USER GUIDE

invitrogen™
by life technologies™

E-Gel® Imager Gel Documentation System

General information for using the E-Gel® Imager and GelCapture software for visualization and documentation of agarose gels

Catalog Numbers 4466611, 4466612, 4466613

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life technologies™

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Product Contents

Upon receiving the device

Examine the unit carefully for any damage incurred during transit. Any damage claims must be filed with the carrier. The warranty does not cover in-transit damage.

E-Gel® Imager Gel Documentation System

The contents of the E-Gel® Imager Gel Documentation System are listed below. The E-Gel® Imager Gel Documentation System is shipped at room temperature.

Product	Catalog no.
E-Gel® Imager with E-Gel® Imager UV Light Base	4466611
E-Gel® Imager with E-Gel® Imager Blue-Light Base	4466612
E-Gel® Imager with E-Gel® Imager Adaptor Base	4466613

Components

The components of each E-Gel® Imager Gel Documentation System consist of an E-Gel® Imager Camera Hood Kit, and a corresponding E-Gel® Imager Light Base or Adaptor Base Kit.

E-Gel® Imager Camera Hood Kit

Components	Quantity
Camera Hood	1
Camera Hood power supply cable (7.5 V)	1
Camera Hood USB 2.0 cable	1
E-Gel® Imager Light Diffuser	1
E-Gel® Imager Universal Filter	1
GelCapture Imaging Software, GelQuant Express Quantitation Software	2 disks
GelQuant Express Software Activation Dongle	1
Product Quick Reference Card	1

Continued on next page

Product Contents, Continued

E-Gel® Imager UV Light Base Kit

Components	Quantity
E-Gel® Imager UV Light Base	1
Universal 12 V Power Cord	1

E-Gel® Imager UV Light Base is also available as a standalone product, Cat. no. 4466602.

E-Gel® Imager Blue-Light Base Kit

Components	Quantity
E-Gel® Imager Blue-Light Base	1
Universal 12 V Power Cord	1

E-Gel® Imager Blue-Light Base is also available as a standalone product, Cat. no. 4466603.

E-Gel® Imager Adaptor Base Kit

Components	Quantity
E-Gel® Imager Adaptor Base	1
DC Connector Cable	1

E-Gel® Imager Adaptor Base is also available as a standalone product, Cat. no. 4466604.

Product Contents, Continued

Accessory products

Accessory products that can be purchased for use with the E-Gel® Imager system are listed in the following section:

E-Gel® Imager Band Excision Kit

Components	Cat. no.	Quantity
E-Gel® Gel cutting kit	4466605	1

E-Gel® Imager Universal Filter Kit

Components	Cat. no.	Quantity
E-Gel® Imager Universal Filter	4466606	1

E-Gel® Imager Qdot® 625 Filter Kit

Components	Cat. no.	Quantity
E-Gel® Imager Qdot® 625 Filter	4466607	1

E-Gel® Imager UV/SYBR® Filter Kit

Components	Cat. no.	Quantity
E-Gel® Imager UV/SYBR® Filter	4466608	1

GelQuant Express Software Activation Dongle

Components	Cat. no.	Quantity
GelQuant Express Software Activation Dongle	4466610	1

Intended use

For research use only. Not intended for human or animal diagnostic or therapeutic uses.

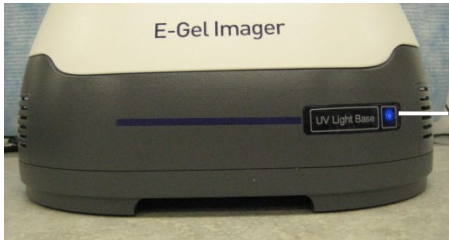
E-Gel® Imager Gel Documentation System

Front view – Camera hood

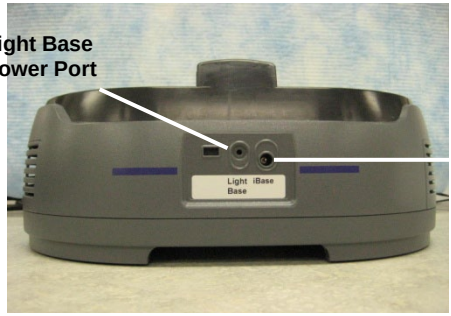
Rear view – Camera hood

E-Gel® Imager Gel Documentation System, Continued

Front view – E-Gel® Imager Light Base



Rear view – E-Gel® Imager Light Base



Rear view – E-Gel® Imager Adaptor Base

About the System

System description

The E-Gel® Imager system is a benchtop gel imaging system that supports visualization of both fluorescent and colorimetric (visible dye) applications. The system consists of a high-resolution camera for capturing images, and a choice of interchangeable bases (E-Gel® Imager UV Light Base, E-Gel® Imager Blue-Light Base, and E-Gel® Imager Adaptor Base) to provide transillumination.

The E-Gel® Imager UV Light Base is designed for visualizing ethidium bromide stained gels, and various E-Gel® pre-cast agarose gels.

The E-Gel® Imager Blue-Light Base is designed for visualizing gels stained with SYBR® dyes (e.g. SYBR Safe®), and also provides power to the E-Gel® iBase™ Device, allowing image capture to occur in real time.

The E-Gel® Imager Adaptor Base is designed to fit, and provide power to the E-Gel® Go! Base, or E-Gel® iBase™/ E-Gel® Safe Imager™ systems. It allows visualization of E-Gel® pre-cast agarose gels, and image capture in real time.

For capturing images, the system is controlled by the GelCapture software application (to be installed on a PC running Windows 7, or Windows XP operating systems), which allows adjustment of exposure, sensitivity, and brightness. Images are captured in real time, and the direct camera to PC image transfer prevents loss of resolution that occurs in systems using frame-grabber cards to capture data from video signals. Captured images are exported to Gel Quant Express for data analysis.

Features

- Small footprint to conserve benchtop space.
- Allows the use of safe blue-light transillumination without the risks of UV light transillumination.
- Sensors permit illumination only when the E-Gel® Imager Camera Hood is properly positioned over the E-Gel® Imager Light Base unit.
- Extended detection feature enables viewing precise images of high and low band intensity by expanding the dynamic range of the image.
- Compatible with a wide range of fluorescent and visible dyes (e.g. Qdot®, SYBR Safe®, ethidium bromide).
- Compatible with different gel formats including precast gels (e.g. E-Gel® Agarose Gels, NuPAGE® Novex Bis-Tris Gels) and pour-it-yourself gels (agarose, or polyacrylamide).
- Rapid acquisition of high resolution images.
- Real-time sample imaging allowing detailed sample viewing.
- Eliminates the need for film or processing chemicals.
- Direct camera to PC image transfer prevents loss of resolution common to systems employing frame-grabber cards to capture data from video signals.

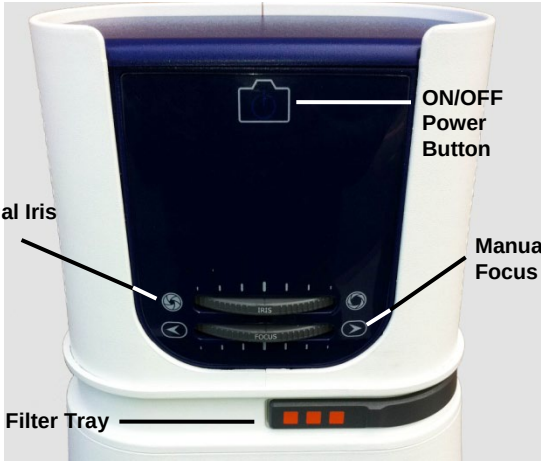
Description of Parts

E-Gel® Imager System

The E-Gel® Imager is a compact sample imaging tool standing 43.7 cm in height. It consists of the E-Gel® Imager Camera Hood (35.6 cm in height), which fits on top of a Base unit (11.9 cm in height) which provides transillumination for visualization of the gel.

E-Gel® Imager Camera Hood

E-Gel® Imager Camera Hood controls



Description of Parts, Continued

E-Gel® Imager Base

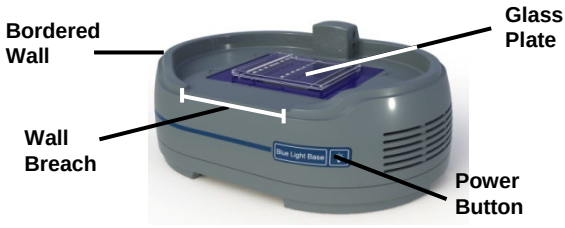
Three types of E-Gel® Imager Base are available for visualizing different types of gel stain, and for different applications. The design includes a bordered wall to prevent accidental spills of liquid, and a wall breach for easy removal of gels from the surface of the light base. The dimensions of each E-Gel® Imager Base is 30.5 cm (length) × 21 cm (width).

E-Gel® Imager UV Light Base

The E-Gel® Imager UV Light Base is used to visualize ethidium bromide stained gels on a flat glass plate, and can be used in conjunction with the E-Gel® iBase™ Device for visualizing various E-Gel® pre-cast agarose gels. An automatic shut-off switch turns the transilluminator off after 10 minutes.

E-Gel® Imager Blue-Light Base

The E-Gel® Imager Blue-Light Base is used to visualize gels stained with SYBR® dyes on a flat glass plate, and can be used in conjunction with the E-Gel® iBase™ Device for visualization of various E-Gel® pre-cast agarose gels. An automatic shut-off switch turns the transilluminator off after 20 minutes.



Description of Parts, Continued

E-Gel® Imager Adaptor Base

The E-Gel® Imager Adaptor Base contains a well capable of accommodating an E-Gel® Go! Base for visualizing E-Gel® Go! pre-cast agarose gels, or an E-Gel® iBase™ Device in conjunction with an E-Gel® Safe Imager™ for visualizing various E-Gel® pre-cast agarose gels.

E-Gel® Imager Adaptor Base – Top view

Precise placement of the E-Gel® Go! Base or E-Gel® iBase™ / E-Gel® Safe Imager™ is required for proper operation of the system. Placement fixtures are located in the well to guide placement of each device to be used with the adaptor base.

E-Gel® Imager Light Diffuser

The E-Gel® Imager Light Diffuser improves images obtained from the E-Gel® iBase™ Device when placed on the E-Gel® Imager Blue-Light Base or E-Gel® Safe Imager™.

Description of Parts, Continued

Power Cables (7.5V Cable 12V Cable)

Two power cables are provided for supplying power to the E-Gel® Imager Camera Hood (7.5V), and the E-Gel® Imager Light Base (12V).

Each power cable includes interchangeable outlet plugs. Select the proper plug type for your wall outlet before attempting to plug the system in.

USB 2.0 Cable

A USB 2.0 cable is provided for connecting the E-Gel® Imager Camera Hood to a PC.

DC Connector Cable

A cable is provided for connecting the E-Gel® iBase™ Device to an E-Gel® Imager Adaptor Base.

Description of Parts, Continued

Colored emission filters

Three colored emission filters are available with the E-Gel® Imager system to provide better definition when viewing certain sample types. Place the type of filter appropriate for the type of stain being used into the filter tray when visualizing a gel through the camera.

E-Gel® Imager Universal Filter

The E-Gel® Imager Universal Filter is an orange filter for general use. Applications include ethidium bromide stained gels used with UV transillumination, or SYBR® dyes with blue-light transillumination.

E-Gel® Imager UV/SYBR® Filter

E-Gel® Imager UV/SYBR® Filter is a green filter for visualizing SYBR® dyes with UV transillumination.

E-Gel® Imager Qdot® 625 Filter

E-Gel® Imager Qdot® 625 Filter is a red filter for visualizing quantum dots with emission spectra of ~625 nm.

Description of Parts, Continued

Band Excision Kit

A Band Excision Kit is available to facilitate removal of bands of interest from a gel for downstream applications. The kit consists of the following components:

Orange Filter Goggles

Orange Filter Goggles protects the eyes from intense blue-light, and allows bands to be viewed.

Activation Switch

A magnetic switch that allows transillumination to be turned on without having the E-Gel® Imager Camera Hood in place.

Gel Cutting Guard

Gel Cutting Guard to protect the surface of the E-Gel® Imager Light Base from scratches when cutting gel bands.

Methods

Getting Started

Minimum PC Requirements

In order to install and operate both the E-Gel® Imager and GelCapture software, your PC must meet the following minimum requirements:

- Intel® Core™ 2 Duo processor, 1.8 GHz.
- Minimum 1 GB RAM of memory (2 GB recommended).
- 32 bit Windows XP Pro (English version, SP 3) OR Windows 7 Professional (English version) operating system.
- Minimum monitor resolution of 1024 × 768 pixels.
- A free USB 2.0 port (Not compatible with USB 1.0 or 1.1).

Installing the E-Gel® Imager Gel Documentation System

The installation procedure for the E-Gel® Imager Gel Documentation System can be completed in four steps as outlined below:

Hardware Installation	
E-Gel® Imager Light Base Installation	page 16
E-Gel® Imager Installation	page 16
E-Gel® Imager Camera Calibration	page 17
GelCapture Software Installation	
.NET Framework 3.5 Installation	page 57
Windows XP Professional	page 55
Windows 7 Professional	page 56
Camera Driver Installation	
Windows XP Professional	page 58
Windows 7 Professional	page 60
GelQuant Express Software Installation	
Refer to GelQuant Express Manual	

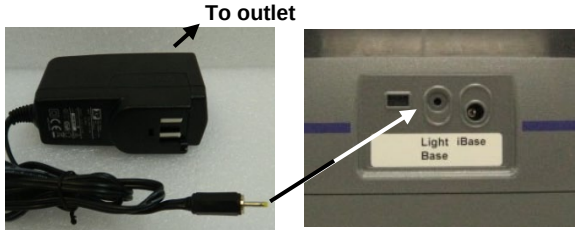
Hardware Installation

General Guidelines

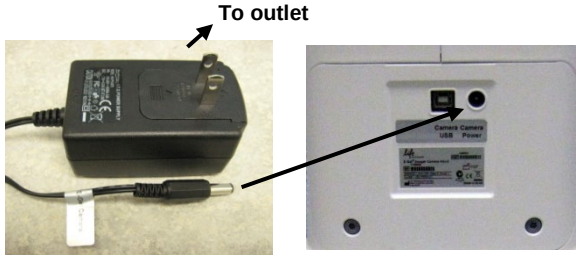
Install the hardware for the E-Gel® Imager Camera Hood and E-Gel® Imager Light Base as described in the following section.

To install the E-Gel® Imager Adaptor Base, see page 44.

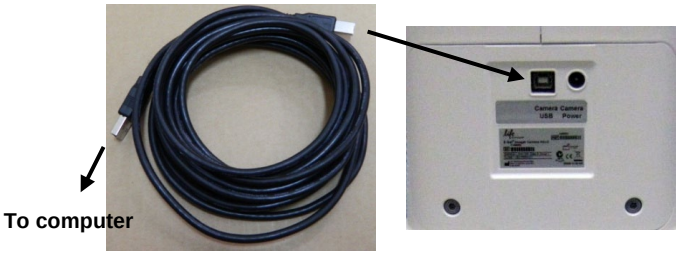
1. Place the E-Gel® Imager Light Base on a flat surface.
2. Plug the light base power cable into the light base power port, and connect the wall plug to an electrical socket.



3. Plug the E-Gel® Imager Camera Hood power supply cable into the camera hood power port, and connect the wall plug to an electrical socket.



4. Plug the USB 2.0 cable into the camera USB port of the camera hood and connect the other end into the USB 2.0 port of your computer.



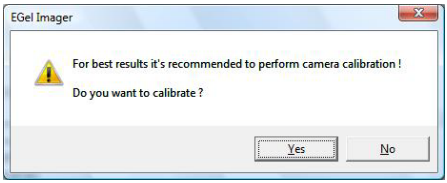
Camera Calibration

General Guidelines

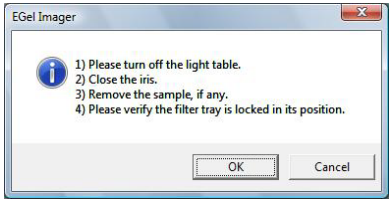
- Calibrate the camera in the E-Gel® Imager immediately after set up and installation, or at a later time when the GelCapture software is opened for use.
- Flat field calibration is performed automatically as part of the calibration process.
- Calibrate the system annually as part of preventive maintenance procedures.
- The camera calibration process takes approximately 30–40 minutes.

Standard camera calibration method

1. Launch the GelCapture software. If you have not previously calibrated the camera, the following message will be displayed:



2. Click **Yes** to start the camera calibration process. If calibration files do not exist, the following message is displayed:

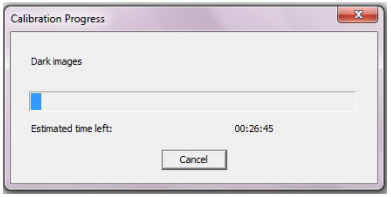


3. Choose **OK** or Cancel and proceed with Calibration. If you click **Cancel**, the GelCapture software proceeds using old calibration files (if they exist).

Camera Calibration, Continued

Standard camera calibration method

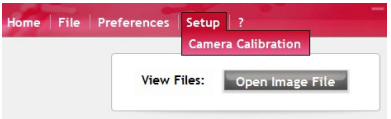
4. The Calibration Progress window appears and displays the installation progress, as the system creates reference pictures for the camera.



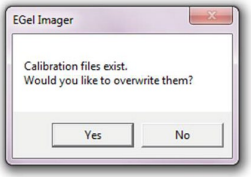
Alternate camera calibration method

An alternative method for calibrating the Camera exists by using the Main Menu.

1. Select "Camera Calibration" from the Main Menu on the first screen.



2. The following message will be displayed if camera calibration files already exist:



3. Choose **Yes** and proceed with Calibration. If you click Cancel, GelCapture will run with old calibration files (if they exist).

4. When the calibration process is completed, a notification message appears. Click **OK**.

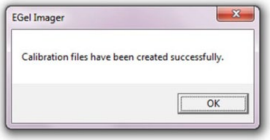


Image Capture using the E-Gel® Imager Gel Documentation System

Ready to Start

After the software and hardware for the E-Gel® Imager system is set up, the system is ready for use. Read the following chapter for detailed explanations on how to operate the system. For your convenience, the system is provided with a Quick Reference Guide that includes the operating instructions.

General Guidelines

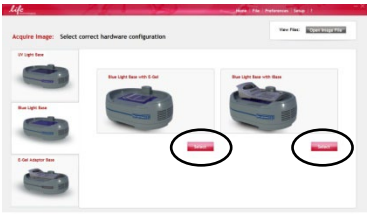
Wear proper safety equipment (ie. Lab coat, goggles, and protective gloves) when conducting experiments.

1. Launch the GelCapture software from your PC desktop.

1

2. Click **Select** to indicate the type of E-Gel® Imager Light Base being used to provide transillumination, and whether the E-Gel® iBase™ Device is being used with it, OR if the E-Gel® iBase™/E-Gel® Safe Imager™, or E-Gel® Go! is being used with the E-Gel® Imager Adaptor Base.

2



3. Verify the appropriate colored emission filter being used in the filter tray.

3

4. Remove the E-Gel® Imager Camera Hood from the E-Gel® Imager Base.
5. Position the gel in the center of the E-Gel® Imager Base.

5

Continued on next page

Image Capture using the E-Gel® Imager Gel Documentation System, Continued

6. Place the E-Gel® Imager Camera Hood on top of the E-Gel® Imager Base.

6

7. Turn the camera on.

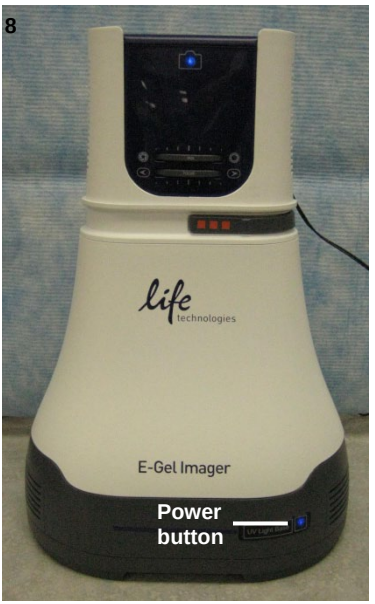
7

Continued on next page

Image Capture using the E-Gel® Imager Gel Documentation System, Continued

8. Turn the E-Gel® Imager Base on.

8

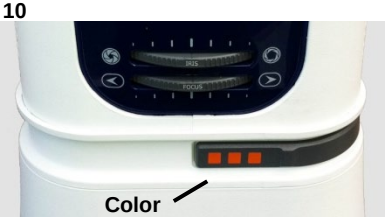


9. When the camera and trans-illuminator are turned on, the image of the gel is displayed on the Live Mode Screen in real time.

9

10. Verify that the type of filter in the filter tray is appropriate for the type of stain being used in your gel sample. If the filter does not provide the best image possible, it may be necessary to test imaging with another type of filter (see page 13 for more information on filters).

10

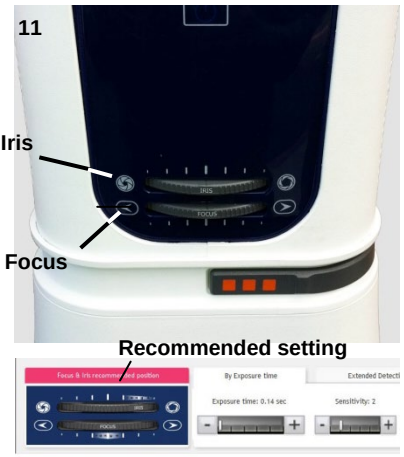


Continued on next page

Image Capture using the E-Gel® Imager Gel Documentation System, Continued

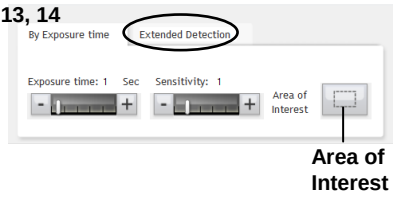
11. Verify that the manual focus and iris dials on the camera hood are adjusted to the recommended settings for the type of E-Gel® Imager Base being used, as shown on the computer screen.

    Note: Each type of E-Gel® Imager Base, and whether it is being used in conjunction with an E-Gel® iBase™ Device, E-Gel® Go! Base, or E-Gel® iBase™ / E-Gel® Safe Imager™ has its own recommended setting.



12. Perform fine adjustment of the image to attain the brightest image possible by clicking on either the minus or plus buttons, or sliding the gauges for each setting (see page 25 for details).

13. If bands of both high and low intensity exist in the gel, perform Extended Detection (see page 30).
14. Define the region of the gel that you wish to image using the Area of Interest icon.



15. A green rectangular frame pops up around the image. Drag the edges of the green rectangle with your cursor to select your Area of Interest.

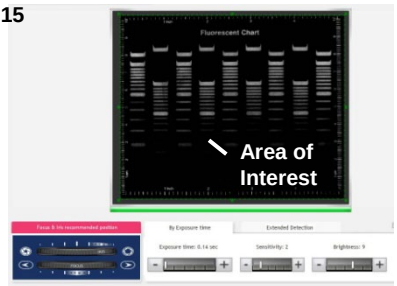


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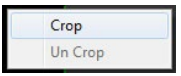
Image Capture using the E-Gel® Imager Gel Documentation System, Continued

16. Right click in the green AOI frame to display a menu with the AOI options.

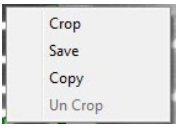
    Note: The options in the menu differ depending on whether you are looking at a real-time image, or working on a previously saved image.

17. Click the **Save** button to capture the image of your gel in TIFF format.
18. To save an image in BMP or JPEG format, click **Export** and select BMP or JPEG.
19. The Save window appears.
20. Browse to the location where you want the image to be saved, and enter a name for the image.
21. Click the Save button to save the file to the selected directory.
22. Additional functions that can be performed at this point include:
    - **Print**: Sends the image to a printer.
    - **Analysis**: Sends the image to the analysis software (see Gel Quant Express manual). Make sure that the GelQuant Express Software Activation Dongle is inserted in your computer before using this function.
    - **Edit Image**: Allows the user to perform advanced applications on the image (see page 30).
    - **Multiple Image Acquisition**: To capture a series of images over a period of time (see page 31).

Real-time image options

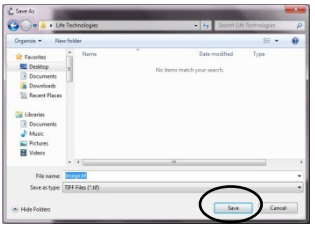


Saved image options



17

19–21



22

GelCapture Software

GelCapture software

The GelCapture software application seamlessly integrates with the E-Gel® Imager hardware, giving you complete control of configuration, capturing and saving sample images on your PC for analysis. The friendly GUI lets you perform common actions with a single click of a button or icon.

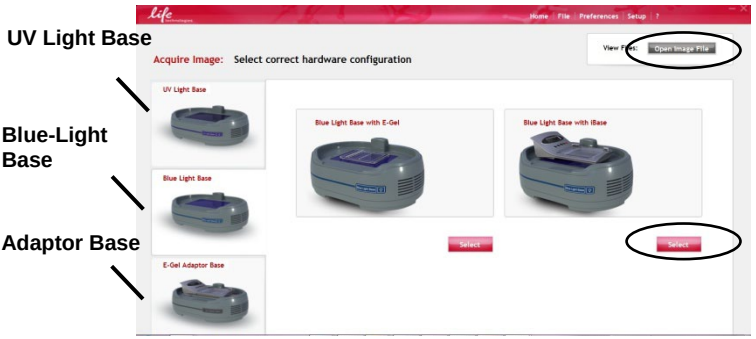
Description of image capture functions

Read the following section for a description of the various functions and uses of features in the GelCapture software.

Hardware Selection Screen

The Hardware Selection Screen appears upon launching the GelCapture software.

- Select the type of E-Gel® Imager Base to access the Live Mode Screen, and capture images, OR
- Open an image file to access the Edit Mode Screen.



GelCapture Software, Continued

Live Mode Screen

Iris and focus settings

The image shown in the lower left hand corner of the Live Mode Screen shows the recommended settings for the iris and focus. For best results adjust the manual dial on the hardware as indicated by the image, and fine tune using the software.

Exposure time and Overexposure

Exposure time is the amount of time available for the camera sensor to collect emitted light from the sample to create an image. Increased exposure permits more time for light to reach the camera sensor, and allows sections of the image that are not visible with a lower exposure time to be visible. Exposure time can be set from 0.14–9.8 seconds. See page 36 for details on overexposure.

Sensitivity

Use the + or the – slide gauge to change the light detection sensitivity. The maximum exposure time is automatically changed according to the sensitivity setting.

Brightness

Use the + or the – slide gauge to change the brightness of the image.

GelCapture Software, Continued

Area of interest

The Area of Interest (AOI) function allows various actions to be performed within specific regions of the image, either in Live Mode or in a saved image. In Live Mode you can save, copy, or view histograms within the selected area.

Extended detection

Certain gels contain bands of both high and low intensity. Extended Detection can be used in order to detect both of these band types in an optimal manner, by increasing dynamic range to include all of types of bands in the image.

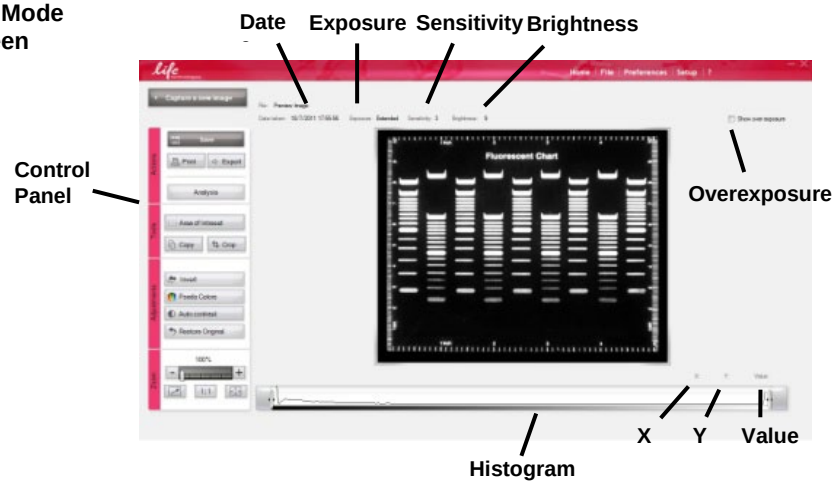
Saving images

Images can be saved in TIFF (default), BMP, or JPEG formats.

Change

The Change button is used to return to the Hardware Selection Screen from the Live Mode Screen.

Edit Mode Screen

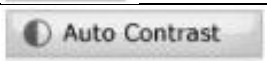


Control panel

The tools on the control panel are used to adjust images, or manage image files. See page 27 for short descriptions of each function.

Control panel icons and buttons

Short descriptions of icons and buttons used in the Edit Mode Screen control panel are listed below.

Icon	Function
	Opens the Live Mode screen to allow capture of a new image.
	Saves an image (available in Edit Mode only).
	Exports an image as BMP or JPEG file.
	Prints an image.
	Shortcut to the analysis software.
	Selects a specific area to work within the image.
	Copies the image to the clipboard to paste elsewhere (available in Edit Mode only).
	Crops an image (available in both Live Mode and Edit Mode).
	This increases the contrast of the image, and can be used to reveal low concentration bands in the gel image.
	Creates an inverted color version of the image. The function changes the image color from black to white and vice versa
	Shows the image in using a color spectrum.
	Restores original image back to original grey scale values. It is the opposite of Auto Contrast and does not have any effect on Invert and Pseudo Color actions.
	Zooms into/out of the image.
	Fits the image to the window.
	Shows the full image on screen.
	Full screen view. Click the ESC button to exit full screen view.

Date, Exposure, Sensitivity, and Brightness

Date taken: the date the image was captured.
Exposure: The exposure time used for the captured image.
Sensitivity: The sensitivity used for the captured image.
Brightness: The brightness used for the captured image.

X, Y & Value

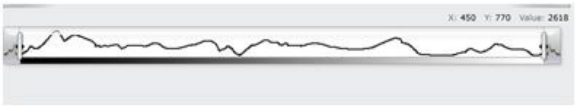
X: The position of the pixel being examined on the X axis.
Y: The position of the pixel being examined on the Y axis.
Value: The grey scale value of the pixel being examined.

Overexposure

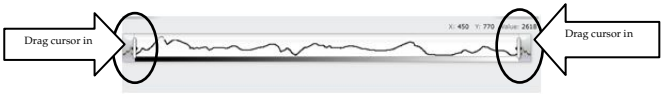
See page 36 for details on overexposure.

Histogram

This Histogram provides the user with a graphical version of the image data to assist in determining the optimal image capture conditions. When an image is detected, the histogram is displayed at the bottom of the screen.



The Y axis of the histogram displays the number of pixels at a given grey level, while the X axis displays the type of the grey levels. The user may also decide to reduce the time taken to view the band by stretching the signal. This can be achieved by dragging the cursor over the left and right grey margins of the histogram, and moving it inwards towards the center.



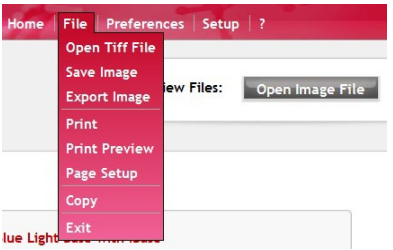
GelCapture Software, Continued

Menu based selection of functions

The Main Menu bar can be used as an alternative method of performing the functions described in **Icon buttons and descriptions**.

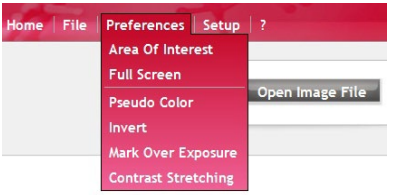
File management

Options to open, save, export, copy, and save files can be found in the **File** menu.



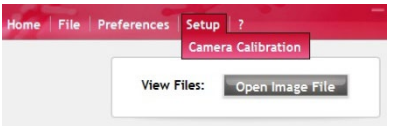
Preferences

Options for imaging tools can be selected from the **Preferences** menu.



Setup

Manual selection of camera calibration can be selected from the **Setup** menu.



Extended detection

To perform Extended Detection, follow the steps listed in this section.

1. Display the image in the Live Mode screen.
2. Click on the Extended Detection tab.

1

3. Adjust sensitivity using the + or the – slide gauge in order to optimize the image.
4. Adjust brightness using the + or the – slide gauge in order to optimize the image.

2

Edit image

To perform advanced applications on the image, use the Edit Image function. The Edit Image function can be performed for single image capture, or multi image acquisition modes.

1. Click on the Edit Image button.

1

2. Perform desired editing functions using the buttons in the panel on the left (see page 27 for details).

2

Multiple Image Acquisition

Multiple Image Acquisition is an advanced image capture function to aquire a series of images over time (e.g., for bands migrating during gel electrophoresis).

Multiple Image Acquisition Live Mode Screen

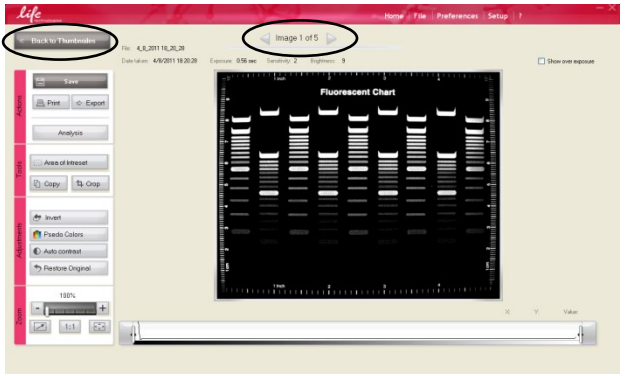
The Live Mode Screen for the Multiple Image Acquisition function is similar to the normal Live Mode Screen. Differences in functions for Multiple Image Acquisition are as listed:

- **Exposure Time**: Setting a new exposure time during the image capture process results in subsequent images being captured with the new exposure time.
- **Sensitivity**: Setting a new sensitivity level during the image capture process results in subsequent images being captured with the new sensitivity level.
- **Brightness**: Setting a new brightness during the image capture process results in subsequent images being captured with the new brightness level.
- **Extended Detection**: Using extended detection during the image capture process results in subsequent images being captured with the new extended detection parameters.
- **Area of Interest (AOI)**: Changing the AOI during the image capture process results in capture of subsequent images in the new AOI.
- **Stop**: To stop image acquisition.

See page 25 for a description of the Live Mode Screen.

Continued on next page

Multiple Image Acquisition Edit Screen



The Edit Mode Screen for the Multiple Image Acquisition function is similar to the normal Edit Mode Screen. Differences in functions for Multiple Image Acquisition are as listed:

- **Back to Thumbnail**: Returns to Multiple Image Acquisition Live Mode thumbnail view.
- **Navigation arrows**: Allows the user to navigate between multiple images captured by the Multiple Image Acquisition. The number of the image being displayed, along with the total number of captured images is indicated between the arrows.

See page 26 for a description of the Edit Mode Screen.

Performing Multiple Image Acquisition

Perform Multiple Image Acquisition to capture images of band migration during gel electrophoresis as follows:

1. Click on the Multiple Image Acquisition button.
2. Set the number of images to be captured (2–20).

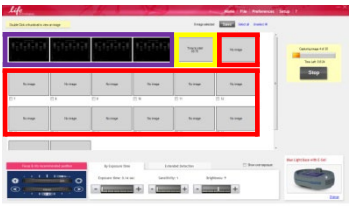
1

3. (*Optional*) Set the amount of time between each image capture event. Mark this check box and set the desired time delay, or leave it unmarked.
4. Click on **Start** to start the image series capturing process.

4

5. A new screen appears, and displays the progress of the image capture in a series of thumbnail images. Double clicking on any thumbnail image brings you to the Multiple Image Acquisition Edit Mode Screen for that image (see page 32).
    - Images already captured shown in purple rectangle.
    - Image currently being captured shown in yellow rectangle.
    - Images to be captured shown in red rectangles.

5

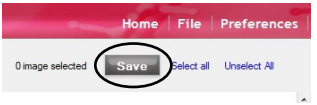


6. Select the images you wish to save by:
   - Marking the check box beneath the image, OR
   - Clicking the **Select All** button.

6

7. Click the **Save** button to save selected images.

7

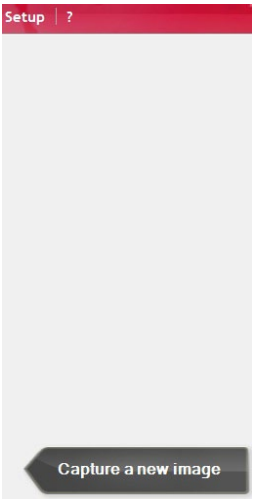


8. Click the **Stop** button to cancel image capture.

8

9. When the acquisition process is completed, or acquisition is aborted, the "Capture a new image" button appears on the screen.
   Click **Capture a new image** button to return to the standard Live Mode Screen.

9



Additional Multiple Image Acquisition functions

The Background function for Multi Images Acquisition process creates images that are made of a combination of previous and new information.

The background for a second image is based on information from both the first and second images, even though the second image was captured with the same exposure time as the first image in the series.

Image #1 1 minute exposure time

The image is captured for one minute

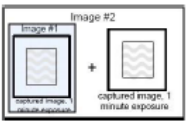


Image #2 2 minute exposure time

The last image (image #1) is captured for one minute and combined with image #1 to create image #2

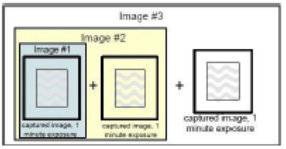


Image #3 3 minute exposure time

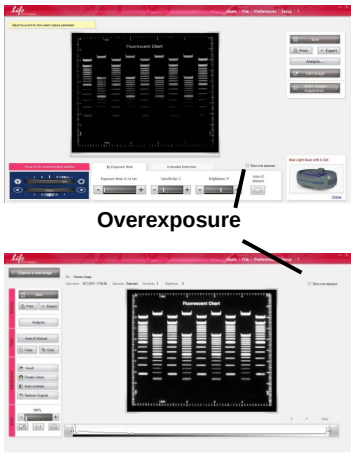
The last image (composite image #2) is capture for one minute and combined with image #2 to create image #3

Overexposure

Overexposure occurs when the camera receives too much light. This can be visualized as white, or bright areas that are difficult to analyze, and that can lead to inaccurate analysis results.

1. Make sure that the box for overexposure is checked off. The box is located in lower right hand side of the Live Mode Screen, and at the top right hand corner of the Edit Screen.

1



2. The GelCapture Overexposure tool automatically displays overexposed, saturated areas in red in a given image.
3. To correct overexposure, go to Live Mode Screen, and perform any action that reduces the overall amount of light reaching the camera (e.g., reducing exposure time, sensitivity, and/or brightness).
4. After overexposure has been corrected, click **Save**.

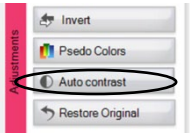
2

Auto-contrast

This function increases the contrast of the image and helps to reveal low concentration bands in the gel image.

1. Click the **Auto Contrast** icon.
2. Click the **Restore Original** button to return the image to its original grayscale parameters.

1

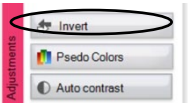


Inverted Image

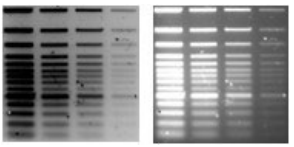
Inverting an image is particularly useful for discriminating between close bands. This function inverts the color scale of the image (i.e., light areas appear dark and dark areas appear light, much like for a film negative).

3. Click the **Invert** icon.
4. An inverted version of the image is displayed.
5. Click the icon again to revert to the image to its original state.

1



2

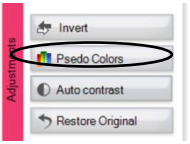


Pseudo Colors

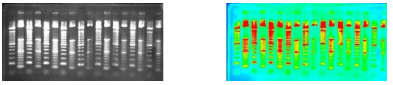
Pseudo Color applies a false color palette to the image by applying a color spectrum, designating “hot” and “cold” regions of the image. Colors are based on gray scale intensity, where red corresponds to the maximum (hot) and blue corresponds to the minimum (cold) gray scale levels.

1. Click the Pseudo Colors icon.
2. A image of the gel with false color is displayed.
3. Click the icon again to revert to the image to its original state.

1



2



Maintenance

To keep the E-Gel® Imager in good working order, observe the following guidelines:

- The glass plate of the E-Gel® Imager Light Base must be cleaned every time a sample is removed. Use a soft non-abrasive, lint-free cloth.
- To clean the E-Gel® Imager and Light Base surface, use a cloth dampened with water.
- Do not operate while wearing gloves with talcum.
- Calibrate the camera once a year, as described in the Camera Calibration section.

  Note: Turn the power OFF before any maintenance is performed on this equipment.

Troubleshooting

Introduction

Before you contact support, it is recommended that you read over this section to see if you can resolve the problem by yourself. To make this as easy as possible, we have created a list of the most common problems and their possible solutions.

Observation	Cause	Solution
E-Gel® Imager does not turn on after pressing either camera hood or E-Gel® Imager Base ON/OFF button	Loose power supply cable	Verify that the camera hood power supply and light base power supply connections are secure and properly connected to an electrical outlet.
	Loose internal power supply button cables	Contact technical support (see page 66).
The camera is not recognized	Camera not turned on	Make sure the camera is turned on.
	Cables not connected properly	Verify that the camera USB 2.0 and power supply cables are connected properly.
	Camera drivers did not install unsuccessfully	Uninstall GelCapture. Reinstall GelCapture and the camera drivers.
No image on screen	E-Gel® Imager Light Base not turned on	Make sure the E-Gel® Imager Light Base is turned on.
	Possible time delay each time images are changed	Wait a few seconds for images to be displayed.
A black image is seen on screen	Short exposure time	Increase the exposure time.
	The iris is closed	Turn the Manual Iris Dial to increase the aperture (see page 9).
Images out of focus	Incorrect focus settings	Adjust the focus settings using the Manual Focus Dial (see page 9).

Continued on next page

Observation	Cause	Solution
Improper illumination intensity	Button is receiving incorrect voltage	Contact technical support (see page 66).
	Low incoming illumination source voltage	Contact technical support (see page 66).
Duration of E-Gel® Safe Imager™ transillumination too short	E-Gel® Safe Imager™ transilluminator turned on with short press (30 second transillumination)	Press the button on the E-Gel® Safe Imager™ for 2 seconds. The transilluminator turns on for 5 minutes before automatic shutoff.

Using the E-Gel® Imager Light Base with E-Gel® iBase™ Device

Using the E-Gel® Imager Light Base with the E-Gel® iBase™ Device

The E-Gel® Imager Blue-Light Base or E-Gel® Imager UV Light Base can be used to provide transillumination for the E-Gel® iBase™ Device.

In order to use the devices together, just place the E-Gel® iBase™ Device on top of the glass plate of the E-Gel® Imager Light Base.

For best results, affix the E-Gel® Imager Light Diffuser to the underside of the E-Gel® iBase™ Device when using the E-Gel® iBase™ Device with the E-Gel® Imager system (see page 52 for details).

E-Gel® iBase™ Device on top of E-Gel® Imager Blue-Light Base

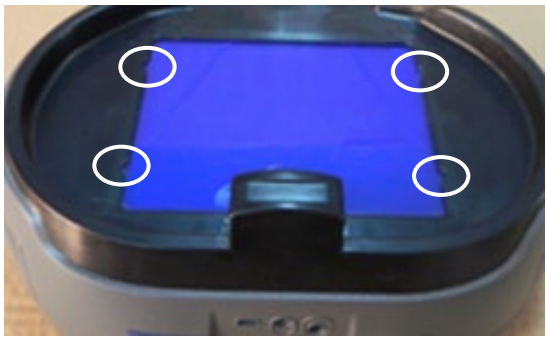
E-Gel® iBase™ Device on top of E-Gel® Imager UV Light Base

Continued on next page

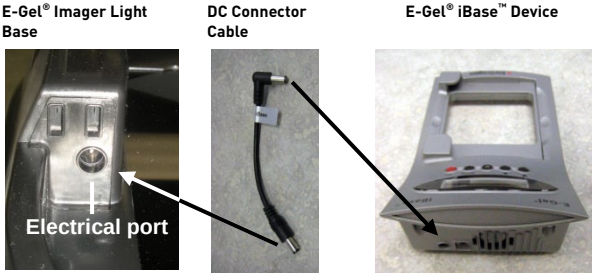
Using the E-Gel® Imager Light Base with E-Gel® iBase™ Device, Continued

Using the E-Gel® Imager Light Base with the E-Gel® iBase™, continued

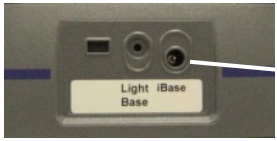
1. Place the E-Gel® iBase™ Device directly on 4 peg niches of the E-Gel® Imager Light Base.



2. Connect the DC Connector Cable between the E-Gel® iBase™ Device and the E-Gel® Imager Adaptor Base.



3. Insert an E-Gel® cassette into the E-Gel® iBase™ Device.
4. Place the Camera Hood over the E-Gel® Imager Light Base.
5. Connect the E-Gel® iBase™ power supply cable to the 48 V power port at the rear of the E-Gel® Imager Light Base.



6. The E-Gel® iBase™ Device is now ready for use with the E-Gel® Imager.

Using the E-Gel® Imager Adaptor Base

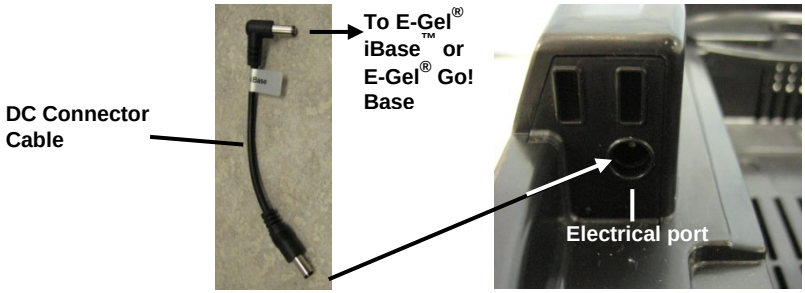
E-Gel® Imager Adaptor Base

The E-Gel® Imager Adaptor Base can be used with the E-Gel® iBase™/E-Gel® Safe Imager™, or E-Gel® Go! Base.

The E-Gel® Imager Adaptor Base is powered by the 48 V power supply that comes with the E-Gel® iBase™/E-Gel® Safe Imager™, or E-Gel® Go! Base.

DC Connector Cable

A DC Connector Cable is supplied with the kit to connect the E-Gel® Imager Adaptor Base to the E-Gel® iBase™ Device, or the E-Gel® Go! Base.



Using the E-Gel® Imager Adaptor Base with the E-Gel® iBase™ Device

Using the E-Gel® Imager Adaptor Base with the E-Gel® iBase™ Device

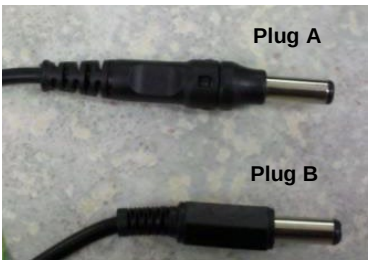
The E-Gel® Imager system can be used to capture images from the E-Gel® iBase™/E-Gel® Safe Imager™ using the E-Gel® Imager Adaptor Base. The adaptor base has a well that can accommodate the E-Gel® Safe Imager™ by itself, or the E-Gel® iBase™ Device when it is placed on top of the E-Gel® Safe Imager™.

E-Gel® iBase™/E-Gel® Safe Imager™ with E-Gel® Imager Adaptor Base

When using the E-Gel® Safe Imager™ to provide transillumination for imaging, make sure to push the red button on the E-Gel® Safe Imager™ for 2 seconds to extend the duration of transillumination to 5 minutes.

Installing the E-Gel® Safe Imager™ with the E-Gel® Imager Adaptor Base

There are two types of plug for the E-Gel® iBase™ Device. Installation of the E-Gel® iBase™/E-Gel® Safe Imager™ varies depending upon the type of plug that your device has.



See page 45 for installation instructions for Plug A.

See page 47 for installation instructions for Plug B.

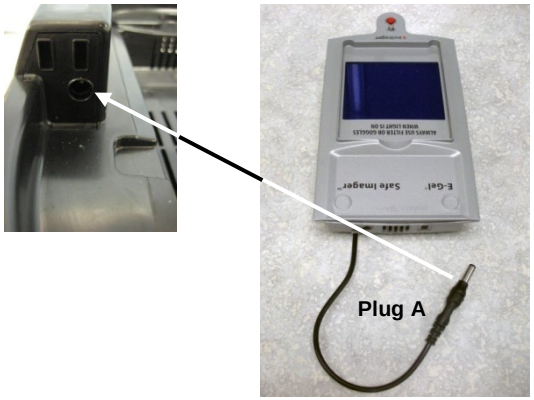
Continued on next page

Using the E-Gel® Imager Adaptor Base with the E-Gel® iBase™ Device, Continued

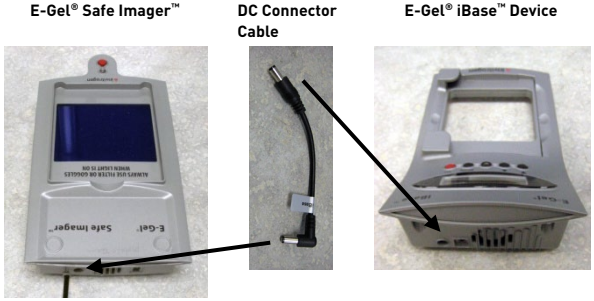
Installing the E-Gel® iBase™/Safe Imager™ with the E-Gel® Imager Adaptor Base – Plug A

1. Place the E-Gel® Safe Imager™ into the well of the E-Gel® Imager Adaptor Base.

2. Connect the E-Gel® Safe Imager™ (Plug A) to the E-Gel® Imager Adaptor Base.



3. Connect the DC Connector Cable between the E-Gel® Safe Imager™ and the E-Gel® iBase™ Device.

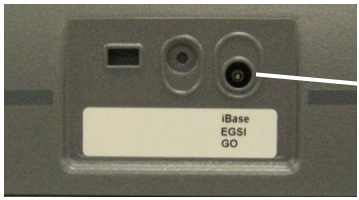


Continued on next page

Using the E-Gel® Imager Adaptor Base with the E-Gel® iBase™ Device, Continued

Installing the E-Gel® iBase™/Safe Imager™ with the E-Gel® Imager Adaptor Base – Plug A, continued

4. Connect the E-Gel® Safe Imager™ power supply cable to the 48 V power port at the rear of the E-Gel® Imager Adaptor Base.



5. The E-Gel® iBase™ Device is now ready for use with the E-Gel® Imager system.

6. Press the ON/OFF power button to turn on the E-Gel® Safe Imager™.

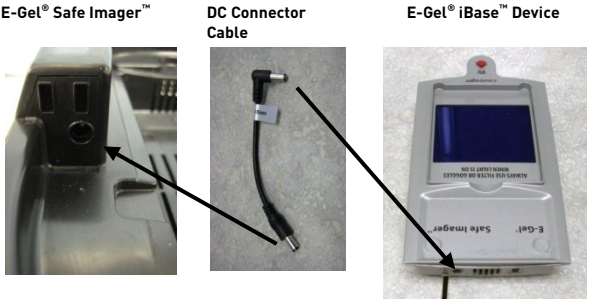
Continued on next page

Using the E-Gel® Imager Adaptor Base with the E-Gel® iBase™ Device, Continued

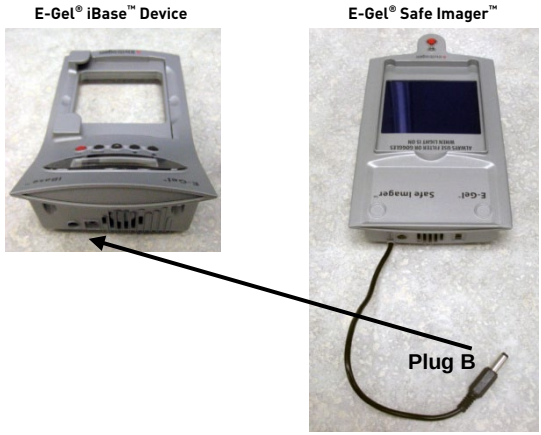
Installing the E-Gel® iBase™/Safe Imager™ with the E-Gel® Imager Adaptor Base – Plug B

1. Place the E-Gel® Safe Imager™ into the well of the E-Gel® Imager Adaptor Base.

2. Connect the DC Connector Cable between the E-Gel® Safe Imager™ and the E-Gel® Imager Adaptor Base.



3. Connect the E-Gel® Safe Imager™ (plug B) to the E-Gel® iBase™ Device.



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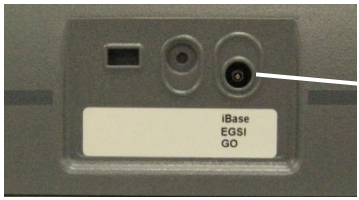
Using the E-Gel® Imager Adaptor Base with the E-Gel® iBase™ Device, Continued

Installing the E-Gel® iBase™/Safe Imager™ with the E-Gel® Imager Adaptor Base – Plug A, continued

4. Connect the E-Gel® Safe Imager™ power supply cable to the 48 V power port at the rear of the E-Gel® Imager Adaptor Base.



48 V power port

5. The E-Gel® iBase™ Device is now ready for use with the E-Gel® Imager system.

6. Press the ON/OFF power button to turn on the E-Gel® Safe Imager™.

ON/OFF Power Button

Using the E-Gel® Imager Adaptor Base with the E-Gel® Go! Base

Using the E-Gel® Imager Adaptor Base with the E-Gel® Go! Base

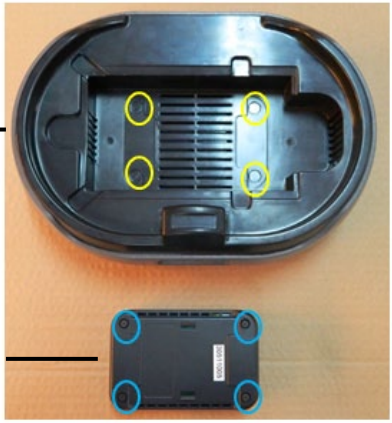
The E-Gel® Imager system can be used to capture images from the E-Gel® Go! Base using the E-Gel® Imager Adaptor Base. The adaptor base has a well that can accommodate the E-Gel® Go! Base with or without the E-Gel® Go! Portable Battery Pack.

E-Gel® Imager Adaptor Base with the E-Gel® Go! Base and Portable Battery Pack

Connect the E-Gel® Go! Base with E-Gel® Go! Portable Battery Pack, and place the entire assembly into the well of the E-Gel® Imager Adaptor Base.

E-Gel® Go! Base in E-Gel® Imager Adaptor Base

1. Place the E-Gel® Go! Base into the well of the E-Gel® Imager Adaptor Base on the dedicated pegs niches.

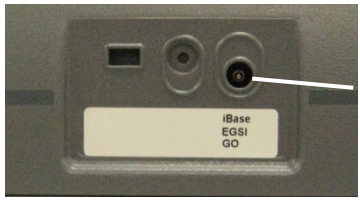


Continued on next page

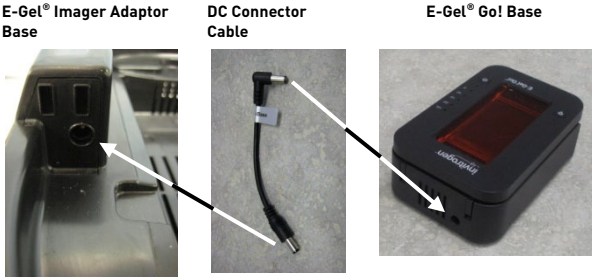
Using the E-Gel® Imager Adaptor Base with the E-Gel® Go! Base, Continued

E-Gel® Go! Base in E-Gel® Imager Adaptor Base

2. Connect the E-Gel® Go! Base power supply cable to the 48 V power port at the rear of the E-Gel® Imager Adaptor Base.



3. Connect the DC Connector Cable between the E-Gel® Go! Base and the E-Gel® Imager Adaptor Base.



4. The E-Gel® Go! Base is now ready for use with the E-Gel® Imager.

Using Accessory Products

Using the Band Excision Kit

In instances where bands from a gel need to be removed for further downstream experiments, the Band Excision Kit can be used to facilitate removal of the bands.

- Turn the E-Gel® Imager camera OFF and remove the E-Gel® Imager Camera Hood.
- When cutting bands using the E-Gel® Imager Blue-Light Base, use the appropriate safety equipment, including gloves for handling gels. Wear the orange filter goggles to protect your eyes from intense blue-light exposure.
- When cutting bands using the E-Gel® Imager UV Light Base, use the appropriate safety equipment to protect yourself from UV exposure, and for handling gels.

1. Place the Cutting Gel Guard on the E-Gel® Imager Light Base surface.

2. Place the magnetic activation switch on top of the sensor, and turn on the E-Gel® Imager Light Base.

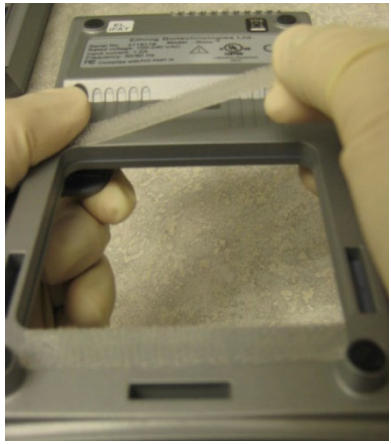
3. Use a clean knife or scalpel to cut the required bands from the gel.
4. After cutting the selected bands, remove the magnet and transfer the excised bands from the plate to the light base. Place the camera hood back on top of the light base. Connect the power cable to the camera hood, and press the camera ON/OFF button to view the gel bands.

Using the E-Gel® Imager Light Diffuser

The E-Gel® Imager Light Diffuser is designed to improve images obtained from the E-Gel® iBase™ Device when placed on the E-Gel® Imager Blue-Light Base or E-Gel® Safe Imager™. To mount the diffuser on the E-Gel® iBase™ Device, use the following procedure:

1. The diffuser has a thin protective film on one side, and 2 strips of adhesive-backed Velcro on the other side.

2. Remove the Velcro strips from the diffuser, and peel off the brown adhesive backing.
3. Attach the Vecro strips to the back of the E-Gel® iBase™ Device and press firmly to set the strips in place.



4. Remove the protective film from the surface of the diffuser.
5. Place the diffuser on the E-Gel® iBase™ Device so that the Velcro strips on the diffuser come in contact with the Velcro strips on the E-Gel® iBase™ Device.

6. The E-Gel® iBase™ Device is now ready to be used with the E-Gel® Imager.

7. To remove the diffuser from the E-Gel® iBase™ Device, gently separate the Velcro strips. The 2 Velcro strips should remain on the E-Gel® iBase™ Device.

Software Installation

Getting Started

Minimum PC Requirements

In order to install and operate both the E-Gel® Imager and GelCapture software, your PC must meet the following minimum requirements:

- Intel® Core™ 2 Duo processor, 1.8 GHz.
- Minimum 1 GB RAM of memory (2 GB recommended).
- 32 bit Windows XP Pro (English version, SP 3) OR Windows 7 Professional (English version) operating system.
- Minimum monitor resolution of 1024 × 768 pixels.
- A free USB 2.0 port (Not compatible with USB 1.0 or 1.1).

Software Installation Guidelines

To install the GelCapture software and camera drivers, follow these guidelines:

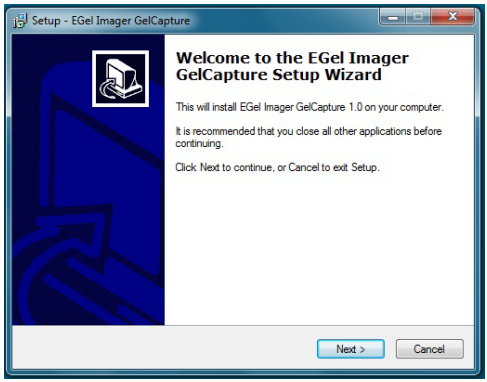
- Log in as user with Administrator privileges (for installation only). Verify that you are logged in as an Administrator before starting installation. If you do not have Administrator privileges, contact your IT department for help.
- Change PC power setting to "Never Hibernate".
- Make sure that the PC is **not** connected to the E-Gel® Imager when installing the GelCapture software.
- Install GelCapture software **before** turning on the E-Gel® Imager and installing camera drivers.
- The GelCapture software installation process requires .NET Framework 3.5. The .NET Framework installation process is automatically launched if it is not present on your PC (see page 57 for details).

You do not have to have an active internet connection while performing software installation.

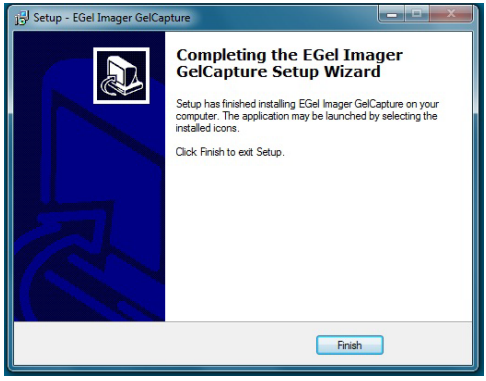
Installing GelCapture (Windows XP Pro)

Installing GelCapture from the CD (Windows XP Professional)

1. Insert the installation CD into the disk drive, and follow the instructions provided by the installation wizard.



2. When the self-installation has completed, click on **Finish** to exit setup.



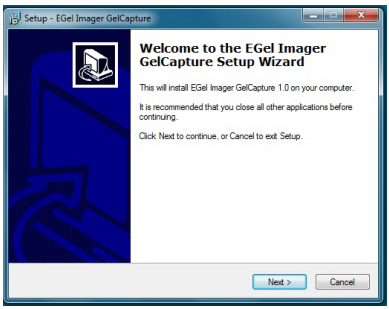
Installing GelCapture (Windows 7 Pro)

Installing GelCapture from the CD (Windows 7 Professional)

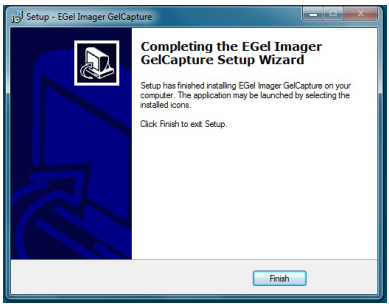
1. Open the CD with internet explorer, right-click the GelCapture.exe installation file, and select the “Run as administrator” option.

2. Select “Allow, I trust this program. I know where it's from or I've used it before” to allow the program to run.

3. Follow the instructions provided by the installation wizard.



4. Once installation is complete, click Finish to exit Setup.



Installing .NET Framework 3.5

.NET Framework 3.5 installation

Follow these steps to complete installation of .NET Framework 3.5:

1. Click the check box to accept the license terms, and click **Install**.

2. Once installation is complete, click **Finish** to exit Setup.

3. Restart your PC.

4. GelCapture installation proceeds after the PC restarts.

Installing the Camera Driver (Windows XP Pro)

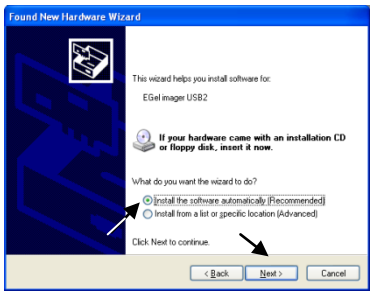
Installing the Camera Driver (Windows XP Professional)

Before installing the camera driver for Windows XP Professional, make sure that the GelCapture software for Windows XP Professional is installed on the computer (page 15).

Note: In most cases the driver is recognized automatically by Windows XP Professional and Windows 7 Professional.

1. Connect the USB 2.0 cable from the PC to the E-Gel® Imager, and turn the E-Gel® Imager camera on.
2. Windows XP Professional automatically displays the Found New Hardware Wizard. Choose No, not this time and click **Next**.

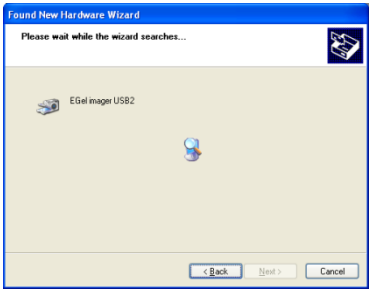
3. Select the "Install the software automatically" option, and click **Next**. The Wizard automatically installs the necessary camera drivers.



Installing the Camera Driver (Windows XP Pro), Continued

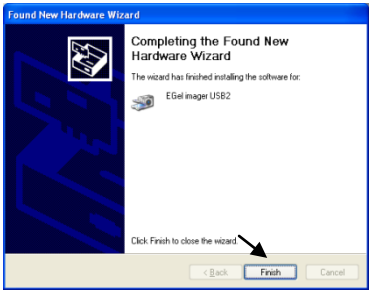
Installing the Camera Driver (Windows XP Professional), continued

4. The Wizard displays the following screen as it searches for the appropriate installation files.



5. If the Windows Logo testing window is displayed, choose Continue Anyway.

6. Once the Wizard completes installation, click Finish.



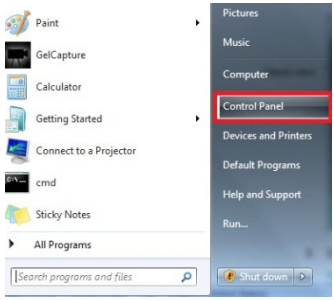
7. GelCapture now recognizes the camera and its drivers.
8. Double-click the desktop GelCapture icon to open the program.

Installing the Camera Driver (Windows 7 Pro)

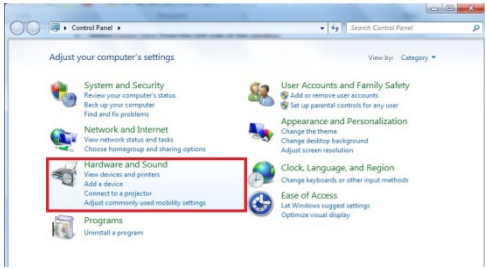
Installing the Camera Driver (Windows 7 Professional)

Before installing the camera driver for Windows 7 Professional, make sure that the GelCapture software for Windows 7 Professional is installed on the computer (page 56).

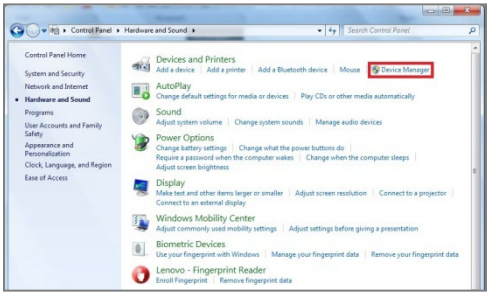
1. Go to Windows Control Panel by clicking Start >> Settings >> Control Panel.



2. Open the Hardware and Sound settings.



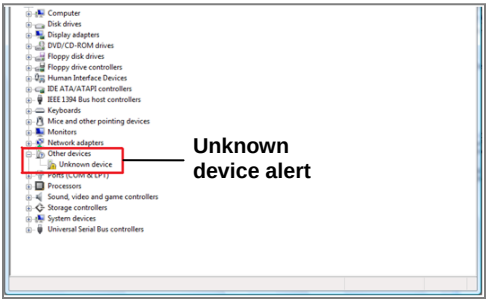
3. From the Devices and Printers settings, open the Device Manger.



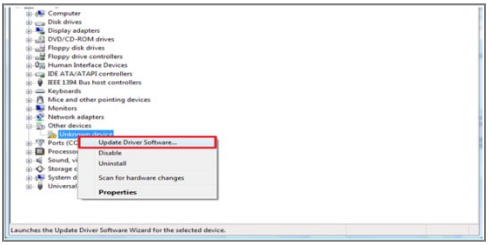
Installing the Camera Driver (Windows 7 Pro), Continued

Installing the Camera Driver (Windows 7 Professional), continued

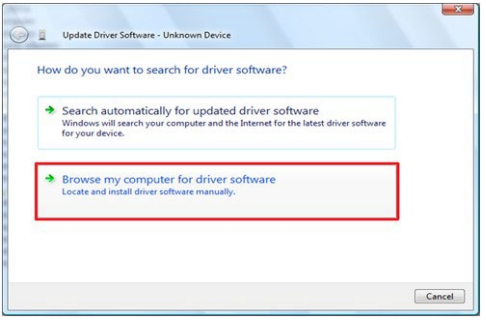
4. Connect the USB 2.0 cable from the PC to the E-Gel® Imager, and turn the E-Gel® Imager camera on. The Device Manager should recognize the new device connection and alert you.



5. Under Other devices, right-click Unknown device and select Update Driver Software.



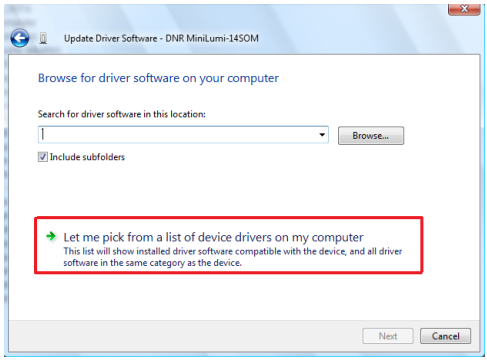
6. In the Update Driver Software window, select "Browse my computer for driver software".



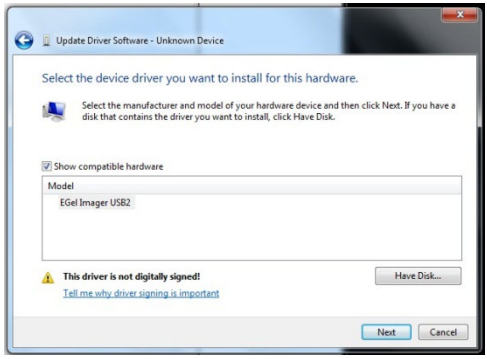
Installing the Camera Driver (Windows 7 Pro), Continued

Installing the Camera Driver (Windows 7 Professional), continued

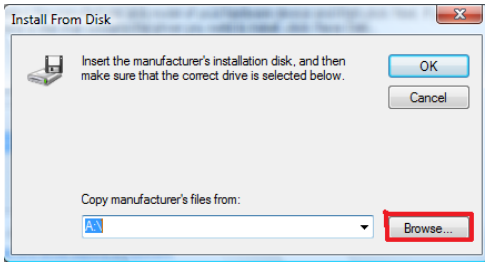
7. Select "Let me pick from a list of device drivers on my computer".



8. Choose E-Gel Imager USB2 and click, **Have Disk**.



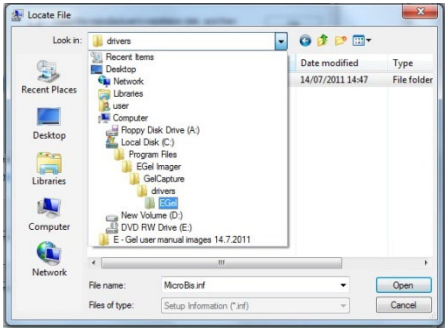
9. In the Install From Disk window, click **Browse**.



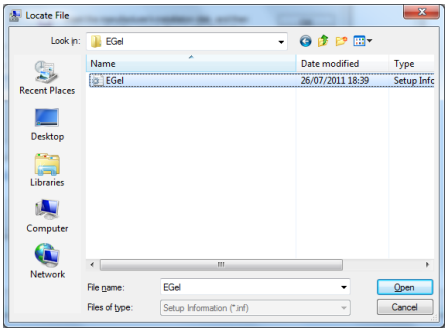
Installing the Camera Driver (Windows 7 Pro), Continued

Installing the Camera Driver (Windows 7 Professional), continued

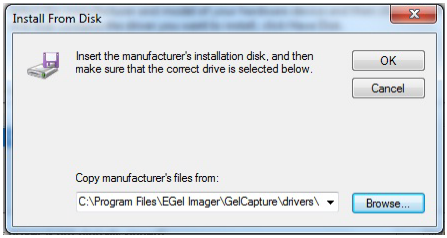
10. Browse to the following location: My computer >> Local Disc (C:) >> Program Files >> EGel Imager >> GelCapture >> drivers >> EGel, and click **Open**.



11. Choose EGel Imager from the E-Gel Imager folder, and click **Open**.



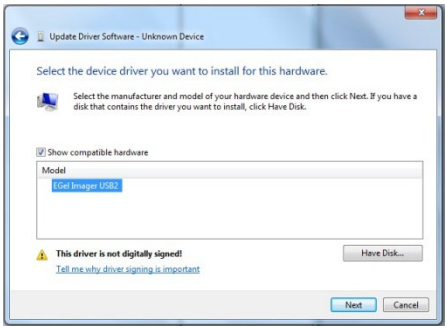
12. Click **OK**.



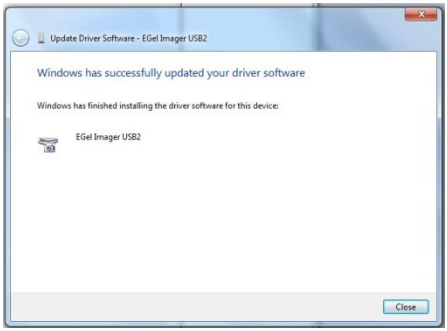
Installing the Camera Driver (Windows 7 Pro), Continued

Installing the Camera Driver (Windows 7 Professional), continued

13. Choose EGel Imager USB2, and click Next.



14. After successfully completing the driver update, the successful update window will be displayed. Click Close.



15. Close the Device Manager and Control Panel windows. The E-Gel® Imager camera driver is now installed and ready for use.

Appendix A

Accessory Products

Additional Products

Ordering information on a variety of electrophoresis reagents and apparatus available from Invitrogen is provided below. For more information, visit our website at **www.invitrogen.com** or call Technical Support (see page 73).

Product	Quantity	Catalog no.
E-Gel® Imager UV Light Base	1 base	4466602
E-Gel® Imager Blue-Light Base	1 base	4466603
E-Gel® Imager Adaptor Base	1 base	4466604
E-Gel® Gel Cutting Kit	1 kit	4466605
E-Gel® Imager Universal Filter	1 filter	4466606
E-Gel® Imager Qdot® 625 Filter	1 filter	4466607
E-Gel® Imager UV/SYBR® Filter	1 filter	4466608
E-Gel® iBase™ and E-Gel® Safe Imager™ Combo Kit	1 kit	G6465
GelQuant Express Software Activation Dongle	1 kit dongle	4466610
E-Gel® iBase™ Power System	1 device	G6400
E-Gel® Safe Imager™ Real-Time Transilluminator	1 device	G6500
E-Gel® Go! Base	1 device	G4400
E-Gel® 1.2% General Purpose Agarose 18-Pak	18 gels	G501801
E-Gel® 2% General Purpose Agarose 18-Pak	18 gels	G501802
E-Gel® CloneWell 0.8% SYBR® Safe gels, 18-Pak	18 gels	G661808
E-Gel® EX Gel, 2%, 20-Pak	20 gels	G402002
E-Gel® EX Gel, 4%, 10-Pak	10 gels	G401004
SYBR® Green I nucleic acid gel stain	500 µL	S7563
Qdot® 625 Streptavidin Conjugate	200 µL	A10196
Qdot® 625 Antibody Conjugation Kit	1 kit	A10197
A variety of antibodies are available from Invitrogen. For more details, visit www.invitrogen.com/antibodies.		

Technical Support

Obtaining support

For the latest services and support information for all locations, go to **www.invitrogen.com** for:

At the website, you can:

- Access worldwide telephone and fax numbers to contact Technical Support and Sales facilities
- Search through frequently asked questions (FAQs)
- Submit a question directly to Technical Support (**techsupport@invitrogen.com**)
- Search for user documents, SDSs, vector maps and sequences, application notes, formulations, handbooks, certificates of analysis, citations, and other product support documents
- Obtain information about customer training
- Download software updates and patches

Purchaser Notification

Limited Warranty

Invitrogen (a part of Life Technologies Corporation) is committed to providing our customers with high-quality goods and services. Our goal is to ensure that every customer is 100% satisfied with our products and our service. If you should have any questions or concerns about an Invitrogen product or service, contact our Technical Support Representatives.

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Product Specifications

E-Gel® Imager Camera Hood

The specifications for the E-Gel® Imager Camera Hood are listed below.

Case dimensions:	35.6 cm (height) × 30.5 cm (length) × 21 cm (width)
Electrical Requirements:	100–240 V, 50/60Hz, 0.6A
Temperature:	Ambient ± 5°C to 40° C
Adaptor Specifications:	Use only the UL Listed adaptor supplied with the E-Gel® Imager Camera Hood (100–240 VAC, 50/60 Hz, 0.6 A).

E-Gel® Imager UV/Blue-Light Light Base

The specifications for the E-Gel® Imager UV/Blue-Light Base are listed below.

Viewing surface dimensions:	42 mm × 83 mm
Case dimensions:	11.9 cm (height) × 30.5 cm (length) × 21 cm (width)
Electrical Requirements:	100–240VAC 50/60Hz 0.6A
Temperature:	Ambient ± 5°C to 40° C
Adaptor Specifications:	Use only the UL Listed adaptor supplied with the E-Gel® Imager Light Base (90–264 VAC, 47/63 Hz, 0.9 A).

Appendix B: Safety

Safety Information

This chapter describes safety requirements required for proper installation and operation of your E-Gel® Imager system.

Safety features

- An internal sensor prevents accidental electrocution when the tower is lifted off the base by automatic circuit cut-out.
- This system has automatic shut-down when not in use for more than 20 minutes.

Safety requirements

- Verify that all devices are turned off before making any connections.
- Do not block the ventilation openings of any parts of the E-Gel® Imager unit or of its sub-assemblies.
- Place the E-Gel® Imager unit at least 30 cm (12 inches) away from walls and ceiling.
- **Do not store below –10°C**. The recommended operating conditions for the E-Gel® Imager are 25°C (78°F) ± 5ºC, 55% relative humidity, up to 2000 m altitude. Storage conditions: –10ºC to 40ºC; 50–80% humidity; up to 2000 m altitude.
- Do not store the system in direct sunlight or in the direct flow of the air conditioner.
- Do not clean the system with harmful solvents. Only use a soft cloth dampened with water.
- Intended for indoor use only.
- Do not open the unit. Due to the danger of exposure to high voltage, only trained service technicians should open the unit.
- Do not place the system near any motorized, vibrating or magnetic equipment.
- Unit protection can be impaired if used in a manner not specified by the manufacturer.
- Dispose of all plastic bags and wrapping according to local environmental regulations and keep them away from children.

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Notice de sécurité

- Vérifier que tous les appareils sont éteints avant tout rembranchement.
- Ne pas bloquer les ouvertures de ventilation d'aucune partie de l'unité de *E-Gel® Imager* ou de ses sous-assemblages.
- Placer l'unité de E-Gel® Imager au moins 30 cm (12 pouces) loin des murs et du plafond.
- Recommandé :
    - A l'exécution : 25°C ± 5°C , 55% humidité relative; Altitude: jusqu'à 2000 mètres.
    - En stockage : –10°C à 40°C; 50–80% niveaux d'humidité; Altitude: jusqu'à 2000 mètres.
- Ne pas stocker le système en plein soleil ni en circulation directe du climatiseur.
- Ne pas nettoyer le système avec des forts solvants. Utiliser un chiffon humide avec de l'eau.
- Destiné uniquement à l'utilisation à l'intérieur des bureaux.
- Ne pas ouvrir l'unité. En raison du danger d'exposition à haute tension, uniquement les techniciens de service formés peuvent l'ouvrir.
- Ne pas placer le système à côté d'appareils motorisés, vibrants ou magnétiques.
- La protection de l'unité peut être réduite si elle est utilisée d'une manière non spécifiée par le fabricant.
- Disposer de tous les sacs en plastique et l'emballage selon les règlements environnementaux locaux et garder-les loin des enfants.

Explanation of Symbols and Warnings

	The E-Gel® Imager system complies with the Underwriters Laboratories Inc. regulation and the European Community Safety requirements. Operation of the E-Gel® Imager system is subject to the conditions described in this manual. The protection provided by the equipment may be impaired if the equipment is used in a manner not specified by Invitrogen.
	The E-Gel® Imager system complies with the MET Laboratories, Inc regulation safety requirements.
	The E-Gel® Imager with E-Gel® Imager UV Light Base is classified as a device that produces ultraviolet illumination, as indicated by the symbol to the left.
	The **Caution** symbol denotes a risk of safety hazard. Refer to accompanying documentation.
	This symbol indicates that the device operates on alternative current.
	This symbol indicates that the device is protected by double reinforced insulation.
	The **WEEE** (Waste Electrical and Electronic Equipment) symbol indicates that this product should not be disposed of in unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE. Visit **www.invitrogen.com/weee** for collection and recycling options.

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Explanation of Symbols and Warnings, Continued

This product has been tested to the requirements of CAN/CSA – C22.2 No. 61010 – 1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

The C-Tick symbol denotes that the device is compliant with the electromagnetic compatibility (EMC) of the Australian Communications Authority (ACA).

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