

HG-1 Mercury Argon Calibration Light Source Installation and Operation Instructions

Description

The HG-1 Mercury Argon Calibration Source is a wavelength calibration source for UV-VIS-Shortwave NIR spectrophotometric systems. The HG-1 produces Mercury and Argon lines from 253-1700 nm, and is an ideal lamp to use when performing fast, accurate spectrometer wavelength calibrations.

The HG-1 features an SMA 905 Connector for interfacing with our optical fibers. It operates with a 12 VDC power supply (included with the unit) or 9V battery (not included).

The following sections detail the features of the HG-1 Mercury Argon Calibration Light Sources.



HG-1 Mercury Argon Calibration Light Source

Note

The HG-1 is NOT designed to operate as an excitation source in your experiments. Spectral lines above 922 nm are not easily detectable by Ocean Optics spectrometers.

Parts Included

The HG-1 package includes the following items:

- HG-1 Mercury Argon Calibration Light Source
 - 12 VDC power supply
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WARNING

The beam emerging from the light source contains UV radiation that can cause serious eye injury upon direct contact with the eye. Never look directly into the light source.

The SMA 905 Connector may get extremely hot during operation. After lamp use, allow sufficient time to cool before handling.

Dangerous voltages are present, and there are no user-serviceable parts inside. Additionally, the HG-1 contains mercury. Never open the HG-1.

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
- Ocean Optics software

Connecting the HG-1

Follow the steps below to set up your HG-1 for use.

► Procedure

1. Plug the 12 VDC power supply into a power outlet, then connect the barrel connector of the power supply to the power input on the rear of the HG-1.

or

Alternately, you can use a 9-volt battery (not included) to power the HG-1. Open the battery hatch of the HG-1 and install the 9-volt battery, and then proceed to Step 2.

2. Connect a fiber to the SMA 905 Connector on the HG-1. If your spectrometer does not have an entrance slit, use a 50 μm diameter (or smaller) fiber. Larger fibers and slits result in reduced optical resolution.

Note

If the spectrometer does not have a slit and your experiment requires you to use fibers of varying diameters, you will need to perform a wavelength calibration after changing fibers. You should perform a wavelength calibration each time you unscrew the fiber from the spectrometer and change fiber size.

3. Move the On/Off switch on the HG-1 (next to the SMA 905 Connector) to the On position. The red LED will illuminate to indicate that the HG-1 is powered on.

You have now configured the HG-1 for use.

Calibrating With the Light Source

The information in this section explains how to calibrate your spectrometer's wavelength using the HG-1 light source.

About the Wavelength Calibration

You are going to be solving the following equation, which shows that the relationship between pixel number and wavelength is a third-order polynomial.

$$\lambda_p = I + C_1 p + C_2 p^2 + C_3 p^3$$

Where λ = the wavelength of pixel p ,

I = the wavelength of pixel 0,

C_1 = the first coefficient (nm/pixel),

C_2 = the second coefficient (nm/pixel²)

C_3 = the third coefficient (nm/pixel³)

You will be calculating the value for I and the three C s.

Calibration Requirements for Ocean Optics Spectrometers

To re-calibrate the wavelength of your Ocean Optics spectrometer using the HG-1, you will need the following items:

HG-1-CAL Installation and Operation Instructions

- HG-1 Mercury Argon Calibration Light Source
- Ocean Optics spectrometer and its manual
- An optical fiber (for spectrometers without a built-in slit, a 50- μm fiber works best)
- A spreadsheet program (Excel or Quattro Pro, for example) or a calculator that performs third-order linear regressions

Note

If you are using Microsoft Excel, choose **Tools | Add-Ins** and check **AnalysisToolPak** and **AnalysisToolPak-VBA**.

Calibration Procedure

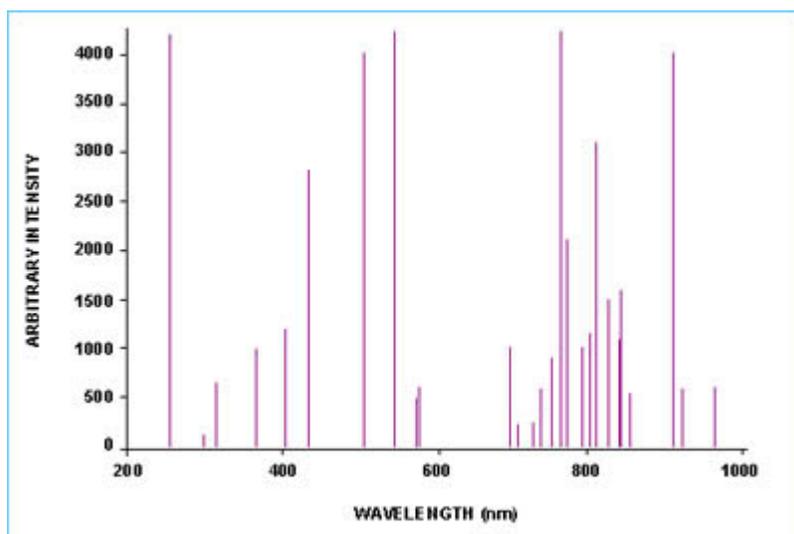
Please see the appropriate manual for your model Ocean Optics spectrometer for instructions on how to calibrate it. Ocean Optics manuals are located at

<http://www.oceanoptics.com/technical/operatinginstructions.asp>.

HG-1 Specifications

The following sections detail the specifications of the HG-1.

Spectral Output



Mercury emission lines are <600 nm. Argon emission lines are >600 nm, and are shown here on an exaggerated amplitude scale.

Strong Hg Emission Lines by Wavelength (nm)

There are more emission lines shown below than printed on the label on the HG-1 housing. The label is intended as a quick, convenient reference and does not list every Ar and Hg emission line that exists.

253.652	404.656
296.728	407.783*
302.150	435.833
313.155	546.074**
334.148	576.960
365.015	579.066

* This spectral line is not evident with spectrometers configured with 300 or 600 lines/mm gratings.

** Spectrometers with 1200, 1800, 2400 or 3600 lines/mm gratings have spectral lines evident at 576.96 nm and 579.07 nm.

Strong Ar Emission Lines by Wavelength (nm)

696.543	800.616*
706.722	811.531
714.704	826.452
727.294	842.465
738.398	852.144
750.387	866.794
763.511	912.297
772.376	922.450
794.818	

* This spectral line is evident only with spectrometers configured with 1800, 2400, or 3600 lines/mm gratings.

Specifications Table

Output	Low-pressure gas discharge lines of Mercury and Argon
Dimensions (in mm):	125.7 x 70 x 25.8
Power consumption:	250 mA at 12 VDC
Power requirements:	12 VDC wall transformer (included) or 9 VDC battery (optional)
Bulb life:	Approx. 3500 hours (at 20 mA)
Internal voltage:	600 volts at 30 kHz
Aperture:	3 mm
Amplitude stabilization:	~ 1 minute
Connector:	SMA 905