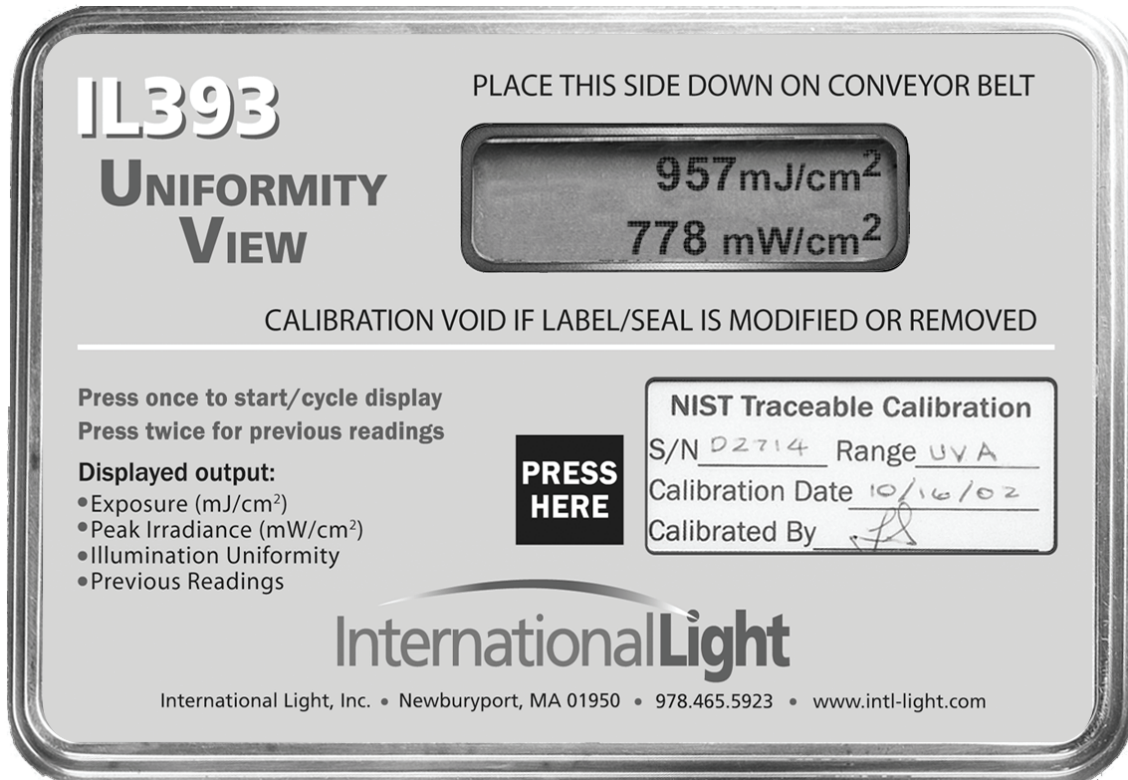


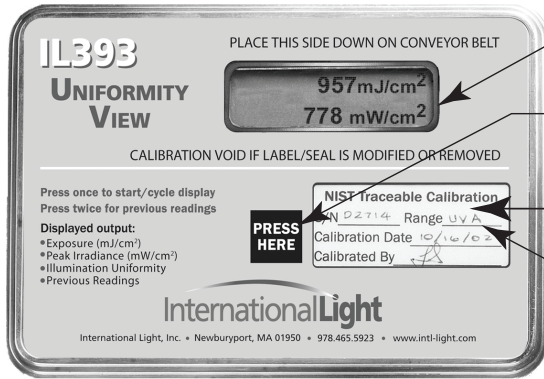
# Operating Manual



## IL393 Radiometer & Irradiance Profiler

Congratulations on your purchase of the International Light IL393 radiometer and illumination profiler. The IL393 is the world's first one-button, real-time diagnostic tool for assuring proper exposure in your curing processes and optimum operation of your conveyORIZED curing chamber.

The IL393 is extremely rugged and easy to operate. With proper care and annual calibration service the IL393 will give you many years of dependable, accurate service.

