



## HHeLM-L

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### Operating Manual

REV 1.0  
8/25/2014



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## 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<sub>2</sub> in the bulb at a constant pressure. The user sets this pressure by LabVIEW™ - based software provided with the lamp system. Low H<sub>2</sub> pressures result in a nearly monochromatic Lyman alpha emission (by dissociation of H<sub>2</sub> in the plasma) whilst higher pressures result in strong H<sub>2</sub> 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<sub>2</sub> pressure. The lamp is supplied with its heater set for optically-thin operation along with NIST traceable irradiance calibrations.

## Features

- Typical flux of  $> 1 \times 10^{14}$  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, 2.75in 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 Lyman Alpha	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 Lyman Alpha	$3 \times 10^{14}$	$3 \times 10^{14}$	$3 \times 10^{14}$	Photons/sec/steradian
VUV Flux H2 or D2 UV	$1 \times 10^{15}$	$1 \times 10^{15}$	$1 \times 10^{15}$	Photons/sec/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 >60cm from lamp.	

## Special Options

- Space qualification
- Miniature
- Low power

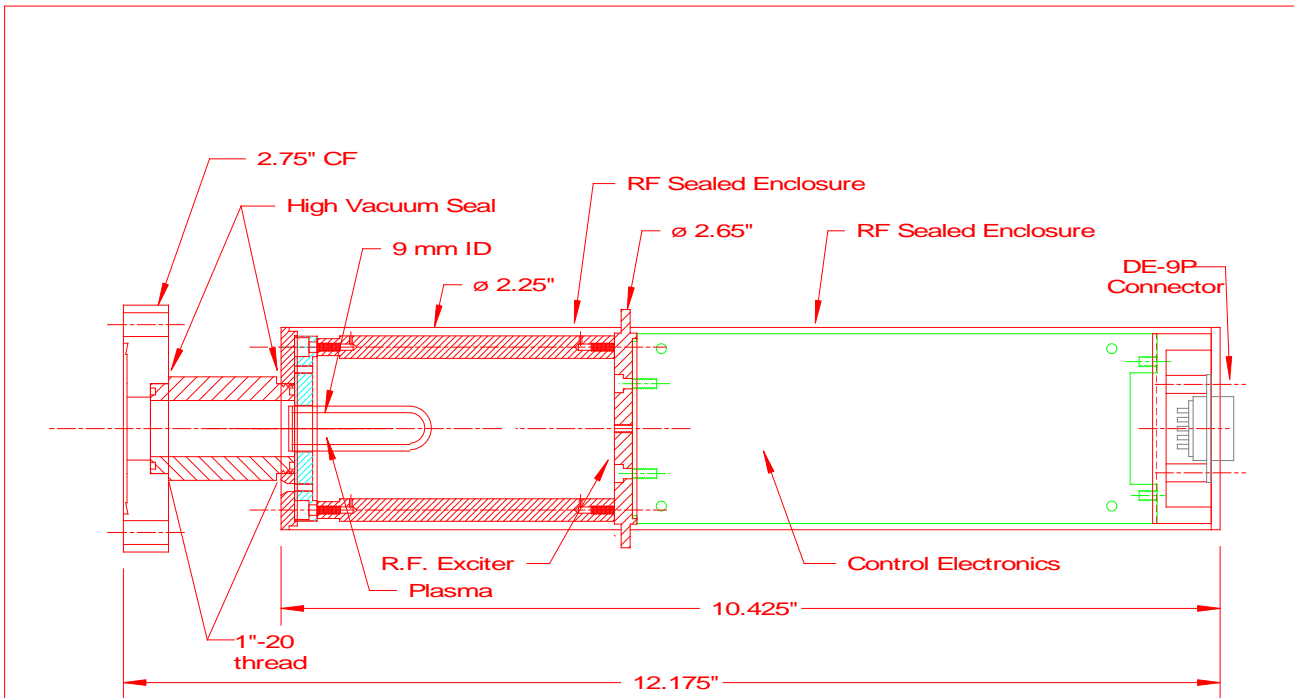
### Configurations

- High flux
- High power

## 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

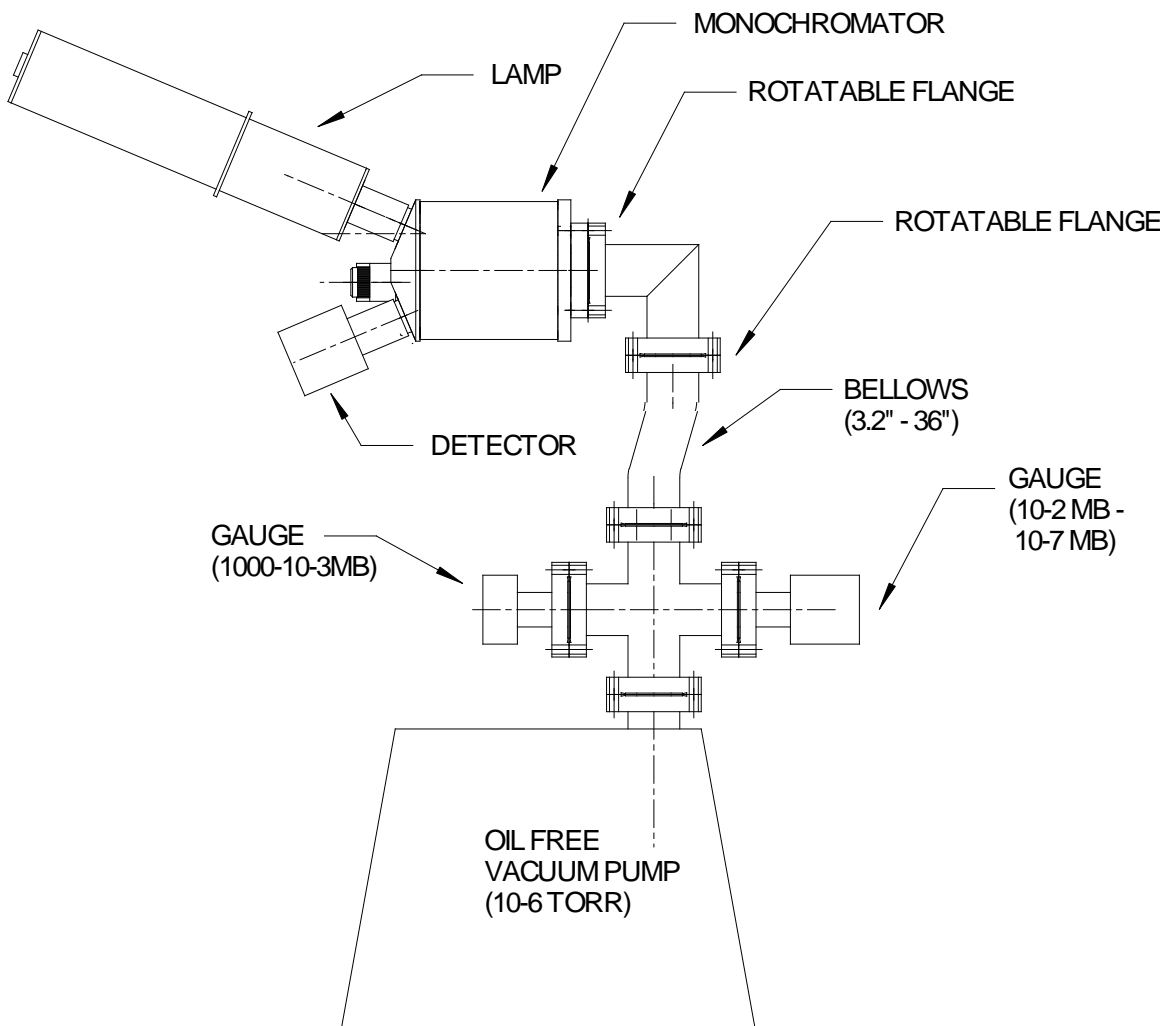
# Configuration



<b>RESONANCE LTD.</b> 143 Ferndale Drive North Barrie ON L4M 4S4 PHONE 1 (705) 733 3633 FAX 1 (705) 733 1388	<b>Resonance Line Sources</b> <b>Control Specification</b>		DRAWN B80MLES DATE 96-10-29	SCALE FULL DWG. NO.
	MAT'L	No. REQ'D 1	REVISION	02A100937

