General

The OL 100 is a high-intensity standard consisting of a 1000-watt, DXW, tungsten-halogen lamp mounted in a slip-cast, fused silica reflector. The source has an effective radiating area of 3 x 5 cm. At a distance of 40 cm, the total irradiance is on the order of one solar constant (approximately 136 mW/cm²). Uniformity tests performed on a number of these units show that the irradiance in the specified direction over an area of 4 cm² is uniform to ± 0.25%.

The standards can be obtained with calibrations for total irradiance, spectral irradiance and illuminance. All calibrations are based on standards supplied by the National Institute of Standards and Technology (NIST).

The following table lists the type of calibrations available and their corresponding model number:

<table>
<thead>
<tr>
<th>Type of Calibration</th>
<th>Model #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Irradiance (300 – 750 nm)</td>
<td>100A</td>
</tr>
<tr>
<td>Spectral Irradiance (750 – 2500 nm)</td>
<td>100B</td>
</tr>
<tr>
<td>Spectral Irradiance (300 – 2500 nm)</td>
<td>100C</td>
</tr>
<tr>
<td>Total Irradiance</td>
<td>100D</td>
</tr>
<tr>
<td>Total and Spectral (300 – 2500 nm)</td>
<td>100H</td>
</tr>
<tr>
<td>Illuminance Only *</td>
<td>100P</td>
</tr>
<tr>
<td>Uncalibrated (seasoned)</td>
<td>100U</td>
</tr>
</tbody>
</table>

* For illuminance calibrations in addition to the above calibrations, add the suffix “P” to the appropriate model number

NOTE: In order to ensure consistent and reliable results, Gooch & Housego (Orlando) standards should only be used with current sources that possess a ramp current feature.
Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Irradiance (nominal)</td>
<td>136 mW/cm²</td>
</tr>
<tr>
<td>Nominal Irradiance at 1000 nm</td>
<td>100µW/cm²nm</td>
</tr>
<tr>
<td>Illuminance (nominal)</td>
<td>3 lumens/cm² (3000 fc)</td>
</tr>
<tr>
<td>Long Term Stability</td>
<td>0.06% / hour</td>
</tr>
<tr>
<td>Uncertainty*</td>
<td></td>
</tr>
<tr>
<td>Spectral Irradiance</td>
<td>± 1 to 2%</td>
</tr>
<tr>
<td>Total Irradiance</td>
<td>± 1.5%</td>
</tr>
<tr>
<td>Illuminance</td>
<td>± 1.5%</td>
</tr>
</tbody>
</table>

* Relative to NIST Standards

Optional Accessories

- OL 56 Lamp Holder
- OL 63 Adjustable Lamp Holder Mount
- OL 83A Programmable Current Source

Method of Calibration

The instrumentation and technique used by Gooch and Housego to transfer calibrations from a standard of spectral irradiance to an uncalibrated lamp is patterned after that used at NIST. The measurement procedure employs the highly accurate wavelength-by-wavelength method of comparison (Figure 1). This minimizes the errors associated with setting the lamp current, distance, wavelength and repeatability.

In this technique, both lamps (standard and test) are operated at the same distance. The spectral irradiance of both lamps is measured at a set wavelength by translating the double monochromator along the optical bench to view each source. A wavelength-by-wavelength comparison is made at all of the NIST calibration wavelengths.

The high-accuracy standards are calibrated by comparison to a standard that was calibrated directly against a NIST standard.

Optional Accessories

Gooch and Housego offers several accessories to enable the user to realize the high accuracy assigned to its NIST-traceable standards. These accessories are designed to minimize errors due to current setting, alignment and orientation.

The OL 83A Programmable Current Source is specifically designed for operating the lamp standards at the exact calibration current.

There are six dimensional variables involved in the NIST recommended alignment of a lamp relative to the instrument. The OL 56 Lamp Holder and OL 63 Adjustable Lamp Holder Mount (Figure 2) are designed to allow the user to control the physical positioning of the lamp including distance, horizontal and vertical distance off the optical axis, pitch (tilt), yaw (rotation) and roll.

Contact: sales@goochandhousego.com
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As part of our policy of continuous product improvement, we reserve the right to change specifications at any time.
Gooch and Housego offers 1000-W DXW, 200-W, and 45-W lamps as standards of spectral irradiance, total irradiance, illuminance, and color temperature. These lamps have tungsten coiled-coil filaments enclosed in a small quartz envelope. The lamp standards can be obtained with spectral irradiance calibrations over all or part of the 250 to 2500 nm wavelength region. In addition, the 1000-W DXW and 200-W lamps can be calibrated out to 4500 nm.