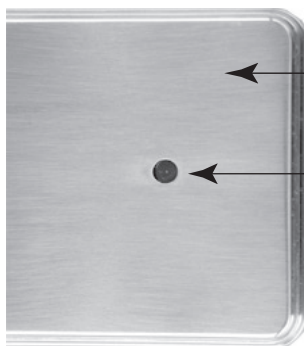


Display

Button

Calibration Label

Measurement Range

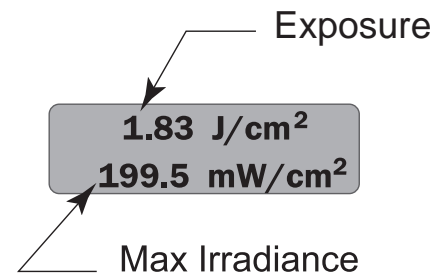


THIS SIDE TOWARDS LAMPS!

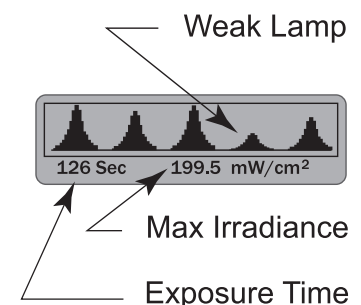
Sensor.... keep clean

Keep the metal side clean and shiny to help prevent overheating. Always store the IL393 in its case to protect the sensor.

The **IL393** numeric display shows the total exposure of UV light received by the products as they passed through the chamber. This is expressed in either  $\text{mJ}/\text{cm}^2$  or  $\text{J}/\text{cm}^2$ . This value is affected by both the intensity of the lamps and the belt speed. The maximum irradiance indicates the power level per square cm of the lamp, or strongest lamp in a multi-lamp system. Tracking this number helps evaluate system performance.



The irradiance profile shows the power distribution of each lamp in the chamber. The height of each peak (lamp) is scaled to the strongest lamp. In the display to the right, the 4<sup>th</sup> lamp is about half the height of the strongest. As the strongest is  $199.5 \text{mW}/\text{cm}^2$ , we can assume that the 4<sup>th</sup> lamp has an irradiance of about  $100 \text{mW}/\text{cm}^2$ . The display also shows that the total exposure was for 126 seconds. Later in this document you will learn how to troubleshoot system problems by interpreting the shapes of the peaks.



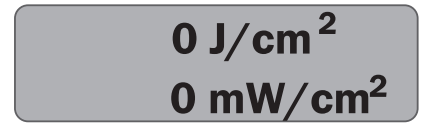
The **IL393** has two operational modes, data acquisition and data analysis. It is not possible to directly go from one mode to the other. The **IL393** must either be shut down or allowed to automatically shut down before entering the new mode.

## Taking Data (Data Acquisition Mode)

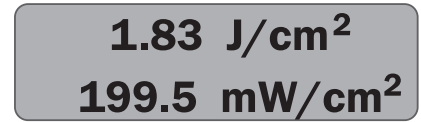
If the screen is blank, press "PRESS HERE" **once**. The unit will turn on and will display screen 1 to the right (It will turn off automatically in 5 minutes if it is not run through the curing chamber.)

Place the **IL393 LABEL SIDE DOWN** on the conveyor. When it emerges from the chamber the display will alternate every 5 seconds between numeric and graphical displays similar to screens 2 and 3 to the right.

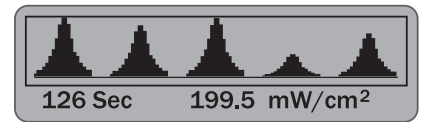
To stop the display from alternating, press "PRESS HERE" **once**. Press it once again to start the display alternating again. The **IL393** will shut itself off automatically after five minutes. To shut it off immediately press "PRESS HERE" **two times** quickly. The current profile may be stored for future analysis in the data acquisition mode. Please read that section for instructions.



Screen 1



Screen 2



Screen 3

**PRESS HERE** Start data collection  
Start/Stop display cycling

**PRESS HERE** **PRESS HERE** Shut down

## Data Analysis/Display (System Diagnostics)

The **IL393** allows you to see the status of your lamps and reflectors and to compare the current condition of these components to that of some base line or reference condition. The **IL393** will hold an irradiance profile in memory that can be visually compared to the last run. To enter the data analysis mode, press the "PRESS HERE" button **twice** if the screen is blank (unit off). If you have just completed an acquisition, press the "PRESS HERE" button two times rapidly to turn the unit off, then two times again to enter the data analysis mode.

