Resonance Ltd.

RF Powered
Lyman Alpha Line Source

Model HHeLM-L
Rev 4

143 Ferndale Drive North, Barrie, Ontario, L4M 9V9, Canada

Tel: (705) 733-3633 Fax: (705) 733-1388

Email: res@resonance.on.ca

Date 12-113-11

Description

The VUV sources are sealed RF excited sources with a window in an EMI shielded enclosure that mounts to a 2.75 inch or larger CF type flange. The source assembly has an integral RF exciter, which is powered by a small wall plug power supply. In addition the lamp uses a thermal control system to maintain the partial pressure of H_2 in the bulb at a constant pressure. The user with sets this pressure by LabVIEW™ -based software provided with the lamp system. Low H_2 pressures result in a nearly monochromatic Lyman alpha emission (by dissociation of H2 in the plasma) whilst higher pressures result in strong H_2 emissions in the 120 to 400 nm spectral region. Once the pressure is set with software, it will be maintained until the software again is activated and the pressure is re-set. The software also allows monitoring of the lamp parameters vs. time.

The premium model lamp, HHeLM–LOT, is set up and certified to be suitable for Lyman Alpha resonance fluorescence measurements. Such measurements require a lamp geometry, which avoids "self-reversal" of the Lyman Alpha line at 121.5668 nm by eliminating absorbing layers of atoms in the bulb and by maintaining a stable but low H_2 pressure. The lamp is supplied with its heater set for optically-thin operation along with NIST traceable irradiance calibrations.

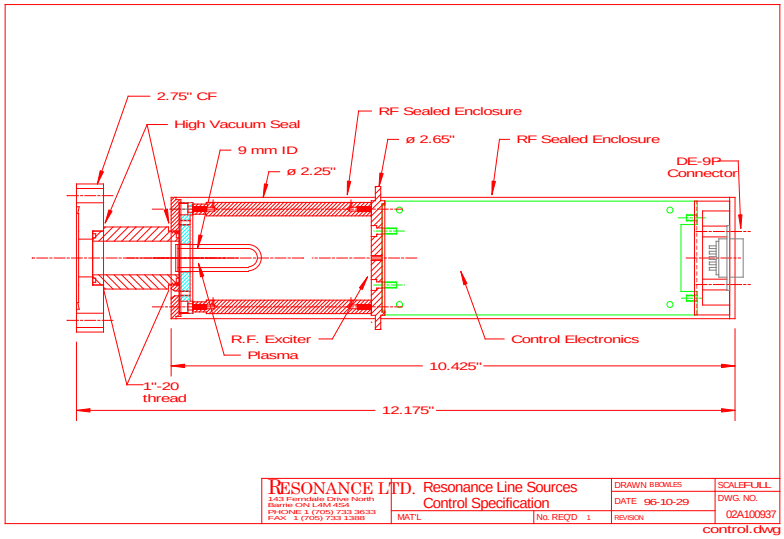
General Specifications:

Typical flux of > $1x10^{14}$ photons per second per steradian in the 121.6 resonance line
Lamp bulb plasma cavity 15 mm x 9 mm ID
Integrated units includes lamp bulb in housing with EMI shielded exciter/controller, 2.75 in CF Adapter, wall plug power supply
Input power to wall plug adapter 100 to 250 V, 50 or 60 Hz, 50 watts max
Lamp unit input power 28 V 1 amp max
Case temperature range 0 to +55 degrees C
Running Life: min 1500 hrs > 2000 hrs typical
Stability: max drift of +/- 2.5 % per hr < +/- 1% per hr typical
Absolute intensity determined by photo ionization or by traceable NBS standard
Spectrum of entire UV region

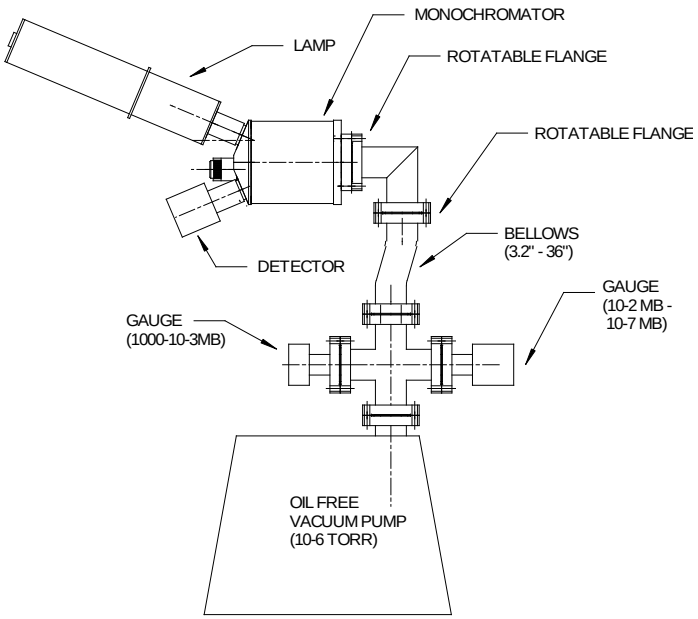
Model Number	HHeLM-LOT	HHeLM-L	HHeLM-LOEM	units
Status	**Production**	**Production**	**Production**	
Peak Wavelengths Ly Alp	**121.6**	**121.5**	**121.5**	**nm**
Peak Wavelengths H2/D2 VUV	**110-180**	**110-180**	**110-180**	**nm**
Peak Wavelengths H2 UV	**180-350**	**180-350**	**180-350**	**nm**
VUV Flux H/D Ly Alp	**3 x 10^{14}**	**3 x 10^{14}**	**3 x 10^{14}**	**Photons/second/steradian**
VUV Flux H2 or D2 UV	**1 x 10^{15}**	**1 x 10^{15}**	**1 x 10^{15}**	**Photons/second/steradian**
Full angle output	**45**	**45**	**45**	**Degrees**

cone				
Bulb window location	**-4**	**-4**	**-4**	**cm**
Window CA	**0.8**	**0.8**	**0.8**	**cm**
Modulation or pulse	**Mod/option**	**Mod/option**	**Mod/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.**	

Configuration:



Typical Installation



Operating instructions:

*** WARNING EYE HAZARD***

Do not look directly at the lamp plasma unless wearing glasses. Normal eyeglasses will block extreme UV of all lamps except Mercury and D2. For these lamps use special UV blocking glasses.