control.dwg

# Typical Installation



## Installation/Mounting

The standard mounting configuration is with a 1"-20 thread adapted to a 2.75" CF type flange which can simply be mounted with the supplied bolts. The light source has been supplied with *Viton*® gaskets (copper gaskets recommended for final installation) and has been vacuum tested down to  $10^{-7}$  Torr. The light source is not designed to be baked to more than 100° C therefore precautions should be taken to ensure the light source is not heated above this temperature during system bake-outs and should not be operated at all during any bake-outs.

## 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.



## Operating Warnings

Be sure to read this section and thoroughly understand it before attempting to operate the light source – for both your own safety and that of the light source!

### **Warning: Eye Hazard**

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

### **Warning: Avoid Damaging Window Seal**

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

# Operating Instructions

Follow these instructions to properly operate the light source. It is recommended that you read this section over carefully before applying power.

## 1. Inspect the Light Source Window

Inspect the front of the window and clean it if contamination is suspected, clean according to the window cleaning instructions found in the section titled “Window Cleaning”.

## 2. Pre-Installation Test

It is recommended that the light source be tested prior to installing into your system to verify it turns on properly. Plug the light source into the power supply. If it does not start, or its output differs from its specifications, refer to the troubleshooting guide found in the section titled “Troubleshooting Guide”.

## 3. Mount the Light Source

Now that the light source has been successfully tested, it may be installed onto your system. Refer to the section titled “Installation / Mounting” for suggestions and guidelines.

## 4. Verify Installed Light Source Turns On

Once the light source has been installed onto your system, it should again be immediately tested to verify it turns on. Plug the lamp into the power supply. Plug power supply into wall at 110 volts. The visible light may be observed through a 1/16: hoe in the front section near the bulb. If there are any problems please refer to the “Troubleshooting Guide” section.

## Maintenance

The only maintenance required is to ensure that the window remains clean. Please refer to the Window Cleaning Instructions section for proper cleaning technique.

## DE-9 Connector and Power Supply

### 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.

## 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 "\n" 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 is shipped with a heater set point of ~3600. Different spectra can be obtained by varying the heater set point.

## Window Cleaning

The light source 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. 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 along with polishing instructions are included with the light source unit.

Before using the light source, inspect the window for any signs of gross contamination, such as fingerprints. If there are or if, after operating the light source, you notice a drop in output then clean the window with polishing powder (aluminum oxide) following these instructions. All cleaning operations are carried out with cotton-tipped applicators or with lint-free tissues.

1. Apply the polishing powder to an applicator tip.
2. Polish the window by firmly pressing the applicator against the center of the window and, in a circular motion, work your way outwards to the edge of the window. You should notice a frictional resistance as you slide across the window.
3. Repeat, using a new applicator, until there is no evidence of a film on the window when it is viewed with reflected light and there has been a noticeable decrease in the frictional resistance.
4. 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.
5. Remove the final bits of powder 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.**

For quick cleaning, it is acceptable to wipe the window with isopropanol or methanol using a cotton-tipped applicator. This will only work for light cleaning (light finger prints, dust, light smudges) and not more serious window contaminants.

## Troubleshooting

The following is a quick guide meant for diagnosing problems and offers possible solutions which will hopefully rectify any unwanted behavior.

### **Light Source Does Not Start**

Often after sitting for a while the lamps are hard to start. Repeat the starting procedure until the plasma strikes.

### **Light Source Intensity Appears to Drop**

This is most often caused by contamination of the outside of the light source window, and can occur in vacuum systems with  $10^{-7}$  Torr total pressure and  $10^{-9}$  Torr partial pressure of organic materials. The light source window should be cleaned according to the instructions found in the section titled "Window Cleaning".

### **Lamp Current is Normal but 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.

## Contact

Resonance Ltd. stands behind every product we sell. We welcome feedback and encourage any of our customers to contact us with questions, or concerns. You may contact us through e-mail, our website, telephone, or fax!

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