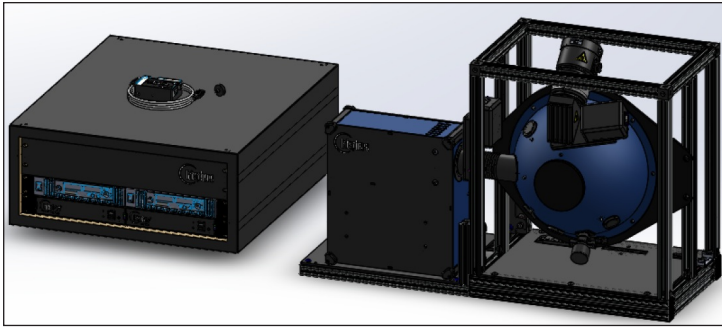




# Plasma External Lamp (PEL) Source



The HELIOS Plasma External Lamp (PEL) is an innovative electrodeless plasma lamp with incredibly high output and stability. Labsphere identified this lamp and studied it for NASA as a new solar-like source for use in rendering solar spectrums, stability and levels (NASA Tech Brief GSC-16399-1). Further innovation by Labsphere has made this lamp even more stable by controlling a "Test or Rest" state. Test/Rest achieves maximum stability by using control of "ON/OFF" of a native lamp "optimization" routine and the system detectors with HELIOS Variable Attenuators in an active feedback mode.

The PEL is a prime choice for anyone looking for solar spectrums to "Test as You Fly & Fly as You Test" or anyone that needs higher Red/Blue spectral ratios with QTH-like short term stability (Test Mode). Using PEL sources in combination with the HIS and HES Quartz Tungsten source lamps allows for the closest spectral match on Earth to sunlight and Albedo output levels from 300-2400 nm.

## VALUE

Extremely high outputs (AM0 or AM1) with single lamp input to most HELIOS HSA Spheres

250W source for addition to HELIOS Systems

HELIOS Systems and HELIOSense Software enables (3) Modes of Lamp Operation:

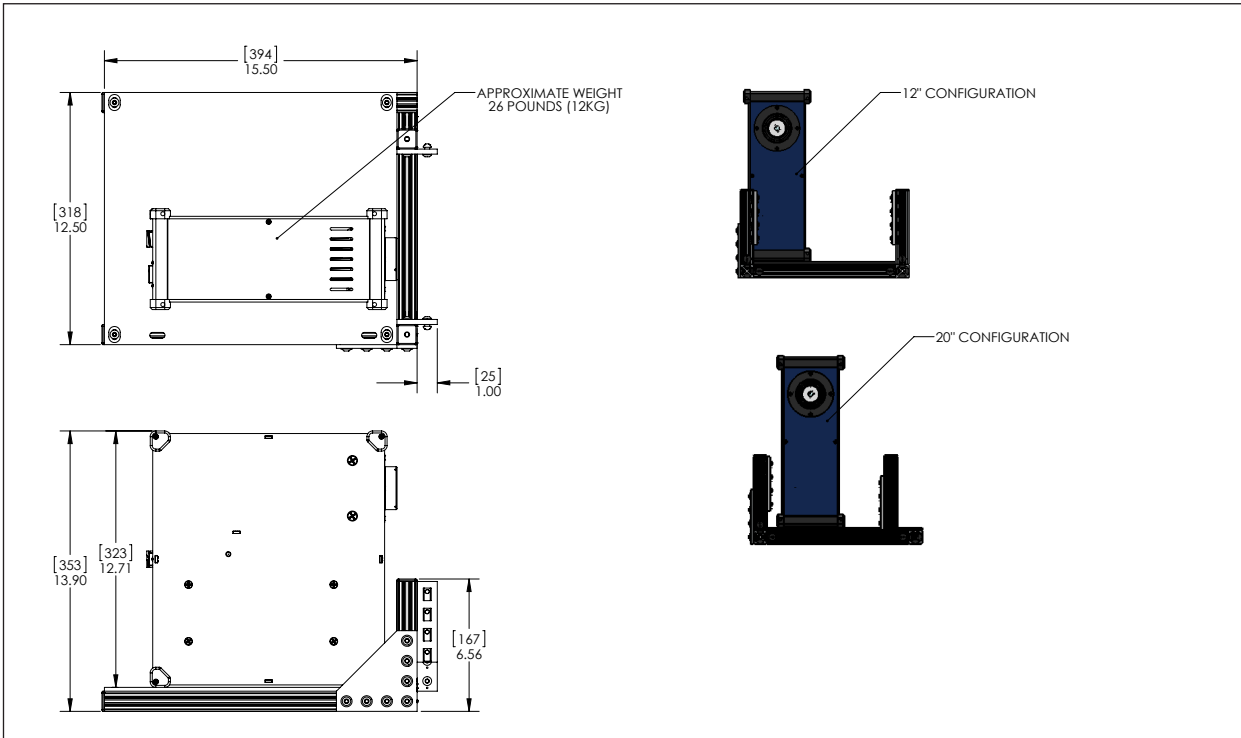
- Rest Mode: Native operation mode of the lamp
- Test Mode: Toggles "off" the Lamp feedback waveform for a limited duration
- Test & Feedback Mode: With the lamp waveform off, HELIOSense uses its detectors and variable attenuators to virtually eliminate short term instability