The first time that you enter this mode, there will be no base line profile. The current profile will be displayed. To save it as your base line, press the "PRESS HERE" button **three times** rapidly. This profile will remain as the base line until you again press the button three times when a current profile is displayed in this mode.

**PRESS HERE** **PRESS HERE** Exit Acquisition Mode

**PRESS HERE** **PRESS HERE** Start analysis mode

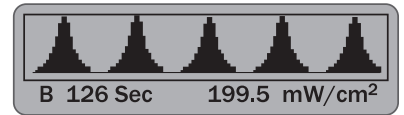
**PRESS HERE** Move between screens

**PRESS HERE** **PRESS HERE** Shut down

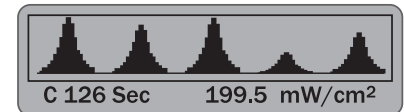
**PRESS HERE** **PRESS HERE** **PRESS HERE**  
Store current profile as base line

After the initial base line has been stored, there will be three screens displayed in the data analysis mode. You can cycle through the screens by pressing the "PRESS HERE" button once. Pressing the button twice will turn off the **IL393**. Pressing the button three times while the current profile is displayed, will store it as the new base line.

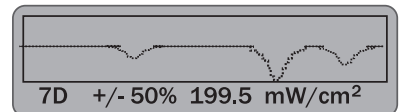
The base line profile can be identified by the letter "B" in the lower left corner of the display. The total exposure time for the run and the maximum irradiance are shown below the profile. The run time information is not important for determining system performance but is shown for process comparison.



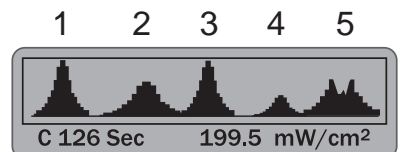
The current profile is from the most recent run through the chamber. The current profile is identified by the letter "C" in the lower left corner of the display. It is easy to see in this example that the maximum irradiance of the system has not changed, as the maximum irradiance values of the base line and current profiles are the same. However lamps 4 and 5 have decreased in intensity. As the height of the profile of lamp 4 is about half that of the maximum, it is clear that it has lost half its power.



The difference screen shows the percentage difference in the irradiance profiles. The "7D" in the lower left corner of the screen shows that there were 7 days between the base line and current run. An "M" or "H" would indicate minutes or hours between measurements. The display shows both decreases and increases in performance. In this case it is clear that the upside down peaks indicate that the lamps are currently weaker than they were when the base line was taken. The +/-50% indicates that the maximum (full scale) difference is 50%. Lamp 4 lost half of its power. Lamp 5 is about half as low, or down about 25%. The accuracy of the difference display is graphically limited to 5%.



The irradiance profile display can be a powerful diagnostic for determining the type of maintenance that is required. In the diagram to the right we have provided some examples for interpreting the information provided by the display. Peaks 1 and 3 represent well focused normal output lamps. Peak 2 is lower and wider. This indicates that lamp 2 is probably out of focus or that the reflector is very dirty. Peak 4 is lower but not wider. This indicates that lamp 4 is losing power, but is well focused. Peak 5 has a double hump. This can indicate that either the reflector is severely defocused or that it is warped or delaminated. The lamp may also be weak.



## Maintenance

The **IL393** is a very rugged instrument and should not require any maintenance other than wiping the shiny surface with a soft cloth occasionally. Over time however, the bandpass filters in the **IL393UV** will begin to degrade due to the extreme UV exposure. This gradual degradation manifests itself in changes in total transmission and bandpass characteristics, both of which adversely affect the calibration. It is, in part, for this reason that the **IL393** should be recalibrated on an annual basis.

The recalibration procedure includes replacement of the LiF batteries, evaluation, and replacement of the filter, if necessary, and a complete optical and electrical recalibration to NIST standards. The IL393 has a built-in timer that will remind you in advance as to when the unit should be returned for recalibration. Beginning 30 days before the recalibration due date an initial reminder screen will appear. It will remain visible for 10 seconds or until the "PRESS HERE" button is pressed once. The calibration due date is set for 13 months from initial set up or last calibration. The batteries are designed to provide approximately 15 months of service before failing.

