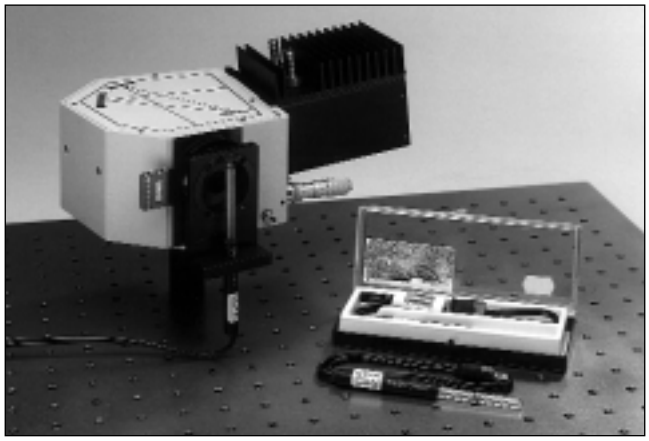
PENCIL STYLE SPECTRAL CALIBRATION LAMPS



Spectral Calibration Lamp mounted to MS125™ Spectrograph, using the 77251 Lamp Mount. A diode array detector is on the output of the MS125™.

- **Compact and simple tools for calibrating spectral instruments**
- **Narrow, discrete UV to IR wavelengths**
- **Excellent stability**
- **Supported by mounting and fiber optic accessories for efficient coupling**

These “Pencil Style” mercury and rare gas sources are used for wavelength calibration of spectroscopic instruments such as monochromators, spectrographs, and spectral radiometers. They produce narrow, intense lines from the excitation of various rare gases and metal vapors. We also offer a full range of accessories, from mounts and holders to fiber optic adapters and aperture shields.

WHICH LAMP DO I CHOOSE?

We offer six lamps; choose the lamp or lamps which suit your wavelength range, using Table 1 as a guide. The single gas lamps (Xe, Ar, Ne and Kr) have distinct lines; the Hg(Ar) and He(Ne) share the mercury lines, but also have distinct differences:

Mercury (Argon) Lamp

- Preferred lamp for calibration, using mercury line spectrum
- Temperature insensitive
- Average intensity is constant and reproducible
- Longer life
- Prefered lamp for calibration using Mercury line spectrum

The 6035 Hg(Ar) lamp is insensitive to temperature. It requires a two minute warm-up for the mercury vapor to dominate the discharge, then 30 minutes for complete stabilization. The average intensity is remarkably constant and reproducible after the thermal conditions stabilize.

Mercury (Neon) Lamp

- Emits additional lines in the VIS-NIR
- Temperature dependent

The 6034 Hg(Ne) Lamp is temperature dependent. When run in normal lab ambient, the output is very similar to that of the Hg(Ar) lamp, that is the characteristic mercury line spectrum. Forced air cooling (i.e. from a muffin fan) of the lamp adds the neon lines to the output. This spectrum has a large number of useful calibration lines in the longer VIS and NIR regions; see Table 1.