Test modes maximum of 30 min cycle with a mandatory 5 Minute refresh required in Rest

VAD or VAA Attenuator required for Feedback Modes

Spectral lines - The plasma spectrum features several sharp spectral peaks that are very stable with time. These peaks are driven by additive elements in the plasma (atomic/molecular lines) and can be used to verify wavelength registration of spectral instruments

A robust carrier chassis design that allows easy mounting of the PEL to 12" and 20" HSA Sphere Cages. Carrier supports the lamp in port forward, port up and port down orientations

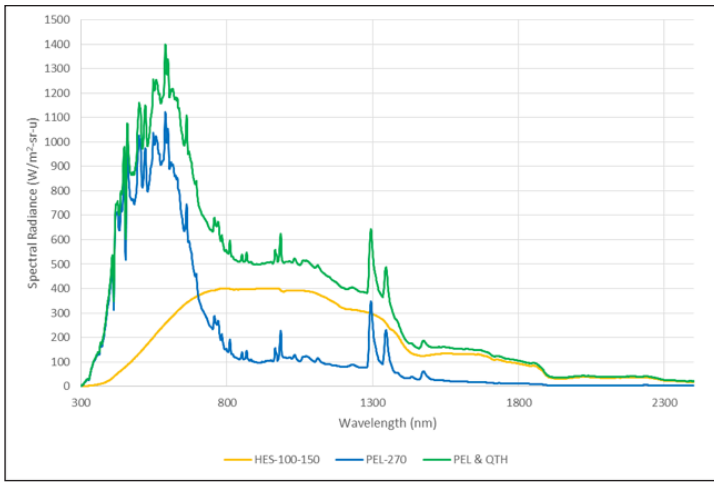


## Plasma with Cage Mount

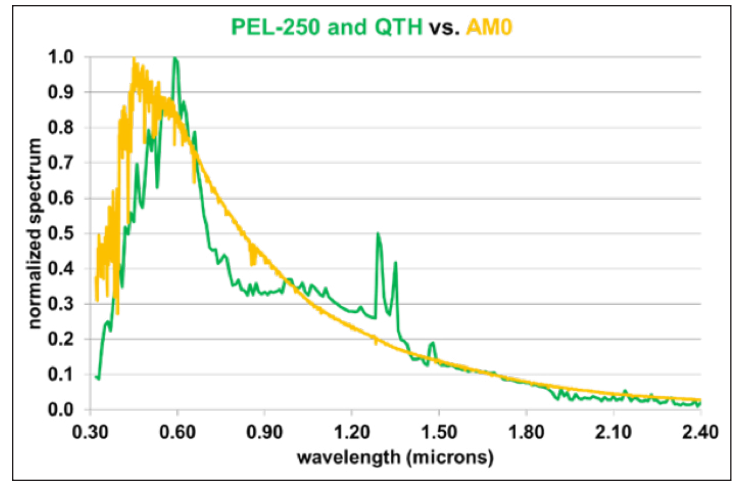


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Spectral Radiance Contributions PEL and QTH in 12 inch SF Sphere



