labsphere®

illumia® pro

LEADING THE WAY
in Light Measurement Systems

LIGHT MEASUREMENT SYSTEMS

THERMAL CONTROL SYSTEMS

WIDE DYNAMIC RANGE SPECTROMETERS

SOLUTION BASED PROFESSIONAL SOFTWARE

www.labsphere.com/illumia

Welcome to Labsphere!

This Product Guide is intended to give you an introduction and overview of Labsphere light measurement products and services.

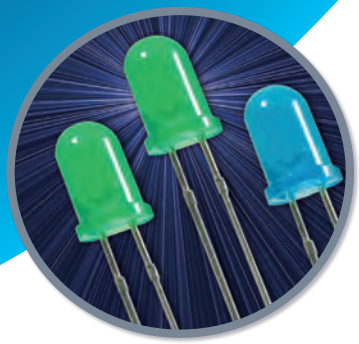
Labsphere's Light Measurement Systems offer a turn-key solution for R&D, production and quality assurance. They feature systems with the highest accuracy and dynamic range available today.

Labsphere offers three Light Measurement Series –

illumia®lite illumia® illumia®pro

We invite you to visit our website at www.labsphere.com to view detailed data sheets for each product as well as our online library of technical articles and application notes.

We look forward to earning your business!



HISTORY

Since 1894, when Richard Ulbricht built the first working integrating sphere, the integrating sphere photometer has been used to measure the total luminous flux of light sources.

Today, the name Labsphere has become synonymous with the integrating sphere while, total radiant flux, luminous flux, and associated color parameters are measured and applied for the determination of lamp lumen efficacy, color rendering, appearance, optical performance and quality.

With applications that include test and calibration in general lighting, automotive lighting, fiber illuminators, LCD backlighting, solid state lighting, LEDs, architectural lighting, lasers and laser diodes, Labsphere integrating sphere photometers, radiometers and spectrometers have become a staple tool in light test labs and industry throughout the world.

Labsphere light measurement systems are designed to minimize spatial distribution sensitivity associated with directional and divergent light sources and provide easy to use systems designed in concert with industry measurement standards.

Labsphere has created thousands of light measurement systems from universal bench top applications to fully integrated automated production line systems with customers ranging from universities and innovative start ups to the world leaders in general and automotive lighting industry and government organizations.

Our customers rely upon our extensive knowledge and experience to provide high-end products that address their specific requirements.

ILLUMIA®

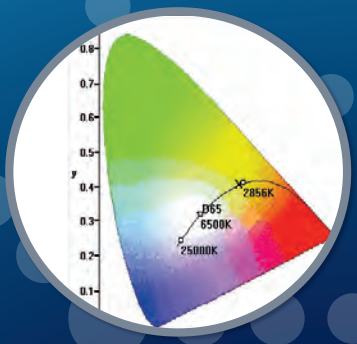
illumia® Light Measurement Systems are designed to minimize spatial distribution sensitivity associated with directional and divergent light sources and provide easy- to-use systems designed in concert with industry measurement standards.

All systems are certified by our calibration laboratory team with extensive experience in performing application specific calibrations, all of which are traceable to the National Institute of Standards and Technologies (NIST).

Labsphere's Spectraflect® sphere coating is a proprietary, high-reflectance coating that is useful over a wide wavelength range. This non-toxic material is near-Lambertian in character and easily applied by spray to any substrate. Spectraflect® is a specially formulated barium sulfate coating which produces a nearly perfect diffuse reflectance surface. Spectraflect® is generally used as a reflectance coating in the UV-VIS-NIR region and is most effective over the wavelength range from 300 to 2400 nm. The range can be stretched to 185 nm before binder absorption peaks begin to appear.

The coating is opaque with reflectance up to 98% over the wavelength range from 400 to 1100 nm. Spectraflect® is thermally stable to approximately 100°C.

illumia® Light Measurement Systems are easily customized with a choice of three high-speed spectrometer series and a variety of interchangeable light measurement accessories. Achieve spectral results in milliseconds and conform to national standard measurement geometries.



