

The PEM-100 Controller performs many functions in the PEM photoelastic modulator system. Its primary function is to control the peak retardation of the photoelastic modulator optical head. It does this by providing a DC voltage signal to the electronic head which determines the transducer vibration amplitude and thus the strain amplitude in the optical element. A current feedback loop from the electronic head enables the controller to maintain stable peak retardation levels.

## FUNCTIONS

### Microprocessor-Based Control

- ◆ Control of peak retardation
- ◆ Automatic adjustment of modulator drive level based on user-supplied retardation and wavelength values
- ◆ Memory protection of controller setup parameters (even when unit is turned off)
- ◆ Inhibit mode for reducing retardation level to zero without turning off power
- ◆ Programmable memory for commonly used settings

### Digital Front Panel Settings & Control

- ◆ For user convenience, LCD display show which parameters and modes are in use.
- ◆ Display of retardation in user-selectable phase units (waves, radians, degrees)
- ◆ Selectable display of wavelength in nm,  $\mu\text{m}$ , or  $\text{cm}^{-1}$
- ◆ Precise digital setting of retardation
- ◆ Incremental increase of wavelength and retardation values
- ◆ Key selection of preset retardation values
- ◆ Enhanced low-retardation operation

### Computer Operation

- ◆ Improved RS-232 serial interface to computer with selectable baud rate
- ◆ PEM100 software provided for complete computer control including macro capabilities
- ◆ National Instrument LabView Driver provided for easy integration into larger experiments
- ◆ IEEE-488 interface available using an external converter with RS-232 port
- ◆ USB interface available using an external converter with RS-232 port
- ◆ Computer monitor of controller status
- ◆ Reference Signal
- ◆ 1f and 2f square wave reference signals
- ◆ Improved reference signal stability



## CONTROLLER OPERATION

The PEM-100 Controller displays modulator retardation amplitude in phase units (waves, radians, or degrees). It also displays the wavelength of light being used with the PEM, and the operating frequency of the attached PEM head. An error message displays if there is an error in the system. Both the wavelength of the light being used and the retardation amplitude must be input to the controller by the user.

Each controller is configured to operate with a particular model head. The controller may be used to operate similar heads without modification or adjustment; however this is not recommended as a 50/50 duty cycle cannot be guaranteed. Operation with a different type or frequency head will require factory adjustment and/or EPROM replacement.

**Setting the Retardation.** The desired retardation amplitude may be set from the front panel by: 1) using the number pad to type in the desired retardation value, or 2) placing the cursor over the value in the retardation field and use the up or down arrows to increment the value. The value of the retardation is displayed on the LCD.

**Setting the Wavelength.** The wavelength is set using the same procedure as described above. The factory default setting is 623.8 nm, the HeNe laser wavelength. The wavelength may be displayed in units of nanometers or microns, or the wave number ( $\text{cm}^{-1}$ ).

**Setting the Retardation Units.** The units of retardation (waves, radians, or degrees) displayed on the front panel may be selected using a menu to the left of the Retardation value. The LCD will display the units selected.

**Limit Condition Indicator.** An error message will be displayed on the LCD if there is a malfunction in the PEM system. This indicates an operating error due to either 1) operation outside the design limits, or 2) a defect in the PEM circuitry or optical head.

**Other Front Panel Displays.** The display panel also displays the operating frequency at either the 1F or 2F value.

### Serial Interface Operation

Serial interface operation by a computer must be initiated by

the computer through the RS-232 interface port. The complete set of operating and query commands is given in the PEM User Manual.

### Options

- ◆ Rack Mount Kit, select either Model RMO, standard full-rack width, or Model RMH, half-rack width
- ◆ RS-232 to IEEE-488 Converter (National Instruments™), Model GPIB-NI
- ◆ RS-232 to USB Converter, Model USB
- ◆ Special Length Controller-to-Head Cable, Model SLCH.

### ORDERING INFORMATION PEM-100 Controller

Model PEM-100, includes manual on CD, controller/head cable, and power cord, and PEM-100 software. Shipping Weight, 6 kg (13 lbs)

## SPECIFICATIONS

### PERFORMANCE CHARACTERISTICS

CHARACTERISTIC	SPECIFICATION	REMARK
FREQUENCY		
Operating Frequency	20 kHz to 84 kHz	Fixed Frequency, determined by head attached
Display Resolution	1 Hz or 0.001 kHz	
Display Accuracy	± 1 Hz at 25° C	
Duty Cycle, f and 2f	50% ± 1%	

### 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	6 kg (13 lbs)	Modulator Head Assembly not included
Actual Weight	2.7 kg (6 lbs)	
Height	108.27 mm (4.27 in.)	
Width	214.12 mm (8.43 in.)	
Depth	330.2 mm (13.0 in.)	

### ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SPECIFICATION	REMARK
Power Supply	100 - 240 VAC 50/60 Hz	Universal
Power Consumption	27W	Maximum

### EMC & SAFETY

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