Table 1 Usable Wavelengths of Spectral Calibration Lamps

Lamp Type (Model No.)					
Hg(Ar) (6035)	Hg(Ne) (6034)	Xenon (6033)	Argon (6030)	Neon (6032)	Krypton (6031)
Wavelength (nm)					
184.9	253.65	418.0	294.3	585.25	427.4
187.1	296.73	419.3	415.9	594.48	432.0
194.2	302.15	433.1	420.1	607.43	435.5
253.65	312.57	439.6	427.7	609.62	457.7
265.4	313.15[1]	444.8	476.5	614.31	461.9
284.8	313.18[1]	446.2	488.0	616.36	465.9
302.2	365.02	473.4	696.54	621.73	473.9
312.57[1]	404.66	480.7	738.40	626.65	476.6
313.15[1]	435.84	483.0	750.39	630.48	483.2
313.18[1]	546.07	508.1	751.47	633.44	557.0
320.8	576.96	529.2	763.51	638.30	587.1
326.4	579.07	531.4	772.38[1]	640.11[1]	758.74
345.2	614.31*	554.0	772.42[1]	640.22[1]	760.15
365.02	638.30*	541.9	794.82	650.65	769.45
404.66	640.11[1]*	547.2	801.48	653.29	769.45
435.84	640.22[1]*	597.7	811.53	659.90[1]	785.48
546.07	650.65*	603.6	826.45	660.29[1]	805.95
576.96	703.24*	605.1	840.82	667.83	810.44
579.07	1013.98	609.8	842.46	671.70	811.29
615.0	1128.74	659.5	912.3	692.95	819.00
1014.0	1357.02**	680.5	922.4	703.24	826.32
1357.0	1367.35**	699.1	965.8	717.39	829.81
1692.0	1529.58	823.2	1047.1	724.52	829.81
1707.3	1688.15**	828.0	1331.3	743.89	850.9
1711.0	1692.02**	834.7	1336.7	783.9	877.7
	1694.20**	840.9	1371.8	792.7	829.9
	1707.28**	881.9	1694.0	793.7	975.2
	1710.99**	895.2		794.3	1363.4
	1732.94**	980.0		808.2	1442.7
	1813.04**	992.3		811.9	1523.9
	1970.02**	1262.3		812.9	1533.4
		1365.7		813.6	1678.51
		1473.3		825.9	1689.04
		1541.8		826.6	1689.68
		1672.8		826.7	1693.58
		1732.5		830.0	1816.73
		2026.2		836.6	
		2482.4		837.8	
		2626.9		841.7	
		2651.0		841.8	
				846.3	
				848.8	
				849.9	
				854.5	
				857.1	
				859.1	
				863.5	
				864.7	
				865.4	
				865.6	
				867.9	
				868.2	
				870.4	
				877.2	
				878.0	
				873.4	
				885.4	
				920.7	
				930.1	
				932.7	
				942.5	
				948.7	
				953.4	
				1056.2	
				1079.8	
				1084.5	
				1114.3	

[1] **Adjacent lines will remain unresolved on many spectroscopic systems.**

* **These are neon lines brought out by forced air cooling.**

** **These lines are very weak, but forced air cooling makes them more useful.**

LAMP CONSTRUCTION

We call these “Pencil” lamps because of their size and shape. They are made of double bore quartz tubing with two electrodes at one end sealed into a phenolic handle. You can hold them with simple laboratory clamps, operate them in any position, and insert them into restricted openings to illuminate enclosed areas.

A 1 ft. (305 mm) long cord with male connector is attached to the end of the handle for connection to the power supply.

POWER SUPPLIES; AC vs DC

We offer different power supplies for different needs:

AC Supplies

- Low Cost
- Stable operating current
- CE Marked

Choose an AC supply if output variations are not a concern, and if you are only operating one or two line lamps. This mode of operation also prolongs the life of the lamps.

DC Supplies

- Variable current output lets you run any of the lamps
- Significantly more stable output
- Also runs as an AC supply

Use a DC supply if you are calibrating multichannel detectors, such as our InstaSpec™ PDAs or CCDs, or if you are using various lamps, as these supplies run all our Spectral Line Lamps (AC supplies are lamp specific). Fig. 1 compares the output stability between the AC and DC supplies.

Note: Prolonged use in a single polarity DC Mode will shorten lamp life due to electrophoresis.

