

International Light

17 Graf Road • Newburyport, MA 01950-4092 USA
Tel: 978.465.5923 • Fax: 978.462.0759
ilsales@intl-light.com • www.intl-light.com

CALIBRATION CERTIFICATE

International Light 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/NCSS Z540-1-1994, ISO 10012-1:1992(E) and ISO/IEC Guide 25:1990(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: 31-Mar-2005

8.58E-4 (A)(cm²)(sr)(W⁻¹) assuming monochromatic radiance at 600nm

-2.61% *Change In Sensitivity From Previous Calibration Dated: 09-Oct-1996

Tolerance As Found: In Out

Unit will read directly in watts per square centimeter per steradian when used with an IL1700 and the Sensitivity Factor Above.
Calibrated with IL1700 #2338.

CALIBRATED WITH IL1700 +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

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 PRIMARY TRANSFER STANDARDS:

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

JAN 1998 - JAN 2008

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

LIGHT SOURCE: 1S Tungsten Halogen/Reflectance Tablet

LAMP OUTPUT: 1.078E-5 W/cm²/sr

INSTRUMENTATION: IL #04

PROCEDURE: PRR1S

TEMPERATURE: 25 degrees C

HUMIDITY: 26 %

CALIBRATED BY: 

CHECKED BY: 

Calibration Technician

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, INC.

Calibration Date: 31-Mar-05 Certificate No.: 503314422

FO/Sales Order #: 115185

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

International Light 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/NCSS Z540-1-1994, ISO 10012-1:1992(E) and ISO/IEC Guide 25:1990(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): See Chart

(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 31-Mar-2005

1.135E-2 (A)(cm²)(W⁻¹) assuming monochromatic irradiance at 600nm

Unit will read directly in watts per square centimeter when used with an IL1700 and the Sensitivity Factor Above. Calibrated with IL1700 #2338.

CALIBRATED WITH IL1700 +5V BIAS: ON OFF

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

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

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

JAN 1998 - JAN 2008

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

LIGHT SOURCE: 1S Tungsten Halogen LAMP OUTPUT: 3.49E-5 W/cm²
INSTRUMENTATION: IL #04 PROCEDURE: PIR1S
TEMPERATURE: 25 degrees C HUMIDITY: 26 %
CALIBRATED BY: [Signature] CHECKED BY: [Signature]
Calibration Technician 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, INC.

Calibration Date: 31-Mar-05 Certificate No.: 503314423 FO/Sales Order #: 115185

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

InternationalLight

17 Graf Road • Newburyport, MA 01950-4092 USA

Tel: 978.465.5923 • Fax: 978.462.0759

ilsales@intl-light.com • www.intl-light.com

CALIBRATION CERTIFICATE

International Light 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) and ISO/IEC Guide 25:1990(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): See Chart

(YIS) PHOTOPIC ILLUMINANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 31-Mar-2005

3.74E-8 (A)(ft²)(lm-1) assuming 3215 K Color Temperature

3.475E-09 (A)(lux-1) assuming 3215 K Color Temperature

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

CALIBRATED WITH IL1700 +5V BIAS: ON OFF

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

PRIMARY STANDARD: U.S. National Institute of Standards and Technology Detector Response
U1023 - January 1997 - NIST Test No. 844/257423-96/2 D204 - January 1997 - NIST Test No. 844/257423-96/1
N.L.S.T. Uncertainty: 200-250nm=5%;250-400nm=1.0%;400-900nm=0.31%;900-1000nm=0.58%;1000-1100nm=2.93%

INTERNATIONAL LIGHT PRIMARY TRANSFER STANDARDS:

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

JAN 1998 - JAN 2008

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

LIGHT SOURCE: 1S Tungsten Halogen

LAMP OUTPUT: 272 lm/ft²


INSTRUMENTATION: IL #04/Y

PROCEDURE: Y1S1S

TEMPERATURE: 25 degrees C

HUMIDITY: 26 %

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, INC.

Calibration Date: 31-Mar-05 Certificate No.: 503314424

FO/Sales Order #: 115185

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

International Light

17 Graf Road • Newburyport, MA 01950-4092 USA

Tel: 978.465.5923 • Fax: 978.462.0759

ilsales@intl-light.com • www.intl-light.com

CALIBRATION CERTIFICATE

International Light 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/NCSS Z.540-1-1994, ISO 10012-1:1992(E) and ISO/IEC Guide 25:1990(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): See Chart

YLS) PHOTOPIC LUMINANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 31-Mar-2005

5.50E-10 (A)(fL-1) assuming 3215 K Color Temperature

1.605E-10 (A)(m2)(cd-1) assuming 3215 K Color Temperature

Unit will read directly in foot-Lamberts when used with an IL1700 and the Sensitivity Factor Above. Calibrated with IL1700 #330.

CALIBRATED WITH IL1700 +5V BIAS: ON OFF

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

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

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

JAN 1998 - JAN 2008

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

LIGHT SOURCE: 1S Tungsten Halogen/Reflectance Tablet LAMP OUTPUT: 264 fL

INSTRUMENTATION: IL #04/Y PROCEDURE: YLSIS

TEMPERATURE: 25 degrees C HUMIDITY: 26 %

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, INC.

Calibration Date: 31-Mar-05 Certificate No.: 503314425

FO/Sales Order #: 115185

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

International Light

17 Graf Road • Newburyport, MA 01950-4092 USA
Tel: 978.465.5923 • Fax: 978.462.0759
ilsales@intl-light.com • www.intl-light.com

CALIBRATION CERTIFICATE

International Light 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) and ISO/IEC Guide 25:1990(E).

Rendered-to: INSTRUMATIC ESPANOLA, S.A.
Detector: SED033 #7059 Input Optic: W #10237
Filter: UVA #23821 Misc.: N/A
Spectral Response (half power points): See Chart

(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 03-Dec-2001

740e-3 (A)(cm²)(W-1) assuming monochromatic irradiance at 360nm

Unit will read directly in watts per square centimeter when used with an IL1700 and the Sensitivity Factor Above.

CALIBRATED WITH IL1700 +5V BIAS: ON OFF

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

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

IL D.R.I.P.#01,#02,#3275,#139,#1490,U522,H627

JAN 1998

IL Transfer Uncertainty to Customer = +/- 4.5 % plus NIST uncertainty above.

LIGHT SOURCE: 18a Hg-Xe IRRADIANCE: 7.55e-3 W/cm²
INSTRUMENTATION: #4544/UVA/W PROCEDURE: PIR18
TEMPERATURE: 20 degrees C HUMIDITY: 33 %
CALIBRATED BY: [Signature] CHECKED BY: [Signature]
Calibration Technician 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, INC.

Calibration Date: 03-Dec-01 Certificate No.: 112030801 FO/Sales Order #: 103502

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

International Light

17 Graf Road • Newburyport, MA 01950-4092 USA

Tel: 978.465.5923 • Fax: 978.462.0759

ilsales@intl-light.com • www.intl-light.com

CALIBRATION CERTIFICATE

International Light 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) and ISO/IEC Guide 25:1990(E).

Rendered-to: INSTRUMATIC ESPANOLA, S.A.
Detector: SED240 #5676 Input Optic: W #10237
Filter: UVB-1 #23781 Misc.: N/A
Spectral Response (half power points) See Chart

(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON 03-Dec-2001

1.139e-5 (A)(cm²)(W-1) assuming monochromatic irradiance at 290nm

Unit will read directly in watts per square centimeter when used with an IL1700 and the Sensitivity Factor Above.

CALIBRATED WITH IL1700 +5V BIAS: ON OFF

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

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

IL D.R.I.P.#01,#02,#3275,#139,#1490,U522,H627

JAN 1998

IL Transfer Uncertainty to Customer = +/- 5.5 % plus NIST uncertainty above.

LIGHT SOURCE: 18a Hg-Xc IRRADIANCE: 4.80e-3 W/cm²
INSTRUMENTATION: #1029/SCS280/W PROCEDURE: PIR18
TEMPERATURE: 20 degrees C HUMIDITY: 33 %
CALIBRATED BY: [Signature] CHECKED BY: R. Gorman
Calibration Technician 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, INC.

Calibration Date 03-Dec-01 Certificate No. 112030802 FO/Sales Order #: 103502

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

International Light

17 Graf Road • Newburyport, MA 01950-4092 USA
Tel: 978.465.5923 • Fax: 978.462.0759
ilsales@intl-light.com • www.intl-light.com

CALIBRATION CERTIFICATE

International Light 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) and ISO/IEC Guide 25:1990(E).

Rendered-to: INSTRUMATIC ESPANOLA, S.A.
Detector: SED240 #5676 Input Optic: W #10237
Filter: ACT5 #23008 Misc.: N/A
Spectral Response (half power points): See Chart

(PIR) PEAK IRRADIANCE RESPONSE SENSITIVITY FACTOR AS CALIBRATED ON: 03-Dec-2001

3.82e-4 (A)(cm²)(eff W-1) assuming monochromatic irradiance at 270nm

Unit will read directly in effective watts per square centimeter when used with an IL1700 and the Sensitivity Factor Above.

CALIBRATED WITH IL1700 +5V BIAS: ON OFF

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

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

IL D.R.L.P. #01, #02, #3275, #139, #1490, U522, H627

JAN 1998

IL Transfer Uncertainty to Customer = +/- 6.5 % plus NIST uncertainty above.

LIGHT SOURCE: 17a Deuterium/EG&G Monochromator IRRADIANCE: 1.279e-6 W/cm²
INSTRUMENTATION: U522 PROCEDURE: PIR17
TEMPERATURE: 20 degrees C HUMIDITY: 33 %
CALIBRATED BY: [Signature] CHECKED BY: [Signature]
Calibration Technician 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, INC.

Calibration Date: 03-Dec-01 Certificate No.: 112030803 FO/Sales Order #: 103502

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