GelDoc-It®² & ChemiDoc-It®² Imagers

Installation and User Instructions

Table of Contents

1 Basic information

1.1 User manual notes

The Imagers are intended for operation by qualified specialist personnel observing this user manual.

The user manual informs about the design and function of the Imagers and provides the necessary know-how for the safe handling of the device and its components to personnel familiar with analysis. The user manual further includes notes on the maintenance and service of the equipment.

User manual conventions

Instructions for action which occur in chronological order are numbered and combined into action units and furnished with the corresponding results.

Lists which are not in chronological order are shown as itemized lists, sub-listings as bullet points.

Safety notes are indicated by pictographs and signal words. The type and source of the danger are stated together with notes on preventing the danger. The meaning of the pictographs and signal words used is explained in the chapter "Safety instructions".

1.2 Intended use

The **GelDoc-It^2 Imager** is a high resolution imager, capable of capturing, documenting and analyzing fluorescent gel images.

The **ChemiDoc-It^2 Imager** is designed as a high resolution imager capable of capturing, documenting and analyzing fluorescent gel images, as well chemiluminescent blot images, including Western blots. The system is equipped with a cooled, scientific-grade CCD camera.

Both imagers incorporate a light-tight darkroom with VisionWorks$^®$ software for image acquisition and analysis functions. The darkroom has a UV-blocking gel viewer window, built-in overhead epi white lighting, a UV transilluminator and a four-position emission filter wheel with an ethidium bromide (EtBr) emission filter included as standard.

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2 Technical data

2.1 Specifications

Power Requirements	100/115V, 50/60Hz; 2.1 Amps at 120 Volts
	230V, 50/60Hz; 1.1 Amps at 230 Volts
	Mains supply voltage fluctuations are not to exceed 10 percent of the nominal supply voltage
Pollution Degree	2
Installation Category	II
Altitude	Up to 2000 m
Ambient Temperature	5 °C to 40 °C
Humidity	Maximum relative humidity of 80 % for temperatures up to 31 °C, decreasing linearly to 50 % maximum relative humidity at 40 °C

2.2 Minimum computer requirements

- ❑ Microsoft Windows 10, 8, 7 or XP (SP2), 32-bit or 64-bit
- ❑ Microsoft Internet Explorer 6.0 or later
- ❑ Pentium class processor or equivalent, 1.6 GHz or higher
- ❑ 2 GB of RAM (4 GB preferred)
- ❑ 200 MB of available hard disk space for the program, more for data
- ❑ CD-ROM drive
- ❑ USB ports: The computer must come equipped with a minimum of three USB2.0 ports. Additional peripherals (mouse, keyboard, printer, etc.) may require additional USB ports.
- ❑ Color monitor, supporting at least 1024 x 768 resolution and 16-bit or better; 24-bit or 32-bit color is strongly recommended

IMPORTANT

For 21 CFR Part 11 support functionality, the computer partition must be formatted with NTFS. Refer to the VisionWorks software manual for instructions.

2.3 Cameras and lenses

The **GelDoc-It² Imager** is equipped with the GelCam 315 camera, a monochrome CMOS camera with a resolution of 5.0MP (2592 x 1944) with USB 3.0 PC interface.

The **ChemiDoc-It² Imager** can be equipped with two different cameras.

Camera with Peltier cooling (for gel documentation and chemiluminescence documentation):

Available are: **CCD™ 515** or **815 CCD** scientific-grade monochrome CCD camera. All cameras are Peltier cooled and offer full 16-bit file bit depth:

The **515 CCD** camera has 2.1 MP resolution with Peltier cooling to - 57 °C from ambient. The 515 CCD has a peak quantum efficiency of 50 % and is capable of binning from 1 x 1 to 8 x 8.

The **815 CCD** camera has 8.1 MP (3296 x 2472) resolution with Peltier cooling to -57 °C from ambient. The 815 CCD has a peak quantum efficiency of 50 % and is also capable of binning from 1 x 1 to 8 x 8.

All camera settings are factory pre-set for optimum performance when viewing gels, films or membranes under low light level conditions. Contact Technical Support prior to making any adjustments to the camera settings.

Lens Kit (Motorized or Manual)

The lens used comes in two configurations:

- The motorized lens is controlled via VisionWorks Software.
- The manual lens requires manual user adjustment.

Some lenses may be fitted with a close-up diopter. The diopter is used for focusing on objects at the focal length of the darkroom.

3 Safety instructions

3.1 General notes

For your own safety, please read this chapter carefully before operating. Observe all safety notes listed in this user manual.

Symbols and signal words used

The user manual uses the following symbols and signal words to indicate safety hazards, warnings and instructions.

General warning

Caution: ultraviolet radiation

Important: hints or useful information

3.2   Safety Instructions – Operation and Maintenance

The system is designed for function, reliability, and safety. The unit may include shortwave UV, which is a powerful source of UV radiation that will cause damage to unprotected eyes and skin.

For your own safety observe the following notes:

- The device must only be operated if all protective equipment is present, and the system is properly installed and fully functional.

- Free access to the power plug and main power switch on the back of the unit must be ensured.