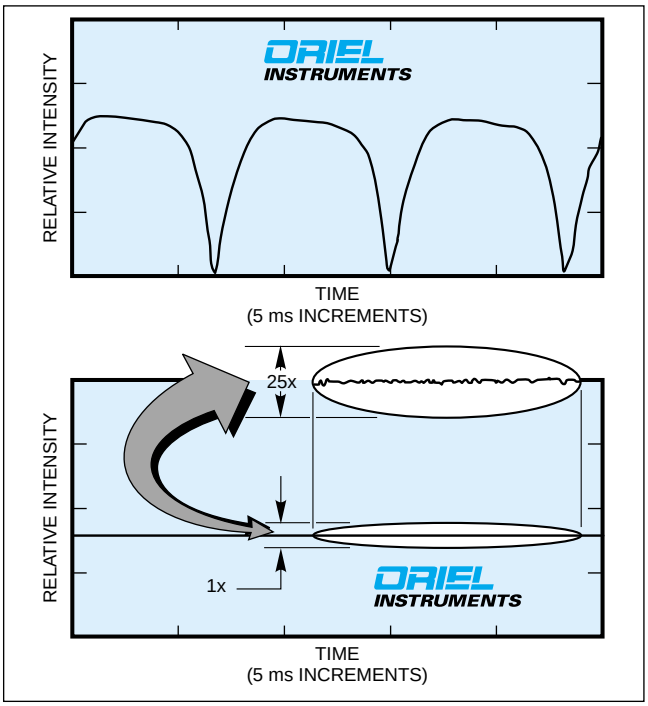


Fig. 1 Output intensity variation of 6034 Hg(Ar) Lamp when operated by 6047 AC Power Supply (top) and 6060 DC Power Supply (bottom).

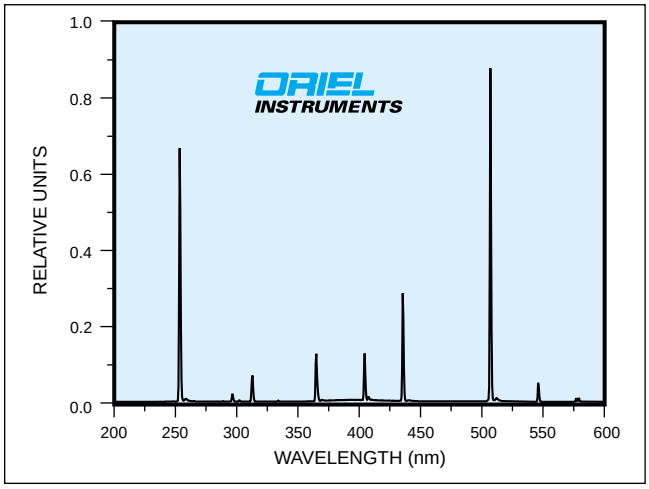


Fig. 2 Output spectrum of 6035 Hg(Ar) Lamp, run at 18 mA, measured with MS257™ 1/4 m Monochromator with 50 µm slits.

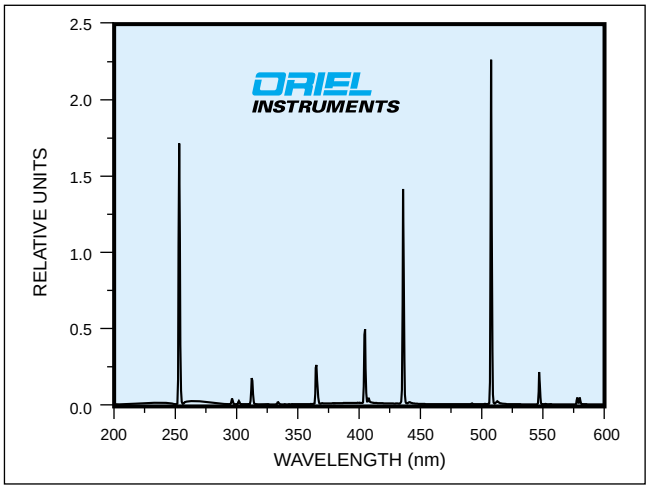


Fig. 3 Output spectrum of 6034 Hg(Ne) Lamp, run at 18 mA, measured with MIR 8000™ FT-IR with CaF_2 beam splitter and InGaAs Detector.

