Focus offset	Adjustable by software control

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POLOS® NANOWRITER ADVANCED

The POLOS® NanoWriter Advanced is capable of writing structures up to 0.3 µm. It is a versatile UV laser writer with ultra-high precision components, specifically designed to give the user the highest degree of freedom to create micro-structures in photosensitive layers.

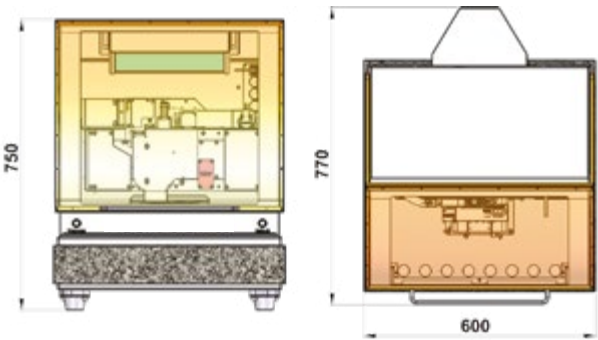


The POLOS® NanoWriter Advanced system includes a 405 nm optical module capable of writing structures as small as 0.3 µm. This user-friendly tool supports up to 4095 levels of gray-scale or pure binary mode and allows for 3D optical structures, surface structures as well as mask projects. Real time laser controlled auto-focus and laser intensity control ensure high quality imaging during the entire exposure process. The control electronics are all mounted within the frame except for the control PC. This Microsoft Windows based desktop PC and all required software is included in the package.

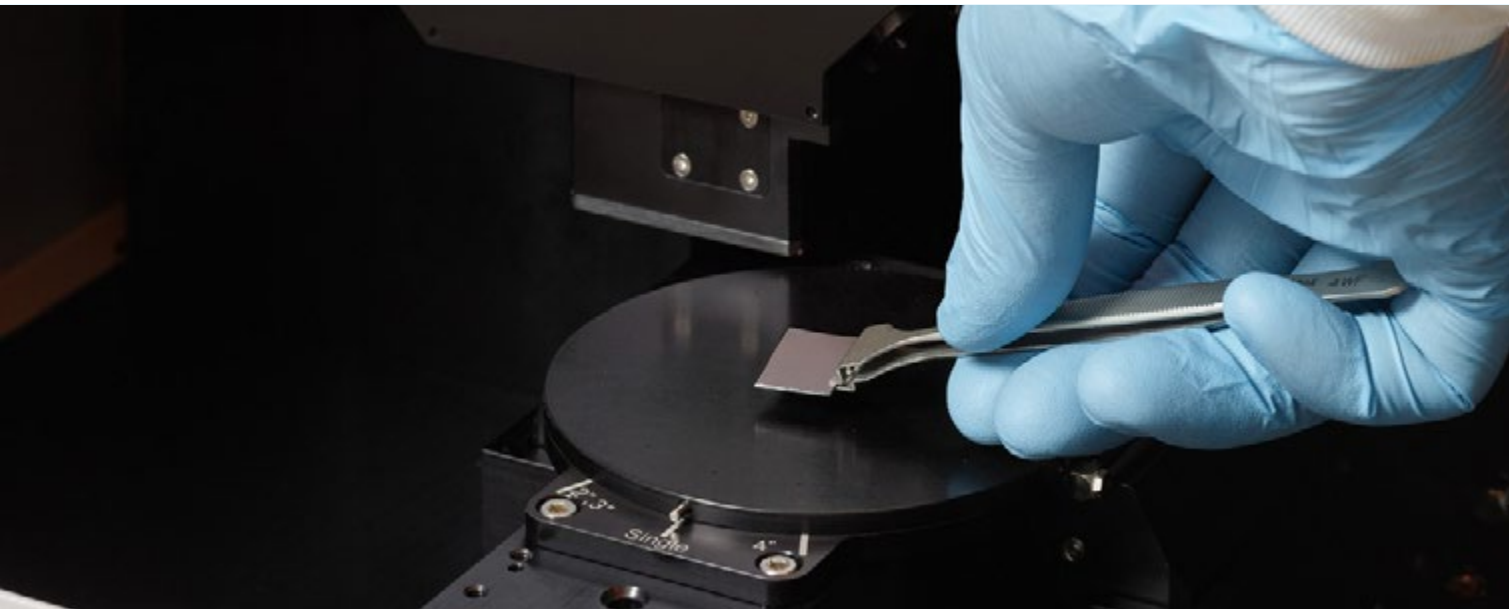
CONFIGURATION	
Max. writeable size	4 x 4"
Stroke scan & step	Max. 115 mm
Repeatability	< 50 nm RMS
Encoder resolution	2.5 nm
Scan speed	Max. 200 mm/s
Straightness axis	< 1 µm over 100 mm
Wafer thickness	0 - 10 mm
Max. substrate size	Min. 5 x 5 mm, max. 125 x 125 mm
Exposable area	Max. 110 x 110 mm (speed dependent)
Dimensions (mm)	600 (w) x 750 (h) x 600 mm (d) (excluding optional air duct)
Weight (kg)	260
Compressed air:	5 - 7 Bar, Air quality according ISO8573-1:2010 class 3 or better

KEY BENEFITS

- Writing resolution down to 0.3 µm (Highest resolution on the market with 405 nm laser)
- 375 nm laser source available for more demanding applications
- Minimal maintenance costs
- Compact optical module: use a spare optical unit for revolutionary machine downtime reduction
- User-friendly operation



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OPTICAL PROPERTIES	
Laser source	Standard 405 nm, GaN laser diode. 375 nm optional
Lifetime	>10.000 hours
Write modes	0.3 μm , optional 0.6 μm and 0.9 μm FWHM
NA	0.85
Working distance	0.6 mm
Intensity	Max. 3 mW in the spot. Software controllable
Grayscale control	4095 levels
Autofocus	800 Hz bandwidth, 650 nm red laser controlled +/- 0.3 mm height variation with auto height tracking Fast voice coil actuator for accurate real time Z correction
Focus offset	Adjustable by software control

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POLOS[®] BEAM

The POLOS[®] Beam is a very cost-effective solution to write structures up to 0.8 μm . This maskless lithography tool enables nanopatterning at will, without the need for slow and expensive photomasks. The POLOS[®] Beam is especially useful for research and rapid prototyping use without any compromise in performance.



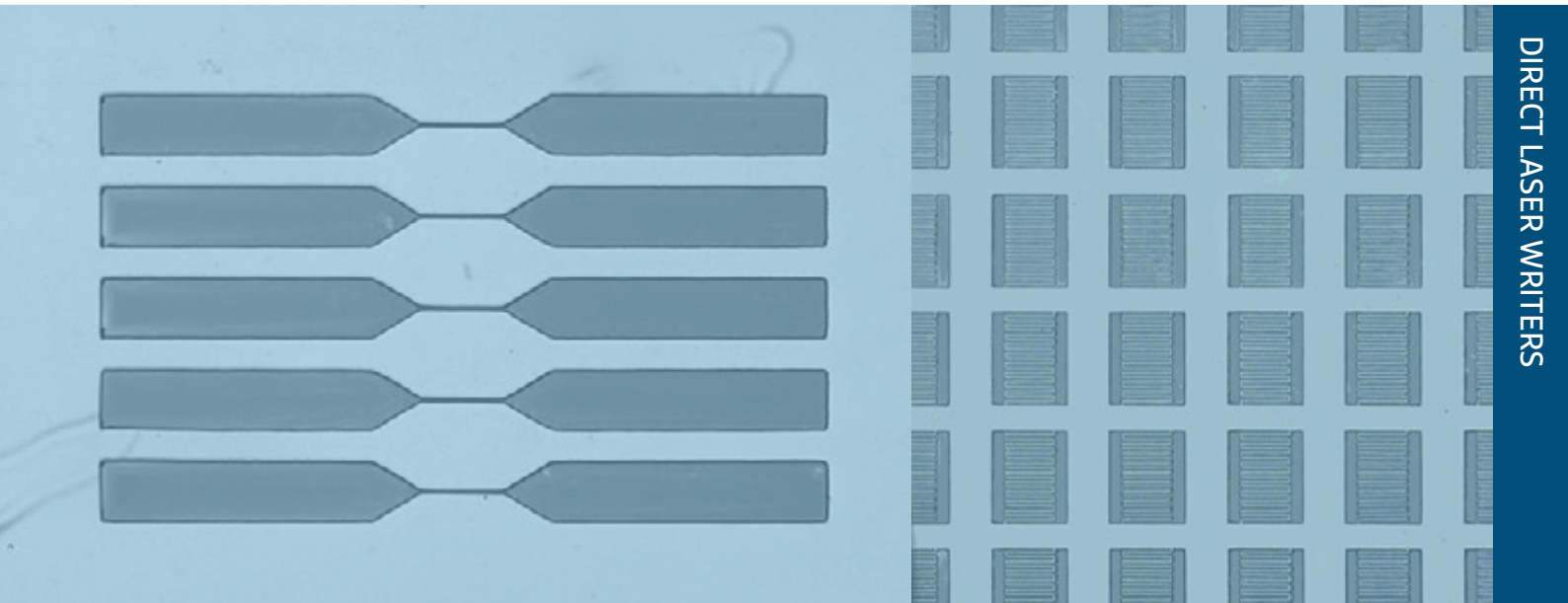
The POLOS[®] Beam focuses a UV laser beam into a diffraction-limited spot and scans the spot to expose any arbitrary pattern on a photoresist. To expose large wafers, precision steppers move the wafer and allows multiple exposures to be stitched. The POLOS[®] Beam is capable of producing structures smaller than 0.8 μm across a 4" wafer.

CONFIGURATION	
Minimum Linewidth	0.8 μm
Repeatability	< 100 nm (static)
Alignment resolution	0.1 μm
Scan speed	Up to 200 mm/s
Max. substrate size	4 x 4" (100 mm x 100 mm)
Movement area	Max. 130 x 130 mm
Dimensions (mm)	330 (w) x 340 (h) x 310 mm (d)
Weight (kg)	20

KEY BENEFITS

- Compact: Full-featured maskless lithography, smaller than a desktop computer.
- Powerful: Sub-micron resolution while exposes a writefield in less than two seconds.
- Ultrafast autofocus: Piezo actuators reach focus in less than a second when combined with our closed looped focus optics.
- No-fuss multilayer: Semi-automatic alignment allows multilayer alignment to be completed within minutes.
- The included software makes quick work of any patterning job; just load, align and expose.
- Writing resolution down to 0.8 μm

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OPTICAL PROPERTIES	
Laser Wavelength	405 nm (375 optional)
Minimum Pitch	1.6 μm achievable
Exposure Time	< 2 s for 1 writefield
Maximum writefield	400 μm x 400 μm
Z-working heigh	10 mm
Wafer alignment	Multilayer processes supported
Accepted file formats	.bmp, .png, .tiff, .gds Custom shapes can directly be drawn in software.

POLOS® BEAM XL

The POLOS® Beam is a very cost-effective solution to write structures up to 0.8 µm. This maskless lithography tool enables nanopatterning on 5" wafers (stage supports 6"), without the need for slow and expensive photomasks. The POLOS® Beam is a desktop tool especially useful for research and rapid prototyping use without any compromise in performance.



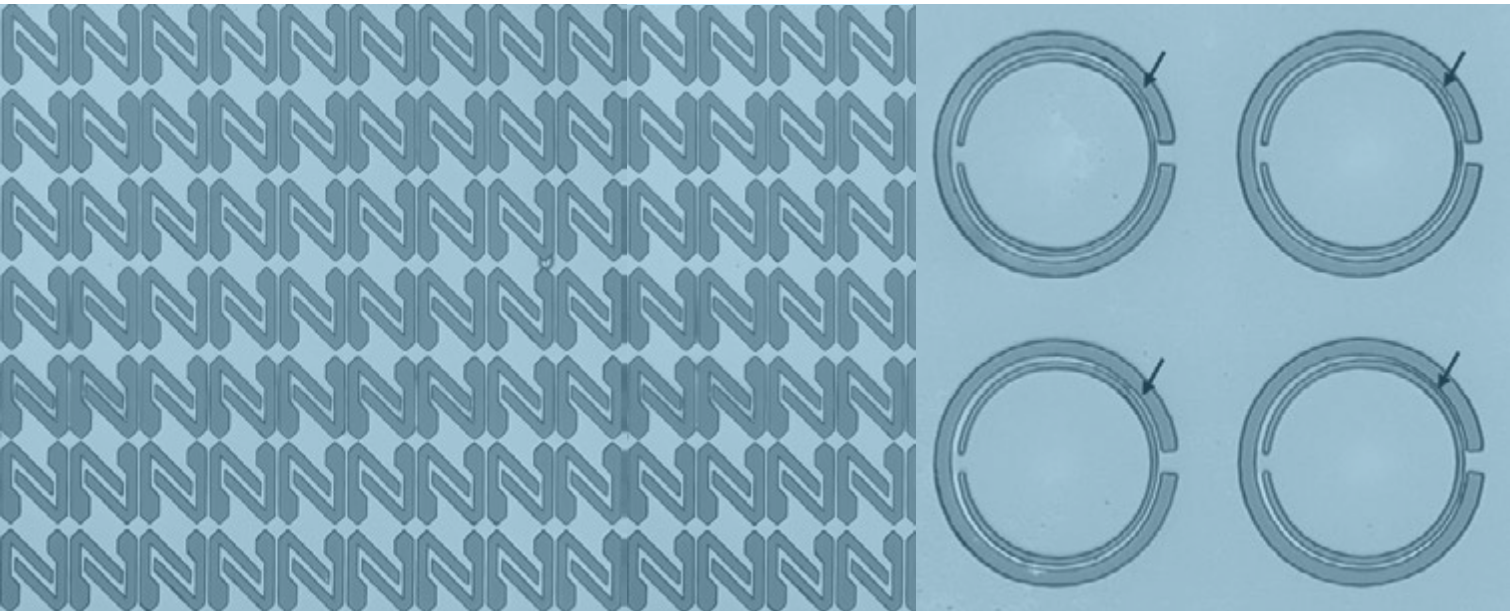
The POLOS® Beam focuses a UV laser beam into a diffraction-limited spot and scans the spot to expose any arbitrary pattern on a photoresist. To expose large wafers, precision steppers move the wafer and allows multiple exposures to be stitched. The POLOS® Beam is capable of producing structures smaller than 0.8 µm across a 5" wafer.

