UVP ChemStudio PLUS

Operating Manual

UVP ChemStudio PLUS Imaging System

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General Information

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1.0 Introduction

The UVP ChemStudio Plus is a high-resolution imaging system capable of capturing, analyzing and documenting many types of fluorescent gels, blots, plates and more. It is a robust imaging system with ability to be adapted to many diverse applications.

The UVP ChemStudio Plus is a self-contained, light tight imager, compatible with windows computers. Both the UVP ChemStudio Plus *touch* and the UVP ChemStudio Plus with a PC come with overhead Epi RGB LEDs, white light LEDs and a UVP UV Thin-Line Transilluminator. In addition, a five-slot filter wheel features removable emission filters, with the ability to upgrade and replace filters as needed. All darkroom features are software controlled through VisionWorks® acquisition and analysis software package.

VisionWorks® has been updated to work with a touchscreen or mouse and includes action scripts, a new feature to the VisionWorks® package. All darkroom features may be automatically controlled through the creation of custom action scripts. VisionWorks® includes a preinstalled complement of common actions and may be customized with ease. The new action script editor allows for actions to be created, edited or deleted, giving complete control over the order and operation of the darkroom.

The UVP ChemStudio Plus has been designed with ease of use and accessibility in the forefront, without compromising the powerful analytical features of the VisionWorks® package. The UVP ChemStudio Plus may be as simple or complex as needed, giving maximum flexibility to all application areas.

2.0 Safety

2.1 Introduction

For your own safety, it is advised that users operating the UVP ChemStudio read this operating manual and observe all safety and warning labels in this manual and on the unit, itself.

2.2 Safety Instructions

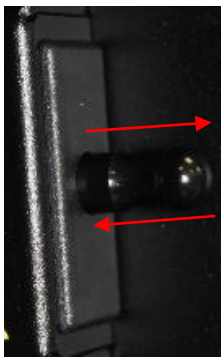
The UVP ChemStudio Plus comes with a UVP thin-line transilluminator that emits powerful shortwave radiation. UV radiation is known to cause damage to unprotected skin and eyes. To avoid potential UV damage, observe the notes below:

- Observe all warning stickers on the UVP ChemStudio Plus.
- Place the UVP ChemStudio Plus in a well-ventilated area, do not obstruct the vents in the rear of the darkroom.
- Ensure easy access to the power switch and power cord.
- Take UV precautions prior to overriding the UV safety switch.
- Do not improperly use or modify built-in safety features, as this may leave them inoperable.
- Adjust the lighting auto-off features within the VisionWorks® interface to ensure all lighting turns-off when not in use.

Do not attempt to service the UVP ChemStudio Plus, contact the Analytik Jena technical support team or an authorized distributor for servicing.

UV Safety Switch

UV Safety Switch Override



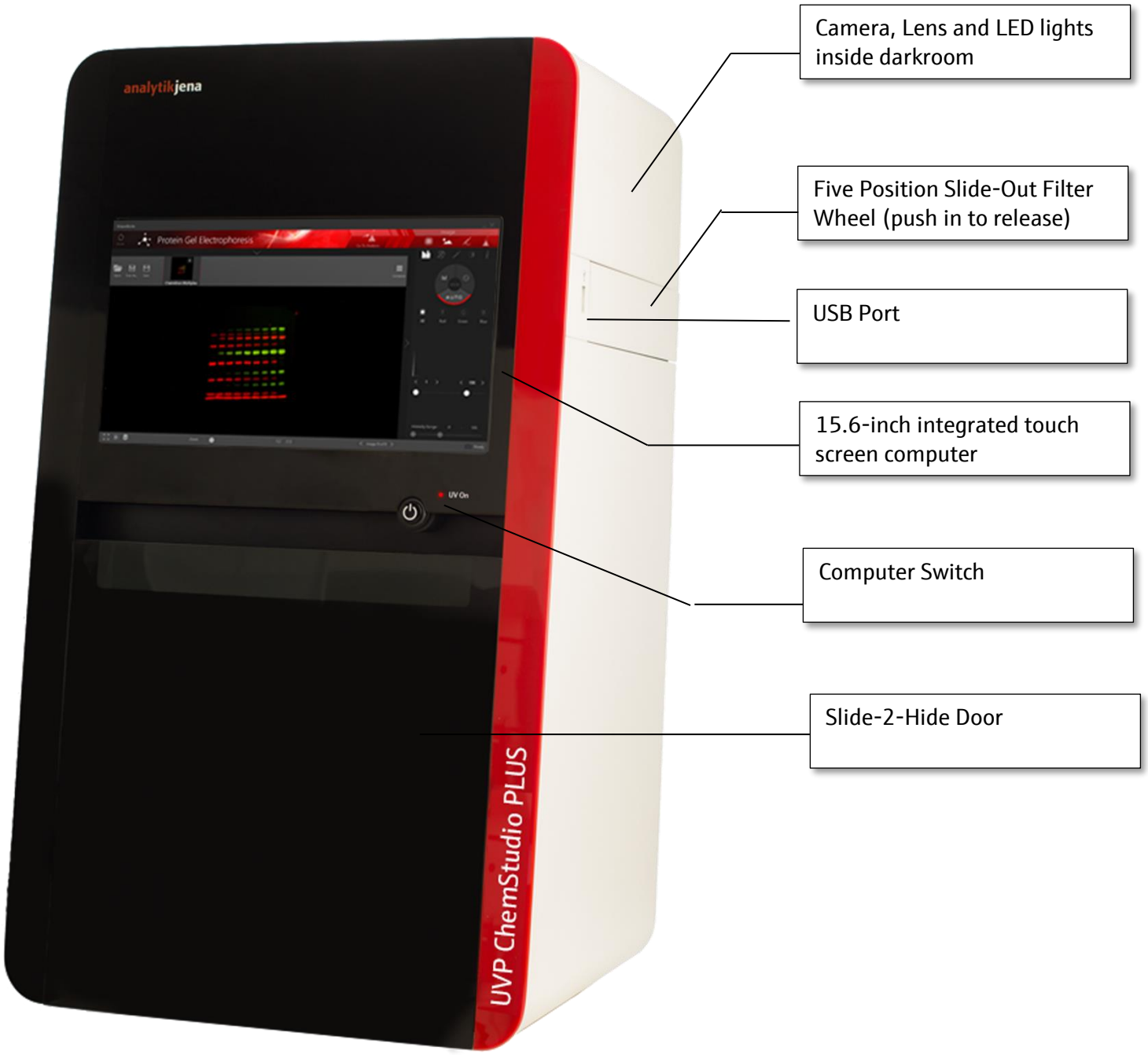
Pull outward disables UV safety switch

Door closed reactivates safety switch

UV Warning Label

3.0 Technical Information

3.1 System Components



3.2 System Specifications

3.2.1 Power Requirements

Interface	7 x USB 2.0
Fuses	Fuse 3.15A for darkroom. 2 Required.
Power Requirements	230 V, 50/60 Hz, 1.55 Amps at 230 Volts 100/115 V, 50/60 Hz, 3.1 Amps at 120 Volts Mains supply voltage fluctuations are not to exceed 10 percent of the nominal supply voltage.
Operation conditions	5 °C to 40 °C, max. 80 % air humidity for temperatures up to 31 °C, decreasing linearly to 50 % maximum relative humidity at 40 °C. Max. 2000 m NN.
Warranty	3-year warranty

3.2.2 Lighting Modules

	Epi Lightsource	Excitation wavelength (Peak)	Positioning
Red	LED	634 nm	Overhead
Green	LED	519 nm	Overhead
Blue	LED	460 nm	Overhead
White	LED	N/A	Overhead
IR 1 (optional add-on)	Laser Diode 80 mW	660 nm	Overhead
IR 2 (optional add-on)	Laser Diode 150 mW	787 nm	Overhead

3.2.3 UVP Thin-Line UV Transilluminator

Filter size	16.8 cm x 21 cm
Wavelength transilluminator	302 nm
Intensity switch	HIGH/LOW
Emission filter	Ethidium bromide, Included
UV protection shield	Included
Converter plates	UVP Visi-Blue™ Converter Plate (UV to blue) UVP Visi-White™ Converter Plate (UV to white)

3.2.4 Dimensions

Weight	41 kg (90 lbs)
Dimensions (W x H x L)	47 x 43 x 83 (cm) 18.5 x 17.1 x 32.6 (inch)
Recommended footprint	47 x 43 x 83 (cm) 18.5 x 17.1 x 32.6 (inch) *Plus additional space needed for PC-controlled system

3.2.5 Touch Screen System

Touch screen software	VisionWorks® Acquisition and Analysis Software
Screen size	15.6“ Multi-touch
Operating system	Windows 10 Pro, 64 bit
Display	1920x 1080, Truelife LED-Backlit Display
Memory capacity (RAM)	4 GB
Storage	500 GB
Wireless network capability	WLAN, accessory for wired-to-Ethernet connection
Features	▪ Image capture ▪ Image enhancement tools ▪ Compositing ▪ Pseudocolor ▪ Invert ▪ Quantification with 1D Analysis, area density and colony counting ▪ Customizable Action Scripts ▪ Reporting ▪ Support for 21 CFR Part 11 ▪ Unlimited copies

3.2.6 PC-Controlled System

PC-controlled software	VisionWorks® Acquisition and Analysis Software
Operating system	Windows® 7 or higher (64-bit recommended)
Minimum requirement of PC	▪ Pentium class, 1.6 GHz or higher ▪ Microsoft Internet Explorer 6.0 or later versions ▪ Computer must be equipped with a minimum of three USB ports. Additional ports may be required for a keyboard, printer and additional accessories ▪ Display: 1024 x 768 and 16-bit or 32-bit color is strongly recommended ▪ Memory capacity: Uses 200 MB of hard drive ▪ For 21 CFR Part 11 support functionality, the hard drive partition must be formatted with NTFS
Features	▪ Image capture ▪ Image enhancement tools ▪ Compositing ▪ Pseudocolor ▪ Invert ▪ Quantification with 1D Analysis, finding lanes and bands and more ▪ Reporting ▪ Support for 21 CFR Part 11 ▪ Unlimited copies

4.0 Installation and Commissioning

Set-Up of the UVP ChemStudio Plus is designed to take only minutes. Only few components seen require configuration before first use. The step-by-step instructions below will provide guidance on the proper set-up of your device.

4.1 Scope of Supply

The following are standard items to be included in the UVP ChemStudio Plus packaging:

- Ethidium bromide filter
- UVP Thin-line transilluminator
- Analytik-Jena fluorescent focus target
- Chemi Tray
- UV protective shield
- UVP gel tray

Please check to ensure these standard items are included with your UVP ChemStudio Plus. For custom orders, please check the packing slip to ensure all parts are present.

4.2 Lifting and Moving

The UVP ChemStudio Plus weighs approximately 41 kg (90 lbs) with a large and modular construction. Great care is to be taken when unpacking, lifting and moving the darkroom into place as injury may occur. To reduce the risk of injury, follow the guidelines below to ensure the darkroom is safely moved into place:

- Use two people to unpack the darkroom.
- Be sure to lift using two people, without bending at the back, using legs to lift.

> **Warning**: Improper lifting technique may result in injury to the lower back. Be sure proper in-plane lifting techniques are followed.

- Do not lift or move the darkroom with the transilluminator and/or emission filters installed.
- Always wear close-toed shoes and pants while lifting, should the darkroom be dropped.
- Always ensure the darkroom is in a well-ventilated area.

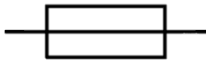
4.3 Connecting the power cable

Plug the main power cable into the back of the darkroom and the other end into a surge-protected power outlet. The main power switch controls the power to the whole darkroom.

Main power switch:

Note: It is recommended to leave the power switch on the back of the system in the **ON (I)** position except when the system will not be used for an extended period (one day or longer).
Do not position the system so that it is difficult to access the power cable and operate the main power switch at the back of the unit.

Warning: The darkroom requires 2 fuses for normal operation. Sometimes, these fuses will fail and need to be replaced. On the darkroom, the following symbol is displayed with the technical specifications for the fuses:



2x 3.15A/250V

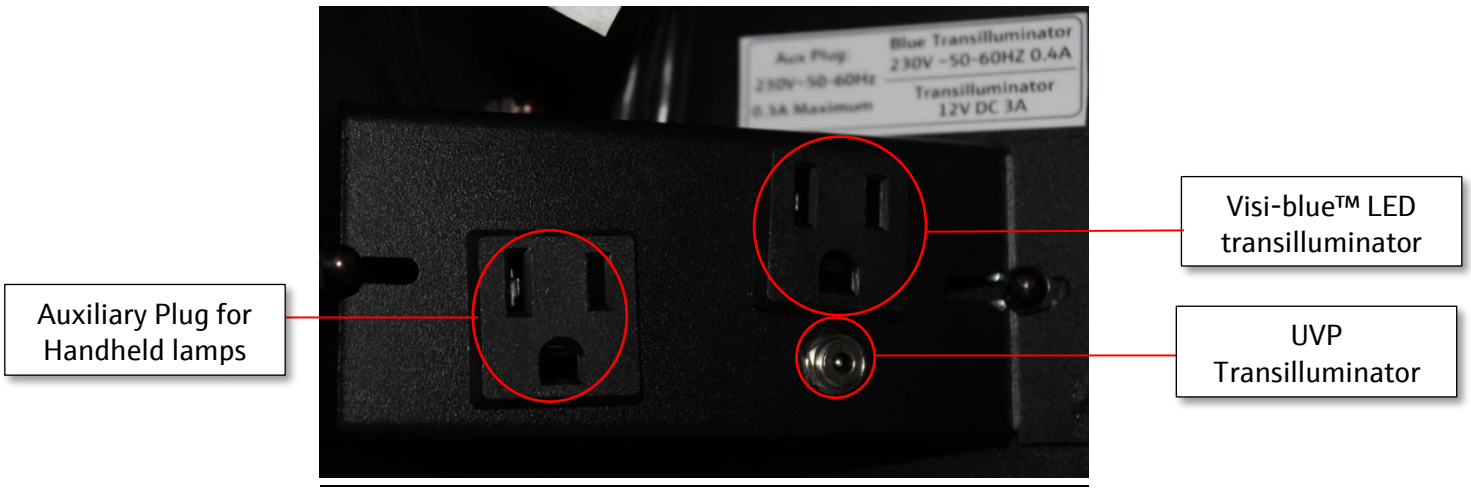
4.4 Installing a UVP Transilluminator

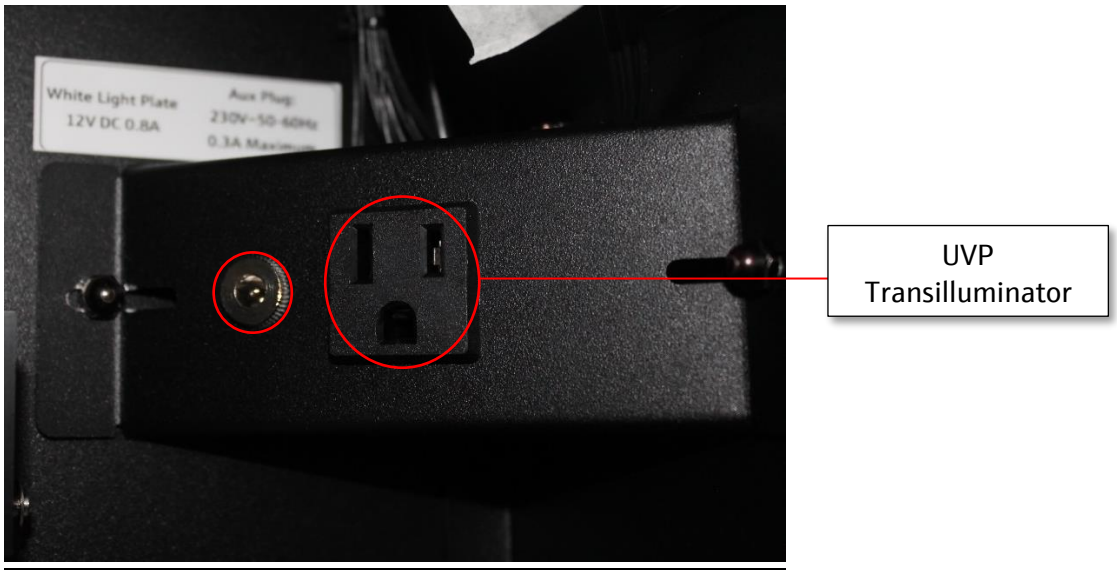
1) Once your UVP ChemStudio Plus is placed, begin by **opening** the Slide-2-Hide door.

2) Carefully **unpack** the included UVP Slim-Line transilluminator.

3) **Place** the UVP Slim-Line transilluminator on the slide out tray. There are four cut-outs on the tray that allow the transilluminator to sit securely.

4) **Plug** the transilluminator into the outlet provided in the back-left corner of the darkroom. Plug the transilluminator into the appropriate outlet, connections are one-way to minimize error.





5) **Slide** the tray back and **close** the door.

Note: The ChemStudio PLUS is designed to work with UVP UV Thin-line, UVP Visi-white™ LED transilluminator and UVP Visi-blue™ LED transilluminator. When installing your transilluminator, be sure to plug into the right outlet. The outlets are different diameters to prevent error.

4.5 Installing UVP Emission Filters

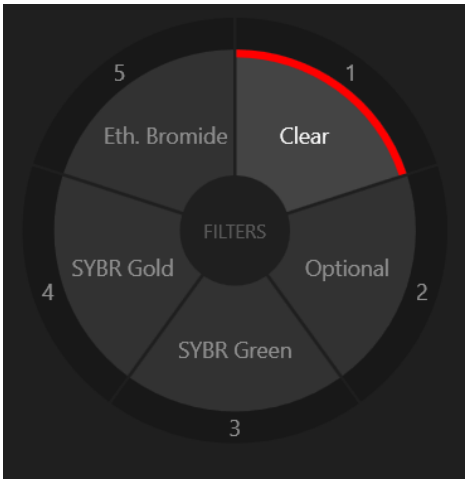
The UVP ChemStudio Plus features a software controlled five-slot slide out emission filter wheel. To install emission filters, push-to-open the filter wheel door located on the right side of the unit.

1) The filter wheel will rotate freely to allow manual replacement of filters. **Rotate** the filter wheel so the desired number position is accessible.

2) Gently **unpack** and **place** the filter into the corresponding numbered filter wheel slot.

Important: The rim of each filter contains a product number, serial number and an arrow identifying the proper orientation of the filter inside the filter wheel. For best performance, the **arrow must point UPWARD** when placed in the filter wheel.

The default UVP ChemStudio Plus filter wheel numbering assignments are illustrated below:



3) Once filters have been **placed** into their corresponding number slots, **close** the filter wheel door and **power up** the UVP ChemStudio Plus.

4) To power up the UVP ChemStudio Plus, **ensure** the power cord is plugged in to a working outlet.

5) **Turn** the darkroom main power switch to the **ON** (I) position, located at the back right of the unit. Then power on the touch screen laptop, with the power button ⏻ on the front panel.

6) Wait for the touchscreen laptop and darkroom to boot and for the VisionWorks® package to launch.

7) **Navigate** to the filter wheel controls, located in the right slide out panel of the touchscreen.

> **Note**: Refer to **section 5.1** of this manual to identify the filter wheel controls.

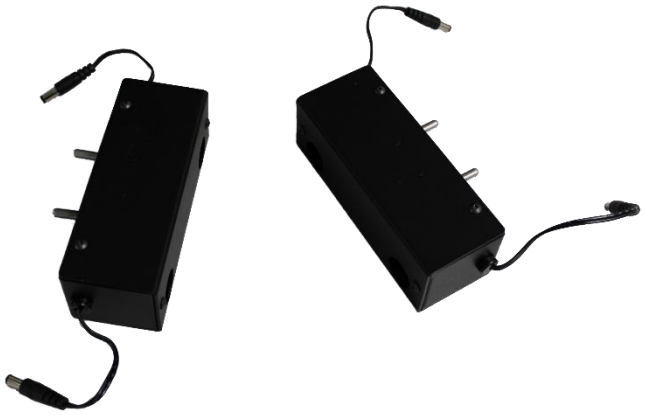
8) Located beneath the filter wheel interface, a reset button should be visible. **Tap or click** this button to realign the filter wheel.

> **Note**: Anytime the filter wheel is moved manually or out of alignment, resetting the filter wheel will be necessary.

9) To replace filters, **follow** this same procedure while **ensuring** the filter wheel is reset prior to use.

4.6 Installing UVP Near-IR Modules

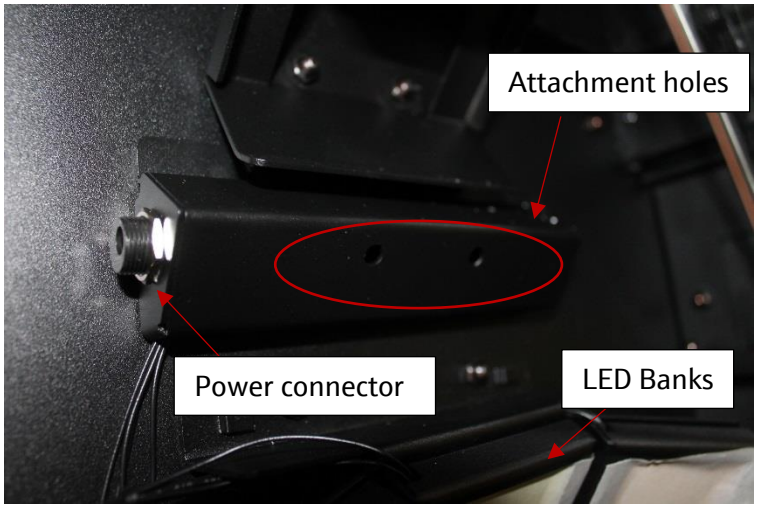
Near-IR laser capability is available on the UVP ChemStudio Plus as an add-on component for near-IR laser applications. This guide will illustrate how to properly install the near-IR laser modules.

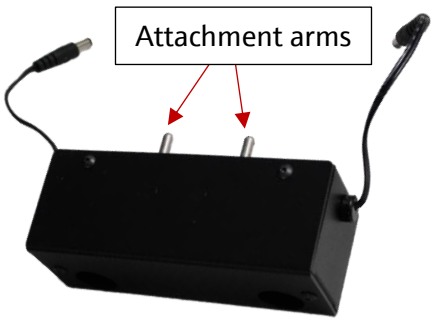
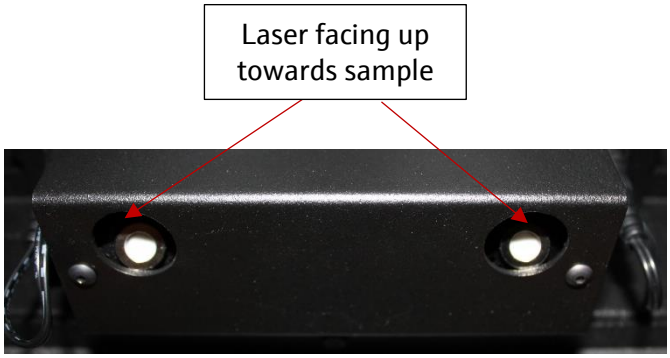


1) The UVP ChemStudio Plus supports up to two magnetic near-IR laser modules and are easily attachable and removable. The two modules attach to the right and left sides on the inside of the darkroom.

2) To install the laser modules, **locate** the two attachment holes on the attachment platforms, located in the upper left of the darkroom, and in the upper right. Both attachment sites are above the LED light banks.

Note: It may be easier to visualize the rear attachment platform with a light source. It will also be easier to visualize only the rear attachment site.



