Halogen Calibration Light Source
HL-2000-CAL

A ![Mikropack] Product

Installation and Operation Manual
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Ocean Optics offers the most comprehensive, innovative and high-quality line of modular spectroscopy tools in the world. Mikropack, a leading supplier of spectroscopy and thin film components, is an essential and valuable partner in this enterprise. We have partnered with Mikropack because they are committed to the same goals of innovation and quality that inspire us here at Ocean Optics. As always, Ocean Optics conducts its business in an open, honest and technically available fashion. We invite you to contact us at Ocean Optics, Inc. (see front cover for contact information) or Mikropack GmbH with any technical questions, comments, or applications inquiries. Mikropack GmbH can be contacted at the following location:

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Important Safety Notices

1. Do not remove or modify any installed safety device on this equipment. Doing so will void your warranty and create an unsafe operating environment.

2. Dangerous voltages are present in this device. There are NO user serviceable parts inside.

3. Only allow qualified personnel to service this unit.

4. Do not use the unit if it is damaged in any way. Contact your dealer for repair or replacement information.

Table of Contents

About This Manual

Document Purpose and Intended Audience

This document provides you with an installation section to get your system up and running.

What's New in this Document

This version of the *Halogen Calibration Light Source HL-2000-CAL2000 Installation and Operation Manual* adds our partnership agreement.

Document Summary

Chapter	Description
Chapter 1: *Setup*	Contains a list of package contents and unpacking instructions. Also contains procedures for connecting to a spectrometer and configuring OOIIrrad software.
Chapter 2: *HL-2000-CAL Specifications*	Contains operating environment specifications, as well as other physical details of the product.
Chapter 3: *Calibration*	Provides instructions for calibrating the spectrometer connected to the HL-2000-CAL Light Source.

Product-Related Documentation

You can access documentation for Ocean Optics products by visiting our website at **http://www.oceanoptics.com**. Select *Technical → Operating Instructions*, then choose the appropriate document from the available drop-down lists. Or, use the **Search by Model Number** field at the bottom of the web page.

You can also access operating instructions for Ocean Optics products on the *Software and Technical Resources* CD included with the system.

Engineering-level documentation is located on our website at *Technical → Engineering Docs.*

Upgrades

Occasionally, you may find that you need Ocean Optics to make a change or an upgrade to your system. To facilitate these changes, you must first contact Customer Support and obtain a Return Merchandise Authorization (RMA) number. Please contact an Ocean Optics Application Scientist for specific instructions when returning a product.

Setup

Overview

The HL-2000-CAL Halogen Calibrated Light Source for the VIS-Shortwave NIR (300nm-1050nm) is a tungsten-halogen light source that provides known absolute intensity values at several wavelengths, expressed in $\mu W/cm^2/nm$. Since the spectral intensity of the HL-2000-CAL can be traced to an intensity standard provided by the National Institute of Standards and Technology (NIST), it is specifically designed for calibrating the absolute spectral response of your system.

Note

If you have a spectrometer setup that is highly sensitive, you may not be able to use the HL-2000-CAL as a calibration source.

Before using the HL-2000-CAL for the first time, check for transport damage. Be sure to adhere to all warnings on the unit and in this operational manual. Make sure you have your HL-2000-CAL, your spectrometer, an SMA-terminated optical fiber or CC-3 cosine-corrected irradiance probe, and Ocean Optics OOIIrrad Irradiance Software.

The following sections provide instructions on unpacking and setting up your HL-2000-CAL Calibration Light Source.

Unpacking the HL-2000-CAL

► *Procedure*

1. Unpack your lamp assembly and power supply carefully. Although the lamp is rigidly mounted, dropping this instrument can cause permanent damage.

2. Inspect the outside of the instrument and make sure that there is no damage. Do not use the instrument if damage is present.

3. Use this instrument in a clean laboratory environment (see *Operating Environment*).

Contents

Your DH-2000-CAL package should contain the following:

❑ DL-2000-CAL unit
❑ 1 Switching AC adapter for stabilizing power
❑ 1 Power cord for supplying power to the power supply
❑ 2 Lamp Calibration Reports; one for using the HL-2000-CAL with a bare fiber and one for using the HL-2000-CAL with a CC-3 cosine-corrected irradiance probe
❑ 1 disk that holds files for both lamp calibration reports
❑ 1 Allen wrench for adjusting the inner barrel of the SMA connector

Connecting a Spectrometer to the HL-2000-CAL

► *Procedure*

Use the following procedure to connect your HL-2000-CAL unit to a spectrometer:

1. Loosen the set screw on the HL-2000-CAL's SMA connector

2. **If using a bare fiber with the lamp**:

   Remove the inner barrel from the SMA connector (if using a bare fiber with the lamp). Screw this connector barrel onto the end of your fiber. The connection should be tight. Insert the barrel/fiber all the way into the HL-2000-CAL's SMA connector.

   If using a fiber and cosine corrector with the lamp:

   Remove the inner barrel from the SMA connector (if using a fiber and cosine corrector with the lamp). Screw the CC-3 cosine corrector onto the end of the fiber. The connection should be tight. Insert the CC-3/fibcr all the way into the HL-2000-CAL's SMA connector, taking the place of the SMA's inner barrel.

