

KR-1 Krypton Calibration Light Source Installation and Operation Instructions

Description

The KR-1 Krypton Calibration Source is a wavelength calibration source for UV-VIS-Shortwave NIR spectrophotometric systems. The KR-1 produces Krypton lines from 427-893 nm, and is an ideal lamp to use when performing fast, accurate spectrometer wavelength calibrations.

The KR-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 KR-1 Krypton Calibration Light Sources.



KR-1 Krypton Calibration Light Source

Note

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

- KR-1 Krypton 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 KR-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 KR-1

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

or

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

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

You have now configured the KR-1 for use.

Calibrating With the Light Source

The information in this section explains how to calibrate your spectrometer's wavelength using the KR-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.

$$\lambda_p = I + C_1p + C_2p^2 + C_3p^3$$

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 KR-1, you will need the following items:

- KR-1 Krypton 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**.

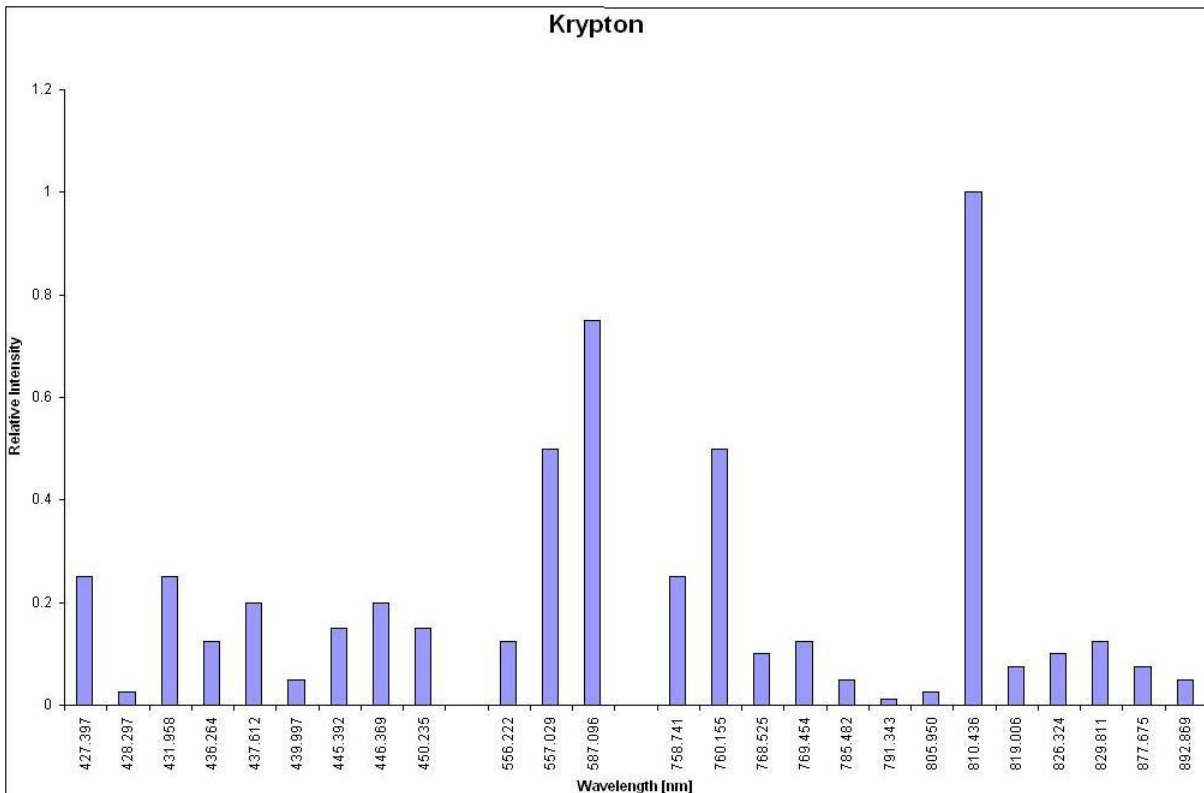
Calibration Procedure

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>.

KR-1 Specifications

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

Spectral Output



Strong KR Emission Lines by Wavelength (nm)

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

Below is a list of wavelengths for Krypton (as well as Neon and Xenon). Wavelengths listed in blue are the ones listed on the calibration lamp's label.

Wavelength	Lamp	Wavelength	Lamp	Wavelength	Lamp	Wavelength	Lamp
341.790	Ne	503.135	Ne	733.930	Xe	904.545	Xe
342.391	Ne	503.775	Ne	738.600	Xe	916.265	Xe
344.770	Ne	508.038	Ne	739.379	Xe	979.970	Xe
345.076	Ne	511.367	Ne	740.040	Xe	992.319	Xe
345.419	Ne	511.650	Ne	743.890	Ne	1083.837	Xe
346.052	Ne	540.056	Ne	747.244	Ne	1117.752	Ne
346.658	Ne	556.222	Kr	748.887	Ne	1152.275	Ne
347.257	Ne	557.029	Kr	753.577	Ne	1181.938	Kr
349.806	Ne	576.441	Ne	754.404	Ne	1220.353	Kr
350.121	Ne	582.015	Ne	755.979	Xe	1317.741	Kr
351.519	Ne	585.249	Ne	758.468	Xe	1363.422	Kr
352.047	Ne	587.096	Kr	758.741	Kr	1365.706	Xe
359.353	Ne	588.189	Ne	760.155	Kr	1414.244	Xe
360.017	Ne	594.483	Ne	764.391	Xe	1442.679	Kr
363.366	Ne	597.553	Ne	768.525	Kr	1473.281	Xe
368.573	Ne	602.000	Ne	769.454	Kr	1473.444	Kr
370.122	Ne	607.433	Ne	780.265	Xe	1537.204	Kr
431.958	Kr	609.616	Ne	785.482	Kr	1541.839	Xe
436.264	Kr	612.884	Ne	788.132	Xe	1605.328	Xe
437.612	Kr	614.306	Ne	791.343	Kr	1672.815	Xe
439.997	Kr	616.359	Ne	796.734	Xe	1689.676	Kr
445.392	Kr	621.728	Ne	805.726	Xe	1800.223	Kr
446.369	Kr	626.649	Ne	805.950	Kr	1816.733	Kr
450.235	Kr	630.479	Ne	806.134	Xe	2190.851	Kr
452.186	Xe	633.442	Ne	810.436	Kr	1262.339*	Xe
462.420	Xe	638.299	Ne	819.006	Kr	1520.310*	Kr
466.849	Xe	640.225	Ne	823.163	Xe	1620.872*	Kr
469.097	Xe	650.653	Ne	826.324	Kr	1647.29*	Xe
469.804	Xe	653.288	Ne	826.652	Xe	1656.023*	Xe
473.415	Xe	659.895	Ne	829.811	Kr	1755.350*	Kr
479.262	Xe	667.828	Ne	837.761	Ne	1763.882*	Xe
480.702	Xe	671.704	Ne	849.536	Ne	1785.738*	Kr
482.971	Xe	692.947	Ne	877.675	Kr	1790.45*	Xe
484.329	Xe	703.241	Ne	878.375	Ne	1809.09*	Xe
491.651	Xe	717.394	Ne	881.941	Xe	1832.53*	Xe
492.315	Xe	724.512	Ne	892.869	Kr	1959.94*	Xe
						1984.638*	Xe

Specifications Table

Output	Low-pressure gas discharge lines of Krypton
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