



## ELECTRICAL INSTRUMENTATION CALIBRATION REPORT

DUE DATE: 26-May-11

This document states that the instrument described below meets or exceeds all manufacturer specifications and has been compared to standards which are directly traceable to the National Institute of Standards and Technology and whose procedures are in accordance with the requirements of ANSI/NCCL Z540-1-1994, ISO 10012-1:1992(E) and ISO/IEC 17025:2005.

Date: 26-May-10      Certificate #: 1005260905E      SO#: 133326  
 Temp: 20 degrees C      Humidity: 47 %      Procedure: TP-0080-REVB

Rendered To: Instrumatic Espanola, S.A.

InstrumentModel-S/N: IL1700 #330

Calibration/Repair Remarks: None

Parts (If Needed): None

As Found Tolerance In	Out	As Found Readings	As Found Permissible Error	Applied Current	As Left Readings	As Left Tolerance
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.980E-4	+/- 0.5%	1.000E-3	1.000E-3	+/- 0.2%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.000E-4	+/-0.5%	1.000E-4	1.002E-4	+/- 0.2%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.990E-6	+/-0.7%	1.000E-5	1.000E-5	+/- 0.2%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9.790E-7	+/-1.0%	1.000E-6	1.000E-6	+/- 0.2%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9.760E-8	+/-1.0%	1.000E-7	9.970E-8	+/- 0.5%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9.790E-9	+/-1.0%	1.000E-08	1.000E-8	+/- 0.5%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9.790E-10	+/-1.0%	1.000E-09	1.001E-9	+/- 0.5%
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9.700E-11	+/-1.5%	1.000E-10	1.000E-10	+/- 1.0%

Tolerance after repair and/or calibration:      Out:      In: X

COMBINED NIST AND KEITHLEY TRANSFER UNCERTAINTY IS AS FOLLOWS: 1mA=+/-0.025%, 100uA=+/-0.025%, 10uA=+/-0.025%, 1uA=+/-0.025%, 100nA=+/-0.035%, 10nA=+/-0.065%, 1nA=+/-0.065%, 100pA=+/-0.25%

The above instrument was compared to the Keithley Current Calibrator/Source Model 263 S/N 0730631 as of 23-Mar-10 which is traceable to NIST and whose calibration is due: 23-Mar-11

Calibrated By: Paul Williams

"For authorized copies of this certificate please contact International Light, Inc."

Form F-094 Rev A

263 S/N 0730631



# CALIBRATION CERTIFICATE

## ELECTRICAL INSTRUMENTATION CALIBRATION REPORT

DUE DATE: 26-May-11

This document states that the instrument described below meets or exceeds all manufacturer specifications and has been compared to standards which are directly traceable to the National Institute of Standards and Technology and whose procedures are in accordance with the requirements of ANSI/NCSL Z540-1-1994, ISO 10012-1:1992(E) and ISO/IEC 17025:2005.

Date: 26-May-10 Certificate #: 1005260904E SO#: 133326

Temp: 20 degrees C Humidity: 47 % Procedure: TP-0080-REVB

Rendered To: Instrumatic Espanola, S.A.

InstrumentModel-S/N: IL1700 #2338

Calibration/Repair Remarks: None

Parts (If Needed): None

As Found Tolerance	In	Out	As Found Readings	As Found Permissible Error	Applied Current	As Left Readings	As Left Tolerance
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.990E-4	+/- 0.5%	1.000E-3	1.000E-3	+/- 0.2%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.000E-4	+/-0.5%	1.000E-4	1.001E-4	+/- 0.2%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1.000E-5	+/-0.7%	1.000E-5	1.000E-5	+/- 0.2%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.940E-7	+/-1.0%	1.000E-6	1.000E-6	+/- 0.2%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.910E-8	+/-1.0%	1.000E-7	9.970E-8	+/- 0.5%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.960E-9	+/-1.0%	1.000E-08	1.000E-8	+/- 0.5%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.990E-10	+/-1.0%	1.000E-09	1.003E-9	+/- 0.5%
✓	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.920E-11	+/-1.5%	1.000E-10	1.000E-10	+/- 1.0%

Tolerance after repair and/or calibration: Out: In: X

COMBINED NIST AND KEITHLEY TRANSFER UNCERTAINTY IS AS FOLLOWS: 1mA=+/-0.025%, 100uA=+/-0.025%, 10uA=+/-0.025%, 1uA=+/-0.025%, 100nA=+/-0.035%, 10nA=+/-0.065%, 1nA=+/-0.065%, 100pA=+/-0.25%

The above instrument was compared to the Keithley Current Calibrator/Source Model 263 S/N 0730631 as of 23-Mar-10 which is traceable to NIST and whose calibration is due: 23-Mar-11

Calibrated By: *Paul Verduin*

\*For authorized copies of this certificate please contact International Light, Inc.\*

Form F-094 Rev A

263 S/N 0730631



International Light Technologies certifies that the instrument described below has been compared with the laboratory working standards whose calibrations are traceable to the U.S. National Institute of Standards and Technology and whose procedures are in accordance with the requirements of ANSI/NCSL Z540-1-1994, ISO 10012-1:1992(E).