3. Tighten the setscrew on the SMA connector of the HL-2000-CAL with an Allen wrench. Screw the other end of the fiber into the SMA connector of the spectrometer.

4. Plug the switching AC adapter (the black rectangle-shaped box) into the back of the HL-2000-CAL. This adapter stabilizes the power coming into the lamp to insure constant spectral intensity.

5. Plug one end the power cord into a standard outlet, then plug the other end of the power cord into the back of the switching AC adapter.

6. Turn the lamp on. Allow the lamp to warm up for at least 15 minutes before using it.

Configuring the OOIIrrad Software

► *Procedure*

Use the following procedure to configure the OOIIrrad software that comes with your HL-2000-CAL:

1. Insert the disk that came with the HL-2000-CAL lamp into the computer.This disk contains two ASCII files containing the same information as the Lamp Calibration Reports that came with the HL-2000-CAL:

   - One file has the calibration numbers for calibrating the spectral response of your system with the lamp and a **bare fiber**. The file name contains the lamp serial number, followed by **FIB.LMP.**

- One file has the calibration numbers when calibrating the spectral response of your system with the lamp and a **CC-3 cosine-corrector and fiber**. The file name contains the lamp serial number, followed by **CC3.LMP.**

2. Copy these two files into your OOIIrrad Irradiance Software directory.

3. Start OOIIrrad Irradiance Software and place the software in **Scope Mode.**

4. Choose the **Select Lamp** option from the Lamp menu. A window opens and prompts you to choose the Lamp Calibration Report file that reflects your optical setup (see Step 1 for details).

5. Choose **Configure Fibers** from the Spectrometer menu. Enter the fiber diameter values for each channel in your setup. If using a bare fiber, enter the fiber's diameter here. If using a fiber with a CC-3 cosine corrector, enter 3,900.

Note:

Whatever optical setup you wish to use for your application, you must also use for calibrating the spectral response of your system. For example, if you are going to use a 200 µm fiber with a CC-3 cosine corrector for your application, you must use the same 200 µm fiber and CC-3 for calibrating the spectral response of your system.

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6. Enter the data acquisition parameters in the appropriate boxes located to the right of the displayed spectrum. The values for Scans to Average and Smoothing Size must be the same for your reference, dark and irradiance scans. You may use a different integration period for your reference scan, but you must use the same integration period for your dark and irradiance scans.

HL-2000-CAL Specifications

This section provides information on the operating environment and specifications of the HL-2000-CAL.

Operating Environment

The following table provides information on optimizing the operating environment of your HL-2000-CAL.

Operating Environment	The HL-2000-CAL Unit . . .
Moisture	Is designed for operation in dry rooms only.
Ventilation	Should be situated so that its location or position does not interfere with proper ventilation.
Heat	Should be situated away from any device that emits excessive heat.
Object and Liquid Entry	Should be positioned so that objects do not fall on top of the unit. Additionally, ensure that no liquids are spilled into the enclosure through openings.

Specifications

Component	Description
Spectral Range (calibrated)	300-1050 nm
Dimensions	9.0 cm x 5.0 cm x 3.2 cm (LWH); 3.5" x 2.0" x 1.25" (LWH)
Power Input	12 VDC/800 mA (regulated)
Power Output	6.5 W
Bulb Life	900 hours (recalibrate after -50 hours of use)
Bulb Color Temperature	3100K
Output to Bulb	5 V / 1.3 A
Output Regulation	0.2% voltage
Time to Stabilized Output	-15 minutes
Connector	SMA 905

Chapter 3

Calibration

Performing Calibration

► *Procedure*

Follow the instructions below to calibrate a spectrometer using the HL-2000-CAL:

1. Click on the **Spectrometer** menu and select **Calibrate**, then select the channel to calibrate. A dialog box opens with the message "Verify lamp was ON for at least 15 minutes for a REFERENCE scan."

2. Ensure that nothing is blocking the light path going to your spectrometer. Your setup (spectrometer, fiber, and sampling optics) used to obtain a reference should be identical to your setup for measuring your sample. Taking a reference spectrum is required before the software can calculate absolute irradiance measurements.

3. Click the **OK** button. Another dialog box opens with the message "Block light path to spectrometer for a DARK scan."

4. Completely block the light path to your spectrometer by inserting an opaque object into the lamp's filter slot (if possible, do not turn off the light source). Taking a dark spectrum is required before the software can calculate absolute irradiance measurements.

5. Click the **OK** button. The spectral response of your system is now calibrated. If you selected **Display calibration info when calculating** in the **Configure Spectrometer** dialog box, you will now see the results of the calibration procedure. The top left graph represents the linear 15th order polynomial regression. The top right graph represents the dark scan. The bottom graph is the calibration curve representing the spectral response of the process.

The calibration procedure is saved in a file named **CHO.CAL** for calibrating the master spectrometer channel, **CH1.CAL** for calibrating the first slave spectrometer channel, and so on.

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