The spectral irradiance standards issued by Gooch and Housego are based on the National Institute of Standards and Technology (NIST) Spectral Irradiance Scale for the wavelength range of 250 to 2400 nm and on a blackbody for the wavelength range above 2400 nm. The NIST Scale has an uncertainty (k=2) of 0.63% in the visible, 1.56% in the ultraviolet at 250 nm, and 0.31% in the infrared at 2000 nm.

Calibration of the 1000-W DXW and 200-W lamps over the wavelength range of 250 to 2400 nm are available with two levels of accuracy: high-accuracy and super high-accuracy. The High-Accuracy Standards of Spectral Irradiance issued by Gooch and Housego have a transfer uncertainty (k=2) relative to the NIST Scale of ±1-2%. The Super High-Accuracy Standards have a transfer uncertainty relative to the NIST Scale of ±0.5%.

OL 200, OL 220, and OL 245
High-Accuracy Irradiance Standards

<table>
<thead>
<tr>
<th>PERFORMANCE SPECIFICATIONS</th>
<th>1000-W</th>
<th>200-W</th>
<th>45-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Irradiance (nominal)**</td>
<td>$2 \times 10^8$</td>
<td>$5 \times 10^6$</td>
<td>$2 \times 10^{10}$</td>
</tr>
<tr>
<td>@ 250 nm (W/(cm²/nm))</td>
<td>$2.5 \times 10^5$</td>
<td>$5 \times 10^6$</td>
<td>$9 \times 10^7$</td>
</tr>
<tr>
<td>@ 1050 nm (W/(cm²/nm))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Irradiance (nominal mW/cm²)</td>
<td>30</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>Illuminance (nominal footcandles)**</td>
<td>800</td>
<td>170</td>
<td>22</td>
</tr>
<tr>
<td>Transfer Uncertainty *</td>
<td>± 1%</td>
<td>± 1-1.5%</td>
<td>± 1-2%</td>
</tr>
<tr>
<td>High-Accuracy</td>
<td>± 0.5%</td>
<td>± 0.5%</td>
<td>N/A</td>
</tr>
<tr>
<td>Super High-Accuracy</td>
<td>± 1%</td>
<td>± 1%</td>
<td>± 1%</td>
</tr>
<tr>
<td>Long Term Photometric Stability</td>
<td>≤ ± 0.06% / hr</td>
<td>≤ ± 0.06% / hr</td>
<td>&lt; ± 0.06% / hr</td>
</tr>
<tr>
<td>Operating Current (amps DC)</td>
<td>8.000</td>
<td>6.500</td>
<td>6.500</td>
</tr>
</tbody>
</table>

*Uncertainty is relative to NIST Scale at k=2
**Measured at 50 cm

<table>
<thead>
<tr>
<th>CALIBRATION OPTIONS</th>
<th>1000-W</th>
<th>200-W</th>
<th>45-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Irradiance:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 - 750 nm</td>
<td>OL 200A</td>
<td>OL 220A</td>
<td>OL 245A</td>
</tr>
<tr>
<td>750 - 2500 nm</td>
<td>OL 200B</td>
<td>OL 220B</td>
<td>OL 245B</td>
</tr>
<tr>
<td>250 - 2500 nm</td>
<td>OL 200C</td>
<td>OL 220C</td>
<td>OL 245C</td>
</tr>
<tr>
<td>250 - 1100 nm</td>
<td>OL 200M</td>
<td>OL 220M</td>
<td>OL 245M</td>
</tr>
<tr>
<td>380 - 780 nm</td>
<td>OL 200V</td>
<td>OL 220V</td>
<td>OL 245V</td>
</tr>
<tr>
<td>250 - 4500 nm</td>
<td>OL 200R</td>
<td>OL 220R</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Irradiance</td>
<td>OL 200D</td>
<td>OL 220D</td>
<td>OL 245D</td>
</tr>
<tr>
<td>Total and Full Spectral</td>
<td>OL 200H</td>
<td>OL 220H</td>
<td>OL 245H</td>
</tr>
<tr>
<td>Illuminance (only)</td>
<td>OL 200P</td>
<td>OL 220P</td>
<td>OL 245P</td>
</tr>
<tr>
<td>Color Temperature (only)</td>
<td>OL 200K</td>
<td>OL 220K</td>
<td>OL 245K</td>
</tr>
<tr>
<td>Uncalibrated (seasoned)</td>
<td>OL 200U</td>
<td>OL 220U</td>
<td>OL 245U</td>
</tr>
</tbody>
</table>

For illuminance and/or color temperature calibrations in addition to any of the above calibrations, add the suffix "P" and/or "K" respectively to the appropriate model number.
For super high-accuracy calibrations (1000-W or 200-W) add the suffix "S" to the appropriate model number.