Rendered-to: INSTRUMATIC ESPANOLA S.A.  
 Detector: SED038 #1386 Input Optic: R #172  
 Filter: Y #5485 Misc.: N/A  
 Spectral Response (half power points):

(YLS) PHOTOPIC LUMINANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 27-May-2010

6.06E-10 (A)(fL-1) assuming 3215 K Color Temperature  
 1.769E-10 (A)(m2)(cd-1) assuming 3215 K Color Temperature  
 4.5% \*Change In Sensitivity From Previous Calibration Dated: 07-Mar-2008

Tolerance As Found: In  Out  Tolerance As Left: In  Out

Unit will read directly in foot-Lamberts when used with an IL1700 Calibrated with IL1700 #330.

CALIBRATED WITH ILT1700 +5V BIAS: ON  OFF

REFERENCE PLANE: Average Field of Vision +/-0.75 Degrees

\*difference includes intrinsic detector change, NIST recertification updates, lab experimental error or modifications to the hardware adjustments.

PRIMARY STANDARD: U.S. National Institute of Standards and Technology Detector Response  
 SED033#4528/Y#16218/R#204 - December 14, 2005 - NIST Test No.:844/272571-05/3

N.I.S.T. Uncertainty: 1.3%

ILT Transfer Uncertainty to Customer = +/- 4.3 % plus NIST uncertainty above.

LIGHT SOURCE: 1S 1000W QTH/Reflectance Tablet LAMP OUTPUT: 205 fL  
 INSTRUMENTATION: #6400/Y PROCEDURE: YLS1S  
 TEMPERATURE: 23 degrees C HUMIDITY: 46 %  
 CALIBRATED BY: Calibration Technician CHECKED BY: QA Manager, Calibrations

FOR AUTHORIZED COPIES OF THIS CERTIFICATE OR OTHER INFORMATION PLEASE REFER TO THESE NUMBERS. THIS CERTIFICATE SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF INTERNATIONAL LIGHT TECHNOLOGIES

Calibration Date: 27-May-10 Certificate No.: 005270104 FO/Sales Order #: 133326

ILT RECOMMENDS AN ANNUAL CALIBRATION CONFIRMATION INTERVAL. INTERVALS OF CONFIRMATION MAY NEED TO BE ADJUSTED DEPENDING ON RESULTS OF PRECEDING CALIBRATIONS.



International Light Technologies certifies that the instrument described below has been compared with the laboratory working standards whose calibrations are traceable to the U.S. National Institute of Standards and Technology and whose procedures are in accordance with the requirements of ANSI/NCSL Z540-1-1994, ISO 10012-1:1992(E).

Rendered-to: INSTRUMATIC ESPANOLA S.A.

Detector: SED038 #1386 Input Optic: W #3728

Filter: Y #5485 Misc.: N/A

Spectral Response (half power points):

(YIS) PHOTOPIC ILLUMINANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 27-May-2010

3.69E-8 (A)(ft<sup>2</sup>)(lm-1) assuming 3215 K Color Temperature

3.428E-09 (A)(lux-1) assuming 3215 K Color Temperature

1.1% \*Change In Sensitivity From Previous Calibration Dated: 07-Mar-2008

Tolerance As Found: In  Out  Tolerance As Left: In  Out

Unit will read directly in lumens per square foot (footcandles) or lux when used with an IL1700 Calibrated with IL1700 #330.

CALIBRATED WITH ILT1700 +5V BIAS: ON  OFF

REFERENCE PLANE: Groove ONE formed by filter or diffuser elements and next element, counted from front surface of assembly.  
\*difference includes intrinsic detector change, NIST recertification updates, lab experimental error or modifications to the hardware adjustments.

PRIMARY STANDARD: U.S. National Institute of Standards and Technology Detector Response  
SED033 #4528 / Y #16218 - December 8, 2005 - NIST Test No.: 844/272571-05/1

N.I.S.T. Uncertainty: 0.50%

ILT Transfer Uncertainty to Customer = +/- 4.3 % plus NIST uncertainty above.

LIGHT SOURCE: 1S 1000W QTH LAMP OUTPUT: 205 lm/ft<sup>2</sup>

INSTRUMENTATION: #6400/Y PROCEDURE: YISIS

TEMPERATURE: 23 degrees HUMIDITY: 46 %

CALIBRATED BY: Calibration Technician CHECKED BY: QA Manager, Calibrations

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Calibration Date: 27-May-10 Certificate No.: 005270103 FO/Sales Order #: 133326

ILT RECOMMENDS AN ANNUAL CALIBRATION CONFIRMATION INTERVAL. INTERVALS OF CONFIRMATION MAY NEED TO BE ADJUSTED DEPENDING ON RESULTS OF PRECEDING CALIBRATIONS.



# CALIBRATION CERTIFICATE

International Light Technologies certifies that the instrument described below has been compared with the laboratory working standards whose calibrations are traceable to the U.S. National Institute of Standards and Technology and whose procedures are in accordance with the requirements of ANSI/NCSL Z540-1-1994, ISO 10012-1:1992(E).

