RESONANCE LTD
Optical Solutions & Technologies

24W RF-Powered Light Sources Brochure

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Description

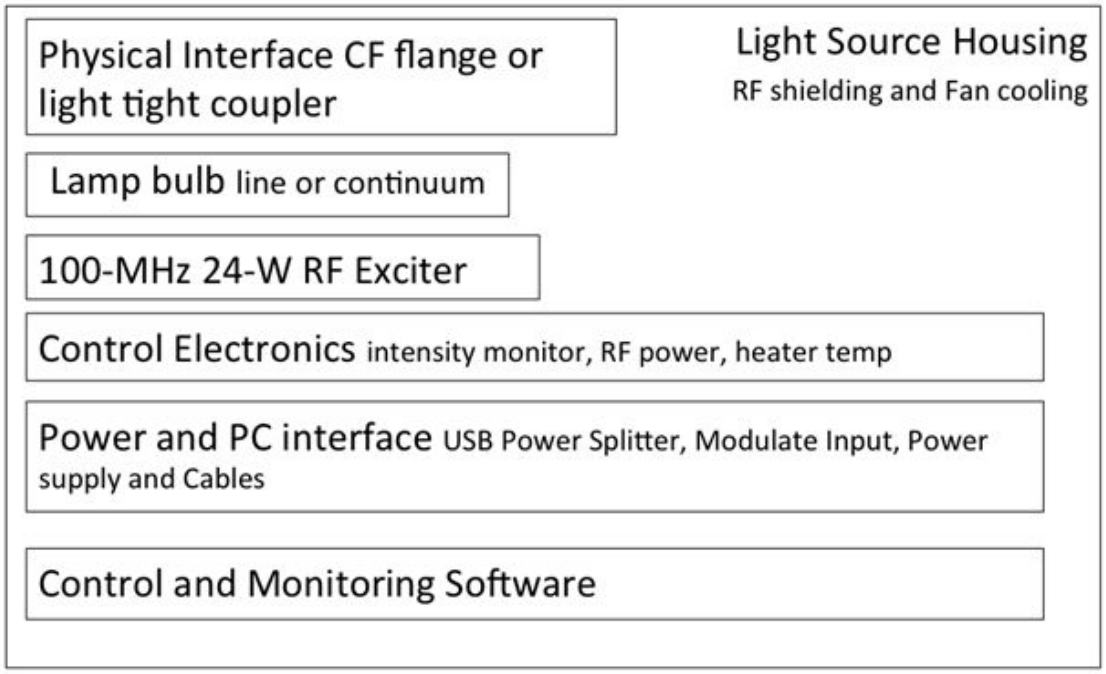
The *Resonance* 24-W RF-powered Light sources are reliable, compact, and maintenance-free sources of gas spectral lines and continua from the 25 to 7,000 NM. These light sources are sealed with UV/IR windows, packaged in EMI-shielded enclosures, and have operating lives of thousands of hours. Standard and custom mounting flanges are offered to adapt the source to the user's optical system or vacuum chamber.

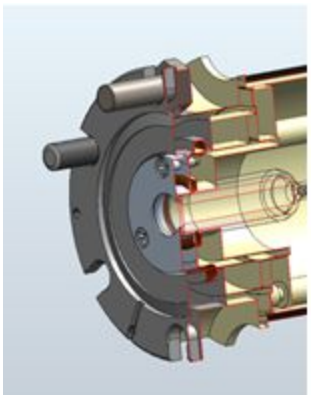
Common Features of 24W RF-Powered Light Sources

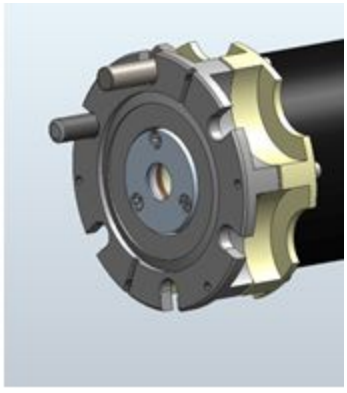
- 24W RF exciter 100 MHz
- EMI shielded enclosure
- Control and Monitoring Electronics include
  - Intensity Monitor (on selected models)
  - Case Temp Monitor
  - Heater Control (as required in solid source lamps)
- Modulation 5V off 0V on (default on) 0 to 400 Hz.
- USB control (excluding EUV-XL-L flowlamp)
- 100 to 250V AC, DC power supply
- Vacuum Interface or Optical Interface for lamps in UV Vis region
- OEM versions available
- Control and Monitoring Lamp PC software interface includes
  - Control panel for changing lamp setup
  - Data logging and display and file saving

Diagram

Block Diagram for 24W RF-Powered Light Sources







Lamp bulb mounting for KrLM-L, XeLM-L, KrCM-L, XeCM-L etc.