CONFIGURATION	
Minimum Linewidth	0.8 µm
Repeatability	< 100 nm (static)
Alignment resolution	0.1 µm
Scan speed	Up to 200 mm/s
Max. substrate size	5 x 5" (125 mm x 125 mm)
Movement area	Max. 155 x 155 mm
Dimensions (mm)	370 (w) x 340 (h) x 360 mm (d)
Weight (kg)	30

KEY BENEFITS

- Compact: Full-featured maskless lithography, smaller than a desktop computer.
- Powerful: Sub-micron resolution while exposes a writefield in less than two seconds.
- Ultrafast autofocus: Piezo actuators reach focus in less than a second when combined with our closed looped focus optics.
- No-fuss multilayer: Semi-automatic alignment allows multilayer alignment to be completed within minutes.
- The included software makes quick work of any patterning job; just load, align and expose.
- Writing resolution down to 0.8 µm

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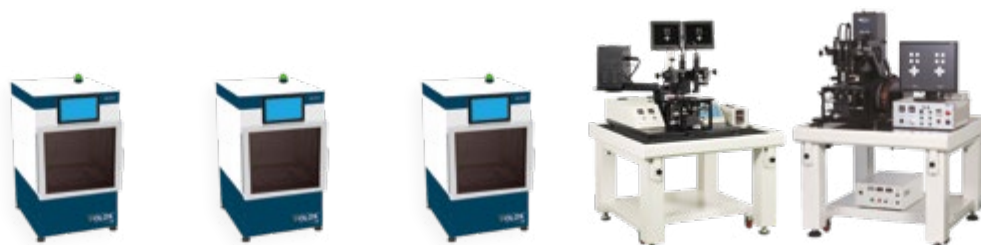
OPTICAL PROPERTIES	
Laser Wavelength	405 nm (375 optional)
Minimum Pitch	1.6 μm achievable
Exposure Time	< 2 s for 1 writefield
Maximum writefield	400 μm x 400 μm
Z-working heigh	10 mm
Wafer alignment	Multilayer processes supported. (Optional) Backside alignment with dual camera)
Accepted file formats	.bmp, .png, .tiff, .gds Custom shapes can directly be drawn in software.

102024-V1

MASK ALIGNERS SYSTEM COMPARISON

At POLOS®, we offer various mask aligner systems: from entry-level low cost 4" & 6" LED (& Broadband) systems, to a full range of systems from 4" to 12" broadband NUV and DUV, manual to fully robotic, large scale FPD and custom engineered systems.

The mask aligners are applicable for various fields such as: the research and production of semiconductors, MEMS applications, research on bio chips and Nano technologies.



MODEL	MA-400X-A	MA-600X-A	MA-800X-A	MDA-400LJ	MDA-400M-6
Type	Manual, touch screen	Manual, touch screen	Manual, touch screen	Manual	PC/PLC control Manual
Mask size	Up to 4" x 4"	Up to 6" x 6"	Up to 8" x 8"	Up to 5" x 5"	Up to 7" x 7"
Substrate size	Piece to 4" Ø	Piece to 6" Ø	Piece to 8" Ø	Piece to 4" Ø	Piece to 6" Ø
UV lamp & power	UV-LED	UV-LED	UV-LED	UV-LED	350 W
Beam wavelength	365 nm	365 nm	365 nm	365 nm only	350 ~ 450 nm
365 nm Intensity	~18 mW/cm ²	~18 mW/cm ²	~18 mW/cm ²	~20 mW/cm ²	~25 mW/cm ²
Alignment accuracy	1 µm	1 µm	1 µm	1 µm	1 µm
Process resolution	1 µm (hard contact)	1 µm (hard contact)	1 µm (hard contact)	1 µm @ 1 µm PR thickness with vacuum contact	
Process mode	Soft and Hard	Soft and Hard	Soft and Hard	Soft, Hard, Vacuum contact & Proximity	
Substrate chuck moving	N/A	N/A	N/A	X, Y, Z & θ	X, Y, Z & θ
Options	Anti-Vibration table			Anti-Vibration table UV Intensity meter	Anti-Vibration table IR BSA UV Intensity meter

- Easy operation & installation
- PC operation with PLC control
- Image grab & data log
- More than 100 program recipes

Easily develop your process on small substrates or wafers up to 12". These mask aligners are widely used for MEMS and optoelectronics applications, such as LED production. Special configurations for nonstandard substrates, such as hybrids and high-frequency components for fragile III-V materials are also available.

Are you handling Taiko wafers? We make a special aligner for handling Taiko wafers.



MODEL	MDA-80MS	MDA-12SA	MDA-60FA	MDA-12FA
Type	PC control semi-auto	PC control semi-auto	Fully automatic	Fully automatic
Mask size	Up to 9" x 9"	Up to 14" x 14"	Up to 7" x 7"	Up to 14" x 14"
Substrate size	Up to 8" x 8"	Up to 8" x 8"	4" ~ 6"	8" ~ 12"
UV lamp & power	1 kW	2 kW / 5 kW	350 W / 500 W	2 kW / 5 kW
Uniform beam size	9.25" x 9.25"	14.25" x 14.25"	6.25" x 6.25"	14.25" x 14.25"
Beam uniformity	3.5 %	5 %	3 %	5 %
Beam wavelength	350 ~ 450 nm	350 ~ 450 nm	350 ~ 450 nm	350 ~ 450 nm
365 nm Intensity	20 ~ 30 mW/cm ²	20 ~ 70 mW/cm ²	20 ~ 30 mW/cm ²	20 ~ 70 mW/cm ²
Alignment accuracy	1 μm	1 μm	0.5 μm	0.5 μm
Process resolution	1 μm @ 1 μm PR thickness with vacuum contact			
Process mode	Soft, Hard, Vacuum contact & Proximity			
Substrate chuck moving	X, Y (manual), Z & θ (motorized)	X, Y, Z & θ (motorized)	X, Y, Z & θ (motorized)	X, Y, Z & θ (motorized)
Options	CCD BSA, UV Intensity meter			
Frame	Anti-Vibration system			
Pre-aligner			±50 μm	±50 μm

We support training and initial testing with a range of resists and developers, and sample wafers. Do not hesitate to contact us for more information and all available options!

POLOS® MA-400X(-800X) ADVANCED

The POLOS® MA-400X (-800x) Advanced utilizes a state-of-the-art surface mount UV Light Emitting Diodes (LED's) source as exposure system, making use of the additional lenses. This makes this innovative and touchscreen controlled system to stand as the most cost-effective and compact mask aligner in the market.



The POLOS® MA-400X, 600X and 800X Advanced mask aligners are very user-friendly photolithography tools for research laboratories, and for teaching and learning activities at academic laboratories. They are designed to provide high uniform irradiance across an 8" x 8" inch exposure area.

The systems provide easy access for the users to place the mask or wafer into the machine. The embedded sensors in the wafer chuck allows users to optimize the wafer- mask contact pressure according to the thickness of wafer. The adjustable exposure height allows users to explore a range of photoresist and support in their research experiments.

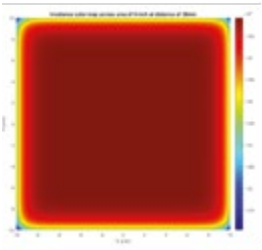
The systems have two IR microscopes for users to view the micron sized features in the mask and wafer. The images captured by the microscope are displayed on a touch screen. The microscope can be controlled on the touchscreen and move along all 3 directions.

CONFIGURATION

Substrate size	4" x 4" max. (also available in a 6" x 6" and 8" x 8" model)
Light source	UV LED, with peak wavelengths at 365 nm ± 2 nm as source of UV light for the exposure system
Resolution two IR microscopes	200 µm to 2 mm across 50 mm x 50 mm
Resolution	1 µm (hard contact)
Calibration for wafer-mask contact	Embedded load sensors in the wafer chuck will provide user opportunity to explore wide thickness of substrate and perform soft and hard contact exposure

KEY FEATURES

- Up to 50% less costs compared to the conventional mask aligners in the market.
- Tabletop footprint machine with up to an incredible 8" wafer handling capability.
- Designed for today, with touchscreen interfaces, and software-driven automation.
- Excellent for research and academic labs.



Uniform irradiance across 8 x 8 inch exposure area



High-quality photoresist printing

102024-VI

4" UV LED MASK ALIGNER

The MDA-400LJ is a mask aligner specially designed for university and research institutes. The system is equipped with a maintenance-free 365 nm LED light source (50,000 hours lifetime) and therefore ideal for resist processing.

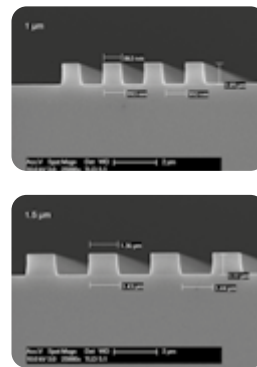


Mask aligners with UV light mask light sources use significantly less energy compared to conventional mercury vapor lamps. The lights of the Midas mask aligner series do not need to warm-up and cool-down. No need for the cooling fan, filters or shutter. The LED light source is only switched on during the actual exposure process. LED masks have a much longer lifetime. In terms of health, safety and environmental protection, the LED technology provides a significant improvement in mask alignment.

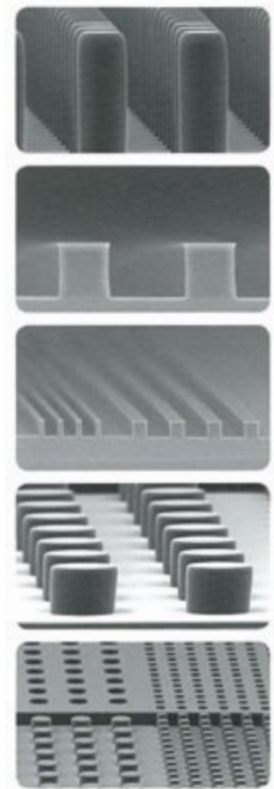
OPTIONS

- Anti-Vibration table
- UV Intensity Meter
- UV-LED (365 nm) Exposure Module

CONFIGURATION	
Substrate size	Up to 4" also available for 6"
Light source	UV LED
Resolution	1 μm with 1 μm thin PR @ Si Wafer
Alignment accuracy	$\pm 1 \mu\text{m}$
I-line beam intensity	About 10 mW/cm ²
Process mode	Soft, Hard, Vacuum contact & Proximity



SEM 1 μm high pattern, generated with DPR-i5500 photoresist, processed MDA400LJ with the UV LED lightsource.



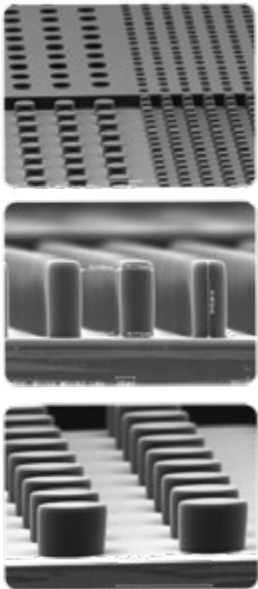
8" SEMI AUTOMATIC MASK ALIGNER

Semi automatic mask aligner MDA-80MS

- Easy operation & Installation
- PC Operation with PLC control
- Image grab & Data log
- More than 100 Program recipes



CONFIGURATION	
Type	PC control Semi Auto
Mask size	Up to 9" x 9"
Substrate size	Piece to 8" Ø
UV lamp & power	1 kW & power supply
Uniform beam size	9.25" x 9.25"
Beam uniformity	< ± 5 %
Beam wavelength	350 ~ 450 nm
365 nm intensity	15 ~ 25 mW/cm ²
Alignment accuracy	1 µm
Process resolution	1 µm @ 1 µm PR thickness with vacuum contact
Process mode	Soft, Hard, Vacuum contact & Proximity
Substrate chuck moving	X, Y (Manual), Z, θ (motorized)
Frame	Anti-vibration table
Options	CCD BSA, UV Intensity meter, etc.



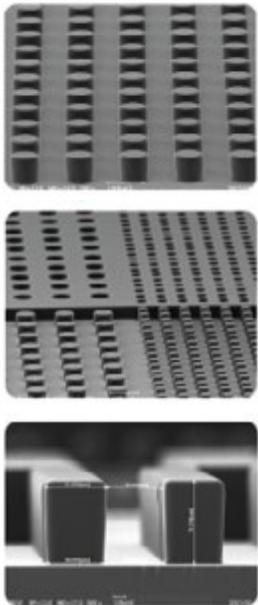
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12" FULL AUTOMATIC MASK ALIGNER

The MDA-12FA represents the next generation of full-field lithography systems. This full auto mask aligner platform ensures a higher overlay accuracy and a more reliable operation. This machine offers users higher productivity and easy control.

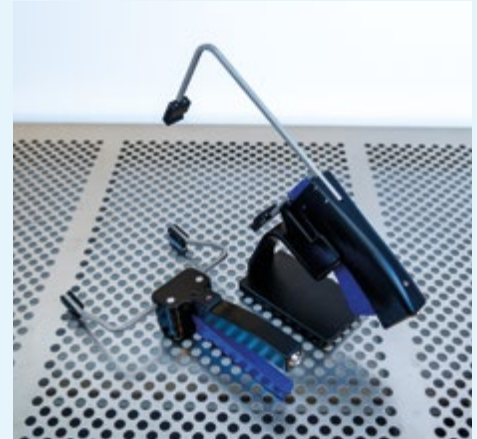


CONFIGURATION	
Substrate size	Up to 12"
UV lamp & power	2 kW [5 kW]
Resolution	2 μm with 1 μm thin @ Si wafer
Alignment Accuracy	< 0.5 μm
Lamp Uniformity	< $\pm 5\%$
Uniform Beam Size	14.25" x 14.25"
365 nm Beam Intensity	2 kW (20~30 mW/cm ²) 5 kW (40~90 mW/cm ²)
Motorized	Microscope X, Y-axis, Zoom and Focus Stage X, Y, θ and Z-axis
Process mode	Soft, Hard, Vacuum contact & Proximity
Options	BSA / Auto Mask Changer



WHS® PHOTOMASK HANDLING

WHS® manufactures the next generation lithography photomask handling tools designed to reduce particles, prevent ESD and improve ergonomic conditions for the technician. Whether you are working with reticles or masks we have a solution for your photomask handling requirements or will custom engineer a product specifically for your needs.

