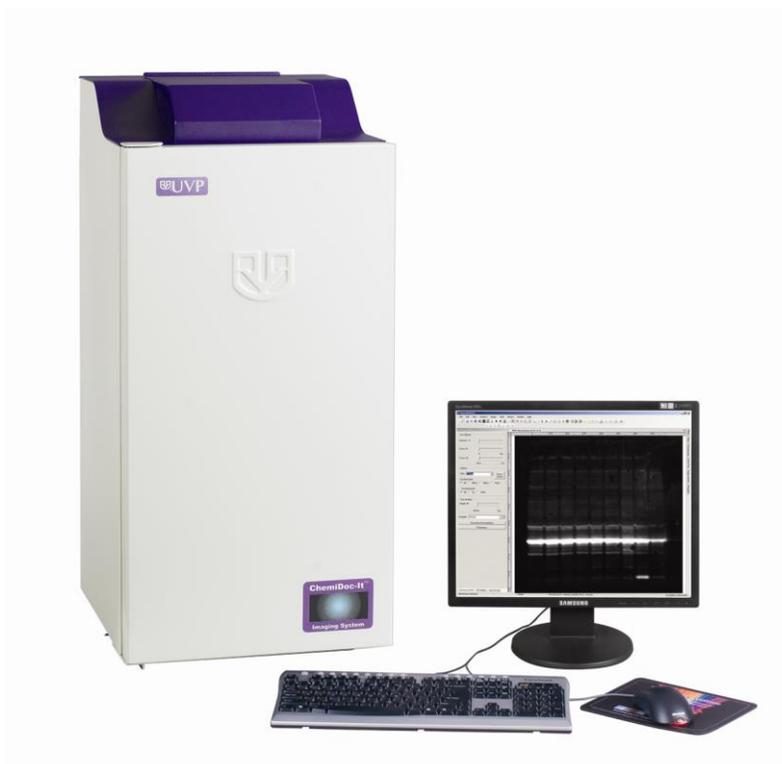


ChemiDoc-It[®] Imaging System

Instruction Guide



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Introduction

The ChemiDoc-It Imaging System is designed to automate chemiluminescence-based research with one-touch, pre-set or user-defined PC controls for accurate, repeatable imaging and analysis of chemiluminescence and bioluminescence applications. The ChemiDoc-It incorporates a light-tight darkroom and VisionWorks[®]LS software to create an ideal, computer-controlled low light imaging environment.

The ChemiDoc-It darkroom features built-in overhead LED white lights, wide darkroom access door, compact footprint and a lift platform with manual adjustment.

The ChemiDoc-It includes a highly sensitive CCD camera and supplies real time live preview of images.