Configurations

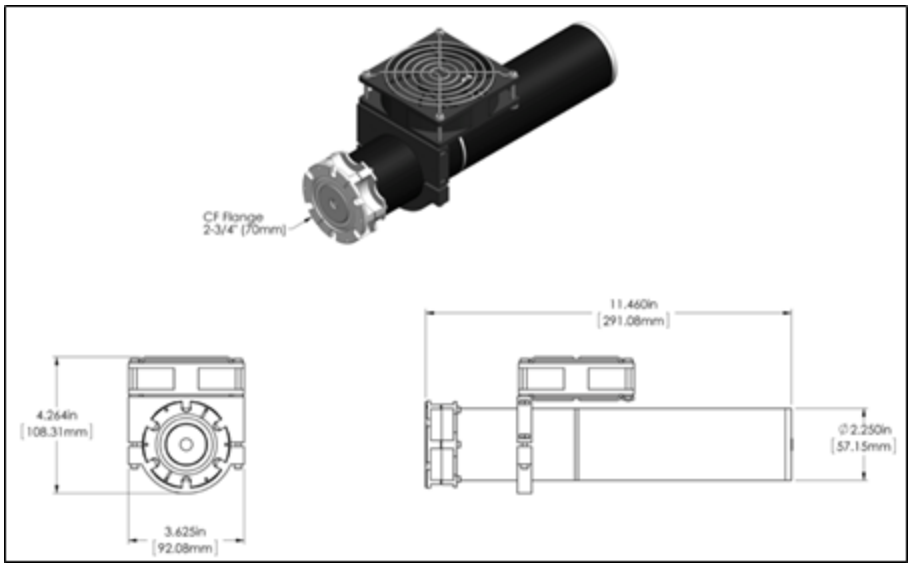


Figure 1: Configuration of all L, LOT Models except EUV-XL-L shown in fig. 3

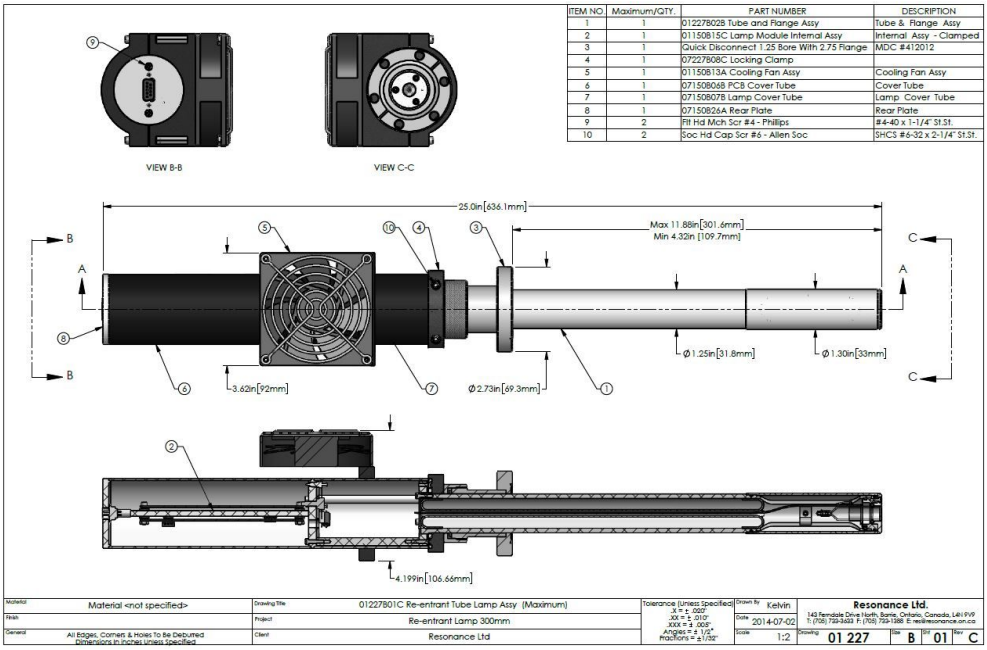
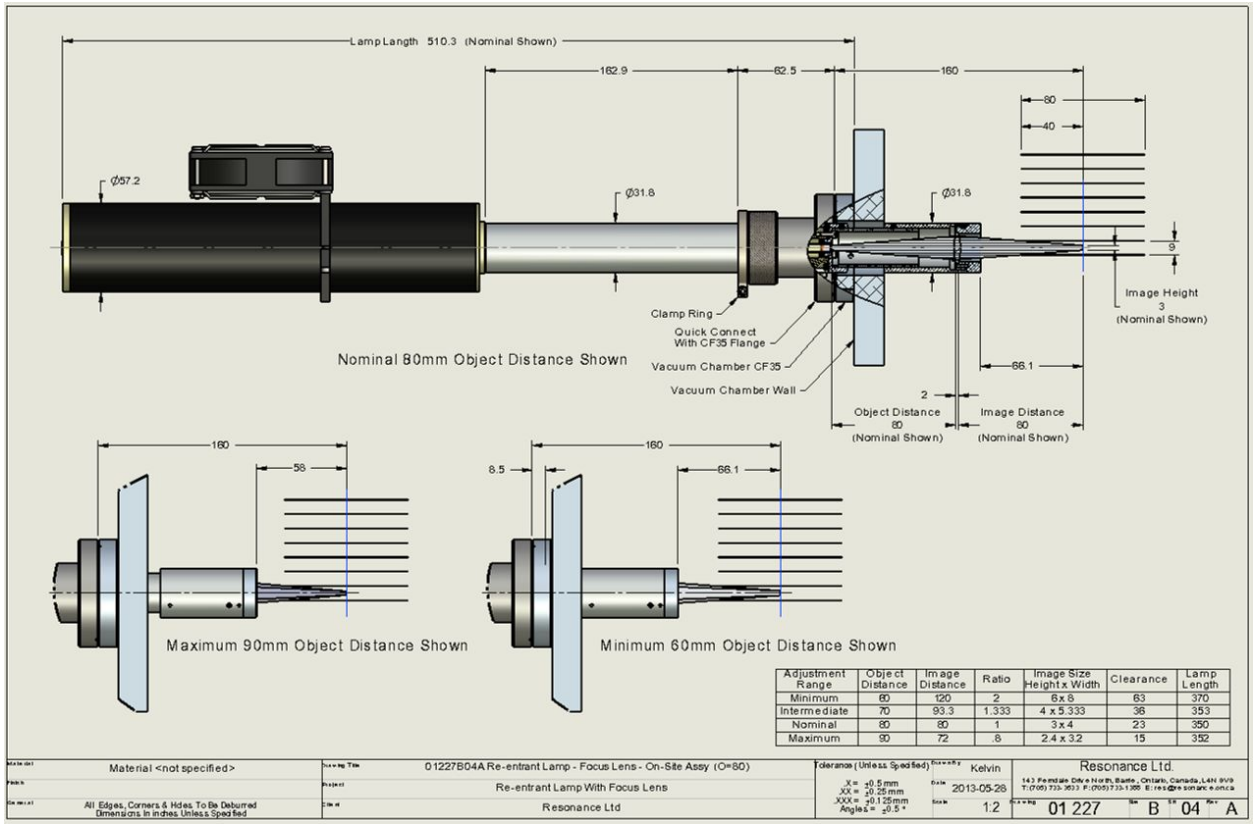


Figure 2: Configuration of all LDQ12 Models (see table 1)



Adjustment Range	Object Distance	Image Distance	Ratio	Image Size Height x Width	Clearance	Lamp Length
Minimum	60	120	2	6 x 8	63	370
Intermediate	70	93.3	1.333	4 x 5.333	36	353
Nominal	80	80	1	3 x 4	23	350
Maximum	90	72	.8	2.4 x 3.2	15	352

Material <not specified>	01227B04A Re-entrant Lamp - Focus Lens - On-Site Assy (O=80)	Tolerance (Unless Specified) X = ±0.5 mm XX = ±0.25 mm XXX = ±0.125 mm Angles = ±0.5 °	Drawing by: Kelvin
	Re-entrant Lamp With Focus Lens		Date: 2013-05-26
All Edges, Corners & Holes To Be Deburred Dimensions In inches Unless Specified	Resonance Ltd		Scale: 1:2
			Resonance Ltd. 143 Ferndale Drive North, Barrie, Ontario, Canada, L4N 9V9 T: (705) 733-3533 F: (705) 733-1355 E: res@resonance.on.ca
			Drawing No: 01 227 Size: B Sh: 04 Rev: A

Figure 2 (option): LQD Lamp with Optional Front Focusing Lens

Configurations (continued)