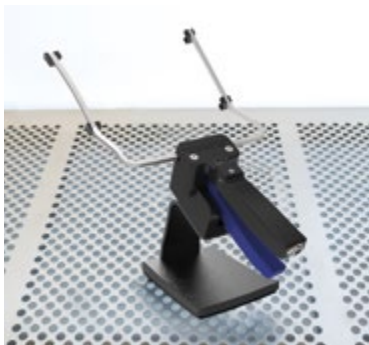


WHS® EUV MASK GRIP - L3 SERIES - 6"X6"X0.250"

This 4-gripper is a normally closed (consistent-force) side grip mechanical pick for handling advanced EUV reticles from the tangential edge, eliminating contact with chrome. Gripper placement is based on industry EUV reticle storage pods. Advanced gripper manufacturing for longevity, anti-static properties, and general chemical resistance. ISO 3.

KEY FEATURES

- Consistent force tangential-edge gripper for handling EUV masks
- Compatible with EUV inner pod
- Ergonomic handling

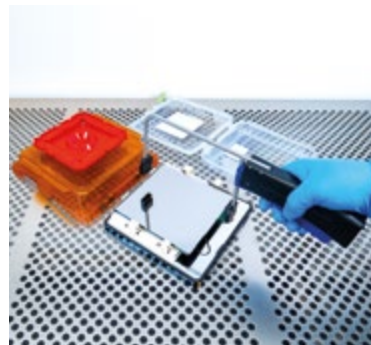


WHS® MASK PICK - L2 SERIES (HORIZONTAL GRIP)

A normally closed (consistent-force) mechanical pick for handling from 5" up to 9" square photomasks. Tangential grip edge to reduce contamination by eliminating contact with chrome. Advanced gripper manufacturing for longevity, antistatic properties, and general chemical resistance. ISO 3.

KEY FEATURES

- Normally-closed, consistent force tangential-edge gripper
- Antistatic construction with ground path
- Ergonomic handling

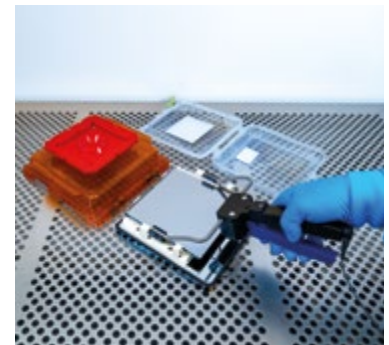


WHS® MASK PICK - L1 SERIES (SIDE GRIP)

A normally closed (consistent-force) mechanical pick for handling from 5" up to 9" square photomasks. Tangential grip edge to reduce contamination by eliminating contact with chrome. Advanced gripper manufacturing for longevity, antistatic properties, and general chemical resistance. ISO 3.

KEY FEATURES

- Normally-closed, consistent force tangential-edge gripper
- Antistatic construction with ground path
- Ergonomic handling



IONIZING AIR PENCIL

The pencil-type air ionizer can help remove static electricity on a material or object. This device is an ideal tool to clean parts and assemblies, not only in the Semiconductor market, but also in the Medical and Electronic Industries.



Quickly and easily, remove dust that adheres to surfaces such as silicon wafers and masks. An Ø1.5 mm air outlet and concentrated fast airflow are most suitable to effectively remove microscopic dust particles. The internal safety circuit cuts off HV power when it detects an abnormality in the HV circuit. A low voltage cable (modular) for easy and simplified operation connects pen and controller.

CONFIGURATION	
Input voltage	DC24V (using an AC adaptor: AC90V- AC264V 50/60 Hz)
Input current	0.5A max
Gas pressure	0.3 MPa Max. (pressure speed control is adjustable)
Purge gas	Air or nitrogen
Emitter material	Polysilicon
Ambient temperature	10°C - 40°C
Ambient humidity	35 % RH - 65 % (non - condensing)
Weight of pen	130 g
Weight of controller	750 g



UV INTENSITY METER

The POLOS® UV Intensity meter is a great tool for measuring the intensity power for Mask Aligners. This UV Intensity meter represents next generation of full-field UV Intensity meter systems. The sensor and probes are fully digital, so no calibration is needed.



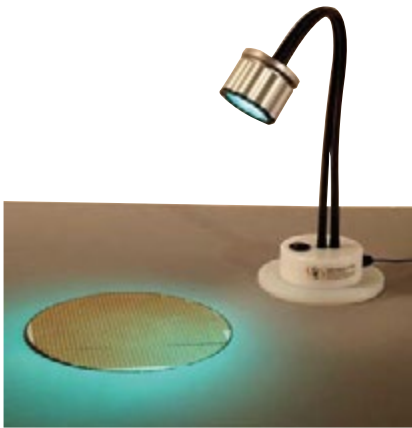
CONFIGURATION	
Wavelength	365 nm (option: 405 nm / 248 nm)
Uniformity	Automatic calculation
Measuring point	5 ~ 9 point
Battery	Recharging type
Dimension (mm)	80 (w) x 150 (d) x 45 (h) mm

INSPECTION LAMP

These inspection lamps were developed for inspecting wafers with possible use of a microscope. Using the mounting flange, it is possible to fix the inspection lamp onto a microscope or onto any process machine.

KEY FEATURES

- No UV or infrared light (even with white)
- Long service life 10 years on the LED
- Colour selection for each inspection process



We have various colour lamps available, contact us for all options.

102024-VI

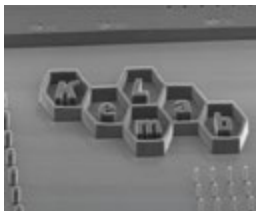
PHOTORESIST PRODUCTS

KemLab™ is a photoresist manufacturer and photo-lithography research and innovation company focused on quality and cost-competitive high-tech photosensitive imaging materials used in the electronics industry. Offering Positive and Negative photoresists for advanced packaging, MEMS & Microfluidics, integrated circuits, metal lift-off, compound semiconductors, LED, image reversal, diffraction gratings and sensor markets.



HARE SQ

Negative Tone Epoxy



NEGATIVE

- 2 - 200 μm FT
- Applications: Microfluidics, MEMS
- Clearer layer (cleaner than SU-8 Resin)
- Lower opacity (Higher transparency - less dosing power/power intensity required)
- Fewer particles
- Fewer micro-bubbles
- More consistent product

ADVANTAGES

- The HARE-SQ photoresist uses an epoxy resin with superior cleanliness and excellent reproducibility
- Consistent surface energy of cross-linked resist (an important property for microfluidic applications).
- Fully compatible with SU-8 processes.

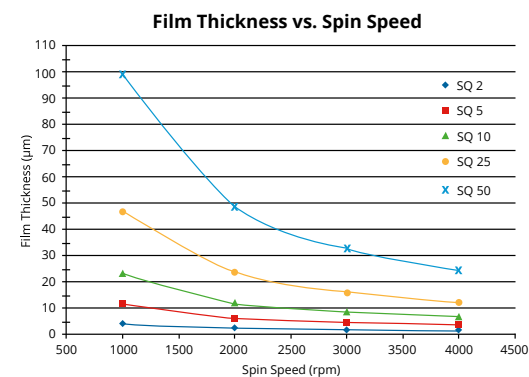
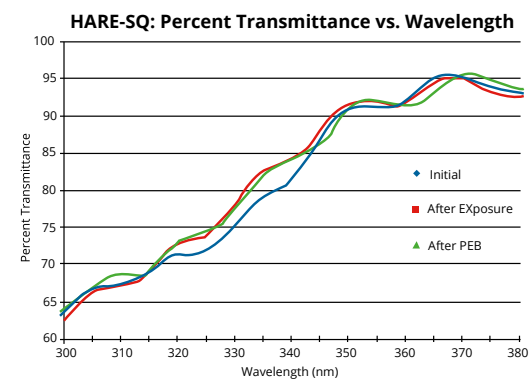
SUBSTRATES

HARE SQ adheres to variety of substrates; including silicon, gold, aluminum, chromium and copper. Proper substrate cleaning & dehydration improve adhesion.

KEY BENEFITS

- Short lead times
- Competitive pricing
- Product support
- Resist customization

We can offer a variety of photoresists. Visit our website to find the complete list of resists by film thickness, competitive products, tone, developer, or exposure.



SPIN COATING - SYSTEM COMPARISON

Specifications POLOS® SPINx series

- Programmable CW & CCW and puddling rotation
- Automatic safety lid lock with sensor interlock
- Speed 0 rpm - 12,000 rpm, accuracy +/- 0.1 rpm
- Acceleration / deceleration 1 - 30,000 rpm/sec, selectable per step
- Motor homing function for automated processes
- Optional automatic lid



MODEL	SPIN150x	SPIN200x	SPIN300x
Max. substrate diameter	150 mm round or 4" x 4" square	200 mm round or 6" x 6" square	300 mm round or 8" x 8" square
Max. process chamber diameter	202 mm	302 mm	402 mm
Dimension (desktop version)	283 (w) x 326 (h) x 326 (d) mm	380 (w) x 307 (h) x 559 (d) mm	430 (w) x 310 (h) x 650 (d) mm
Shipping weight	15 kg	20 kg	32 kg
Shipping dimensions	-	680 (w) x 580 (h) x 480 (d) mm	780 (w) x 620 (h) x 580 (d) mm
Free programmable outputs	3 dry relays, nominal switching capacity 0.5A / 125 VAC - 0.3A / 60DC		3 dry relays, nominal switching capacity 0.5A / 125 VAC - 0.3A / 60DC
	3 Programmable Dry Contacts: e.g. for automated control of Dispense unit, Nitrogen diffuser, etc.		Up to 16 digital input, 16 digital output, 4 analog input, 4 analog output (with optional IO modules)
	Available in standard or advanced model		Available in advanced model only
REQUIREMENTS			
Voltage	100 - 120 VAC / 200 - 240 VAC 50 / 60 Hz (auto select)		
Power consumption	Max. 500 W		Max. 1800 W
Max. current	5 A / 2.5 A		10 A / 8 A
Vacuum	- 65 kPa (-19 inHg), ≥ 80 LPM Tube OD Ø8 mm		- 80 kPa (-24 inHg), ≥ 80 LPM Tube OD Ø8 mm
Motor purge gas	20 - 50 kPa, 2-5 L/min, tube OD Ø 6 mm 500 L/hr		
Drain connection	1" M-NPT		



MODEL	POLOS® 450 Advanced	POLOS® SPIN4000A	POLOS® SPIN5000A
Max. substrate diameter	460 mm round or 10" x 10" square	300 mm round or 8" x 8" square	500 mm round or 10" x 10" square
Max. process chamber diameter	502 mm	400 mm (15.7")	850 mm
Dimension (desktop version)	795 (w) x 638 (h) x 922 (d) mm	650 (w) x 1200 (h) x 945 (d) mm	1700 (w) x 2100 (h) x 1700 (d) mm
Shipping weight	75 kg	350 kg	2150 kg
Shipping dimensions	800 (w) x 790 (h) x 1180 (d) mm	1230 (w) x 1390 (h) x 1420 (d) mm	2200 (w) x 2500 (h) x 2200 (d) mm
Free programmable outputs	3 dry relays, nominal switching capacity 0.5A / 125 VAC - 0.3A / 60DC Up to 16 digital input and output, 4 analog input and output (with optional IO modules)	HMI : USB / PLC : R232	
REQUIREMENTS			
Voltage	100 - 120 VAC / 200 - 240 VAC 50 / 60 Hz (auto select)	1 KW	9.5 KW
Power consumption	Max. 1800 W	Pump power: AC 220V Main power: AC 220V/1P/15A	
Max. current	10 A / 8 A		
Vacuum	- 80 kPa (-24 inHg), ≥ 80 LPM Tube OD Ø8 mm	-600 mm Hg	-600 mm Hg
Motor purge gas	20 - 50 kPa, 2-5 L/min, tube OD Ø 6 mm 500 L/hr	NO	
Drain connection	1" M-NPT	50 mm	50 mm

POLOS® SPIN150x SPIN COATER

The POLOS® SPIN150x offers precise and repeatable process control. It is made from natural polypropylene (NPP) or chemically resistant PTFE and suitable for all typical spin processes. This new version of the well-proven model comes in a standard and an advanced version. It is ideal for processing a wide range of substrates with a diameter of up to 150 mm or square samples with dimensions 100 x 100 mm.



UNIQUE DESIGN

The unique outer shell and drain design allows easy transformation from table-top to in-deck model. The modular design enables the user to upgrade the unit using a wide range of different accessories to ease dispensing and overall handling.

MOTOR HOMING POSITION

The new SPINx-series has the ability to define a motor homing position, allowing for easy integration in robot controlled/automated environments.

EASY CHAMBER ACCESS

The vacuum chuck sits above the edge of the bowl allowing easy access to the wafer/substrate with an end-effector, tweezer or vacuum wand. This is a unique requirement to enable robot handling.

SPECIFICATIONS HARDWARE

- Lid lock and vacuum sensor for user safety
- Indirect brushless drive unit - up to 12.000 RPM
- High acceleration and accuracy: 1 - 30.000 RPM
- Programmable motor homing position
- Center injection holder for syringe or dispense nozzle
- Liquid filter trap
- Large (detachable) touchscreen display
- USB-port to store recipes on USB-drive and for software updates specifications drive-unit
- Clockwise/counter clockwise rotation and puddle mode
- Options: Automatic lid and/or automatic dispense arm (advanced versions only)

AUTO LID (ADVANCED VERSION ONLY)

The lid can be automatically opened and closed using the User Interface or alternatively a foot pedal (ideal for glovebox usage). In addition, it is also possible to automatically open the lid as a final step of your recipe.

LIQUID FILTER TRAP

The SPINx-series is equipped with a liquid filter trap to protect the spin coater's critical components. It will capture any liquids or resists entering the vacuum lines via the process chamber or vacuum chuck in a liquid container.