OBSERVED SIGNAL

The curves on this and the following page illustrate the relative signal strength observed at various wavelengths. The signal can differ very significantly from these curves due to the spectral throughput of the optical system, e.g. monochromator and its grating, or FT-IR and its beam splitter, and the spectral responsivity of the detector being convolved with the spectral properties of the incident light to produce that signal. The differences can be pretty insignificant or quite drastic depending on the exact experimental conditions.

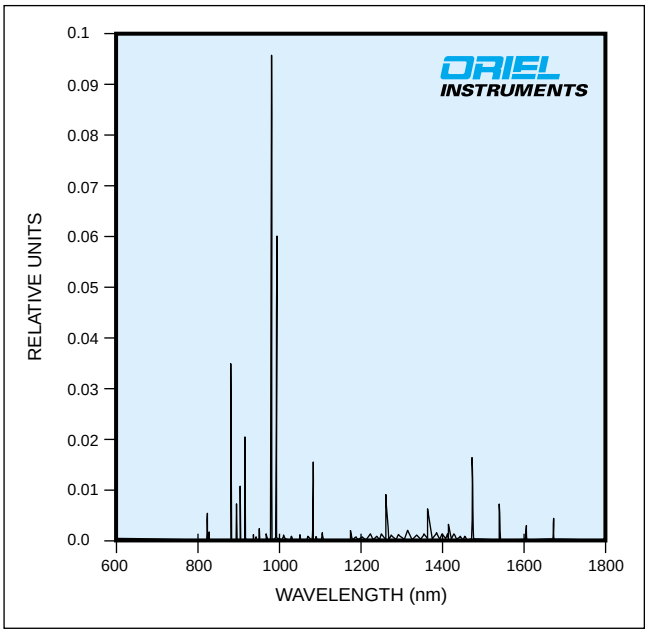


Fig. 4 Output spectrum of 6033 Xenon Lamp, run at 6 mA, measured with MIR 8000™ FT-IR with CaF_2 beam splitter and InGaAs Detector.

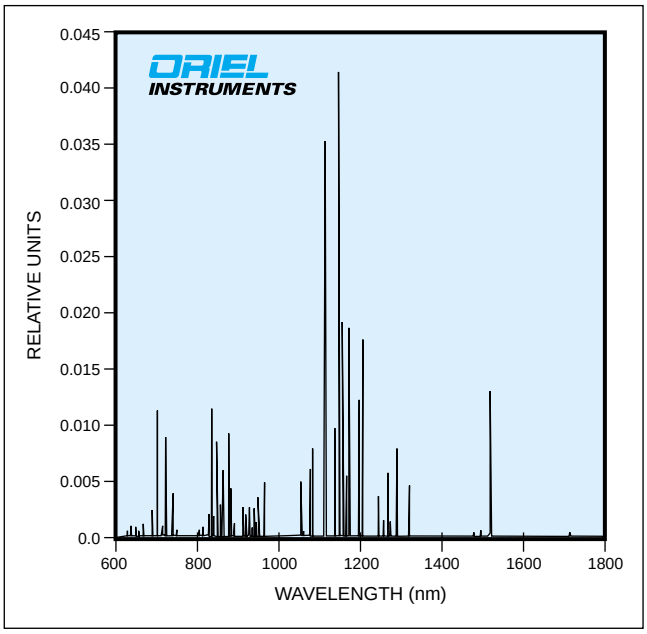


Fig. 6 Output spectrum of 6032 Neon Lamp, run at 6 mA, measured with MIR 8000™ FT-IR with CaF_2 beam splitter and InGaAs Detector.