Example PEL & QTH Spectrums in HELIOS HSA Spheres

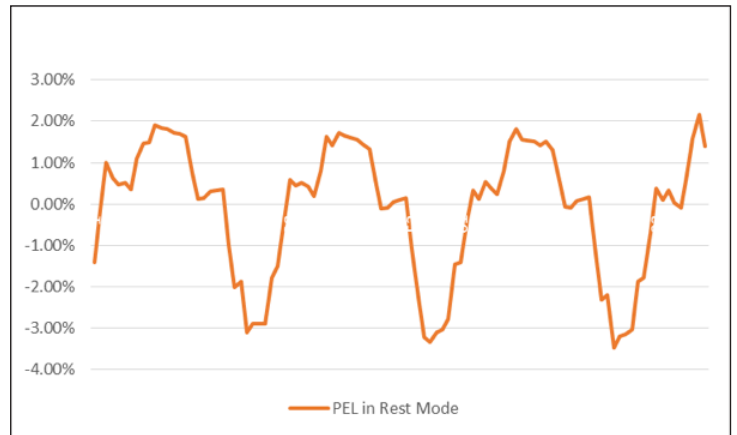
## Specifications

Electrical Power Ratings:	260W: 9.3A, 28V
Models:	PEL-250
Approximate CCT:	5100K +/-200K
Rated Lifetime:	30,000 hrs MTBF (50% of Initial Lumens)
Short Term Stability - REST Mode:	+/-3% P-P (6% magnitude), 0.1Hz
Short Term Stability - TEST Mode:	<+/-0.5% P-P (1% magnitude), 0.1Hz
Active VA FEEDBACK Mode:	+/-0.3% P-P (0.6% magnitude), DC
Spectral Peak Short Term Stability:	<0.5 nm for 30 min
Maximum Duration of Test Mode:	30 Minutes
Minimum Interval between Test/Rest:	5 Minutes
Long Term Stability:	<1% per 100 hrs based on (L85 @ 12,500hrs)
CCT Long Term Stability:	<100K per 100 hrs
Spectral Peak Long Term Stability:	<0.5 nm for 10 hrs
Rated AC Input/Frequency:	100-240VAC, 47-63Hz
Operating Temperature Range:	10 to 50C
Storage Temperature Range:	-20C to 70C
Operating Temperature RH%:	30-90% (no condensation)
Storage Temperature RH%:	10-95% (no condensation)
Recommended Warm Up Time:	20 Minutes
Included Accessories for HSA:	Mirror Tube, Diffuser Baffle
Cooling:	Forced Air Internal Fan
Compliance:	CE, RoHS
Replacement Lamp Model:	RPL-250
Standard Warranty:	1 year or 5,000 hrs of Use

## Definitions of Plasma Stability

### Rest Mode

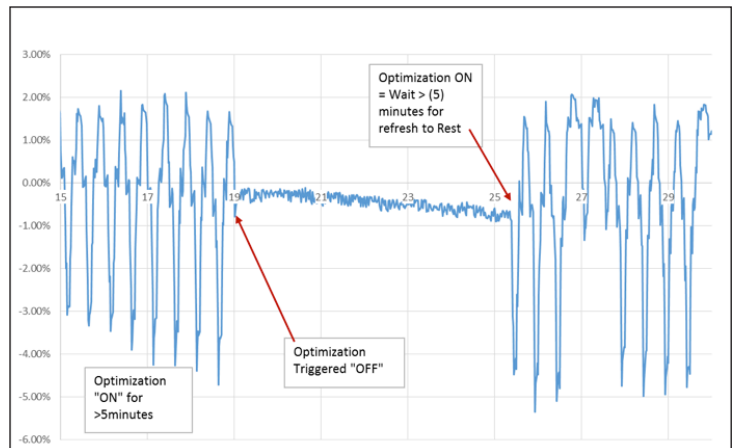
The PEL-250 is microwave-induced plasma source and does not have the anode and cathode found in conventional HID lamps. The form factor of the emitter is quite small (jellybean-size) and the output has a close to Lambertian distribution. However, the microwave emitter requires thermal feedback to maintain the lamp with nominal operation and that results in a 0.1Hz "sawtooth" type waveform with a typical +/-3.0% Peak-to-Peak magnitude. The incredible lifetime of these lamps virtually eliminates long term stability for most averaged or long term temporal test situations.



PEL-250 Short Term Waveform of Rest Mode

### Test Mode

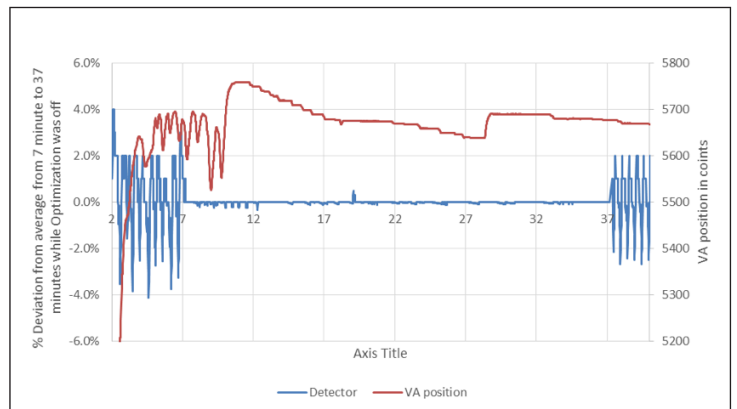
For periods up to 30 minutes the lamp's native waveform can be suppressed by HELIOSense Software (<1.0% P-P, 0.2% RMS). The Test Mode can be triggered by the user, but must accommodate a mandatory 5 minute "relaxation" period where the lamp returns to normal operation in Rest Mode.



