

ChemStudio Imager



Operating manual

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Documentation number: 81-0220-02

Edition – April 2016 (Rev B)
Implementation of the Technical Documentation:
Analytik Jena AG

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1 Basic information

1.1 User manual notes

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

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

User manual conventions

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

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

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

1.2 Intended use

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

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

1.3 Warranty and liability

The warranty duration and liability comply with the legal requirements and the provisions in the general terms and conditions of Analytik Jena AG. Tubes and filters are warranted for 90 days.

Deviations from the intended use described in this user manual result in limitations of warranty and liability during a damage event. Damage to wearing parts is not included in the warranty.

Warranty and liability claims are excluded for personal injury and property damage due to one or several of the following causes:

- use of the Imager other than intended
- improper commissioning, operation and service of the device
- modifications of the equipment without prior consultation with Analytik Jena AG

- unauthorized intervention in the equipment
- operation of the device with faulty safety equipment or improperly fitted safety and protection equipment
- inadequate monitoring of the equipment components subject to wear
- use of other than original spare parts, wearing parts or consumables
- improper repairs
- faults due to the non-observance of this user manual

2 Technical data

2.1 Specifications

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

2.2 Minimum computer requirements

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



IMPORTANT

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

2.3 Cameras and lenses

The ChemStudio can be equipped with two different cameras.

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

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

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

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

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

Lens Kit (Motorized or Manual)

The zoom lens used comes in two configurations:

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

Additionally, a light-sensitive fixed lens with 42.5 mm focal lengths ist available for camera 815 CCD.

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

3 Safety instructions

3.1 General notes

For your own safety and to ensure error-free and safe operation of the Imaging System, please read this chapter carefully before commissioning.

Observe all safety notes listed in this user manual.

Besides the safety instructions in this user manual and the local safety regulations that apply to the operation of the device the general applicable regulations regarding accident prevention, occupational health and safety and environmental protection have to be observed and complied with.

References to potential dangers do not replace the work protection regulations which must be observed.

3.2 Symbols and signal words used

The user manual uses the following symbols and signal words to indicate hazards or instructions. The safety instructions are always placed before an action.



CAUTION

Indicates a potentially hazardous situation.

If it is not prevented light or minor injuries and material damage can result.



IMPORTANT

Indicates application hints and other especially useful information without any resulting hazardous or damaging situations.

3.3 Safety markings at the Imaging System

Safety symbols have been attached to the Ultraviolet Transilluminator whose content must always be observed. Damaged or missing safety symbols can cause incorrect actions leading to personal injury or material damage! The safety symbols must not be removed! Damaged safety symbols must be replaced without delay!

The following safety symbols have been attached to the Ultraviolet Transilluminators:



General warning



Caution: Radiation,
ultraviolet

3.4 Technical condition

The Imaging System corresponds in its design and construction to the current state of the art technology. Unauthorized modifications or changes, especially such that affect the safety of the staff and the environment, are generally not allowed.

Observe the following notes:

- The operator must only operate the device in a sound and operationally safe condition. The technical condition must always comply with the legal requirements and regulations.
- Prior to every use the device must be checked for damage and sound condition.
- Any changes in the device affecting its safety must be reported by the operating personnel to the operator without delay.

3.5 Requirements for the operating personnel

Observe the following notes:

- The device must only be commissioned, operated and serviced by trained personnel instructed in technical safety.
- The operation or servicing of the device by minors or individuals under the influence of alcohol, drugs or medication is not permitted.
- It must be ensured that only authorized personnel works at the device.
- The operating personnel must be familiar with the dangers arising from samples to be used. The appropriate protective equipment must be used.
- The unit may include shortwave UV, which is a powerful source of UV radiation that will cause damage to unprotected eyes and skin. Before operating any unit, ensure all personnel in the area are properly protected and that instructions for use of this equipment are followed.

3.6 Safety instructions – transport and assembly

- Clean and decontaminate the Imaging System.
- Allow for a sufficient cool-down of the light tubes of the transilluminator before transport.
- Protect the filter glass of the transilluminator against scratches and breakage by a suitable padding.
- Protect the instrument against moisture.

3.7 Safety instructions – operation

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

For your own safety observe the following notes:

- The device must only be operated if all protective equipment is present, properly installed and fully operational. Special care must be taken that the UV protection lid is closed. Protective and safety equipment must never be removed, modified or decommissioned during operation.
- The sound condition of the protection and safety equipment must be checked regularly. Any defects must be corrected as soon as they occur.
- The Imaging System must only be connected to a power supply with the indicated voltage (100 V, 110 V or 230 V).
- Free access to the power plug on the back of the unit must be ensured.
- Covered vents may cause the device to break down or may cause damage to it.

3.8 Handling of auxiliary and operating materials

The operator is responsible for the selection of substances used in the process as well as for their safe handling. This is particularly important for radioactive, infectious, poisonous, corrosive, combustible, explosive and otherwise dangerous substances.

Observe the following notes:

- Hazardous substances have to be handled according to the biosafety level of the laboratory. The relevant regulations and the notes in the EC safety data sheets of the manufacturers have to be observed as well as the national and international guidelines (WHO, "Laboratory Biosafety Manual").
- Wear protective equipment when operating the UV light.
- Obey all security instructions for decontaminating the Imaging System.

3.9 Safety instructions – maintenance

Observe the following notes:

- Disconnect the power supply before servicing the Imaging System.
- Allow for a sufficient cool-down of the light tubes of the transilluminator before maintaining them.

To clean the unit:

- Use only mild soap and a damp soft cloth or damp sponge to clean the unit surface.
- Never use organic based compounds, Alcohol, or Ammonia containing cleaners.
- Do not use abrasive pads or cleaners, they could damage the UV filter surface of the transilluminator.

3.10 Behavior during emergencies

- In case of emergency disconnect immediately the plug of the Imaging System from the outlet!

Because a rapid response can save lives during an emergency, the following has to be ensured:

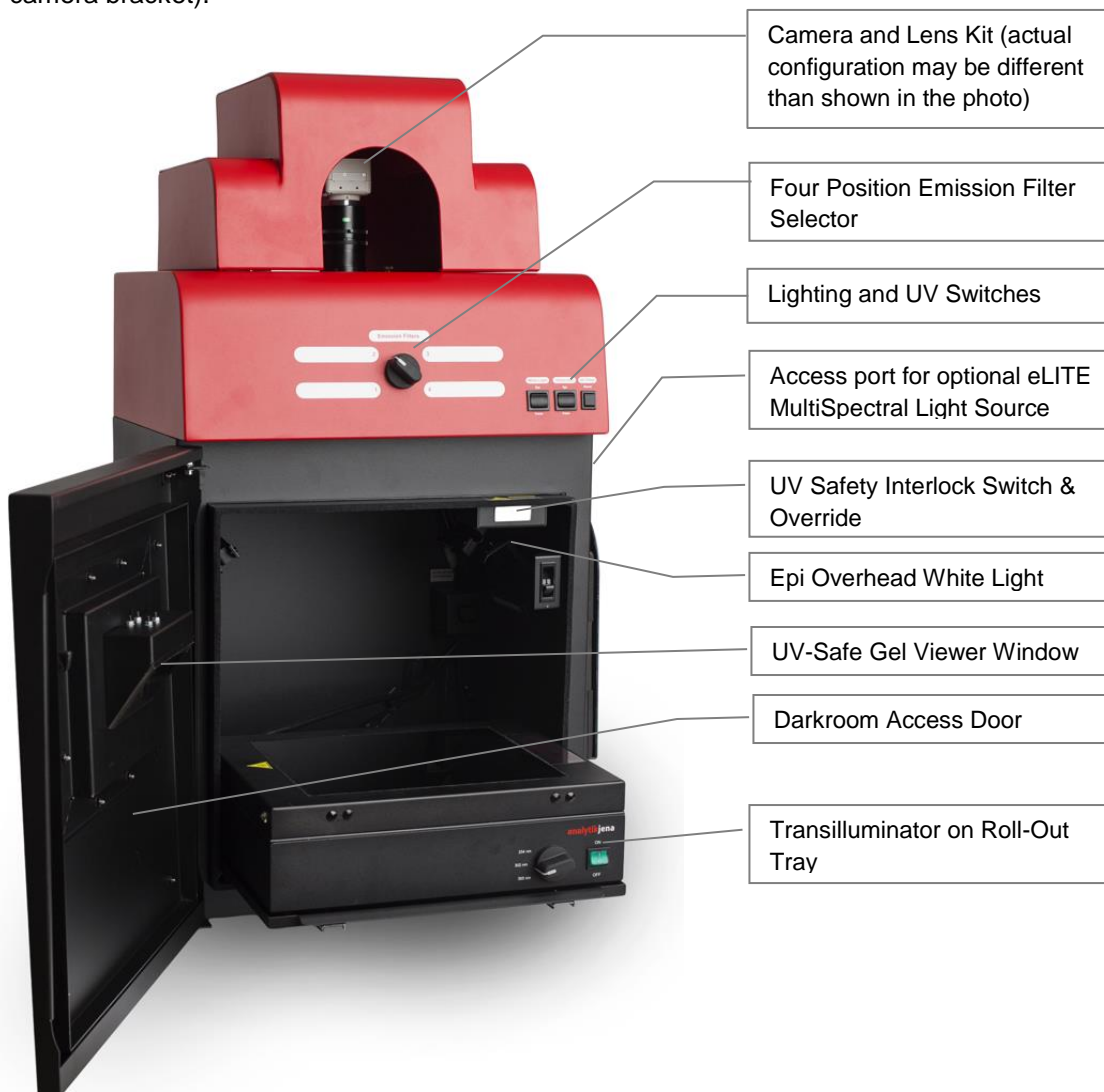
- The operating staff must be familiar with the location of safety equipment, accident and danger alarms, first aid and rescue equipment as well as their handling.
- The operator is responsible for the respective training of the operating staff.
- All equipment for first aid (first-aid kit, eyewash bottles, stretcher, etc.) as well as equipment for firefighting (fire extinguishers) must be within reach and easy to access. All equipment has to be in a sound condition and should be checked at regular intervals.

4 System design

4.1 Components

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

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



4.2 Camera Models

815 CCD and 515 CCD Cameras

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

4.3 Ethidium Bromide (EtBr) emission filter

The ethidium bromide (50 mm²) UV-blocking bandpass interference filter blocks UV and IR radiation emitted from the transilluminator. The filter is placed in the slide-out filter wheel assembly on the side of the Imager. The filter allows visualization of fluorophores from 580 - 630 nm, targeting the ethidium bromide emission peak of 605 nm.

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

4.4 Darkroom

The darkroom is light tight to provide optimal imaging conditions. Darkroom features include:

- Epi (overhead) LED white light
- Roll-out transilluminator tray
- UV-safe gel viewer window built into the darkroom door
- Side pocket for storage of materials
- Four position emission filter wheel
- Brackets and built-in power ports for installing optional epi UV illumination lamps
- Brackets for installing optional high-intensity halogen or xenon eLITE epi light guides
- Built-in power port for transilluminator
- Built-in power cord for optional LED White Light Plate
- UV safety interlock switch with manual override to disable UV transillumination and optional UV epi illumination when darkroom door is opened

4.5 Transilluminator

The ChemStudio Imager can accommodate Analytik Jena's Benchtop and FirstLight[®] transilluminator models. