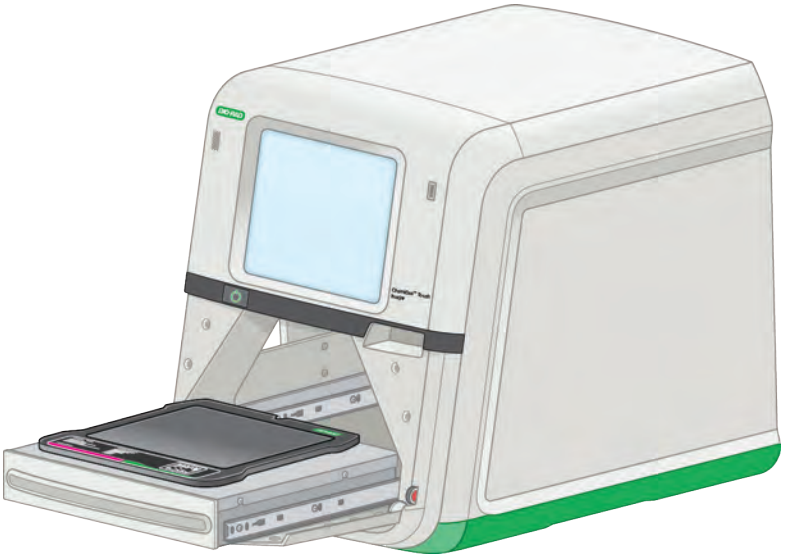
ChemiDoc™ Touch Imaging System with Image Lab™ Touch Software

User Guide

Version 1.2



BIO-RAD

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Bio-Rad Technical Support

The Bio-Rad Technical Support department in the U.S. is open Monday through Friday, 5:00 AM to 5:00 PM, Pacific time. Go to www.consult.bio-rad.com for worldwide technical support.

Phone: 1-800-424-6723, option 2

Web: www.consult.bio-rad.com

Email: Support@Bio-Rad.com (U.S./Canada only)

For technical assistance outside the U.S. and Canada, contact your local technical support office.

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Safety and Regulatory Compliance

Important Safety Information

Please read these instructions before operating the ChemiDoc™ imager.

This instrument is suitable for research use only. Therefore, it must be used only by specialized personnel who know the health risks associated with the reagents that are normally used with this instrument.

WARNING: The imaging of some applications involves UV illumination. This instrument should be used only by trained personnel who know the health risks associated with the UV radiation normally associated with this instrument. Users should be trained on the appropriate personal protection gear for working with UV light to minimize UV exposure.

To perform band excision using the Chemi/UV/Stain-Free tray, the transilluminator drawer is pulled out with the UV source enabled. This exposes the user to UV radiation, which can cause permanent damage to the eyes and skin. In its lowered position, the instrument's acrylic shield provides UV protection. However, in its raised position, it does not provide complete protection to the user, and it does not protect others who are standing in the area around the imager.

To protect users and bystanders, these procedures must be followed:

- Protect all skin surfaces (including the neck, ears, and hands). Before performing band excision, the user and anyone near the imager must put on protective gear including UV protective safety glasses, a face shield, lab coat, and gloves. A typical and reasonable expectation of use is three operations per user a day for three minutes each.
- Bystanders without protective gear must stand at least 1.5 meters (five feet) away from the imager and limit their exposure to no more than one hour per day.

Note: There is no exposure to UV radiation with the blue or white trays. No protective gear is necessary when excising bands with these trays.

Warranty

The ChemiDoc Touch imaging system is warranted against defects in materials and workmanship for one year. If any defect occurs in the instrument during this warranty period, Bio-Rad Laboratories, Inc. will repair or replace the defective parts at its discretion without charge. The following defects, however, are specifically excluded:

- Defects caused by improper operation
- Repair or modification done by anyone other than Bio-Rad Laboratories, Inc. or the company's authorized agent
- Use of spare parts supplied by anyone other than Bio-Rad Laboratories, Inc.
- Damage caused by accident or misuse
- Damage caused by disaster
- Corrosion caused by improper solvents or samples

General Precautions

- Read the user guide carefully.
- Use the instrument only for the intended purpose of gel and blot image acquisition in research laboratories.
- Connect the instrument to a grounded power source and to a circuit breaker.
- Do not pour liquids on or inside the instrument.
- Clean the sample tray after use.

Regulatory Notices

The ChemiDoc Touch imaging system is designed and certified to meet EN 61010, the internationally accepted electrical safety standard, EMC regulations, and TUV requirements. Certified products are safe to use when operated in accordance with this user guide. Do not modify or alter this instrument in any way. Modification or alteration of this instrument will:

- Void the manufacturer's warranty
- Void the regulatory certifications
- Create a potential safety hazard

Caution: Bio-Rad Laboratories, Inc. is not responsible for any injury or damage caused by use of this instrument for purposes other than those for which it is intended or by modifications of the instrument not performed by Bio-Rad Laboratories, Inc., or an authorized agent.

Alert Icons

Alert icons call attention to caution and warning paragraphs. The icon indicates the type of hazard addressed.

Table 1. How alert icons are used

Icon	Explanation
	General Indicates a potential hazard requiring special attention. This icon is used when the hazard or condition is of a general nature.
	Electrical Hazard Indicates a potential hazard requiring special attention when you are working with electricity or electrical equipment.
	Extreme heat and flammable materials Indicates a potential hazard requiring special attention when you are working with extreme heat and flammable materials.
	Radiation hazard Indicates a potential hazard requiring special attention when you are working with UV radiation.

Cautions

A caution alerts you to take or avoid a specific action that could result in loss of data or damage to the instrument. A caution can also indicate that, if the precaution against a potential hazard is not taken, minor or moderate injury might occur.

Example

Caution: With the exception of cleaning or replacing light bulbs, refer all servicing to qualified Bio-Rad personnel or their agents.

Warnings

A warning precedes an action that, if not followed correctly, could cause serious injury or death to the operator, serious or total loss of data, or serious damage to the instrument.

Example

WARNING! Keep the UV shield open for as little time as possible.

Instrument Safety Warnings

Before you operate the instrument, carefully read the contents of Table 2.

Table 2. Safety cautions and warnings for the instrument

Icon	Explanation
	**Caution:** With the exception of cleaning or replacing light bulbs, refer all servicing to qualified Bio-Rad personnel or their agents. If you experience technical difficulties with the instrument, contact Bio-Rad to schedule service. The instrument should not be modified or altered in any way. Alteration voids the manufacturer's warranty and might create a potential safety hazard for the user.
	**WARNING!** If the tray interlock is defeated, there is a possibility of UV-B radiation hazard due to UV-B light exposure. Exercise caution when servicing the instrument.
	**WARNING!** This instrument must be connected to an appropriate AC voltage outlet that is properly grounded.

Notice

The ChemiDoc Touch instrument is intended for laboratory use only. This device is meant for use by specialized personnel who know the health risks associated with reagents used in electrophoresis. The UV light source is computer controlled, and proper interlocks are implemented to avoid users' accidental exposure to UV radiation. Bio-Rad Laboratories, Inc. is not responsible for any injury or damage caused by use of this instrument for purposes other than those for which it is intended, or for instrument modifications not performed by Bio-Rad Laboratories, Inc. or an authorized agent.

Power Safety Information

Voltage Setting Information

The ChemiDoc Touch imager has a universal power supply that automatically chooses the correct voltage for your country or region.

Fuses

The imager has two user-serviceable fuses, F1 and F2, which are located on the rear panel and are a part of the power entry module. See Replacing the Fuses on page 109 for more information.

Chapter 1 Introduction

The ChemiDoc™ Touch system is a compact and chemiluminescent-capable gel/blot imaging instrument. This instrument automates the process of selecting blot detection parameters and acquires high-quality and high-sensitivity gel and western blot images. It can do this with the tap of an on-screen button.

The ChemiDoc Touch system uses Bio-Rad's Image Lab™ Touch software to control image capture and optimization for selected applications. You interact with the instrument via an integrated touch screen and a simplified user interface. Position the sample on a sample tray, choose the image acquisition presets, and acquire the image by tapping a button.

Note: Image Lab Touch software does not support image analysis. Use Image Lab software version 5.2 or greater, running on a separate Windows-based computer, to analyze images acquired with the ChemiDoc Touch instrument.

Product Features

The ChemiDoc Touch instrument supports the acquisition of images from a wide range of laboratory gels and blots. The instrument uses a supersensitive camera with a charge-coupled device (CCD) and a large maximum-aperture lens that provides high chemiluminescent sensitivity. The imager has a built-in UV transilluminator and white LEDs for epi (reflective) illumination. The imager works with gels and blots stained with a wide range of dyes and fluorophores. Additional features include

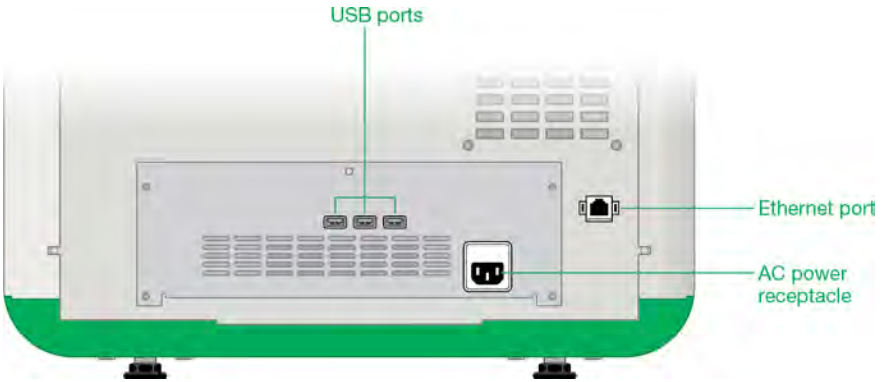
- Support for chemiluminescent imaging, colorimetric western blotting applications, and DNA/protein gel visualization
- Dynamic flat fielding specific to each application

- Smart, tray-based imaging that identifies the correct applications and presents appropriate filter and illumination sources for each
- Support for imaging applications that require high sensitivity (chemiluminescent western blots)
- Dynamic range of >4 orders of magnitude

Front Panel Components

1	USB port	6	Transilluminator drawer
2	Touch screen	7	Front door (open position)
3	System on/off button	8	Imaging stage
4	Sample tray	9	Front door open handle
5	Transilluminator drawer handle		

Rear Panel Components



CCD Camera and Lenses

The ChemiDoc Touch camera is installed within a lighttight enclosure. Based on acquisition settings you select, Image Lab Touch uses a patented* algorithm to adjust the camera zoom and lens focus automatically. See Technical Specifications on page 21 for more information.

Introduction to Image Lab Touch Software

The imager comes with Image Lab Touch software installed. You can acquire and view images, fine tune how images appear, print images, and export them to a computer running Image Lab software. With Image Lab you can carry out detailed analyses of the images.

* U.S. patent 8913127

Emission Filters

The ChemiDoc Touch instrument has a motorized emission filter for fluorescent and white light applications. When no filter is required to image chemiluminescent samples, the filter automatically moves out of the way of the lens.

Optional Accessories

See Appendix B, Ordering Information, for a list of optional accessories and replacement parts.

Printer

An optional USB printer, the Mitsubishi thermal printer (cat. #1708089), is available from Bio-Rad for use with the ChemiDoc Touch imaging system.

White Sample Tray

The optional White Tray (cat. #1708372) is a phosphor screen that produces white light transillumination.

Blue SampleTray

The optional Blue Tray (cat. #1708373) is a UV-to-blue-light conversion screen that makes DNA samples visible while protecting them from UV damage.

Supported Tray Types

The ChemiDoc Touch imager can be used with the Chemi/UV/Stain-Free, white, and blue trays. Table 3 lists each tray type and the application it supports.

Table 3. Sample Trays

Tray Type	Supported Applications	
Chemi/UV/Stain-Free (cat. #1708374)	■ Alexa Fluor 488 ■ Chemiluminescence ■ Colorimetric Blots ■ Coomassie Fluor Orange ■ Cy2 ■ DyLight 488 ■ Ethidium bromide (EtBr) ■ Flamingo™ Fluorescent Gel Stain ■ Fluorescein ■ GelGreen ■ GelRed	■ Krypton ■ Oriole™ Fluorescent Gel Stain ■ Qdot 525 ■ Qdot 565 ■ Qdot 625 ■ SYBR® Green ■ SYBR® Gold ■ SYBR® Safe ■ SYPRO Ruby ■ Stain-free gels ■ Stain-free blots
White (cat. #1708372)	■ Coomassie Blue stain ■ Cooper stain ■ Fast Blast™ DNA Stain	■ Silver stain ■ Zinc stain
Blue (cat. #1708373)	■ Alexa Fluor 488 ■ Cy2 ■ DyLight 488 ■ Ethidium bromide	■ Fluorescein ■ GelGreen ■ SYBR® Green ■ SYBR® Gold ■ SYBR® Safe

Technical Specifications

Supported Applications	
Chemiluminescence	Yes
Fluorescence	Yes Important: Using the optional Blue Tray (cat. #1708373) is highly recommended for SYBR® Safe DNA applications because the conversion to blue light makes DNA samples visible while protecting them from UV damage.
Colorimetry	Yes
Gel documentation	Yes
Hardware Specifications	
Touch screen functionality	■ Multitouch capable ■ Display resolution 1024 x 768 pixels ■ 12.1" (30.73 cm) display
Onboard computer system	■ 4 GB RAM ■ 60 GB disk space ■ 4 USB ports
Sample thickness	Maximum thickness of 5 mm is supported
Maximum image area	■ Length: 16.8 cm ■ Width: 21 cm

Excitation source	■ Trans-UV 302 nm (standard) ■ Epi-white (standard) ■ Trans-white (optional) ■ Trans-blue (optional)
Detector	Deeply cooled CCD
Pixel size	4.54 x 4.54 µm
Cooling system	Thermoelectric, setpoint –25°C
Filter selector	Automated
Emission filters	1 included (535–645 nm)
Dynamic range	>4.0 orders of magnitude
Pixel density (gray levels)	65,535
Instrument size	■ Length: 63 cm (24") ■ Width: 50 cm (20") ■ Height: 53 cm (21")
Instrument weight	32 kg (78 lb)
Operating Ranges	
Operating voltage	100–240 VAC, 50–60 Hz
Operating temperature	10–28°C
Operating humidity	10–80% relative humidity (noncondensing)
Automation Capabilities	
Workflow automated selection	Application-driven, tray-based imaging

Autofocus	Precalibrated focus for any zoom setting
Image flat fielding	Dynamic; precalibrated and optimized per application
Autoexposure	2 user-defined modes (rapid or optimal) for chemiluminescent applications
	2 user-defined modes (intense or faint bands) for fluorescent and visible applications

Environmental Requirements

The ChemiDoc Touch imager requires a space 52 x 56 x 62 cm (W x H x D) and a clearance of at least 8 cm from the back for instrument ventilation and for connecting or disconnecting the AC power cord. Place the imager on a sturdy and level laboratory bench or table away from excessive heat and moisture. The imager's operating temperature range is 10–28°C. The imager contains a universal power supply that supports a voltage range of 100–240 VAC.

WARNING! Transilluminators are powerful sources of UV radiation, which can cause serious damage to unprotected eyes and skin. The accessory UV shield (cat. #1708375) provides UV protection. However, this shield does not guarantee complete protection nor does it provide protection to others in the area around the imager. Before performing band excision, the user and anyone near the imager must put on protective gear including eyeglasses (laboratory glasses provide adequate protection), a face shield, lab coat, and gloves.

Chapter 2 Image Lab Touch Software Overview

This chapter describes the touch screen interface and presents an overview of the software.

Starting Image Lab Touch

To start Image Lab™ Touch Software

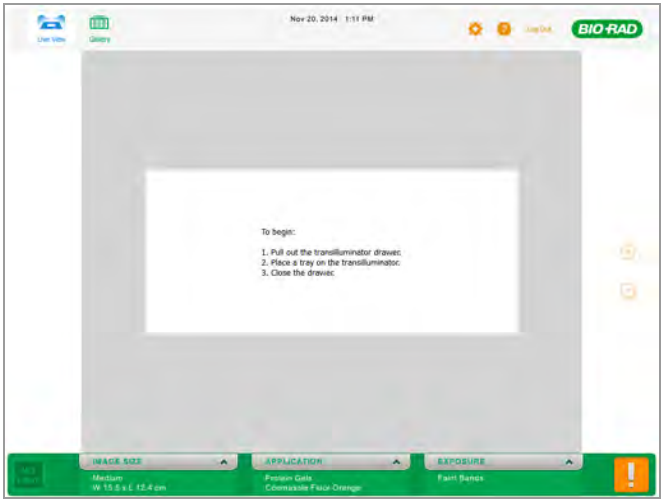
1. To turn on the imager, press the On button on the front.

   The instrument starts Image Lab Touch software and the Welcome screen appears.

You can customize the text on this screen. For more information, see Editing the Welcome Screen on page 40.

2. Tap Begin.

   The Live View screen appears.