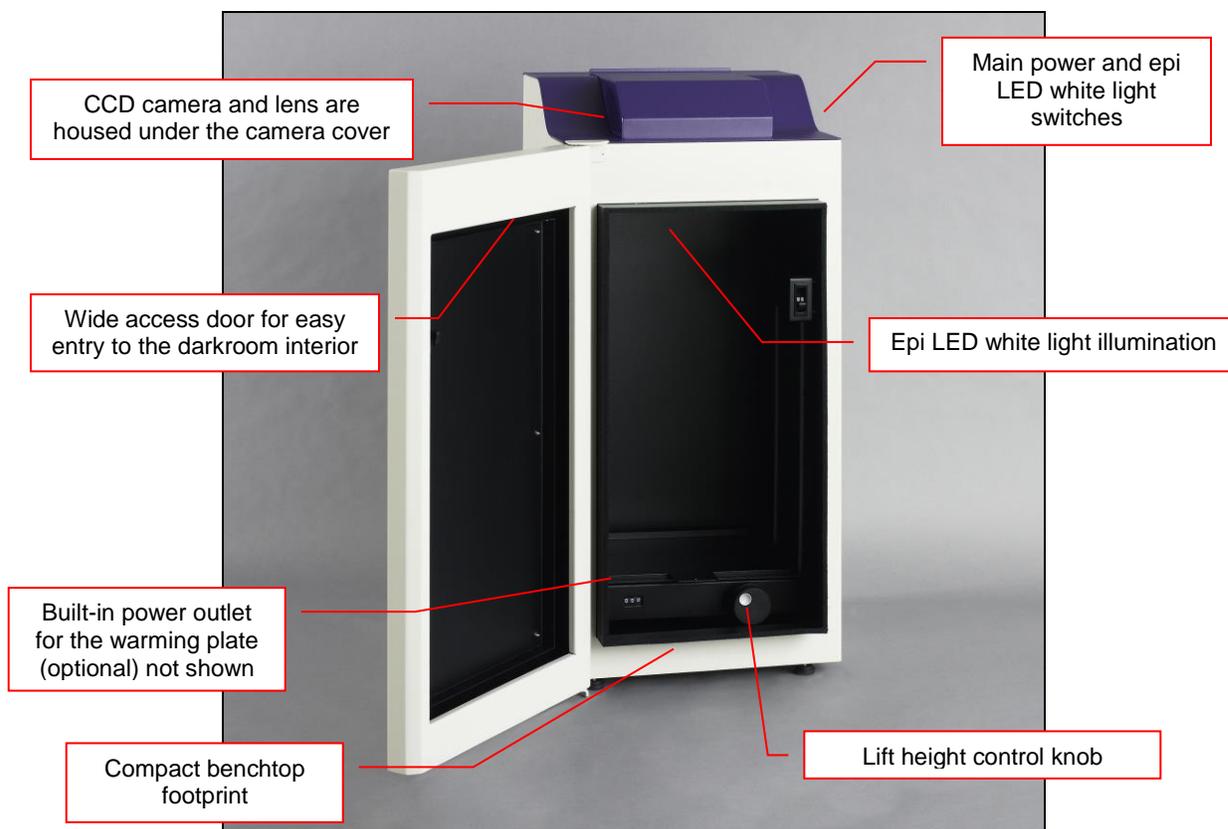
ChemiDoc-It Imaging System

Components

The ChemiDoc-It Imaging System is comprised of the following equipment:

- Darkroom Cabinet
- CCD Camera:
 - MegaCam 815
 - OptiChemi™ 615
 - BioChemi™ 515
- Lift Platform (manually adjustable)
- White Epi Illumination
- Chemi Tray
- VisionWorksLS Software

Refer to the packing slip for a complete equipment list. System components may vary. The system may additionally include a computer and monitor.



Minimum Computer Requirements

Processor:	Pentium class, 1.6 GHz or higher
RAM:	2 GB (4 GB Preferred)
Hardware:	Uses 200 MB of hard disk space NOTE: For 21 CFR Part 11 support functionality, the hard drive partition must be formatted with NTFS
Display:	1024 x 768 and 16-bit or better; 24-bit or 32-bit color is strongly recommended
Operating System:	Windows Vista or Newer (32-bit or 64-bit)
Internet Browser:	Microsoft Internet Explorer 6.0 or later
Computer USB Ports:	Computer must come equipped with a minimum of three USB ports; additional peripherals (mouse, keyboard, printer, etc.) may require additional USB ports.

Setup Instructions

Installing VisionWorksLS Software

1. Insert the VisionWorksLS flash drive into the computer.
2. Navigate to the flash drive folder and open the folder.
3. Open the first folder found in the drive and then open the **Installation** folder.
4. Scroll to find the **VisionWorksLSSteup.exe** file and double click to run installation.
5. Click **OK**, **Next**, agree to "I accept terms of licensing agreement", then **Next**. Leave all options in their default settings. Then click **Next**, **Next**, **Install** and finally **Finish**.

Registering the Software

1. Double click the VisionWorksLS software icon on the desktop.
2. To activate the software, registration is required. To immediately activate the software online, choose **On-the-Fly activation**. Activation can also be done **using a smartphone**. Activation can also be done at REG.UVP.com using any other web connected device. A **Config ID** will be needed for this option and can be found by clicking **Next** after selecting **On the fly activation**. It will be displayed under **Configuration ID**.
3. Click **Next** to continue.
4. The **Already have an activation ID** option is useful when reloading the software after receiving an initial activation code.
5. Complete all required information on the form.
6. Fill out the Serial Number located on the box delivered with the flash drive. The number should be four sets of six numbers.
7. Once the form is completed, click on **Get Activation No.** and then click **Activate** once the Activation Number appears in the box.
8. If the computer is not connected to the Internet, click **Offline activation** to register the software. This allows the user to obtain the activation code and enter it at another time.
9. Click **Next** to continue.
10. Click the link provided and complete the form to obtain registration instructions. Click **Finish**.



Installing Camera Drivers

1. The software must be installed for the camera drivers to be installed. Open the VisionWorksLS software suite.
2. Plug the USB cable from the camera into the USB port. At this time, the lens control box USB or lens controller USB should also be plugged into the computer.
3. The computer should display **Found New Hardware**. The drivers will automatically install.