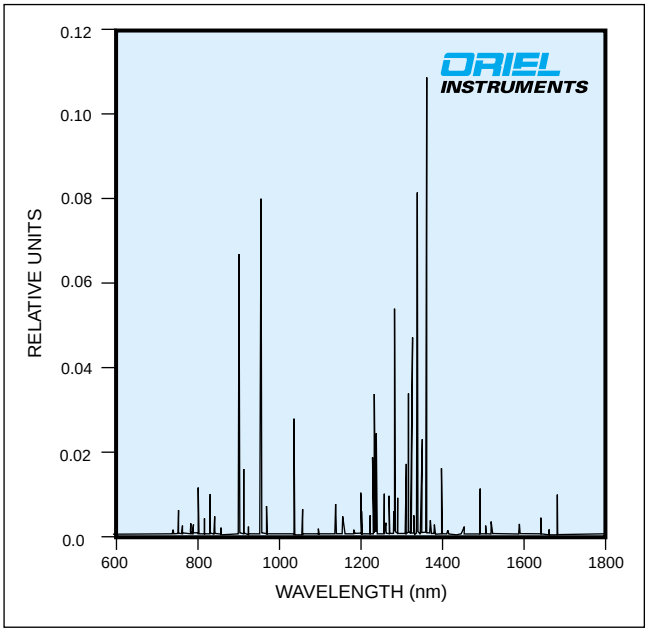


Fig. 5 Output spectrum of 6030 Argon Lamp, run at 10 mA, measured with MIR 8000™ FT-IR with CaF_2 beam splitter and InGaAs Detector.

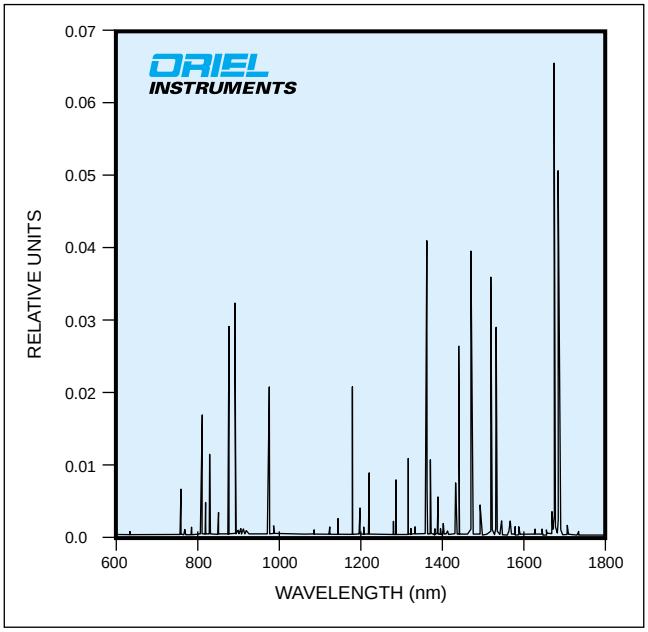
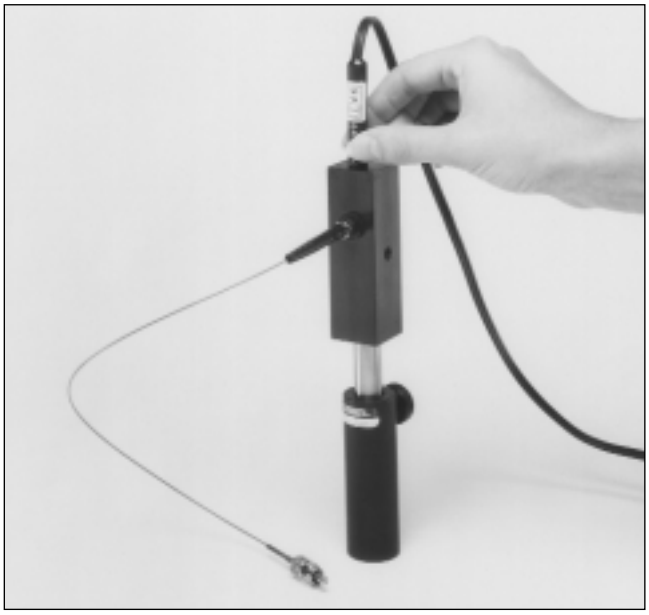


Fig. 7 Output spectrum of 6031 Krypton Lamp, run at 10 mA, measured with MIR 8000™ FT-IR with CaF_2 beam splitter and InGaAs Detector.



