FirstLight UV Transilluminators

Instruction Manual

UVP

UVP, LLC
2066 W 11th Street, Upland, CA 91786
Tel: (800) 452-6788 / (909) 946-3197
Fax: (909) 946-3597

Ultra-Violet Products Ltd.
Unit 1,Trinity Hall Farm Estate,
Nuffield Road Cambridge CB4 1TG UK
Tel: +44(0)1223-420022 / Fax: +44(0)1223-420561

Web site: www.uvp.com

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Introduction

UV transillumination is a ubiquitous tool in Life Science research. With few exceptions, fluorescent stains used in post electrophoresis analysis of proteins and nucleic acids have significant excitation peaks with ultraviolet (300-365 nm) light, making midrange UV the excitation source of choice for high sensitivity analysis for many fluorophores. However, quantitative analysis is limited by the extreme lack of illumination uniformity across the surface of typical UV light boxes. We report the development and characterization of a highly uniform UV transillumination system, the **FirstLight® UV Illuminator**. Through use of a high density lighting system with a tuned phosphor coating, uniformity of <5% CV across the imaging surface has been achieved and applied to proteomic analysis.

Presently, the use of digital fluorescent imaging for both documentation and analysis of electrophoretic separations is commonplace in biological research laboratories[1]. Applications include protein and DNA gel documentation and analysis [1-5,7,8]. With the introduction of cooled low light and high resolution CCD cameras[1], CCD capture is an attractive alternative to laser scanning based approaches.

The FirstLight UV Illuminator represents a unique highly uniform excitation source for quantitative fluorescent imaging.

The FirstLight features:

Specifications

The FirstLight UV illuminator features a powder coat housing base and stainless steel frame. The stainless steel frame is coated with an antimicrobial substance that resists bacterial growth. The filter assembly is a unique combination of phosphored and filtered plates. The unit includes:

- UV blocking cover
- UV transmitting Gel-Tray with cm markings
- Gel-Cutter tool
- Fluorescent target

Physical dimensions of the FirstLight UV illuminator:

Width: 14.0” (356 mm)
Depth: 11.0” (279 mm)
Height: 5.63” (143 mm) Height includes UV blocking cover

Model	***Part Number***	***Nominal Volt/Hz/Amp***	***Wavelength***	***Filter Size***
FI-26X	95-0364-01	100-115/50-60/1.5	302 nm	25 x 26cm
FI-26X	95-0364-02	230/50/0.8	302 nm	25 x 26cm
FI-20	95-0365-01	100-115/50-60/1.5	302 nm	20 x 20cm
FI-20	95-0365-02	230/50/0.8	302 nm	20 x 20cm
FI-26	95-0366-01	100-115/50-60/1.5	302 nm	21 x 26cm
FI-26	95-0366-02	230/50/0.8	302 nm	21 x 26cm

Transilluminator Operation

Safety Precautions

Caution: The FirstLight UV illuminators are powerful sources of UV radiation that will cause damage to unprotected eyes and skin. Before operating any unit, ensure all personnel in the area are properly protected. It is preferable that the illuminator be installed and operated in a darkroom where access and exposure is limited while the unit is in operation. If a darkroom is unavailable, UVP offers imaging darkroom systems which provide protection from accidental exposure. For information on the systems, contact UVP.

Unless configured with another system to create a darkroom environment, the illuminator is equipped with a UV blocking cover. Even though this cover blocks the ultraviolet radiation emitted by the unit, UV blocking eyewear should be worn as well. UVP has a complete line of UV blocking eyewear: spectacles, goggles, and faceshields designed for this purpose. For part numbers, see the Accessories section.

Caution: The grid lamp contains Mercury. Dispose as hazardous waste according to local, state, and federal codes. MSDS sheet available upon request.

When the UV Blocking Cover is not being used, UV light may escape through the holes dedicated to accepting the bracket pins of the UV Blocking Cover.

- Remove the black safety plugs from their package
- Insert the safety plugs through the holes as shown.

Set-Up

- Place the transilluminator on a level work surface. Be sure that an air space exists around the bottom of the work surface. This space allows for the proper air circulation through the unit.
- Plug the female end of the power cord into the transilluminator. For 230 volt models, or those requiring special power cord connectors, ensure that the proper configuration of male connector or plug has been properly connected to the power cord.
- Plug the male end of the power cord into a properly grounded electrical outlet. The proper voltage of the transilluminator is found on the product information label.