Note: The installation may cause a warning message stating that the drivers are “not verified by Microsoft”. Select **Continue Anyway** and the drivers will be installed correctly.

Camera Setup

High sensitivity, scientific-grade CCD cameras are designed for use with the ChemiDoc-It Imaging System. This section covers the components and steps required to install and operate ChemiDoc-It cameras. The following cameras are covered in this manual:

- **MegaCam 815**
- **OptiChemi 615**
- **BioChemi 515**

Refer to the packing list for the camera included with the system.

Components

Depending upon configuration, the components for each camera kit are outlined in the following sections:

- **Installation with Motorized or Manual Lens**

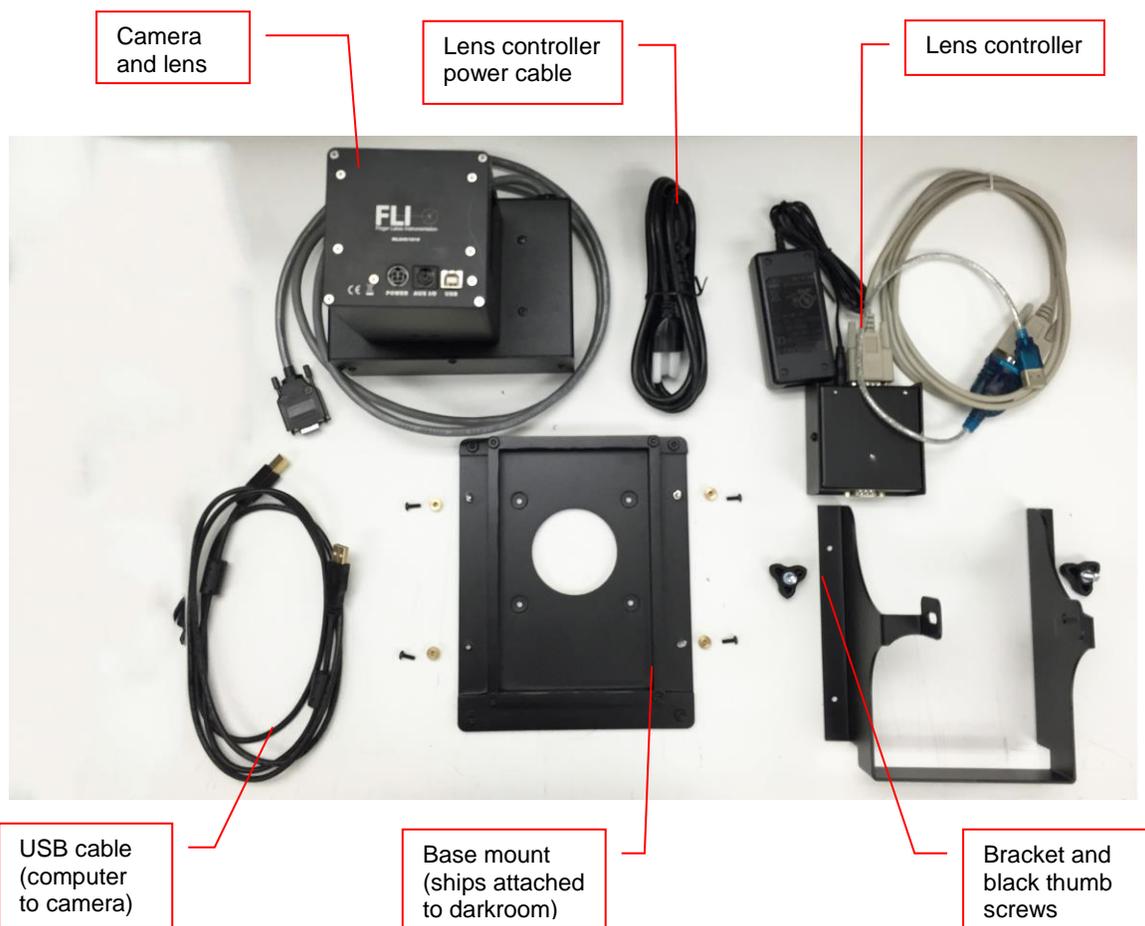
MegaCam 815, OptiChemi 615 and BioChemi 515 Cameras with Motorized or Manual Lens

Components

Note: The camera, lens and brackets, may appear different than pictured.

Note: The manual lens will not need a lens controller or bracket.

