

AR-1 Argon Calibration Light Source Installation and Operation Instructions

Description

The AR-1 Argon Calibration Source is a wavelength calibration source for UV-VIS-Shortwave NIR spectrophotometric systems. The AR-1 produces Argon lines from 696-1704 nm, and is an ideal lamp to use when performing fast, accurate spectrometer wavelength calibrations in the NIR range.

The AR-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 AR-1 Argon Calibration Light Sources.



AR-1 Argon Calibration Light Source

Note

The AR-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 AR-1 package includes the following items:

- AR-1 Argon Calibration Light Source
- 12 VDC power supply

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. Never open the AR-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 AR-1

Follow the steps below to set up your AR-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 AR-1.

or

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

2. Connect a fiber to the SMA 905 Connector on the AR-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 AR-1 (next to the SMA 905 Connector) to the On position. The red LED will illuminate to indicate that the AR-1 is powered on.

You have now configured the AR-1 for use.

Calibrating With the Light Source

The information in this section explains how to calibrate your spectrometer's wavelength using the AR-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 AR-1, you will need the following items:

- AR-1 Argon Calibration Light Source
- Ocean Optics spectrometer and its manual
- An optical fiber (for spectrometers without a built-in slit, a 50- μ m 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**.

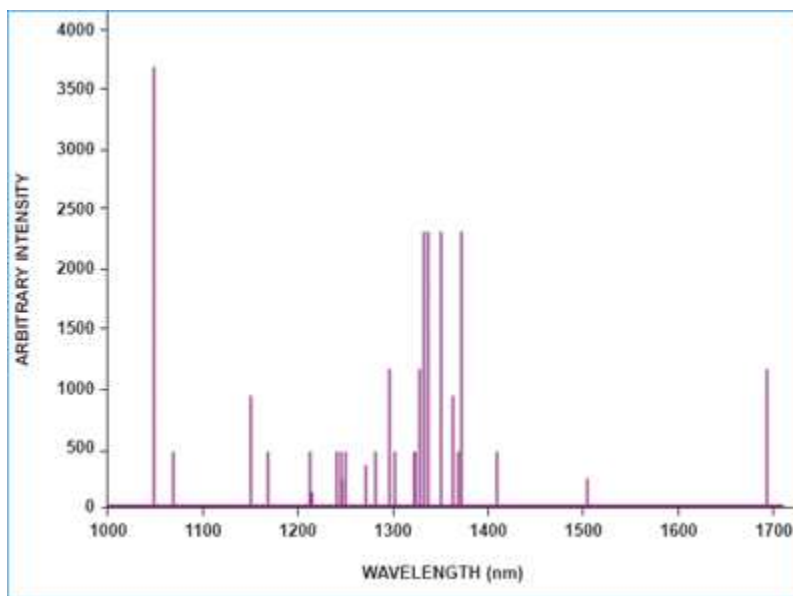
Calibration Procedure

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>.

AR-1 Specifications

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

Spectral Output



Strong AR Emission Lines by Wavelength (nm)

The list below identifies the most prominent Argon peaks:

866.794	1280.274
912.297	1295.666
922.450	1300.826
935.422	1322.811
965.779	1327.264
978.450	1331.321
1047.005	1336.711
1067.357	1350.419
1107.887	1362.266
1144.183	1367.855
1148.811	1371.858
1166.871	1382.572
1171.949	1390.748
1211.233	1409.364
1213.974	1504.650
1234.339	1517.269
1243.932	1532.934
1248.766	1598.949
1270.228	1694.058
1273.342	1704.288

Specifications Table

Output	Low-pressure gas discharge lines of Argon
Spectral range	696 – 1704 nm
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