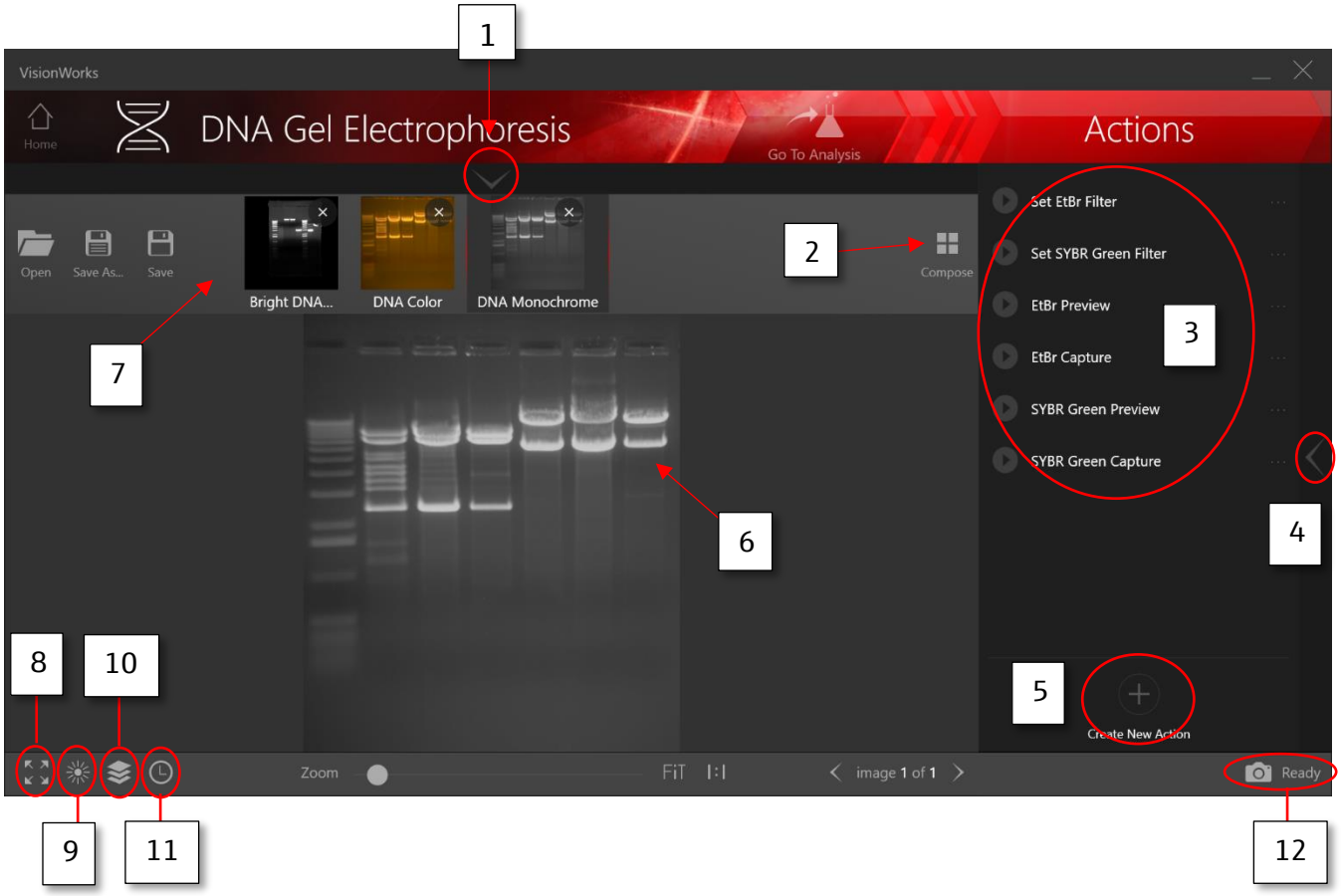
3) **Locate** the attachment arms on the laser modules. **Lift** the laser modules into place by aligning the attachment arms with the attachment holes. **4)** Once aligned, continue **lifting** the module until the module magnetically attaches.	
5) **Verify** the lasers are pointing up towards the center of the darkroom/sample tray to assure proper orientation. If orientation is not correct, detach, orient, then reattach. **6)** After the magnetic attachment, **plug** the power cables into the power connectors, located on the side of the assembly. Continue **pushing** the power cables into the connector until they are fully seated inside the connector terminal.	
7) Follow this procedure until both the right and left laser modules are installed. **8)** Once installed, imaging may occur, power-up the UVP ChemStudio Plus and begin imaging with the near-IR lasers.	

Warning: NEVER look into the near-IR lasers while active as they emit highly focused, high intensity photons that may damage eye tissue. Always ensure the UVP ChemStudio Plus is either powered-off, or the lasers are off in the software control interface.

5.0 Getting Started with VisionWorks®

VisionWorks® has been redesigned to bring powerful VisionWorks® analytical tools to an easy-to-use interface for modern touchscreen systems. This chapter highlights the VisionWorks® interface, as well as, the powerful action script editor.

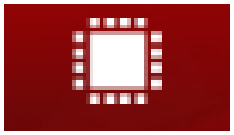
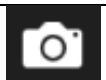
5.1 VisionWorks® Interface

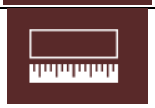
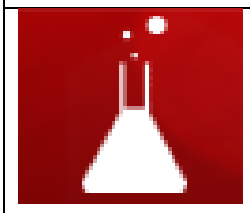


Major Interface Elements

1	Slide down pre-capture modification tools
2	Compositing tool
3	Actions pane, all available actions are displayed here
4	Slide out pane, contains device controls
5	Create new action button
6	Selected image view
7	Thumbnail gallery
8	Enlarged photo view
9	Saturation warning
10	Flatten image
11	Image timestamp
12	Camera status

After tapping the arrow on the right of the screen, a collapsible pane will slide out over the **"Actions"** pane. This provides manual access to the major features of UVP ChemStudio Plus. A summary of the icons and their descriptions are available below:

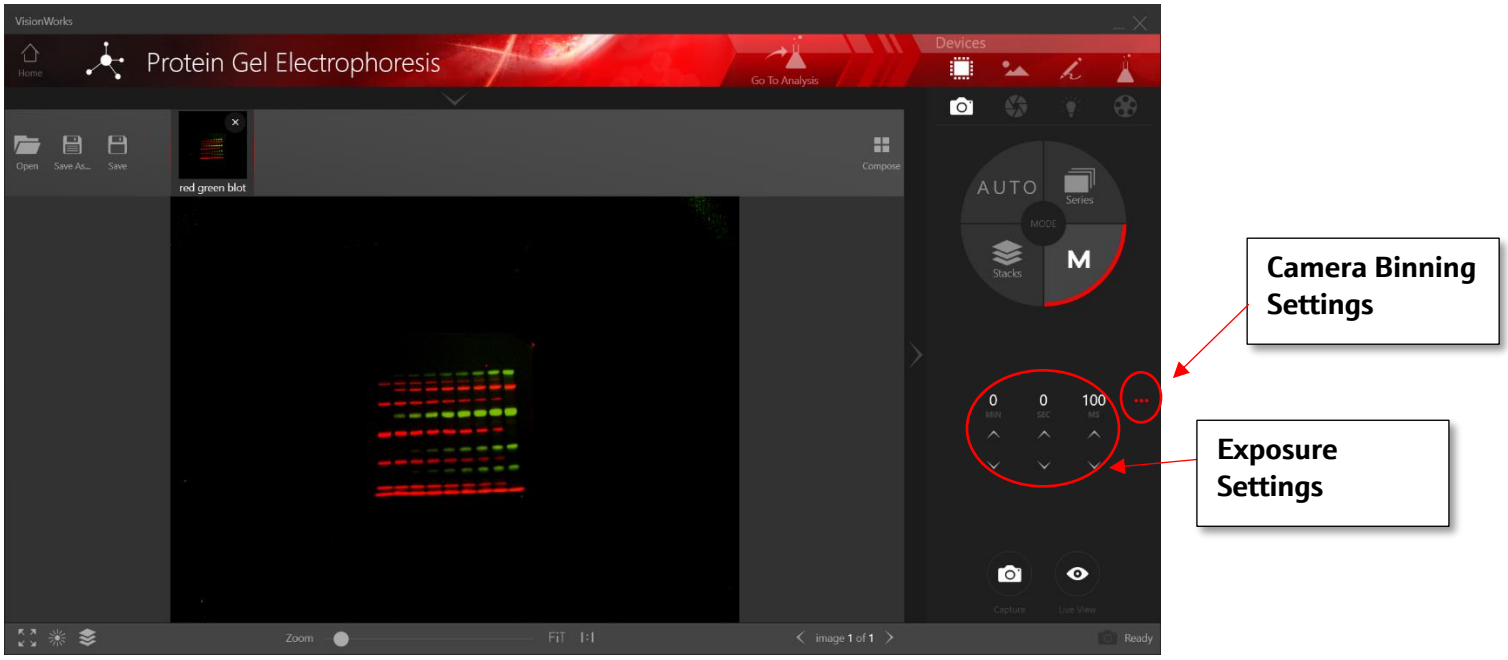
	**"Devices"** gives access to the follow menu options:	
		**Camera** – This tab contains all camera modes, settings and parameters for image capture.
		**Lens** – Provides access to "*Focusing*" and "*Brightness*" controls.
		**Lighting** – Provides access to "*Transilluminator*" and "*Overhead lighting*" controls.
		**Filters** – Provides access to the "*Filter Wheel*" control. Use the "*Filter*" control wheel to load your desired filters.
	**"Image"** gives access to the following menu options:	
		**Histogram** – Provides access to auto and manual histogram adjustment.
		**Pseudocolor** – Provides access to post capture coloring options.
		**Image Editing** – Provides access to image editing tools.
		**Image Corrections** – Provides access to image correction options.
		**Image Information** – Displays image metadata for reference.
	**"Annotations"** provides access to the following menu options.	
		**Drawing Tools –** 12 drawing tools are included as part of the annotations package, these include the following:
		 **Draw Line** – Draws a line from points A and B
		 **Draw Highlight** – Draws a highlight box

			**Standard Bar** – Creates a standard calibration bar between points
			**Add Text** – Adds a text box
			**Line Measure** – Measures a distance between two points
			**Heat Map** – Creates a heat map from pixel intensities
			**Draw Rectangle** – Draws rectangle around areas of interest
			**Area Measure** – Measures the area within a box
			**Select and Edit Annotation** – Allows for the selection and editing of added annotation
			**Draw Ellipse** – Draws an ellipse around an area of interest
			**Angle Measure** – Measures an angle on interest
			**Drag and move image** – Moves the image around the screen with annotations
		**Settings** – Sync with zoom, appearance and import/export are available	
	**"Image Analysis"** provides access to the following menu options:		
		**1D Analysis** – Provides access to 1D lanes and bands tools.	
		**Colony Counting** – Provides access to colony counting algorithms and colony count calculations.	
		**Area Density** – Provides access to area density calculations and reports.	

5.2 Capturing an Image

1) To capture an image, **place** your sample in the dark room and **close** the door.

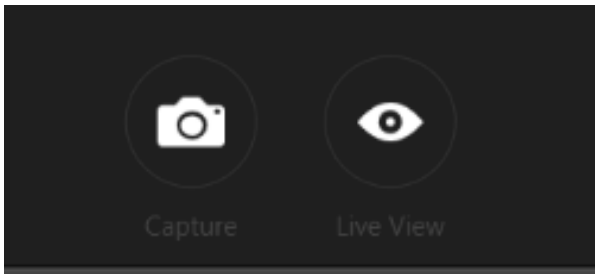
2) To open the camera controls, **open** the right collapsible side bar then **tap or click** on the devices icon, then the camera icon.



3) On this menu, four primary camera control modes are available. They are summarized in the table below:

Mode	Function
Auto	VisionWorks® automatically sets camera binning, exposure, focus, brightness and histogram settings.
Series	A series of images are taken, users are able to set custom exposures and number of images to be taken.
Stacks	Similar to series, stacks take a series of images, however, images are added together. All images taken through stacks will appear in the thumbnail gallery. Each successive image will be that image plus the previous. Stacks may be taken at a set exposure for a user defined length of time.
Manual	This setting allows manual control over all camera settings.

4) To display a live view of the **dark room**, tap the "*Live View*" icon on the bottom of the right pane.



5) A live view of the **dark room** will appear on screen. This live view can be used to adjust imaging parameters and see their effects in real time.

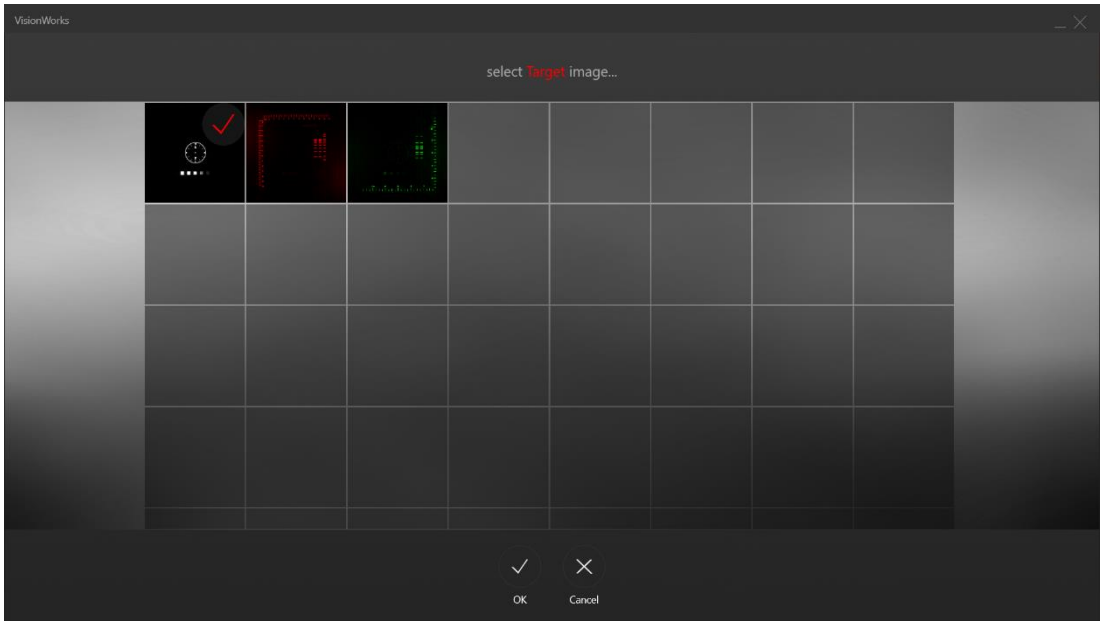
6) Once parameters are set, tap the **Capture** icon to begin the image capture according to your set parameters.

