

Spectro- Radio Meter Light Measurement System

Model 2600- (Upgraded Model of CDS 2100)-195 (76”)

Labsphere Inc, USA

Application: Capable of measuring variety of light sources including: .

- LED Luminaires, LED Street Lights, LED Bulbs, LED Solar Street Lights, LED Solar lantern, LED arrays & LED packages
- General lighting, Fluorescent Tubes, CFLs, High Intensity Discharge Lamps
- Indicator Lamps
- Miniature Lamps etc.

Measuring Parameters :

- Total Spectral Flux (Watts/nm)/ Radiant Flux (Watts) / Luminous Flux (Lumens)
- Color (CCT)
- Color Rendering Index (CRI)
- Chromaticity co-ordinates including **Chrom x, Chrom y, Chrom u,Chrom v, Chrom u’& Chrom v’**
- Color Ellipses and color tolerance Quadrangles
- Lamp Performance vs. Time
- Peak Wavelength, Center Wavelength, Centroid and Dominant Wavelength
- Spectral Purity
- Full width half max
- Optical parameters of LEDs/LED engines as function of temperature
- I, V Measurement
- Luminous Efficacy

Key Features :

- System comply with **BIS 16106:2012 and IESNA-LM-79** for testing of LED based products
- Comply with CIE-84 for flux measurement of all other traditional light sources
- The Spectral Flux Calibration Lamp comply with ISO 17025 or calibrated by ISO 17025 certified lab

System Components

1. **Light measurement integrating sphere:**

Designed per **BIS 16106:2012, IESNA-79 & CIE 84 recommendations,**

Capable of performing total flux (4 π) and forward flux (2 π) measurements

Sphere nominal diameter shall be 76" or 2m.

Sphere Coating: High reflectance diffuse white coating. Spectral range 300-2400nm and spectral reflectance $\geq 97\%$ in the visible spectrum (400-800nm)

Sphere coating is functional upto

100⁰C Mounted on robust rails

Separate Carriage for Each hemi-sphere of the Integrating Sphere

Dia of the port – 24" for 2 π measurement

Ablity to mount two independent detectors. The detector has near cosine response Port for temperature sensor.

Port for Auxiliary Correction Lamp " 1" or

2.5cm Lamp mounting bracket.

Port reducers

2. **Spectral flux calibration lamp standard:**

Carefully screened, seasoned spectral Flux standard calibrated under the **guidelines recommended by the IESNA (Illuminating Engineering Society)**

with the highest degree of accuracy. The calibration is in the range of 350-1050

nm for total spectral flux and certified by ISO 17025 certified Lab

Tungsten- Halogen Lamp, rated life >1000

hrs. Luminous Flux : approx. 1400 lumens

Operating Current : ≈ 2.680

A. Nominal CCT : 3000K

Uncertainty for total luminous flux: 1%.

Calibration uncertainty for CCT < 7degK.

3. **Power supply** : Preset, constant current and highly regulated power supply for the operation of Calibration Lamp & Auxiliary Lamp, CE Compliance :

Current Accuracy: +/- 0.1%

Current Stability: +/- 0.1%

Regulated output current: Lamp operating current +/-

0.1% Power Requirements: 110./220 VAC, 50/60 Hz

Timers and display to track lamp operation time and display the lamp hours

4. **TE cooled CCD array spectrometer** :

CCD array: Hamamatsu S7031-1006 provide lower stray light & High S/N ratio, exceptional signal processing speed and improved efficiency in UV & short NIR

Wavelength accuracy ± 0.4 nm or better

The base design : Crossed Czerny-Turner spectrograph with a top of the line electrically-cooled, back-thinned illuminated CCD detector.

Integrated shutter for real-time dark correction.

Detector TE Cooled: 1044 x 64 CCD (back thinned) Spectral Range: 350-1050 nm

Resolution: 1.5 FWHM

Integration Time: 10 ms - 60 s (with software auto exposure), capability to set exposure time in the range 8 ms- 3 minutes.

