

# LR-USS LUMINANCE/RADIANCE SOURCES

## Multiple Output Levels and Modular Design Features

### 12-INCH LUMINANCE RADIANCE SOURCE



### L/R-USS SERIES LUMINANCE RADIANCE SOURCES

Labsphere Luminance/Radiance Uniform Source Systems are integrating sphere based uniform light sources designed to accommodate a wide range of applications from night vision to remote sensing. Integrating spheres provide a near perfectly uniform source of radiance or irradiance for testing and calibrating telescopes, imaging detectors, photometers, radiometers and many other electronic imaging devices.

Luminance/Radiance Systems are available in sphere sizes ranging from 4 -inches (10 cm) to 20 -inches (51 cm), each optimally designed with an output port diameter to provide luminance uniformity of  $\pm 1\%$ .

All systems are equipped with a light source assembly, variable attenuator, power supplies, detectors, and operating software. The standard variable attenuator, provided with all systems, is a manually driven micrometer unit that allows for control of input light levels while keeping the spectral shape fixed. An automated variable attenuator and controller unit is available when more precise control of the light output level is required.

### SYSTEM APPLICATIONS:

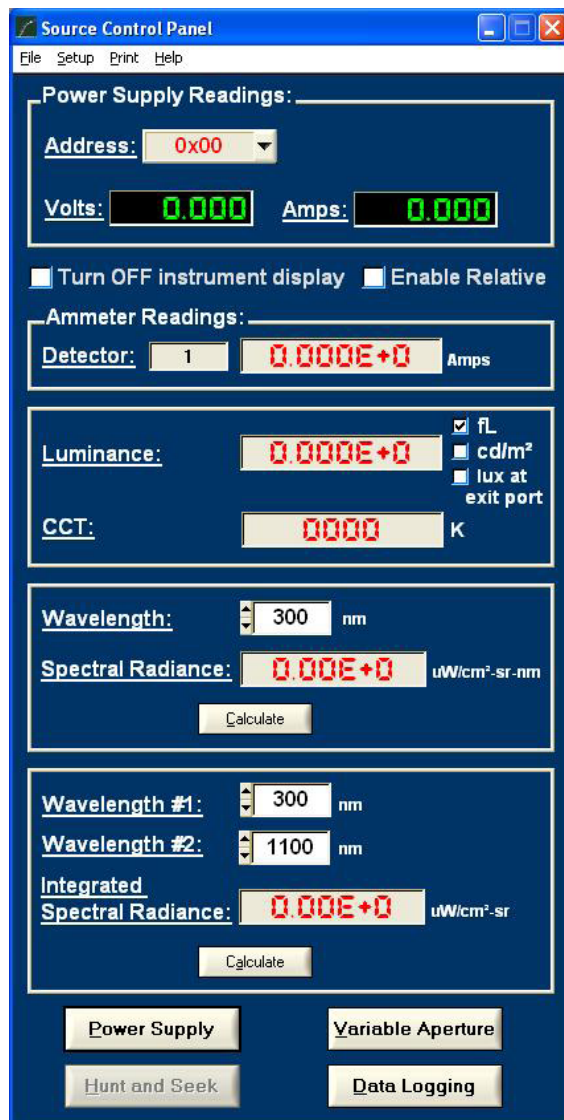
- Calibration of Photometers and Radiometers
- Calibration for Spectral Radiance and Irradiance
- Calibration and Testing of Electronic Imaging Devices
- Flat Field Testing
- Detector Linearity Testing
- Solar Simulation

### SOFTWARE FEATURES:

- Achieve variable output levels while maintaining consistent color temperature
- Self monitoring of luminance in fL and  $\text{cd}/\text{m}^2$  and color temperature
- Monitor spectral radiance at specified wavelength with systems calibrated for spectral radiance
- Powerful menu driven software