<table>
<thead>
<tr>
<th>OPTIONAL ACCESSORIES</th>
<th>1000-W</th>
<th>200-W</th>
<th>45-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp Holder</td>
<td>OL 56</td>
<td>OL 57W</td>
<td>OL 57</td>
</tr>
<tr>
<td>Adjustable Lamp Holder Mount</td>
<td>OL 63</td>
<td>OL 63</td>
<td>OL 63</td>
</tr>
<tr>
<td>Programmable DC Current Source</td>
<td>OL 83A</td>
<td>OL 410</td>
<td>OL 410</td>
</tr>
</tbody>
</table>

NOTE: In order to ensure consistent and reliable results, Gooch & Housego (Orlando) standards should only be used with current sources that possess a ramp current feature.
Method of Calibration

The instrumentation and methods used by Gooch and Housego to transfer calibrations from a standard of spectral irradiance to an uncalibrated lamp is patterned after that used at NIST. The measurement procedure employs the highly accurate wavelength-by-wavelength method of comparison (Figure 1). This minimizes the errors associated with setting the lamp current, distance, wavelength, and repeatability.

In this technique, both lamps (standard and test) are operated at the same distance. The spectral irradiance of both lamps is measured at a set wavelength by translating the double monochromator along the optical bench to view each source. A wavelength-by-wavelength comparison is made at all of the NIST calibration wavelengths.

The High-accuracy Standards are calibrated by comparison to a standard that was calibrated directly against a NIST standard. The Super High-Accuracy Standards are compared directly to a NIST standard.

Optional Accessories

Gooch and Housego offers several accessories to enable the user to realize the high accuracy assigned to its NIST-traceable standards. These accessories are designed to minimize errors due to current setting, alignment, and orientation.

The OL 410 and OL 83A Programmable DC Current Sources are specifically designed for operating the lamp standards at the exact calibration current. (See Bulletin 121 for further details).

There are six dimensional variables involved in the NIST recommended alignment of a lamp relative to the instrument. The OL 56, OL 57, and OL 57W Lamp Holders and OL 63 Adjustable Lamp Holder Mount (Figure 2) are designed to allow the user to control the physical positioning of the lamp including distance, horizontal distance, vertical distance, pitch (tilt), yaw (rotation), and roll.

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As part of our policy of continuous product improvement, we reserve the right to change specifications at any time.
Two plug-in, pre-aligned irradiance standards are available for accurately calibrating the OL 754 Spectroradiometer for spectral irradiance response. The "plug-in/ pre-aligned" concept eliminates tedious and time consuming set-up and alignment normally associated with spectroradiometric standards as they merely attach to the OL 754's integrating sphere cosine receptor. Both standards, with appropriate baffles, are mounted in pre-aligned/holder mounts. Machined, cylindrical covers are provided to protect the lamps when not in use.

**OL 752-10 Tungsten Plug-In Standard**

The OL 752-10 can be obtained with spectral irradiance calibrations over the wavelength range of 250 to 2500 nm. It consists of a compact, 200-W tungsten-halogen lamp operating at a color temperature of about 3000 K. The short working distance of 13 cm results in irradiance levels significantly higher than that normally obtained with higher wattage standards. The combination of greater precision in optical alignment and higher irradiance levels provides for a more accurate calibration of the spectroradiometer. Calibration of the OL 752-10 is based on the NIST High-Accuracy Scale of Spectral Irradiance. The NIST Scale has a reported uncertainty that varies from ± 2% at 250 nm to ± 1% in the visible. The OL 752-10 has a transfer uncertainty relative to the NIST Scale that varies from ± 1.5% in the ultraviolet to ± 1% in the visible-near infrared.