  NOTE: If using the transilluminator with an imaging system, a jumper cable is required for connecting to the darkroom. Refer to the imaging system documentation for additional instructions.
- The transilluminator may be equipped with a UV Blocking Cover. Remove the brown protective paper from the cover. Insert the bracket pins on the cover into the holes on the front of the transilluminator. The cover is adjustable to varying angles for access to the filter surface.

If not using the transilluminator with an imaging system darkroom, do not operate the unit without securing the cover. If the cover is missing, a UV Blocking Faceshield must be worn to avoid UV exposure to the skin. UV Blocking Eyewear should be worn even with the cover in place to avoid accidental UV exposure.

FirstLight Applications

Using the FirstLight along with digital fluorescent CCD imaging has a number of advantages, including:

- Low capital cost compared to laser based scanning
- High detection sensitivity
- Wide dynamic range
- Rapid signal acquisition by low noise CCD cameras (typically msec to seconds)
- Availability of a wide range of highly sensitive stains for protein and nucleic acid analysis. With few exceptions, fluorescent stains used in post electrophoresis analysis of proteins and nucleic acids have significant excitation peaks with ultraviolet (300-365 nm) light, making midrange UV the excitation source of choice for high sensitivity analysis for most fluorophores [2].
- Rapid multiplex analysis of proteins (multiple fluorescent signatures from a single gel), greatly simplifying the analysis of protein expression, turnover, and posttranslational modifications after one and two dimensional SDS PAGE separations.

In the past, quantitative CCD imaging with UV has been difficult due to the lack of uniformity found in typical UV transilluminators. Accurate and repeatable UV imaging requires a uniform light source. Uniform Illumination of the FirstLight is critical for quantitative analysis and ensures:

- Sensitivity and dynamic range are consistent across the illumination surface
- Little or no reliance on uniformity correction by software that can lead to low signal data loss
- Straightforward gel to gel comparison

Through design of the FirstLight UV Illuminator, quantitative UV imaging is now possible.

Using the Transilluminator

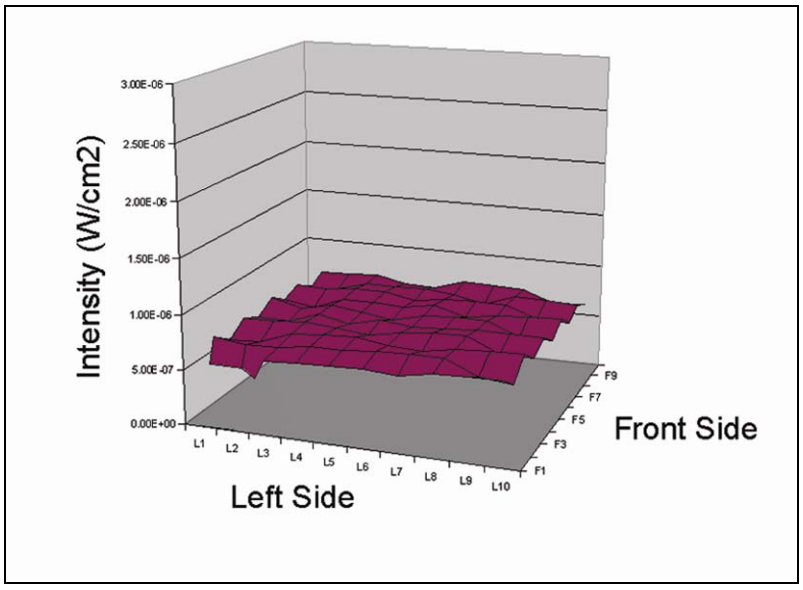
- Place gel/sample on the filter area. It is recommended to place the gels on a Gel-Tray to protect the filter surface from cuts and scratches. It is recommended that gloves be worn to avoid contact with gel and staining agents.
- Press the ON/OFF switch to ON. Prior to use each day, it is recommended that approximately a ten-minute warm-up period be observed for the initial use. When frequently turning the unit on and off, the warm-up period is not required.
- After viewing/photographing the sample, turn the transilluminator off.

Uniformity

Through the use of a high density lighting system with a tuned phosphor coating, uniformity of ≤5% CV across the imaging surface is achieved and applied for quantiative fluorescent imaging.

Each unit comes with a Certificate of Uniformity, measuring the coefficent of Variance.

The chart below demonstrates the uniformity across the filter area.



Servicing Procedures

Servicing the Transilluminator

The FirstLight UV illuminator has **no serviceable parts at the customer location** except the fuses. See below for replacement fuse part numbers.

NOTE: The warranty is void if the unit is opened! The illuminator must be returned to the factory for repairs or replacement of parts, except the fuses.

A **Returned Goods Authorization (RGA)** number must be obtained from UVP Customer Service before returning any product. Contact UVP for shipping instructions. A shipping box and packing materials are available if required.

Cleaning and Care of the Transilluminator

Clean unit surface with a damp soft cloth or sponge. Never use abrasive cleaners, solvent based cleaners or scouring pads as these can damage the UV filter surface.

ALWAYS DISCONNECT THE ILLUMINATOR FROM THE ELECTRICAL POWER PRIOR TO CLEANING THE UNIT.

To protect the filter glass and minimize moisture and liquids on the glass, use a UV transmitting Gel-Tray . Refer to the Replacement Parts for ordering information.

Replacement Parts/Accessories

For replacement parts or components not shown here, please call UVP Customer Service or place of purchase. Please have the transilluminator model number available when calling.

Replacement Part Description	**Part Number**
Cover, UV blocking	19-0121-01
Fuse, 2 amp, 250V, Slo-Blo (all voltages)	56-0022-03 – Qty 2
Accessories Description	**Part Number**
Gel-Tray, UV Transmitting, FirstLight	38-0296-02
Fluorescent Focus Target	98-0064-01
Gel-Cutter	85-0002-01
Gel-Scooper	85-0006-01
Gel-Ruler, UV Fluorescing	85-0003-01
Spectacles, UV Blocking	98-0002-01
Goggles, UV Blocking	98-0002-02
Faceshield, UV Blocking	98-0002-04

Technical Support

UVP offers technical support for all of its products. If you have any questions about the product's use or, operation, please contact UVP's offices at the following locations.

If you are in North America, South America, East Asia or Australia:

- **Call (800) 452-6788 or (909) 946-3197 Customer Service** regular business days, between 7 am and 5 pm PST
- **E-Mail**: info@uvp.com
- **Fax** Customer Service**:** (909) 946-3597
- **Write to:** UVP, LLC
  2066 W. 11th Street
  Upland, CA 91786 USA

If you are in Europe, Africa, the Middle East, Western Asia:

- **Call +44(0) 1223-420022 Customer** regular business days, between 9 am and 5:30 pm
- **E-Mail**: uvp@uvp.co.uk
- **Fax** Customer Service**:** +44(0)1223-420561
- **Write to:** Ultra-Violet Products Ltd.
  Unit 1, Trinity Hall Farm Est, Nuffield Rd
  Cambridge CB4 1TG UK

Note: A **Returned Goods Authorization (RGA) number** must be obtained from UVP Customer Service before returning any product.

Warranty

UVP, LLC warrants its Ultraviolet Transilluminators to be free of detects in materials and workmanship for a period of two (2) years from date of purchase. The foregoing warranty of UVP shall be of no force and effect if buyer has modified or damaged the product. Tubes and filters are warranted for 90 days.

All warranties or merchantability and fitness for any purpose and all other warranties, expressed or implied, except those expressly set forth herein, are deemed waived and excluded.

UVP's duty under the warranty is limited to replacement and/or repair of the defective part at the option of UVP, LLC. UVP shall not be liable for any expenses or damages incurred by the purchaser except as expressly set forth herein, and in no event shall UVP be liable for any special, incidental or consequential damages of any kind. This warranty does not supersede any statutory rights that may be available in certain countries.

UVP … Providing Quality Products for the Researcher Since 1932

Patents

The FirstLight UV Illuminator is covered under the following US and International Patents:

- US 6,670,619, US 6,911,657 US 7,030,392, US 7,081,637
- GB 2,399,265 Patents Pending

References

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   [1]UVP, LLC Upland, CA 91786; [2]Scripps College, Claremont CA 91711; [3]Keck Graduate Institute, Claremont CA 91711
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