### POWERFUL CONTROL SOFTWARE

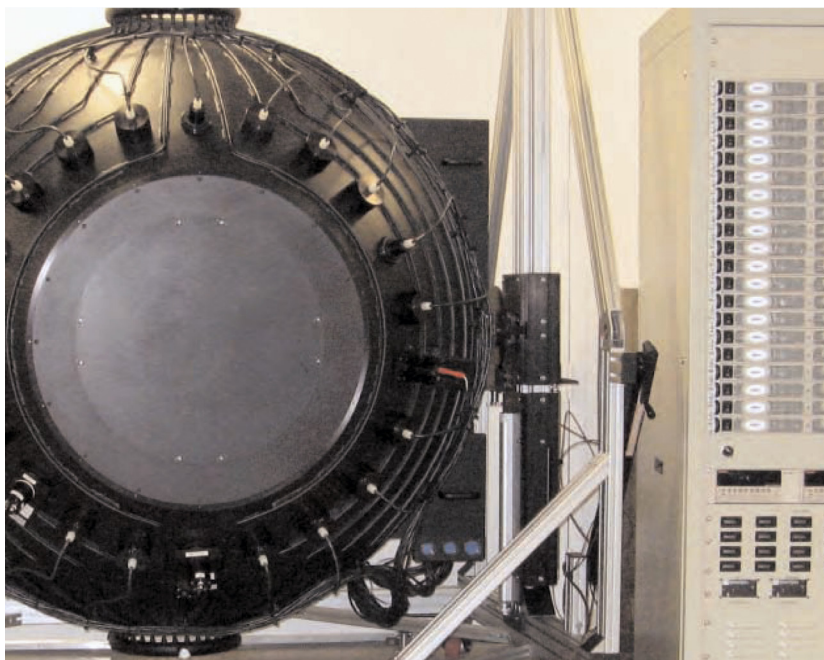
Application software, provided with the systems, operates in a convenient Windows™ environment and is used to control and monitor light output. The software allows users to turn lamps on and off individually and monitor the voltage and current of the light source. The detector current calculated luminance and correlated color temperature are monitored in real time so that output can be precisely adjusted. Systems with the automated variable attenuator control option allow users to select and drive luminance values via a software feedback control that is linked to a luminance monitor.



# LUMINANCE/RADIANCE SOURCES

## Multiple Output Levels and Modular Design Features

### CUSTOM VACUUM RADIANCE SOURCE

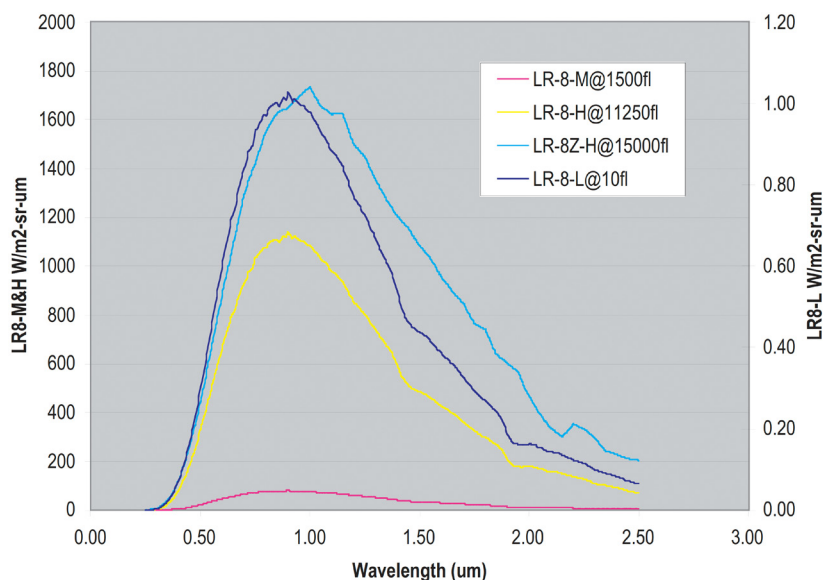


### VACUUM COMPATIBLE RADIANCE SOURCES

Ambient optical testing using spheres is a well established technique in many programs, but recent testing shows optical tests in a vacuum environment gives lower uncertainty and better correlation between calibration and execution of space flight systems.

Labsphere has designed and built vacuum compatible Radiance Sphere Systems for use in a vacuum chamber to carry out radiometric characterization and calibration of electro-optical sensors under controlled temperature and vacuum environment. We have the capabilities to meet your needs with customized vacuum compatible systems in sphere sizes up to 2 meters.

