OL Series 455
Integrating Sphere Calibration Standard

GENERAL

The OL Series 455 Integrating Sphere Calibration Standard is designed for accurately calibrating microphotometers, image intensifiers, telephotometers and imaging spectroradiometers for photometric, radiometric, or spectroradiometric response. It serves as a highly accurate, large area, uniform, diffusely radiating source with a near normal luminance that can be varied over 6 decades with essentially constant color temperature.

The OL Series 455 consists of an optics head and a separate electronic display console/ power supply (OL 400-C Controller). This enables remote location of either unit, which facilitates alignment or positioning of the source with respect to the device to be calibrated. The source module/ optics head is designed such that it can be configured with integrating spheres having diameters of 4, 6, 8, 12 and 18 inches with exit (radiating) ports of 1, 1½, 2, 3 and 6 inches, respectively.

OPTICS HEAD

The optics head has a 150-W tungsten-halogen reflectorized lamp with a micrometer-controlled variable aperture between the lamp and the entrance port of the integrating sphere. This combination provides for continuous adjustment of the sphere luminance over a range of more than 10^6. A precision silicon detector-filter combination with an accurate photopic response is mounted in the sphere wall and monitors the sphere luminance. The in-line sphere port concept with an intermediate spider baffle provides exceptional high luminance levels while maintaining high uniformity in the near normal luminance across the radiating aperture.

A shutter is located between the lamp and the entrance port of the integrating sphere. The location of the shutter ensures that any stray light (room light) entering the radiating port of the sphere is properly accounted for when auto-zeroing the photometer.

In addition, the source output can easily be set to zero by use of the shutter without any changes to the sphere luminance setting.

An optional filter holder, mounted at the exit port, accommodates alignment targets, filters, de-coupling diffusers etc. for specific user requirements. Spectral shaping filters can be utilized to simulate various sources such as Illuminant A, B, C, D65, etc. In addition to luminance and color temperature, the OL Series 455 can be obtained with calibrations for spectral radiance over all or part of the entire 350 to 2500 nm wavelength range.

CONTROLLER

The microprocessor-based OL 400-C Controller performs all system interface and monitoring functions. An automatic ramp up/ down function eliminates potentially dangerous current surges to the lamp. Luminance, color temperature, and lamp current are displayed on a 2 line by 20 character alphanumeric LED display, which may be turned off for low-light level conditions. An 8 key keypad and main power switch are located on the front panel for easy access to all system functions. Luminance is displayed with 4 ½ digits plus exponent in units specified by the user. As an option, the display can be factory programmed to read in virtually any pertinent units the user desires. DC current supplied to the lamp has a 0.001 ampere resolution with a 0.02% uncertainty. The controller computes the color temperature of the source over the range of 2000 – 3000K. Software for remote operation of the source including on/off and lamp current setting functions, as well as the photometer read-out units via full speed USB 2.0 interface, is included. An optional software development kit is available for custom programming.

OL 455-OH OPTICS HEAD

Luminance Uncertainty (@ 2856 K, 90% max. luminance) ..... **± 0.5% relative to NIST**
Color Temperature Range ..... **2000 to 3000 K**
Color Temperature Uncertainty ..... **± 25 K**
Source Stability @ 2856 K
Short Term ..... **± 0.5%**
Long Term ..... **± 2% 100 hours/ 1 year**
Spectral Radiance Uncertainty @ 550 nm ..... **± 2% relative to NIST**
Sphere Coating (reflectance) ..... **> 99% (350 to 1100 nm)**
Variable Aperture ..... **micrometer controlled**
Shutter ..... **open/ closed**

OL 400-C CONTROLLER

Luminance Display (4½ digits) ..... **fL or cd/m^2**
Luminance Display Range ..... **0.0001 to 50,000 fL (auto-ranging, manual, or software selectable)**
Lamp Current
Display ..... **4 digits**
Range ..... **0 to 6.600 amperes DC**
Power Cycle ..... **60 second ramp function**
Accuracy ..... **± 0.02% of full scale**
Regulation ..... **< 2ppm/ V**
Temperature Regulation ..... **<25 ppm/ °C**
Lamp Timer ..... **0 - >1000 hours**
Operating Temperature Range ..... **15° to 35° C**
Operating Humidity Range ..... **10% to 85% (non-condensing)**
Power (user selectable) ..... **100/ 115/ 230 VAC, 50/60 Hz**
Remote Interface ..... **Full-speed USB and TTL-I/O**
Size ..... **12.0" x 9.38" x 5.38"**
Weight ..... **17.0 lbs.**

LUMINANCE LEVELS (nominal)

Model Number	Sphere Diameter	Exit Port Diameter	Uniformity	Maximum Luminance		Display Resolution
				@ 2856 K	@ 3000 K	
OL 455-4	4"	1"	± 0.5%	22,000 fL	35,000 fL	0.0001 fL
OL 455-6	6"	1½"	± 0.5%	12,000 fL	20,000 fL	0.0001 fL
OL 455-8	8"	2"	± 0.5%	9,000 fL	13,000 fL	0.0001 fL
OL 455-12	12"	3"	± 0.5%	4,000 fL	6,400 fL	0.0001 fL
OL 455-18	18"	6"	± 1.0%	700 fL	1,100 fL	0.0001 fL

Other configurations available upon request.

CALIBRATION OPTIONS

OL 455-X ..... **luminance, color temperature**
OL 455-X-1 ..... **luminance, color temperature, [1/]spectral radiance (350 to 1100 nm)**
OL 455-X-2 ..... **luminance, color temperature, [1/]spectral radiance (350 to 2500 nm)**
OL 455-X-U ..... **uncalibrated**

Note: "X" designates the diameter of the integrating sphere.

[1/]Spectral radiance measured at a color temperature of ~3000 K unless otherwise specified.

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