6035 Hg(Ar) Lamp in 6058 Fiber Optic Accessory, with fiber.

ACCESSORIES

The following accessories facilitate the coupling of these lamps to our instruments.

Spectral Calibration Lamp Mount

The 77251 Mount holds a calibration lamp at the input slit of an Oriel Monochromator or Spectrograph, or other 1.5 Inch Series male flanged component.

Fiber Optic Accessory

The 6058 Fiber Optic Accessory holds the face of an SMA terminated fiber close to the lamp to collect a portion of the light output for spectral calibration purposes. 1/4-20 tapped holes on four of the faces allow rod mounting in various configurations.

Rod Mounted Lamp Holder

If you simply want to hold the lamp in open air, use the 63670 Holder (shown in photograph on following page). It holds the lamp on an optical rod for vertical lamp operation or on a 90° Rod Connector for horizontal operation (the lamps operate in any orientation). The 63670 Mount includes a 1.75 inch (44.5 mm) long optical rod.

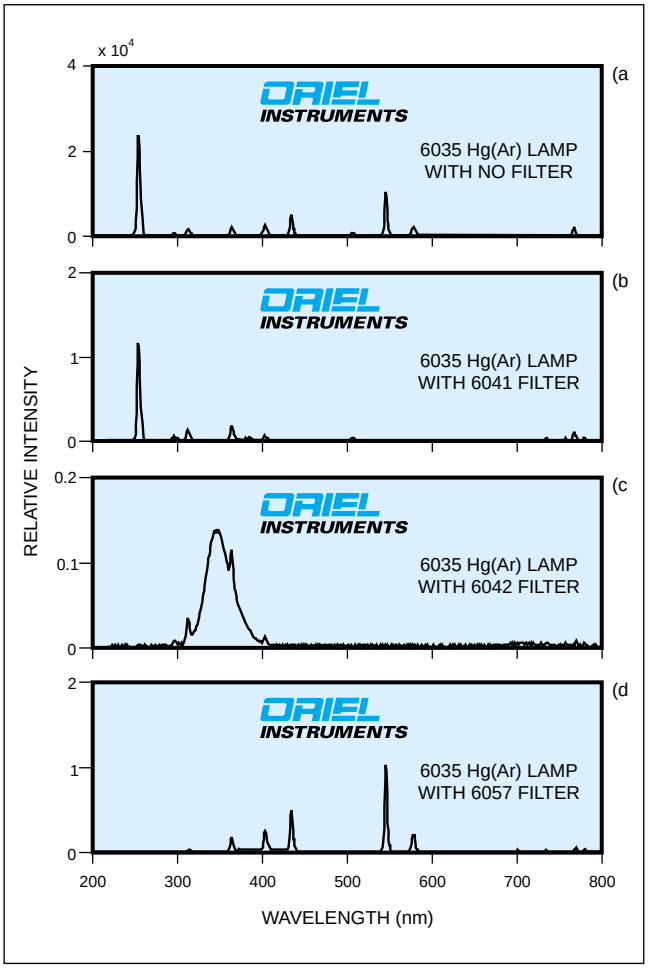


Fig. 8 Relative line intensities of 6035 Lamp with different filters.

Booklet of Spectra

The 6052 is a booklet of typical spectra of these pencil style spectral calibration lamps.

Filters

We offer filters which fit over the lamp to block a specific wavelength region Fig. 8. We offer the following models:

- **6041 Short Wave Filter**: this filter absorbs the visible lines.
- **6042 Long Wave Conversion Filter**: this model attenuates the 253.7 nm Hg line and fluoresces in the 300-400 nm region.
- **6057 Glass Safety Filter**: this filter protects you from the lamp's intense UV lines. It completely absorbs the 253.7 nm Hg line and attenuates the 312.6 nm line.