CONFIGURATION

Process chamber material	Natural polypropylene (NPP) or PTFE
Max. substrate diameter	Up to 6" (150 mm) wafers Up to 4" x 4" (100 mm) substrates

SUITABLE FOR:

- Coating
- Cleaning
- Rinse/Dry
- Developing
- Etching
- PDMI and other processes

STANDARD ACCESSORIES:

- Vacuum chuck for 4 - 6-inch wafers
- Fragment adapter for fragments of 10 mm and larger

POLOS® SPIN200x SPIN COATER

The POLOS® SPIN200x offers precise, repeatable process control. It is made from natural polypropylene (NPP) or chemically resistant PTFE and suitable for all typical spin processes. This new version of the well-proven model comes in a standard and an advanced version. It is ideal for processing a wide range of substrates with a diameter of up to 200 mm or square samples with dimensions 150 x 150 mm.



UNIQUE DESIGN

The unique outer shell and drain design allows easy transformation from table-top to in-deck model. The modular design enables the user to upgrade the unit using a wide range of different accessories to ease dispensing and overall handling.

MOTOR HOMING POSITION

The new SPINx-series has the ability to define a motor homing position, allowing for easy integration in robot controlled/automated environments.

EASY CHAMBER ACCESS

The vacuum chuck sits above the edge of the bowl allowing easy access to the wafer/substrate with an end-effector, tweezer or vacuum wand. This is a unique requirement to enable robot handling.

SPECIFICATIONS HARDWARE

- Lid lock and vacuum sensor for user safety
- Indirect brushless drive unit - up to 12.000 RPM
- High acceleration and accuracy: 1 - 30.000 RPM
- Programmable motor homing position
- Center injection holder for syringe or dispense nozzle
- Liquid filter trap
- Large (detachable) touchscreen display
- USB-port to store recipes on USB-drive and for software updates specifications drive-unit
- Clockwise/counter clockwise rotation and puddle mode
- Options: Automatic lid and/or automatic dispense arm (advanced versions)

AUTO LID (ADVANCED VERSION ONLY)

The lid can be automatically opened and closed using the User Interface or alternatively a foot pedal (ideal for glovebox usage). In addition, it is also possible to automatically open the lid as a final step of your recipe.

LIQUID FILTER TRAP

The SPINx-series is equipped with a liquid filter trap to protect the spin coater's critical components. It will capture any liquids or resists entering the vacuum lines via the process chamber or vacuum chuck in a liquid container.

CONFIGURATION

Process chamber material	Natural polypropylene (NPP) or PTFE (optionally)
Max. substrate diameter	Up to 8" (200 mm) wafers Up to 6" x 6" (150 mm) substrates

SUITABLE FOR:

- Coating
- Cleaning
- Rinse/Dry
- Developing
- Etching
- PDMI and other processes

STANDARD ACCESSORIES:

- Vacuum chuck for 4 - 8-inch wafers

SOME OF OUR MUST-HAVE SPIN COATER ACCESSORIES

Complete your spin coating set-up with these must-have accessories!



POLOS® VACUUM PUMP

A popular stand-alone oilless vacuum pump option, providing a vacuum source for spin coaters in the absence of a facilities vacuum supply.

Available in 115 VAC and 230 VAC.



POLOS® CENTERING AID

A natural polypropylene adjustable centering aid tool for easy and accurate alignment of your round or square substrate on a spin coater vacuum chuck.

Available for 150 mm, 200 mm and 300 mm spin coaters.



POLOS® LINER INSERTS

Anti-static PET bowl & lid liner set, simplifies keeping your spin coater clean and reduces set up time for the next user. It can also be used to capture media for reuse.

Available for 150 mm and 200 mm spin coaters.

WHY CHOOSE OUR ADVANCED SERIES SPIN COATERS?



AUTO LID

Our Advanced Series Spinners are equipped with an programmable automatic opening and closing lid, perfect for robot handling



PROGRAMMABLE OUTPUTS

Automatically control up to 8 dispense lines with the Advanced Series Spinners.



LINEAR DISPENSE ARM UPGRADE

Our Advanced Series Spinners can be upgraded with a Linear Dispense Arm with up to 3 dispense lines.

POLOS® DISPENSE OPTIONS: MANUAL DISPENSE



POLOS® SHSK SET

A collection of syringes, compatible with the center injection mounting hole which is standard on all POLOS® spin coaters.



TRIPLE SYRINGE HOLDER

To allow for multiple syringe dispense lines, we offer a triple syringe holder which can be installed on the center injection hole.

POLOS® DISPENSE OPTIONS: SEMI-AUTOMATIC DISPENSE



AUTOMATED SYRINGE DISPENSE

For precision dispensing from syringe, our dispense pump can be connected to the center injection hole, and supports all fluids 0 - 100 psi (0 - 7 bar).



HIGH PRECISION PHOTORESIST DISPENSE

The bottle dispenser is electronically controlled using the external control module and offers precise motorized volume dispensing.

POLOS® DISPENSE OPTIONS: AUTOMATIC DISPENSE



ALL ROUND PERISTALTIC PUMP

Our POLOS® Peristaltic pump can be used for various dispense applications, with features such as suck back function and inter-connectable communication (up to 3 pumps) we are ready to support your application.



PTFE DISPENSE VESSEL

The POLOS® Pressurized Vessel can be used for highly aggressive chemical dispensing. Controlling the unit directly from your spin coater and supporting various available valves and nozzles makes the system customizable to your needs.

POLOS® SPIN300x SPIN COATER

The POLOS® SPIN300x offers precise, repeatable process control. It is made from natural polypropylene (NPP) or chemically resistant PTFE. The SPIN300x comes in a standard and advanced version. It processes a wide range of substrates with a diameter of up to 300 mm or square samples with dimensions 200 x 200 mm.



MOTOR HOMING POSITION

The new SPINx-series has the ability to define a motor homing position, allowing for easy integration in robot controlled/automated environments.

EASY CHAMBER ACCESS

The vacuum chuck sits above the edge of the bowl allowing easy access to the wafer/substrate with an end-effector, tweezer or vacuum wand. This is a unique requirement to enable robot handling.

SPECIFICATIONS HARDWARE

- Lid lock and vacuum sensor for user safety
- Indirect brushless drive unit - up to 6.000 RPM
- Programmable motor homing position
- Center injection holder for syringe or dispense nozzle
- Liquid filter trap
- Large (detachable) touchscreen display
- USB-port to store recipes on USB-drive and for software updates specifications drive-unit
- Clockwise/counter clockwise rotation and puddle mode
- Options: Automatic lid and/or automatic dispense arm (advanced versions)

AUTO LID (ADVANCED VERSION ONLY)

The lid can be automatically opened and closed using the User Interface or alternative a foot pedal (ideal for glovebox usage). In addition, it is also possible to automatically open the lid as a final step of your recipe.

LIQUID FILTER TRAP

The SPINx-series is equipped with a liquid filter trap to protect the spin coater's critical components. It will capture any liquids or resists entering the vacuum lines via the process chamber or vacuum chuck in a liquid container.

CONFIGURATION

Process chamber material	Natural polypropylene (NPP) or PTFE (optionally)
Max. substrate diameter	Up to 12" (300 mm) wafers Up to 8" x 8" (200 mm) substrates

SUITABLE FOR:

- Coating
- Cleaning
- Rinse/Dry
- Developing
- Etching
- PDMI and other processes

STANDARD ACCESSORIES:

- Vacuum chuck for 12-inch wafers

POLOS® 450 SPIN COATER

The POLOS® Advanced series spin processors are advanced systems, offering precise and repeatable process control. An aerodynamically efficient chamber enhances uniformity, while the natural polypropylene process chamber guarantees a contamination-free, easy to clean process area. All units feature programmable clockwise & counter clockwise rotation and puddle function.



The POLOS® 450 is a table-top single substrate spinner with NPP housing, spincup and manual chemical dispense. The inside diameter measures 500 mm for substrates up to max. Ø 500 mm round and 350 x 350 mm square substrates.

KEY FEATURES

- Automatic sequential or parallel chemical dispenses
- Up to 6 spray nozzles, each programmable independently

CONFIGURATION	
Housing material	Natural polypropylene (NPP)
Process chamber material	Natural polypropylene (NPP) or high chemical resistant PTFE (TFM™)
Spin speed RPM	0 - 1500 rpm** ± 1 rpm steps
Spin speed accuracy	± 0.1 rpm**
Spin rotational direction	Clockwise, counter clockwise and puddle
Max. acceleration	≤1500 rpm/s depends on the load**
Free programmable outputs	3 dry relays, nominal switching capacity 0.5A / 125 VAC - 0.3A / 60DC
Max. substrate diameter	460 mm round and 350 x 350 mm square substrates
Max. process chamber diameter	502 mm
Dimension (desktop version)	795 (w) x 638 (h) x 922 (d) mm
Motor purge gas	20 - 50 kPa. Tube OD Ø 6mm 500 L/hr
Drain connection	1.5" M-NPT

**Measured without substrate, limitations may apply depending on chuck used and substrate specification.

102024-V1

POLOS® SPIN4000A

The POLOS® SPIN4000A is a powerful spin coater system especially designed for research and variable processes of all applications. It is characterized by its ability to operate fully automatic. The POLOS® SPIN4000A represents the next generation of full-field spin coating systems.



The POLOS® SPIN4000A is a stand-alone, fully automatic spin coater system. The steel housing guarantees a contamination free work area, and its high-end components ensure a repeatable, programmable spin process of up 300 x 300 mm substrates, over and over.

KEY FEATURES

- Automatic Photoresist Dispense with up to 3 spray nozzles (optional)
- 8,5" touch screen
- Vacuum pump
- Upper cover (optional)

CONFIGURATION

Spin speed RPM	6000 rpm
Spin speed accuracy	0.1 rpm
Spin rotational direction	Clockwise and Counter clockwise
Max. acceleration	≤3000 rpm/s depends on the load**
Free programmable outputs	20 steps, 20 recipes (save & load)
Max. substrate diameter	300 mm round or 8" x 8" square substrates
Dimension (desktop version)	650 (w) x 1200 (h) x 945 (d) mm

**Measured without substrate, limitations may apply depending on chuck used and substrate specification.

POLOS® SPIN5000A

A powerful spin coater system especially designed for research and variable processes of all applications. It is characterized by its ability to be fully customizable and operate fully automatic. The POLOS® SPIN5000A represents the next generation of full-field spin coating systems.



The POLOS® SPIN5000A is a stand-alone, fully automatic spin coater system. The steel housing guarantees a contamination free work area, and its high-end components ensure a repeatable, programmable spin process of up 500 x 500 mm substrates, over and over.

KEY FEATURES

- Automatic Dispense with up to 3 spray nozzles (optional)
- 8,5" touch screen
- Vacuum pump
- Upper cover (optional)

CONFIGURATION	
Spin speed RPM	1200 rpm
Spin speed accuracy	0.1 rpm
Spin rotational direction	Clockwise and Counter clockwise
Max. acceleration	≤3000 rpm/s depends on the load**
Free programmable outputs	20 steps, 20 recipes (save & load)
Max. substrate diameter	700 mm round or 500 x 500 mm square substrates
Dimension (desktop version)	1700 (w) × 2100 (h) × 1700 (d) mm

**Measured without substrate, limitations may apply depending on chuck used and substrate specification.

102024-V1

POLOS® SPIN WET STATION

An extremely versatile platform for a wide range of processes. Based on the proven high quality POLOS® single substrate spin processor, the modular design spin process station provides excellent value for money: full plastic construction, with high-end components, compatible with any chemical environment in a modular set-up, suitable for your specific requirement.



The seamless integration of polypropylene (optional PTFE) spin processor in the base station allows you to work with all kinds of chemicals. In the station housing various modules can be incorporated and centrally controlled for supply of chemicals and gases.

Standard configurations are available for cleaning substrates as well as photo masks, photoresist coating, developing, etching and lift-off processes.

Value for money: Fully automatic, accurate and repeatable processing.

AUTOMATIC DISPENSE

Static chemical dispense through a range of adjustable nozzles in the domed lid. Adjustable back-side spray arm. Heavy-duty motor: programmable for 1 to 12,000 rpm. CW & CCW rotation allowing puddle mode. Megasonic is available as an option.



FREELY PROGRAMMABLE PROCESS

- Sequentially programmable multiple dispense lines.
- Step-less programming of various flows within a process step from 150 up to 2500 ml/min (depending on dispense line thickness. For optional integrated mixing systems, the mixing rates of the various chemicals can be programmed per step.



Source: Fraunhofer ENAS-Dr. Knut Gottfried, Precise Bulk Silicon Wet Etching 2013

POLOS® HOTPLATE 200

Our table-top hotplate is a versatile tool for R&D and pilot lines. It is suitable for soft bake, hard bake and vacuum bake processes, and curing of photoresist, epoxy or any other work requiring precise temperature control.

The POLOS® Hotplate Advanced unit is standard equipped with complimentary features such as an nitrogen purge for inert bake, lifting and proximity pins and vacuum bake. Easily transformed into an in-deck version.



KEY FEATURES

Standard version

- Suitable for 200 mm wafers
- Soft-close lid, enabling single-handed closing
- 2-layer design reducing exterior lid temperature
- Programmable storage of 20 programs (temperature/time)
- Countdown timer (1 - 999 sec.)
- Temperature uniformity $\pm 1^{\circ}\text{C}$

Advanced version

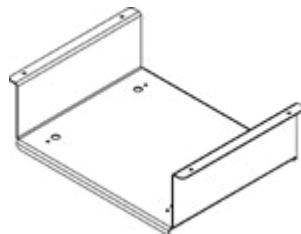
- Nitrogen purge for inert bake
- Lifting and proximity pins
- Vacuum bake

EASILY CONVERTIBLE INTO AN INDECK MODEL

Using our specially designed indeck bracket and display bracket, you can easily convert the POLOS® hotplate into an indeck solution.