- Disconnect the power supply before servicing the system

- For UV protection and to extend the life of the UV transilluminator, the system incorporates a customizable transilluminator shutoff timer built into the software. For additional information, refer to Section 4.4.

Caution: Do not override the UV safety switch located on the darkroom without the use of protective equipment and face shields.

Caution: Shortwave UV (254 nm) is a powerful source 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 and that instructions for use of this equipment are followed.

4 System design

4.1 Components

Refer to the packing slip and pictured components for specific parts and components included with the system.

Note: The delivered system may look slightly different (without cover, only with different camera bracket).

GelDoc-It®² & ChemiDoc-It®² Imagers

Camera and Lens Kit (actual configuration may be different than shown in the photo)

Four Position Emission Filter Selector

Lighting and UV Timer Switches

Access port for optional BioLite™ MultiSpectral Light Source

UV Safety Interlock Switch

Epi Overhead White Light

UV-Safe Gel Viewer Window

LED White Light Plate (Optional)

Roll-Out Transilluminator
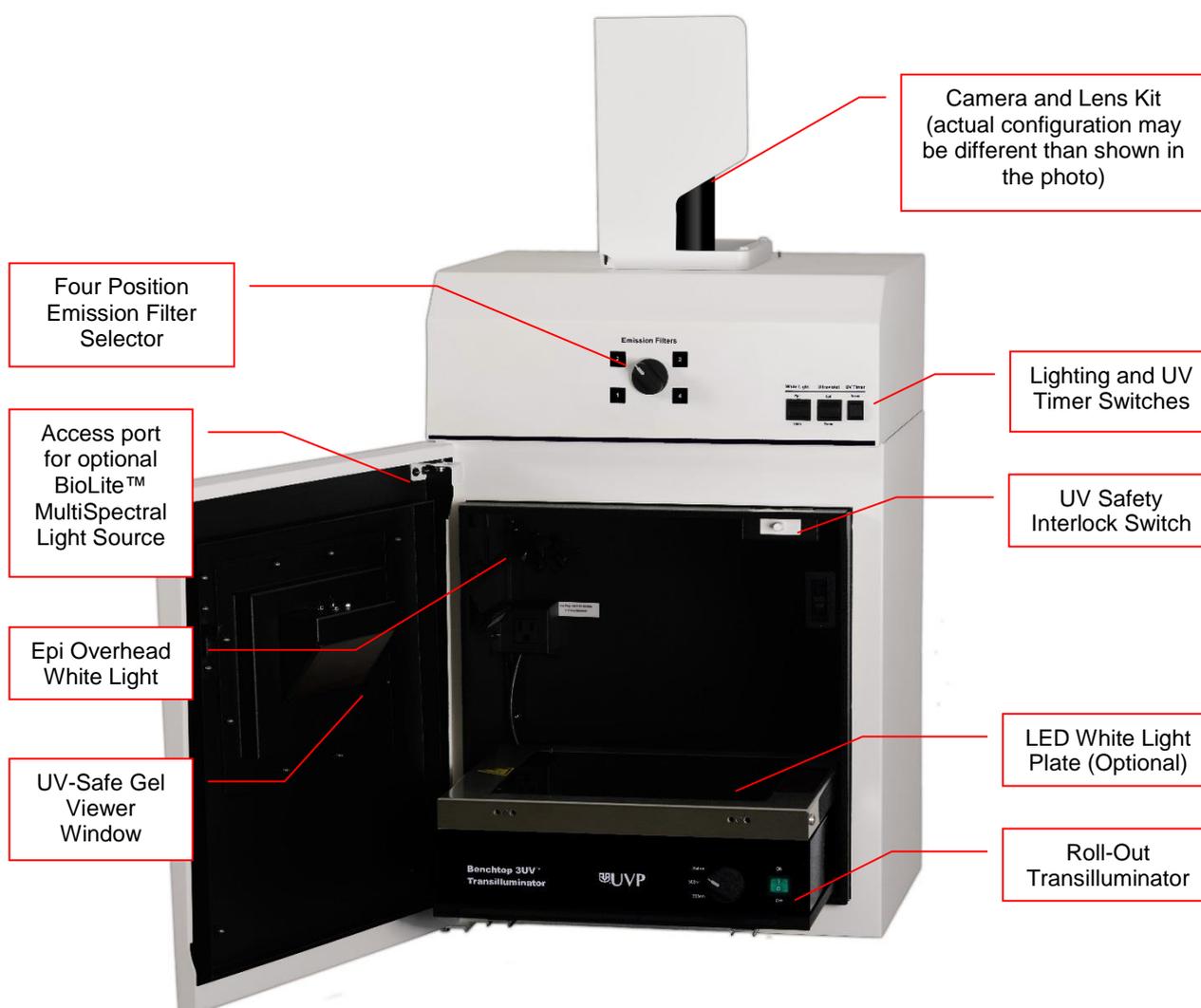
4.2 Camera Models

815 CCD and 515 CCD Cameras

Specifications	815 CCD	515 CCD
Type	CCD, Monochrome	CCD, Monochrome
Resolution	3296 x 2472, 8.1 MP	2.1 MP
Bit Depth	16 bit	16 bit
Quantum Efficiency	50 % peak	50 % peak
Cooling	- 57 °C from ambient	- 57 °C from ambient
Binning	Yes, 1 x 1 through 8 x 8	Yes, 1 x 1 through 8 x 8
PC Interface	USB2.0	USB2.0

4.3 Ethidium Bromide (EtBr) emission filter

The ethidium bromide (50 mm^2) UV-blocking bandpass interference filter blocks UV and IR radiation emitted from the transilluminator. The filter is placed in the slide-out filter wheel assembly on the side of the Imager. The filter allows visualization of fluorophores from 580 - 630 nm, targeting the ethidium bromide emission peak of 605 nm.