Aperture Shields

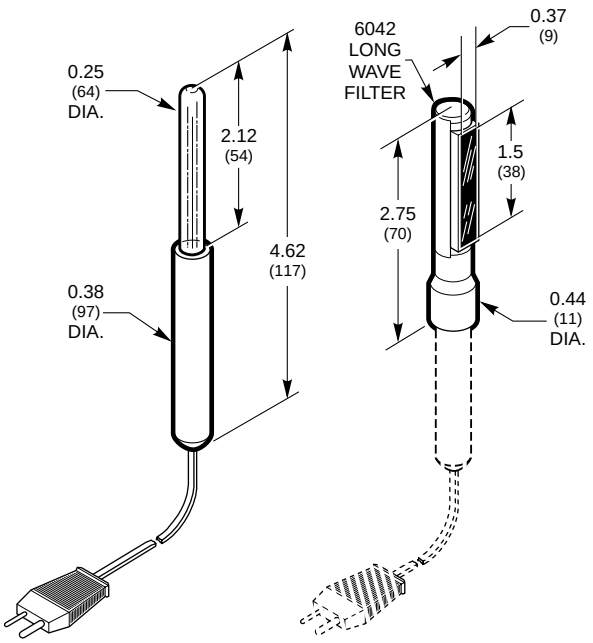
The shields listed below fit over the lamps to limit the radiation area. We offer three aperture sizes:

- **6038 Pinhole Shield**: 0.040 inch (1 mm) diameter
- **6039 Small Aperture Shield**: 0.313 x 0.375 inches (8 x 9.5 mm)
- **6040 Large Aperture Shield**: 0.188 x 1.50 inches (4.8 x 38 mm)

6035 Hg(Ar) Lamp in 63670 Holder with 6047 Power Supply.

SAFETY CONSIDERATIONS

Exposure to UV radiation, even low intensity UV, may cause severe damage to the eyes and skin. We recommend you wear protective eyewear and gloves with any UV source.



Dimensions in inches (mm)

Fig. 9 Dimensional diagram of Pencil Style Calibration Lamps, and 6042 Long Wave Filter.

SPECIFICATIONS AND ORDERING INFORMATION

Spectral Calibration Lamps

Lamp Type	Operating Current (mA)	Rated Life* (Hrs)	Model No.	Price ($)
Hg(Ar)	18, ±5	5000 (@18 mA)	**6035**	
Hg(Ne)	18, ±5	500	**6034**	
Argon	10	500	**6030**	
Krypton	10, ±4	1000	**6031**	
Neon	10, ±4	250	**6032**	
Xenon	6, ±3	250	**6033**	

*** This data is for AC operation**

Power Supplies (AC Power Supplies are CE marked)

Type	For These Lamps	Output Current* (mA)	110 V, 60 Hz		220 V, 50 Hz	
			Model No.	Price ($)	Model No.	Price ($)
AC	Hg(Ar), Hg(Ne)	18	**6047**		**6048**	
	Ne and Xe	6	**6043**		**6044**	
	Hg(Ar), Ar, Kr	10	**6045**		**6046**	
DC	Hg(Ar), Hg(Ne), Ne, Xe, Ar, Kr	6 to 20	**6060**		**6061**	

*** Do not run the lamps at more than the rated operating current; you can damage the phenolic handle.**

Lamp Accessories

6052 Booklet of Spectra

6038 Pinhole Shield
0.040 inch (1mm) diameter aperture

6039 Small Aperture Shield
0.313 x 0.375 inch (8x9.5 mm) aperture

6040 Large Aperture Shield
0.188 x 1.5 inch (4.8x38 mm) aperture

6041 Short Wave Filter**5.00**

6042 Long Wave Filter

6057 Glass Safety Filter

6058 Fiber Optic Accessory
With SMA Adapter

63670 Lamp Holder
1.75 inch long optical rod included

77251 Spectral Calibration Lamp Mount
With 1.5 inch Series female flange