

The Exicor® DUV and 193 DUV systems measure birefringence at deep ultraviolet wavelengths. The 2003 "R&D 100" award winning Exicor DUV system was developed to evaluate intrinsic birefringence in Calcium Fluoride (CaF₂) lens materials at the application wavelength of 157 nm. The subsequent Exicor 193 DUV focuses on a variety of materials used in 193 nm lithographic systems, especially immersion 193 nm lithography systems that demand the highest quality optics. Both of these systems satisfy the 'measure at the wavelength of use' principle demanded by precision optical materials manufacturers who are pushing the technology envelope.

The Exicor DUV and 193DUV systems are the primary systems used by the leading lithography industry optics manufactures to measure birefringence in lens blank materials and photo-mask blanks at DUV lithographic wavelengths (157 nm, 193 nm, 248 nm). These systems are built with a robust frame and heavy duty motion control components for measuring optics up to 400 mm x 400 mm and 200+ mm thick. The Exicor DUV system also utilizes a unique localized oxygen displacement system in the sample chamber because 157 nm UV light is absorbed by oxygen molecules. This clean dry nitrogen purged environment also prevents the generation of ozone in the DUV sample chamber. Purging is not required for 193 nm and 248 nm measurements.

These systems' large scanning stage also allows for loading multiple smaller parts on the stage, with the optional Exicor Macro+ software executing automated routines to scan each part individually. The user can begin the routine and let it run for multiple shifts, overnight or even longer (depending on the application) without having to intervene.

Significant Features

- ♦ Heavy Duty Automated XY stage
- ♦ Up to three selectable DUV wavelengths (157 nm, 193 nm, 248 nm)
- ♦ 2D and 3D graphical representation of birefringence parameters
- ♦ Advanced data analysis features included standard in user interface
- ♦ Large and adaptable stage platform design for adding custom parts holders or process aids



SPECIFICATIONS

	Exicor DUV	Exicor 193DUV
Wavelengths, selectable	A) 157 nm B) 193 nm C) 248 nm	A) 193 nm B) 248 nm
Retardation Range:	A) 0.05 to 70+ nm B) 0.05 to 90+ nm C) 0.05 to 120+ nm	A) 0.05 to 90+ nm B) 0.05 to 120+ nm
Retardation Resolution / Repeatability ^{1,2} :	0.01 nm / $\pm$ 0.08 nm	0.01 nm / $\pm$ 0.08 nm
Angular Resolution / Repeatability ¹ :	0.01° / $\pm$ 0.5°	0.01° / $\pm$ 0.5°
Nitrogen (N ₂) Gas Purge:	Required (for 157 nm measurements)	Not Required
Facility Exhaust:	Required (for N ₂ purge gas removal)	Required (for lamp ozone removal)
Size (mm):	2150 (H) x 1600 (W) x 1220 (D)	1900 (H) x 1350 (W) x 1350 (D)
Light Source:	30W Deuterium Lamp (N ₂ gas cooled)	30W Deuterium Lamp (air cooled)
Measurement Spot Diameter ³ :	3mm to 5mm nominal (resolution can be as low as 1mm)	
Modulation Technique / Frequency:	PEMLabs™ Photoelastic Modulator / 50 kHz and 50/60 kHz	
Demodulation Analysis Technique:	Hinds Instruments Signaloc™ Lock-in Amplifier or Wave Form Capture Card	
Measurement Units:	nm (retardation), ° (angle)	

1 Typical performance at 5 nm retardation

2 Up to 4 nm, 2% thereafter

3 Smaller spot sizes require additional averaging to achieve optimal repeatability

OPTIONS:

- ◆ Hinds Scan in Motion™ (High Speed Scanning)
- ◆ Custom Sample holders
- ◆ Custom Software (UI or DLL)
- ◆ Stress Estimation Calculations

BIREFRINGENCE MAPS OF A [111] CAF₂ WINDOW