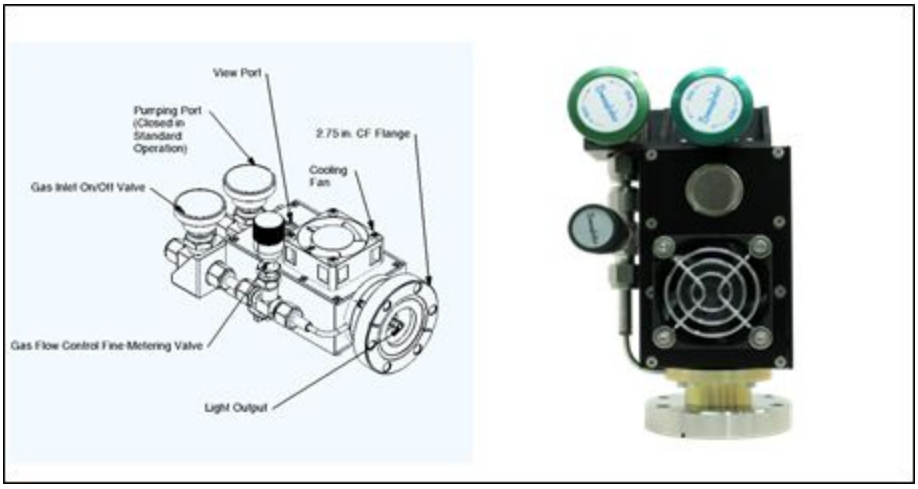


Figure 3: Configuration of EUV-XL-L model (28-Watt RF-Powered Flow Lamp)