Additional filters are available for other specific fluorophores. Filters can also be removed when imaging non-fluorescent media (including chemiluminescent blots, protein gels, colony plates, etc.) in order to produce brighter images.

4.4 Transilluminator

The GelDoc-It^2 and ChemiDoc-It^2 Imagers can accommodate UVP's Benchtop and FirstLight transilluminator models. UVP offers a variety of transilluminator configurations, including Benchtop models with multiple wavelengths and variable intensities as well as the highly uniform, patented FirstLight® transilluminator. Refer to the packing slip for the transilluminator included with your system.

Note: For UV protection and to extend the life of the UV transilluminator, the system incorporates a ten-minute transilluminator shutoff timer. The timer shuts off the transilluminator after ten minutes of operation. A push button on the front of the darkroom allows the user to reset the timer. Alternately, the timer can also be reset by opening and closing the darkroom door.

4.5 Fluorescent Focus Target

The Fluorescent Focus Target fluoresces when placed on a UV transilluminator or when exposed to overhead UV. The Target provides sharp fluorescent images to aid in adjusting the lens and camera settings for ideal imaging results.

4.6   Optional Equipment

UVP offers a variety of optional equipment to support the needs of varying laboratory environments. Refer to "Replacement Parts and Accessories" at the end of this manual for optional equipment part numbers.

4.7   Thermal Printer

The thermal printer provides archive quality, 256 gray-scale prints and five optional cost-effective print sizes.

Thermal Printer

4.8   UV Handheld Lamps for Epi (Overhead) Lighting

A set of two 4-watt ultraviolet lamps can be connected inside the darkroom to provide epi UV illumination. These lamps can be switched on or off using the switch in front of the darkroom and can also be removed from the darkroom and used as standalone handheld lamps (as seen in the image to the right).

UV Lamp

4.9   LED White Light Plate

The LED White Light Plate emits high uniformity with less than 5 % coefficient of variance (CV). Plug the LED White Light Plate directly into the power supply within the system darkroom, or store it in the exterior dark-room side pocket when not in use.

LED White Light Plate

4.10   Converter Plates

An alternate to the LED White Light Plate, the **UV/White Converter Plate** allows imaging of non-fluorescent stained media with an ultraviolet transillumi-nator. The converter plate is specially coated to convert 302 nm UV output to white light rather than using a separate white light box or plate.

The **Converter Plate Visi-Blue™** (not shown) converts UV to a safe 460 – 470 nm wavelength designed for use with blue excitation samples and SYBR Green, SYPRO Orange and GFP stains.

UV/White Converter Plate

4.11   VisionWorks® Acquisition and Analysis Software

The Imager is configured with VisionWorks Software for acquisition and analysis of gels, plates and membranes. The software features image enhancement, complete analysis tools and reporting capabilities, and is ideal for users who require image analysis functions in addition to the standard image acquisition capabilities.

IMPORTANT

VisionWorks is included as standard. Software must be installed on an external computer. For installation instructions please see next chapter as well the separate software instructions.

5 Set-Up

5.1 Scope of supply

When unpacking the system, the following items will be included:

- ❑ GelDoc-It^2 or ChemiDoc-It^2 darkroom

- ❑ Transilluminator

- ❑ Camera with lens and bracket

- ❑ Ethidium bromide (EtBr) emission filter

- ❑ Power cables

- ❑ VisionWorks® Software

- ❑ Supporting documentation

- ❑ Black chemi tray for blots (ChemiDoc-It^2 only)

- ❑ Gel tray and gel ruler (GelDoc-It^2 only)

Note: When unpacking and setting up the darkroom, two people are required to move the dark- room. Place the darkroom on a flat surface which can provide adequate support for up to 100 pounds.

CAUTION! Risk of short circuits!

Do not attempt to perform any setup procedures while the system is plugged in or powered on unless otherwise instructed.

IMPORTANT

Do not install the system in areas with high moisture, dust or high temperatures. Keep the equipment away from motors or any other large magnetic equipment apparatus. This system is designed for indoor use only.

5.2 Connecting the power cables

1. Inside the darkroom, place the transilluminator on the roll-out tray. Connect the transilluminator to one end of the jumper cable. Connect the other end of the jumper cable to the interior of the darkroom. Turn the UV transilluminator's main power switch (green switch) **ON**.

2. If installing the LED White Light Plate, place the plate on top of the UV transilluminator and connect the power cord coming from inside the darkroom to the back of the Plate.

3. If installing epi UV handheld lamps, place the lamps in the brackets located at the top of the darkroom. Plug the handheld lamps into the outlets provided inside the darkroom. Place the power switches located on the outside of the handheld lamps in the **ON** position.