*** WARNING: AVOID DAMAGING WINDOW SEAL ***

Do not use chloroform, acetone or xylene to clean the lamp window. Use of these (or similar based solvents) might dissolve the window or the window seal.

1: Inspect the lamp window

Inspect the front of the lamp window and clean it if contamination is suspected. See lamp window cleaning instructions

2: Pre installation test

Plug the lamp into the power supply Plug power supply into the wall at 110 volts.. If the lamp does not light or problems occur refer to the troubleshooting guide.

3: Mount the lamp

Ensure that the lamp is properly mounted. (see mounting and heat sinking instructions).

Comment [RL1]:

Comment [RL2]: Add this section

4: Power up the lamp

Plug the lamp into the power supply Plug power supply into the wall at 110 volts. The lamp visible light may be observed through a 1/16" hole in the front section near the bulb If the lamp does not light or problems occur refer to the troubleshooting guide.

Maintenance

The only maintenance necessary is to ensure that the window remains clean. . See lamp window cleaning instructions

Lamp DE-9 connector pin out

Pin 1	ground
Pin 2	28VDC
Pin 3	Heater Monitor
Pin 5	Intensity Monitor

Power Supply:

The power supply has a green LED which is on when the supply is working normally. Flashing or off indicates an overload or defective condition.

Accessories:

1. Short adapter for wide angle output
2. Lens assembly
3. Modulator
4. UV diodes
5. PSD and Pulse counting
6. Detector assemblies
7. McPherson or Acton flanges
8. Heat Sink

Special Options:

Space qualification,
Miniature
Low power

Configurations; High flux,
High power

High Operating Temperatures

If the Lamp operating case temperature is above 40˚C we recommend operating the lamps either with a heat sink or with a small cooling fan. Cool operation will enhance the spectral purity of the lamp output and prolong the life of the electronics.

Lamp Mounting

Refer to the configuration drawings above. The normal mounting configuration is with a 2.75 inch Conflat type flange. The lamp has been vacuum tested and will bolt onto a standard flange or adapter. The lamp is designed to operate on High Vacuum equipment at pressures less than 10(-7) torr. The seals in the mounting adapters are viton and should operate to vacuums less than 10(-9) torr. The lamp is not designed to be baked to more than 100 C. Precautions should be taken to insure the lamp does not get heated above this temperature during system bake-outs. Also the lamp should not be operated during system bake-outs

LAMP WINDOW CLEANING INSTRUCTIONS:

The lamp window is polished magnesium fluoride and its vacuum ultraviolet transmission will be degraded if it is touched or otherwise contaminated. In all but the best vacuum systems a slow loss of window transmission will result from photo polymerization of organic materials on the outside window surface. Both of these problems may be overcome by proper cleaning of the window. A small bottle of polishing powder (1 micron aluminum oxide powder) and cotton tipped applicators are included with the lamp unit. Inspect the window for any signs of gross contamination, such as fingerprints. If there are signs of this, first clean the window with polishing powder (aluminum oxide) following the instructions below. All cleaning operations are carried out with cotton tipped applicators or with lint free tissues. Apply the polishing powder to an applicator tip and gently polish the window. Repeat until there is no evidence of a film on the window when it is viewed with reflected light. Wipe away excess powder with a dry applicator. A few specks of powder on the window will have a negligible effect on the optical transmission. The final bits of powder may be removed by directing a stream of ultra-high-purity helium, nitrogen or argon across the window. Never use a lab source of air for this process because it may contain compressor oil.

TROUBLE SHOOTING GUIDE

Symptom	Remedy
Lamp intensity appears to go down	This is most often caused by contamination of the outside of the lamp window. Will occur in vacuum systems with 10(-7) torr total pressure and 10(-9) torr partial pressure of organic materials. Clean the window according to the window cleaning instructions in section 2.
Lamp does not start	Often after sitting for a while the lamps are hard to start. Repeat the starting procedure until the plasma strikes.
The lamp current normal but the lamp does not start.	As a last resort you can start the lamp by holding a Tesla coil in the vicinity of the lamp window. Be VERY CAREFUL that the coil does not arc to the window or lamp can as this can damage the window, the lamp electronics, and even the power supply.

Standard Lamp Temperature Modification Procedure

1. Connect the serial port of the lamp adaptor (available from Resonance Ltd) to the serial port on a computer.
2. Start the Hyper Terminal program on the computer.
3. Enter a name for your connection (e.g. “Standard Lamp”).
4. Enter the settings: Connect using: Com 1 (or whichever port you have connected the lamp to), Bits per second: 9600, Data bits: 8, Parity: None, Stop bits: 1, Flow control: None. Click “Okay”
5. If the lamp is on, a stream of numbers will appear. Press the “\” key when the stream comes to the end of a line and a menu will appear.
6. Select the third option on the menu and enter the heater set point you would like the lamp to run at. Hit the Enter key and the lamp will adjust to the new setting.

** The lamp arrives with a heater set point of ~3600 (see following page for lamp output). Different spectra can be obtained by varying the heater set point.