FEATURES INCLUDE:

- **Wide Dynamic Range which Allows a Single Sphere to Measure a Wide Range of Light Levels**
- **NIST Traceable Standards for In-house Recalibration**
- **Spectral Results in Milliseconds**
- **Spectraflect® Interior Sphere Coating**
- **Conforms to National Standard Measurement Geometries**

MEASURE:

- **Total Spectral Flux**
- **Luminous Flux**
- **Radiant Flux**
- **Chromaticity**
- **CCT & CRI**
- **Peak Wavelength**
- **Dominant Wavelength**
- **I, V and Luminous Efficacy**
- **And Many More Measurements**

***NVLAP is in full conformance with the standards of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), including ISO/IEC 17025 and Guide 58.**

labsphere®
A HALMA COMPANY

	illumia®lite	illumia® 600/610	illumia® 1100/2100	illumia® 30x0	illumia®pro 500
	see brochure for product details		*see brochure for product details*		
Luminous Flux Measurement	✓	✓	✓	✓	✓
Spectral Measurements	✓	✓	✓	✓	✓
Accuracy at Lower Light Levels	++	++	+++	+++	++
Sphere Sizes 25cm dia to 3m dia		✓	✓	✓	✓
Absorption Correction Lamps	✓	✓	✓	✓	✓
Calibration Lamps		✓	✓	✓	✓
Dynamic Range	++	+	++	+++**	+
Single Scan Dynamic Range	++	+	++	+++	+
Low Stray Light	+	++	+++	+++	++*
Continuous Measurements	+	+	+	+++	++
Speed of Minimum Exposure Time	+++	+++	+	++	+++
Sensitivity	+	++	+	+++	++
Maximum Exposure Time	+	+	+++	++	+
Low Level Light Measurement	++	+	+++	+++	+
Stability for Long Integration Times @ Low Light Levels	++	+	++	+++	+
Shutter			✓	✓	
Temperature Controller					
Active Device Temperature Control					✓
Temperature Sweeps					✓
Voltage Sweeps					✓
Current Sweeps					✓
Soak Time Triggering					✓
Performance					
Incandescent lamps	+++	+++	+++	+++	+++
HID / CFL Lamps		+	+++	+++	+
Low Level Sources	+	+	+++	+++	+
Blue LEDs	+	++	+++	+++	++*
White LEDs	++	++	+++	+++	++*
Customization Options					
Customized Ports / Baffles	✓	✓	✓	✓	✓
Rotation Systems		✓	✓	✓	✓
Ambient Temp. Controlled Systems		✓	✓	✓	✓
Software Options					
MtrX-SPEC	✓	✓	✓	✓	
illumia®pro Software					✓
Standards					
LM-79		✓	✓	✓	✓

* with stray light correction software
** with ND filters

SPECTROMETERS

SMS-500/510

The highly sensitive SMS-500 and SMS-510 Mini CCD Array Spectrometers offer low noise and a broad spectral response with calibrated ranges from 360 to 1000nm or 300 to 1050nm.

Within the illumia® pro Thermal Measurement System, the spectrometers avoid the inherent photometric errors associated with filter-based photometers. Data is accurate even for narrow-band light sources such as LEDs, fluorescent lamps, and discharge lamps.

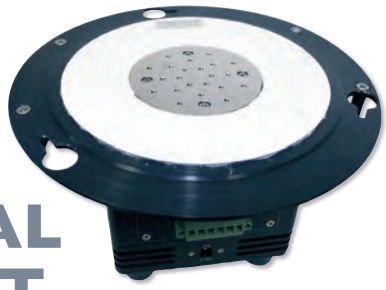
The Labsphere SMS-5x0 CCD Array Spectrometers are multi-channeled spectral analyzers designed for real-time spectral analysis. Instantaneous spectral acquisition provides the radiometric, photometric, and color characteristics of the device under test (DUT). Fast results help to increase the rate of product development, decrease the time to market, and reduce development costs.

KEITHLEY®*

KEITHLEY 2400 SERIES SOURCEMETER® OPTIONS

We are pleased to offer the Keithley 2400 Series SourceMeters for optimum operation of the illumia®pro systems. Our sales engineers can assist you in choosing the right model for your application.

The Keithley® SourceMeter is a required component for operating the illumia®pro systems. For user convenience, the instrument can be supplied by the user and sent to Labsphere for integration into the electronics rack, or it may be purchased directly from Labsphere.



TEC - THERMAL ELEMENT

FEATURES:

- Complete Thermal, Optical & Electrical Analysis
- Automated Data Acquisition & Analysis
- TEC Temperature Control and Monitoring
- Measure Optical Properties as a Function of Temperature and Operating Current
- Available in 20, 40, 65 and 76 inch Sphere Diameters
- Conforms to IESNA LM-79 & LM-80
- Ambient Air Temperature Control Available

Labsphere's illumia®pro Thermal, Optical, Electrical Characterization Systems allow users to quickly, accurately and simultaneously measure the optical and thermal characteristics of various LEDs and arrays.

LED manufacturers, integrators and users are paying more attention to the thermal and electrical characteristics of LEDs because thermal variances at the junction can affect an LED's performance in terms of color, output, life expectancy, luminous efficacy and linearity performance.

