

Polarimeter – PMI-2000

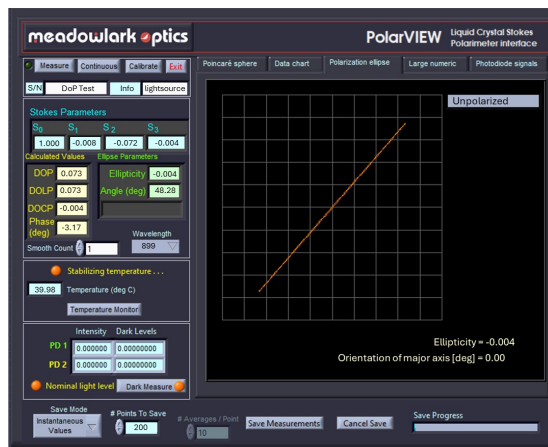
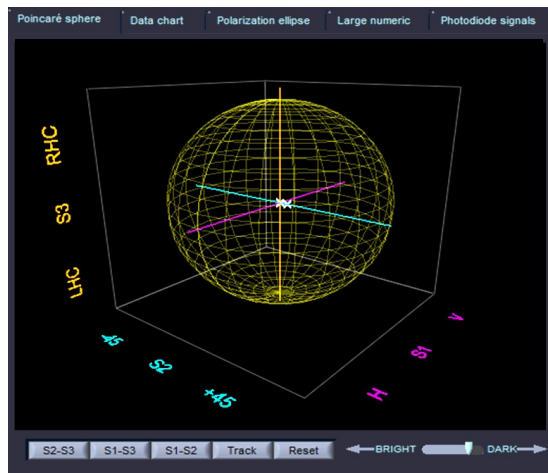
Our NEW user-friendly Liquid Crystal Stokes vector Polarimeter (PMI-2000) provides high accuracy and reliability in an easy-to-use instrument, suitable for manufacturing and laboratory applications. Our Polarimeter is a compact system with convenient computer control that accurately measures Stokes parameters 10 times per second. It quantifies the State of Polarization (SOP) and graphically displays the Poincaré Sphere, Polarization Ellipse, or running chart. The Meadowlark Optics system contains no spinning waveplates, motors, or other moving parts to wear or cause vibrations. Patented algorithms provide high accuracy and calibration versatility.

The controller of the Polarimeter PMI-2000 is integrated into the optical head. Temperature control and Stokes vector calculation are autonomously completed server-side in the Controller. This reduces the data volume of USB calls from PC to Controller.

The Stokes parameters comprise a four-component vector that completely characterizes the polarization of a light beam. The components of the Stokes vector are simple combinations of the intensity outputs from linear polarizers or circular polarizers.

The PolarVIEW software is a user-friendly interface which displays polarization data and allows the user to perform various operations:

- Display four Stokes parameters
- Readout temperature
- Display light levels
- Save function for continuous measurement mode



Key Features

...

Compact

No moving parts

Broad wavelength range

Versatile Configuration

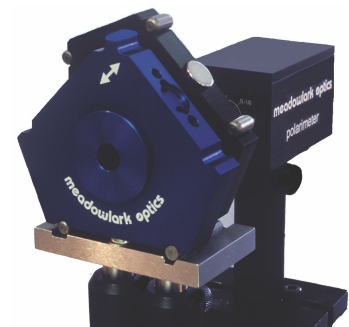
User-Friendly Operation

High Sensitivity

Optional

...

Eigenstate Calibration Set





PMI-2000 SPECIFICATIONS

Wavelength Range	450 – 1100 nm
Absolute Degree of Polarization Accuracy	≤ 1%
Measurable State of Polarization	Entire Poincaré Sphere
Measurement Frequency	10 Hz
Azimuth Accuracy	± 0.54°
Ellipticity Accuracy	± 0.008°
Standard Deviation for Ellipticity	< 0.0008 (no averaging)
Standard Deviation for Angle of Linear States	< 0.011° (no averaging)
Standard Deviation for S₁, S₂ of Linear States	< 0.0004 (no averaging)
Standard Deviation for S₃	< 0.0005 (no averaging)
Warm-up Time for Rated Accuracy	15 minutes for 20°C room temperature
Minimum Optical Power to maintain accuracy*	10 μW
Resolution of Stokes vector components	0.001
Re-calibration Process	3 minutes, performed as needed with Eigenstate Set
Input Aperture	2 mm diameter, knife edge
Input Fiber Connector	Optional, 11 mm diameter
Fiber Coupling Adaptor	Optional
Maximum Operating Temperature	35°C
Input Power Supply	12 V, 2A
Power Supply Ratings	Included 5 plugs for different regions
Optical Head Dimensions	55.88 mm (W) x 76.20 mm (H) x 69.34 mm (L)
Command and Control Interface	USB 2.0 Micro A

These specifications describe performance at 23 ± 3 °C ambient temperature.

