Gigahertz-Optik

Optometers, Instruments Page 15

X9

X93 Hand-held Laser Power and Laser Stray-light Meter

- © Hand-held Single Channel Laser Power Meter
- © Low Profile Detector 100 mW max.
- © Compact Integrating Sphere Detector 500 mW max.
- © 7 mm dia. Aperture Laser Stray-light Detector
- © Wavelength Range from 400 to 1100 nm
- © Simple Wavelength Selection
- © CW Snapshot Hold Function
- © Peak Hold Function
- © Economical Price
- © Battery Operation
- © RS232 Interface

Laser Power Measurement

Lasers with low to medium power levels in the wavelength range from 400 to 1100 nm are well established in metrology applications. To quantify laser power three different measurement geometries exist.

Collimated Lasers

Lasers with quasi-parallel light bundles are typically measured using a flat-field detector with an active area larger than the laser beam diameter. There is some measurement error risk with flat field detectors due to polarization effects, re-reflection from the detector surface or windows and misalignment of the beam on the detector.



Non-collimated Lasers

Lasers with divergent light bundles (beams), such as laser diode array bars, are difficult to measure with a flat-field detector because of the different angles of incidence. The power output of these lasers is typically measured with detectors combined with an integrating sphere to collect all incoming radiation independent of the angle of



incidence.

Due to its unique design and the multiple reflections produced, integrating spheres offer:

- High attenuation permitting higher power measurements
- Reduction of polarization effects inaccuracies as found with flat-field detectors
- Flexibility with less aiming problems since sphere port diameter can be enlarged by increasing the sphere diameter to allow measurement of larger diameter beams

Laser Stray-light

Although very useful, laser radiation can pose a health risk to the human eye. Even stray-light from lasers may be hazardous due to the typically high power levels found. The EN 60825 standard describes the risk and measurement methods for risk classification. Laser stray-light can be assessed with the use of a detector head with a 7 mm dia. free aperture to mimic the open pupil. **X93 Meter**

Besides it's precise measurement capability the X93 meter's most outstanding feature is its easy handling. To measure, the user simply switches on the meter and selects the wavelength corresponding to the laser wavelength. The LCD characters are 9 mm high for easy viewing. The X93 is a compact handheld battery operated instrument.

LP-9901 Flat Field Detector

A 7 mm diameter aperture makes this low profile design detector useful for laser power and laser stray-light measurement over a useful wavelength range from 400 to 1100 nm. The wavelength dependent laser power measurement range is 1 μ W to 100 mW with 0.02 resolution at 633 nm.

The wavelength dependent laser stray-light measurement range is 2.5 μ W/cm² to 250 mW/cm² with 0.05 μ W/cm² resolution at 633 nm.



LP-9910 Sphere Detector

With a free measurement aperture of 12.7 (0.5 in.) and an acceptance angle of +/- 45° this detector is well suited to measure collimated and noncollimated radiation beams from lasers, laser diodes, laser diodes with lens attachments and narrow beam diverging light emitting diodes. It's high precision Siphotodiode with a compact 50 mm diameter integrating sphere offers a useful wavelength range from 400 to 1100 nm with a power range from 0.5 W to 100 mW with 0.01 μ W resolution at 633 nm.



Traceable Calibration Calibration is traceable to the



Custom Label:

All meters in the X9 family are ready made for custom design and labeling. Customization may include the meter front panel, function/mode set-up, detector heads, manuals and calibration certificates. Contact the factory for details and applications assistance.

Operation

The X93 is simple to operate. To measure, connect the detector and switch on the meter.

CW Measurement

CW mode is used to measure continuous DC or AC signals.

Power/Stray-light Meas.

Laser power in mW must be selected if the laser beam under fills the detectors area.

Laser stray-light in mW/cm² must be selected if the laser beam over fills the detectors area.

Auto/Manual Gain Ranging

Select manual ranging when the power range in production control applications stays at the same level to avoid time delays in auto-ranging mode.

Peak Hold Measurement

Peak Hold mode is used to search for "hot-spots" light intensities. The peak intensity measured is frozen on the display.

Stop/Run Function

Current reading can be 'frozen' by pressing 'stop' button.