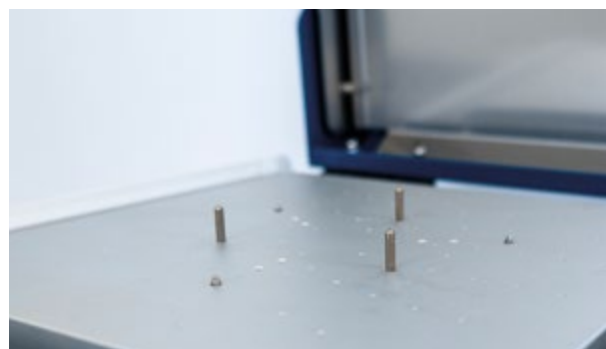
INDECK DISPLAY
BRACKET



INDECK BRACKET

CONFIGURATION

Temperature range	Up to 230°C
Heater surface area	220 x 220 mm
Heater block material	Aluminum (anodized)
Housing material	Powder coated stainless steel
Voltage	230 or 110 VAC
Weight	12 kg
Dimensions device	422 x 295 x 201 mm



Perforated vacuum plate and programmable lifting pins on a Hotplate Advanced

POLOS® HOTPLATE 350

Our table-top hotplate is a versatile tool for R&D and pilot lines. It is suitable for soft bake, hard bake and vacuum bake processes, and curing of photoresist, epoxy or any other work requiring precise temperature control.

The POLOS® Hotplate Advanced unit is standard equipped with complimentary features such as an nitrogen purge for inert bake, lifting and proximity pins and vacuum bake. Easily transformed into an in-deck version.



KEY FEATURES

Standard version

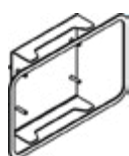
- Suitable for 300 mm wafers
- Soft-close lid, enabling single-handed closing
- 2-layer design reducing exterior lid temperature
- Programmable storage of 20 programs (temperature/time)
- Countdown timer (1 - 999 sec.)
- Temperature uniformity $\pm 1^\circ\text{C}$

Advanced version

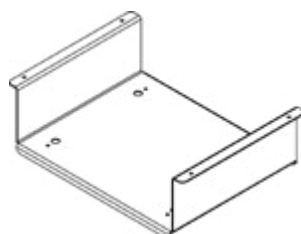
- Nitrogen purge for inert bake
- Lifting and proximity pins
- Vacuum bake

EASILY CONVERTIBLE INTO AN INDECK MODEL

Using our specially designed indeck bracket and display bracket, you can easily convert the POLOS® hotplate into an indeck solution.



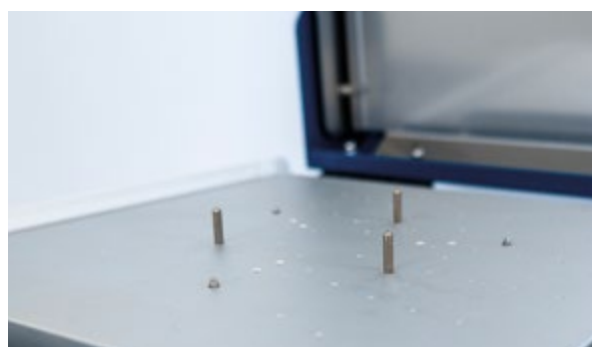
INDECK DISPLAY
BRACKET



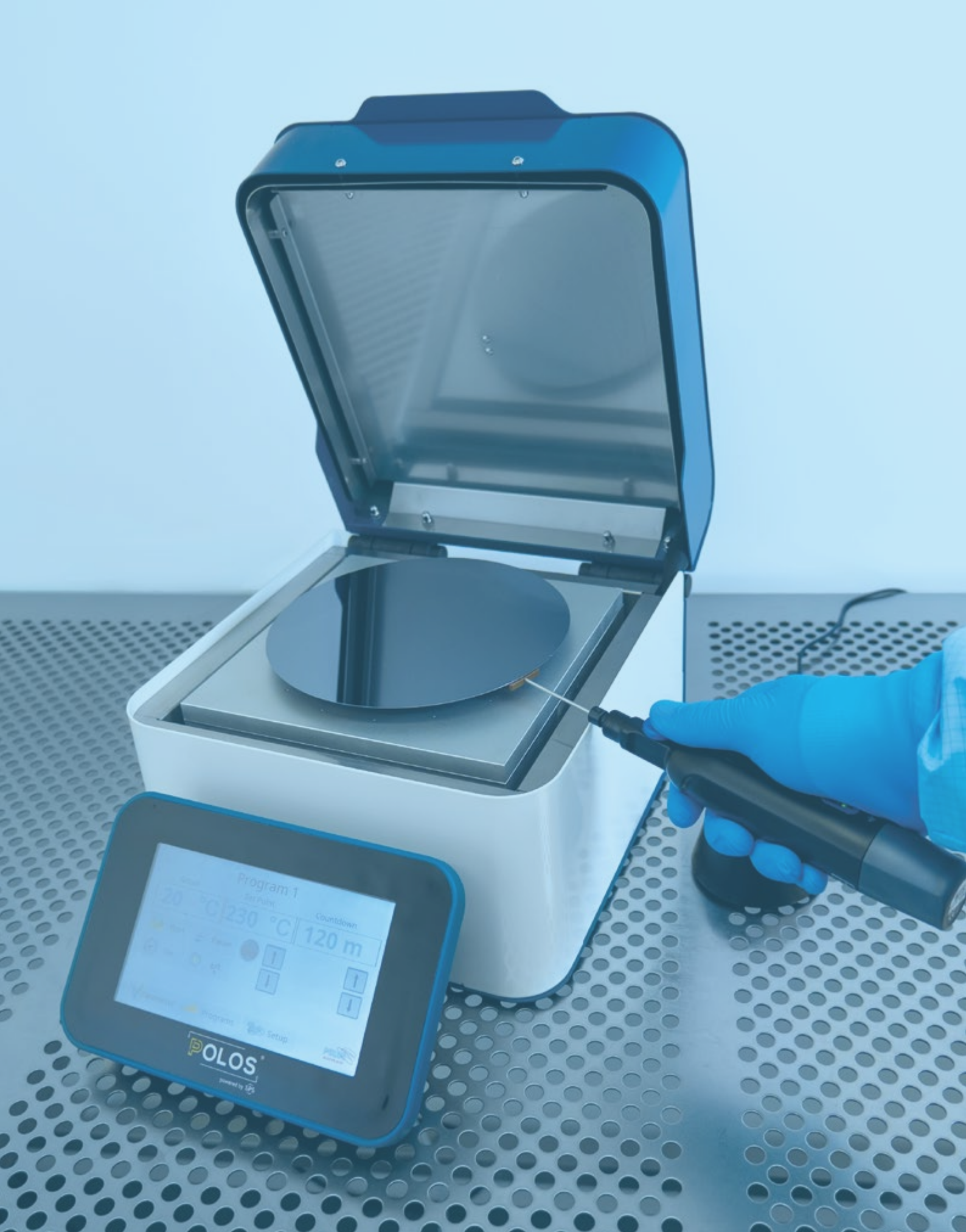
INDECK BRACKET

CONFIGURATION

Temperature range	Up to 230°C
Heater surface area	350 x 350 mm
Heater block material	Aluminum (anodized)
Housing material	Powder coated stainless steel
Voltage	230 VAC
Weight	25 kg



Perforated vacuum plate and programmable lifting pins on a Hotplate Advanced



SYSTEM COMPARISON

SPRAY COATERS



MODEL	POLOS® UC330	POLOS® UC320	POLOS® UC360c
System type	Bench-top	Bench-top	Stand-Alone
Flow rate	1 - 20 ml/min	0.1 - 5 ml/min	< 50 ml/min
Spray diameter	10 - 60 mm	5 - 20 mm	< 100 mm
Spray height	40 - 150 mm	10 - 80 mm	40 - 150 mm
Median droplet size	40 µm	40 µm	10 - 40 µm
Max. viscosity	30 cps	30 cps	30 cps
Particle size in suspension	< 20 µm	< 20 µm	< 20 µm
Solid concentration	< 30%	< 30%	< 30%
Recommended shaping air pressure	0.01 - 0.05 Mpa	0.01 - 0.05 Mpa	0.01 - 0.05 Mpa
Max. spray area	300 × 300 mm	150 × 150 mm	600 × 600 mm
Motion	XYZ servo system	XYZ servo system	XYZ servo system
Motion precision	± 0.02 mm	± 0.02 mm	± 0.02 mm
Max. velocity	XY axis: 300 mm/sec; Z axis: 30 mm/sec	XY axis: 200 mm/sec; Z axis: 30 mm/sec	XY axis: 500 mm/sec; Z axis: 30 mm/sec
Control method	PLC	PLC	Motion controller & touch screen
Input voltage	220 VAC 50/60 Hz	220 VAC 50/60 Hz	220 VAC 50/60 Hz
System dimension (mm)	1110 (w) x 850 (d) x 970 (h)	830 (w) x 690 (d) x 950 (h)	1720 (w) x 1390 (d) x 2190 (h)
Exhaust system	Built-in exhaust system	Built-in exhaust system	Built-in exhaust system

POLOS® UC320 ULTRASONIC SPRAY COATING SYSTEM

Our POLOS® table-top ultrasonic spray coating systems are used for precision coating in the fields of R&D and small volume production. Typical applications include photoresist coatings for various wafer materials and creating functional layers for thin-film processes.



Our systems allow high precision nano-particle coating with more efficient photoresist consumption compared to standard photoresist application techniques. On our Ultrasonic Spray Coating Systems the material usage ratio exceeds 95%, this will allow our users to reduce costs of photoresist consumption and improve their process efficiency.

Listening to the needs of our customers, we designed a compact system with easy-to-use software controls, the ability to choose from the wide range of Ultrasonic Nozzles and complimentary options will allow our customers to find the perfect match for their process application.

The POLOS® UC320 is standard supplied with integrated syringe pump, carrier gas regulation, ultrasonic generator and controllable motion system. With patented ultrasonic spray technology, the system can provide highly uniform and efficient fine spray coating.

CONFIGURATION	
Ultrasonic nozzle	All series of patented ultrasonic spray nozzles available. Controlled by a multi-closed-loop system with a control step size of 0.01 W for high accuracy.
Motion system	High-precision XYZ motor driven stages and laser positioning allowing accurate controllable and repeatable coating.
Liquid delivery	Syringe pump with accuracy up to 0.01 ul/min. Different specifications can be equipped to achieve stable liquid supply.
Exhaust system	Connect the build-in exhaust system to your cleanroom exhaust line.

KEY FEATURES

- High precision nanoparticle coating due to Ultrasonic Nozzle, material consumption ratio > 95%.
- Compatible with all series of POLOS® by Siansonic® nozzles; Spray width from 1 mm to 100 mm and flow rate of 0.001 ml/min - 50 ml/min.
- Max. spray area: 150 mm x 150 mm.

OPTIONS

- Vacuum heating plate with maximum temperature of 150°C.
- Ultrasonic bath: used to pre-disperse the coating liquid.
- Ultrasonic syringe: Used to provide nano particle dispersion during the liquid delivery process and to avoid the solid settlement during spray coating.

POLOS® UC330 ULTRASONIC SPRAY COATING SYSTEM

Our POLOS® table-top ultrasonic spray coating systems are used for precision coating in the fields of R&D and small volume production. Typical applications include photoresist coatings for various wafer materials and creating functional layers for thin-film processes.



Our systems allow high precision nano-particle coating with more efficient photoresist consumption compared to standard photoresist application techniques. On our Ultrasonic Spray Coating Systems the material usage ratio exceeds 95%, this will allow our users to reduce costs of photoresist consumption and improve their process efficiency.

Listening to the needs of our customers, we designed a compact system with easy-to-use software controls, the ability to choose from the wide range of Ultrasonic Nozzles and complimentary options will allow our customers to find the perfect match for their process application.

The POLOS® UC330 is standard supplied with integrated syringe pump, carrier gas regulation, ultrasonic generator and controllable motion system. With patented ultrasonic spray technology, the system can provide highly uniform and efficient fine spray coating.

CONFIGURATION	
Ultrasonic nozzle	All series of patented ultrasonic spray nozzles available. Controlled by a multi-closed-loop system with a control step size of 0.01 W for high accuracy.
Motion system	High-precision XYZ motor driven stages and laser positioning allowing accurate controllable and repeatable coating.
Liquid delivery	Syringe pump with accuracy up to 0.01 ul/min. Different specifications can be equipped to achieve stable liquid supply.
Exhaust system	Connect the build-in exhaust system to your cleanroom exhaust line.

KEY FEATURES

- High precision nanoparticle coating due to Ultrasonic Nozzle, material consumption ratio > 95%.
- Compatible with all series of POLOS® by Siansonic® nozzles; Spray width from 1 mm to 100 mm and flow rate of 0.001 ml/min - 50 ml/min.
- Max. spray area: 300 mm x 300 mm.

OPTIONS

- Vacuum heating plate with maximum temperature of 150°C.
- Ultrasonic bath: used to pre-disperse the coating liquid.
- Ultrasonic syringe: Used to provide nano particle dispersion during the liquid delivery process and to avoid the solid settlement during spray coating.

POLOS® UC360C ULTRASONIC SPRAY COATING SYSTEM

Our POLOS® UC360c ultrasonic spray coating system is used for precision coating in the fields of R&D and pilot scale manufacturing. Typical applications include thin film solar cell, fuel cell, glass coating, stent coating, balloon catheter coating, ultrasonic spray pyrolysis, and more!



Our systems allow highly precision nano-particle coating with more efficient photoresist consumption compared to standard photoresist application techniques. On our Ultrasonic Spray Coating Systems the material usage ratio exceeds 95%, this will allow our users to reduce costs of photoresist consumption and improve their process efficiency.

Listening to the needs of our customers, we designed a compact system with easy-to-use software controls, the ability to choose from the wide range of Ultrasonic Nozzles and complimentary options will allow our customers to find the perfect match for their process application.

The POLOS® UC360c is standard supplied with integrated syringe pump, carrier gas regulation, ultrasonic generator and controllable motion system. With patented ultrasonic spray technology, the system can provide highly uniform nano-scale thin film coatings, such as fuel cell, solar cell, glass coating, TCO, electronics, and more.