4. Connect the main power cord from the back of the darkroom to a surge-protected power outlet.

5.3   Installing emission filters

To install the 50 mm^2 ethidium bromide (EtBr) filter and any other emission filters:

1.   Carefully remove the filter from the protective plastic case, holding the filter at the edges to prevent placing fingerprints on the glass surface.

IMPORTANT

It may be necessary to remove the base and camera as-sembly to insert new filters (photograph shows camera and base removed).

2.   The filter wheel is located inside the top of the dark-room. Before placing the filter in the filter wheel, en-sure that the text on the edge of the filter is posi-tioned so it is right side up when facing the installer.

3.   Place the filter in the filter wheel.

4.   Write the name of the filter on the appropriate label at the front of the darkroom.
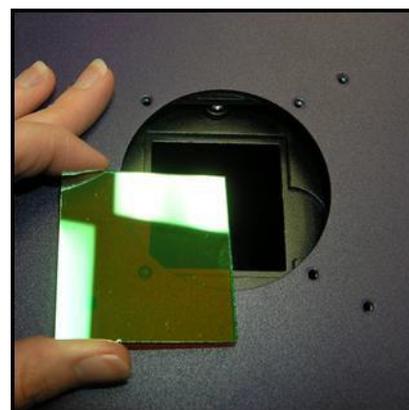
Additional and replacement emission filters are available through UVP. Refer to the "**Replacement Parts and Accessories**" section of this manual for ordering information.

5.4   Camera Setup

High sensitivity, scientific-grade cameras are designed for use with UVP's imagers. This section covers the components and steps required to install cameras. The following cameras are covered in this manual (refer to the packing list for the camera included with your specific system):

- 515 CCD
- 815 CCD

5.4.1   Camera with Manual Lens

The 515 camera, zoom lens and diopter are assembled at the UVP factory.

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

1.   Before installing the camera, install the emission filter. Refer to section: 5.3 Installing emission filters.

2.   Remove the cap from the lens by pulling off, instead of unscrewing.

3.   When using a zoom lens, a step-up ring and diopter should be attached to the lens. The step-up ring and diopter will only fit one way.

4. Using the brass thumb nuts provided, secure the camera assembly bracket to the dark-room base located the top of the system. Ensure that a light-tight seal is made between the end of the lens and the rubber gasket beneath the darkroom bracket.

5. Plug the additional power cables to an external power source.
   Do not plug the camera USB into the computer, until VisionWorks LS has been installed!

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Darkroom bracket

Brass thumb nut

Camera bracket

Camera USB cable

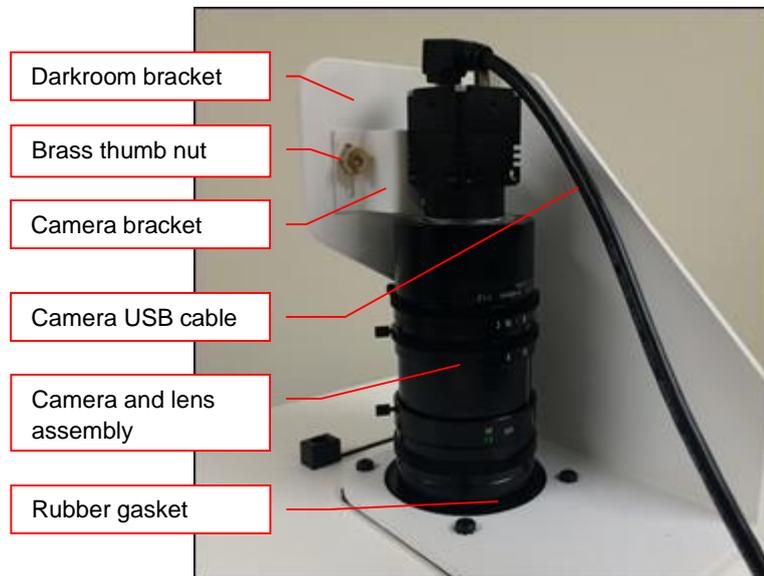Camera and lens assembly

Rubber gasket

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5.4.2 Camera with Motorized Lens

The 515 camera, zoom lens and diopter are assembled at the UVP factory.

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

The 815 CCD and and 515 CCD 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 power supply | Camera and lens | Lens controller power cable | Lens controller

Camera power cable | USB cable (computer to camera) | Base mount (ships attached to darkroom) | Black screws and brass thumb nuts | Bracket and black thumb screws

Camera Installation

The photograph shows the parts required for assembly of the 815 CCD and 515 CCD camera kits with the motorized lens on the Imager.

Note: The image above shows the motorized 42.5mm 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. Check to see if base mount has been mounted to the top of the darkroom. If not, use the black screws or brass thumb nuts to install the mount.

2. Attach the camera bracket to the base mount with the brass thumb nuts.

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 serial cable from the motorized lens into the lens controller.

6. 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 VisionWorks software has been installed

Note: When looking at the darkroom from the front, the 815 CCD and 515 CCD 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.