*sensitivity can be increased to 1 mW by special request

PMI-2000 ORDERING INFORMATION

Wavelength Range	Version	Part Number
450 – 1100 (nm)	Visible	PMI – VIS
900 – 1700 (nm)	Near Infrared	PMI – NIR

STANDARD DEVIATIONS OF CALIBRATION STATE POLARIZATIONS

Stokes vector Rate (Hz)	S₁	S₂	S₃	Ellipticity	Orientation (degrees)
16.1	0.00038	0.00021	0.00042	0.00079	0.01077
20.8	0.00062	0.00057	0.00080	0.00055	0.01799
23.8	0.00053	0.00053	0.00092	0.00069	0.01520
26.6	0.00032	0.00028	0.00115	0.00057	0.00924

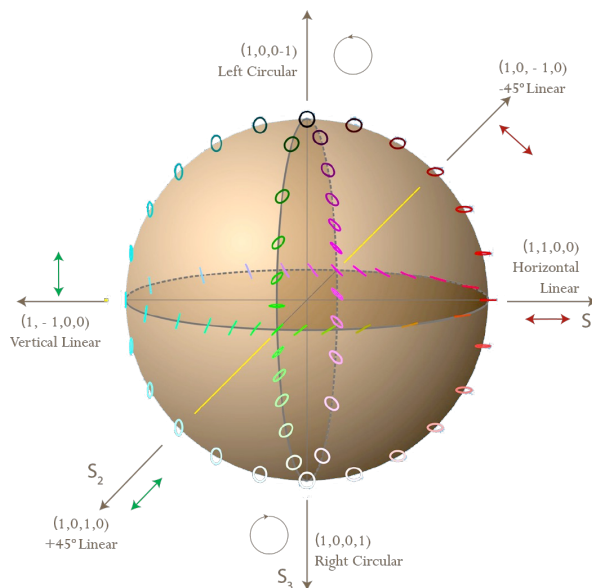


Optional Eigenstate Calibration Set

The polarimeter comes pre-calibrated with up to three wavelengths. The optional Eigenstate Calibration Set makes additional or recalibrations easy. Due to changes in environmental conditions and laboratory configurations, recalibration may be necessary. The PolarVIEW software gives step-by-step instructions in pictorial format. Basic knowledge of polarization optics isn't necessary when using the Eigenstate Set.

The Eigenstate Calibration Set produces six polarization eigenstates: linear polarized light at angles of 0, 90, +45, -45 degrees as well as circular right-handed and circular left-handed polarized light. These states are created by using a precision dichroic linear polarizer and a precision superachromatic quarter waveplate. The housings are CNC machined so that the accuracy of the angles is better than 1 arc minute. Pins on the housings mate to a v-groove and a flat groove in a quasi-kinematic fashion, while magnets provide holding force. This scheme facilitates precise, simple and fast indexing of the polarization eigenstates. Large arrows on the housing indicate the transmission axis of the polarizer and the fast axis of the waveplate for ease of use.

Poincaré Sphere showing six polarization eigenstates



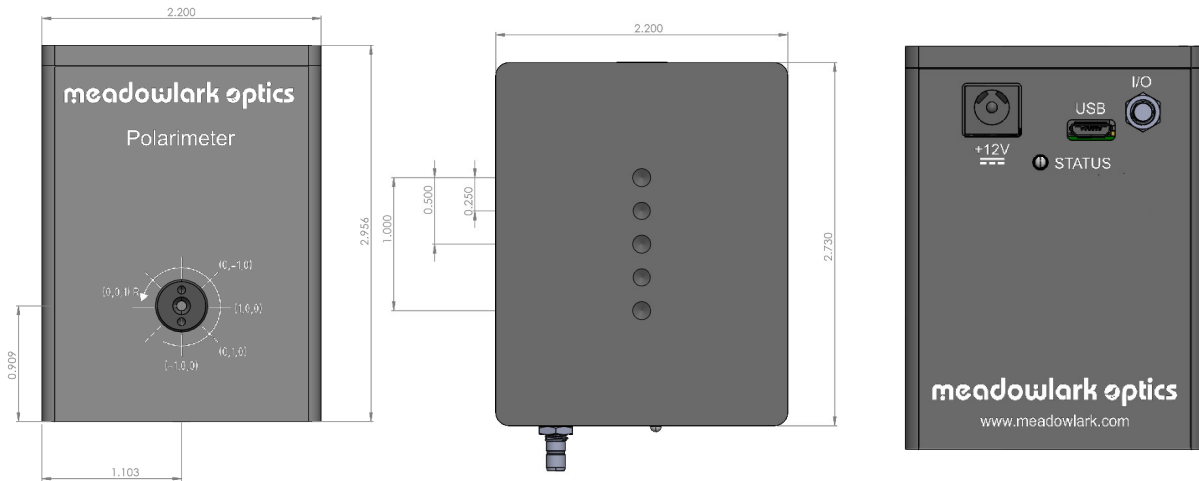
BROADBAND EIGENSTATE CALIBRATION SET SPECIFICATIONS	
Wavelength Range	450 – 1100 nm
Wavelength Range – IR	1100 – 1700 nm
Retardance Accuracy	$\lambda/50$
Thickness	1.10 ± 0.02 in (27.94 ± 0.51 mm)
Clear Aperture	0.197 in (5.0 mm)