MEASURE:

- Electrical: I, V, Electrical Watts
- Optical: Flux, Color, Luminous Efficiency
- Thermal: Case Temperature Control vs. Electrical and Optical Parameters

APPLICATIONS:

- Packaged LEDs
- Modules & Arrays
- Backlight Displays
- Solid State Lighting

MEASUREMENT FUNCTIONS:

ILV @ constant T: step & control I, stabilize T, measure L & V

VLI @ constant T: step & control V, stabilize T, measure L & I

TLV @ constant I: step & control T, stabilize T, measure L & V

TLI @ constant V: step & control T, stabilize T, measure L & I

ILV/T: perform ILV @ constant T, step T and repeat at each T

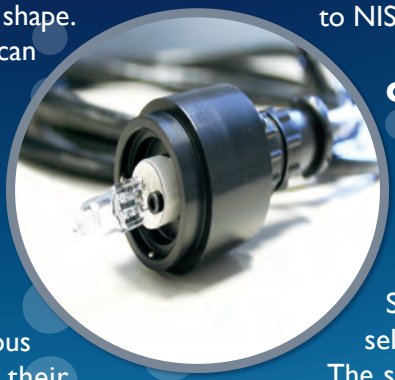
VLI/T: perform VLI @ constant T, step T and repeat at each T

Key: L = Lumens V = Voltage I = Current T = Temperature

LAMPS

Auxiliary Lamps for Absorption Correction
Industry standards and Labsphere recommend applying absorption correction techniques. Self-absorption correction is critical, since the physical size and shape of SSL products and lamps under test are typically very different from the reference lamp size and shape. The use of an absorption correction lamp can correct for self-absorption errors.

Lamp assemblies mount onto a Labsphere 1-inch port frame and auxiliary lamp port on our Light Measurement Spheres with no modifications required.



Calibrated Lamp Standards
Labsphere's Total Spectral and Total Luminous Flux Lamp Standards are selected for their stability and reproducibility. Each lamp has been carefully screened, seasoned and calibrated at our Optical Calibration Laboratory under the guidelines recommended by the IESNA (Illuminating Engineering Society of North America) to provide the highest degree of accuracy. A calibration certificate verifying traceability to NIST is provided with each lamp.

Calibrated Forward Flux Standards
Labsphere's Lamp Standards of Total Spectral Flux provide an exceptional artifact for calibrating integrating sphere spectrometers for total spectral radiant flux responsivity from 350 to 1050 nm. Labsphere's Lamp Standards of Forward Spectral Flux are selected for their stability and reproducibility. The selected lamps are then calibrated directly to the NIST lumen, for a calibration result you can rely on.

AGILENT®

Agilent A3634A Programmable DC Power Supply

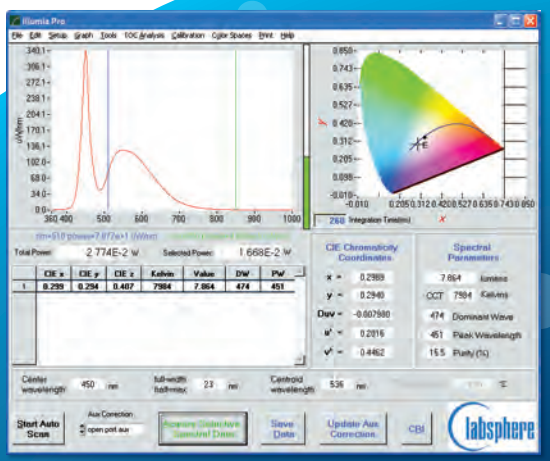
This single output power supply gives you the flexibility to select from a dual output range. Therefore you can drive the calibration lamp and the auxiliary correction lamp from one power supply. The output load is protected against overvoltage and overcurrent, which is easily monitored and adjusted from the front panel and illumia® pro software.

SOFTWARE
Sold Separately

illumia® pro software provides a powerful, yet easy-to-use menu driven operating environment. It allows users to control the LED temperature and operating current at specified ranges. This control enables the software to measure and characterize the device under test (DUT) over a wide range of temperatures.

System software automates procedures for measuring the spectral characteristics and controlling current and temperature. Software simultaneously collects electrical, optical and thermal data which is graphed and viewed on screen or can be exported to Excel® format for further analysis.