5.2.1 Compositing in VisionWorks®

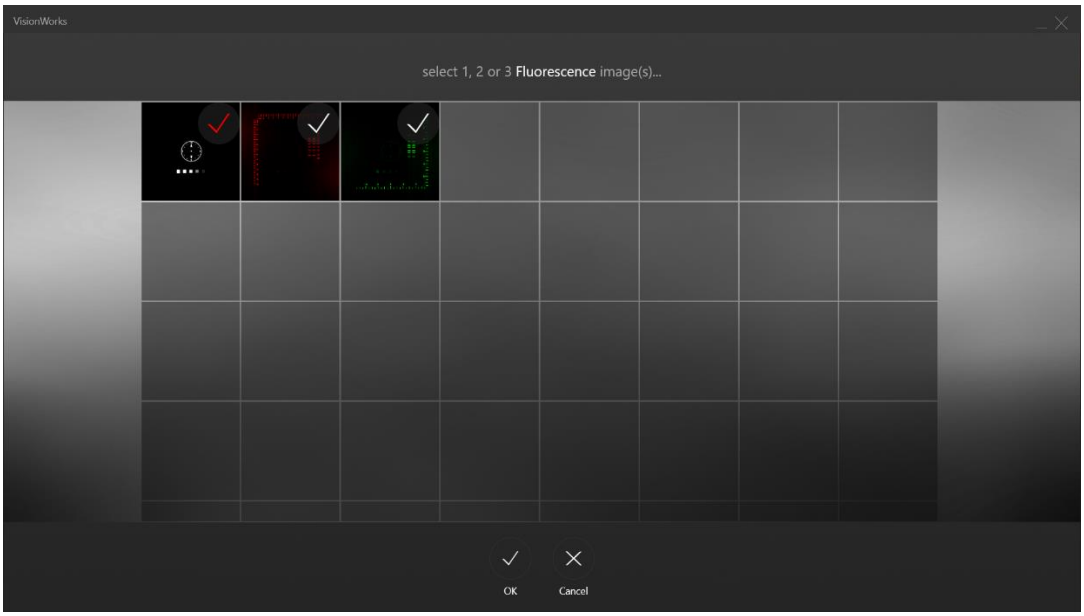
VisionWorks® includes a powerful compositing tool that allows for multiple images to be transposed over a primary target image. This is useful for, but not limited to: multiplexing, imaging multiple gels simultaneously and chemiluminescent imaging. The steps below illustrate quick and easy use of the powerful compositing tool.

1) Once you have taken your desired images, tap or click on the **"Compose"** icon 

2) In the compose window, being by selecting your target image.

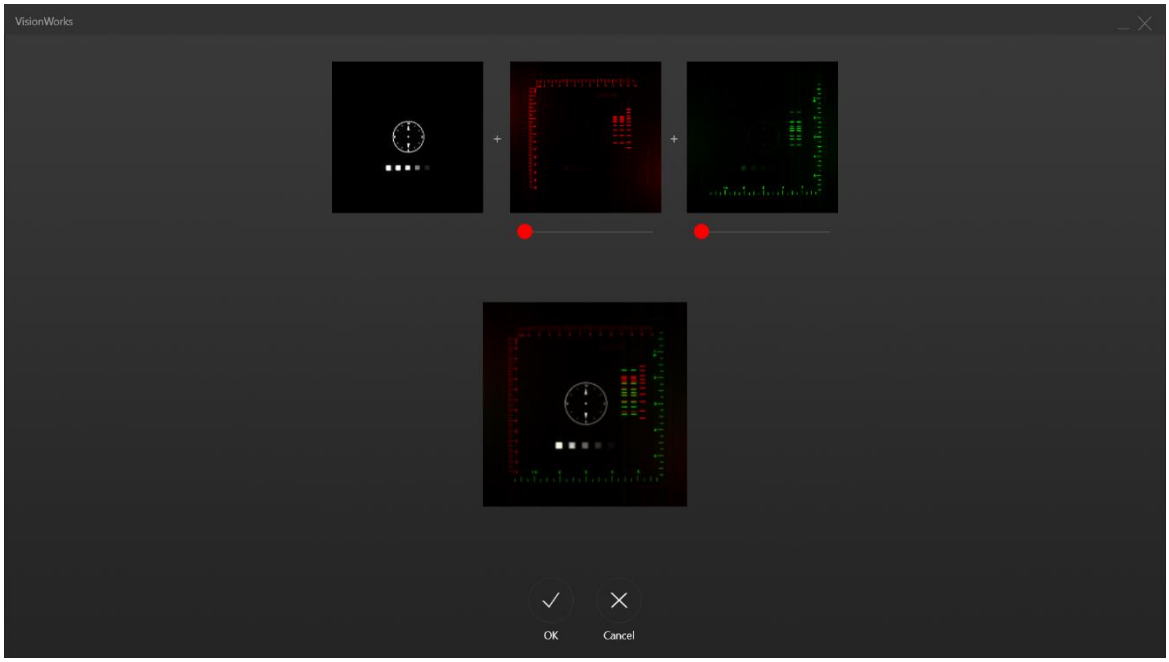


3) Then select desired fluorescence images.

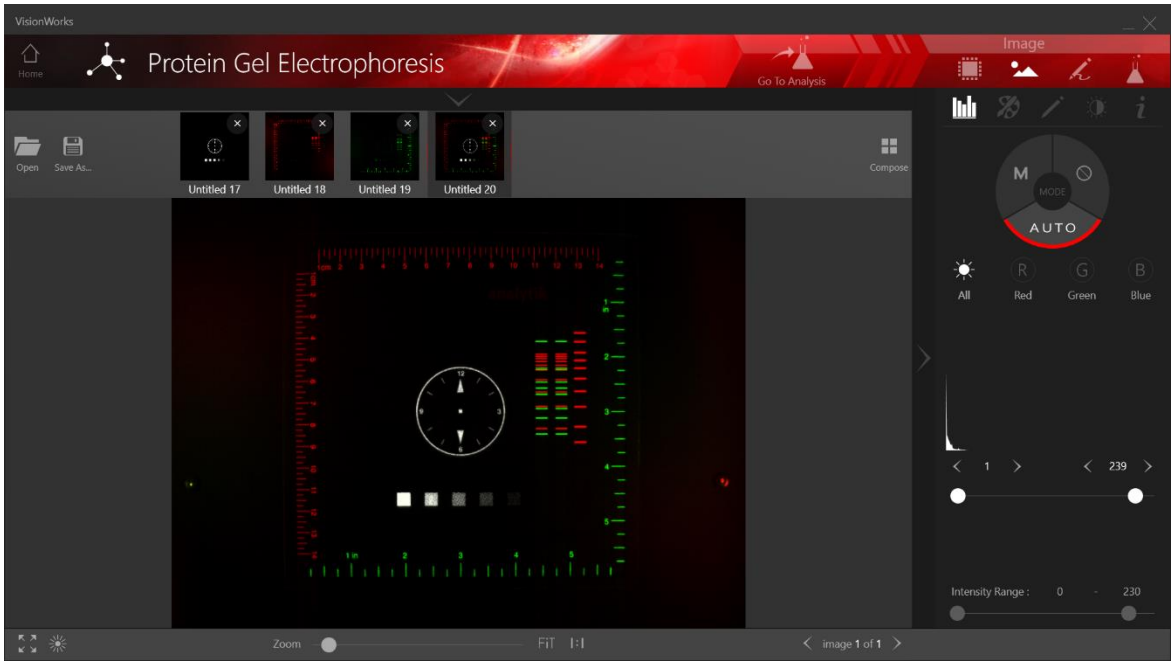


4) Select **"Ok"** to generate the composed image preview.

5) Adjust the sliders and see the real-time adjustments in the preview image. These sliders adjust how much of each fluorescent image is present in the target image. Once satisfied, select "**Ok"** to create a new composite image.



6) Your composited image will appear in the thumbnail gallery and further image enhancement and/or analysis may be performed.



5.3 Actions within VisionWorks®

Actions in VisionWorks® allow for quick and easy imaging of repetitive experiments and may be accessed through the pane on the right of the screen under "**Actions**". Preset actions come built into VisionWorks® to take images with minimal set up. Actions may be customized, created, or deleted to suit individual needs. This guide will provide a basic overview on how to get started with "**Actions**".

5.3.1 Using Preset Actions within VisionWorks®

VisionWorks® includes numerous action scripts preinstalled for each home screen application. A complete list of included actions can be found in **Appendix 1.0**, preset actions table. Preset actions allow users to quickly configure and access the most important and relevant features of the darkroom. This section includes a brief overview of preset actions, as well as, recommended settings for the darkroom.

1) To execute a preset action, tap the play icon next to each action description as seen in **Figure 1**.

Figure 1. Action Execute Button

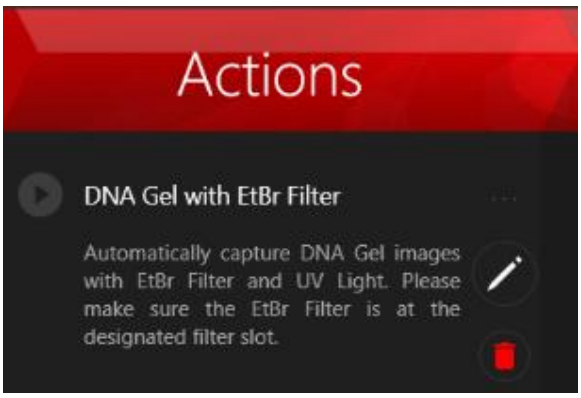


Figure 2. Tap to reveal action description.

2) To view a description of the action, tap on the text of the action, seen in **Figure 2**.

3) Once the short description is available, the pencil icon and trash icon (seen in Figure 2) will also become available. Use the pencil icon to customize that action and the red trash icon to delete that action.

5.3.3 Creating and Customizing Actions

All actions within VisionWorks® may be customized to suit individual needs. VisionWorks® is designed to make action creation and customization easy.

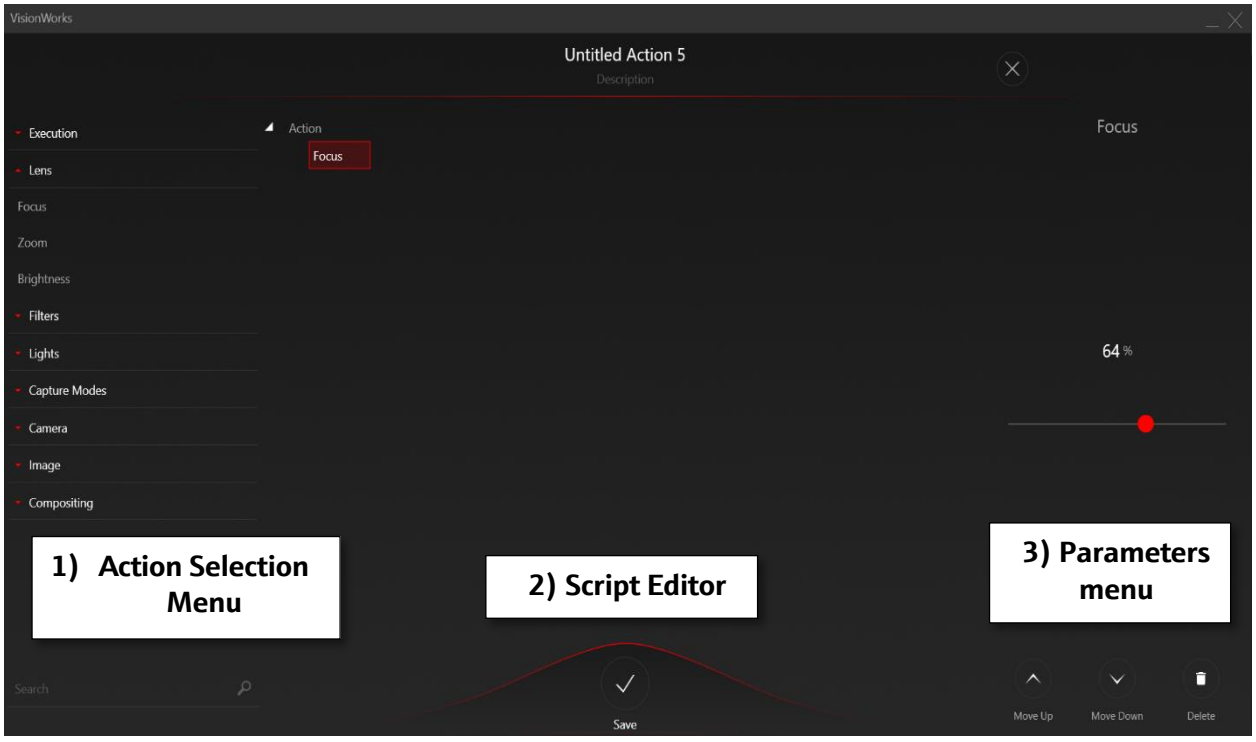
1) To create a new action, tap the "**Create New Action"** button on the bottom of the **"Actions"** pane.

