

LS-1-CAL Series Calibration Light Sources Installation and Operation Instructions

Description

The LS-1-CAL and the LS-1-CAL-INT are tungsten halogen light sources that you can use to calibrate the absolute spectral response of your system. Each light source emits a spectral intensity that is calibrated by standards that provide traceability to the National Institute of Standards and Technology (NIST).

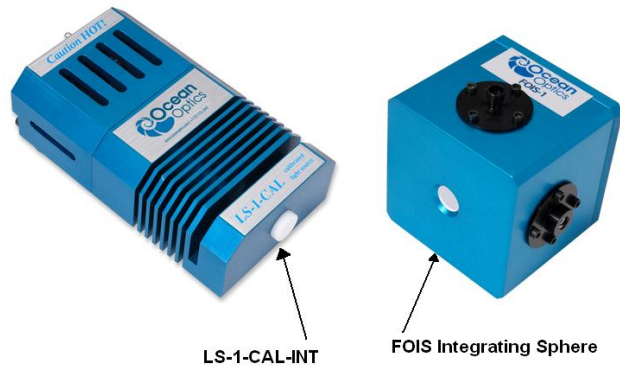
The bulbs used in the LS-1-CAL and the LS-1-CAL-INT have a bulb life of 900 hours. Each lamp also features a 12 VDC regulated power supply. The lamps are effective in calibrating the absolute spectral response of a system from 350-1050 nm. When the lamps are combined with Ocean Optics software, you can calculate the absolute spectral intensity of an emissive sample. Furthermore, each light source can be used when calculating absolute irradiance or absolute irradiance and emissive color (with Ocean Optics software).



LS-1-CAL Installation and Operation Instructions

The LS-1-CAL Series of calibrated light sources are designed for use in the VIS-Shortwave NIR (350–1050 nm). It provides known absolute intensity values at several wavelengths, expressed in $\mu\text{W}/\text{cm}^2/\text{nm}$. Since the spectral intensity of the LS-1-CAL is traceable to the National Institute of Standards and Technology (NIST), it is specifically designed for calibrating the absolute spectral response of your system.

The primary difference between the LS-1-CAL and the LS-1-CAL-INT is the Teflon diffusion disc that is installed in place of the SMA 905 Connector found on the LS-1-CAL. The LS-1-CAL-INT is designed to work with the FOIS-1 Fiber Optic Integrating Sphere. The Teflon disc on the LS-1-CAL-INT fits snugly into the optical aperture on the FOIS-1, providing a uniform light source optimized for the FOIS-1.



The LS-1-CAL-INT can be used with other integrating spheres. However, the optical aperture on the integrating sphere must be large enough to accommodate the Teflon disc on the LS-1-CAL-INT, as the Teflon disc must be fully inserted into the integrating sphere. The LS-1-CAL-INT is not effective when the Teflon disc is placed up against an integrating sphere aperture that is too small to accommodate the disc size.

Note

The LS-1-CAL is NOT designed to operate as an excitation source in your experiments.

Parts Included

The LS-1-CAL Series light source ships with the following items:

- LS-1-CAL or LS-1-CAL-INT Calibrated Light Source
- Switching AC adapter (for power stabilization)
- Power cord for the power supply
- Floppy disk or CD containing calibration lamp report files (.lmp). The LS-1-CAL has two lamp reports; one for using the LS-1-CAL with a bare fiber and one for using the LS-1-CAL with a CC-3 cosine-corrected irradiance probe.

Additional Accessories

The following are additional accessories available from Ocean Optics that you may need, depending on your system set-up:

- Spectrometer
- SMA-terminated optical fiber or CC-3 cosine-corrected irradiance probe
- Ocean Optics software

WARNING

The light source becomes extremely hot during operation and does not contain a cooling fan. Handle with extreme care during operation.

Connecting the Light Source

The set-up procedure differs slightly, depending on whether you are connecting the LS-1-CAL to a bare fiber or a cosine corrector. The LS-1-CAL-INT connects to an integrating sphere such as the Ocean Optics FOIS-1 Fiber Optics Integrating Sphere.

Connecting the LS-1-CAL

► **Procedure**

1. Use a 0.050 Allen wrench to loosen the setscrew on the SMA connector of the LS-1-CAL.
2. **If using a bare fiber with the LS-1-CAL:**
 - a. Remove the inner barrel from the SMA connector.
 - b. Screw this connector barrel onto the end of the fiber until the connection is tight.
 - c. Insert the barrel and fiber **completely** into the SMA connector of the LS-1-CAL.