SOFTWARE OPERATING ENVIRONMENT
Windows XP, 7 - 32 bit operating systems



Model Number:	illumia®pro 500-050	illumia®pro 500-100	illumia®pro 500-165	illumia®pro 500-195
Part Number:	AA-80510-050	AA-80510-100	AA-80510-165	AA-80510-195

SPHERE

Sphere Size (m)	0.5	1.00	1.65	1.95
Sphere Assembly Frame Style	H Frame	H Frame	H Frame on rails	H Frame on rails
Sphere Coating Reflectance	97-98% @600nm	97-98% @600nm	97-98% @600nm	97-98% @600nm
Radiometric Range of Coating	350-2499nm	350-2499nm	350-2499nm	350-2499nm
TE Mounting Plate	76.2mm diameter	76.2mm diameter	76.2mm diameter	76.2mm dia.
2 Pi/TEC Port Size (mm)	152	330	533	635
Sphere Assembly Dim. (WxHxD) (m)	0.73x0.74x0.46	1.28x1.75x0.90	1.96x2.14x1.83-2.85	2.20x2.33x1.88-2.85
Recommended Lamp Size (LM-79)	<0.07m diameter, <0.33m l	<0.14m diameter, <0.67m l	<0.23m diameter, <1.10m l	<0.27m dia., <1.3m l
MAX Lamp Wattage	Ambient temp. ≤100C	Ambient temp. ≤100C	Ambient temp. ≤100C	Ambient temp. ≤100C

SYSTEM SPECIFICATION

SPECTROMETER	SMS-500		SMS-500		SMS-500		SMS-500	
Detector	2048 element Linear CCD		2048 element Linear CCD		2048 element Linear CCD		2048 element Linear CCD	
Spectral Range (spectrograph)	350-1050nm		350-1050nm		350-1050nm		350-1050nm	
Spectral Range (calibrated)	350-1050nm		350-1050nm		350-1050nm		350-1050nm	
Resolution	1.4nm		1.4nm		1.4nm		1.4nm	
Integration Time	1.1ms - 4 sec		1.1ms - 4 sec		1.1ms - 4 sec		1.1ms - 4 sec	
Cooling	n/a		n/a		n/a		n/a	
TE Temp Drift	n/a		n/a		n/a		n/a	
Linearity	+/-0.3%		+/-0.3%		+/-0.3%		+/-0.3%	
Wavelength Accuracy	<+/- 0.3 nm		<+/- 0.3 nm		<+/- 0.3 nm		<+/- 0.3 nm	
Performance (lumens)	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
QTH	0.192	11369	0.768	14875	2.08	73222	2.912	102265
CW	0.42	4380	1.68	9904	4.58	56691	6.412	79177
WW	0.344	6185	1.376	11924	3.74	67318	5.236	94019
Blue	0.354	446	1.416	1054	3.84	3044	5.376	4252
Red	0.412	1186	1.648	1573	4.48	7996	6.272	11186
Average % Noise on 100% Line	0.23%		0.23%		0.23%		0.23%	
Stray Light (Y-50 filter)	39.0% (5.78% for ULS)		39.0% (5.78% for ULS)		39.0% (5.78% for ULS)		39.0% (5.78%/ULS)	
Stray Light LED/Laser	3.4E04 -450-550nm		3.4E04 from 450-550nm		3.4E04 from 450-550nm		3.4E04 - 450-550nm	
Focal Length	75mm		75mm		75mm		75mm	
Optical Input								
Dynamic Range (single scan)	436.7		436.7		436.7		436.7	
Average Spectral Sample Interval	1nm		1nm		1nm		1nm	
Blaze Wavelength of Grating	500nm		500nm		500nm		500nm	
Peak Responsively Wavelength								
x, y Chromaticity Accuracy	<0.001 for x, y		<0.001 for x, y		<0.001 for x, y		<0.001 for x, y	
Software Stray Light Correction	Yes		Yes		Yes		Yes	
Mechanical Shutter	No		No		No		No	
AD Converter	16 bit		16 bit		16 bit		16 bit	
PC Interface	USB 2.0		USB 2.0		USB 2.0		USB 2.0	
Trigger: hardware	Yes		Yes		Yes		Yes	
Trigger: software	Yes		Yes		Yes		Yes	

1. Stray light (Y-50 filter) is the average reported transmittance from 360470nm trough a 500nm cut on filter

Labsphere Locations and Dealers Around the Globe:

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South America

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Hong Kong
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Malaysia
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labsphere®
A HALMA COMPANY

SphereOptics
Phone +49 7556 966 562-0
Fax +49 7556 966 562-22
E-Mail info@sphereoptics.de
www.sphereoptics.de

NVLAP®

231 Shaker Street • North Sutton • New Hampshire 03260 • USA
Phone: +1.603.927.4266 Fax: +1.603.927.4694 www.labsphere.com