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5.4.3   515 CCD Camera with Motorized Zoom Lens
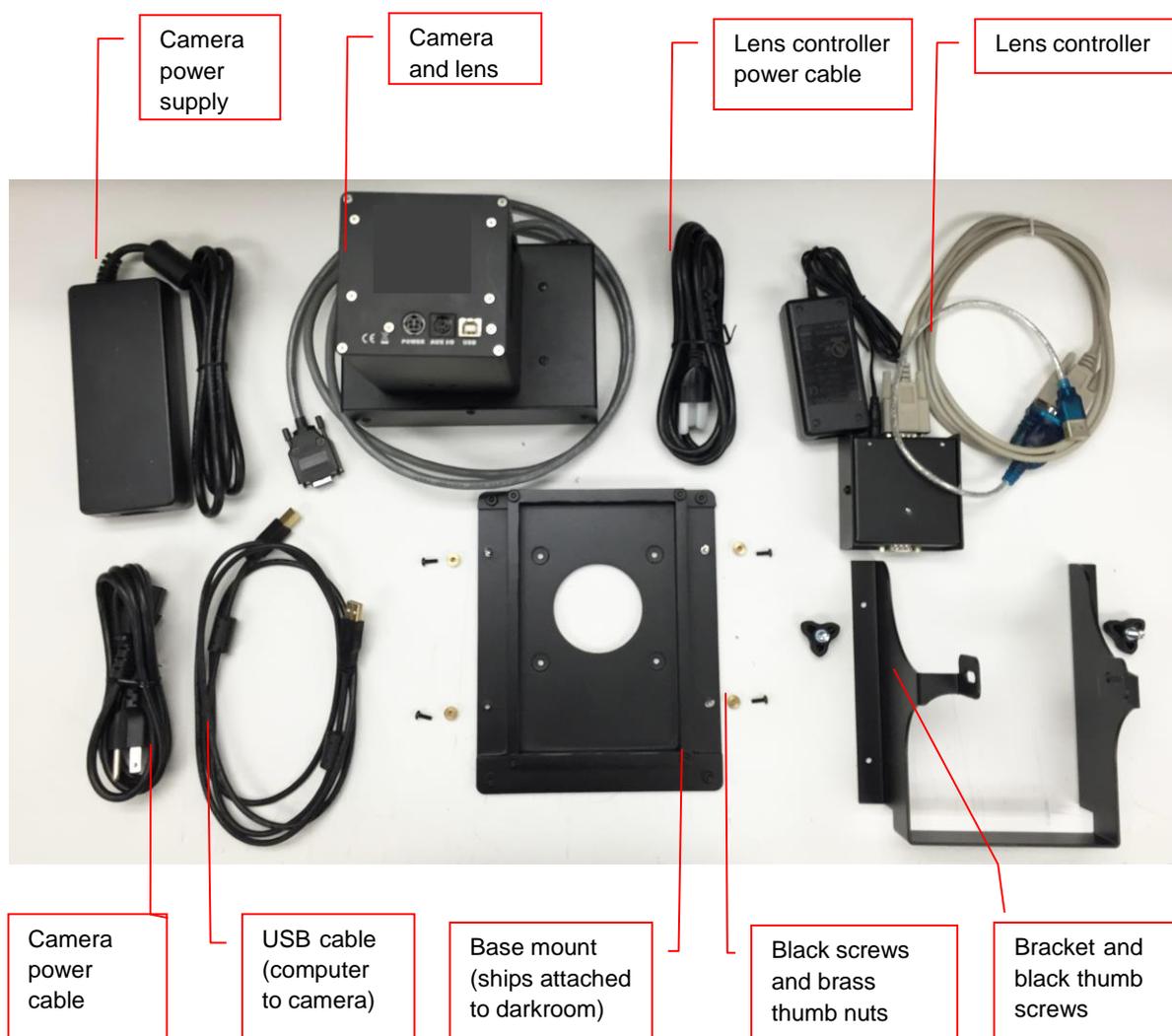
Note: The picture below shows the **12.5-75mm f/1.2 motorized zoom lens**. The camera, zoom lens and diopter are assembled at the UVP factory.

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

Camera power supply   Camera power cable   USB (camera to PC)   Camera and lens   Diopter

Lens control box   USB cable (lens control box to PC)   Base mount   Black screws and brass thumb nuts   Lens control box power   Black thumb screw and bracket

Camera Installation

1. **Note:** If not already removed, take the lens cap off the lens by pulling straight off. Do not unscrew the lens cap as it will simply pull off.

2. Follow steps 1-4 from the **Camera Installation** section under **5.4.2 Cameras with Motorized Lens.**

3. Plug the camera cable into the top of the camera but do not plug in the other end of the USB cable until VisionWorks software has been installed.

4. Mount the lens control box on the hook located at the back of the darkroom.

Hook for the
Lens Control Box
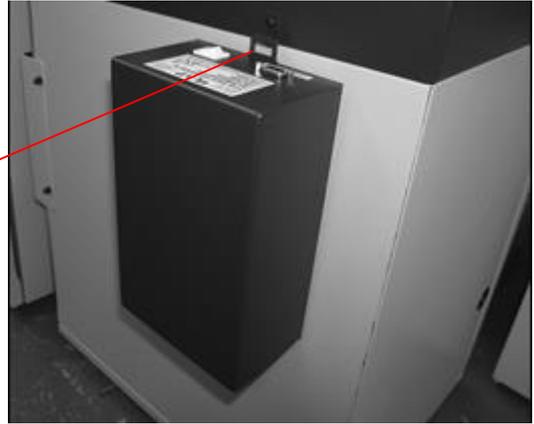
5. Plug the serial cable from the motorized lens into the lens control box.