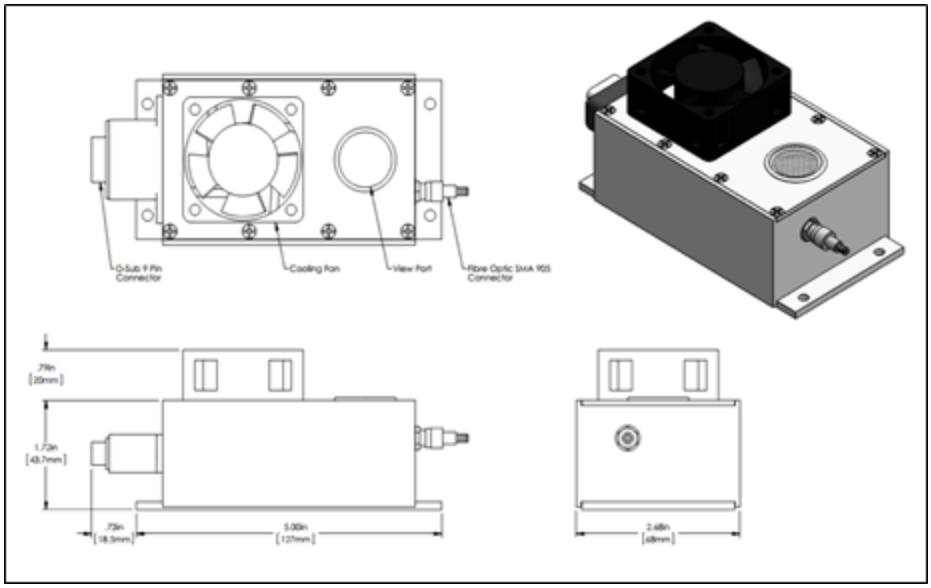


Figure 4: Configuration of LFO Fiber-Optic-Output Lamps

Model Features

Model	Line Continuum Molecular	Window	Principal Lines/Continua of Interest	Thermally Controlled Gas Source	Distance of Lamp Front (window) into Vac. Chamber in cm.	Heater Control and Monitor	USB Lamp Control Interface	Optically Thin Version for Fluorescence/ Absorption	Notes
EUV-XL-L	L, M	None	58	N	NA	Option	Option	N	Reflective Tube Available
KrLM-L	L	MgF2	116.5, 123.6	N	0	N	Y	N	
KrLM-LQD12	L	MgF2	116.5, 123.6	N	11 – 30	N	Y	N	
ArLL-L(1)	L	LiF	104, 106	N	0	N	Y	N	
XeLM-L	L	MgF2	147	N	0	N	Y	N	
XeLM-LQD12	L	MgF2	147	N	11 – 30	N	Y	N	
HHeLCMM-L *	L, C, M	MgF2	122, 160, 240	Y	0	Y	Y	Y	Spectrum varied with heater
DHeLCMM-L	L, C, M	MgF2	122, 160, 240	Y	0	Y	Y	Y	Spectrum varied with heater
HgArLQ-L	L	MgF2	185, 254	Option	0	Option	Y	Y	
OHeLM-LOT	M	MgF2	130	Y	0	Y	Y	Y	Suitable for Fluorescence
NHeLM-LOT	M	MgF2	120	Y	0	Y	Y	Y	Suitable for Fluorescence
ClHeLM-LOT	M	MgF2	118	Y	0	Y	Y	Y	Suitable for Fluorescence
ARCM-L	L, C	MgF2	125c	N	0	N	Y	Y	Continuum 30nm Wide
KrCM-L	L, C	MgF2	116.5, 123.6, 145c	N	0	N	Y	NA	Continuum 30nm Wide
XeCM-L	L, C	MgF2	147, 172c	N	0	N	Y	NA	Continuum 40nm Wide
XeCM-PC	L, C	MgF2	147, 172, 240	N	0	N	Y	NA	Xe cont. Phos 220 – 250nm
OHArMQ-LOT	M	QTZ	300	Y	0	Y	Y	Y	Suitable for Fluorescence
NOArMQ-LOT	M	QTZ	230	Y	0	Y	Y	Y	Suitable for Fluorescence
COArMM-LOT	M	MgF2	150	Y	0	Y	Y	Y	Suitable for Fluorescence
OArLP-L	L	Pyrex	557.7	N	0	N	Y	NA	Aurora Green Line
O2ArLP-L	M	Pyrex	Atm. Bands	N	0	N	Y	NA	Airglow O2 Atm. Bands
KrLP-LFO	L	Pyrex	557	N	NA	N	N	NA	Simulates Aurora
NeLP-LFO	L	Pyrex	630	N	NA	N	N	NA	Simulates Aurora

(1) Special Order *also called HHeLM-L, H2HeCM-L and H2HeCW-L ** *also called DHeLM-L

Appendices

Specifications for Hydrogen and Deuterium Light Sources HHeLCMM-L, DHeLCMM-L

The Hydrogen or Deuterium Light sources comes standard with everything needed to produce VUV radiation in the 110 to 200 nm region. A heater on the light source bulb generates H2 or D2 in the light source. This allows the user to operate the light source at low H2/D2 levels for an "optically thin" Lyman-Alpha line or a multiple-lined H2 or D2 spectrum in the 110 to 165 nm region and a continuum between 165 and 375 nm.

- Continuously variable heater temperature setting that allows:
  - "Optically thin" source of Lyman-Alpha radiation (121.6 nm) or with heater adjustment a broadband VUV UV light source with output from 112 to 400 NM.
  - Hydrogen/Deuterium spectral output from 112 to 6000 NM.

- Air-cooled, optically stable (Typically < 1% drift per hour)

- Longer lifetime than most available Lyman-Alpha sources owing to an internal source of hydrogen

- Breakout box for RS-232 telemetry, BNC modulation input (if equipped), power switch, and USB interface for interface software (see software manual)

- "Smart Light Source" software allows for precise control and monitoring of light source parameters (heater, RF power etc.)
  - Visible NIR source emission intensity graphing and logging for tracking source stability.
  - Temperature and RF power logging and graphing via graphical chart-recorder interface
  - Excel-friendly .csv output format for data saving

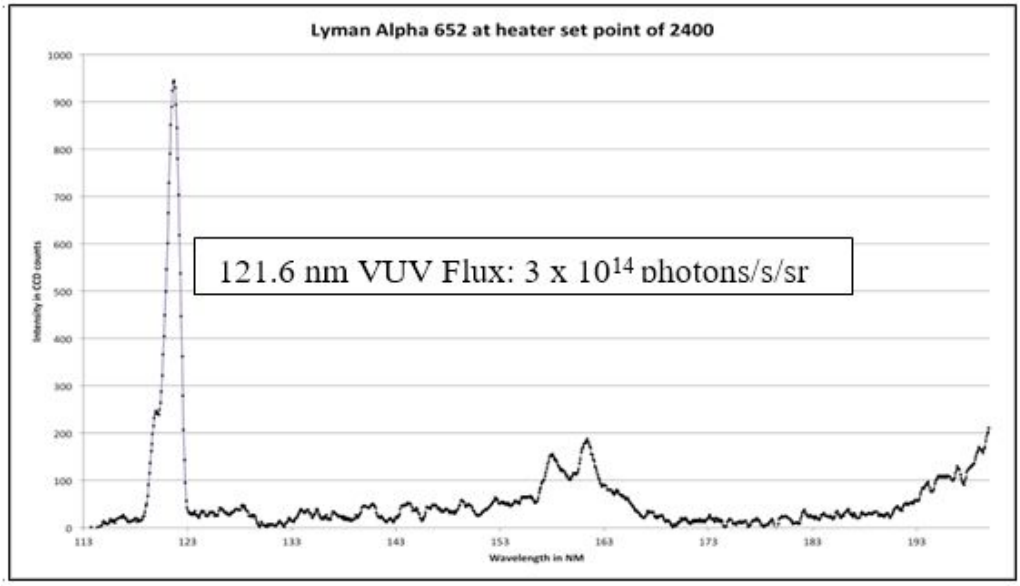
- Configurations
  - HHeLM-L, HHeLM-LOT are physically identical but have bulbs selected for high Lyman Alpha output which is verified by taking VUV spectra. They are delivered with the heater setting optimized for lyman alpha output. The HHeLM-LOT are additionally verified to have an "optically thin" Lyman alpha line by measurement of the absorption of the VUV emission by atomic hydrogen.
  - The H2HeCM-L and H2HeCW-L light sources have the same physical configurations as the HHeLM series except for the lamp bulbs. Lamp bulbs in