KEY FEATURES

- Stand-alone System
- High precision nanoparticle coating due to Ultrasonic Nozzle, material consumption ratio > 95% (Optional Nozzles Available)
- Compatible with all series of POLOS® by Siansonic® nozzles; Spray width from 1 mm to 100 mm and flow rate of 0.001 ml/min - 50 ml/min
- Max. spray area: 600 mm x 600 mm
- Patented full digital ultrasonic generator, Control step size: 0.01W
- Uniformity: >95%
- Liquid viscosity: <30 cps
- Thickness of coating: 20 nm - 100 micron (depending on material)
- XYZ servo motion system
- Continuous syringe pump
- Exhaust system
- Laser light for positioning of nozzle

OPTIONS

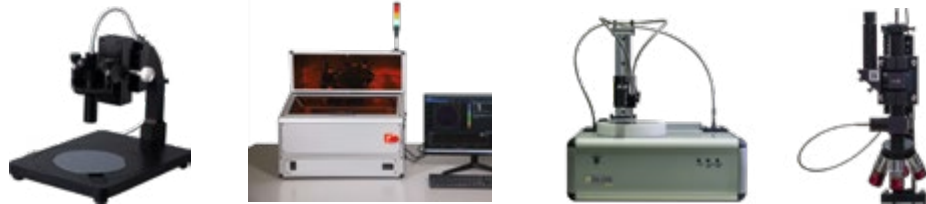
- Vacuum heating plate with maximum temperature of 150°C.
- Ultrasonic bath: used to pre-disperse the coating liquid.
- Ultrasonic syringe: Used to provide nano particle dispersion during the liquid delivery process and to avoid the solid settlement during spray coating.

SYSTEM COMPARISON

FILM CHARACTERIZATION

All systems include the following features:

- Single-click analysis (no need for initial guess)
- Dynamic measurements
- Reflectance, transmittance, absorption, color parameters
- Save videos for presentations
- 350+ non-identical materials
- Running on Windows 7/8/10
- Free of-charge software update



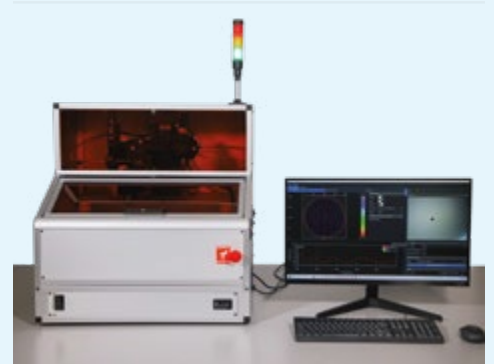
MODEL	FR-ES	FR-SCANNER-AIO-MIC-XY200	FR-PRO	FR-MIC
Type	Table-top system	Table-top system	Table-top system	-
Spectral range	200 nm - 1700 nm	200 nm - 1700 nm	190 nm - 1700 nm	200 nm - 1700 nm
Thickness range	12 nm - 250 µm	4 nm - 130 µm	200 nm - 250 µm	4 nm - 130 µm
Thickness accuracy	0.2 % - 3 nm	2 nm or 0.2 %	0.2 % or 1 nm	0.1% or 1 nm
Thickness precision	0,05 nm - 0,1 nm	0.02 nm	0.07 nm or 1‰	0.02 nm
Light source MTBF	Halogen (internal), 3000 hours (MTBF)	2,000 hours or 5,000 hours	2,000 hours	3,000 hours
Dimensions (mm)	220 (w) x 200 (d) x 60 (h)	800 (w) x 600 (d) x 850 (h)	390 (w) x 320 (d) x 420 (h)	N/A
Power requirements	10 V / 230 V, 50 - 60 Hz, 10 W	Single-phase 96 - 230 V, 5 A@100 V, 2 A@220 V	110 V / 220 V	N/A

"
A unique solution for
accurate & precise non-
destructive characterization
of films
"



POLOS® FR-SCANNER-AIO-MIC-XY200

FR-Scanner-AIO-Mic-XY200 is a holistic platform for the fully-automated in-depth characterization of patterned single and multilayer coatings on wafers. It provides 200 mm of travel along X and Y axes and is suitable for accurate measurements while the sample is secured on the stage through vacuum. The tool is offered in an endless range of optical configurations within the 200 – 1700 nm spectral range.



Designed for automated & fast mapping of films in the micron lateral scale. FR-Scanner-AllInOne-Mic-XY200 integrates under the same roof state-of-the-art optical, electronic, and mechanical modules for the accurate & precise characterization of patterned films. Typical examples include (but are not limited to): micro-patterned surfaces, rough surfaces, and numerous others. The wafer is placed on a vacuum chuck that supports any wafer size up to 200 mm diameter and is equipped with reflectance standards. The characterization is performed by a powerful optical module with a spot size as small as a few microns. The motorized XY stage provides travel of 200 mm on each axis with unprecedented speed, accuracy & repeatability.

FR-Scanner-AIO-Mic-XY200 provides:

- Real-time spectroscopic reflectance measurements
- Film thickness, optical properties, non-uniformity measurements, thickness mapping
- Imaging with an integrated high-quality color camera
- Wide range of statistics for the parameters under characterization
- Semi-automatic pattern alignment capability for mapping of periodic small patterns
- Unique S/W features such as: Click2Move, scale bar and more

APPLICATIONS

- Universities & research labs
 - Semiconductors (oxides, nitrides, Si, resists, etc.)
 - MEMS devices (photoresists, Si membranes, etc.)
 - LEDs, VCSELs
 - Data storage
 - Polymer coatings, adhesives, etc.
 - And many more...
- (contact us with your requirements)

OPTIONS

- FR-AutoFocus
- FR-FilterWheel
- FR-AutoTurret
- Lenses
- Pump
- Chucks
- Enclosure

KEY FEATURES

- Single-click analysis (no need for initial guess)
- Dynamic measurements
- Optical parameters (n & k, color)
- Click2Move & Pattern alignment functions
- Multiple installations for off-line analysis
- Free of-charge software update

102024-VI

MODEL		UV/Vis	UV/NIR-EX	UV/NIR-HR	D UV/NIR	VIS/NIR	D VIS/NIR	NIR	NIR-N2
Spectral range (nm)		200 - 850	200 - 1000	190 - 1100	200 - 1700	380 - 1020	370 - 1700	900 - 1700	900 - 1050
Spectrometer		CCD image sensor							
Spectrometer pixels		3648	3648	2048	3648 & 512	3648	3648 & 512	512	3648
Thickness range (SiO ₂)	5X- VIS/NIR	4 nm – 60 μm	4 nm - 70 um	4 nm - 80 μm	4 nm - 150 μm	10 nm - 90 μm	15 nm - 150 μm	100 nm – 150 μm	4 nm - 1 mm
	10X-VIS/NIR 10X-UV/NIR*	4 nm – 50 μm	4 nm – 60 μm	4 nm – 65 μm	4nm – 130 μm	10 nm – 80 μm	15 nm – 130 μm	100 nm – 130 μm	-
	15X- UV/NIR *	4 nm – 40 μm	4 nm – 50 μm	4 nm – 50 μm	4 nm – 120 μm	-	-	100 nm – 100 μm	-
	20X- VIS/NIR 20X- UV/NIR *	4 nm – 25 μm	4 nm – 30 μm	4 nm – 30 μm	4 nm – 50 μm	10 nm – 50 μm	15 nm – 60 μm	100 nm – 60 μm	-
	40X- UV/NIR *	4 nm – 4 μm	4 nm – 4 μm	4 nm – 5 μm	4 nm – 6 μm	-	-	-	-
	50X- VIS/NIR	-	-	-	-	10 nm – 7 μm	15 nm – 8 μm	100 nm – 8 μm	-
Min. Thickness for n & k ¹		50 nm	50 nm	50 nm	50 nm	100 nm	100 nm	500 nm	-
Number of layers		Simultaneous measurement of 4 layers with adequate refractive index contrast							
Thickness accuracy ²		1 nm or 0.2 %				2 nm or 0.2 %		3 nm or 0.3 %	
Thickness precision ^{3,4}		0.02 nm				0.02 nm		<1 nm	5 nm
Thickness stability ⁵		0.05 nm				0.05 nm		<1 nm	5 nm
Light Source		Deuterium & Halogen (internal), 2000 h (MTBF)				Halogen 12V/50W (internal)			
Microscope module		Microscope column with 2 MP / 5 MP color image sensor with wide observation area							
Stage resolution		Better than 0.5 μm							
Stage repeatability		±2 μm (bi-directional)							
Absolute accuracy		±3 μm							
Wafer size		50 mm (2'') - 75 mm (3'') - 100 mm (4'') - 150 mm (6'') - 200 mm (8'') and of any shape up to 200 mm							
Scanning Speed		49 meas / 90 sec (200 mm (8'') wafer size)							
Power Requirements		Single-phase 96 - 230 V, 5A@100 V, 2A@220 V							
Tool dimensions		800(W) x 600 (D) x 850 mm (H) / 90 Kg							
Material Database		> 800 different materials							
SW Characteristics		FR-Monitor v4.0 (free of charge updates)							

¹ Specifications are subject to change without any notice. True X-Y scanning is also possible through custom-made configuration ** Measurements compared with a calibrated spectroscopic ellipsometer and XRD, Average of standard deviation of mean value over 15 days. Sample: 1 micron SiO₂ on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1 micron SiO₂ on Si wafer, ²* Standard-Deviation of daily average over 15 days. Sample: 1 micron SiO₂ on Si wafer. *** For Double Side Polished Si wafers ***Stage for 450 mm wafers is also available upon request.

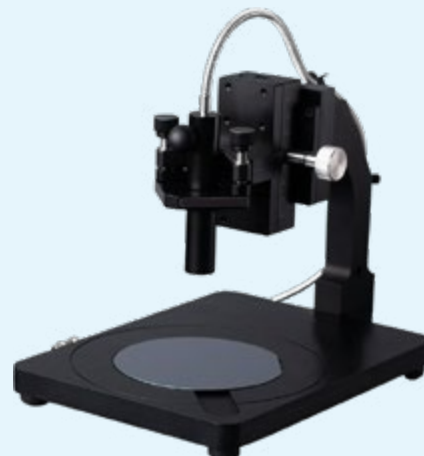
PRINCIPLE OF OPERATION

White Light Reflectance Spectroscopy (WLRS) measures the amount of light reflected from a film or a multilayer stack over a spectral range, with the incident light normal (perpendicular) to the sample surface.

The measured reflectance spectrum, produced by interference from the interfaces is being used to determine the thickness, optical constants (n & k), etc. of free-standing and supported (on transparent or partially/fully reflective substrates) stack of films.

POLOS® FR-ES

FR-ES is a compact and light-weighted unit for the characterization of coatings. With FR-ES the user can perform reflectance and transmittance measurements in the 370 - 1020 nm spectral range. The FR-ES platform is designed to provide an excellent performance in terms of characterization of coatings.



The FR-ES can be employed in a wide range of diverse applications, such as: Film thickness, Refractive Index, Color, Transmittance, Reflectance, and many more. There are three configurations available: VIS/NIR (370 - 1020 nm), NIR-N1 (850 - 1050 nm), NIR (900 - 1700 nm).

Then, there is a wide range of accessories, such as:

- Filters to block light at certain spectral regimes
- FR-Mic for measurements at very small areas
- Manual stage, either 25 x 25 mm or 100 x 100 mm or 200 x 200 mm
- Film/Cuvette Holder for Absorbance / Transmittance and chemical concentration measurements
- Integration Spheres for diffuse & total reflectance

By the combination of different modules, the final set-up meets any end-user needs.

APPLICATIONS

- Universities & Research labs
- Semiconductors
- Polymer & Resist characterization
- Chemical measurements
- Dielectric characterizations
- Biomedical
- Hardcoat, Anodization, Metal parts process
- Optical Coating
- Non-metal Films
- And many more...

KEY FEATURES

- Single-click analysis (no need for initial guess)
- Dynamic measurements
- Measurement of n & k , color is included
- Save images and videos for presentations
- Multiple installations for off-line analysis
- Free of-charge Software update

PRINCIPLE OF OPERATION

White Light Reflectance Spectroscopy (WLRS) measures the amount of light reflected from a film or a multilayer stack over a spectral range, with the incident light normal (perpendicular) to the sample surface.

The measured reflectance spectrum, produced by interference from the individual interfaces is being used to determine the thickness, optical constants (n & k), etc. of free-standing and supported (on transparent or partially/fully reflective substrates) stack of films.



ACCESSORIES

- Focusing module: Optical module attached on the reflection probe for <100 μm diameter spot size
- Transmittance module: Optical module for transmittance/ absorbance measurements
- Film/Cuvette kit: Transmission measurements of films or liquids in standard cuvettes
- Contact probe: Thickness & optical measurements of coatings in the field. Ideal for curved surfaces
- Microscope: Microscope-based reflectance and thickness measurements with high lateral resolution
- Manual X-Y stage: Manual X-Y stage for measurements over an area of 25 x 25 mm or 100 x 100 mm or 200 x 200 mm



MODEL	VIS/ NIR	NIR	NIR-N1
Spectral Range (nm)	370 - 1020	900 - 1700	850 - 1050
Pixels	3648	512	3648
Min Thick -SiO ₂	12 nm	50 nm	1 μm
Max Thick -SiO ₂	100 μm	250 μm	500 μm
Max Thick -Si	-	-	300 μm
n&k -Min. Thickness	100 nm	500 nm	-
Thick. Accuracy **	1 nm / 0.2%	3 nm / 0.4%	50 nm / 0.2%
Thick. Precision**	0.05 nm	0.1 nm	-
Thick. stability **	0.05 nm	0.15 nm	-
API support	Yes	-	Yes
Light Source	Halogen (internal), 3000h (MTBF)		
Integration Time	5 msec (min)		
Spot size	Diameter of 350 μm (smaller spot size as option)		
Material Database	> 700 different materials		
Dimensions (cm) / Weight (kg)	20 x 22 x 6 (L x W x H), 1.8 (stage excluded)		
Power	110 V / 230 V, 50-60 Hz, 10 W		

* Specifications are subject to change without any notice;

** Thickness range depends on the spectral range and refers to a single layer with refractive index ~1.5 over Si or similar substrate

POLOS® FR-PRO

FR-pRo is a modular and expandable platform for the characterization of coatings in the 1 nm - 1 mm thickness range. FR-pRo tools are tailored to the customer needs and are used in a wide range of diverse applications such as: Absorbance / Transmittance / Reflectance measurements, Film Characterization under temperature and ambient controlled environment or even in liquid environment and many more.