Power switch for the Lens
Control Box
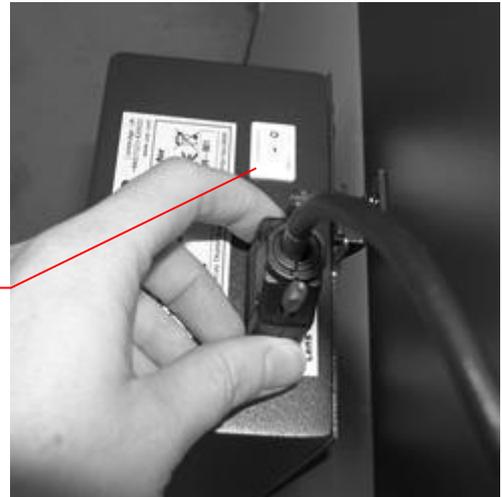
6. Connect the USB cable to the PC connection port on the lens control box. Leave the other end of the USB cable unplugged until installation of VisionWorks is complete.

7. Connect the power supply to the lens control box and into the power outlet.

Power supply
on the Lens Control Box

PC Connection on the Lens
Control Box

FUSE
2 X T1 AMP 250 V

PC Connection

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6   Software Installation

6.1   Installing VisionWorks Software

1.   Insert the VisionWorks flash drive into the computer.

2.   Click on the **Install** button for VisionWorks.

3.   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**.

6.2   Registering the Software

1.   Double click the VisionWorks soft-ware icon on the desk-top.

2.   To activate the software, registration is required. To immediately activate the software online, choose **On-the-Fly activation**. Activation can aso 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 activiation**. 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 infor-mation on the form.

6.   Fill out the Serial Number located on the box delivered with the flash drive. The num-ber 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**.

6.3   Installing Camera Drivers

1. The software must be installed for the camera drivers to be installed. Open the Vision-Works 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.

7 Using the imaging system

7.1 Powering up the system

Once plugged in to a surge-protected wall outlet, the system is always powered on. Power to specific system components, including overhead and transillumination lighting, is con- trolled by switches located on the front of the unit.

If using the system with a motorized zoom lens, turn on the power switch for the Lens Control Box (see "Camera Setup" for more information).

The **White Light** and **Ultraviolet** power switches are three-way rocker switches. Selecting the upper switch position will turn on the corresponding overhead illumination. Selecting the lower switch position will turn on the corresponding transillumination. Finally, selecting the middle switch position will turn off the lighting.

7.1.1 UV Timer

For UV light protection and to extend the life of the UV transilluminator, there is a ten-minute transilluminator **UV Timer** installed in the system. The timer shuts off the transilluminator after ten minutes of operation. Press the button on the front of the darkroom to reset the timer.
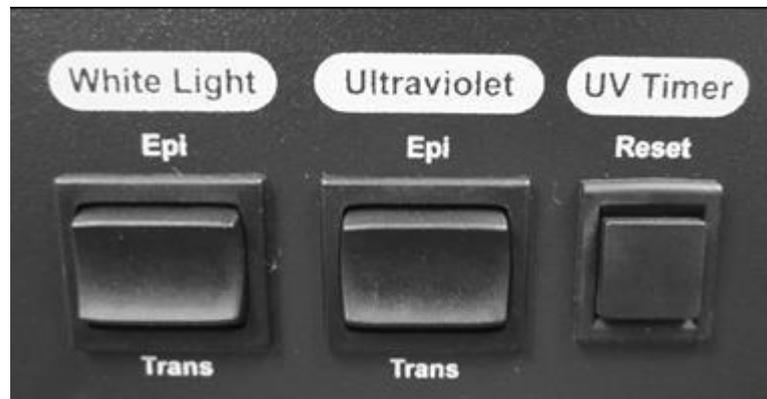
IMPORTANT

When the darkroom door is opened and closed again, the UV timer is automatically reset.

7.2   Using the Filters

When installing emission filters in the system, the user should note the location of the emission filter selector knob located on the front of the system (pictured below).

To change to a different filter, turn the filter selector knob to the desired location. Ensure that the knob clicks into place to verify that the filter is positioned correctly.

7.3   Using the Transilluminator

To use the UV transilluminator or LED White Light Plate, ensure that the components are plugged into the system (see "Connecting the Power Cables").

Using the power switches located on the front of the unit, select either **White Light: Trans** or **Ultraviolet: Trans** depending upon application. When using the UV transilluminator, ensure that the green power switch on the front of the transilluminator unit is in the **ON** position.

IMPORTANT

Do not attempt to use both the White Light and Ultraviolet transillumination sources simultaneously as system damage may occur.

For UV light protection and to extend the life of the UV transilluminator, there is a ten-minute transilluminator **UV Timer** installed in the system. See "UV Timer" for more information.

Refer to the Transilluminator manual for additional instructions on using the transilluminator.

