

DIGITAL PHOTOELASTIC MODULATOR



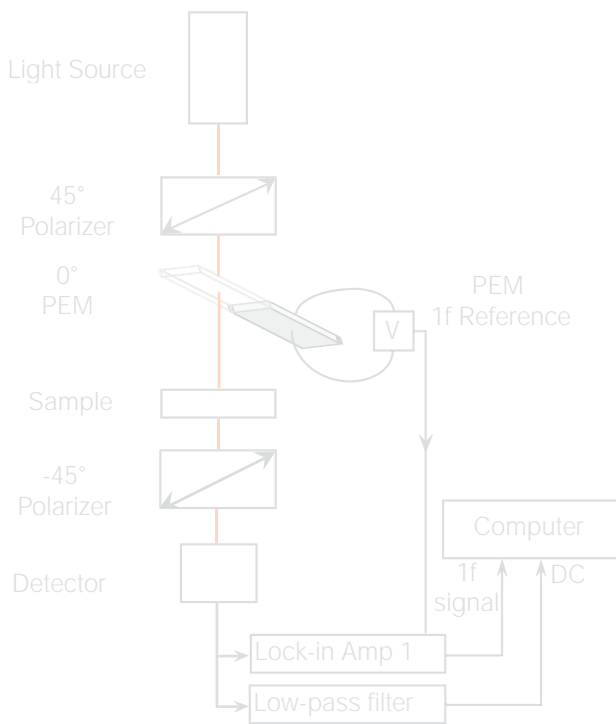
PEM200

Smaller. Lighter. Digital.
Same High Sensitivity.
Same Pure Sinusoidal Function.

PRODUCT BULLETIN

Controller Features:

- ◆ Improved 50/50 duty cycle, 1f and 2f: $50\% \pm 1\%$
- ◆ Small Footprint: 62 mm x 135 mm x 174 mm
- ◆ Simplified connection – dual SMA cable from optical head to control box
- ◆ USB 2.0 or optional Ethernet Communication
- ◆ Low Power requirement - 1.7W (71mA @ 24V), typical.
- ◆ Optional Synchronous detection/signal processing (later development)



Unique Features of the PEM

- HIGH TRANSMISSION OF LIGHT -**
Most Hinds PEM models have a transmission of $>90\%$ without anti-reflection (AR) coating. A transmission of $>99\%$ at a particular wavelength or over a specified spectral range can be achieved using AR coatings.
- HIGH POWER HANDLING CAPABILITY -**
Hinds PEMs have an excellent power handling rating which is estimated above 5 GW/cm^2 . PEMs are compatible with most laser systems.
- WIDE SPECTRAL RANGE COVERAGE -**
Depending on the optical material used, wavelengths from the vacuum UV to the FIR can be used with PEMs.
- LARGE ACCEPTANCE ANGLE -**
The PEM's useful acceptance angle has been reported as large as $\pm 40^\circ$ by some researchers.
- LARGE APERTURES -**
13mm to as large as 56mm
- HIGH SENSITIVITY FOR AN INTEGRATED INSTRUMENT -**
When a PEM is used as the key component for polarization modulation experiments, most instruments have a sensitivity higher than 10^{-6} .
- DURABILITY -**
Although constructed of fragile optics, Hinds PEMs are rugged and long-lasting. Most PEMs we made 20 years ago are still in current use.