**OL 752-12 Deuterium Plug-In Standard**

The OL 752-12 is calibrated for spectral irradiance over the wavelength range of 200 to 400 nm. It uses a stable, 40-W deuterium lamp. When mounted in the plug-in/pre-aligned housing, the working distance is 10 cm. This short working distance generates considerably higher irradiance levels than that obtained with conventional ultraviolet irradiance standards. The OL 752-12 is calibrated relative to the NIST Ultraviolet Irradiance Standard for the region below 250 nm and to the NIST High-Accuracy Scale of Spectral Irradiance for the 250 to 400 nm region. The NIST Ultraviolet Irradiance Standard has an uncertainty that varies from ± 7.5% at 200 nm to ± 5% at 250 nm. The OL 752-12 has a transfer uncertainty relative to the NIST Scales that varies from ± 3% at 200 nm to ± 1.5% at 400 nm.

**OL 752-10 and OL 752-12**

**Plug-in Standards of Spectral Irradiance**

**SPECIFICATIONS**

- **Lamp Type**
  - OL 752-10: tungsten-halogen (200-W)
  - OL 752-12: deuterium (40-W)
- **Operating Current**
  - OL 752-10: 6.500 amps DC
  - OL 752-12: 500 milliamps DC
- **Nominal Irradiance (OL 752-10)**
  - @ 250 nm: 6 x 10^-6 W/cm²/nm
  - @ 550 nm: 3 x 10^-5 W/cm²/nm
  - @ 1000 nm: 5 x 10^-6 W/cm²/nm
  - @ 1600 nm: 3 x 10^-5 W/cm²/nm
- **Nominal Irradiance (OL 752-12)**
  - @ 200 nm: 2 x 10^-6 W/cm²/nm
  - @ 300 nm: 5 x 10^-7 W/cm²/nm
  - @ 400 nm: 2 x 10^-7 W/cm²/nm
- **Uncertainty (relative to NIST scale)**
  - OL 752-10: 1 to 1.5%
  - OL 752-12: 1.5 to 3%
- **Long Term Photometric Stability**
  - OL 752-10: ≤ 0.06%/hour
  - OL 752-12: ≤ 0.06%/hour
- **Recommended Power Supply**
  - OL 752-10: OL 65A Constant Current DC Source
  - OL 752-12: OL 46D Deuterium Lamp Source
* Black stability option available

**CALIBRATION OPTIONS FOR THE OL 752-10**

- OL 752-10C: 250 to 2500 nm
- OL 752-10E: 250 to 800 nm
- OL 752-10F: 350 to 1100 nm
- OL 752-10G: 600 to 1600 nm
- OL 752-10J: 250 to 1600 nm
- OL 752-10L: 250 to 1800 nm
- OL 752-10M: 250 to 1100 nm
- OL 752-10U: uncalibrated

**NOTE:** In order to ensure consistent and reliable results, Gooch & Housego (Orlando) standards should only be used with current sources that possess a ramp current feature.

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As part of our policy of continuous product improvement, we reserve the right to change specifications at any time.
OL 752-10 and OL 752-12
Plug-in Standards of Spectral Irradiance

OL 752-10 Tungsten Plug-in Irradiance Standard
(Typical Spectral Irradiance)

OL 752-12 Deuterium Plug-In Irradiance Standard
(Typical Spectral Irradiance)

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As part of our policy of continuous product improvement, we reserve the right to change specifications at any time.
The OL 83A is a microprocessor-controlled, precision DC current source specifically designed to accurately operate tungsten filament lamp standards and calibration sources. The power output range is 10 to 1000 watts. The unit features:

- Output current accuracy of ± 0.01% or better
- Controlled ramp up/ ramp down of the lamp current
- Simultaneous digital readout of lamp current, voltage, and power
- Ability to set lamp current, voltage, or power
- Lamp "library" for storing and recalling the operating parameters & description for up to 10 different lamps. The user-defined operating parameters include lamp current, voltage or power, current limit, calibration due interval & lamp hours. A separate elapsed time meter keeps track of the lamp hours for each of the 10 lamps. A calibration due warning message will appear upon power up when the lamp hour's limit is exceeded and/or one (1) year has elapsed since last calibration.
- RS-232 (standard) and IEEE-488 (optional) computer interface

Tungsten lamp standards must be operated at their specified calibration current in order to realize the accuracy of the standard. A small error in setting the lamp current can induce a sizeable, wavelength dependent error in the spectral output of the lamp. The OL 83A enables the lamp current to be set to an accuracy of better than ± 0.01%, a factor of about 25 better than most other commercial power supplies, which are typically 0.25%. The advantage of the OL 83A's increased accuracy is illustrated in the table below.