7.4   Using the Overhead (Epi) Lighting

To operate the built-in overhead white light**,** use the power switch located on the front of the unit to select **White Light: Epi**.

To operate the optional overhead (epi) UV illumination, ensure that the optional UV handheld lamps are plugged into the back of the darkroom interior and are mounted to the brackets at the top of the darkroom. Also ensure that the power switches, located on the handheld lamps, are in the **ON** position. Use the power switch located on the front of the system to select **Ultraviolet: Epi**.

7.5   Using the UV Gel Viewer Window

The **UV Gel Viewer Window**, built into the darkroom door, allows users to view the interior of the darkroom without opening the entire darkroom door.

To open the Window, press firmly on the top of the Window cover to release the pressure-sensitive clasp and open the viewer. The Window glass is UV blocking while providing a clear view to the transilluminator surface for sample viewing without opening the darkroom door.

IMPORTANT

Close the UV Gel Viewer Window prior to capturing a light-sensitive image such as a chemi-luminescent blot.

8   Capturing Images and Using Templates

8.1   Image Focusing

8.1.1   Manual Lens

Prior to capturing an image, prepare the image focus:

1. Turn on the transilluminator and place the **Fluorescent Focus Target** (see "System Components") on the transilluminator surface.

   NOTE: The darkroom has a UV safety switch that turns off the transilluminator and optional UV handheld lamps when the door is open. After closing the door, open the **UV Gel Viewer Window** to ensure that the transilluminator is on and that all other lighting is off.

2. With VisionWorks open, preview the image. Adjust the camera settings, including exposure time, to enhance the image of the sample. To adjust the settings, go to the Acquisition Action Tab and click on the Camera Menu Button. Adjust the exposure time from the Exposure Time section of the Camera Menu.

3. Rotate the lens f-stop adjustment (top ring) so that the image is bright enough to be seen on the screen.

4. Rotate the lens focus adjustment (bottom ring) on the lens. Adjust the focus so that the image appears clear on the screen.

5. Rotate the zoom lens adjustment (middle ring, if zoom lens is used) on the lens so that the image is ideally zoomed. Readjust the focus ring (bottom ring) on the lens, making the image clear. Adjust the zoom so that the object of interest is within the image preview area.

8.1.2   Motorized Lens (815 CCD and 515 CCD)

Prior to capturing an image, prepare the image focus:

1. Turn on the transilluminator and place the **Fluorescent Focus Target** (see "System Components") on the transilluminator surface.

    NOTE: The darkroom has a UV safety switch that turns the transilluminator and optional UV handheld lamps off when the door is open. After closing the door, open the **UV Gel Viewer Window** to ensure that the transilluminator is on and that all other lighting is off.

2. Open VisionWorks software, click on the Acquisition Action Tab, and then click on the Lighting Menu Button. Adjust the aperture, zoom (if applicable) and focus controls from the Lens Control section of the Lighting Menu until an ideal image is seen.

3. Adjust the camera settings, including exposure time, to enhance the image of the sample. To adjust the settings, go to the Acquisition Action Tab and click on the Camera Menu Button. Adjust the exposure time from the Exposure Time section of the Camera Menu.

8.2   Capturing Images

1. Depending on the sample type, place the sample on the chemi tray, transilluminator or white light plate.

2. For a chemiluminescent sample, turn off all darkroom lighting, place the black chemi tray on top of the transilluminator and place the sample on the tray. For a fluorescent gel sample, turn on the UV transilluminator.

3. Adjust the capture settings in VisionWorks.

4. Click the **Capture** button.

### 8.2.1   Recommended Settings for Short Exposures and Focusing

1. Increasing the Binning will increase the camera's refresh rate and sensitivity. However, it also exponentially decreases overall image resolution. Binning works by combining smaller pixels into one larger pixel. For example, 2 x 2 binning will take a 2 x 2 area of pixels (4 pixels all together) and combine them into one large pixel, 4 x 4 binning will combine a 4 x 4 area of pixels (16 pixels all together) into one large pixel, and so forth, thus increasing image sensitivity but decreasing overall image resolution.

2. In most cases, 4 x 4 preview binning is recommended for general focusing and the fastest possible frame rates. (**NOTE**: Binning is not available on 300-series cameras)

3. Decrease the preview exposure time to 15 - 100 ms.

4. Always focus at a lower (faster) f-number than the capture setting. Increasing the f-number will increase the "depth of field," creating a better focus on the target.

8.2.2 Capturing Longer Image Exposure with the Least Noise

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

2. Ensure that the camera has had an adequate amount of time to cool before taking long exposure images. This can be verified by referencing the "CCD Temperature" status in the lower-left corner of VisionWorks.

Take a test image with a short exposure (less than 1 minute) to ensure adequate focus before starting longer (greater than 1 minute) exposures.
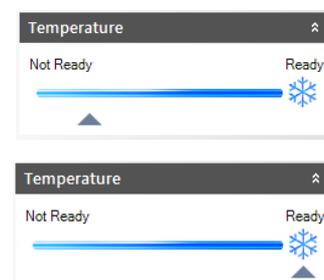
8.3 Using Templates

8.3.1 Set Up and Save Camera Templates

IMPORTANT

Without using templates, camera settings can be manually adjusted directly in the software. For additional information on using templates, refer to the software Help files or the Vision-WorksLS software manual.