### TYPICAL LR-8 SERIES SPECTRAL RADIANCE @ 300K



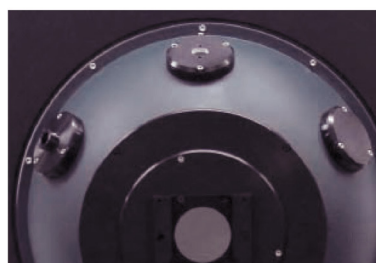
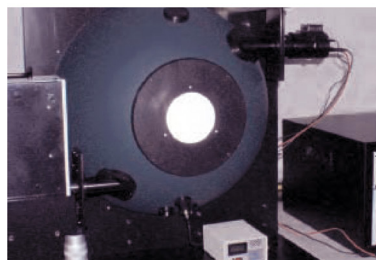
### CUSTOM SOLUTIONS AND EXAMPLES

Labsphere engineers have years of experience designing and manufacturing high value standard and customized luminance and radiance systems. Our optical, electrical, mechanical and software engineers will work with you to design and build a customized system that meets your requirements.

Labsphere specialty is designing and manufacturing dedicated camera calibration test systems. By coupling a luminance/radiance uniform source with an MTF target and imaging lens, customers have the ability to accurately test bare camera sensors for MTF, uniformity, linearity and much more. These flexible luminance/radiance sources also allow for precise testing of lensed systems.

Labsphere designed a high dynamic range luminance/radiance system to calibrate specialized optical detectors used in geolocation tags embedded in aquatic species, such as tuna. Because tuna reside below the ocean surface accurate calibration of the detectors ensures better tracking of migration patterns over traditional electromagnetic system.

### EXAMPLES OF CUSTOM L/R SYSTEMS



# Specifications

## System Properties and Performance

### High- Radiance Systems - for Remote Sensing Applications

Model Number:	LR-USS-4ZH	LR-USS-6ZH	LR-USS-8H	LR-USS-8ZH
Part Number:				
Sphere Diameter:	4 in. (10.2 cm)	6 in. (15.2 cm)	8 in. (20.3 cm)	8 in. (20.3 cm)
Output Port Diameter: inches (cm)	1 in. (2.54 cm)	1.5 in. (3.81 cm)	2 in. (5.08 cm)	2 in. (5.08 cm)
Sphere Interior:	Spectralon	Spectralon	Spectrafect	Spectralon
Luminance Uniformity:	±1%	±1%	±1%	±1%
Expected Luminance Output: (fL)	0-30,000	0-25,000	0-11,250	0-20,000
Minimum Resolution: (fL)	1.5	1.25	0.5	0.75
Peak Radiance: (w/m .sr.µm@.95µm)	2470	2200	1100	2200
Color Temperature:	3000 K	3000 K	3000 K	3000 K
FOV: (Full Angle from Center of Exit Port)	70°	70°	90°	90°

### High- Radiance Systems - for Remote Sensing Applications (Cont.)

Model Number:	LR-USS-12H	LR-USS-12ZH	LR-USS-20H
Part Number:			
Sphere Diameter:	12 in. (30.5 cm)	12 in. (30.5 cm)	20 in. (50.8 cm)
Output Port Diameter: inches (cm)	4 (10.16)	4 (10.16)	8 (20.32)
Sphere Interior:	Spectrafect	Spectralon	Spectrafect
Luminance Uniformity:	±2%	±2%	±2%
Expected Luminance Output: (fL)	0-8,000	0-15,000	0-10,000
Minimum Resolution: (fL)	0.4	0.1	0.1
Peak Radiance: (w/m .sr.µm@.95µm)	600	1650	1100
Color Temperature:	3000 K	3000 K	3000 K
FOV: (Full Angle from Center of Exit Port)	90°	90°	90°