<table>
<thead>
<tr>
<th>Wavelength (nm)</th>
<th>OL 83A ± 0.01%</th>
<th>Other Supplies ± 0.25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>0.12%</td>
<td>3.0%</td>
</tr>
<tr>
<td>300</td>
<td>0.09%</td>
<td>2.3%</td>
</tr>
<tr>
<td>550</td>
<td>0.04%</td>
<td>1.0%</td>
</tr>
<tr>
<td>1000</td>
<td>0.02%</td>
<td>0.5%</td>
</tr>
<tr>
<td>2000</td>
<td>0.01%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

*Tungsten Lamp @ ~3000K

In order to eliminate electrical shocking of the lamp due to high initial current surges, a ramp function is used to control the turn-on current rise. Once the instrument is turned on, the current automatically increases at a slow, safe rate until the set current is reached. A fail-safe, shut down circuit protects the lamp standard against any equipment malfunctions.

The current sources will maintain their accuracies while experiencing ± 10% fluctuations in line voltage and ±10% variance on the load voltage. These features effectively compensate for transients in the power line and variations in resistance from one lamp to another. The power supplies are packaged in a chassis suitable for mounting in a 19" cabinet rack.
SPECIFICATIONS

Power Output .................................................................................................................................................... 10 – 1000 Watts
Voltage Output (maximum) .................................................................................................................................................... 120 Volts DC
Current Output (maximum) .................................................................................................................................................... 8.4 Amps DC
Current Resolution ............................................................................................................................................ 0.001 Amps
Voltage Resolution ................................................................. 0.01 Volts
Wattage Resolution ............................................................................................................................................0.01 Watts
Lamp Current Ramp Time ................................................................. 1 minute
Current Error ..................................................................................................................................... < ± 0.01% @ 8.00 Amps
Stability (after 20 minutes) ........................................................................................................................................ 10 ppm
Line Regulation ............................................................................................................................................. < 2 ppm/v
I/O Communication Interface ......................................................... RS-232 (standard), IEEE-488 (optional)
Temperature Range .............................................................................................................................................. 0 – 45°C
Power requirements .......................................................................................................................... 115 VAC, 60 Hz or 230 VAC, 50 Hz ± 10%
Dimensions ................................................................................................................................................... 19"W x 7"H x 15.5"D (48 cm x 18 cm x 39 cm)
Weight ........................................................................................................................................................... 50 lbs (23 kg)
Warranty ................................................................................................................................................... Part and Labor for one (1) year

1 The OL 83A requires a heavy duty (20 amp) power service NEMA 5-20R. A dedicated line is recommended to handle the 2 kw electrical load.

Optional PCS Software Package

The PCS Software Package is available for the OL 83A Programmable Current Source (PCS) and consists of two instrument control software applications and a software development kit. Instrument control applications allow the user to operate all of the PCS’s functions from a host computer. The primary application is based upon ActiveX technology. A secondary LabVIEW application is also provided.

The software development kit includes an ActiveX control, which functions as an instrument driver and user interface. Additionally, programmers may develop custom applications from suitable ActiveX containers such as Excel, a Visual Basic executable program, or C++. This is a very useful feature, especially for controlling multiple instruments and custom reporting or logging.

Another component of the software development kit is the LabVIEW source code (vi’s). These vi’s function as LabVIEW instrument drivers for customers who own LabVIEW and wish to develop their own custom applications in this development environment.

- Software applications include the real-time display of lamp parameters, including current, voltage, wattage, usage hours, current limit, and lamp description.
- Uploading and downloading of a lamp parameter set, which contains information on a particular lamp (current, voltage, wattage, usage hours, current limit, and lamp description).
- Uploading and downloading an entire lamp library file, which contains up to 10 separate lamp parameter sets.
- Logging of the lamp's current and voltage to a user-specified data-logging file at regular user-defined intervals (LabVIEW application and software development kit).

The uploading/downloading features allow an unlimited number of lamps to be tracked individually!
Gooch and Housego offers 1000-W FEL type lamps as standards of spectral irradiance, total irradiance, Illuminance, and color temperature. These lamps have a tungsten coiled-coil filament enclosed in a small quartz envelope. The lamp bases have been converted to a medium bi-post base as recommended by the National Institute of Standards and Technology (NIST). This special lamp base improves alignment accuracy, which minimizes uncertainties due to positioning and orientation of the lamp.