these lamps are configured for concentration of the plasma along the bulb axis. This allows operation at higher H2 pressures which increases optical power the 110 to 165 nm H2 molecular and the 165 to 400 nm H2 continuum spectra. The H2HeCM-L bulbs are optimized for flood applications while the H2HeCW-L bulbs are optimized for coupling to wavelength filtering devices such as monochromators.

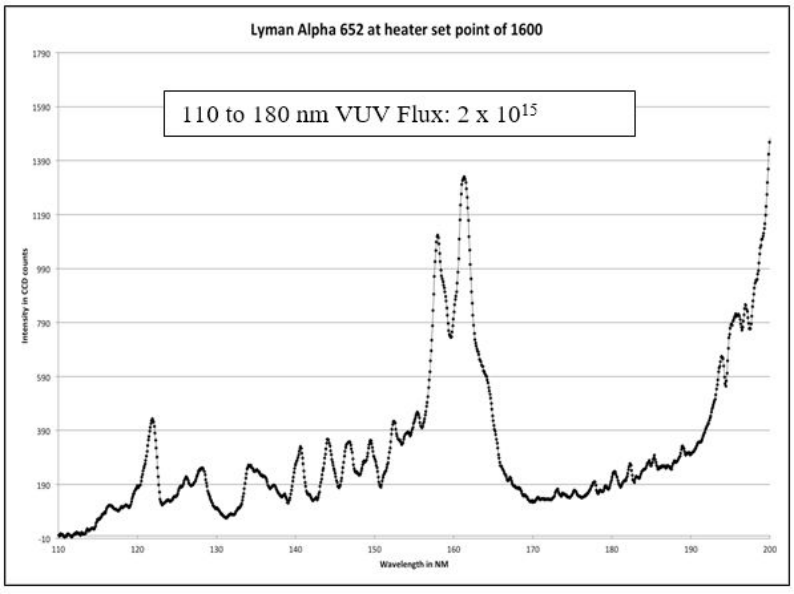
Model Number	HHeLM-LOT	HHeLM-L	HHeLM-LOEM	units
Status	Production	Production	Production	
Peak WL (nm)	121.567	121.567	121.567	nm
Peak WL H2 VUV	110-165	110-165	110-165	nm
Peak WL UV	165-400	165-400	180-400	nm
VUV Flux H Ly Alp	3 x 1014	3 x 1014	3 x 1014	Photons/second/steradian
VUV Flux H2	<1 x 1014	<1.5 x 1014	2 x 1014	Photons/second/steradian
Full angle output cone	45	45	45	Degrees
Bulb window location	0	0	0	cm
Window CA	0.8	0.8	0.8	cm
Modulation	Y	Y	As option	
Standard flanges	2.75 " CF	2.75 " CF	2.75 " CF	inches
Features	-Calibration against H atoms in addition to NIST traceable intensity calibration -H2 source is adjustable with internal heater	-NIST traceable intensity calibration -H2 source is adjustable with internal heater	-H2 source is adjustable with internal heater -Control electronics separate from main lamp box (can be moved >60 cm from lamp.	