Note: The MegaCam 815, OptiChemi 615 and BioChemi 515 cameras use many of the same components and are installed in a similar manner. Therefore, the installation instructions herein will refer to all three cameras interchangeably.



Camera Installation

The photograph shows the parts required for assembly of the MegaCam 815, BioChemi 515 and OptiChemi 615 camera kits with the motorized lens on the ChemiDoc-It Imager.

Note: The image above shows the **motorized 50mm f/0.95 lens**. Another lens and/or lens controller may be shipped with the system, but will be installed in the same manner.

1. The base should be delivered mounted to the system.
2. Attach the camera bracket to the base mount with the provided thumb nuts (only if using a motorized lens).
3. Place the camera/lens assembly in the hole in the base mount, making sure that the label, found on the camera, which states **Front**, is placed towards the front of the darkroom, facing the user.

4. Use the black thumb screw(s) to tightly secure the camera in place, attaching it through the hole at the top of the bracket.
5. Plug the camera power supply chord, which hangs off the top of the system, into the camera.
6. If using a motorized lens, plug the serial cable from the motorized lens into the lens controller.
7. Plug the camera cable into the top of the camera. Do not plug the other end of the USB cable for the lens controller and camera, into the computer, until VisionWorksLS software has been installed

Note: When looking at the darkroom from the front, the MegaCam 815, OptiChemi 615 and BioChemi 515 cameras attach to the bracket with the black thumb screw to the right and/or left of the system. The USB and power cables will extend from the top of the camera, facing the user.

Thermal Printer Setup

If this order did not include a thermal printer, move on to the next section. Otherwise, to set up the printer:

1. Plug the power cable from the printer into the power source.
2. Press the **Open** button to open the lid of the printer and load the paper by allowing the loose end of the roll to come off the top of the roll.
3. After shutting the printer lid, tear off the excess paper that is visible.
4. Plug in the USB cable from the printer to the computer.
5. Load the driver CD for the printer that came shipped in the printer box.
6. To set the printer settings click "Start" at the lower left of the computer. Next, click "Printers and Faxes", then right-click on the appropriate printer icon and select "Printing Preferences".
7. Choose the following settings: High Density paper, 1280X1280, Portrait mode.
8. Click on the "Option" tab and click the "Enlarge Image to Fit Paper" box. Then, click "Apply" and "OK".
9. Close the VisionWorksLS software suite so it will remember and apply the printer setting changes.

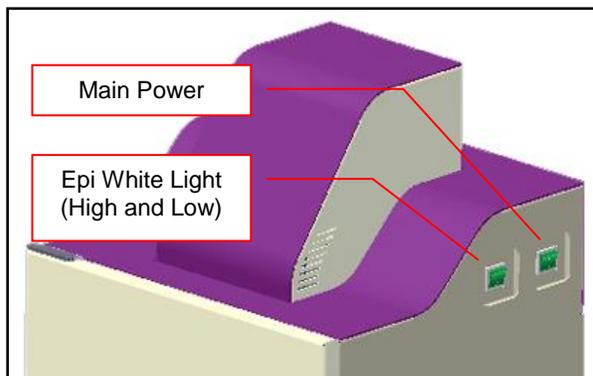
Operation

Using the System

The master power switch is located on the upper right side of the darkroom (see picture below). Connect the system power as described in **Hardware Installation**.

1. Turn on the darkroom **Main Power** switch.
2. Open VisionWorksLS software.
3. The ChemiDoc-It Imaging System may be configured with a motorized lens that is controlled by VisionWorksLS software. The software has default settings which can be modified with user-defined templates.

For additional instructions on using VisionWorksLS software, refer to the software help files or the software manual available at <http://uvp.com/manuals>.



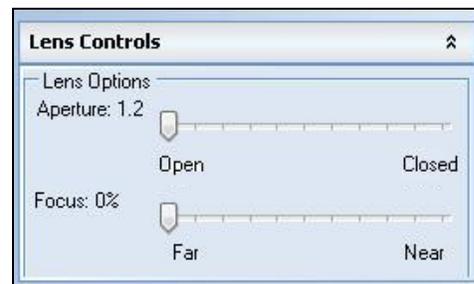
Darkroom and Lighting Power Switches

Motorized Lens Control

NOTE: If not using a motorized lens, proceed to the next section, **Adjusting the Platform Tray Height**.