Thin Film Characterization



Photovoltaic Improvement



Polarization of Assembled LCD



Astronomical Polarimetry



Optical Lithography



DIGITAL PHOTOELASTIC MODULATOR



PRODUCT BULLETIN

PEM 200 OPTICAL HEAD SPECIFICATIONS¹

Model	Optical Material	Frequency, nominal	Transmission Range	Retardation Wavelength Range		Useful Aperture ²
				Quarter Wave	Half Wave	
I/FS40	Fused Silica	40kHz	170 nm - 2.6 μm	170 nm - 2 μm	170 nm - 1 μm	17 mm
I/FS50	Fused Silica	50 kHz	170 nm - 2.6 μm	170 nm - 2 μm	170 nm - 1 μm	16 mm
I/FS60	Fused Silica	60 kHz	170 nm - 2.6 μm	170 nm - 2 μm	170 nm - 1 μm	15mm
II/FS42 ³	Fused Silica	42 kHz	170 nm - 2.6 μm	170 nm - 2.6 μm	170 nm - 2.5 μm	27 mm
II/FS47 ³	Fused Silica	47 kHz	170 nm - 2.6 μm	170 nm - 2.6 μm	170 nm - 2.5 μm	24 mm
II/FS50 ³	Fused Silica	50 kHz	170 nm - 2.6 μm	170 nm - 2.6 μm	170 nm - 2.5 μm	22 mm
II/FS84 ³	Fused Silica	84 kHz	170 nm - 2.6 μm	400 nm - 1 μm	400 nm - 1 μm	13 mm
II/IS42 ³	Infrasil	42 kHz	210 nm - 3.5 μm	300 nm - 3.5 μm	300 nm - 3 μm	27 mm
II/IS84 ³	Infrasil	84 kHz	210 nm - 3.5 μm	400 nm - 1 μm	400 nm - 1 μm	13 mm
II/ZS37	Zinc Selenide	37 kHz	550 nm - 18 μm	2 μm - 18 μm	1 μm - 9 μm	19 mm
II/ZS42	Zinc Selenide	42 kHz	550 nm - 18 μm	2 μm - 18 μm	1 μm - 10 μm	17 mm
II/ZS50	Zinc Selenide	50 kHz	550 nm - 18 μm	2 μm - 18 μm	1 μm - 10 μm	14 mm

¹ Specifications for models in the PEM200 category only

² For a full discussion, consult the Useful Aperture Technical Note

³ Please contact Hinds Instruments with your wavelength range for optical calibration. II/FSXX PEMs may experience an loss of wavelength resolution if not calibrated for the user's expected wavelength range.

Polarizer, 45°

Detector



PEM 100 OPTICAL HEAD SPECIFICATIONS - must be used with the PEM-100 Controller¹

Model	Optical Material	Frequency, nominal	Retardation Wavelength Range		Useful Aperture ²
			Quarter Wave	Half Wave	
I/CF50	Calcium Fluoride	50 kHz	130nm - 1um	130nm - 500nm	16mm
I/FS20 ³	Fused Silica	20 kHz	170 nm - 2 μm	170 nm - 1 μm	22 mm
II/FS20 ³	Fused Silica	20 kHz	170 nm - 2 μm	170 nm - 1 μm	56 mm
II/FS23 ³	Fused Silica	23 kHz	170 nm - 2 μm	170 nm - 1 μm	50 mm
II/SI40 ³	Silicon	40 kHz	28 um - 50 μm	n/a	36 mm
II/SI50 ³	Silicon	50 kHz	28 um - 50 μm	n/a	29 mm

¹ Specifications for models in the PEM100 category only

² For a full discussion, consult the Useful Aperture Technical Note

³ Please contact Hinds Instruments with your wavelength range for optical calibration. PEMs may experience an loss of wavelength resolution if not calibrated for the user's expected wavelength range.

Remote Sensing

Fiber Optic Polarization

Magnetic Material Research

Pharmaceutical Development

Fusion Research



PEM-200 Controller Specifications

PERFORMANCE CHARACTERISTICS

CHARACTERISTIC	SPECIFICATION	REMARK
FREQUENCY		
Operating Frequency	37 kHz to 74 kHz	Fixed Frequency, determined by head attached
Display Resolution	1 dHz	
Display Accuracy	4 dHz	
Duty Cycle, f and 2f	50% ± 0.001%	

ENVIRONMENTAL CHARACTERISTICS

CHARACTERISTIC	SPECIFICATION	REMARK
TEMPERATURE		
Non-Operating	-40° C to +65° C (-40° F to 150° F)	Controller only
Operating	2° C to +50° C (36° F to 122° F)	
HUMIDITY	0 to 95 % RH	Non-Condensing

PHYSICAL CHARACTERISTICS

CHARACTERISTIC	SPECIFICATION	REMARK
Shipping Weight	2.75 kg / 6 lbs	Modulator Head Assembly not included
Actual Weight	1 kg / 2 lbs	
Height	62 mm / 2.44 in.	
Width	135 mm / 5.31 in.	
Depth	174 mm / 6.86 in.	

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SPECIFICATION	REMARK
Power Supply	100 - 240 VAC 50/60 Hz	Universal
Power Consumption	13W	Maximum

EMC & SAFETY

CHARACTERISTIC	SPECIFICATION	REMARK
Approval	CE marked	
Safety Standard	EN 61010-1	
EMC Standards	EN 61326; FCC Class A	