If using a CC-3 cosine corrector with the LS-1-CAL:

- a. Remove the inner barrel from the SMA connector.
 - b. Screw the CC-3 cosine corrector onto the end of the fiber until the connection is tight.
 - c. Insert the CC-3 and fiber **completely** into the SMA connector of the LS-1-CAL.
3. Use the Allen wrench to tighten the setscrew on the SMA connector or CC-3 of the LS-1-CAL.
 4. Screw the other end of the fiber into the SMA connector of the spectrometer.
 5. Plug the switching AC adapter (black rectangular box) into the back of the LS-1-CAL. This adapter stabilizes the power coming into the lamp to insure constant spectral intensity
 6. Plug the power cord into the back of the switching AC adapter, then plug the other end of the power cord into a standard outlet.
 7. Switch the lamp on using the on/off switch on the back of the LS-1-CAL.

8. Allow the lamp to warm up for at least 30 minutes before proceeding.

You have now connected the LS-1-CAL for operation.

Connecting the LS-1-CAL-INT

► **Procedure**

1. Connect the Teflon disc on the LS-1-CAL-INT into the optical aperture on the FOIS-1.
2. Plug the switching AC adapter (black rectangular box) into the back of the LS-1-CAL-INT. This adapter stabilizes the power coming into the lamp to insure constant spectral intensity
3. Plug the power cord into the back of the switching AC adapter, then plug the other end of the power cord into a standard outlet.
4. Switch the lamp on using the on/off switch on the back of the LS-1-CAL-INT.
5. Allow the lamp to warm up for at least 30 minutes before proceeding.

You have now connected the LS-1-CAL-INT for operation.

Calibrating With the Light Source

► **Procedure**

Follow the steps below to calibrate the spectral response of your system using the LS-1-CAL or LS-1-CAL-INT:

1. Insert the CD that came with the light source that contains the ASCII file (.lmp) of the Lamp Calibration Report.

The LS-1-CAL has two lamp files. One file has the calibration numbers for calibrating the spectral response of your system with the lamp and a bare fiber; the name of this file contains the lamp's serial number followed by FIB.LMP. The other file has the calibration numbers for calibrating the spectral response of your system with the lamp and a CC-3 cosine corrector; the name of this file contains the lamp's serial number followed by CC.LMP (for example, 123_FIB.LMP or 123_CC.LMP).

2. Copy the lamp file(s) to your computer.
3. Start your software and follow the instructions for calibrating your spectrometer for absolute irradiance measurements. Be sure to do the following:
 - Select the proper lamp file that matches your configuration.
 - If using a bare fiber, enter the fiber diameter.
 - If using a fiber with a CC-3 cosine corrector, enter **3,900**.
 - If using a LS-1-CAL-INT, select Integrating Sphere.

Note

You must use whatever optical setup you choose for your application when calibrating the spectral response of your system. For example, if you are going to use a 200- μm fiber and a CC-3 for your application, you must use the same components when calibrating the spectral response of your system.

4. Verify that the lamp was ON for approximately 30 minutes prior to calibrating your spectrometer.
 5. Ensure that nothing is blocking the light path to the spectrometer and that the conditions for the reference scan are identical to those you will use for your sample.
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Note

You must always take a dark measurement before taking an absolute irradiance measurement.

You have now calibrated the spectral response of your system.

Maintenance

LS-1-CAL and LS-1-CAL-INT maintenance must be done at the Ocean Optics factory:

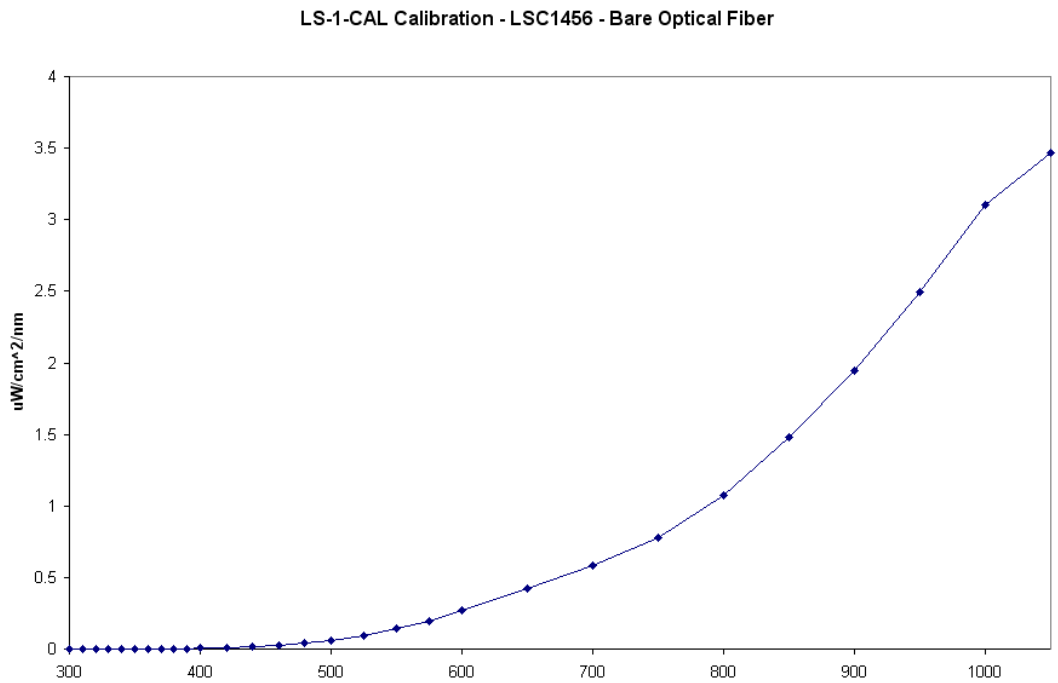
- **Recalibration:** You should have the LS-1-CAL and LS-1-CAL-INT recalibrated after every 50 hours of use. Contact an Ocean Optics Application Sales Engineer for information on lamp recalibration.
- **Bulb replacement:** You cannot change the bulb in the LS-1-CAL and LS-1-CAL-INT, as a recalibration is required when the bulb is replaced. Contact an Ocean Optics Application Sales Engineer for information on bulb replacement.

Specifications

Lamp Specifications

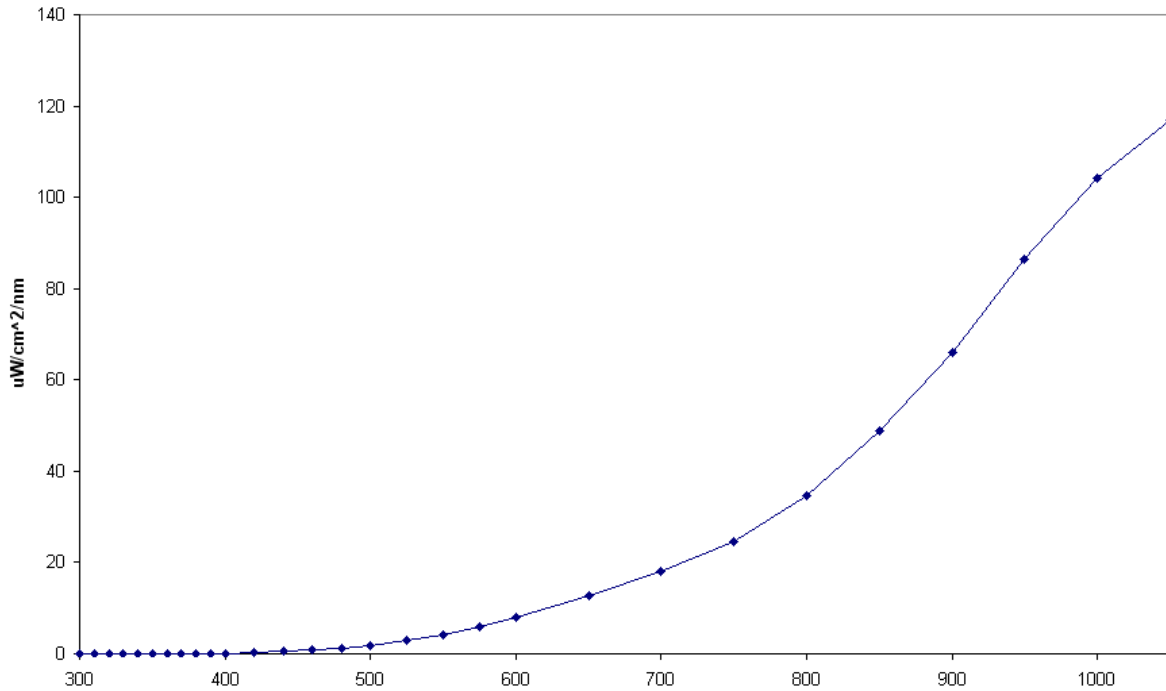
Specification	Value
Dimensions (mm) LxWxH	90 x 50 x 32 mm
Weight	370 g
Power consumption	12 VDC/800 mA (regulated)
Power output	6.5 watts
Spectral range	350–1050 nm (calibrated)
Connector LS-1-CAL LS-1-CAL-INT	SMA 905 for fiber; 6.35 mm barrel for cosine corrector PTFE for integrating sphere
Output to bulb	5 volts/1.3 amps
Time to stabilized output	~30 minutes
Output regulation	0.2% voltage