X93 Specifications & Ordering Information

Specifications: X93 Meter

Signal Inpu	t							
Detector Input		Photo with n integr	Photocurrent to voltage converter amplifier with following voltage to voltage amplifier (x10). 7 decade stepped gain ranges with max. gain signal values from 200.0 μ A to 200.0 pA. Automatic range switching. 12 bit ADC with up to 14 bits at longer ntegration times.					
Signal Processing A/D converter with 20 ms time interval. 500 ms integration through averaging of multiple measurements.								
Frequency Range S		Signa	gnal conversion from 0.166 Hz to >300 MHz					
Detector Connector 9 pin MDSM9 socket .								
Range Spec	ification	S						
Range (A/V)	Max. Iı Valu	nput Je	Slew-Rate (10 - 90%)	Error (with offset compensation) 1 year, $23^{\circ}C \pm 5^{\circ}C \pm (\% \text{ of reading } +\% \text{ of range})$,		Permitted Detector Capacitance		
1x10-4	200.0) µA 30 ms		0.2 % + 0.05 %		2 nF		
1x10-5	1x10-5 20,00 µA		30 ms	0.2 % + 0.05 %		2 nF		
1x10-6	2,000	μA	30 ms 0.2 % + 0.05 %		2 nF			
1x10-7	1x10-7 200,0 A		30 ms	0.2 % + 0.05 %		10 nF		
1x10-8	1x10-8 20,00 nA		30 ms	0.2 % + 0.05 %		10 nF		
1x10-9	2,000	nA	30 ms	0.2 % + 0.05 %		10 nF		
1x10-10	1x10-10 200,0 pA		30 ms	0.2 % + 0.05 %		10 nF		
Function								
Parameter S	ettings	Ret	ention of the last	settings in continuous memory. 3 function buttor				
Measuremer	nt Quanti	ty Am play	peres calibrated y the radiant pow	with DKD calibrated current source. Current signer in mW or the irradiance in mW/cm ² . Calibration	nal multiplied with n factors stored in	n calibration correction factor to dis- n meter.		
General								
Display		6 0	6 character LCD. Character height 9 mm. Indication of appropriate measurement quantities, battery low, peak, stop					
Operating Te	emperatu	ire 5 t	to 40 °C (41 to 104 ° F) (75 % rel. H, non-condensing). Storage Temperature: 0 to 50°C (32 to 122 °F).					
Dimensions/Weight		12	120 x 65 x 22 mm / 150 g (4.7 x 2.6 x 0.9 in / 0.33 lb).					
Power		9 V era	9 V one-piece battery. Operation time about 100 h. Operation from a AC plug-in power supply 230V/50 Hz on option, erases battery operation.					
Interface			` ``		Spectral Sens	itivity		
RS232 9600 Baud, 8 8D, 1S,N. 8 pin plug Hirose, type 3260-8S1. Power supply operation								
X93 with Detector Head LP-9901 and LP-9910								
X93 with LP	-9901-4				sivity			
tvp. max. value*		30	0 mW at 900 nm,	mW at 900 nm, 100 mW at 633 nm				
tvp. max. resolution*		0.	0.00002 mW*					
wavelength range			400 – 1100 nm, calibrated in 10 nm increments					
measurement aperture		re 7	7 mm diameter					
dimensions		8	8 mm height, 37 mm diameter, handle length 100 mm			600 700 800 900 1000 1100		
X93 with LP-9910-4						LP-9901		
typ. max. value*		1(100 mW*					
typ. max. resolution*		0.	0.00001 mW*					
wavelength range		4(la	00 – 1100 nm, c ser wavelength**	alibrated in 10 nm increments and additional	Alivisu			
measurement aperture		re 12	2.7 mm diameter	\backslash				
dimensions		50	50 mm sphere diameter					
*) values ma 594, 612, 63	ay vary fro 3, 647, 10	om unit 064 nm	to unit **) 441, 4 1	58, 473, 476, 488, 496, 514, 532, 543, 568,	0			
					400 500	600 700 800 900 1000 1100 wavelength (nm)		

LP-9910

Ordering Information				
X9 3	Optometer with handbook and battery. Detector calibration data stored in memory			
LP-9901-4	Low-profile detector head. Calibration in mW from 400-1100 nm in 10 nm increments and calculated irradiance in mW/cm ² . Calibration certificate. ITT-type connector			
LP-9910-4	Integrating sphere detector head. Calibration in mW from 400-1100 nm in 10 nm increments. Calibration certificate. ITT-type connector			
X9Z-01	RS232 interface cable to connect the X9 meter with 9 PIN SUB-D PC standard socket			
X9Z-02	External AC power unit for the X9 meter including meter modification (cancels battery operation)			
BHO-05	Hard case to carry and store the X9 3 with one LP-9901-4			