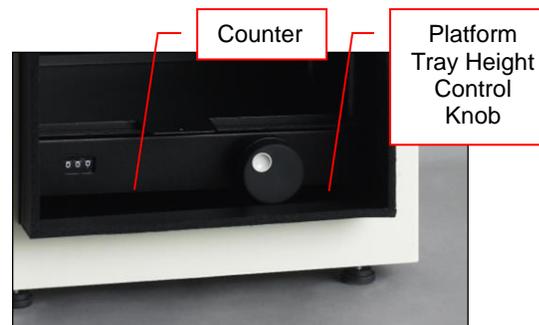
The motorized lens is controlled by VisionWorksLS software. To adjust the lens, click on the **Acquisition** Action Tab and then on the **Lighting** menu button. The lens is motorized for adjusting aperture or focus settings.

1. In the lens area, adjust the **Aperture** by moving the slider to the left to let more light into the camera or to the right to decrease the amount of light into the lens. The f-stop number is shown next to **Aperture**.
2. Adjust the **Focus** slider to control the near/far focus of the lens. Sliding the control from right to left will adjust the focus from near to far.



Adjusting the Platform Tray Height

The platform tray height is adjusted by turning the platform tray height control knob clockwise or counterclockwise. The built-in counter displays the relative height of the tray.



Chemi Tray

Place the flat black Chemi Tray on top of the adjustable platform tray. Place blots in the center of the Chemi Tray.

Capturing Images and Using Templates

Focusing the Lens Using VisionWorksLS Preview

1. Place the sample or focus target on the surface where the sample will be imaged.
2. Turn on the darkroom **Epi White Light** switch (see page 13 for more information).
3. Open VisionWorksLS. Start the image preview by clicking on the Preview button on the main VisionWorksLS screen. With the darkroom door open, move the sample around as necessary.
4. Set the aperture to the lowest setting and adjust the exposure time to see the target clearly.
5. Zoom to the desired region of interest move the platform tray up and down by rotating the Platform Tray Height Control Knob.
6. Adjust the focus to attain as sharp an image as possible.

Note: Decrease the aperture (increase the f-stop number) after focusing the lens if possible. This will sharpen the focus and increase the depth of field at the expense of some of the brightness of the image.

Capturing Images

1. Place the sample to be imaged on the chemi plate.
2. Turn off the epi white light for a chemi sample.
3. Under the Acquisition Action Tab, adjust the capture settings in the Camera and Lighting menus.
4. Click the Capture button.

Recommended Settings for Short Exposure Times and Focusing

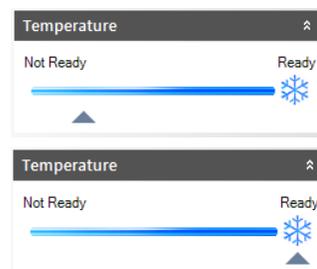
Increasing the binning will increase both sensitivity and the camera's refresh rate, providing "real-time" image previewing.

1. 4x4 binning is recommended for general focusing and the fastest possible frame refresh rates.
2. Decrease the preview exposure time to 15-100 ms.
3. Always focus at a lower (faster) f-number (aperture setting on the lens) than the capture setting. Increasing the f-number will increase the "depth of field" creating a better focus on the target.

Recommended Settings for Longer Exposure Times and Final Image Capture

Binning is ideal for very dim images where high sensitivity is needed. Binning of at least 2x2 is recommended for exposures over 1-2 minutes.

1. Ensure that the camera has had an adequate amount of time to cool before taking long exposure images. This can be verified using the "Temperature" status in the lower-left corner of VisionWorksLS. The camera cooling is **Ready**, when the moving arrow reaches the bottom of the snowflake to the right.
2. Take a test image with a short exposure (less than one minute) to ensure ideal focus before starting longer (greater than one minute) exposures.



Using Templates

Set Up and Save Camera Templates

NOTE: Without using templates, camera settings can be manually adjusted directly in the software.

Chemi Blot Pre-Capture Positioning: For this application, use a preview binning of 1x1, a capture binning 1x1 and an exposure time of 0.2sec. Have the darkroom door cracked open to let in some ambient light.

Chemi Blot with Fast Capture and Lower Resolution: For this application, use a preview binning of 8x8, a capture binning of 4x4, and an exposure time of 15sec. This setting is useful for quick screening; the time can be increased or decreased depending on the intensity of the signal from the blot.

For better resolution, set the preview binning to 8x8, the capture binning to 2x2, and the exposure time to 60sec. The preview is the same and the exposure time is intermediate, but the final image is of higher resolution than when using 4x4 binning.