### Medium Radiance Models - for Machine Vision and Inspection Applications

Model Number:	LR-USS-4M	LR-USS-6M	LR-USS-8M	LR-USS-12M	LR-USS-20M
Part Number:					
Sphere Diameter:	4 in. (10.2 cm)	6 in. (15.2 cm)	8 in. (20.3 cm)	12 in. (30.5 cm)	20 in. (50.8 cm)
Output Port Diameter:	1 in. (2.54 cm)	1.5 in. (3.81 cm)	2 in. (5.08 cm)	4 in. (10.16 cm)	8 in. (20.32 cm)
Sphere Interior: Optowhite	Spectrafect	Spectrafect	Spectrafect	Spectrafect	Spectrafect
Luminance Uniformity:	±1%	±1%	±1%	±2%	±2%
Expected Luminance Output: (fL)	0-6,000	0-3,000	0-1,500	0-2,000	0-2,000
Minimum Resolution:	0.1	0.1	0.1	0.1	0.1
Peak Radiance: (w/m .sr.µm@.95µm)	197	147	75	197	100
Color Temperature:	3000 K	3000 K	3000 K	3000 K	3000 K
FOV: (Full Angle from Center of Exit Port)	70°	70°	70°	90°	90°

### Low Radiance Models - for Night Vision Applications

Model Number:	LR-USS-4L	LR-USS-6L	LR-USS-8L	LR-USS-12L	LR-USS-20L
Part Number:					
Sphere Diameter:	4 in. (10.2 cm)	6 in. (15.2 cm)	8 in. (20.3 cm)	12 in. (30.5 cm)	20 in. (50.8 cm)
Output Port Diameter:	1 in. (2.54 cm)	1 in. (2.54 cm)	2 in. (5.08 cm)	4 in. (10.16 cm)	8 in. (20.32 cm)
Sphere Interior:	Spectrafect	Spectrafect	Spectrafect	Spectrafect	Spectrafect
Luminance Uniformity:	±1%	±1%	±1%	±2%	±2%
Luminance Output: (fL)	0-10	0-10	0-10	0-10	0-10
Minimum Resolution:	0.0005	0.0005	0.0005	0.0005	0.0005
Peak Radiance: (w/m .sr.µm@.90µm)	0.1	0.1	0.1	0.1	0.1
Color Temperature:	3000 K	3000 K	3000 K	3000 K	3000 K
FOV: (Full Angle from Center of Exit Port)	70°	70°	70°	90°	90°

### System Calibrations

Luminance Radiance Systems are calibrated for luminance and correlated color temperature. Calibrations are traceable to national laboratory standards. Custom calibrations are available.

### Optional System Calibrations

Order Number	Description
SCC-RA	Radiance Calibration
USC-PM	Exit Port Luminance Uniformity Mapping
SCC-IL	Illuminance Calibration

## OPTIONAL ACCESSORIES

### Variable Attenuators

Used to vary the intensity of an external light source entering the sphere, while minimizing color shifts in the output spectrum. The Automated Variable Attenuator is a motorized attenuator that includes an aperture controller module, and is operated through the system software. A dual channel attenuator is also available for applications requiring more than one type of lamp, such as our Tungsten-Halogen Xenon systems.

### SMS-LR Spectral Monitor

Allows the user to monitor the spectral output of the sphere in real time. The SMS-LR spectral monitor will track changes in the output due to age of the lamp or changes induced by the variable attenuator. Furthermore, if the LR system contains a xenon source, spectral monitoring is needed to track the luminance of the output. When using the automated variable attenuator option, the SMS-LR has the ability to "Hunt and Seek" the desired luminance output, while still spectrally monitoring the source.

### Filter/Target Holders

Used to mount a filter in front of a detector or sphere port. Filter holders accommodate different filter thicknesses, or a stack of filters up to 0.375 inches. The filter holders mount easily to the mounting ring designed into all integrating sphere ports.

### Filter Wheels and Controllers

Mounted in front of a detector or sphere port. They are used to either manually or automatically switch between up to 6 or 12 different filters or aperture sizes. Filter wheels accommodate different filter thicknesses, or a stack of filters up to 0.375 inches. The filter apertures are sized for either 1" or 2" diameter ports.

As part of our continuous product improvement program, Labsphere reserves the right to change specifications without notice. All tradenames are the property of their respective owner.