ORDERING INFORMATION FOR CALIBRATION SETS (POLARIZER AND RETARDER)	
Item	Part Number
Broadband Eigenstate Calibration Set	ECS – VIS-NIR
Broadband Eigenstate Calibration Set – IR	ECS – IR

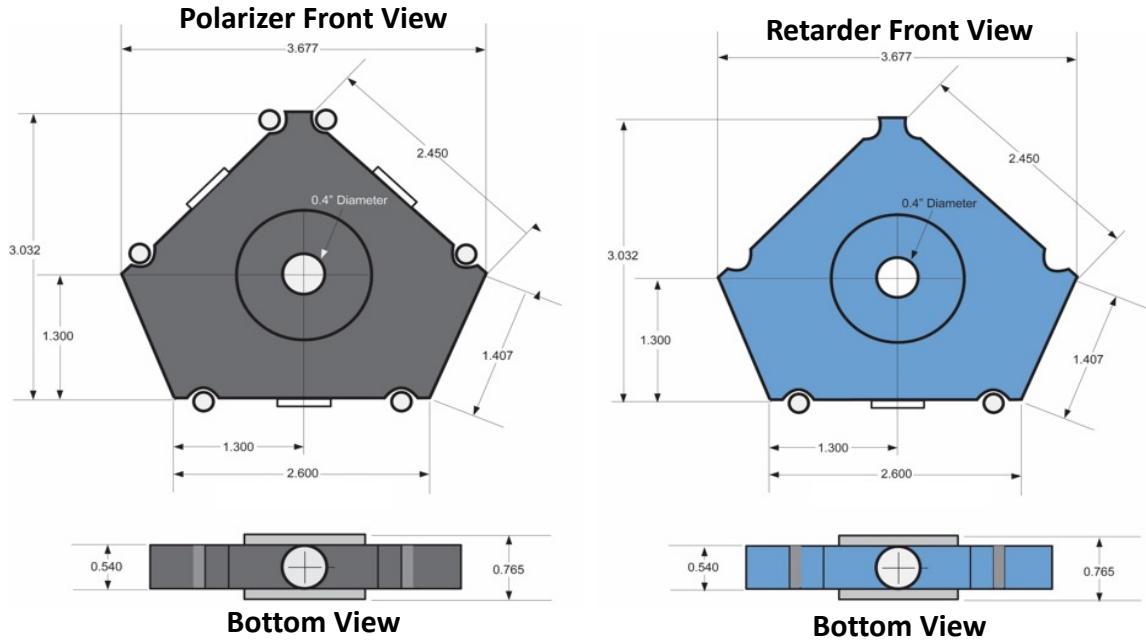
ORDERING INFORMATION FOR CALIBRATION RETARDERS OR POLARIZERS (INDIVIDUAL COMPONENTS)	
Broadband Eigenstate Polarizer (450 – 1700 nm)	EGP – GTP
Achromatic Eigenstate Retarder (450 – 1100 nm)	EGR – VIS-NIR
Achromatic Eigenstate Retarder – IR (1100 – 1700 nm)	EGR – IR



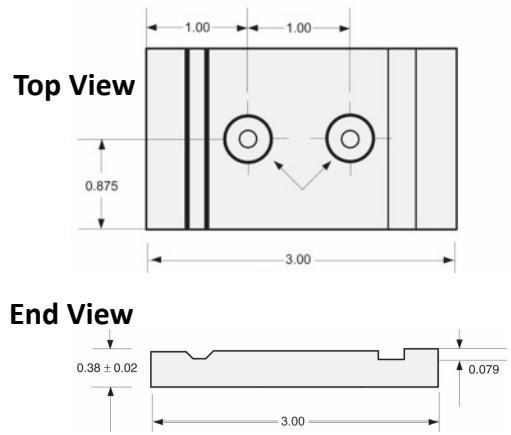
Polarimeter



Eigenstate Set



Eigenstate Baseplate



Calibration Sequence	Stokes Vector	SOP Description	Polarizer Orientation	Waveplate Orientation
Step 1	(1,1,0,0)	Horizontal		Removed
Step 2	(1,-1,0,0)	Vertical		Removed
Step 3	(1,0,1,0)	+45°		Removed
Step 4	(1,0,-1,0)	-45°		Removed
Step 5	(1,0,0,1)	Right Circular		
Step 6	(1,0,0,-1)	Left Circular		

Polarimeter calibration is greatly simplified by the Eigenstate Calibrator sequence outlined above