2) The action editor is brought up and displays three distinct **interfaces** on the screen. The leftmost pane of the editor is the **action selection menu** sorted by category. The center pane is the **script editor**, this area allows you to select and rearrange action steps to your preferences. The rightmost pane is the **parameters menu** where device and imaging parameters are displayed for your selected action step.

Action Selection Menu | **Script Editor** | **Parameters menu**

3) To create your first action, begin by selecting an action step from the **Action Selection Menu**.

> **Note**: Any parameter that is not defined within an action, VisionWorks® will use the most recent parameter from the last image taken. This allows for creation of custom actions without having to define every parameter in the system. This also allows for rapid imaging, using parameters that are customized to different uses. This also allows for creation of actions to be performed in certain orders. Actions are designed to give complete automated control the UVP ChemStudio.

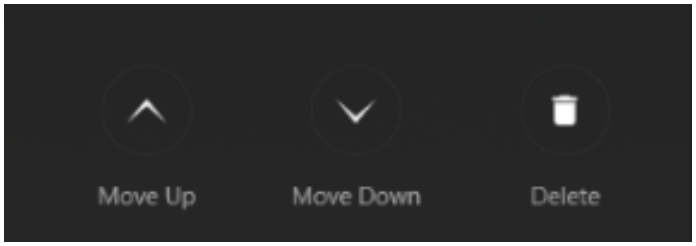


> **Note**: It is most effective to begin constructing your action by starting at the top of the menu and working your way down. For instance, begin by defining the action steps under **"Lens"** then **"Filters"**. By working your way down the **Action Selection Menu**, you will ensure the best chance of creating the highest quality action.

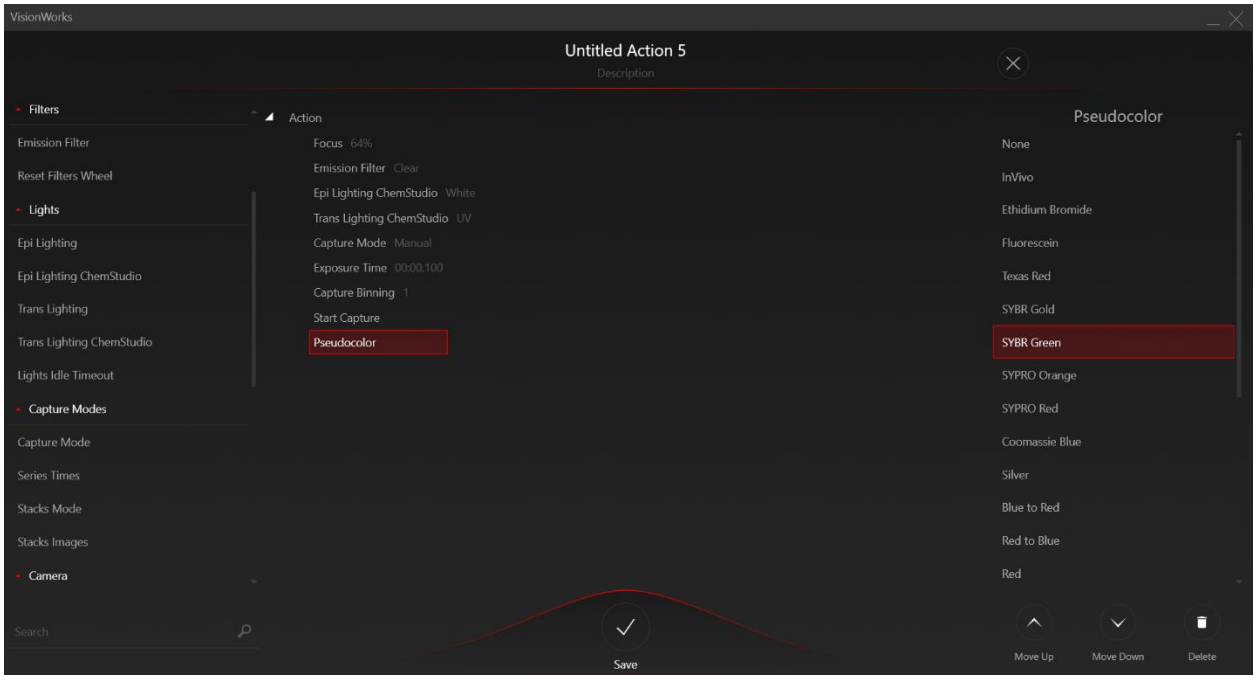
4) Once selected, that action step will populate into the **Script Editor**.

5) When selected in the **Script Editor** the contextual **Parameters menu** will display all relevant parameters.

6) To change the order of your action steps, use the **arrow up** & **arrow down** keys located at the bottom of the **Parameters Menu**.



7) As your build your action, the **Script Editor** will populate with all steps currently in your action.



8) Once competed, give your action a name by tapping the **Untitled Action** title on the top of the screen. Once you change the title, you can add a short description.

9) Tap **"Save"** on the bottom to save your **Action.**

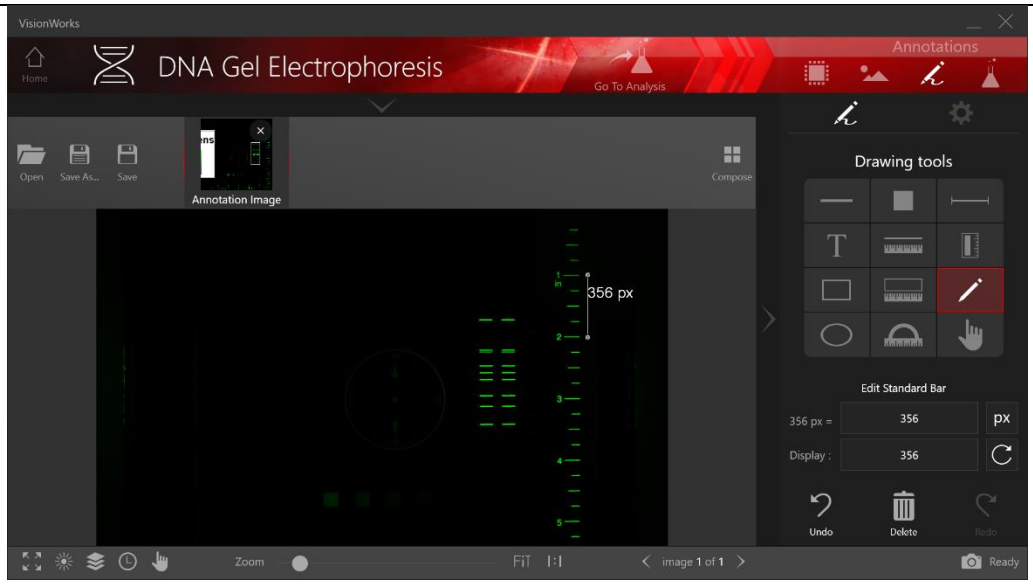
5.4 Annotations

Annotations allow for images to be annotated without altering the image data. This is to allow users the flexibility of highlighting points of interest within an image, in a non-destructive way. Annotations may be created, deleted or hidden at any time to give maximum flexibility. Annotations may be exported, then later imported for repeat imaging applications.

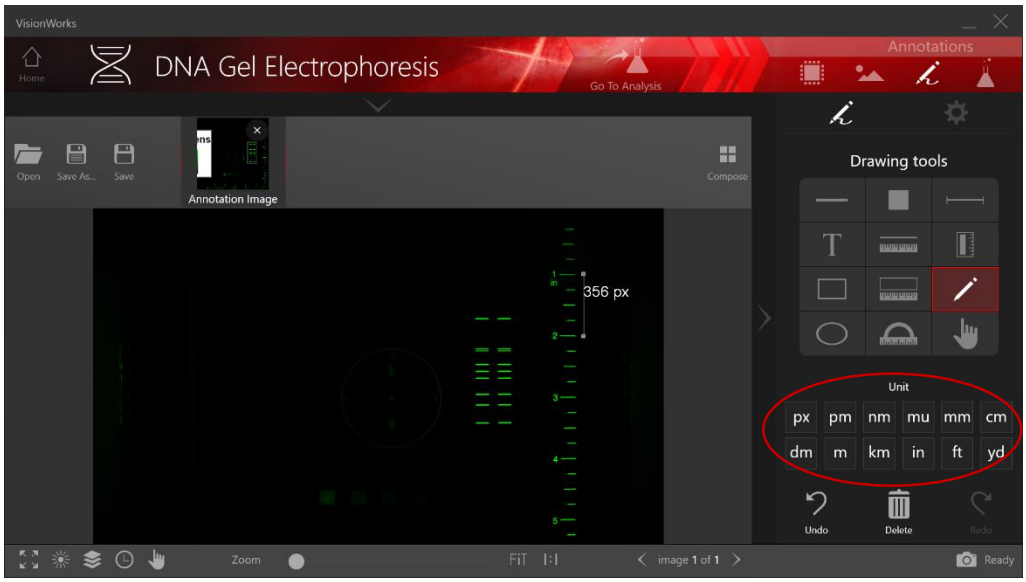
5.4.1 Annotation Tools

VisionWorks® includes 12 annotation tools that may be used according to a user's preferences. Below is a list of each tool and their corresponding uses:

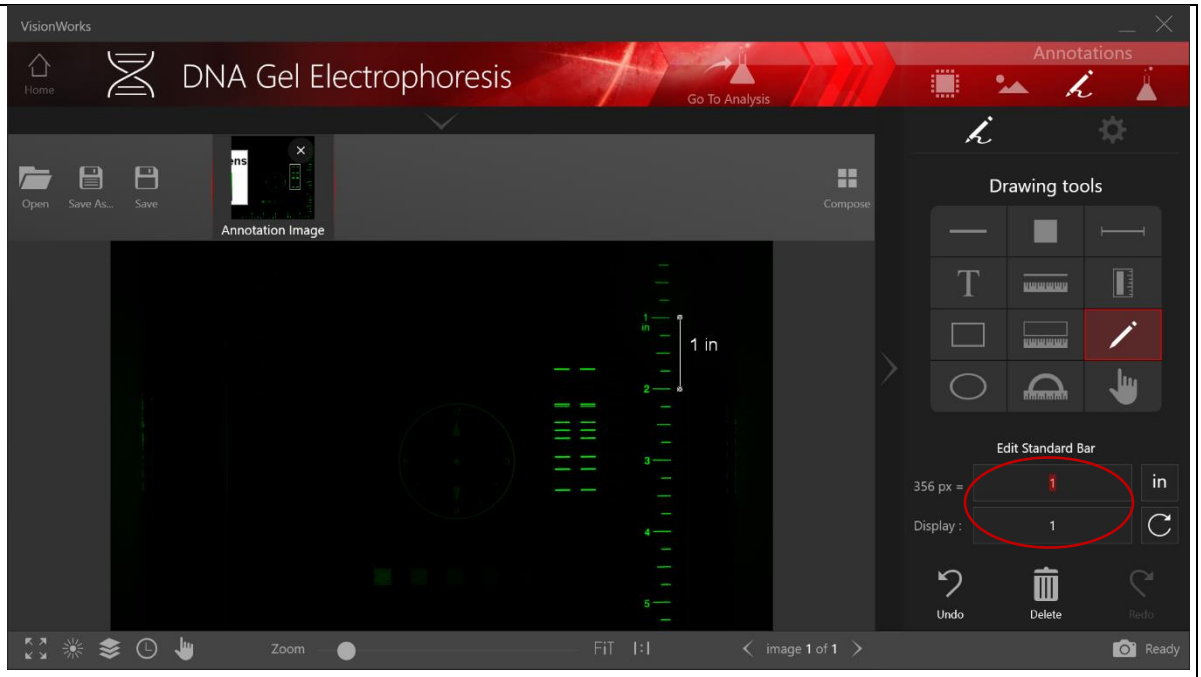
Annotation Tools – Each tool may be initiated by tapping or clicking on the following icons. Once a tool is selected, tap or click on the image to begin the placement and selection of the area of interest.	
	**Draw Line –** Draws a line from one location to another without quantitative analysis.
	**Draw Highlight –** Draws a highlighting box around an area of interest. Click to initiate the box, drag the box around desired area, click to release.
	**Standard Bar –** A calibration tool used to define standard distances in terms of pixels. Draw the line from point A to point B, then define the desired measurement units. A brief guide is provided below: 1) Select the Standard Bar icon. 2) Draw a line from location A to location B. 3) After placement, a pixel count will appear next to the newly drawn line. 4) Located under the "Edit Standard Bar" menu, tap or click the unit indicator to change the desired units.



5) Once selected, 12 measurement units will become available for selection. **Tap or click** the measure of interest, then **define** x number of pixels = y number of your selected unit.