Chemi Blot with Slower Capture and Higher Resolution: For this application, use a preview binning of 8x8, a capture binning of 1x1, and an exposure time of 5min. This will result in the best possible capture resolution. However, the exposure takes longer because the image is not binned.

Set Up Darkroom Templates

NOTE: Without using templates, darkroom settings can be manually adjusted directly in the software.

Chemi Blots: Place a business card on the chemi tray in the ChemiDoc-It darkroom. Set the lens to the fastest f-stop (the lowest aperture number) and focus on the business card with darkroom door cracked open, no emission filter in place, no lighting on, and either the lens zoomed or the lift platform positioned to fit the blot.

To Process a Blot

1. Place the Western blot on a hinged transparency or in clear plastic bag.
2. Position the blot on the black chemi tray.
3. Pre-focus and position the blot with the lights off, the door cracked open and the lens set to the fastest f-stop (the lowest aperture number). Use the "Chemi Blot Pre-Capture Positioning" template discussed earlier.
4. Apply the chemi substrate on the blot (front side up) and then close the hinged transparency over the blot and smooth out any bubbles. Reposition the blot in the field of view if needed. Close the darkroom door.
5. Immediately start previewing with the "Chemi Blot with Fast Capture and Lower Resolution" template. Let the blot develop inside the darkroom while watching the preview. When approaching maximum signal (which should take 2 to 3 minutes) use the "Chemi Blot with Lower Capture and Higher Resolution" template to capture the image.
6. Light emission will drop off quickly, so capture several images as quickly as possible.
7. Save and archive original files for future quantitative analysis.
8. After creating a copy of an image file, use the image invert function in VisionWorksLS, adjust the image histogram for optimal viewing, and burn the changes to a new file.

Note: Capture and image processing steps are described in more detail in the VisionWorksLS software manual and in the software help files.

Service Procedures

Return Procedure

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

Troubleshooting

No Power to the Darkroom

1. Recheck main power cord connections to the darkroom.
2. Check fuses, located at the back of the unit, near the power port. A flat-head screwdriver will be required. Turn the fuseholder cap counterclockwise and the fuse holder will pop out. Inspect the thin wire within the glass fuse to see if there is a break in the wire. If so, replace the fuse(s). If fuses are blowing repeatedly, contact UVP Technical Support for additional troubleshooting.

Replacement Parts and Accessories

Replacement parts and accessories part numbers are shown below. To order accessories or replacement parts, contact UVP's offices listed under Technical Support.

<i>Part Description</i>	<i>Part Number</i>
Power Cord, 100V/115V	46-0023-38
Power Cord, 230V	46-0023-39
Thermal printer, digital archive quality 256-grayscale (Mitsubishi)	89-0069-06 (115V)
Thermal printer, digital archive quality 256-grayscale (Mitsubishi)	89-0069-07 (230V)
Thermal printer, digital archive quality 256-grayscale (Sony for Europe)	89-0069-15 (230V)
Thermal paper, Mitsubishi (4 rolls – 800 images)	89-0038-01
Thermal paper, Sony high gloss (5 rolls – 1000 images)	89-0174-01
Thermal paper, Sony glossy (5 rolls – 1000 images)	89-0031-01

Technical Support

UVP offers expert technical support on all of UVP's products. If there are any questions about the product use, operation or repair, please contact UVP's offices at the locations below. Or go to UVP's web site and click the Tech Support > BioImaging Systems.

NOTE: A Returned Goods Authorization (RGA) number must be obtained from UVP's Customer Service prior to returning any product.

If you are in North America, South America, East Asia or Australia:	If you are in Europe, Africa, the Middle East or Western Asia:
Call (800) 452-6788 or (909) 946-3197 , and ask for Technical Support during regular business days, between 7:00 am and 5:00 pm, PST.	Call +44(0) 1223-420022 , and ask for Customer Service during regular business days between 9:00 am and 5:30 pm.
E-mail your message to: info@uvp.com or techsupport@uvp.com	E-mail your message to: uvp@uvp.co.uk
Fax Technical Support at (909) 946-3597	Fax Customer Service at +44(0) 1223-420561
Write to: UVP, LLC. 2066 W. 11 th Street, Upland, CA 91786 USA	Write to: Ultra-Violet Products Ltd. Unit 1, Trinity Hall Farm Estate, Nuffield Road, Cambridge CB4 1TG UK

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