RECAL DUE  
IN 30 DAYS

RECAL IS  
DUE NOW

PRESS  
HERE

Clear message

## Calibration and Repair

Calibration and repair service can be obtained by contacting our customer service department. All returns require an RMA (returned materials authorization) number: Customer Service may be reached at:

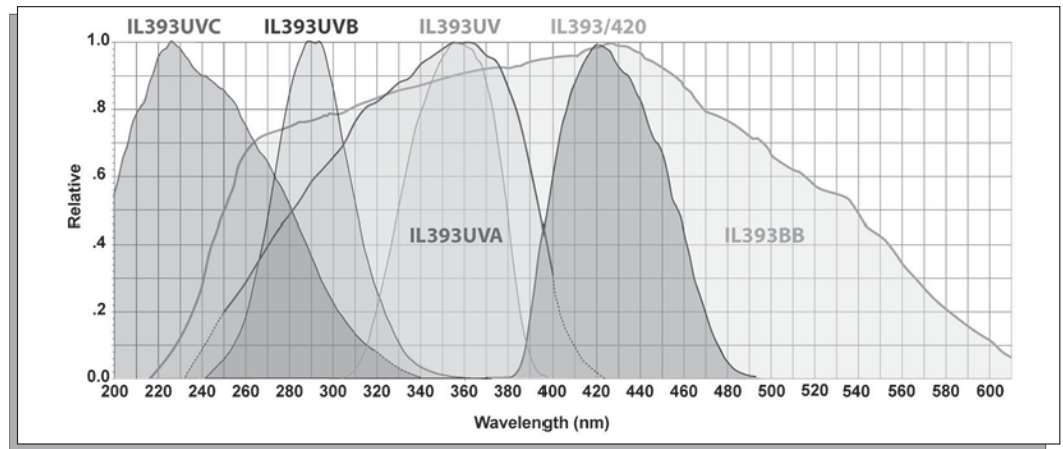
Phone: 1978.465.5923 X35  
Fax: 1978.462.0759  
e-mail: [ilservice@intl-light.com](mailto:ilservice@intl-light.com)

## Specifications

Exposure Range:	1 mJ – 20 J/cm <sup>2</sup>
Temperature Range:	10° – 50° C (case temperature). Higher ambient temperatures can be handled for short periods, so long as the case temperature limit is not exceeded.
Accuracy:	Typically better than 6%
Cosine Receptor:	Integrating sphere
Display:	4 significant digits
Display Graphics:	Resolves 5% of full scale (peak irradiance)
Calibration:	Recommend annual recalibration under normal operating conditions.

## Spectral Options

RANGE (nm) (10% peak power)	MODEL
205 - 345	IL393UVC
250 - 400	IL393UV
265 - 310	IL393UVB
315 - 390	IL393UVA
390 - 465	IL393/420
240 - 610	IL393BB



## Software Options

**H** - shuts off after 5 minutes, or when dark for 8 seconds, whichever is first

Maximum belt speed: 300 fpm  
 Irradiance Range: 10 mW/cm<sup>2</sup> – 20 W/cm<sup>2</sup>  
 Profiling starts at: 10 mW/cm<sup>2</sup>

**L** - shuts off after 15 minutes, or when the button is pressed once while “P” is flashing

Maximum belt speed: 30 fpm  
 Irradiance Range: 1 mW/cm<sup>2</sup> – 2.5 W/cm<sup>2</sup>  
 Profiling starts at: 1 mW/cm<sup>2</sup>

The “L” option is designed for slower, lower intensity applications where “H” equipped models may shut off before completely profiling a lamp system. A “L” equipped IL393, unlike “H” equipped models, has no built-in auto shutoff feature. Measurements begin when the button is pressed once and will continue until the button is pressed again. Once the button has been pressed to begin taking measurements, the numerical measurement screen will continue to display with a flashing “P” in the top left corner to indicate that the unit is still actively profiling. The unit will continue to integrate while in this screen until the button is pressed. Once pressed to stop integrating, the unit will alternate between the numerical display and the graphical display.



17 Graf Road Newburyport, MA USA Phone 1978.465.5923 Fax 1978.462.0759

The first name in NIST traceable UV measurement systems

