X97 Hand-held Irradiance Meter

- © **Hand-held Single Channel Irradiance Meter**
- © **Wide Range of UV-VIS-NIR Polychromatic Irradiance Detector Heads**
- © **Measurement of DC and AC Signals**
- © **Peak Value Hold Function**
- © **Signal Range from 0.1 pA to 200 μA with 7 Gain Ranges**
- © **Automatic or Manual Gain Range Selection**
- © **Easy to Use**
- © **Offset Compensation**
- © **Compact Size**
- © **Battery Operation**
- © **RS232 Interface**

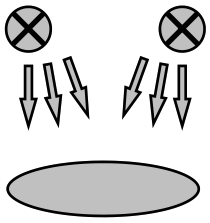


Optical Radiation
Optical radiation describes that segment of electromagnetic radiation from λ=100 nm to λ=1 mm. Optical radiation can be measured using quantities related to radiation physics (radiometry), light engineering (photometry), photobiology, plant physiology and others. The application determines which quantities are appropriate.

Radiometry
Radiometry involves the metrological evaluation of optical radiation in physical radiation measurement quantities.

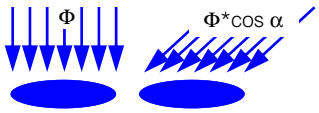
Polychromatic Radiometry
The most important aspect of radiometry is that radiation intensity is observed independently of wavelength. This distinguishes absolute radiometry from the actively weighted quantities such as those used in photometry, photobiology, plant physiology, etc., which is effective radiometry.
For this reason, radiation detectors for radiometric measurements covering a broadband wavelength range, like UV-A, VISIBLE for instance, must have a flat spectral sensitivity shape within the specified wavelength range.
Unfortunately only "thermal detectors" have this property. But their wide spectral bandwidth and low sensitivity prohibit their use in many applications so filter-corrected semiconductor detectors are more commonly used.

Irradiance E
Irradiance refers to the radiant power impinging on a particular surface from one or more sources of optical radiation. Irradiance is measured horizontally and vertically in the units of watts per square meter (W/m^2).



Irradiance is the most commonly measured quantity in optical radiation measurement applications. Due to ageing of the radiation source, irradiance levels need to be constantly checked if a minimum irradiance value needs to be maintained.

Cosine Field of View
When the incident optical radiation is not parallel, which in practice is normal, a cosine diffuser must be used to correct the measurement geometry for irradiance detector heads.

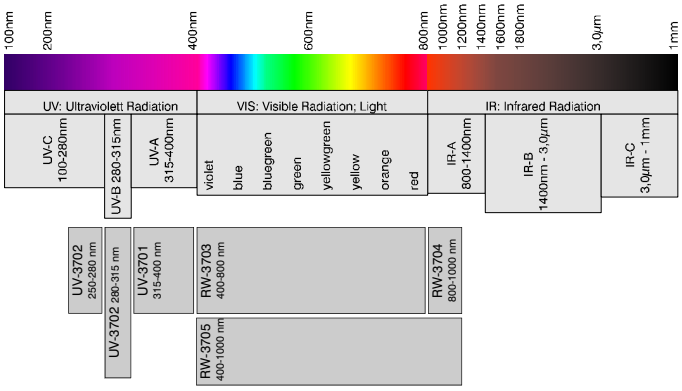


Polychromatic Irradiance Detector Heads
Gigahertz-Optik manufactures a wide range of detector heads for polychromatic irradiance measurements with respect to a defined spectral response function. Detector heads are offered for the ultraviolet range (UV-A, UV-B, UV-C) as well as for the visible and near infrared range.
One or more of these detector heads can be combined with one of Gigahertz-Optik's broad range of optometers.

X97 Meter
For end-users whose application requires just one detector head and does not need multimeter level functional ability in their optometer, the X97 ("Xnineseven") Irradiance Meter is an economical alternative.
Besides it's precise measurement capability the X97 meter's most outstanding feature is its easy handling. To measure, the user simply connects the detector head and switches on the meter. The LCD characters are 9 mm high for easy viewing. The X97 is a compact handheld battery operated instrument.