FR-pRo is assembled by user selected modules. The Core Unit accommodate the light source, the spectrometer (for any spectral regime in the 200 nm - 2500 nm range) and the control & communication electronics. Then, there is a wide range of accessories, such as:

- Film/Cuvette Holder for Absorbance/Transmittance and chemical concentration measurements
- Film Thickness kit for characterization of coatings
- Thermal or Liquid kits for measurements under controlled Temperature or in Liquid environment
- Integration Spheres for diffuse & total reflectance

By the combination of different modules, the final set-up meets any end-user needs.

APPLICATIONS

- Universities & Research labs
- Semiconductors
- Polymer & Resist characterization
- Chemical measurements
- Dielectric characterizations
- Biomedical
- Hardcoat, Anodization, Metal parts process
- Optical Coating
- Non-metal Films
- And more...

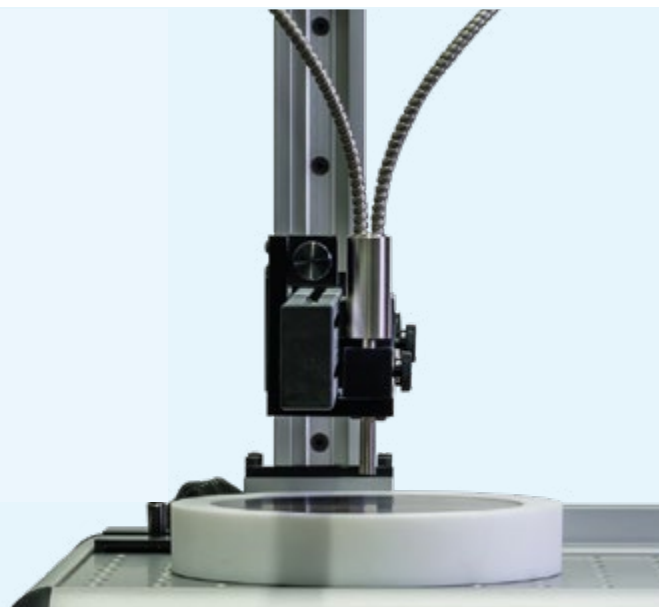
KEY FEATURES

- Thickness measurement range: 12 nm to 90 μm
- Refractive Index (n & k) calculation
- Broad Spectral Range: 380 nm – 1020 nm
- USB powered
- Portable
- Reflectance, Transmittance, Absorption and Color parameters

MODEL*	SPECTRAL RANGE	THICKNESS RANGE
FR-pRo UV/VIS	200 nm - 850 nm	200 nm - 250 μm
FR-pRo VIS/NIR	380 nm - 1000 nm	12 nm - 100 μm
FR-pRo RED/NIR	600 nm - 1040 nm	200 nm - 250 μm
FR-pRo UV/NIR-HR	190 nm - 1100 nm	1 nm - 120 μm
FR-pRo UV/NIR-EXT	190 nm - 1000 nm	3 nm - 80 μm
FR-pRo-D UV/NIR	190 nm - 1700 nm	1 nm - 250 μm

* Specifications are subject to change without any notice;

** Thickness measurements range is representative of the spectra range and refers to a single film layer with refractive index ~ 1.5 over a high reflective substrate



CONFIGURATION	
Computer	Touch Panel PC with 19" screen
Focusing module	Optical module attached on the reflection probe for <100 µm diameter spot size
Film/Cuvette kit	Transmission measurements of films or liquids in standard cuvettes
External base	To accommodate samples up to 300 mm in diameter (reflectance & transmission)
Scanner (motorized)	Polar (R-Θ) or Cartesian (X-Y) automated stage with wafer chuck. The polar option support reflectance and the Cartesian support reflectance & transmittance
Integrating sphere	For the characterization of specular and diffuse reflectance of coatings and surfaces
Manual X-Y stage	Manual X-Y stage for positioning measurements over an area of 100 mm x 100 mm
Thermal Module	Hot plate embedded in the FR-tool operating in the room temperature - 200°C range. Programmable temperature controller (0.1°C accuracy) operated through FR-Monitor
Liquid Module	Teflon® cell for measurements in liquids with optical window (quartz). Sample holder for insertion of the sample into the liquid capable to handle up to 30 mm x 30 mm samples
Flow cells	Measurement of minute values of absorbance, fluorescence in liquids

PRINCIPLE OF OPERATION

White Light Reflectance Spectroscopy (WLRS) measures the amount of light reflected from a film or a multilayer stack over a range of wavelengths, with the incident light normal (perpendicular) to the sample surface.

The measured reflectance spectrum, produced by interference from the interfaces is being used to determine the thickness, optical constants (n & k), etc. of free-standing and supported (on transparent or partially/fully reflective substrates) stack of films.

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POLOS® FR-MIC

Local characterization of coatings in the micron lateral scale. With FR-Mic, local measurement of film thickness, optical constants, reflectance, transmission, and absorbance across any spectral regime within UV / VIS / NIR spectral range, is just a matter of a click. FR-Mic can be either mounted on FR-pRo or next to FR-pRo when large surfaces need to be characterized.



FR-Mic is the modular optical column for fast & accurate coating characterization applications that require spot size as small as few micrometers, Typical examples include (but not limited to): micro-patterned surfaces, rough surfaces and numerous others. It can be combined with a dedicated computer controlled XY stage, allowing the automated thickness & optical properties mapping of samples fast, easily and accurately.

FR-Mic provides:

- Real-time spectroscopic measurements
- Film thickness, optical properties, non-uniformity measurements, thickness mapping
- Imaging with an integrated, USB connected and high-quality color camera

APPLICATIONS

- University & Research labs
 - Semiconductors (Oxides, Nitrides, Si, Resists, etc.)
 - MEMS devices (Photoresists, Si membranes, etc.)
 - LEDs, VCSELs
 - Data Storage
 - Anodization
 - Hard/Soft coatings on curved substrates
 - Polymer coatings, adhesives, etc.
 - Biomedical (parylene, balloon wall thickness, etc.)
 - And many more...
- (contact us with your requirements)

PRINCIPLE OF OPERATION

White Light Reflectance Spectroscopy (WLRS) measures the amount of light reflected from a film or a multilayer stack over a range of wavelengths, with the incident light normal (perpendicular) to the sample surface.

The measured reflectance spectrum, produced by interference from the interfaces is being used to determine the thickness, optical constants (n & k), etc. of free-standing and supported (on transparent or partially/fully reflective substrates) stack of films.

KEY FEATURES

- Single-click analysis (no need for initial guess)
- Dynamic measurements
- Optical parameters (n & k , color)
- Save videos for presentations
- Multiple installations for off-line analysis
- Free of-charge Software update



MODEL		UV/Vis	UV/ NIR-EX	UV/ NIR-HR	D UV/ NIR	VIS/ NIR	D VIS/ NIR	NIR	NIR-N2
Spectral range (nm)		200 - 850	200 - 1020	200 - 1100	200 - 1700	370 - 1020	370 - 1700	900 - 1700	900 - 1050
Spectrometer pixels		3648	3648	3648	3648 & 512	3648	3648 & 512	512	3648
Thickness range	5X- VIS/NIR	4 nm – 60 µm	4 nm - 70 µm	4 nm - 100 µm	4 nm - 150 µm	15 nm - 90 µm	15 nm - 150 µm	100 nm - 150 µm	4 µm - 1 mm (SiO ₂) 400 µm max (Si)
	10X-VIS/NIR 10X-UV/NIR*	4 nm – 50 µm	4 nm – 60 µm	4 nm – 80 µm	4nm – 130 µm	15 nm – 80 µm	15 nm – 130 µm	100 nm – 130 µm	-
	15X- UV/NIR *	4 nm – 40 µm	4 nm – 50 µm	4 nm – 50 µm	4 nm – 120 µm	-	-	100 nm – 100 µm	-
	20X- VIS/NIR 20X- UV/NIR *	4 nm – 25 µm	4 nm – 30 µm	4 nm – 30 µm	4 nm – 50 µm	15 nm – 30 µm	15 nm – 50 µm	100 nm – 50 µm	-
	40X- UV/NIR *	4 nm – 4 µm	4 nm – 4 µm	4 nm – 5 µm	4 nm – 6 µm	-	-	-	-
	50X- VIS/NIR	-	-	-	-	10 nm – 5 µm	15 nm – 5 µm	100 nm – 5 µm	-
Min. Thickness for n & k ¹		50 nm	50 nm	50 nm	50 nm	100 nm	100 nm	500 nm	-
FR-API		YES	YES	YES	-	YES	-	-	YES
Thickness accuracy ²		1 nm or 0.1 %				2 nm or 0.2 %		3 nm or 0.3 %	
Thickness precision ^{3,4}		0.02 nm				0.02 nm		<1 nm	5 nm
Thickness stability ⁵		0.05 nm				0.05 nm		<1 nm	5 nm
Light source (not included)		Balanced Deuterium & Halogen (internal)				Halogen 12 V / 50 W (internal) 3000 h (MTBF)			
Material database		> 700 different materials							

¹ Specifications are subject to change without any notice, * Reflective objective lens ** Measurements compared with a calibrated spectroscopic ellipsometer and XRD, Average of standard deviation of mean value over 15 days. Sample: 1 micron SiO₂ on Si wafer, Standard deviation of 100 thickness measurements. Sample: 1 micron SiO₂ on Si wafer, 2*Standard-Deviation of daily average over 15 days. Sample: 1 micron SiO₂ on Si wafer.

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SYSTEM COMPARISON

ATOMIC LAYER DEPOSITION

At POLOS®, we provide a full line of desktop ALD equipment for research to pilot line, from thermal ALD to plasma ALD. Our simple and reliable ALD systems lead to fast, proof-of-concept solutions at the lowest cost. These systems are user-friendly and flexible to quickly optimize your process.



MODEL	AT200M	AT410	AT650T	AT650P
System type	Thermal	Thermal	Thermal	Plasma
Substrate size	2"	4" (also available in 6" and 8")	6"	6"
Heated precursors	Up to 2	Up to 3	Up to 4	Up to 4
Temperature range	Up to 300°C	Up to 315°C	40 - 400°C	40 - 400°C
Chamber	Stainless-steel	Aluminum	Aluminum	Aluminum
Customizable chucks	Yes	Yes	Yes	Yes
Glovebox integration	Not required. Fits in glovebox.	Yes	No	No

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2-INCH TABLE-TOP ALD SYSTEM

Meet the smallest footprint ALD tool available on the market. The AT200M is specifically designed for simple operation and installation with a focus on academic and startup markets where small size and cost effectiveness are the largest concerns. Thanks to its small size, it fits in a glovebox.



The AT200M maintains the same semiconductor grade components, metal-sealed lines and a robust PLC driven user interface that yields fast cycling and high quality single component thin films, while still realizing easy maintenance and safe, repeatable operation.

OPTIONS

- Vacuum pump
- *4 port manifold
- Ozone generator (AT-O3)
- Battle heaters
- QCM
- Remote PC control
- ALD precursors
- Glovebox
- HT Kit (precursors to 180°C)
- Bubbler
- Powder coater
- HC plasma

KEY FEATURES

- Small Footprint Desktop Thermal ALD system
W: 14" (35.5 cm) x D: 15" (38.1 cm) x H: 14.5" (36.8 cm)
- Powder Coating Option (capacity up to ~ 10 cm³)
- Accommodates samples from 2" x 2" x 3" or two 2" round wafers (customizable chucks and our powder coating option)
- 2 precursor ports, 4 ports optional with heat traced lines up to 150°C (HT kit to 180°C)
- Upgradeable to hollow cathode plasma (optional)
- Vented Precursor enclosure
- High temperature compatible fast pulsing ALD valves with ultrafast MFC for integrated inert gas purge - standard
- All stainless steel chamber with temperature range to 300°C
- High exposure available with static processing mode
- 5" Display with integrated PLC control
- Lifetime SW upgrades included
- 1 year warranty (parts and labor included)

4-INCH TABLE-TOP ALD SYSTEM

ALD technology has taken a leap in the past couple of years. POLOS® offers various systems, including a table top version for surface controlled layer-by-layer deposition with atomic layer accuracy.



Analog pressure controller for quick pressure check and pulse monitoring.

7" 16-bit color touchscreen HMI



7" touchscreen display with complete control over operation of the tool, recipe generation and sensor data. Easy to use and robust control SW interface.

6" and 8" systems also available!

KEY FEATURES

- Small Footprint Desktop Thermal ALD system
- Accommodates samples of 4" diameter with optional customizable chucks (large and batch chambers (3+ wafers) available)
- 3 organometallic sources (can be heated to 150°C) and 2 oxidant/reductant sources (HT kit for 180°C). Extra counter-reactant (optional)
- High temperature compatible fast pulsing ALD valves with ultrafast MFC for integrated inert gas purge - standard
- All aluminum chamber with temperature range to 315°C
- High exposure available with static processing mode
- 7" Display with integrated PLC control
- Lifetime SW upgrades included
- 1 year warranty (parts and labor included)

TABLE TOP ALD SYSTEMS

There is a need for deposition equipment optimized for growing conformal thin films at smaller scales at a reasonable cost. The AT410 4" system accomplishes these goals and fills a space in the market.

The AT-410 ALD system provides a solution to conformal, conductive thin films for 3D sample prep while also providing traditional 2D coatings that are currently grown using sputtering/evaporation. The AT410 not only pushes the boundaries, but is also an effective replacement for current sample preparation processes all within a bench-top configuration at a comparable price point.

GLOVEBOX INTEGRATION

A standard AT410 can be attached to a glove box with a glove box adapter upgrade. The system is sealed to an open side of a pre-existing or new glove box.

The deposition chamber and sample holder are completely sealed within the inert gas environment. Air sensitive materials and substrates can be handled and deposited with utmost confidence. 100% of the glove box floor and shelving will remain accessible after installation ALD system.



6-INCH TABLE-TOP THERMAL ALD SYSTEM

The AT650T is a small footprint desktop thermal ALD tool with in-field upgradeability to Plasma. It is designed with a streamlined chamber design and small chamber volume, while also offering fast cycling capability and high exposure for deep penetration processing.