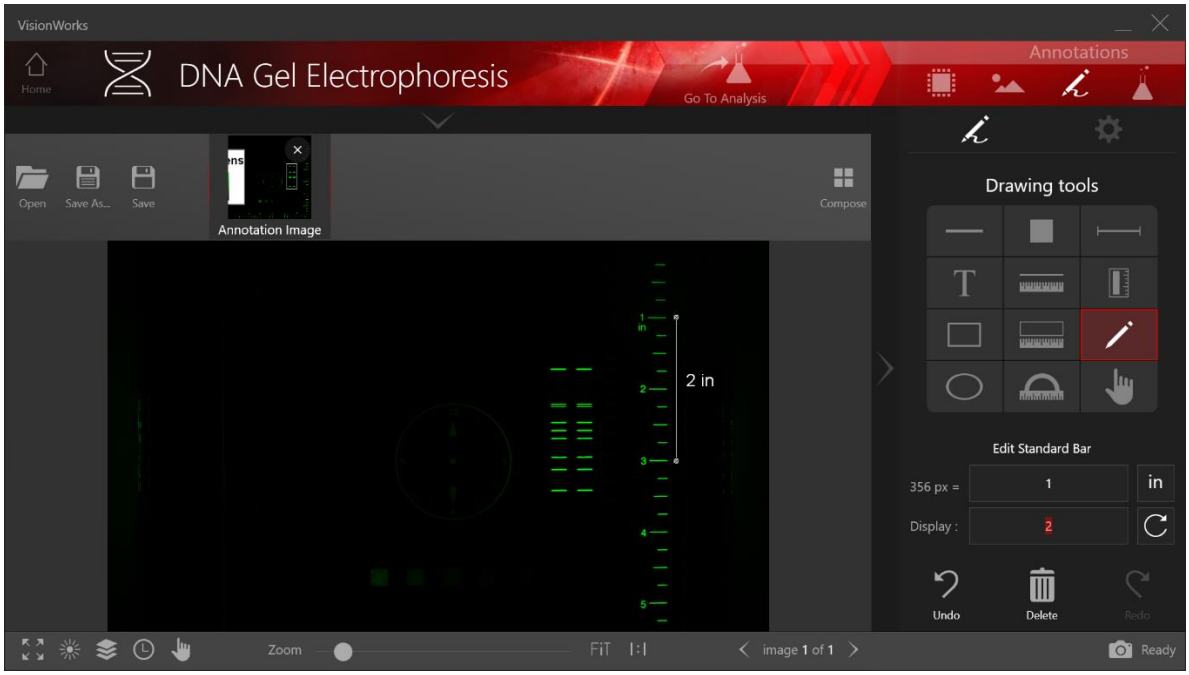


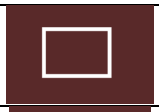
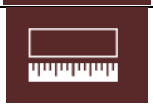
6) **Define** the unit of measure in terms of pixels.



7) All lines and area measures will now be based upon the definition that was just entered. To change or delete this definition, **tap or click** on the "Select and Edit Annotation" icon.

8) The "Display" field allows for your defined value to be multiplied and displayed according to a user's preferences. The line value displayed on-screen will be the user defined value times the display value.



	**Add Text –** Allows for the addition of text boxes to images. Draw a text box where the desired text would be, then type the desired text into the text field. Settings such as: font, font size and color may be adjusted in the settings pane  under the "Appearance" tab.
	**Line Measure –** Measures the distance drawn between two points. The return value from the line measure is calculated based off the unit definition set using the standard bar tool. Should the line measure return pixels, then use the standard bar tool to calibrate all measures based off the standard bar tool.
	**Heat Map –** Displays a reference heatmap of the image that is calculated from pixel intensities in the image. The heatmap may be moved, resized or rescaled for best positioning on the image.
	**Draw Rectangle** – Draws a rectangle around a region of interest without quantitative calculation.
	**Area Measure** – Measures the area within a selected area of interest. The measurements are presented as the square of the currently defined unit from the standard bar tool.
	**Select and Edit Annotation –** This tool allows for the selection and modification of existing annotations. The settings displayed by this tool are contextual and will change according to the selected annotation.
	**Draw Ellipse –** Draws an ellipse around a region of interest without quantitative analysis.
	**Angle Measure –** Allows for the measurement of angles on the image. Measurements are in degrees.
	**Drag and move image –** Drags and moves the entire image around the screen with annotations.

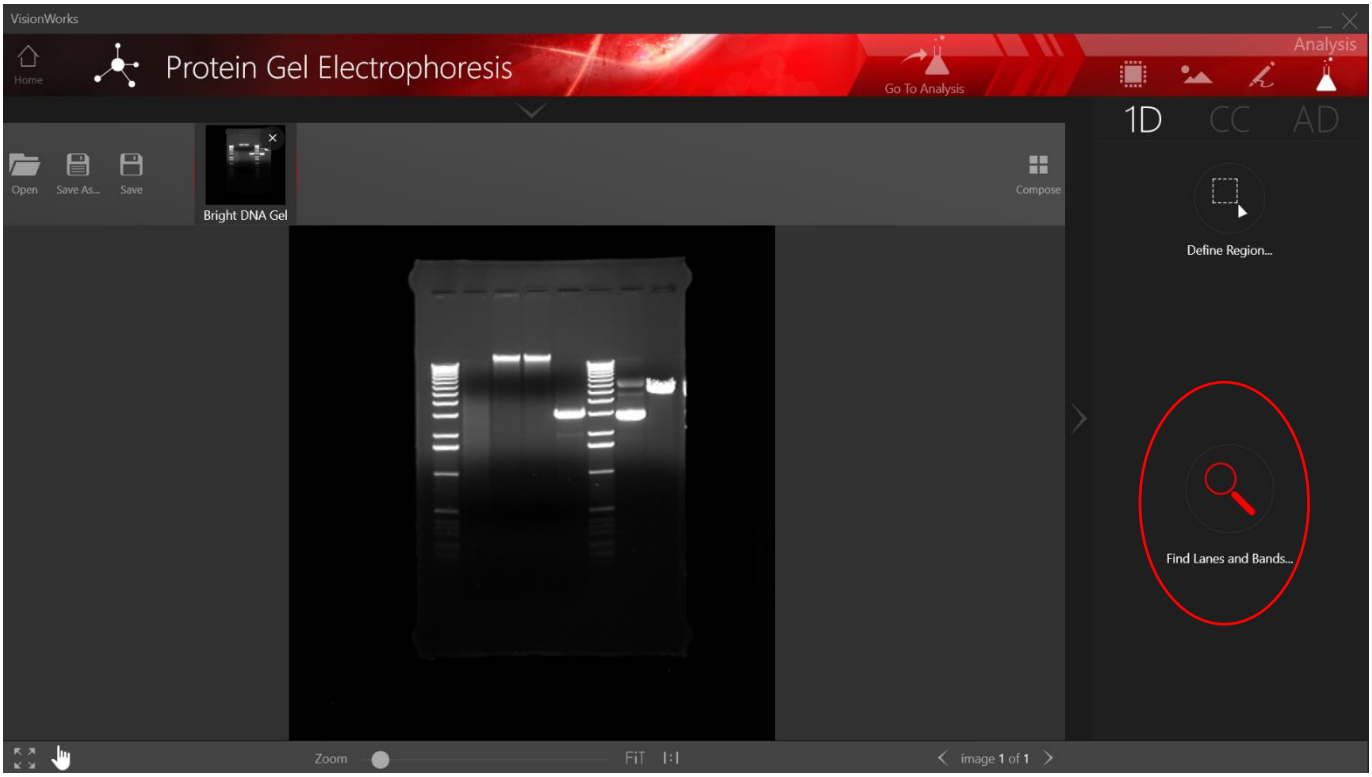
5.5 Analysis Within VisionWorks®

VisionWorks® contains advanced analysis features optimized for modern systems. Analysis features include: 1D Analysis, Colony Counting and Area Density. These powerful analytical tools allow for complex analysis to be performed immediately after imaging, with ability to export to Microsoft Excel or to a printer.

5.5.1 1D Analysis

1D analysis includes identification and quantification of lanes and bands in protein/DNA gels. Many of the functions within the 1D analysis are highlighted in the following section:

1) To have VisionWorks® automatically identify lanes and bands for a gel or a blot tap or click **"Find Lanes and Bands"** illustrated below.

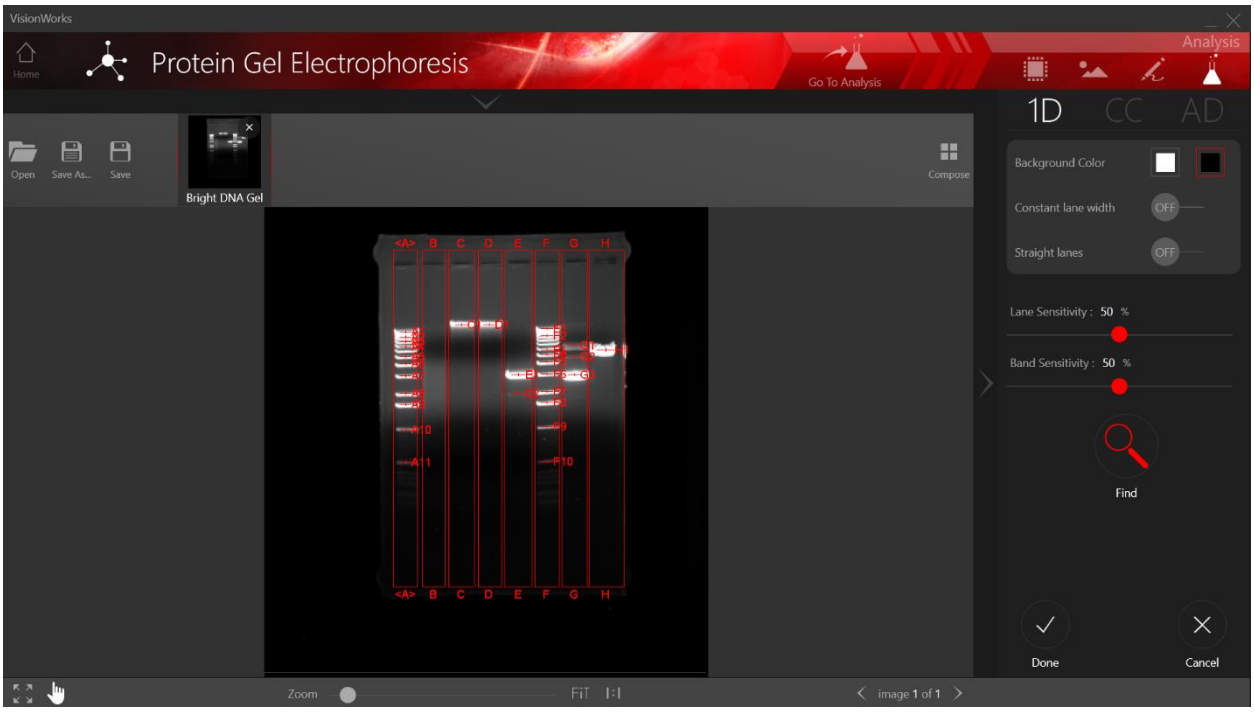


2) VisionWorks® will proceed to identify all lanes and bands it finds within the entire image. If only a certain region is desired then, select "**Define Region"** above and either tap or click to drag a selection box around the desired area.

3) Once satisfied, tap or click **"Find lanes and bands"** to run the search in the selection box.

4) Lanes and bands identified by VisionWorks® will then be displayed.

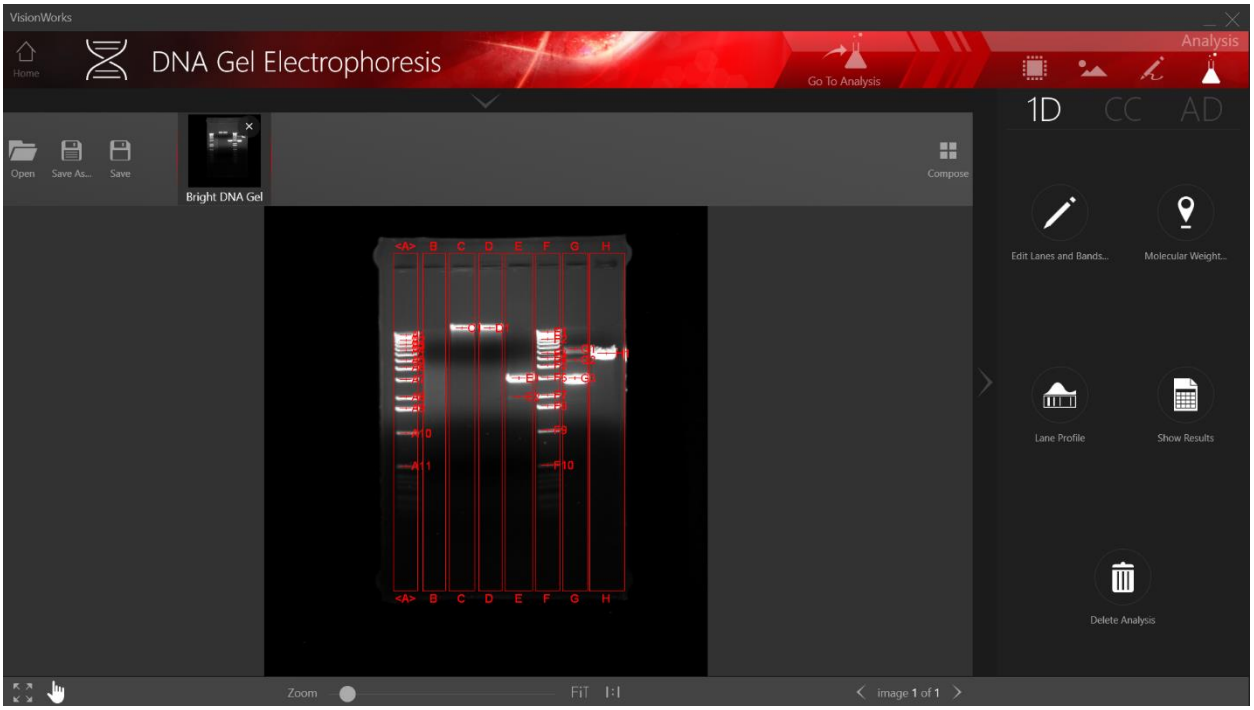
5) After a preview of the image is seen, parameters for the lanes and bands function will be visible. **Use** the sliders to adjust lane and band sensitivity as needed.