PEL-250 Test Mode - On & Off

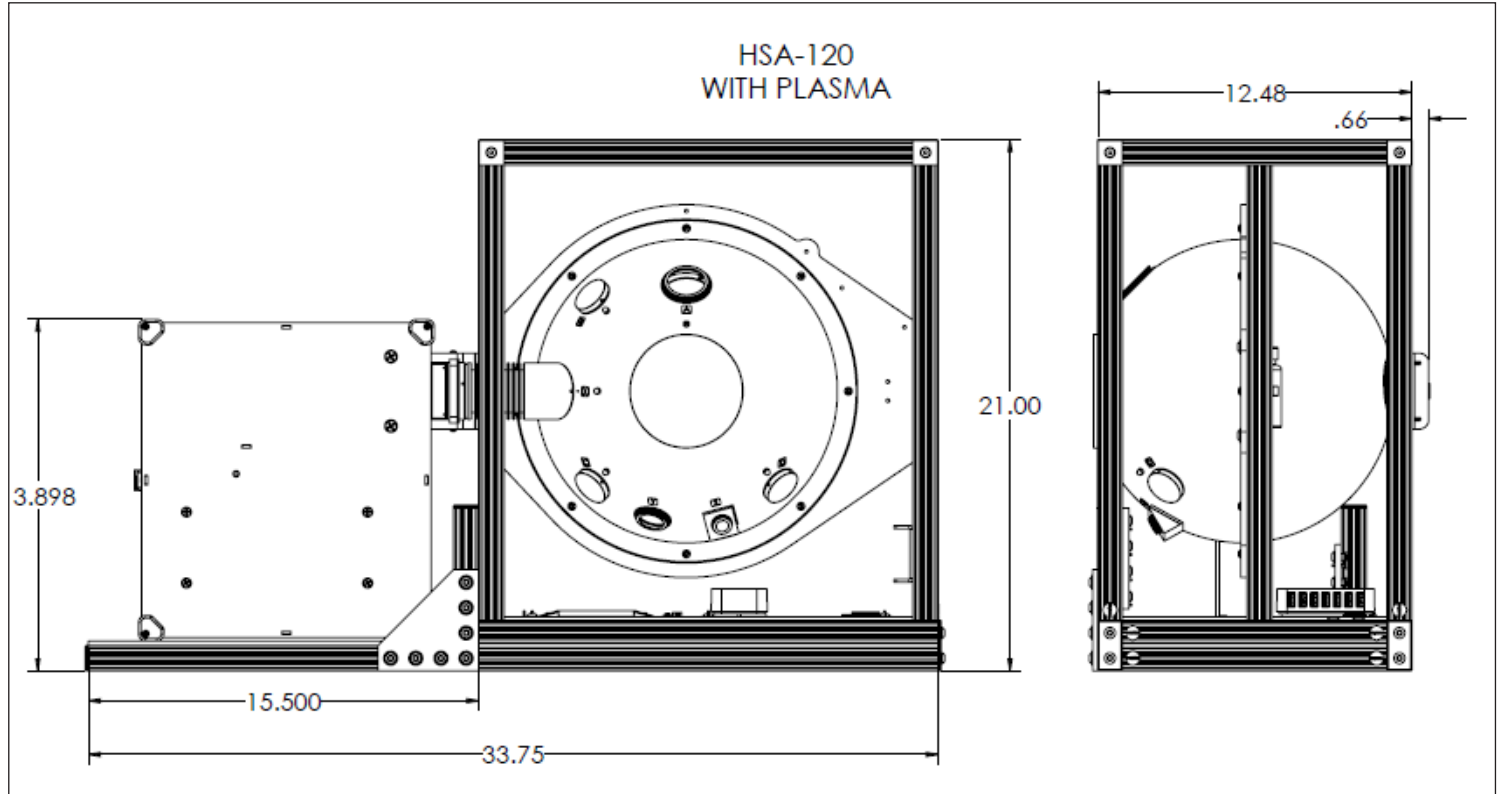
### Test & Feedback Mode

When both the Test Mode and the Feedback from the HELIOS Systems are engaged in the operation of the plasma lamp, the results are spectacular. For periods of up to 30 minutes, there is virtually no instability in the lamp (<0.6% P-P, 0.04%RMS) – nearing QTH-like performance with a solar source.



PEL-250 Performance of Test & Feedback

## HSA-120 with Plasma Dimensional Drawing



## HSA-200 with Plasma Dimensional Drawing