Chemi Blot Pre-Capture Positioning: For this application, use a preview binning of 4 x 4, a capture binning 1 x 1 and an exposure time of 0.2 sec. 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 8 x 8, a capture binning of 4 x 4, and an exposure time of 15 sec. 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 8 x 8, the capture binning to 2 x 2, and the exposure time to 60 sec. The preview is the same and the exposure time is intermediate, but the final image is of higher resolution than when using 4 x 4 binning.

Chemi Blot with Slower Capture and Higher Resolution: For this application, use a preview binning of 8 x 8, a capture binning of 1 x 1, and an exposure time of 5 min. This will result in the best possible capture resolution. However, the exposure takes longer because the image is unbinned.

IMPORTANT

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

Chemi Blots: Place e.g. a business card on the chemi tray in the darkroom. Set the lens to the fastest f-stop (the lowest aperture number) and focus on the business card with the 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.

8.3.2 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). 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 VisionWorks, adjust the image histogram for optimal viewing, and burn the changes to a new file.

IMPORTANT

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

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9 Maintenance, replacement parts/accessories

9.1 Care and cleaning

⚠️ **CAUTION! Risk of electrical shock!**

Ensure that the system is turned OFF and unplugged during cleaning.

❑ Clean unit surface with a damp soft cloth or sponge. Use mild soap or detergent solution.

  Never use abrasive cleaners (can damage the UV filter surface of the transilluminator). Do NOT use oil- or petroleum-based cleaners for the cabinet.

❑ Clean the instrument only from outside.

  The imaging system or the transilluminator must not be dipped into water or other liquids!

Transilluminator

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

❑ When the transilluminator features a UV Blocking Cover only cleaning with a damp cloth is allowed.

  Alcohol and glass cleaner detergents attack the plastic and damage the UV protection shield.

9.2 Replacement parts and accessories

Replacement parts and accessories are listed below. Only authorized UVP service personnel should perform repairs or replacements other than specified in these procedures.

For replacement parts of the transilluminator please refer the manual of the transilluminator.

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

Part Description	Part Number
Overhead (Epi) lighting:	
UV Modules:	
UV Compact Lamp, 254/365nm, 4 watt (115V)	95-0021-12 (2 Recommended)
UV Compact Lamp, 254/365nm, 4 watt (230V)	95-0021-10 (2 Recommended)
Fuses:	
Fuse, 3.15A (for Darkroom)	56-0022-04 (2 Required)
Fuse, 2A (for Transilluminators)	56-0002-01 (2 Required)
Fuse, T1 Amp (for Motorized Lens Controller Box)	56-0022-02 (2 Required)
Emission Filters:	
Filter, Ethidium Bromide, 50mm Square	38-0220-01
Filter, SYBR Green, 50mm Square	38-0219-01

Filter, SYBR Gold, 50mm Square	38-0221-01
Transillumination Accessories:	
LED White Light Plate	95-0476-01
White Light Converter Plate, 21x26cm	38-0191-01
Visi-Blue Converter Plate, 21x26cm	38-0200-01
Gel Accessories:	
Gel-Cutter	85-0002-01
Gel-Ruler	85-0003-01
Gel-Scooper	85-0006-01
Gel-Tray, small	85-0007-01
Gel-Sentry DNA Preparation Plate	97-0076-01
Fluorescent Standard Step Tablet	33-0014-02
Protective Equipment:	
Spectacles, UV Blocking (UVC-303)	98-0002-01
Goggles, UV Blocking (UVC-503)	98-0002-02
Faceshield, UV Blocking (UVC-803)	98-0002-04

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9.3 Troubleshooting

9.3.1 No power to the darkroom or transilluminator

1. Recheck the main power cord connection to the darkroom as well as the power cables between the darkroom and transilluminator, LED White Light Plate or optional UV handheld lamps.

2. Check the fuses located at the back of the unit next to the power port. A small flat-head screwdriver or similar tool 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.

9.3.2 A partial image appears on the screen

1. Ensure that the filter wheel is not off center by turning the filter wheel selector until it fully engages or "clicks" into place.

2. Remove the camera/lens combination and verify that the emission filter is fully seated in the filter wheel.

9.3.3 Transilluminator will not turn on

1. In addition to the Ultraviolet: Trans power switch on the front of the darkroom, the transilluminator itself has a power switch. Make sure that the green transilluminator power switch, located on the front of the transilluminator, is in the ON position.

2. For UV protection and to extend the life of the UV transilluminator, there is a ten-minute transilluminator shutoff timer installed in the system. The timer shuts off the transilluminator after ten minutes of operation. Push the reset button on the front of the darkroom to reset the timer.

9.3.4 Error messages appear on the screen

1. An error message that is related to the VisionWorks software interface or Microsoft Windows may appear on the screen. If the message is related to Microsoft Windows, such as a reminder to activate or update the copy of Windows, please contact your system administrator for assistance.

2. If an error message appears repeatedly and your system administrator does not recognize it as a Microsoft Windows error, contact UVP Technical Support for further assistance.

10 Disposal

At the end of its service life the Imaging System and all its electronic components must be disposed of in accordance with the applicable regulations as electronic waste.