Stray Light Broadband: $<10^{-4}$ at 400nm w/ III A source Stray Light LED/laser: $<10^{-5}$ at 500nm w/633 nm laser Focal Length: 100 mm

Speed: 0.1 scans /sec

Dynamic Range (single scan): 30000:1 or better Spectral Sample Interval: 0.25nm

Mechanical Shutter (controlled by software for real time dark correction) AD Converter: 16 bit , PC Interface: USB 2.0

Pixel size: $24.576 \mu\text{m}^2$

Pixel well depth: 1000 Ke-

Cooling: 10 +/- 0.05 C

TE Temp Drift: +/- 1

C Linearity: +/- 0.5%

Sensitivity: ~ 0.065 counts / e-

Quantum efficiency: 90% peak; 65% at 250 nm

5. **Integral-Cube (10 cm x 10 cm x 4 cm) System control software:**

The software is capable of performing complete characterization of the light sources, .

Total spectral flux (Watts/nm)

Total radiant flux (Watts)/ luminous Flux (lumens) Spectral intensity (Watts/sr-nm)

Averaged luminous intensity (lumens/sr)/ radiant intensity(Watts/sr) Spectral irradiance (Watts/cm²-nm)

Irradiance (Watts/cm²) /

Illuminance Dominant wavelength

Spectral purity

Correlated color temperature

Peak wavelength

Color rendering index (CRI)

Chromaticity coordinates

Electrical, thermal

Temporal (W/s, lm/s, CCT/s...) etc....

6. Single Channel Power Analyser:

VOLTAGE RANGE (MEASURABLE) : 2000Vpk (850Vrms) max. continuous

INTERNAL CURRENT RANGE (MEASURABLE) : 150Apk (30Arms) max.

continuous

EXTERNAL CURRENT TRANSDUCERS (MEASURABLE) : 35Vpk (15Vrms)

max. continuous

VOLTAGE AND CURRENT ACCURACY : Base accuracy <0.08%. Current and voltage accuracies specified to less than 1mArms and 1Vrms respectively (<0.2%)

FREQUENCY MEASUREMENT ACCURACY :

0.005% CREST FACTOR ACCURACY

V: (50mV + 0.01% of pk rng)/RMS value

A: (50uA + 0.01% of pk rng)/RMS value

HARMONIC ACCURACY (VOLTAGE & CURRENT) : 0.02%

WAVEFORMS : Actual, Peak Capture, Distortion, and Glitch capture

LINE SWITCH : Max Open Voltage: 720Vpk (480Vrms) Max Surge Current:

TBD Max On Current: 10Arms Turn On Phase: 1° resolution

DIGITAL INTERFACES : GPIB (IEEE-488), USB (host and device), RS-232,

Digital IO, Ethernet* (***planned**)

7. Programmable AC Power Supply:

Max. Power	1.5KVA
Voltage Range	150V / 300V / Auto
Voltage Accuracy	0.2% + 0.2% F.S.
Voltage Resolution	0.1V
Voltage Distortion* ¹	0.3% @ 50 / 60 Hz, 1% 15-1KHz (Typical)
Voltage Line Regulation	0.1%
Voltage Load Regulation* ²	0.2%
Max. Current(r.m.s)	12A / 6A (150V/300V)
Max. Current(Peak)	72A / 36A (150 V/300V)
Frequency.. Range	DC , 15 – 1 KHz
Accuracy (Frequency)	0.15%
Input Voltage Range	90 – 250V
Input Frequency Range	47 – 63 Hz
Input Current	21A Max. (22A Max. @ 90V)
Power Factor* ³	0.98 Min.
Operating Temperature	0 – 40 ⁰ C

Note*¹ : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.

Note*² : Load regulation is tested with sine wave and remote sense.

Note*³ : Input power factor is tested on input 220V, full load condition.