The AT650T has a small footprint (15" by 15"), bench-top installation and is fully cleanroom compatible. Its fast cycling capability and high exposure make deep penetration processing possible. Due to its simple system maintenance and low utilities cost, this tool is a very cost effective desktop thermal ALD system.

OPTIONS

- Upgrade to Plasma
- Customized chuck/platen
- ATOzone - ozone generator (required for some films: Pt, Ir, SiO₂, MoO₃, high quality Al₂O₃ below 60°C, high quality HfO₂)
- QCM (Quartz Crystal Microbalance)
- Additional Counter reactant lines (MFC controlled) – up to 2 additional
- Optional 4th heated precursor (185°C)
- Additional heated precursor line to 185°C for 4 total

KEY FEATURES

- Smallest Footprint Desktop Plasma ALD
- Affordable Plasma ALD at the cost of a thermal system
- Accommodates samples of 6" diameter with optional customizable chucks
- Warm walled aluminum chamber with heated sample holder from 40 – 400°C
- 3 organometallic sources (can be heated to 185°C with nitrogen assist), 1 at RT (upgradeable to 185°C) and up to 4 oxidant/reductant sources.
- High temperature compatible fast pulsing ALD valves with ultrafast MFC for integrated inert gas purge - standard
- Substrate temperature to 400°C
- High exposure available with static processing mode
- Full HW and SW interlocks for safe operation even in multi-user environment.



6-INCH TABLE-TOP PLASMA ALD SYSTEM

The AT650P is a small footprint desktop plasma ALD tool with a streamlined chamber design and small chamber volume, while also offering fast cycling capability and high exposure for deep penetration processing.



The AT650P has a small footprint bench-top installation and is fully cleanroom compatible. Its fast cycling capability and high exposure make deep penetration processing possible. Due to its simple system maintenance and low utilities cost, this tool is a very cost effective desktop plasma ALD system.

OPTIONS

- Customized chuck/platen
- QCM (Quartz Crystal Microbalance)
- Bubbler design for your bottles
- Lead-lock (or glovebox interface)
- Counter-reactant line (MFC controlled) (up to 2 additional)
- Additional heated precursor line to 185 CC for 4 total
- Customized systems available. Contact us for more information

KEY FEATURES

- Small Footprint Desktop Plasma ALD
- Now with a Hollow Cathode source
 - Improved growth per cycle
 - High electron density
 - Low plasma damage
 - Less oxygen contamination (in nitrides)
- Affordable Plasma ALD at the cost of thermal system
- Accommodates samples of 6" diameter with optional customizable chucks
- 3 organometallic sources (can be heated to 185°C), 1 at RT (upgradeable to 185°C) and up to 4 oxidant/reductant sources.
- High temperature compatible fast pulsing ALD valves with ultrafast MFC for integrated inert gas purge - standard
- Substrate temperature to 400°C
- High exposure available with static processing mode



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AT-OZONE GENERATOR

The ATOzone (Ozone Generator) system utilizes high quality components that deliver high concentration (up to 12%) ozone in a very small form. The system does not require expensive and bulky water cooling. The built-in high velocity fans keep the plasma cell cool even during prolonged or constant use.



The user can choose between manual or automatic switching between ozone, oxygen and off positions.

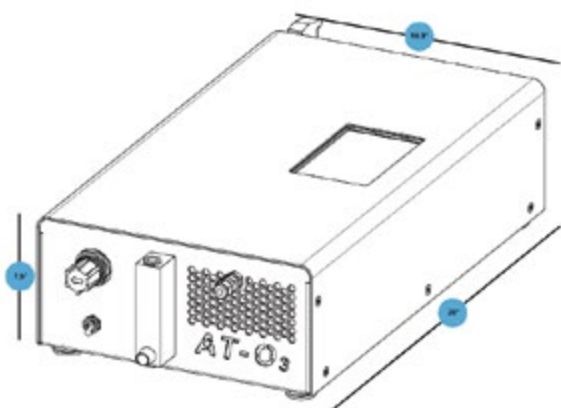
In Thermal ALD processes ozone is required for low temp Pt, Ir, SiO₂, MoO₃, high quality Al₂O₃ below 60°C and high quality HfO₂

OPTIONS

- Ozone Safety Monitor (Integrated)
 - Green: ozone level is below 1500 ppb
 - Yellow: ozone level 1500 ppb to 3500 ppb
 - Red: ozone level greater than 3500 ppb

KEY FEATURES

- Ozone production range: 12% by weight at low flow, 6% at high flow.
- Integrated O₂ regulator: 3 – 29 psi
- High capacity ozone destructor for off-cycle ozone flow
- Can be controlled by 3 – 24 V input signal
- Override switch for manual ozone control
- Front panel switch for O₂ or Ozone output selection



PROTECT YOUR WAFERS

The most valuable product in the semiconductor and electronics industry is also the most fragile and susceptible to mishandling and contamination. Mix in that not all wafers are created equal, which means one product does not fit all wafers! We offer various solutions to safely ship and store your wafers; from single wafer shippers, wafer jars and shipping boxes, to wafer canisters and storage boxes.



From the most advanced eLX wafer canisters to cost-efficient wafer jars, we offer tailor fit products to meet your requirements. Our coin style and clamshell shippers keep the wafers secure and only contact the edges of the wafer during shipping and storage.

The single wafer shippers are available in different sizes 1", 1.5", 2", 2.5", 3", 4", 5" and 6" and in materials Natural PP or ESD-Safe Conductive PP. They are impact resistant with a screw-on lid for secure packing. Available from stock! Contact us for special requests!

WAFER SIZE	ePAK DESCRIPTION	INTERNAL DIAMETER	ORDER CODE
1" (25 mm)	eCT1-25-ASSY-1-eM-08-NAT	25.4 mm	eWB0091-ASSY-1
1.5" (38 mm)	eCT1.5-38-ASSY-1-eM-08-NAT	39.6 mm	eWB0325-ASSY-1
2" (50 mm)	eCT2-50-ASSY-1-eM-08-NAT	52 mm	eWB0021-ASSY-1
2.5" (63 mm)	eCT2.5-63-ASSY-1-eM-08-NAT	65.5 mm	eWB0328-ASSY-1
3" (76 mm)	eCT3-76-ASSY-1-eM-08-NAT	78.6 mm	eWB0022-ASSY-1
4" (100 mm)	eCT4-100-ASSY-1-eM-08-NAT	104 mm	eWB0024-ASSY-1
5" (125 mm)	eCT5-125-ASSY-1-eM-08-NAT	127 mm	eWB0060-ASSY-1
6" (150 mm)	eCT6-150-ASSY-1-eM-08-NAT	152 mm	eWB0025-ASSY-1



Process boats and storage boxes for 2, 3, 4, 6 and 8" wafers. Designed with open or closed slots to ensure easy and safe wafer handling.



Wafer shipping boxes for 1, 2, 2.5, 3, 4, 6 and 8" wafers. Designed to hold multiple wafers by the edge.



Plastic wafer jars, with foams and wafer separators and liners for easy loading / unloading in automated or manual applications.

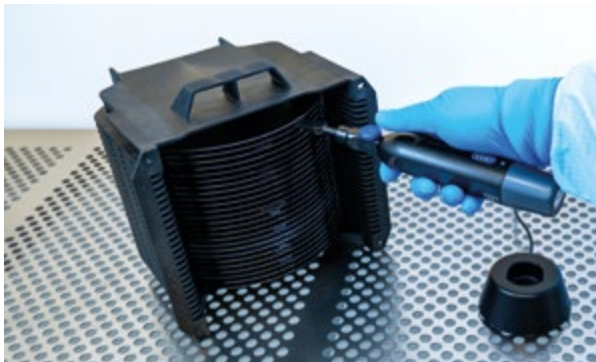


ELX wafer canisters enhanced protection of wafer surfaces. Minimizes lateral movement without applying compression to delicate wafer edges.

102024-VI

VACUUM HANDLING

The manufacturing cycle of Si wafers and other compound material wafers such as; InP, SiC, GaAs, GaN and Ge, consists of many process steps. To be able to safely handle your wafers between and during your process, WHS® offers a wide range of vacuum handling and mechanical handling solutions. All our vacuum handling solutions are interchangeable and compatible with other brands.



CORDLESS VACUUM WAND ASSEMBLY

This advanced cordless and battery-powered vacuum wand allows independence from vacuum lines. Provides mobility to go anywhere in the cleanroom. The smart charging electronics keep prevent damage to the tool from over/deep charging. Designed for wafer rescue or light-production, ISO 3.



TABLE-TOP PORTABLE WAND

This advanced table-top and portable battery-powered vacuum wand allows independence from in-house vacuum. The powerful vacuum pump, high performance battery and auto-shutoff holder allows this system to be used in a high production environment for multiple days on one charge. It ships with a choice of vacuum tip and small device adapter if needed. Designed for wafer rescue or heavy-production, 800mBar (23.6"Hg). ISO 3.



SMALL DEVICE CUPS

Antistatic conductive silicone rubber vacuum cups for high temperature applications, antistatic Nitrile Buna N rubber vacuum cups for general use application, or PUR® ultra silicone rubber non-marking vacuum cups for optic handling application. ISO 5.

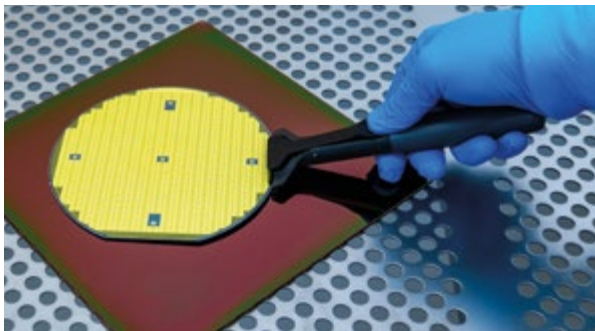
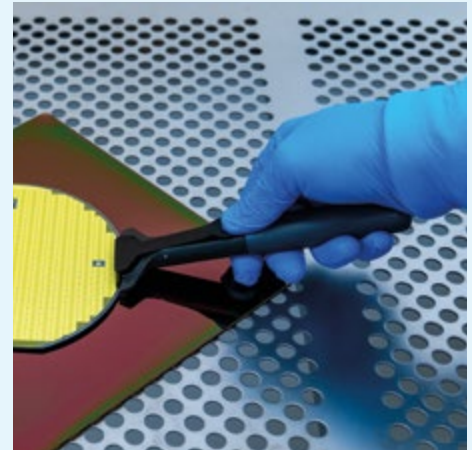
VACUUM TIPS - PEEK OR POLYIMIDE

We offer widely used anti-static PEEK vacuum tips for ESD-Safe wafer handling, or our high temperature Polyimide tips when handling wafers from/to your platen, evaporator, hotplate or any other high temperature equipment.



WHS® WAFER EDGE PICKS

WHS® provides an extensive range of industry-leading wafer grippers designed to accommodate a variety of wafer handling needs in cleanroom settings. Each model is tailored to meet specific requirements for specialized wafer handling. Our lithography photomask handling tools are designed to minimize particle contamination, prevent electrostatic discharge (ESD), and improve ergonomics for technicians.

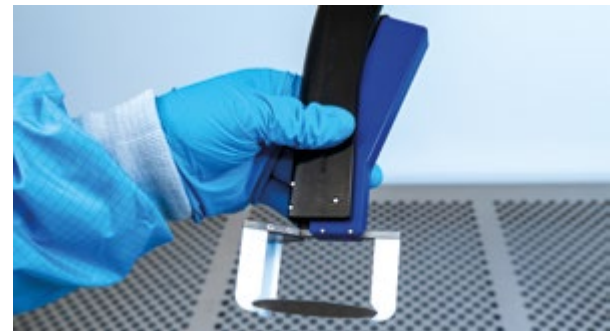


WHS® MECHANICAL WAFER EDGE GRIP - G1 & G2 SERIES

A normally closed (consistent-force) edge exclusion mechanical pick for handling up to 200 mm round substrates from the wafer edge. The gripper material is ESD-safe PEEK for longevity, antistatic properties, and general chemical resistance. The wafer contact pad is a perfluoro elastomer strip for grip hold on the wafer without scratching or leaving out-gassing behind. ISO 4. Compound and thin wafer compatible. Two models available: with and without spatula.

KEY FEATURES

- Compound and thin wafer compatible
- Normally-closed edge wafer handling
- Ergonomic safe wafer handling
- Perfluorocarbon 3 mm front side touchpad
- Antistatic material construction



WHS® 3-POINT MECHANICAL WAFER GRIPPER - G3 SERIES

Designed for round substrates with diameters up to 300 mm, specifically targeting the tangential wafer diameter. This normally closed pick is suitable for both laboratory single wafer processing and wafer rescue applications. The 50 mm height grippers are crafted from high-performance PTFE Teflon®, ensuring resistance to chemicals and high temperatures. It is adjustable for thin/compound substrates. ISO 4. Optional table-top pedestal holder available.

KEY FEATURES

- Tangential wafer edge handling
- Single wafer processing and rescue
- PTFE grippers (PEEK is optional)
- Ergonomic left/right hand use
- Adjustable for thin/compound substrates



“
With decades of experience
we deliver tools that not
only work, but last in a
cleanroom environment
”



HIGH-END PHOTOLITHOGRAPHY SOLUTIONS

POLOS® provides high-end semiconductor equipment especially targeted to support Universities, R&D institutes and small production facilities. Our portfolio consists of user-friendly and highly durable systems, mainly within the photolithography process area. We are part of the SPS Group.

We believe technology moves the world forward. Not only in terms of growth, but also in terms of efficiency and sustainability. We are proud to be a part of an industry that holds the key to a better future for all. And we are extremely driven to help you innovate and improve your semiconductor production processes with innovative products, advice and service.

We carefully select our equipment, based on long-term experience and user feedback, to support your process. If you want to see for yourself how our solutions could fit into your cleanroom environment, simply contact us. We have at least 1 demo system operational at all times, as well as local service engineers and remote support! For more information, please contact your local office.

POLOS®: Empowering your research with tools for photolithography and coating applications, enabling unmatched results.

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