Spectral Output



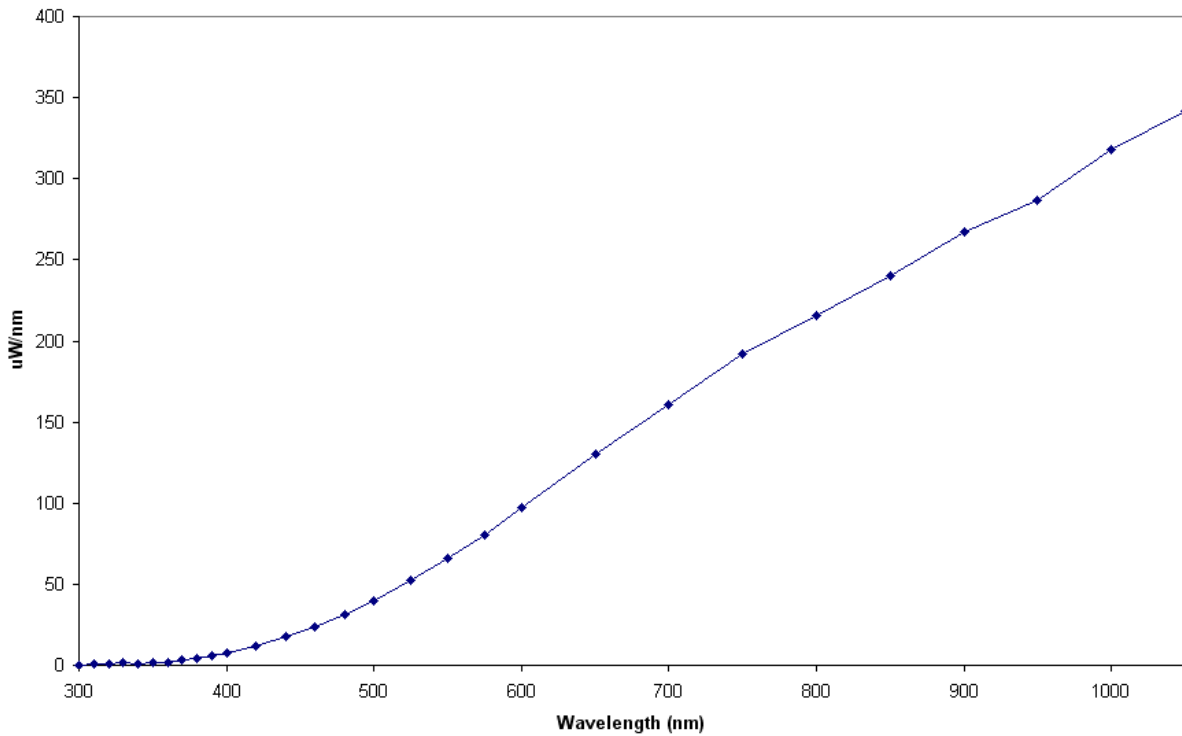
Spectral Output of the LS-1-CAL Using a Bare SMA-terminated Fiber

LS-1-CAL Calibration - LSC1456 - Cosine-corrected Irradiance Probe



Spectral Output of the LS-1-CAL Using the CC3 Cosine Corrector

LS-1-CAL-INT Calibration - LSCI404 - FOIS-1 Integrating Sphere



Spectral Output of the LS-1-CAL-INT When Connected to a FOIS-1 Integrating Sphere