The spectral irradiance standards issued by Gooch and Housego can be obtained with spectral irradiance calibrations over all or part of the entire 250 to 4500 nm wavelength region. Calibrations are based on the NIST Spectral Irradiance Scale for the wavelength range of 250 to 2400 nm and on a copper freezing point blackbody for the wavelength range above 2400 nm. The NIST Scale has an uncertainty of 1% in the visible, 2.5% in the ultraviolet at 250 nm, and 3% in the infrared at 2000 nm.

Calibrations over the wavelength range of 250 to 2400 nm are available with two levels of accuracy: high-accuracy and super high-accuracy. The High-accuracy FEL Standards issued by Gooch and Housego have a transfer uncertainty relative to the NIST Scale of ± 1%. The Super High-accuracy FEL Standards have a transfer uncertainty relative to the NIST Scale of ± 0.5%.

**PERFORMANCE SPECIFICATIONS**

- Spectral Irradiance (nominal)
  - @ 250 nm .................................................. 0.03 µW/cm²nm
  - @ 1000 nm ................................................ 25 µW/cm²nm
- Total Irradiance (nominal) 32 mW/cm²
- Illuminance (nominal) ......................................... 800 footcandles
- Transfer Uncertainty*
  - High accuracy ................................................ ± 1%
  - Super High-accuracy ...................................... ± 0.5%
- Uncertainty* - Illuminance ................................. ± 1%
- Long Term Stability** .................................. < 0.06%/ hour
- Operating Current ........................................ 8.00 amps DC

* Uncertainty is relative to NIST Scale
** High Stability option available

**CALIBRATION OPTIONS**

- Spectral Irradiance: 250 – 750 nm .................. OL FEL-A
- Spectral Irradiance: 750 – 2500 nm .............. OL FEL-B
- Spectral Irradiance: 250 – 2500 nm .............. OL FEL-C
- Spectral Irradiance: 250 – 1100 nm .............. OL FEL-M
- Spectral Irradiance: 250 – 4500 nm .............. OL FEL-IR
- Total Irradiance ........................................... OL FEL-D
- Total and Full Spectral ................................... OL FEL-H
- Illuminance (only) ........................................ OL FEL-P
- Color Temperature (only) ............................ OL FEL-K
- Uncalibrated (seasoned) .............................. OL FEL-U

For Illuminance and/or color temperature calibrations in addition to any of the above calibrations, add the suffix “P” and/or “K” respectively to the appropriate model number.

For super high-accuracy calibrations, add the suffix “S” to the appropriate model number.

**OPTIONAL ACCESSORIES**

- Lamp Holder ................................................. OL 61
- FEL Alignment Jig ........................................ OL 62
- Adjustable Lamp Holder Mount ...................... OL 63
- Programmable Current Source ...................... OL 83A

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As part of our policy of continuous product improvement, we reserve the right to change specifications at any time.
**Method of Calibration**

The instrumentation and technique used by Gooch & Housego to transfer calibrations from a standard of spectral irradiance to an uncalibrated lamp is patterned after that used at NIST. The measurement procedure employs the highly accurate wavelength-by-wavelength method of comparison (Figure 1). This minimizes the errors associated with setting the lamp current, distance, wavelength, and repeatability.

In this technique, both lamps (standard and test) are operated in series at the same current and at the same distance. The spectral irradiance of both lamps is measured at a set wavelength by translating the double monochromator along the optical bench to view each source. A wavelength-by-wavelength comparison is made at all of the NIST calibration wavelengths.

The high-accuracy FEL standards are calibrated by comparison to a standard that was calibrated directly against a NIST standard. The super high accuracy FEL standards are compared directly to a NIST standard.

**Optional Accessories**

Gooch & Housego offers several accessories to enable the user to realize the high accuracy assigned to their NIST-traceable standard. These accessories are designed to minimize errors due to current setting, alignment, and orientation.

The OL 83A programmable Current Source is specifically designed for operating the 1000-W lamp standards at the exact current.

There are six dimensional variables involved in the NIST recommended alignment of a lamp relative to the instrument. The OL 61 Lamp Holder, OL 62 FEL Alignment Jig, and OL 63 Adjustable Lamp Holder Mount (Figure 2) are designed to allow the user to control the physical positioning of the lamp including distance, horizontal distance, vertical distance, pitch (tilt), yaw (rotation), and roll.