Traceable Calibration
Calibration is traceable to the ISO EN 17025 accredited part of Gigahertz-Optik's Calibration Laboratory for Optical Radiation Quantities. Calibration includes detector irradiance sensitivity and an individually measured plot of spectral sensitivity with the calibration certificate.

Custom Labeling:
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 assistance.



Operation
The X97 offers simply operation. To measure, switch on the meter with the connected detector.

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

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' on display by pressing 'stop' button.

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.

X9$_7$ Specifications & Ordering Information

Specifications: X9$_7$ Meter

Signal Input	
Detector Input	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 µA to 200.0 pA . Automatic range switching. 12 bit ADC with up to 14 bits at longer integration times.
Signal Processing	A/D converter with 20 ms time interval. 500 ms integration through averaging of multiple measurements.
Frequency Range	Signal conversion from 0.166 Hz to >300 MHz.
Detector Connector	9 pin MDSM9 socket.

Range Specifications

Range (A/V)	Max. Input Value	Slew-Rate (10 - 90%)	Error (with offset compensation) 1 year, 23°C ±5°C ±(% of reading + % of range),	Permitted Detector Capacitance
1x10-4	200.0 µA	30 ms	0.2 % + 0.05 %	2 nF
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	200,0 A	30 ms	0.2 % + 0.05 %	10 nF
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	200,0 pA	30 ms	0.2 % + 0.05 %	10 nF

Function	
Parameter Settings	Retention of the last settings in continuous memory. 3 function buttons.
Measurement Quantity	Amperes calibrated with DKD calibrated current source. Current signal multiplied with calibration correction factor to display irradiance in mW/cm^2.

General	
Display	6 character LCD. Character height 9 mm. Indication of appropriate measurement quantities , battery low, peak, stop
Operating Temperature	5 to 40 °C (41 to 104 ° F) (75 % rel. H, non-condensing). Storage Temperature: 0 to 50°C (32 to 122 °F).
Dimensions/Weight	120 x 65 x 22 mm / 150 g (4.7 x 2.6 x 0.9 in / 0.33 lb).
Power	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	
RS232	9600 Baud, 8 8D, 1S,N. 8 pin plug Hirose, type 3260-8S1. Power supply operation recommended for remote control.

X9$_7$ with Detector Head

Model No:	Spectral Response Function	Measurement Range in mW/cm^2*	max. Resolution in mW/cm^2*
UV-3701-4	UV-A (315-400 nm)	0.0005 to 1700	0.00001
UV-3702-4	UV-B (280-315 nm)	0.001 to 10000	0.00002
UV-3703-4	UV-C (250-280 nm)	0.0005 to 2500	0.00001
UV-3704-4	UV-Erythema	0.0005 to 1700	0.00001
UV-3706-4	Bilirubin	0.0005 to 100	0.00001
UV-3708-4	ACGIH (ICNIRP)	0.0005 to 5000	0.00001
UV-3709-4	Blue-Light Hazard	0.0005 to 500	0.00001
UV-3710-4	UV-A (320-400 nm)	0.0005 to 2000	0.00001
UV-3711-4	UV-B (280-320 nm)	0.0015 to 1000	0.00003
UV-3716-4	UV-A (305-400 nm)	0.0005 to 2000	0.00001
UV-3717-4	UV-A (315-400 nm)	0.0005 to 1700	0.00001
RW-3701-4	BLUE (400-500 nm)	0.0005 to 100	0.00001
RW-3702-4	RED (700-800 nm)	0.0005 to 100	0.00001
RW-3703-4	VISIBLE (400-800 nm)	0.0005 to 100	0.00001
RW-3704-4	NIR (800-1000 nm)	0.0005 to 100	0.00001
RW-3705-4	VISNIR (400-1000 nm)	0.0005 to 50	0.00001

*) typical values are calculated based on current measurement capability and may be limited by operating temp., power density and other factors

Ordering Information	
X9 7	Optometer with handbook and battery. Calibration data of the detector ordered with the meter are stored in memory.
Detector Head	One of any Gigahertz-Optik irradiance detector heads with ITT type (-4) connector.
X9Z-01	RS232 interface cable to connect the X9 meters with 9PIN SUB-D PC standard socket.
X9Z-02	External power unit for the X9 meters including the meter modification. Battery operation will be canceled.
BHO-04	Hard case to carry and store the X9 7 with one 37 type detector.