Summary of 1D analysis tools

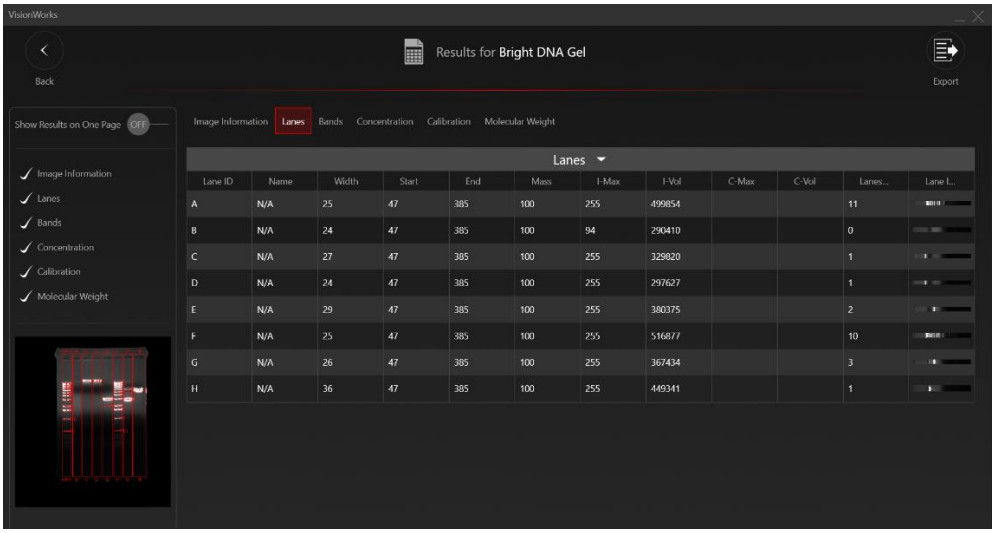
Settings	Function
Background Color	Sets the correct background color so that bands may be properly distinguished from the background pixels.
Constant lane width	All lanes will remain the same width, even when adjusted later. This is to allow for uniform width across the gel or blot.
Straight lanes	This setting makes all lanes straight, where the current default is to allow VisionWorks® to draw lines where it sees lanes, which may result in non-straight lanes.
Lane Sensitivity	The slider adjusts how sensitive VisionWorks® is to faint lanes. Set this slider higher if lanes are not clear.
Band Sensitivity	This slider allows for higher band sensitivity to identify more faint bands.

6) Once settings are correct, **click or tap** *"Done"* to save the changes and analysis.



7) Once saved, more analysis tools become available, they are summarized in a table below:

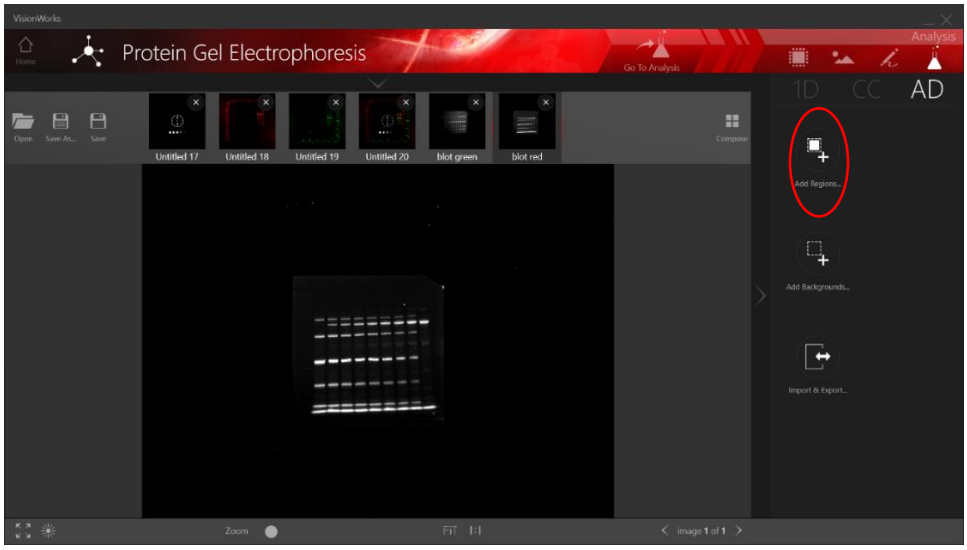
Tool	**Function**	
Edit Lanes and Bands	Allows for editing of individual lanes and bands. The following more detailed settings will become available under this menu.	
	Add Lanes	Individual lanes may be added. VisionWorks® will identify where a lane may be placed. Once the lane turns green, then click to finalize.
	Add Bands	Allows for individual bands. This is useful for highlighting very faint bands or blank bands.
	Delete Lanes and Bands	Allows for the deletion of individual lanes or bands. This is useful for removing and correcting incorrect lanes or bands.
	Move and Resize	Allows for lane or band placement on the image for more precise control over lanes and bands.
Molecular Weight	Allows for molecular weight calculations to be made based off a reference lane of the user's definition. This function comes with three primary steps: **1)** **Select** a lane to calibrate. **2)** Once selected **pick** a standard DNA weight, or create your own. **3)** **Adjust** the standard to match your gel.	

	4) Your calculated molecular weights will be displayed on the results page.
Lane Profile	Allows for band intensities to be displayed in a histogram. Lanes may be turned on or off to visualize peaks of interest. A background correction option is also available and may be adjusted to suit imaging needs. 
Show Results	Allows for quantitative analysis data to be previewed, printed or exported to Microsoft Excel. This allows for deeper data analysis beyond VisionWorks®. 
Delete Analysis	All analysis data is discarded nondestructively allowing for a new analysis to be started.

5.5.2 Area Density

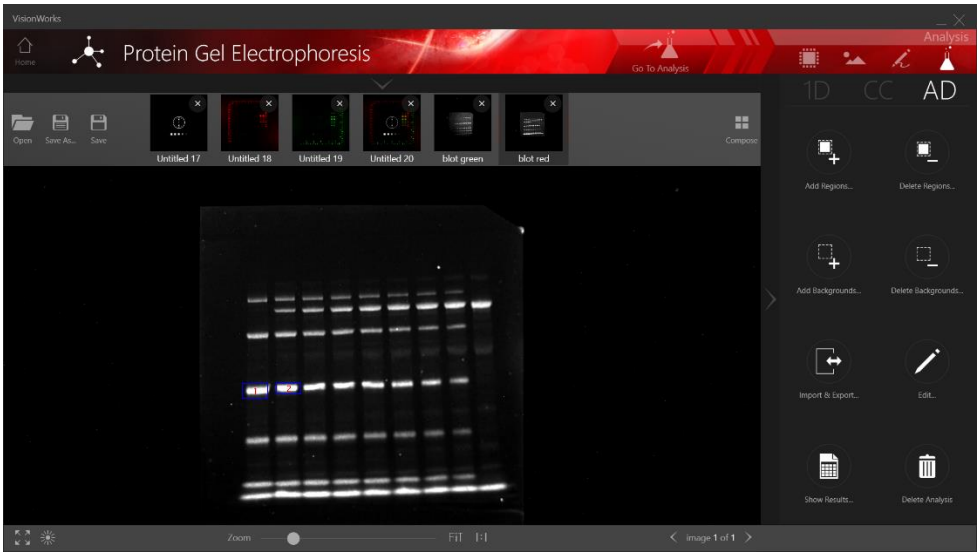
Area density allows for the quantification of intensities from a captured image. This feature is useful for quantitatively identifying and comparing band intensities to your control. Area density allows for background to be selected and subtracted out from the image.

1) To begin using area density, **click or tap** the **"Add Regions"** button under the **"AD"** screen of the Analysis menu.



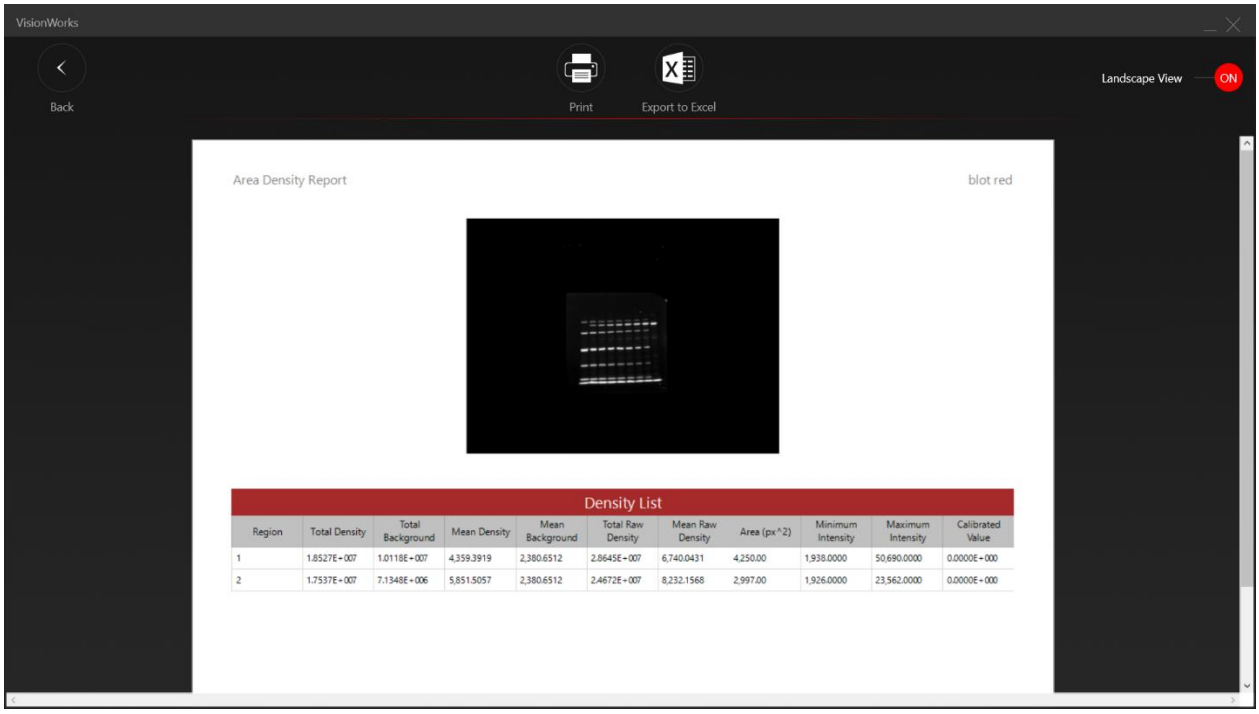
2) **Select** a region to be measured. Once satisfied with a selection **click or tap** "*keep*" to finalize the selection. Once all desired regions are selected, **tap or click** "*Ok*".

3) After selection, many more tools become visible to customize the selected regions. A summary table of all the tools and their functions is included below:



Tool	Function
Add Regions	Allows for additional measurement regions to be added to the current analysis.
Delete Regions	Allows for regions to be selectively deleted as needed.
Add Backgrounds	Allows for background regions to be defined.
Delete Backgrounds	Should an improper area be defined as background, this tool will allow that region to be removed from analysis.
Import & Export	This tool allows for regions to be imported or exported. Useful for saving and loading regions for repetitive imaging applications.
Edit	Allows for the relocation, resizing and adjustment of the overall image location.
Show Results	This tool displays all quantitative data from the selected regions. Options for print and export to Excel are available here.
Delete Analysis	This deletes the quantitative analysis data that was overlaid on the image allowing for a new analysis to be performed.

4) Using the tools above, adjust all regions according to preference. Once satisfied, **click or tap** the "*Show Results*" button to have all results displayed. From that window, **click or tap**, your export preference, Excel document or print.



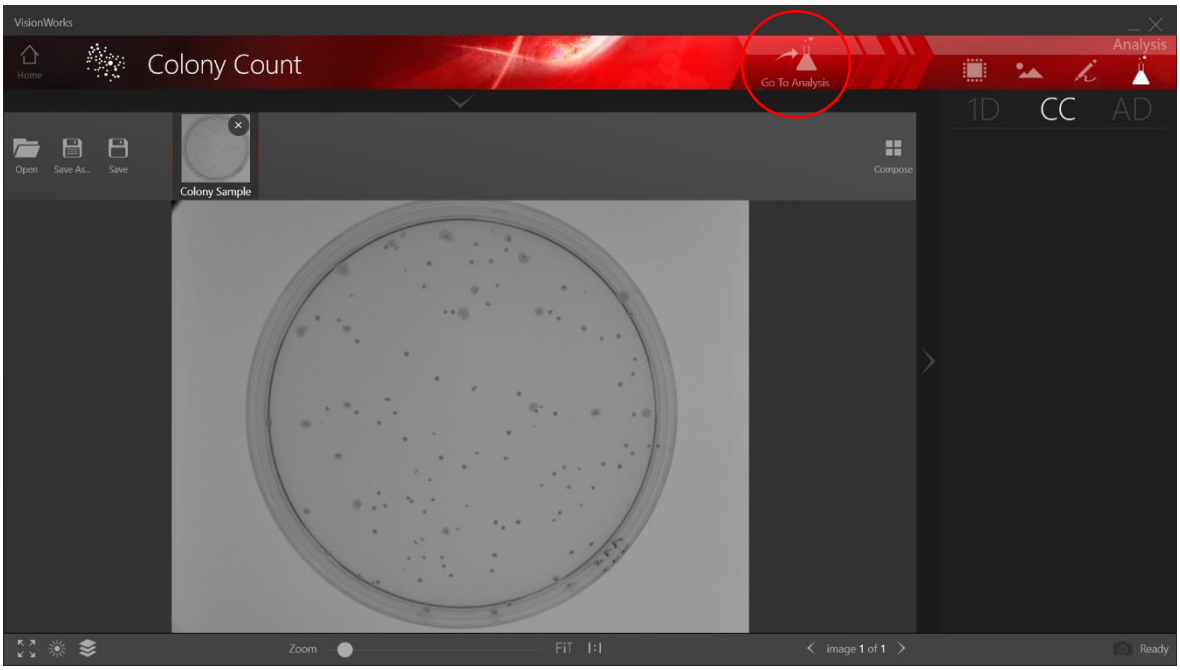
5.5.3 Colony Counting

Colony counting allows users to quantify intensities from colonies on a petri dish. VisionWorks® can identify these intensities automatically or users may define their own. Once identified results of the analysis may be displayed.

> **Note**: Colony counting will be featured in the VisionWorks® update, however, until the update is implemented colony counting is available through the use of the previous VisionWorks® interface. Those who use the previous version of VisionWorks® will recognize this interface.

To access the powerful colony count tool, follow the steps indicated below:

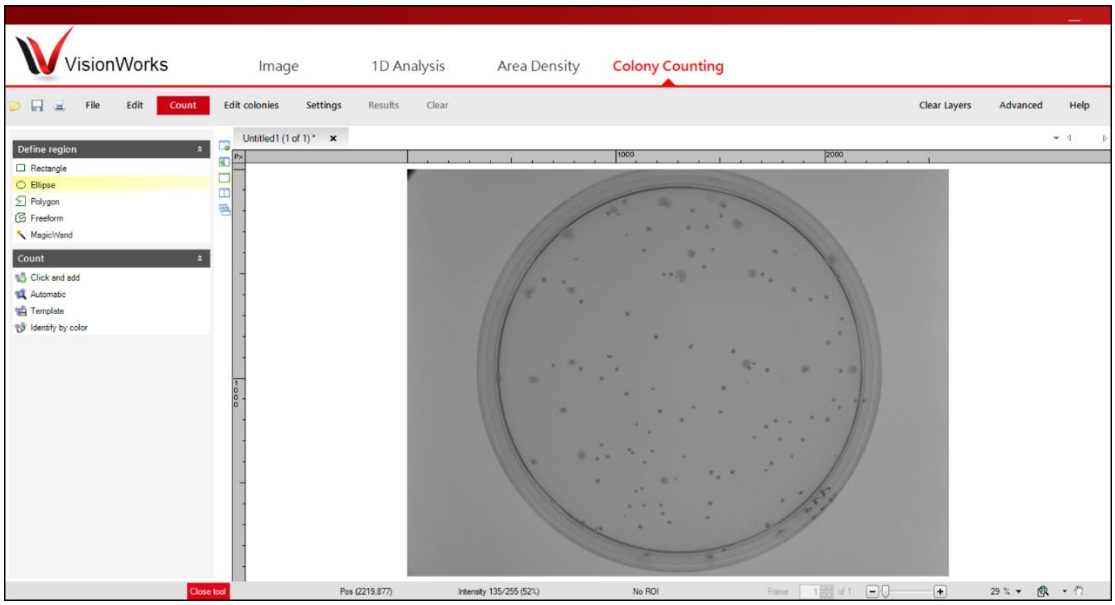
1) **Tap or click** the white "*Go to Analysis*" button in the top right corner of the screen.



2) This will boot the old VisionWorks® interface, as well as, send any pictures in the thumbnail gallery over to the old VisionWorks® GUI.

3) Once all images load, all analysis features included in the previous version of VisionWorks® will be available.

4) For colony counting, **select** the "*Colony Counting*" action tab in the toolbar above.



5) All colony counting features will be displayed. For in-depth documentation and instructions on how to use Colony Counting in VisionWorks®, please **consult** the VisionWorks® Software User Guide, page 150.

5.6 Support for 21 CFR Part 11 Compliance

US – Food and Drug Administration (US-FDA) created and released Part 11 of Title 21 of the Code of Federal Regulations (CFR) in August 1997. The rules delineate the conditions under which the US-FDA considers electronic records and electronic signatures equivalent to paper records and paper signatures. The instructions for compliance span the entire organization and its practices. The software *supports* organizations with their 21 CFR Part 11 compliance.

> **Note**: While software from Analytik Jena is an essential tool for assisting an organization to maintain CFR compliance, Analytik Jena cannot claim that this is the only tool needed to achieve overall CFR compliance. The organization must establish policies and procedures that work in conjunction with such efficient tools, to ensure total compliance with 21 CFR Part 11 regulations.

5.6.1 Features Supporting Compliance

VisionWorks® supports two sections of part 11 compliance. The features are listed according to the sections they support:

21 CFR 11.10 (e) – VisionWorks® provides two features to support section 10(e), image history and a master audit file.

Image History records the username and timestamp of any modification to the original image data starting with image creation. The additions of pseudocolors, histogram and brightness/contrast adjustments are not recorded as they do not modify original image data. Image history is stored within the metadata of the captured image and will be updated by VisionWorks as changes occur. Should an image be modified by an external program, an error will be displayed under image history. Original capture data is also recorded; however, this is displayed under another tab and not needed for compliance.

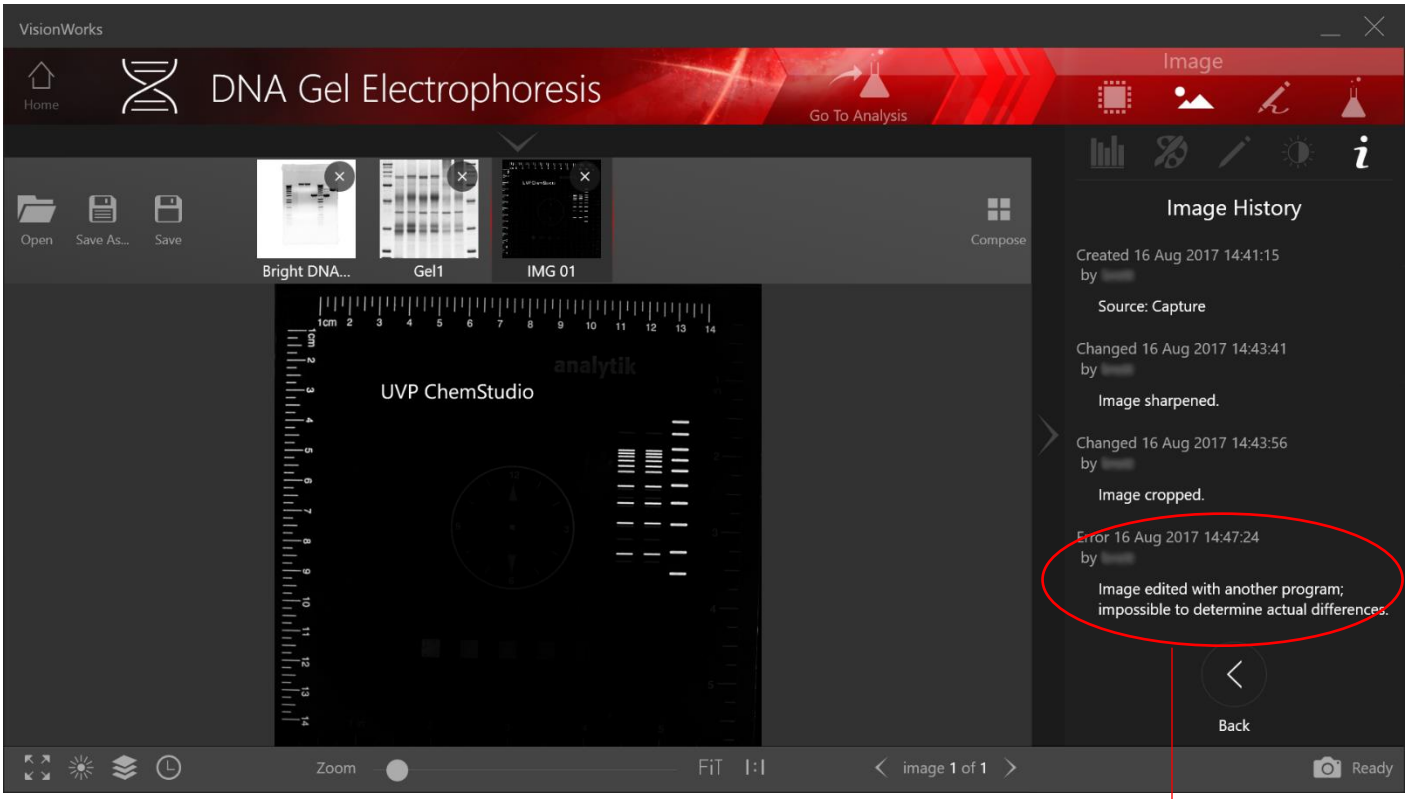
Master audit file is the record keeping file of VisionWorks that will timestamp all activity within VisionWorks® during a session with the currently logged in user. A session is defined as the time from program execution to termination. The audit file will only be available through VisionWorks® and will not be recognized by any other program. This is to prevent unauthorized edits to the audit file.

21 CFR 11.30 – VisionWorks® does not directly handle user accounts, but instead relies upon the use of active directory and windows authentication to control authorized entry and use of the system. It is the responsibility of the user to ensure the UVP ChemStudio has been properly configured to their IT environment to achieve compliance.

5.6.2 Usage

Image History

Image history is located under the image information tab under the image menu. The screenshot below illustrates the basic layout of image history. Tapping or clicking on the timestamp entry reveals the action that was performed.



This image was created and edited in VisionWorks, then was reopened after editing in a third-party program. VisionWorks recognizes this and will record it in the image history.

Master Audit File

The Master Audit file timestamps all actions performed by the currently logged in Windows user. This feature will provide an audit trail of a user per session. This feature is currently under development and will be released shortly after the initial candidate release. This feature will become available via an over the air software update.

6.0 Servicing Procedures

6.1 Cleaning and Care

The darkroom may be cleaned out and/or sterilized with isopropanol, ethanol and/or a mild soap or detergent. **DO NOT USE** any oil or petroleum based cleaners on the darkroom. **DO NOT USE** abrasive cleaners on the darkroom or transilluminator.

To clean the transilluminator surface, use a damp soft cloth or sponge. Never use abrasive cleaners which can damage the UV filter surface.

It is **NOT** advised to clean the **lens, camera or filters** as those sensitive components may become damaged and require replacement. Should a lens or camera need cleaning, contact Analytik-Jena technical support.

6.2 Return Procedure

Contact Analytik-Jena technical support to obtain a **Returned Goods Authorization** (**RGA**) number, as well as, further instructions prior to shipping any product back to Analytik-Jena.

WolfLabs

Pricing on any accessories shown can be found by keying the part number into the search box on our website.

The specifications listed in this brochure are subject to change by the manufacturer and therefore cannot be guaranteed to be correct.
If there are aspects of the specification that must be guaranteed, please provide these to our sales team so that details can be confirmed.

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Please contact us if this literature doesn't answer all your questions.