

Meters • Scotopic Photopic

SL-3101



Measures Illumination According to the Dark and Light Luminous Efficiency Curve of the Eye

Applications

- Architectural Lighting Design
- Lighting Efficiency Measurements
- Energy Efficiency Designing
- Scotopic Lighting Research

Features and Benefits

- 2.6 Million Dynamic Range
- On-board Calculations for S/P Ratio, Perceived Brightness and Visual Effectiveness
- NIST Traceable for 12 Months
- Selectable Units
- 99.997% Linearity

The SL-3101 is a portable illumination meter. It measures spectral response following the CIE scotopic and photopic action spectrum. This meter is designed to have a spectral response like that of the human eye's visual response in the photopic and scotopic region.

This meter uses a ratio of S/P to determine lighting levels measuring both Scotopic and Photopic light levels giving an accurate measurement of brightness as perceived by the human eye.

The human eye has three distinctive regions of response. The first region is the response of the eye under typical lighting conditions (photopic) defined as intensities greater than about 0.1 Lux. The second region is a transitional region known as the Purkinje region defined as intensities between about 0.01 and 0.1 Lux. The third region is the dark adapted region of the human eye (scotopic) defined as intensities between about 0.01 and 0.0001 Lux. Intensities less than 0.0001 Lux are undetectable with the human eye. These three region are distinctive in that the human eye has different spectral response for each region of intensity. The scotopic spectral luminous efficiency curve peaks at 507nm and it is normalized to 1 at that wavelength. The power-like unit of brightness-sensation-producing ability of light is lumen [lm]. The relationship between effective Watts and scotopic lumen is now assumed to be 1754 lm/W. For example, 507nm monochromatic radiation flux of 0.0001W would carry the scotopicluminous flux of 0.1754 lm. Please note, that photopic spectral luminous efficiency as well as the conversion factor between Watts and photopic lumens differ from their scotopic counterparts.

The SL-3101 detector has a teflon diffuser assuring an angular response close to the cosine function (Lambertian response). It is very important in order to measure accurately radiation flux from extended sources or from sources positioned at an angle to the axis of the detector.

The SL-3101 Kit Includes:

- Meter
- Scotopic/Photopic Detectors
- Custom Stand for 2 Sensors
- Hard Carrying Case with Storage for Meter and 2 Sensors
- NIST Traceable Meter Calibration Certificate



The SL-3101 detector is calibrated by transfer from a NIST traceable quartz-halogen standard lamp. The spectral irradiance from the lamp, at the nominal distance of 50cm, is cross-multiplied by the photopic luminous efficiency function and the effective power of the radiation is converted to lm/m^2 (lux) using a conversion factor of 1754 lm/W . The SL-3101 detector is then exposed to this radiation and adjusted accordingly.

The basic radiometric uncertainty of this calibration is under 5%. The detectors require yearly re-calibration.

Specifications

Spectral Response	Follows CIE Scotopic Spectral Luminous Efficiency Curve (400-600nm) Figure 1
Angular Response	5% for Angles $<60^\circ$, Figure 2
Range	200,000 Scotopic mLux, 20,000 mft-cd, 120,000 $\mu\text{W}/\text{m}^2$
Display Resolution	1 mLux, 0.1 mft-cd, 1 $\mu\text{W}/\text{m}^2$
Operating Environment	32 to 120 °F (0 to +50 °C) No Precipitation
Cable	1ft, Retractable to 5 ft (0.3m/1.5m)
Diameter	1.6" (40.6mm)
Height	1.8" (45.8mm)
Weight	7.1 oz. (200 grams)

Ordering Information

SL-3101	Scotopic Photopic Meter
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References

- ¹ "American National Standards: Nomenclature and Definitions for Illuminating Engineering" (1981). Illuminating Engineering Society, New York
- ² Smith, Warren J. "Modern Optical Engineering", McGraw-Hill, New York (1966).

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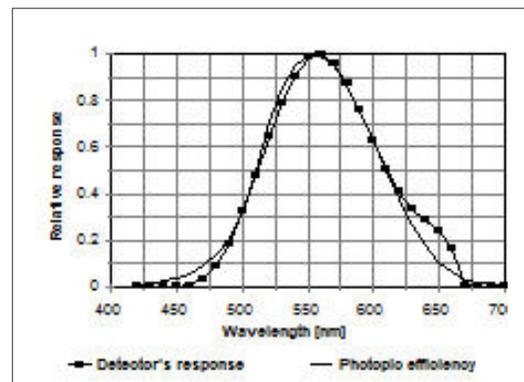


Fig. 1. SL-3101 Spectral Response

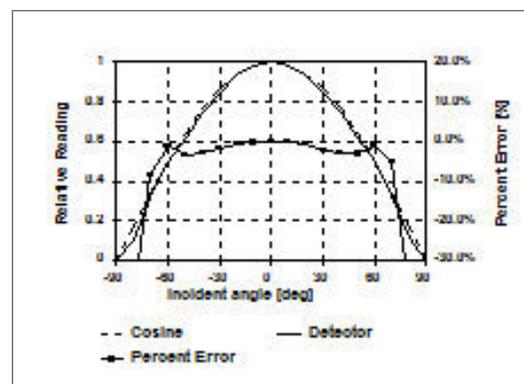


Fig. 2. SL-3101 Angular Response