Hydrogen Light Source VUV and UV Output Spectra

Lamp spectrum with Heater set to 45 C

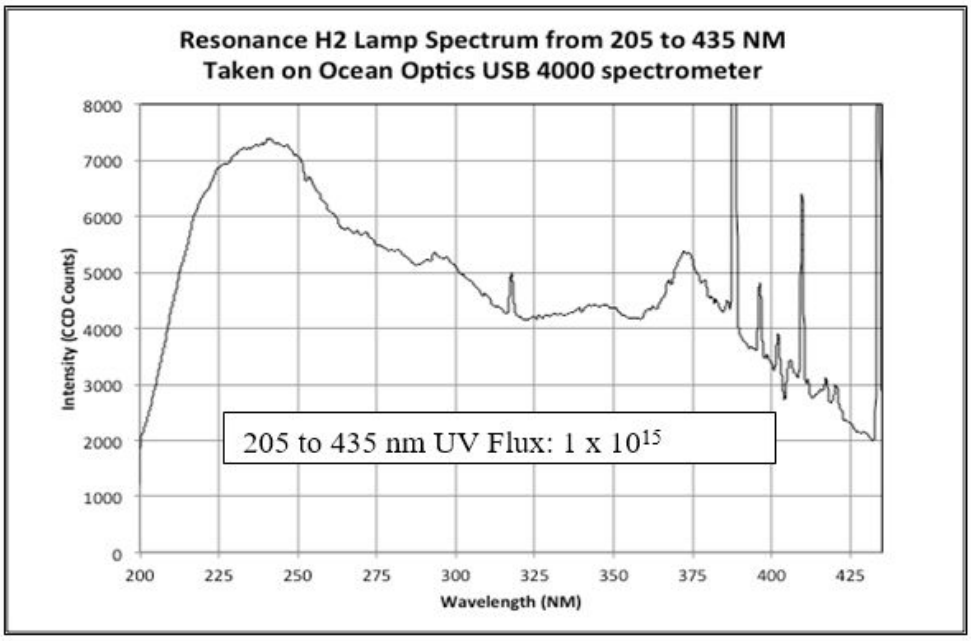


Heater set to 60 C

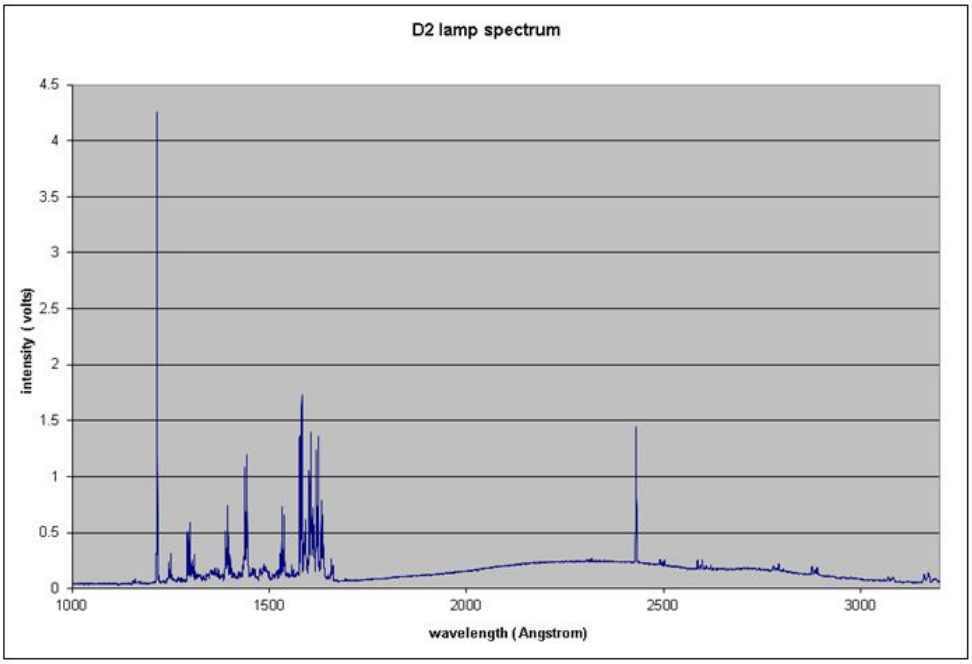


Hydrogen Light Source VUV and UV Output Spectra

Heater Set to 60C UV Spectrum



D2 Spectrum with VM300 monochromator at 1 Ang. Resolution



General Specifications for all Rare-Gas LIght Sources Models ArLL-L, KrLM-L, XeLM-L, KrLM-LDQ12, XeLM-LDQ12, ArCM-L, KrCM-L, XeCM-L