Rendered-to: INSTRUMATIC ESPANOLA S.A.

Detector: SED033 #4776

Input Optic: W #5599

Filter: F #16702

Misc.: N/A

Spectral Response (half power points):

(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 26-May-2010

1.137E-2 (A)(cm<sup>2</sup>)(W-1) assuming monochromatic irradiance at 600nm

0.7% \*Change In Sensitivity From Previous Calibration Dated: 07-Mar-2008

Tolerance As Found: In  Out  Tolerance As Left: In  Out

Unit will read directly in watts per square centimeter when used with an IL1700 Calibrated with IL1700 #2338.

CALIBRATED WITH ILT1700 +5V BIAS: ON  OFF

REFERENCE PLANE: Groove ONE formed by filter or diffuser elements and next element, counted from front surface of assembly.

\*difference includes intrinsic detector change, NIST recertification updates, lab experimental error or modifications to the hardware adjustments.

PRIMARY STANDARD: U.S. National Institute of Standards and Technology Detector Response

1219 - November 2005 - NIST Test No. 844/272521-05 : U1023 - January 1997 - NIST Test No. 844/257423-96/2 : D204 - January 1997 - NIST Test No. 844/257423-96/1

N.I.S.T. Uncertainty: 200-250nm=5%;250-400nm=1.0%;400-900nm=0.31%;900-1000nm=0.58%;1000-1100nm=2.93%

INTERNATIONAL LIGHT TECHNOLOGIES PRIMARY TRANSFER STANDARDS:

IL.#01.#02.#3275.#139.#1490,U522,H627

JAN 2008 - JAN 2018

ILT Transfer Uncertainty to Customer = +/- 3.0 % plus NIST uncertainty above.

LIGHT SOURCE: IS 1000W QTH

LAMP OUTPUT: 2.85E-5 W/cm<sup>2</sup>

INSTRUMENTATION: #6400

PROCEDURE: PIR1S

TEMPERATURE: 23 degrees C

HUMIDITY: 46 %

CALIBRATED BY:

CHECKED BY:

Calibration Technician

QA Manager, Calibrations

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Calibration Date: 26-May-10

Certificate No.: 005270102

FO/Sales Order #: 133326

ILT RECOMMENDS AN ANNUAL CALIBRATION CONFIRMATION INTERVAL. INTERVALS OF CONFIRMATION MAY NEED TO BE ADJUSTED DEPENDING ON RESULTS OF PRECEDING CALIBRATIONS.



International Light Technologies certifies that the instrument described below has been compared with the laboratory working standards whose calibrations are traceable to the U.S. National Institute of Standards and Technology and whose procedures are in accordance with the requirements of ANSI/NC SL Z540-1-1994, ISO 10012-1:1992(E).

Rendered-to: INSTRUMATIC ESPANOLA S.A.  
 Detector: SED033 #4776 Input Optic: R #415  
 Filter: F #16702 Misc.: N/A  
 Spectral Response (half power points):

(PRR) PEAK RADIANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 26-May-2010

8.86E-4 (A)(cm<sup>2</sup>)(sr)(W-1) assuming monochromatic radiance at 600nm

-3.7% \*Change In Sensitivity From Previous Calibration Dated: 07-Mar-2008

Tolerance As Found: In  Out  Tolerance As Left: In  Out

Unit will read directly in watts per square centimeter per steradian when used with an IL1700 Calibrated with IL1700 #2338.

CALIBRATED WITH ILT1700 +5V BIAS: ON  OFF

REFERENCE PLANE: Average Field of Vision +/-0.75 Degrees

\*Difference includes intrinsic detector change, NIST recertification updates, lab experimental error or modifications to the hardware adjustments.

PRIMARY STANDARD: U.S. National Institute of Standards and Technology Detector Response

I219 - November 2005 - NIST Test No. 844/272521-05 : U1023 - January 1997 - NIST Test No. 844/257423-96/2 : D204 - January 1997 - NIST Test No. 844/257423-96/1

N.I.S.T. Uncertainty: 200-250nm=5%;250-400nm=1.0%;400-900nm=0.31%;900-1000nm=0.58%;1000-1100nm=2.93%

INTERNATIONAL LIGHT TECHNOLOGIES PRIMARY TRANSFER STANDARDS:

IL.#01,#02,#3275,#139,#1490,U522,I1627

JAN 2008 - JAN 2018

ILT Transfer Uncertainty to Customer = +/- 3.0 % plus NIST uncertainty above.

LIGHT SOURCE: IS 1000W QTH/Reflectance Tablet LAMP OUTPUT: 8.80E-6 W/cm<sup>2</sup>/sr

INSTRUMENTATION: #6400 PROCEDURE: PRR1S

TEMPERATURE: 23 degrees HUMIDITY: 46 %

CALIBRATED BY: Calibration Technician CHECKED BY: QA Manager, Calibrations

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Calibration Date: 26-May-10 Certificate No.: 005270101 FO/Sales Order #: 133326

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