Setting the System Date and Time

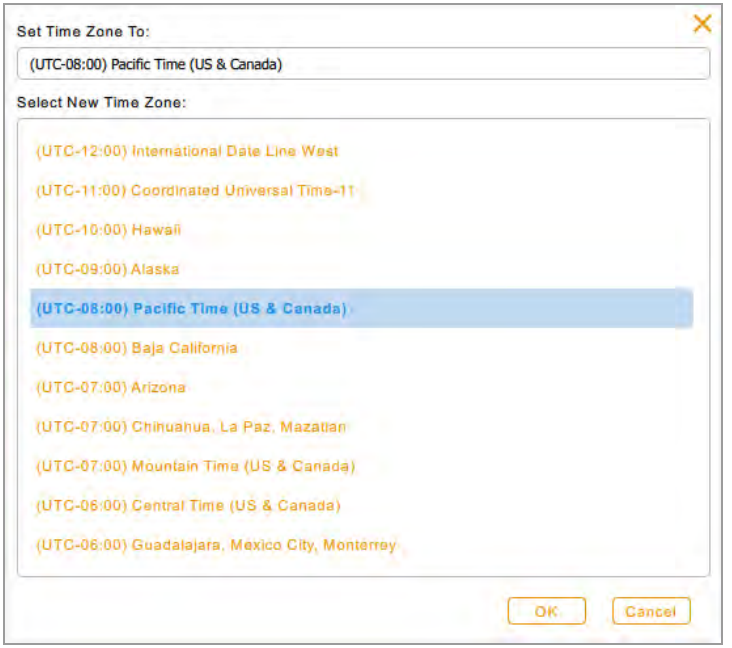
Before you begin using the imager, ensure that the date and time settings are correct for your locale. If you are connected to a network, date and time are synchronized to the network setting.

The system date and time are determined by a combination of the time zone and the current time settings. The date and time appear in the default name assigned to acquired images.

To set the system date and time

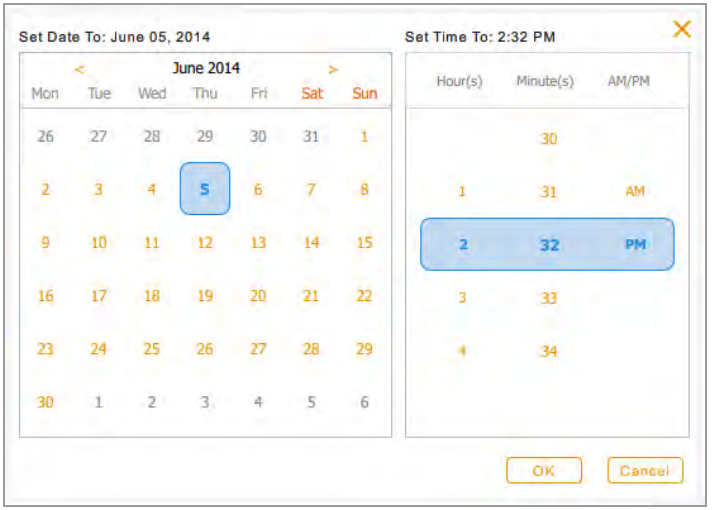
1. Tap Settings.

2. Then tap Set Time Zone.



3. Scroll through the list until the time zone for your locale appears. Tap the time zone to select it.
4. Tap OK.

5. Tap Settings. Then tap Set Date and Time to set the current time.



6. Tap an angle bracket (< or >) in the calendar to navigate to the correct month.
7. Tap the day of the month.
8. Scroll through the Hour and the Minutes lists until the current time appears in the blue band.
9. Scroll the AM/PM list until the correct setting appears in the blue band.
10. Tap OK.

    The date and time you selected appear at the top of the screen.

Touch Screen Actions

Touch Screen Actions

Use the following actions to interact with the imager.

Action	Definition
Tap	Briefly touch the screen surface.
Double-tap	Tap twice quickly.
Pan	Touch and then move your finger left or right.
Scroll	Touch and hold, and then move your finger up or down.
Stretch	Place a thumb and one or two fingers together on the screen, and then move them apart. This is equivalent to zooming in.
Pinch	Place a thumb and one or two fingers slightly apart on the screen, and then move them together. This is equivalent to zooming out.

The Application Interface

Tap the following screen objects to specify a setting or execute an action.

- **Tabs** — open a dialog box in which you specify image settings.
- **Icons** — execute a command.
- **Text Boxes** — display an on-screen keyboard or numeric keypad to enter data.

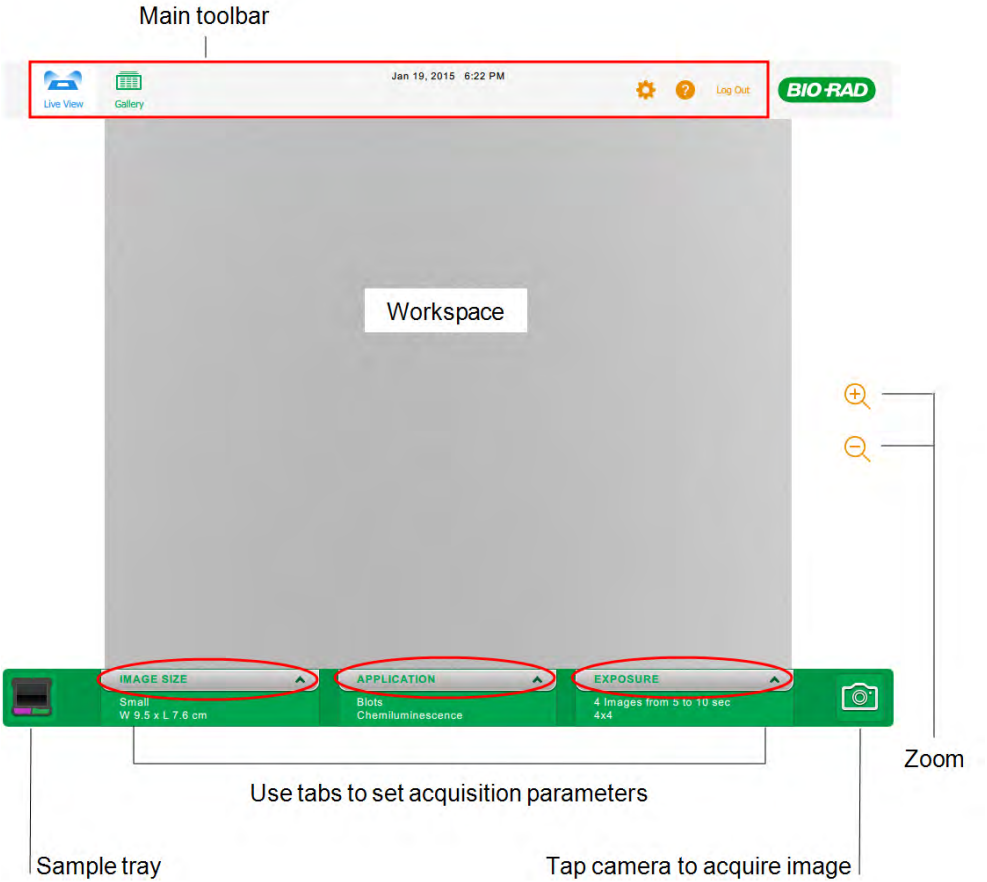
The Live View screen is annotated with the interface elements you can access by tapping.

Alternatively, you can use a USB mouse to click on tabs and icons or click in text boxes and enter data with a USB keyboard.

Note: If you are using a USB mouse, replace any instruction to *tap* with *click*.

About the Live View Screen

The Live View screen appears when you start Image Lab Touch. In Live View you specify the image size, select an application, and set the exposure. Once these parameters have been set, the system is ready to acquire the image.



Live View Screen Elements

- **Main toolbar** — accesses the Live View, Gallery, and Help screens, the Settings menu, and the Logout icon. For more information about the toolbar icons, see The Image Lab Touch Main Toolbar in the next section.
- **Workspace** — displays a live view of the sample on the sample tray.
- **Sample tray** — displays a thumbnail image of the sample tray on the imaging stage.
- **Tabs** — open dialog boxes where you can specify image acquisition settings.
- **Camera icon** — acquires an image of the sample.
- **Zoom icons** — zoom in and out to focus on an area of the sample.

The Image Lab Touch Main Toolbar

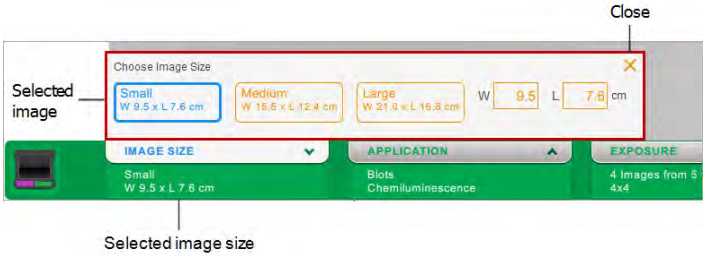
Tap the following screen objects to specify a setting or execute an action.

Icon or Text	Description
	**Live View** — accesses the Live View screen, which displays the sample in the sample tray in real time. You can select acquisition settings and tap the Camera icon to acquire images.
	**Gallery** — displays thumbnails of all acquired images. You can view, browse, delete, print, or export images.
Date and time	**Date and Time** — displays the current date and time of the imaging system. Go to Settings > Set Date and Time to change this setting.
	**Settings** — displays system settings and accesses software updates.

Icon or Text	Description
	**Help** — displays information about Image Lab Touch screens.
Logout	**Logout** — logs you out and returns to the Welcome screen.

Tabs

IMAGE SIZE, APPLICATION, and EXPOSURE tabs display image settings. Tapping a tab opens a dialog box. For example, when you tap the IMAGE SIZE tab, this dialog box appears:



Notes

- A blue border surrounds the current selection.
- Tabs display current settings when they are open. When the tabs are closed, current settings appear in the green area below the tabs. In the example screen, the image size (Small) and image dimensions (W 9.5 x L 7.6 cm) appear below the tab. Similarly, the selected application and exposure settings appear below the APPLICATION and EXPOSURE tabs.
- For information on entering numbers and text using the on-screen keypad or keyboard, see Entering Text on Screen on page 39.
- To close the dialog box, tap the X or tap anywhere else on the screen.

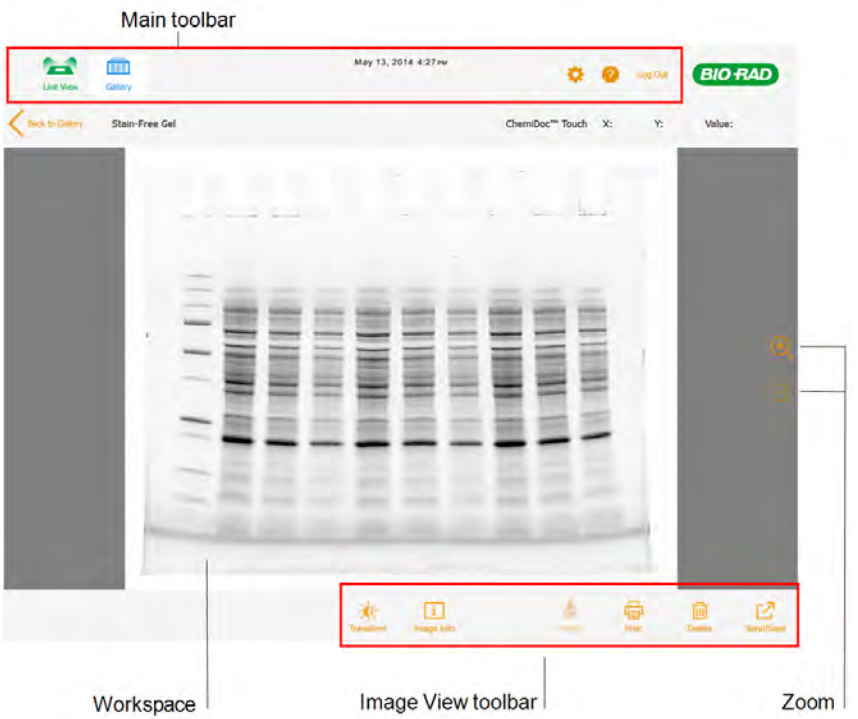
About the Image View Screen

Image View displays acquired images in the following situations:

- When you acquire an image in Live View, the image appears in Image View.
- In the Gallery, when you double-tap a thumbnail of an acquired image, the image appears full size in Image View.

You can fine tune the image display, view information about the image, delete the image, or save it to a USB flash drive or network drive.

Tip: To compare images, you can select up to four images in the Gallery and then view them in Image View.



- **Main toolbar** — accesses the Live View, Gallery, and Help screens, the Settings menu, and the Logout icon. For more information about toolbar icons, see The Image Lab Touch Main Toolbar on page 32.
- **Workspace** — displays the acquired image.
- **Image View toolbar** — optimizes images, views information about images, merges two images, prints the image(s) being viewed, deletes and saves images. For more information about toolbar icons, see The Image View Toolbar on page 36.
- **Zoom icons** — zoom in and out to focus on an area of the sample.

The Image View Toolbar

The Image View toolbar displays the following icons.

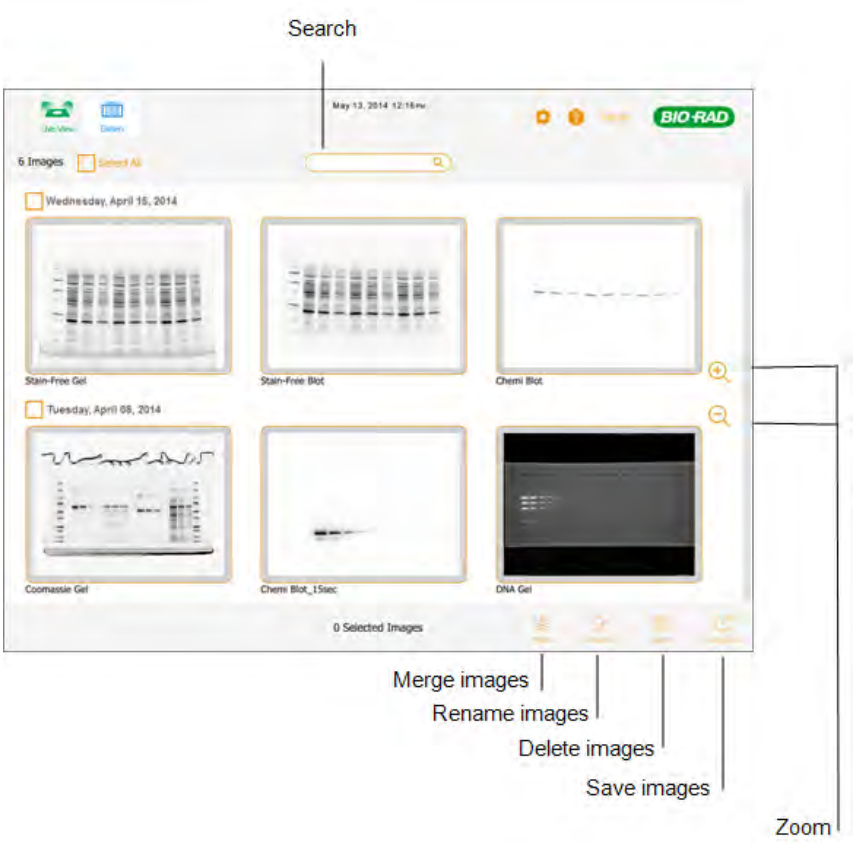
Icon	Description
	**Transform** — optimizes image appearance by adjusting the image brightness and contrast.
	**Image Info** — provides information about the active image. Image information includes the date of acquisition, name of the acquisition application, and login name of the user who acquired the image. You can rename the image and add notes.
	**Merge** — combines two images of the same sample into a single image.
	**Print** — prints the image(s) in Image View to the Mitsubishi thermal printer.
	**Delete** — deletes the displayed image.
	**Send/Save** — saves the displayed image to a USB flash drive or network drive.

The Gallery

The Gallery displays thumbnail images of all acquired images organized by the date they were acquired, with the most recent acquisition date shown first. In this view, you can open an image in Image View, delete selected images, and save selected images to a USB flash drive or network drive.

Note: To compare images, you can select up to four images in the Gallery to view in Image View. For more information, see Comparing Images on page 81.

By default, each thumbnail image is named with the date and time of acquisition. You can change the name in the Image Info box.



Gallery Screen Components

- **Main toolbar** — accesses the Live View, Gallery, and Help screens, the Settings menu, and the Logout icon. For more information about toolbar icons, see The Image Lab Touch Main Toolbar on page 32.
- **Thumbnail images** — displays thumbnails of all acquired images in order by the date and time of acquisition with the most recently acquired displayed first.
- **Search** — searches for selected image by date or name.
- **Merge** — combines two images of the same sample into a single image.
- **Rename** — renames selected images.
- **Delete** — deletes selected images.
- **Send/Save** — saves selected images to a USB flash drive or network drive.
- **Zoom icons** — zooms in and out to focus on an area of the sample.

Getting Help

Online help is available in each main view and in selected dialog boxes.

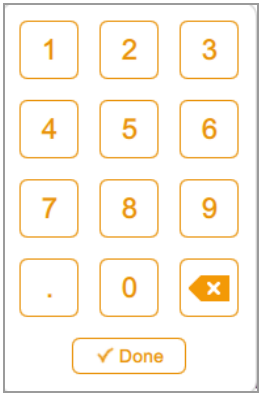
To access help

- Tap Help to open the help topic for that screen.
- Scroll to display longer topics and to access links to related topics.
- Tap the X in the upper right corner to close the help screen.
- Access a list of all help topics by tapping Help Topics at the bottom of the screen.

Entering Text on Screen

In text boxes you can enter or edit text with an on-screen keyboard or keypad. When you tap a box, the appropriate input object appears. Tap keys to enter your input. Alternatively, you can type text on a USB keyboard.

Using the On-Screen Keypad



Tips

- Tap a box to display the range of valid values below the box.
- You cannot enter an invalid number. If a number you tap does not appear on the screen, verify that the number is within the range of valid values.

  If the box turns red when you enter a number and tap Done, you entered an invalid number.
- Some properties are set by entering data in multiple boxes. Enter data in the first box and then tap the next one and enter the next setting. The software saves your entries.
- Tap Done or tap anywhere else on the screen to close the keypad.

Using the On-Screen Keyboard

Tap in a text box to display the keyboard.

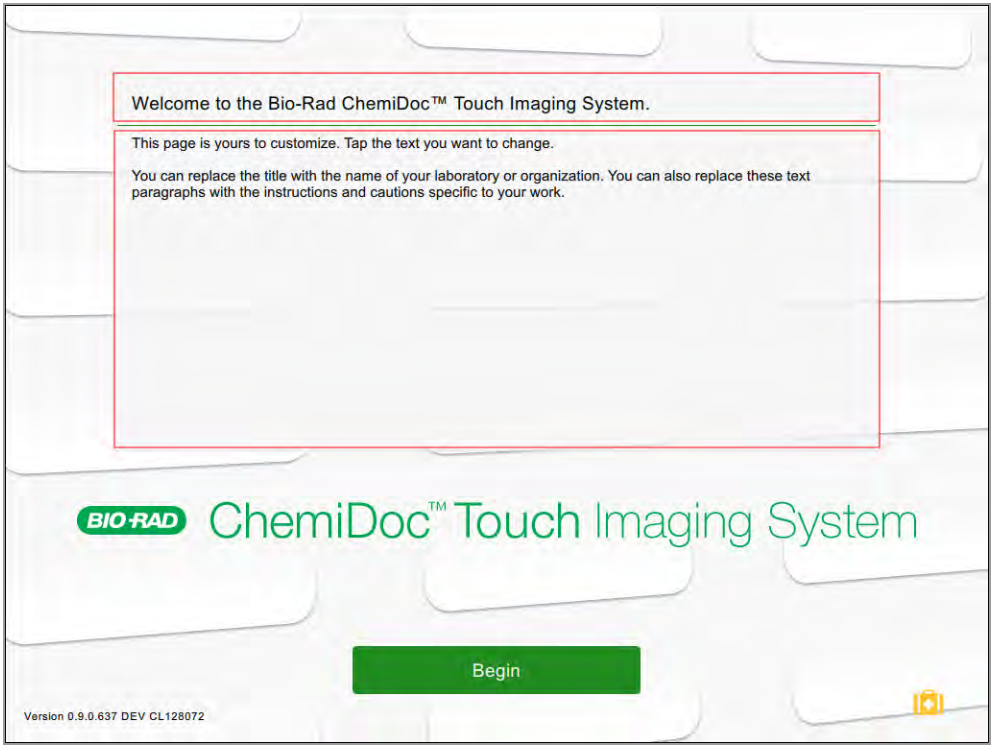
You can select from three keyboards.Tap the keys on the left side of the bottom row to display the different keyboards and enter English alphabetic characters, numbers and symbols, and Western European characters.

Choose the keyboard you want and tap keys to enter your input.

Editing the Welcome Screen

When you log on to the ChemiDoc™ Touch imager, Image Lab Touch software starts and a Welcome screen appears. You can add custom text for your organization in the two boxes on the screen. For example, you can enter the name of your business or laboratory in the upper box and add a warning message or other helpful information in the lower box.

You can enter one line of text in the upper box and up to three lines of text in the lower box.



To edit the Welcome screen

1. Tap in a box.

   The touch screen keyboard appears. For more information, see Entering Text on Screen on page 39.

2. Triple-tap to select the text.
3. Enter the new text.
4. Tap OK to save the changes.

Setting the Sound Volume

You can change the system sound level or turn the sound off.

To set the sound volume

1. Tap Settings.

2. Then tap Set Sound Volume.
3. Tap a volume level.
4. Tap X to close the dialog box.

Chapter 3 Acquiring an Image

This chapter describes the steps to acquire an image using the following workflows:

- Workflow for Acquiring a Chemiluminescent Image on page 46
- Workflow for Acquiring Gel and Blot Images on page 62

Note: This chapter focuses on chemiluminescent blots. It explains how to specify the area of focus to shorten the exposure time required and how to use the different exposure options to get the result you want.

About Sample Trays

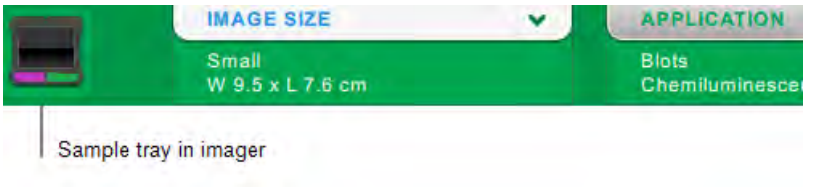
Each application must be used with the appropriate sample tray. The ChemiDoc™ Touch imaging system supports the following sample trays:

Table 4. Sample trays

Tray Name	Icon
Chemi/UV/Stain-Free tray	
White tray	
Blue tray	

For information on the applications to use with these trays, see Supported Tray Types on page 20.

In Live View, the toolbar displays a thumbnail of the sample tray in the transilluminator drawer. When no tray is in the drawer, the image displays the words NO TRAY.



Important: You must use the correct tray with the application you select.

The ChemiDoc Touch imager detects the type of sample tray on the imaging stage. If the tray in the transilluminator drawer does not support the application, an error message appears and the imager does not acquire the image.

Some fluorescent reagents have excitation peaks in both UV and blue wavelengths. In this case, either excitation source can be used. However, the resulting images are not identical. Using the recommended tray with these fluorescent reagents provides a better signal-to-noise ratio, which increases sensitivity. When two tray types can be used, both are shown. An asterisk identifies the recommended tray.

To prepare a sample tray

1. Place the gel or blot on the appropriate sample tray.
2. Open the imager main door and pull out the transilluminator drawer for easier access to the imaging stage.
3. Place the sample tray on the imaging stage.
4. Push the transilluminator drawer in and close the main door.

Workflow for Acquiring a Chemiluminescent Image

Note: For information on acquiring images other than chemiluminescent blot images, see Workflow for Acquiring Gel and Blot Images on page 62.

The basic steps to acquire a chemiluminescent image are

- Specify the image size.
- Choose the application type.
- Specify the region of interest.
- Set the exposure time.
- Acquire the image.

Note: You can specify the acquisition settings at any point in the workflow, for example, before you prepare the sample tray or after the tray is in the transilluminator drawer. The imager retains the settings until you change them.

Specifying the Image Size

You can select a preset image size or specify a custom size.

To specify the image size for a chemiluminescent image

1. In Live View, tap IMAGE SIZE.
2. To choose a standard size, tap Small, Medium, or Large.

3. To specify a custom size, tap the W (width) or L (length) box.

   The on-screen keypad appears.

4. Enter the width or length of the image (in cm) using the keypad.

   The valid width values are 9.0 to 21.0 cm. The valid length values are 7.2 to 16.8 cm.

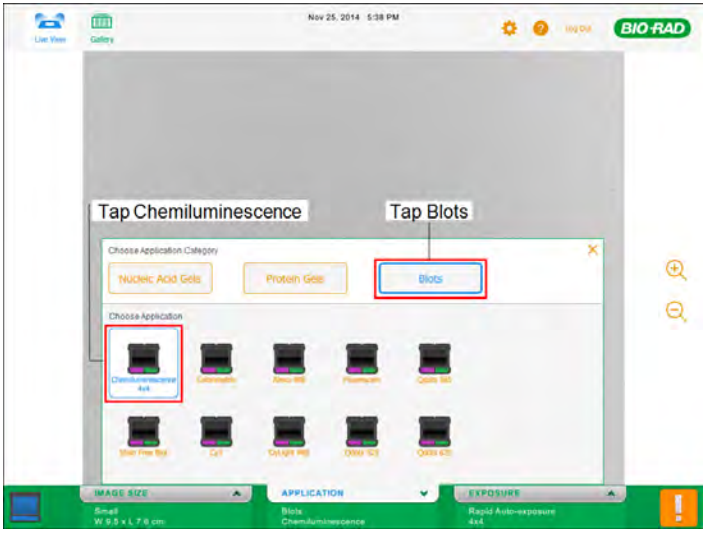
   Note: When you enter one dimension, the software calculates the other dimension according to the imager's 5:4 aspect ratio.

5. Tap Done to save your changes and close the keypad.

Choosing the Application

To choose the chemiluminescence application

1. In Live View, tap APPLICATION.
2. Tap Blots. Then tap Chemiluminescence.



About Exposure Times for Chemiluminescent Images

Image Lab™ Touch software accurately estimates the shortest exposure time for obtaining high-resolution images. You can use the Image Resolution/Sensitivity scale with adjustable binning settings to acquire the image you want. You can choose higher resolution for publication-quality images or, when the bands are faint, higher sensitivity.

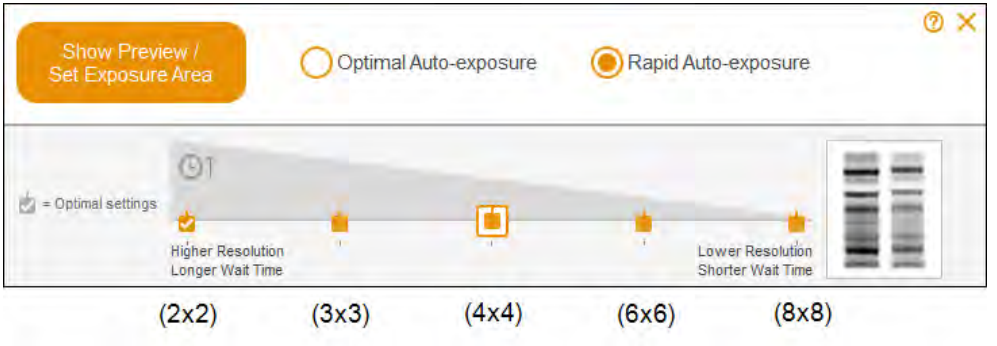
Image Lab Touch automatically determines the optimal setting required to achieve publication-quality images. Images acquired at the optimal setting have a resolution of 175 microns or better per pixel. Selecting a setting to the left of this default setting increases the

resolution; however, the imaging time might increase. Selecting a setting to the right of the default setting might reduce the resolution below that required for publication; however, the exposure time is reduced.

Bio-Rad recommends that you start with the optimal binning setting, examine the result, and then adjust subsequent images.

The Image Resolution/Sensitivity Scale

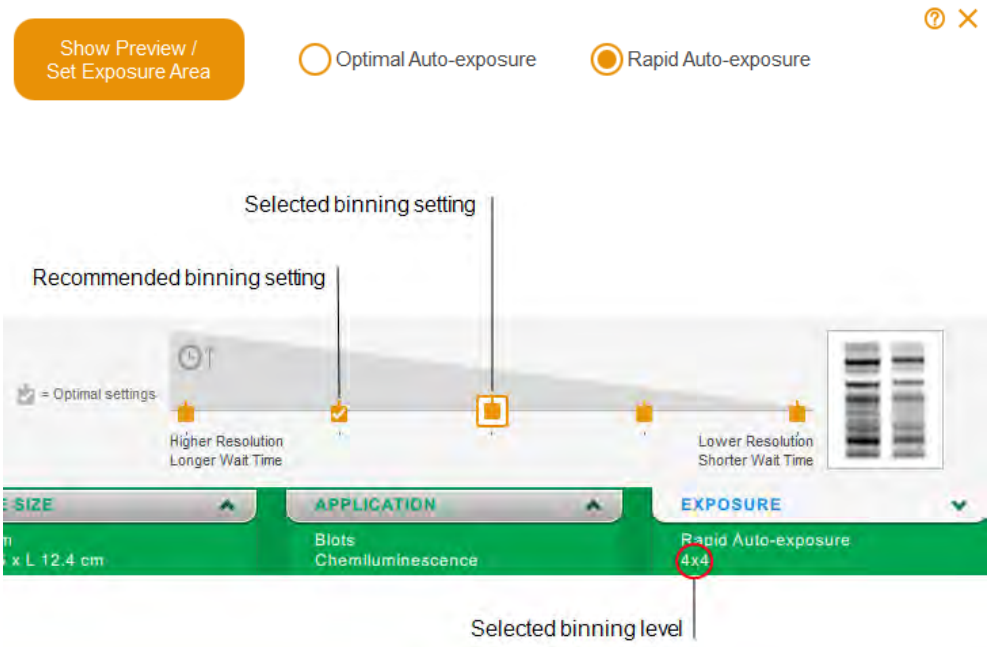
The Image Resolution/Sensitivity scale has five pixel binning settings: 2x2, 3x3, 4x4, 6x6, and 8x8.



The following icons indicate binning settings.

Icon	Description
	Binning level
	Selected binning level
	Optimal setting for publication-quality images

The optimal binning setting required to achieve publication-quality images is indicated on the Image Resolution Sensitivity scale.



In the example screen, the selected binning level displays under the Exposure tab.

How Binning Settings Affect Image Quality

Pixel binning refers to the process of combining data from adjacent CCD pixels to form a single larger pixel. As a result, this provides faster acquisition speeds and, in most images, improved light sensitivity. However, pixel binning is achieved at the cost of reduced resolution. A binning of 2x2 means that 4 adjacent pixels are combined into one larger pixel. A binning of 3x3 means that 9 pixels are combined into one, 4x4 means that 16 are combined into one, and so on.

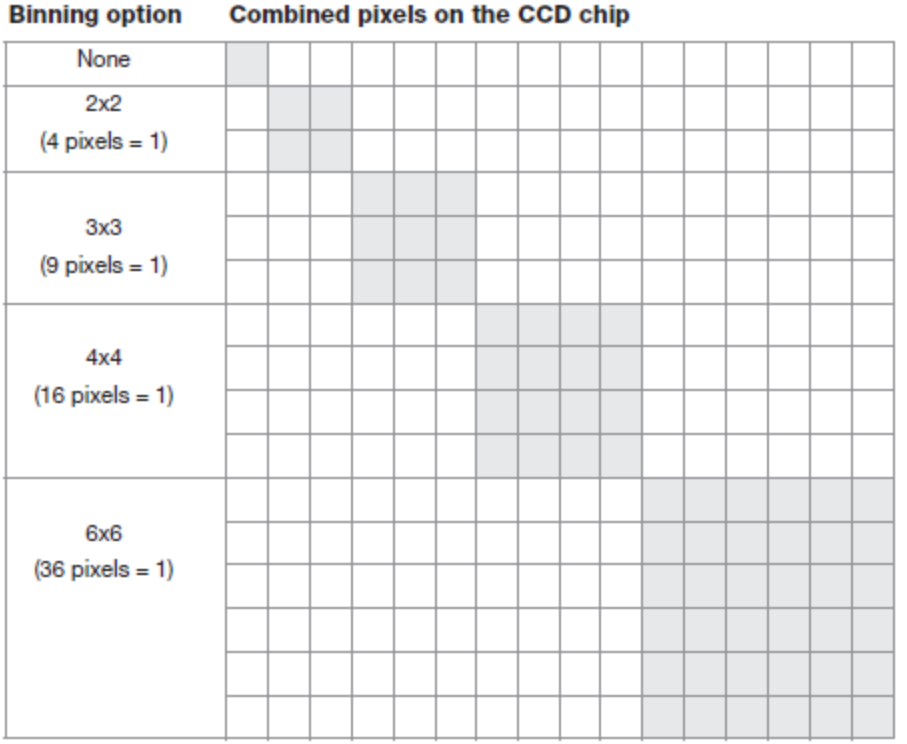


Fig. 1. Pixel binning combines adjacent pixels into one larger pixel.

Using pixel binning, you can balance sensitivity, resolution, and exposure time to produce an image best suited for your purposes:

- **Sensitivity** — as binning increases, sensitivity to light increases in most images, which improves the ability of the lens to detect faint bands. A binning of 4x4 uses 16 pixels compared to a binning of 2x2, which uses four pixels. As a result, a binning of 4x4 is four times more sensitive than a binning of 2x2.

  Note: At higher binning settings, sensitivity may depend on the signal intensity and size of the feature being imaged relative to the background. If the bin contains more pixels than the feature (for example, a band), the intensity is averaged over the binned area. In some images, a higher binning setting may render the feature not visible above the background.

- **Resolution** — resolution decreases at the higher binning settings. As pixel binning increases, fewer pixels appear in the resulting image.

- **Exposure time** — as binning increases, the larger pixel size reduces the time it takes to acquire the image.

Tip: Zooming in on the area to be imaged increases the resolution and might increase the optimal binning. The loss in resolution with a higher binning setting can be offset by the increase in resolution and shorter exposure time.

In general, a 2x2 binning level produces images that are relatively higher in resolution, lower in sensitivity, and require longer exposure times. An 8x8 binning level produces images that are relatively lower in resolution and, generally, higher in sensitivity (faint bands are optimized), and are acquired in shorter exposure times.

Tip: For a first acquisition of a sample, you might use a higher binning level (for example, 8x8) with a shorter exposure time. Evaluate the results and then use a 2x2 binning level with a longer exposure time on the next acquisition. With some acquisitions the 2x2 binning level might produce an image with optimal resolution and acceptable sensitivity.

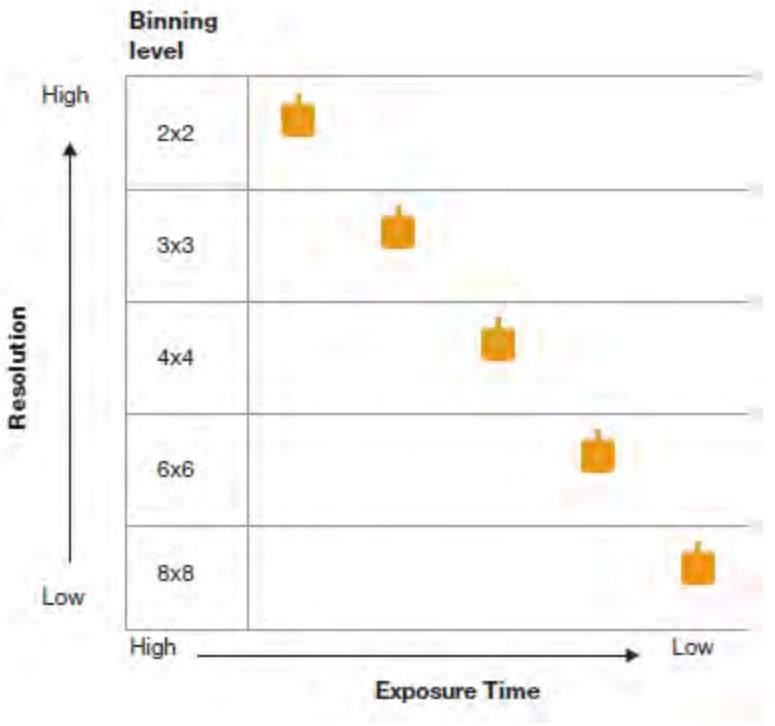


Fig. 2. Relationship between resolution and exposure time.

The two gel lanes to the right of the scale are an example of how an image looks given the selected resolution setting. As you tap on the different binning settings, the displayed lanes change to show the relationship between the resolution and sensitivity you selected.

More intense bands with higher resolution appear at the lower binning settings.

At the higher binning settings, the faint bands are more prominent but resolution is reduced.

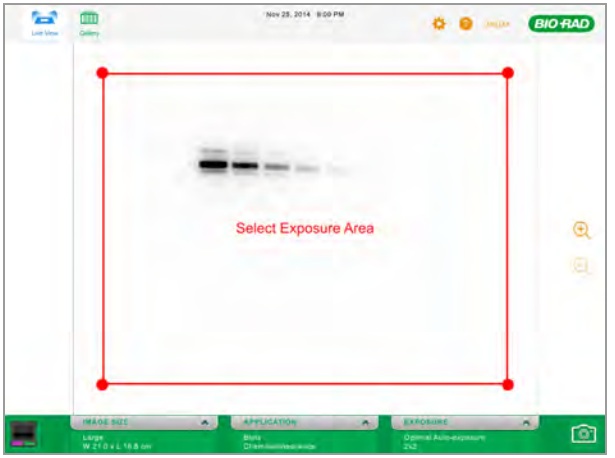
Specifying the Region of Interest for Auto Exposure

For a chemiluminescent image, you can specify the area of interest in the blot. Image Lab Touch determines the optimal auto exposure time for this area in the final image. By focusing on an area, you can decrease the exposure time.

Note: Opening the door at any time during this process returns the imager to Live View. Close the door and repeat the procedure that follows to return to a preview of the image.

To specify the region of interest in a chemiluminescent image

1. In Live View, tap EXPOSURE.
2. Tap Show Preview.



The imager generates a low-resolution image of the blot. A red rectangle surrounds the preview image.

3. Move the rectangle to specify the area of interest:
   - To resize the rectangle, touch and drag any of its corners.
   - To reposition the rectangle, touch inside the rectangle and move your finger.
   - To adjust the resolution of the preview image, use the zoom icons or stretch or pinch your fingers to zoom in or out.

Tip: If you cannot achieve an acceptable image, reposition the blot on the sample tray and repeat this procedure.

Setting the Exposure Time for a Chemiluminescent Image

You can set the exposure time for a chemiluminescent image in the following ways:

- **Automatically** — Image Lab Touch determines the optimal exposure time.
- **Manually** — you specify the exposure time.
- **By Signal Accumulation Mode (SAM)** — Image Lab Touch captures a series of images with a range of exposure times. See Configuring Signal Accumulation Mode on page 60.

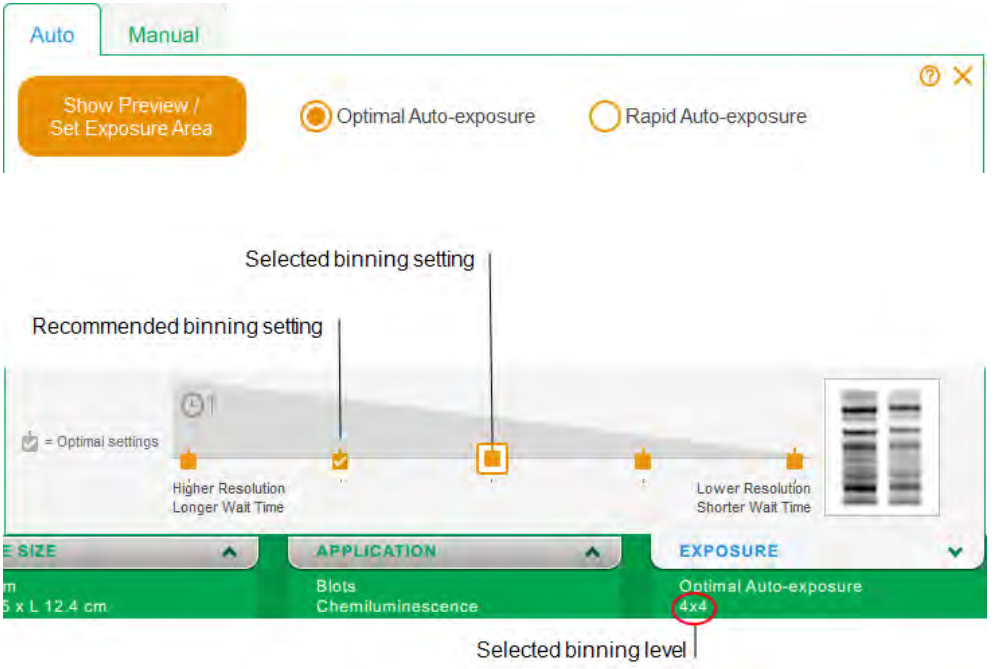
Setting the Exposure Automatically

To set the exposure for a chemiluminescent image automatically

1. In Live View, tap EXPOSURE.

   Default exposure settings appear on the Auto tab.

2. Review the recommended setting on the Image Resolution/Sensitivity scale and change the setting if necessary.



3. Tap one of the following:

   - Optimal Auto-exposure for an image that uses the full dynamic range but does not exceed saturation. ChemiDoc Touch optimizes the image for the brightest region within the selected area.
   - Rapid Auto-exposure for an image that is usable but that might not detect fainter bands. This exposure takes less time than the Optimal Auto-exposure.

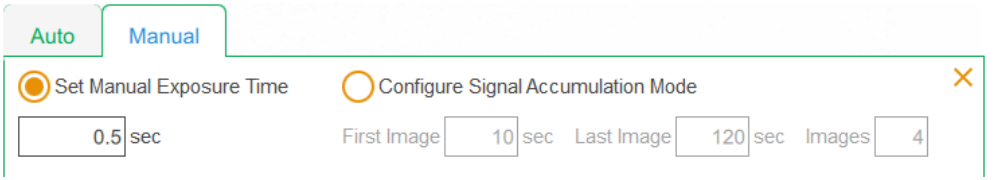
     Choose Rapid Auto-exposure when you are less interested in detecting faint bands or to get an initial image that you can use to estimate manual exposure time. Tap Image Info to get the exposure time.

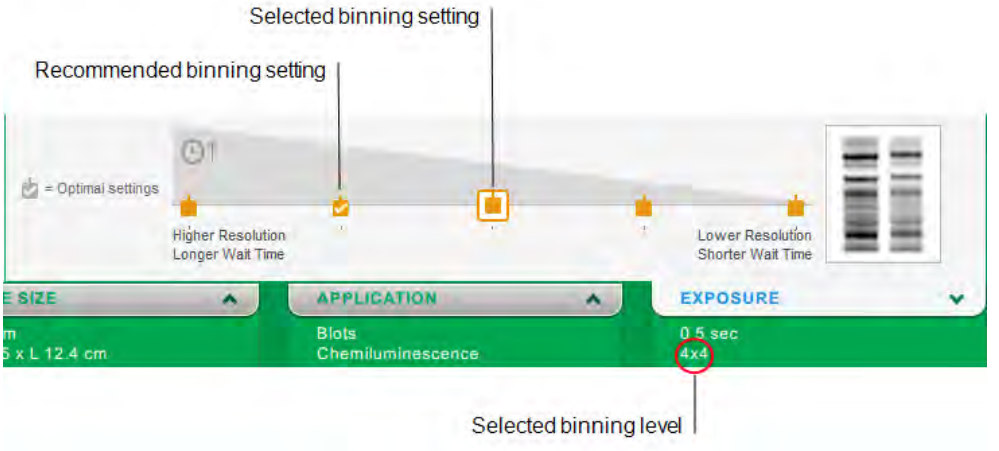
For more information, see The Image Resolution/Sensitivity Scale on page 49.

Setting the Exposure Manually

To set the exposure for a chemiluminescent image manually

1. In Live View, tap EXPOSURE.
2. Tap Manual.
3. Review the recommended setting on the Image Resolution/Sensitivity scale and change the setting if necessary.





4. Tap Set Manual Exposure Time.
5. Tap the sec (seconds) box to display the keypad.

6. Enter the exposure time in seconds.

   Note: You can use the exposure time from a Rapid Auto-exposure image to estimate this exposure time.

7. Tap Done.

For more information, see The Image Resolution/Sensitivity Scale on page 49.

Signal Accumulation Mode

Signal Accumulation Mode (SAM) makes it easier to acquire high-quality chemiluminescent images. Rather than taking a series of single images with different exposure settings, SAM produces a series of cumulative images. Each successive image includes all of the accumulated signal of the previous images, plus additional exposure time.

To calculate the SAM exposure setting, estimate the shortest and the longest exposure times you think will achieve the optimal image. Decide on the total number of images to be taken within this time range. For example, assume you want to take four images. You specify a minimum exposure time of 60 seconds and a maximum of 240 seconds. The first image is taken at 60 seconds, the last image is taken at 240 seconds, and the remaining two images are taken at even intervals in between, at 120 and 180 seconds.

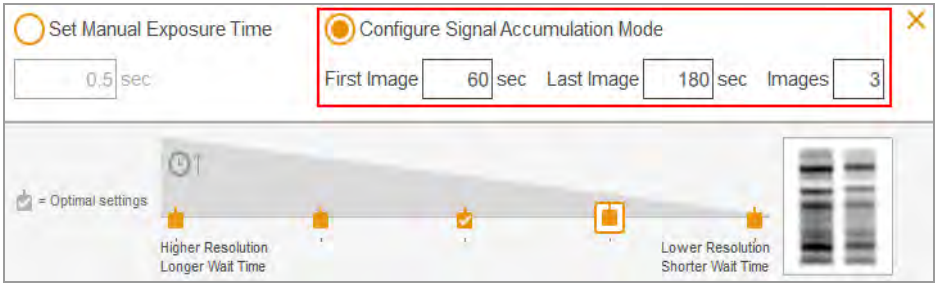
SAM is useful for determining the optimal imaging time for a chemiluminescent sample. However, the data SAM produces are not as accurate as data from a single image. Signal near the intensity of background noise becomes increasingly masked with each successive image. After you have used SAM to determine the optimal exposure time, acquire a single image of the sample using the optimal exposure to identify very faint signals in the image.

Configuring Signal Accumulation Mode

To configure signal accumulation mode

1. In Live View, tap EXPOSURE.
2. Tap Manual. Then tap Configure Signal Accumulation Mode.
3. Enter the exposure times, in seconds, in the First Image and Last Image text boxes.

   Tip: Allow a minimum of 60 seconds to acquire each image. For example, if you specify three images to be acquired, specify a minimum of 60 seconds exposure time for First Image and a minimum of 180 seconds for Last Image.



4. Enter the total number of images in the Images text box.

   Tip: The recommended total is 3–5 images.

5. Tap Done.

Acquiring Images

After you have specified the settings for the image, you can acquire the image. Be sure the transilluminator drawer is pushed in all the way and the main door is closed.

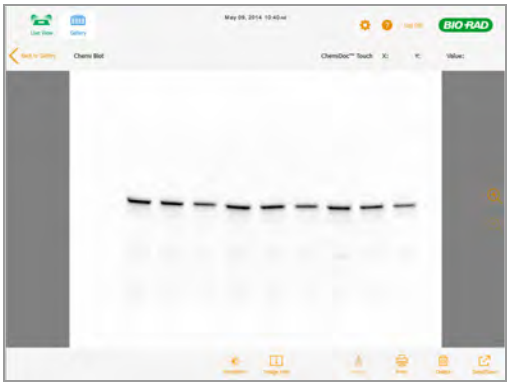
Note: When you take a series of SAM images, the main door must remain closed until all images are acquired. If the door opens during the acquisition process, an error

message appears and the acquisition is canceled. Only images acquired before the door opened are saved.

To acquire the chemiluminescent image

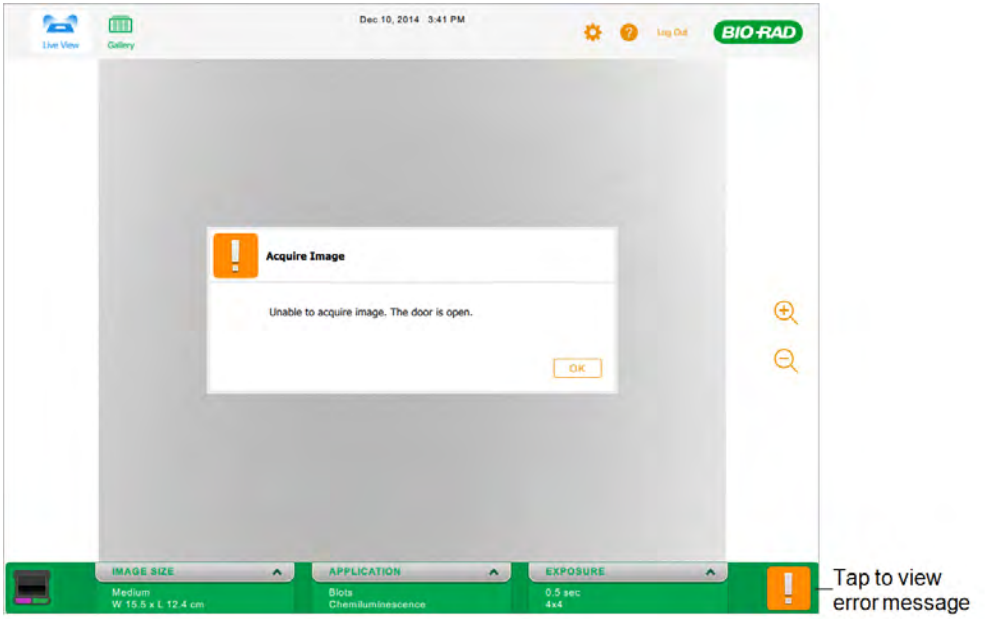
▶ Tap the Camera icon.

A progress bar monitors the image acquisition. When the image is acquired, it appears in Image View.



Now you can adjust the appearance of the image and print, rename, or delete the image. For more information, see Chapter 4, Viewing Images.

If an exclamation point appears in place of the Camera icon, a problem has prevented image acquisition. The exclamation point appears in orange or reddish brown depending on the severity of the problem. Tap the exclamation point to display the error message.



Workflow for Acquiring Gel and Blot Images

You can specify the acquisition settings at any time in the workflow, for example, before preparing the sample tray or once the tray is in the transilluminator drawer. The settings persist until you change them.

The basic steps to acquiring a gel or blot image are

- Specify the size of the image.
- Choose the application type.

- Set the exposure time.
- Acquire the image.

Specifying the Image Size

To specify the image size for a gel or blot image

1. In Live View, tap IMAGE SIZE.
2. To choose a standard size, tap Small, Medium, or Large.

   The preset sizes correspond to these Bio-Rad gels:

   - **Small** — Mini-PROTEAN®
   - **Medium** — Criterion™
   - **Large** — Wide Mini ReadyAgarose™
3. To specify a custom size, tap the W (width) or L (length) box.
4. Enter the width or length of the image (in cm) using the keypad.

   The valid width values are 9.0 to 21.0 cm. The valid length values are 7.2 to 16.8 cm.

   Note: When you enter one dimension, the software calculates the other dimension according to the imager's 5:4 aspect ratio.
5. Tap Done to save your changes and close the keypad.

Choosing the Application

If you are not sure which tray and application combination to use, see Supported Tray Types on page 20 for information on the sample trays and applications supported by the ChemiDoc Touch imager.

To choose a gel or blot

1. In Live View, tap APPLICATION.
2. Tap an application category.
3. Tap an application.

Setting the Exposure Time

To set the exposure time for a gel or blot

1. In Live View, tap EXPOSURE.
2. (For stain-free gels only) If you are imaging a stain-free gel, choose one of the following gel activation times:
   - **No Activation** — choose No Activation if you do not want to activate the gel.
   - **45 sec** — use this setting when you choose western blotting followed by immunodetection.
   - **5 min** — use this setting to detect proteins in low concentrations. This duration provides an optimal signal-to-noise ratio because the gel activation is close to completion at the end of 5 minutes.
3. Tap Set Exposure Automatically to have the software determine the exposure time.

4. Choose the bands you want optimized in the image and tap Intense Bands or Faint Bands.

   Note: To set a specific exposure time, tap Set Manual Exposure Time and enter the time in the text box.

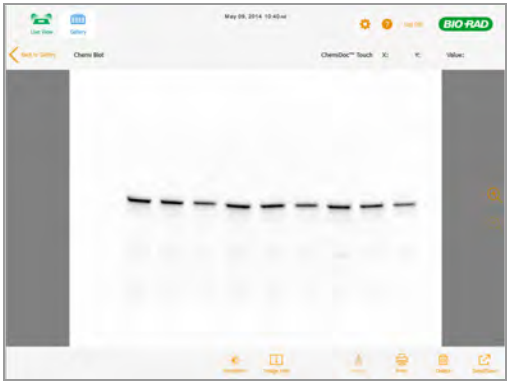
Acquiring an Image

After you specify the settings for the image, you can acquire the image. Be sure the transilluminator drawer is pushed in and the main door is closed.

To acquire the gel or blot image

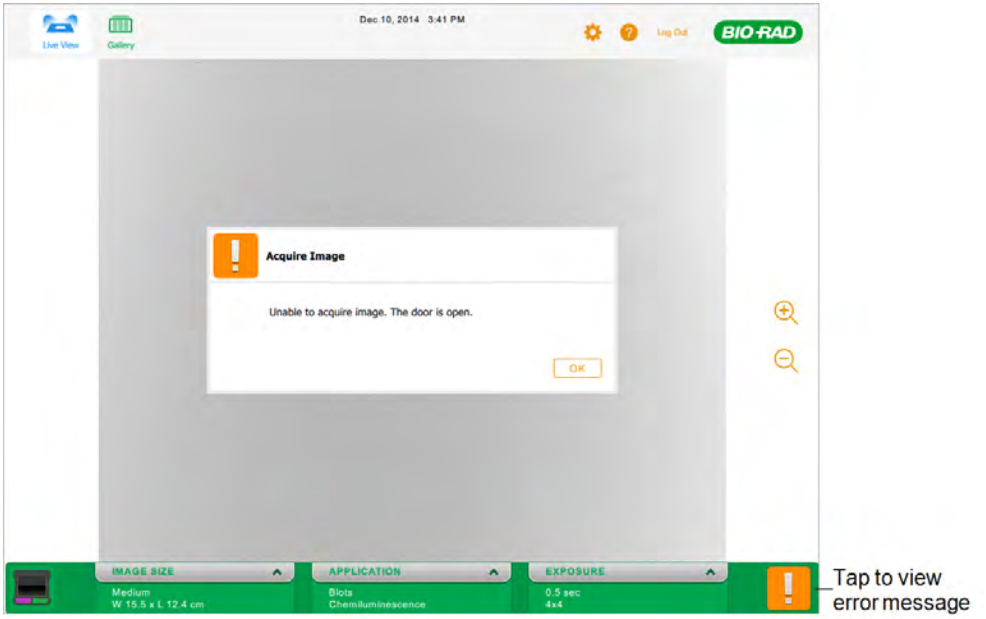
▶ Tap the Camera icon.

A progress bar monitors the image acquisition. When the image is acquired, it appears in Image View.



Now you can adjust the appearance of the image and print, rename, or delete the image. For more information, see Chapter 4, Viewing Images.

If an exclamation point appears in place of the Camera icon, a problem has prevented image acquisition. The exclamation point appears in orange or reddish brown depending on the severity of the problem. Tap the exclamation point to display the error message.



Deleting Images

You can discard unnecessary images as they are acquired.

To delete an image in Image View

1. In Image View, tap Delete.

   The software prompts you to confirm the deletion.

2. Tap OK to delete the image.

Chapter 4 Viewing Images

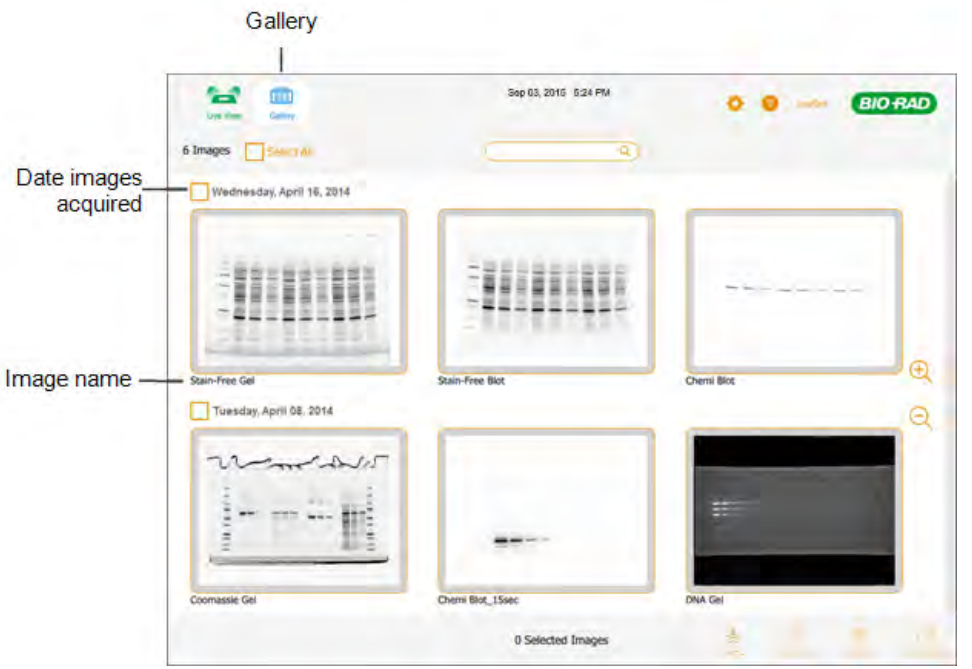
You can view images in Image View or the Gallery. In Image View you can view an image several ways. The Gallery is a view of all images acquired using the ChemiDoc™ Touch imager. The images are displayed as thumbnails organized by the date they were acquired, with the most recent acquisition date shown first.

Some tasks can be performed only in the Gallery or in Image View. Other tasks can be performed in either view.

To access the Gallery

▶ Tap the Gallery icon in the main toolbar.

A Gallery similar to the following appears.

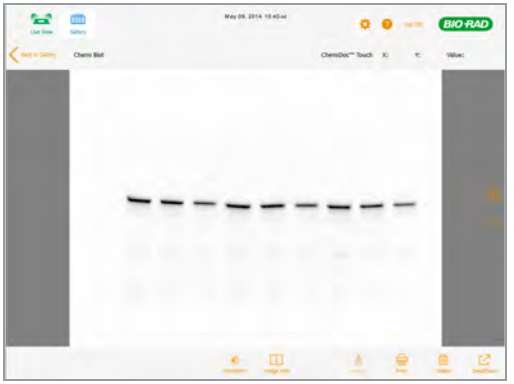


The image name appears below each thumbnail image. By default, each name consists of the date and time of acquisition, for example: 2014-02-18 18hr 30min 51sec.scn. You can change the default name in the Image Info box. For more information, see Renaming Images on page 87.

To open an image in the Gallery

▶ Double-tap a thumbnail image.

The image opens in Image View.



About Image View

In Image View, you can do the following:

- Focus on a smaller area by zooming in or focus on a larger area by zooming out.
- Pan across the image from left to right or up and down.
- Restore the image to its original view with a double tap.
- Merge two images. See About Merging Images on page 80 and Merging Images on page 85.
- Change the image appearance using the Transform feature. See See Adjusting How Images Are Displayed.
- Copy transform or zoom and pan settings from one image to other images.
- Delete the image. See See Deleting Images.

- Save the image to a USB flash drive or network drive. See Chapter 6, Exporting Images.
- View details about the image. See See Viewing Image Information.

Note: You can perform these actions on any image visible in Image View. If multiple images are visible, tap the image you want and perform the task.

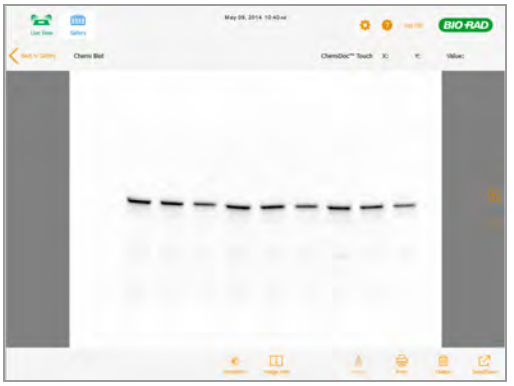
About the Gallery

In the Gallery, you can do the following:

- Open a single image in Image View. See Selecting and Opening Images in the Gallery on page 72.
- Open up to four images in Image View. See Selecting and Opening Images in the Gallery on page 72.
- Rename an image. See Renaming Images on page 87.
- Manage acquired images and delete images. See Deleting Images on page 88.
- Export the images to a USB flash drive or to a network drive. See Chapter 6, Exporting Images.
- Merge two images. See About Merging Images on page 80 and Merging Images on page 85.

Viewing Images in Image View

When you acquire an image of a gel or blot in Live View, the image appears in Image View at full size.



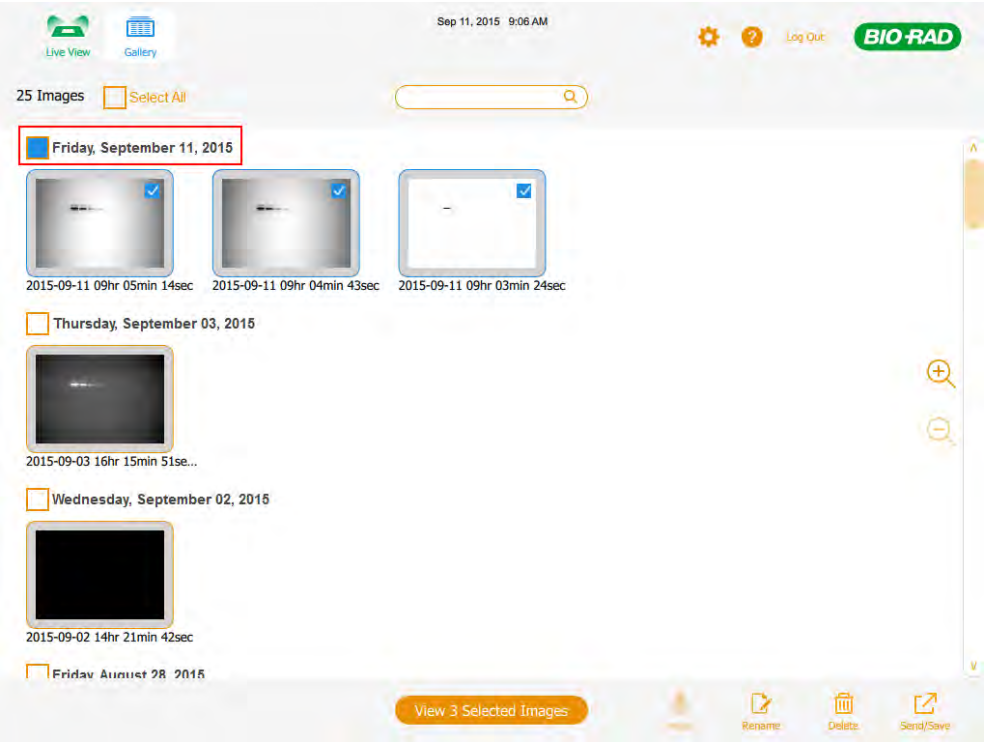
In the Gallery, you can select and open up to four images at a time. The images open in Image View.

Selecting and Opening Images in the Gallery

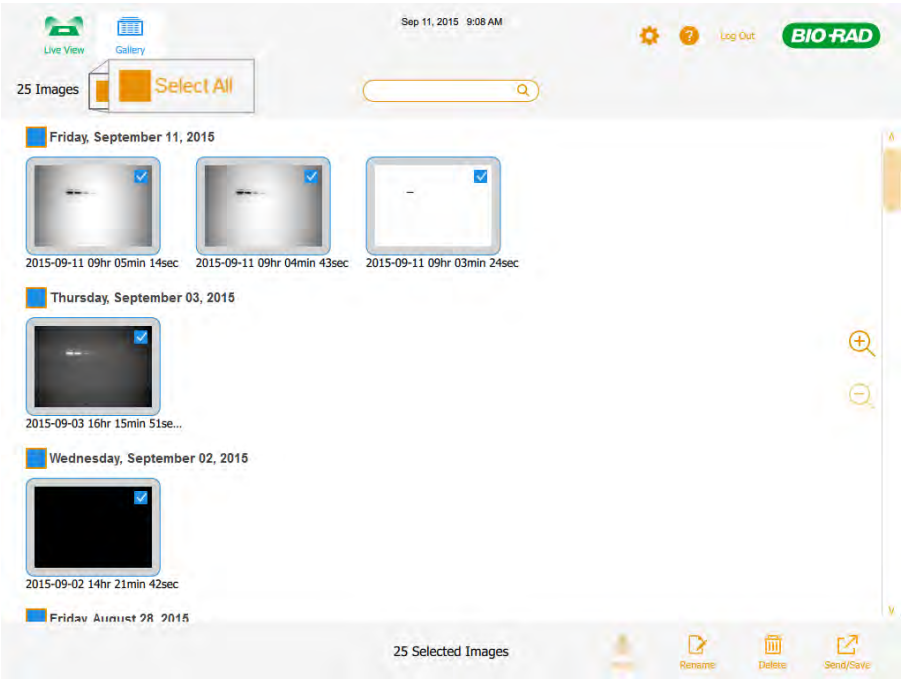
To select images in the Gallery

Do one of the following:

- To select an image and view it at full size, tap a thumbnail.
- To select all images taken on one date, tap a date checkbox.



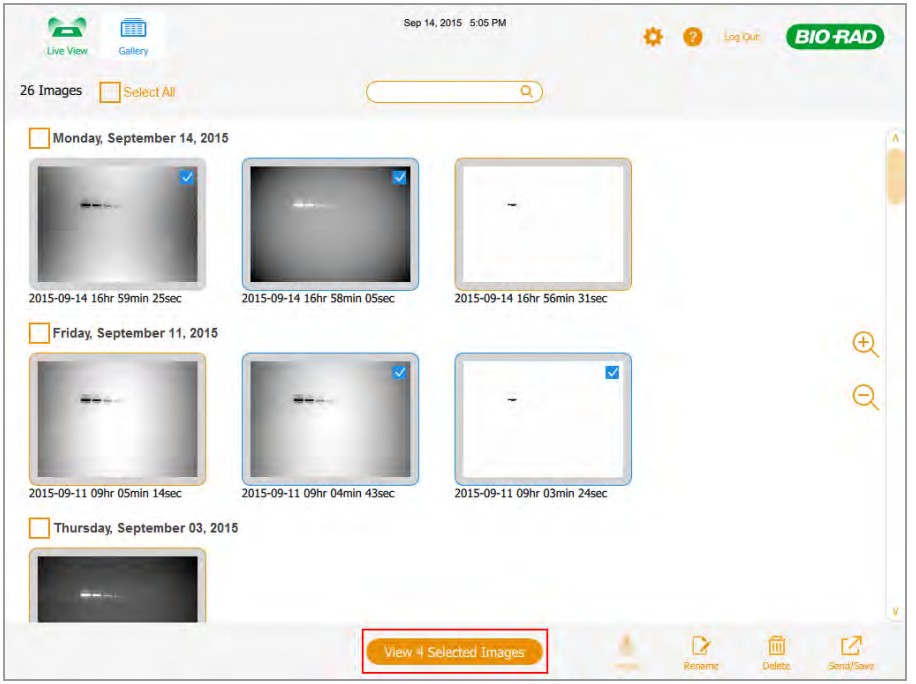
- To select all images in the Gallery, tap the Select All checkbox.



Tip: To enlarge images in the Gallery, tap the plus (+) zoom icon.

To open 1–4 images in the Gallery

▶ Select 1–4 images and tap View *x* Selected Images (where *x* is the number of images).



Adjusting How Images Are Displayed

Image Lab™ Touch software optimizes images based on the range of intensity levels in the image and the known behavior of the applications. Use this optimized image as a starting point. Use the histogram scale and the grayscale curve settings in the Transform dialog box to adjust the image brightness and contrast as necessary.

Important: The transform settings change only the *appearance* of the image, not the underlying data.

Note: Chemiluminescent images taken in SAM mode are displayed with a fixed transform so you can compare them with each other. The intensity is set to the bottom third of the full range and the gamma is set to .75. The fixed transform enables you to distinguish accurately the differences between the images in one SAM acquisition and select the best one.

Light Intensity Histogram

Transform adjusts image brightness and contrast, optimizing the image display so faint details can be seen. The minimum to maximum range varies depending on the light and dark values present in the image. Adjustments to brightness and contrast do not change the data. They change only the way the data are displayed.

The frequency distribution histogram shows the total data range in the image and the amount of data at each point in the range.

Tap Auto to return to the default setting. The lightest part of the image is set to the minimum intensity, and the darkest is set to the maximum.

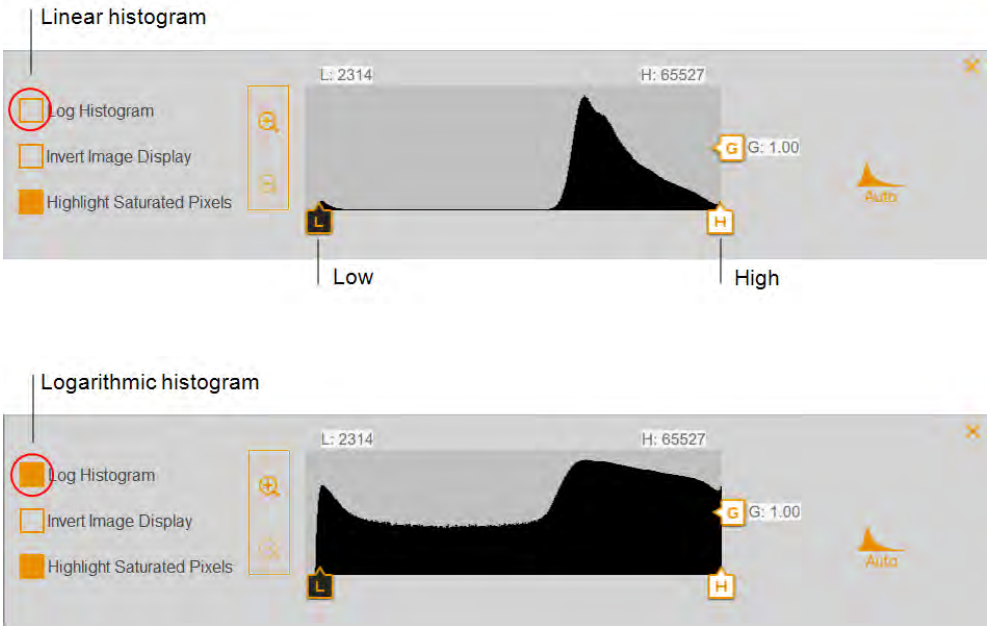
Use the Low and High sliders to narrow the displayed grayscale range.

Reducing gamma highlights the background, nonspecific binding, and faint bands. Increasing gamma reduces the background and nonspecific binding and highlights the intense bands.

- The High indicator determines which intensity value is shown at the maximum value of the gray scale in the gel image.
- The Low indicator determines which intensity value is shown at the minimum value of the gray scale in the gel image.
- The Gamma indicator changes the grayscale curve. A value of 1 is linear. A value <1 redistributes a greater proportion of the gray scale to the first half of the intensity values. A value >1 redistributes a greater proportion of the gray scale to the second half of the intensity values.

To change the histogram scale

1. Open an image in Image View and tap Transform.
2. Tap the Log Histogram box to choose the logarithmic scale.



Tip: The logarithmic histogram can reveal the presence of intensity values that are otherwise obscured. In images with a large background area, the intensity value of most of the pixels is that of the background. Often, there are too few pixels at the intensity values of the data peaks of interest to make these peaks readily visible in a linear histogram.

The linear histogram can be useful when the intensity values are more evenly distributed. Used in combination with the logarithmic histogram, the linear histogram shows more clearly the relative quantity of pixels at each intensity value.

To change the light intensity range displayed in the image

▶ Tap and drag the Low or the High slider.

- Dragging the Low slider to the right reduces the background and low-intensity bands and makes it easier to visualize high-intensity bands.
- Dragging the High slider to the left makes it easier to visualize the background, nonspecific binding, and low-intensity bands. However, dragging the High slider to the left will further darken intense bands so they appear overexposed.

To adjust the grayscale curve

▶ Tap and drag the gamma slider control or touch anywhere in the slider bar.

Other Display Options

- **Zoom in and out** — displays greater detail about the intensity range.
- **Highlight saturated pixels** — displays areas with saturated signal intensity (higher than a measurable range) in red.
- **Invert image display** — inverts dark and light areas. Clear the box to return to the original display.

Restoring Default Settings

You can adjust the light intensity range and grayscale settings to enhance the contrast in images that have faint bands. After changing the intensity and contrast, you can return to the default settings.

To return to the default settings

▶ Tap Auto.

Checking Intensity Values

You can check intensity values by tapping the image area of interest. X and Y coordinates identify the location. The value is the average intensity of the pixels in a 3 x 3 pixel area. When you zoom in to an area of the image, you can check intensity values to identify the size of the image detail and its location in the overall image. Intensity values provide more accurate information about the dynamic range than you can determine by visually inspecting the image.

About Merging Images

A merged image consists of two images of the same sample combined into a single image. A common example is the combination of a colorimetric image of prestained standards with a chemiluminescent image of the same blot.

You can use the merged image to estimate the molecular weight or size of proteins on the chemiluminescent blot. However, do not use the merged image for other types of data analysis.

To estimate molecular weight accurately using a merged image, the images you merge must be the same size and you must not move the sample between individual image acquisitions.

Important: If quantitation must be accurate, export the original separate images to a computer running Image Lab™ software and analyze them using that program.

Tip: You can select up to four images in the Gallery, switch to Image View, closely compare them, and then choose two for merging.

Note: You can merge two images with the same binning setting or merge one image with a 1x1 binning setting and another image with any binning setting. However, you cannot merge two images with any other combinations of binning settings. For more information about binning, see The Image Resolution/Sensitivity Scale on page 49 .

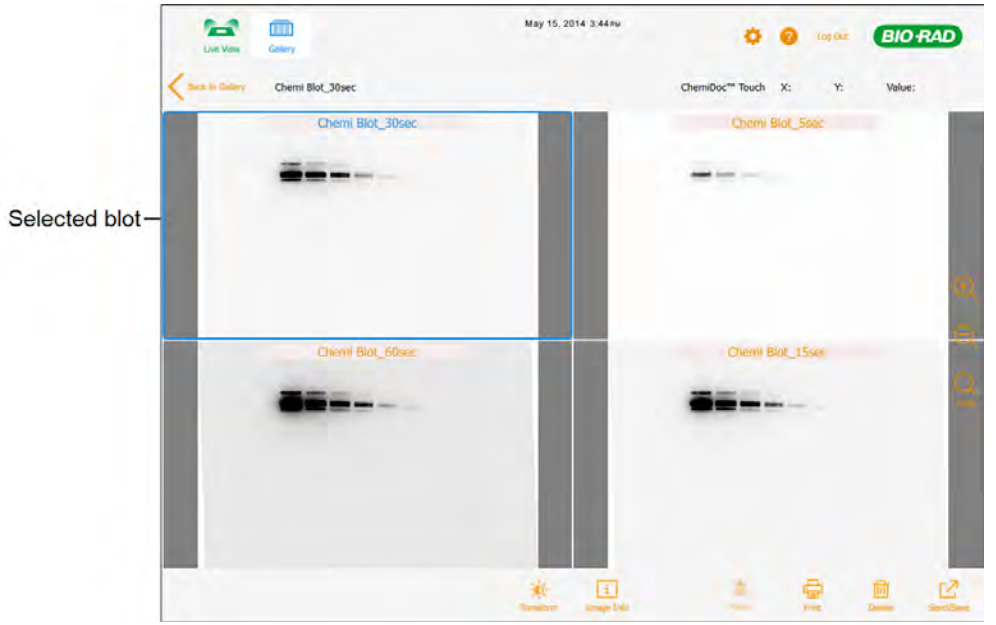
For more information, see Merging Images on page 85.

Comparing Images

You can open and compare up to four images of a gel or blot at a time in the Gallery.

The selected images appear in Image View. Each image is labeled with its name. A blue border surrounds the currently selected image.

For more information, see To open 1–4 images in the Gallery on page 74.

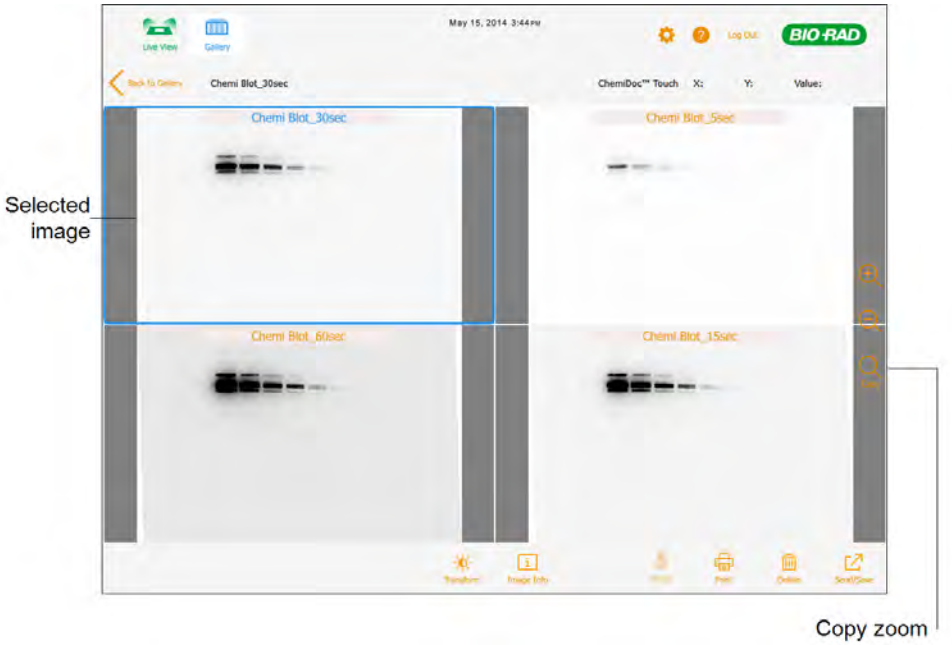


Tip: It is easier to compare images with identical transform and zoom settings. You can copy the settings from one image to the others.

To copy zoom settings to the other images

1. In the Gallery, select the image whose zoom settings you want to copy.
2. Select 1–3 other images to which you want to copy zoom settings.
3. Click View *x* Selected Images where *x* is the number of images selected.
4. In Image View, select the image whose zoom settings you want to copy.
5. Tap Copy Zoom on the right side of the screen.

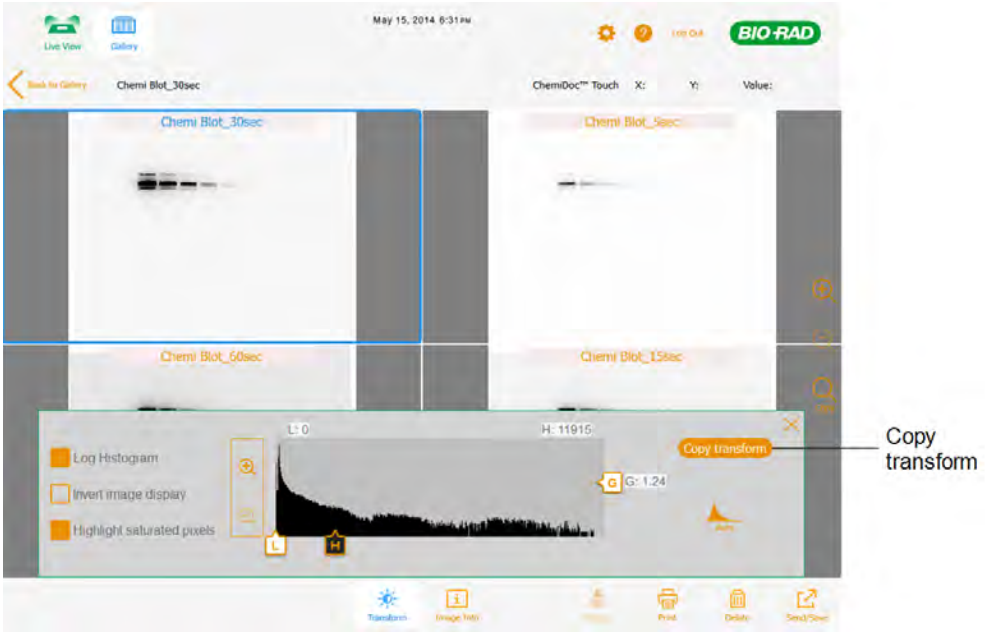
   The pan and zoom settings of the selected image are copied to the other images.



To copy transform settings to the other images

1. In the Gallery, select the image whose transform settings you want to copy.
2. Select 1–3 other images to which you want to copy transform settings.
3. Tap View *x* Selected Images where *x* is the number of images selected.
4. In Image View, select the image whose transform settings you want to copy.
5. Tap Transform.
6. Tap Copy Transform.

   The transform settings of the selected image are copied to the other images.



As you tap each image, the Transform dialog box automatically displays the transform settings for that image. You need not close the dialog box between selections.

Searching for Images in the Gallery

When you acquire so many images that you cannot view them in the Gallery without scrolling, you can search for the image you want to view.

To search for an image

1. Tap the search box to display the keyboard.
2. Enter search text.

   You can enter any portion of the date or name. Case does not matter. As you enter the search text, images that match the text appear in the Gallery.

   Note: To return to viewing thumbnail images of all acquired images organized by the date they were acquired, clear the search box.
3. When you have found the images you want, tap Done.

Printing Images

You can print an image in Image View to the Mitusbishi P95 printer right after you acquire it. You can also print previously acquired images in the Gallery.

Before you begin, verify the following:

- The printer is connected to the imager and is turned on.
- The page orientation is set to Landscape.

To print an image

1. Acquire an image or open an image in the Gallery.
2. Tap Print.

Merging Images

A merged image consists of two images of the same sample combined into a single image. You can merge two images in the Gallery or in Image View.

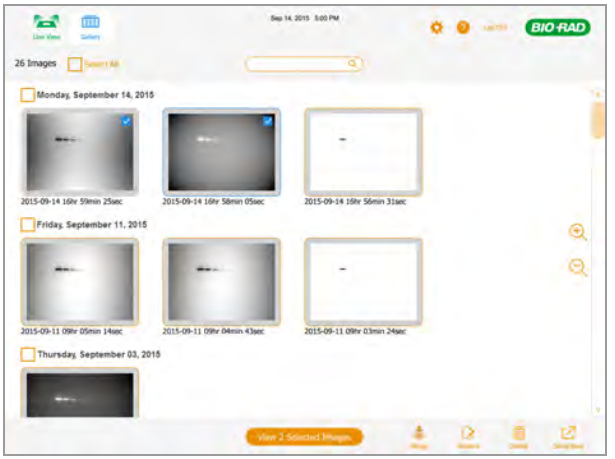
Tip: You can select up to four images in the Gallery, switch to Image View, closely compare them, and then choose two for merging.

Note: You can merge two images with the same binning setting or merge one image with a 1x1 binning setting and another image with any binning setting. However, you cannot merge two images with any other combinations of binning settings. For more information about binning, see The Image Resolution/Sensitivity Scale on page 49.

For more information about merging images, see About Merging Images on page 80.

To merge images in the Gallery

1. Select two images.



2. Tap Merge.

To merge images in Image View

▶ Display two images in Image View and tap Merge.

Naming Merged Images

The system names the merged image by combining the names of both images separated by a plus sign:

Example

2015-04-30 17hr 26min 19sec+2015-04-30 17hr 27min 24sec

If the name is already in use in the Gallery, the system generates another name by adding a hyphen and an incremental number (starting at 1) to the end of the combined name. The system continues to incrementally raise the number it is adding (-2, -3, -4 and so on) until the name is unique.

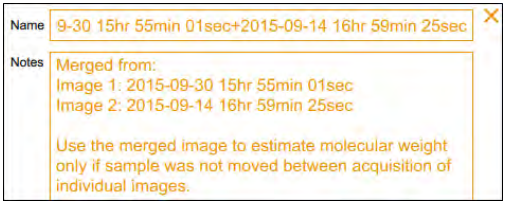
Example

2015-04-30 17hr 26min 19sec+2015-04-30 17hr 27min 24sec-1

The system stores the name of the merged image and the two source images.

To view the names of the source images

▶ In Image View, open the Image Info box for the merged image.



To rename the merged image, see Renaming Images on page 87.

Renaming Images

When you acquire an image, the system assigns it a default name.

An image name can consist of 190 alphanumeric characters. Spaces are permitted except at the beginning and end. The following characters cannot be used:

\ / : * ? “ < > |

Case does not matter.

To rename an image in the Gallery

1. Select an image.
2. Tap Rename.
3. In the dialog box, enter a name for the image.
4. Tap OK.

To rename multiple images in the Gallery

1. Select more than one image.
2. Tap Rename.
3. In the dialog box, enter a name for the first image.
4. Tap OK.

   The system labels the remaining images with the same name as the first image plus a consecutive number. For example: ChemiBlot_1, ChemiBlot_2, and so on.

To rename an image in Image View

1. In Image View, tap Image Info.
2. In the Image Info dialog box, tap the Name box.

   A keyboard appears.

3. Triple-tap the Name box to select the entire image name and then type the new name.
4. Tap OK to save the image name.
5. Tap X to close the window.

Deleting Images

You can delete Images in the following ways:

- In the Gallery, you can delete multiple images at one time.
- In Image View, you can delete any open image.

In the Gallery, you delete images to manage the number of images stored on the ChemiDoc Touch imager.

To delete an image from the Gallery

1. In the Gallery, select the images to delete in one of the following ways:
   - Tap one or more thumbnails.
   - Tap the checkbox for one or more days to select all thumbnails for those days.
   - Tap Select All to select all thumbnails in the Gallery.
2. Tap Delete.

   The Delete Image prompt appears.
3. Tap OK to delete the selected images.

To delete an image in Image View

1. Do one of the following:
   - If one image is open in Image View, tap Delete.
   - If more than one image appears in Image View, select the image you want to delete and tap Delete.
2. To confirm the deletion, tap OK.

Viewing Image Information

The Image Info dialog box displays information such as the image name, the acquisition's exposure duration and date, and the application type. You can add more information about the image and change the name.

To view information about the image

▶ In Image View, tap Image Info.

The Image Info box appears.

Adding Notes to an Image

To add information about the image

1. In Image View, tap Image Info.
2. In the Image Info dialog box, tap the Notes box.

   A keyboard appears.
3. Type your information.
4. Tap OK to save the information and close the keyboard.
5. Tap X to close the dialog box.

Chapter 5 Excising Bands

Excising Bands from Samples

You can excise bands of interest from agarose or acrylamide gels for applications such as mass spectrometry or DNA cloning.

The procedure for excising bands varies depending on the sample tray you use. To excise bands on a white or blue tray, see Excising Bands on a White or Blue Tray on page 97.

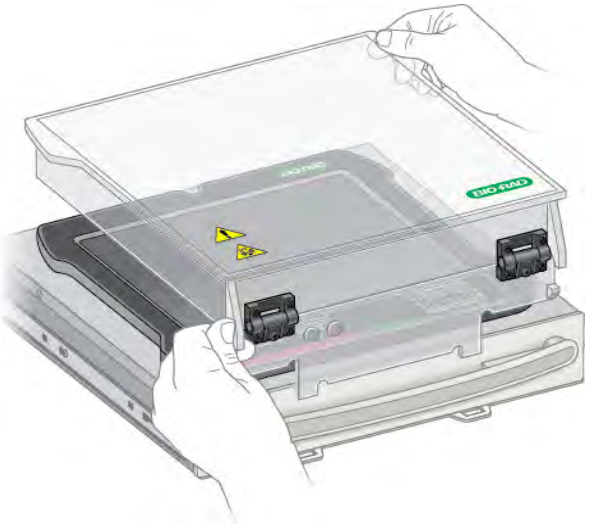
Excising Bands on a Chemi/UV/Stain-Free Tray

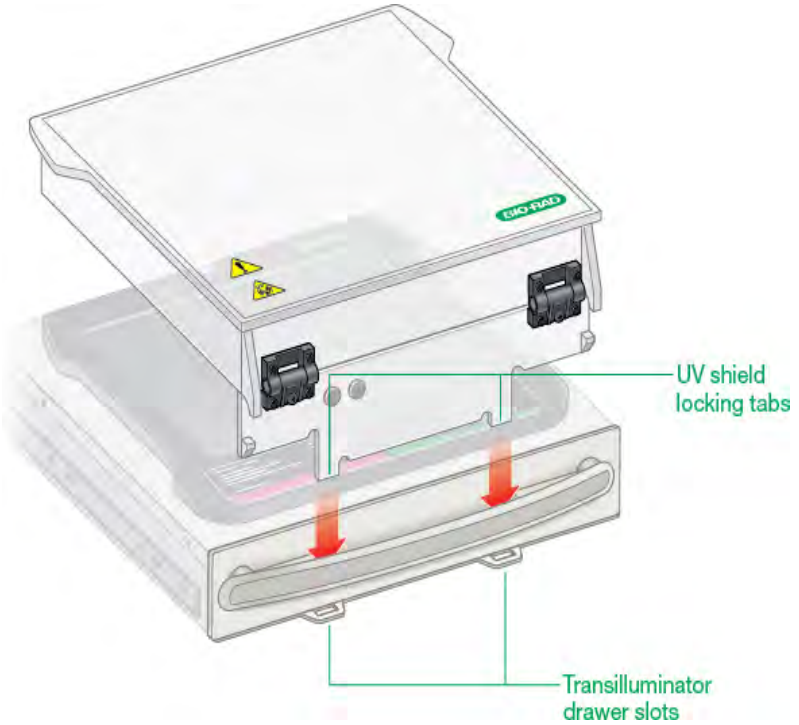
WARNING! Transilluminators are powerful sources of UV radiation, which can cause serious damage to unprotected eyes and skin. The accessory UV shield (catalog #1708375) provides some UV protection. However, this shield does not protect others standing in the area around the imager. Before performing band excision, the user and other lab personnel in proximity to the imager must put on protective gear including UV protective safety glasses, a face shield, lab coat, and gloves to ensure that no skin is exposed. A typical and reasonable expectation of use is three operations per user a day for three minutes each. Bystanders without protective gear must stand at least 1.5 meters (five feet) away from the imager and limit their exposure to no longer than one hour per day.

Important: Before excising bands, you must install the UV shield.

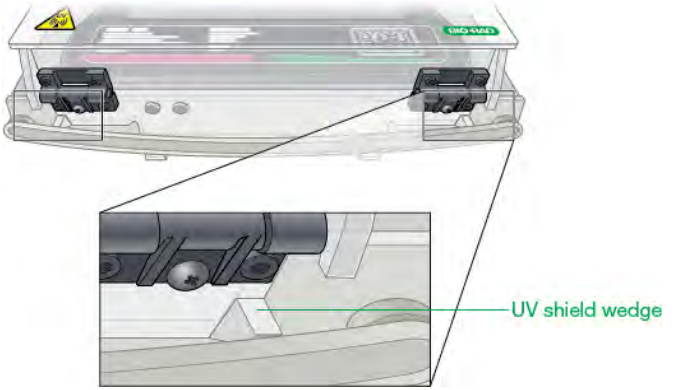
To install the UV shield

1. Open the imager front door and pull out the transilluminator drawer.
2. Place a UV tray on the transilluminator drawer.
3. Hold the UV shield by diagonal corners so you can guide it accurately.





4. Insert the two locking tabs that extend from the front of the UV shield into the two slots on the front of the transilluminator drawer.



5. Ensure that the two wedges on the front of the UV shield snap into position on the transilluminator handle.

   The installed UV shield should look like this:

Important: Before you begin excising bands, you must put on the required protective gear and ensure that the UV shield is installed.

The UV lights turn off after 15 minutes of continuous use. To turn the UV lights back on, tap Turn Transilluminator On.

To excise bands on a Chemi/UV/Stain-Free tray

1. To avoid damaging the surface of the sample tray, place a sheet of clear glass or plastic on the tray before you add the gel sample.
2. Place a gel sample in the center of the tray.
3. With Live View on the screen, tap Turn Transilluminator On.

   Turn Transilluminator On changes from green to blue and the UV lights turn on, illuminating the gel.

   Note: The UV lights turn on only when both the sample tray and the UV shield are in place. If the lights do not turn on, verify that the UV shield is installed correctly.
4. Raise the UV shield no more than is necessary to work with the sample.

WARNING! Keep the UV shield open for as little time as possible.

5. Reach around the sides of the shield to excise the bands.

Caution: Sharp cutting tools can easily damage the surface of the trays.Use a *chopping* motion rather than a *sawing* motion.

6. When you finish excising the bands, tap Turn Transilluminator Off to turn off the UV lamps.
7. Close the UV shield.
8. Remove the UV shield, remove the sample tray, slide in the transilluminator drawer, and close the main door.

Excising Bands on a White or Blue Tray

Working with white and blue trays does not require using the UV shield or wearing protective gear. However, you must wear yellow XcitaBlue™ goggles to see bands on a blue tray.

Caution: Sharp cutting tools can easily damage the surface of the trays. To avoid this, place a sheet of clear glass or plastic on the tray before you add the gel sample. Use a *chopping* motion rather than a *sawing* motion.

To excise bands on a white or blue tray

1. Place a gel sample in the center of the tray.
2. With Live View on screen, tap Turn Transilluminator On.

   The transilluminator turns on, illuminating the gel.

   Note: The lights turn on only when the sample tray is in place.
3. Excise the bands.
4. When you finish excising the bands, remove the sample tray and tap Turn Transilluminator Off.
5. Slide in the transilluminator drawer and close the main door.

Chapter 6 Exporting Images

On the ChemiDoc™ Touch imaging system, you use Image Lab™ Touch software to view images, make changes to improve how the images are displayed, and generate printouts.

For more detailed analysis, you can export images and copy them to a computer running Image Lab™ software and use Image Lab features to analyze them. For more information about image analysis, see the Image Lab Software User Guide.

You can export images from the ChemiDoc Touch imaging system to one of the following:

- Flash drive or external hard drive
- Shared folder on a network drive or stand-alone computer

For more information about sharing folders, see the following:

- For the Windows environment, see Share files with someone: http://windows.microsoft.com/en-us/windows/share-files-with-someone#1TC=windows-7
- For the Mac environment, see Mac Basics: File Sharing: http://support.apple.com/en-us/HT1549

Exporting to a USB Flash Drive or External Hard Drive

Note: The flash drive or external hard drive must meet the following requirements:

- Supports USB 2.0 or above
- Is recognized on a formatted Windows computer
- Has no encryption software or other software add-ons on the drive

Image Lab Touch exports images to a folder created on the flash drive or external hard drive with the name *Chemidoc Touch Images* followed by a time stamp of the image export, for example, Chemidoc Touch Images 2015-04-29_19.08.51.

To export images to a USB flash drive or external hard drive

1. Insert a USB flash drive in or connect an external hard drive to the ChemiDoc Touch USB port.
2. Do one of the following:
   - Navigate to Image View by acquiring an image or by opening an image in the Gallery.
   - Select the images you want to export in the Gallery.
3. Tap Send/Save.
4. Tap Save to USB Drive.

   A progress bar monitors the image export.
5. When the export is completed, tap OK.

Exporting to a Shared Folder

Before exporting images to a shared folder on a network drive or stand-alone computer, obtain the following information:

- The UNC path to the shared folder on the network drive or stand-alone computer
- Log-in credentials to the shared folder

If the ChemiDoc Touch imager is connected to a stand-alone computer, see Exporting to a Shared Folder on page 117.

To export images to a shared folder

1. Verify that the ChemiDoc Touch imager is connected via an Ethernet cable to a network outlet or to a stand-alone computer.
2. Do one of the following:
   - Select the images you want to export in the Gallery.
   - Navigate to Image View by acquiring an image or opening an image in the Gallery.
3. Tap Send/Save.
4. Tap Save to Network.

   The Save to Network dialog box appears.

Recent Locations displays the ten most recent network locations or shared folders on a stand-alone computer where images have been saved, with the most recent location listed first.

5. Type the pathname to the shared folder on the network drive or stand-alone computer in the appropriate form for your system, or select it from the Recent Locations list.

   Windows: \\<server or computer name>\<file_path_to_shared_folder>

   Example

   \\LAB021\Team\Alpha\Share

   Mac: /<IP address>/<file_path_to_shared_folder>

   Example

   /22.231.113.64/Team/Alpha/Share

6. (Optional) Delete a network location by tapping a location and then tapping Remove.
7. Tap Save.
8. If a log-in dialog box appears, enter the log-in credentials to the shared folder.

For a network drive, type the network domain name, your user name on the domain, and your domain password. Type the domain and user name in the form *domain_name\username*. Example: Global.xyz.com\jsmith.

9. Tap OK.

   A progress bar monitors the image export.

10. When the export is complete, tap OK.

    Image Lab Touch exports the images to a folder at the top level of the specified location with the name *Chemidoc Touch Images* followed by a time stamp of the image export, for example, Chemidoc Touch Images 2015-04-29_19.08.51.

Disconnecting from a Shared Folder

The imaging system remains connected to a shared folder on a network until you log out or turn off the imaging system, or until the network disconnects you.

Appendix A Maintaining the Imaging System

Updating Image Lab Touch Software

Updates of Image Lab™ Touch software are delivered on a USB flash drive. Before you start the update, complete any image acquisitions or image exports in progress.

Important: Start Image Lab Touch software *before* you insert the USB flash drive into the USB port.

To update Image Lab Touch

1. Log in to Image Lab Touch.
2. Insert the USB flash drive into the USB port above the imager main door.

   A dialog box displays the current software version and the software update version.
3. (Optional) If the dialog box does not appear, tap Settings. Then tap Update Installation.
4. Tap OK.

   The installer updates the imager with the latest version of Image Lab Touch.

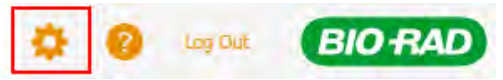
   When installation is complete, Image Lab Touch restarts and the login screen appears.

Reinstalling Image Lab Touch

Reinstall Image Lab Touch when software problems appear to be due to a flawed installation or corrupted files. Complete any image acquisitions or image exports before you begin.

To reinstall Image Lab Touch

1. Insert the USB flash drive into the USB port above the imager main door.
2. Log in to Image Lab Touch.
3. Tap Settings in the main toolbar.



4. Tap Update Installation.

   A dialog box displays the current software version and the software update version.

5. Tap OK.

   When installation is complete, Image Lab Touch restarts and the login screen appears.

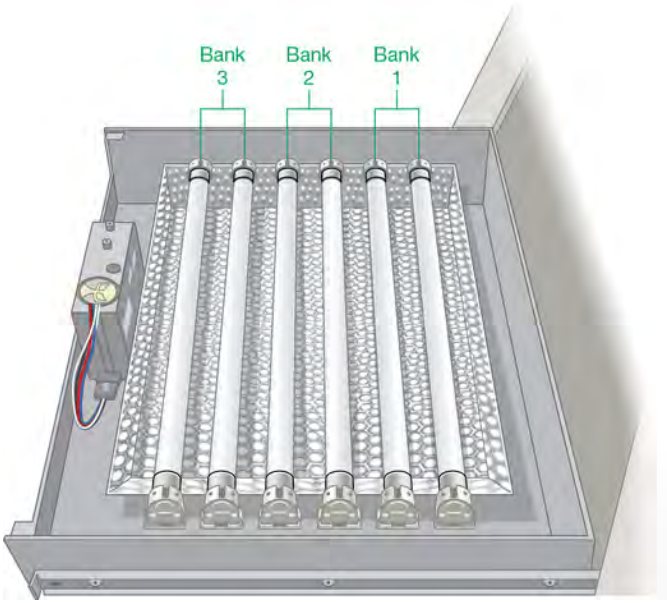
About the UV Transilluminator Bulbs

Use 302 nm standard transilluminator bulbs with the imager. (See Appendix B, Ordering Information for the catalog number.)

Depending on the amount of use, the UV bulbs can last for many years. An error message appears when one or more of the bulbs must be replaced.

When Transilluminator Bulbs Fail

The six bulbs are organized into three groups of two and are identified as Bank 1, Bank 2, and Bank 3. When a transilluminator bulb fails, an error message identifies the failed bank of bulbs.



Replacing the UV Transilluminator Bulbs

One or more transilluminator bulbs can fail at any time. Bio-Rad recommends that you replace all six bulbs, including those that still work. Replacing all bulbs at once ensures consistent light over the imaging stage.

To replace the transilluminator bulbs, use a 2.5 mm hex wrench.

Important: Transilluminator bulbs contain heavy metals, including mercury. Do not throw used bulbs in the trash. Dispose of them in accordance with local recycling and disposal guidelines.

To replace the bulbs

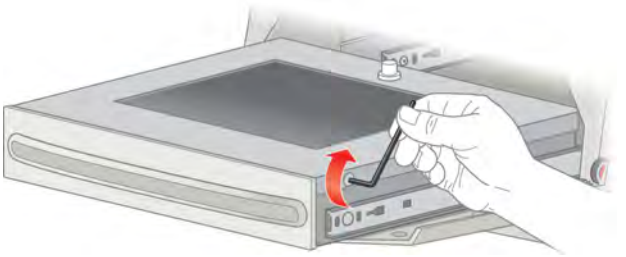
1. Turn off the power to the imager.
2. Disconnect the AC power cord from the imager.

3. Open the main door and pull the transilluminator drawer out completely.

   Tip: Use the drawer slide release levers to extend the drawer further and clear the opening. This makes it easier to remove the transilluminator cover.

   The levers are located on both sides of the drawer in the drawer slide release mechanism that slides the drawer in and out. Push the lever on the left side down, push the lever on the right side up, and pull. The drawer will extend another centimeter.

4. Loosen the four screws (two on each side) of the transilluminator cover.



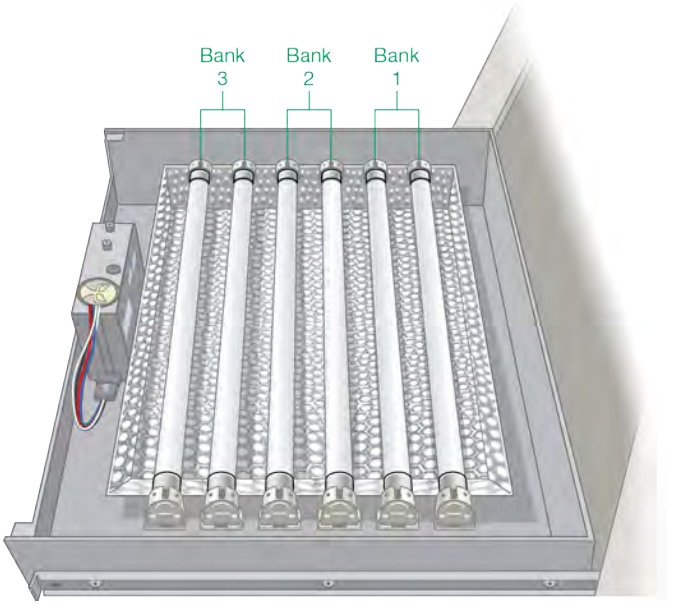
   Tip: Leave the loosened screws in the cover to avoid misplacing them.

5. Remove the transilluminator cover by sliding it forward and then lifting it.

   Note: Do not place the transilluminator cover directly on the bench.

6. Place the cover on a nonabrasive surface to avoid scratching or damaging the UV filter glass.

   Important: Exercise caution when touching the lamps. They can be hot.



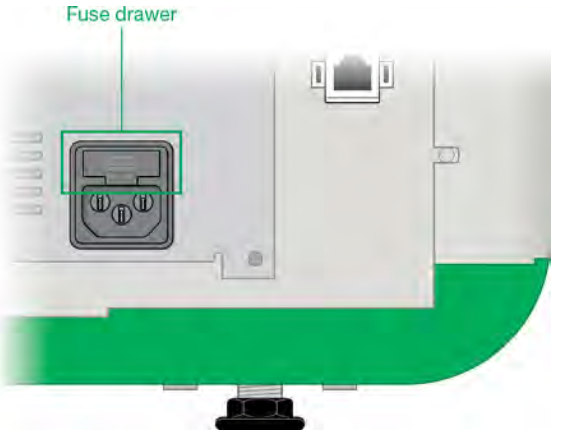
7. Rotate a lamp until it loosens and the pins are vertical and aligned with the socket.
8. Remove the lamp.
9. Install the new lamp by setting it in place and rotating it until the pins are seated and horizontal.
10. Set the transilluminator cover on the drawer. Secure the cover to the drawer with the screws.

Replacing the Fuses

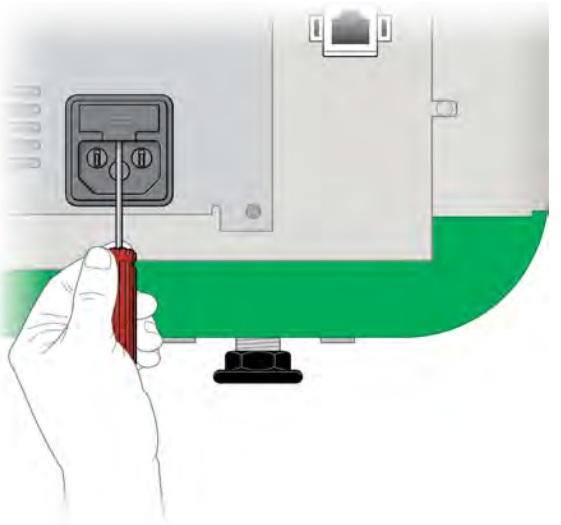
To replace the fuses

1. Unplug the power cord from the back of the instrument.

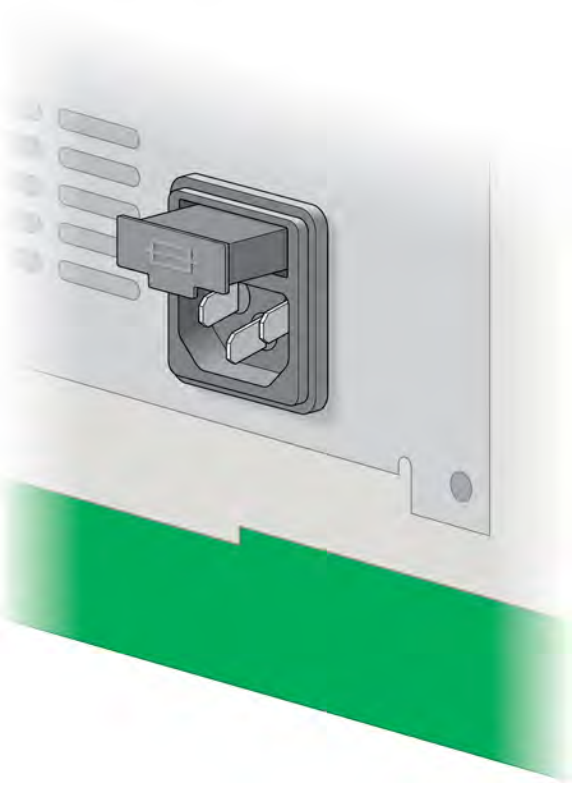
   The fuse drawer sits above the power plug.



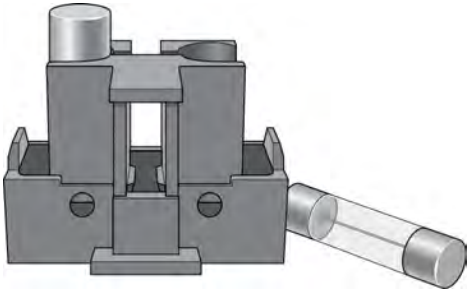
2. Insert the tip of a screwdriver as far as it will go under the center of the fuse drawer.



3. Tug hard on the screwdriver to open the fuse drawer.
4. Remove the drawer from the power module.



5. Remove the fuses from the drawer and inspect them to determine whether they should be replaced.



6. Snap new fuses into place.
7. Push the fuse drawer in until it snaps into place.

Appendix B Ordering Information

Catalog #	Description
1708370	ChemiDoc™ Touch Imager with Image Lab™ Touch Software
Optional Software	
1709690	Image Lab Software
1709691	Image Lab Software, Security Edition, 1 license
1709692	Image Lab Software, Security Edition, 5 licenses
1709693	Image Lab Software, Security Edition, 10 licenses
ChemiDoc Touch Trays	
1708374	Chemi/UV/Stain-Free Tray
1708372	White Tray
1708373	Blue Tray
Optional Accessories	
1708375	ChemiDoc Touch UV Shield
1708377	Holder for Sample Trays and UV Shield
1708185	XcitaBlue™ Viewing Goggles
1708376	Gel Alignment Template Kit
1708089	Mitsubishi Printer, 100/240 V, USB

Catalog #	Description
1703759	Bio-Rad Fluorescent Ruler
1703760	Gel Cutter Ruler
1708378	ChemiDoc Touch IQ/OQ protocols
Replacement Parts	
1001361	UVB Lamp, 302 nm, 1 each
10026840	Fuse, 8 A, 250 V, 5 x 20 mm, 1 each
1708097	302 nm Lamp Kit, 6 lamps
1707581	Mitsubishi Thermal Printer Paper, 4 rolls
Nucleic Acid Standards	
1708351	EZ Load™ 20 Base Pair Molecular Ruler
1708352	EZ Load 100 Base Pair Molecular Ruler
1708353	EZ Load 100 Base Pair PCR Molecular Ruler
Protein Standards	
1610373	Precision Plus Protein™ All Blue Standards
1610363	Precision Plus Protein Unstained Standards
1610385	Precision Plus Protein™ WesternC™ Pack
Buffers	
1610732	10x Tris/Glycine/SDS
1610747	4x Laemmli Sample Buffer
Electrophoresis Cells	

Catalog #	Description
1656001	Criterion™ Cell, includes electrophoresis buffer tank, lid with power cables, 3 sample loading guides
1658004	Mini-PROTEAN® Tetra Cell for Mini Precast Gels, 4-gel vertical electrophoresis system, includes electrode assembly, companion running module, tank, lid with power cables, mini cell buffer dam
Blotting System	
1704155	Trans-Blot® Turbo™ Starter System, blotting instrument, includes base, 2 cassettes to hold 1–2 midi or up to 4 mini blotting sandwiches, blot roller, and starter consumable kit
1704156	Trans-Blot Turbo Transfer Pack, mini, PVDF, pkg of 10
170-4157	Trans-Blot Turbo Transfer Pack, midi, PVDF, pkg of 10
1704158	Trans-Blot Turbo Transfer Pack, mini, nitrocellulose, pkg of 10
1704159	Trans-Blot Turbo Transfer Pack, midi, nitrocellulose, pkg of 10
1704270	Trans-Blot Turbo RTA Transfer Pack, mini, nitrocellulose
1704271	Trans-Blot Turbo RTA Transfer Pack, midi, nitrocellulose
1704272	Trans-Blot Turbo RTA Transfer Pack, mini, PVDF
1704273	Trans-Blot Turbo RTA Transfer Pack, midi, PVDF
1704274	Trans-Blot Turbo RTA Transfer Pack, mini, LF PVDF
1704275	Trans-Blot Turbo RTA Transfer Pack, midi, LF PVDF
Detection Reagents	
1705060	Clarity™ Western ECL Substrate, 200 ml
1705061	Clarity Western ECL Substrate, 500 ml

Appendix C Exporting to a Shared Folder

To export images to a stand-alone computer you must have a shared folder set up on that computer. This appendix explains how to create the shared folder and obtain the UNC paths to the folder.

Unix-based computers (Mac, Linux) use the SMB (Server Message Block) to communicate with the imager when sharing files. The Mac version of the UNC path is the SMB address that uses the IP address.

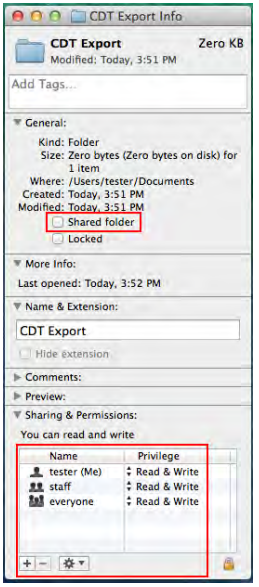
After creating the shared folder, follow the instructions in Exporting Images on page 99.

Note: The procedures in this appendix are based on Windows version 7 and Mac version 10.8. If you are running a different operating system version, you might notice differences in the user interfaces. The procedures, however, are accurate.

To create a shared folder on a Mac computer

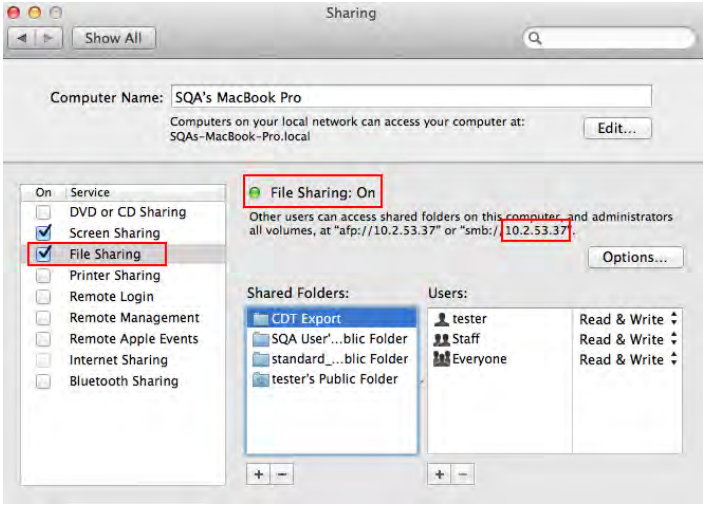
1. Log in as the Administrator.
2. Create a destination folder.
3. Click the folder and choose Get Info in the menu that appears.

   The <*folder name*> Info dialog box appears.
4. Select Shared Folder.



5. In the Sharing & Permissions box, verify that the user you want to share the folder with has permission to read and write to this folder.
6. On the Apple menu, open System Preferences and select File Sharing.

   The Sharing dialog box appears.



7. Select File Sharing in the Service pane.
8. Under File Sharing: On, find the SMB address and write it down.

   You will use the IP address when the imager prompts for a location before you export an image. See Exporting to a Shared Folder on page 101.
9. Click Options.

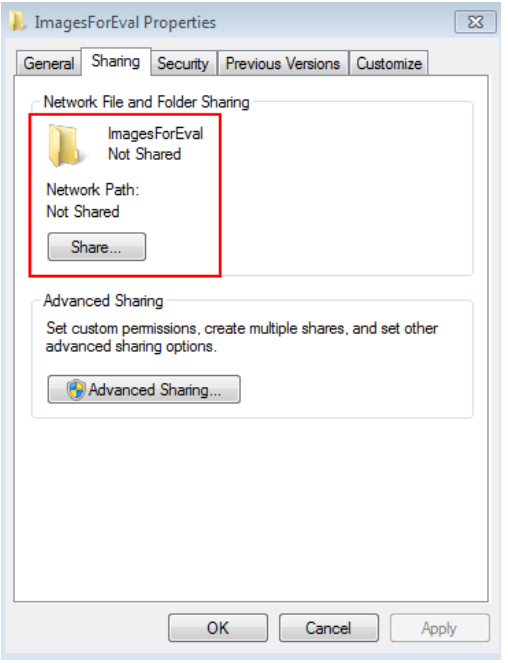
10. In the dialog box that appears, select Share files and folders using SMB.

    Note: You can have both SMB and AFP selected. By default, OS X Mavericks and later automatically enable SMB and AFP for compatibility with Windows computers, Macs using Mavericks and Yosemite, and Macs using older versions of OS X.

11. Click Done.

To create a shared folder on a Windows computer

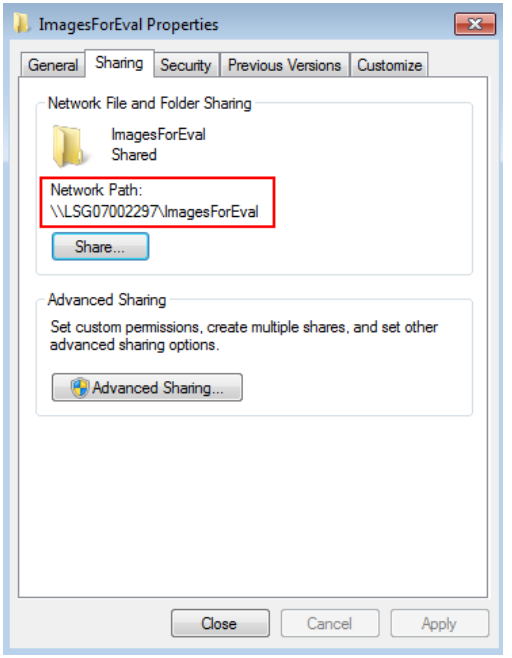
1. Log in as the Windows Administrator for the computer.
2. Create a destination folder.
3. Right-click the folder and select Properties in the menu that appears.
4. Click Sharing.
5. Click Share.



6. Choose users with whom you want to share the destination folder.
7. Set Read/Write permissions for each user.
8. Click Share and then click Done.

9. On the Sharing tab, the UNC path appears under Network Path. Write down this path.

   You will use this address when the imager prompts for a location before you export an image. See Exporting to a Shared Folder on page 101.



10. Click Close.

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