Specification	Typical Values	Units
Peak Wavelengths H/D Ly Alp	D/121.5 H/121.6	nm
Peak Wavelengths H2/D2 VUV	110 - 165	nm
Wavelengths H2/D UV Ctm.	165 - 350	nm
VUV Flux H/D Ly Alp.	3×10^{14}	Ph./sec./steradian
VUV Flux H2 or D2	2×10^{15}	Ph./sec./steradian
UV Flux H2 or D2	1×10^{15}	Ph./sec./steradian
VUV Flux stability	<± percent per hour shift	
Full angle output cone	45	Degrees
Bulb window location	1mm behind face of CF flange	
Window clear aperture	9	mm
Plasma dimensions in bulb	30 axial length 9 circular diameter	mm
Modulation Range	1 - 1000	Hz.
Cooling	Integrated DC fan	
Standard flange	2.75	Inches (CF)
Power Requirements	Light source at 24 VDC for RF exciter, fan and control electronics (in lamp housing)	
AC to DC Power Supply	Power in: 90 to 240 volts AC (50-60 Hz) <0.5 amps 110 VAC	
EMI shielding of lamp housing	Designed to MIL-STD-461C	
Light Source includes	Lamp bulb exciter heater control circuits intensity monitor, heater and housing temperature sensors microprocessor, modulation circuit and USB interface	
Operational/Non Op. Lifetime	>2000hr/>10 years	
Power and Splitter	AC to DC supply, power USB splitter, modulate input, on/off switch	
Temperature range of case	0 to 55	Degrees C
Calibration and Spectrum	1. Flux determined with NIST Standard 2. VUV UV spectrum of light source	
Mass of Light Source	500	Grams
Mass of Power Supply	400	Grams
Software/PC Interface	Labview based executable with GUI to view and log lamp power, intensity monitor heater and case temperatures with data save CSV format for Excel plotting. Windows 32 or 64 bit. Optional data acquisition SW available.	

Rare Gas Light Sources

The Resonance Argon Krypton and Xenon Rare Gas Light source comes standard with everything needed to produce VUV radiation in the 110 to 200 nm region. They employ RF-excited bulbs with Magnesium Fluoride windows in EMI shielded enclosures. The line sources are filled to a few Torr and emit narrow emission lines in the VUV. The continuum sources are filled to 30 to 400 Torr Ar, Kr or Xe and emit both lines and continua in the VUV (see spectra below).

- Air-cooled, optically stable (Typically < 1% drift per hour)
- Longer lifetime than most available Rare gas sources sources owing to an internal source getters and “hard seal windows”.
- Breakout box for RS-232 telemetry, BNC modulation input (if equipped), power switch, and USB interface for interface software (see software manual)
- “Smart Light Source” software allows for precise control and monitoring of light source parameters (heater, RF power etc.)
    - Visible NIR source emission logging and graphing for tracking source stability.
    - Temperature and RF power logging and graphing via graphical chart-recorder interface
    - Excel-friendly .csv output format for data saving

General Specifications for all Rare-Gas Light Sources Models

ArLL-L, KrLM-L, XeLM-L, KrLM-LDQ12, XeLM-LDQ12, ArCM-L, KrCM-L, XeCM-L

Specification	Typical Values	Units
Peak WL/flux ArLL-L	105, 107 / 5e14	NM./Ph./sec./steradian
Peak WL/flux KrLM-L and KrLM-LDQ12	117, 124 / 2e15	NM./Ph./sec./steradian
Peak WL/flux XeLM-L and XeLM-LDQ12	147 / 3e15	NM./Ph./sec./steradian
Peak WL/flux ArCM-L	124 / 1e15	NM./Ph./sec./steradian
Peak WL/flux KrCM-L	117, 124, 147 / 4e15	NM./Ph./sec./steradian
Peak WL/flux XeCM-L	147, 172 / 6e15	NM./Ph./sec./steradian
VUV flux stability	<±1 percent per hour drift	
Operational/Non Op. lifetime	>4000 hours / >10 years	
Full angle output cone	25 to 45	Degrees
Bulb window location	1mm behind face of CF flange	
Window clear aperture	9	mm
Plasma dimensions in bulb	30 axial length 9 circular diameter	mm
Modulation Range	1 - 500	Hz
Cooling	Integrated fan	
Standard flange	2.75	Inches (CF)
Power Requirements	Light source at 24 VDC for RF exciter, fan and control electronics (in lamp housing)	
AC to DC Power Supply	Power in: 90 to 240 volts AC (50-60 Hz) <0.5 amps at 110 V AC	
EMI Shielding of lamp housing	Designed to MIL-STD-461C	
Light Source includes	Lamp bulb exciter heater control circuits intensity monitor, heater and housing temperature sensors microprocessor, modulation circuit and USB interface	
Power and Splitter	AC to DC supply, power USB splitter, modulate input, on/off switch	
Temperature range of case	0 to 55	Degrees C
Mass of Light Source	500	Grams
Mass of Power Supply	400	Grams
Software/PC Interface	Labview based executable with GUI to view and log lamp power, intensity monitor heater and case temperatures with data save CSV format for Excel plotting. Windows 32 or 64 bit. Optional data acquisition SW available.	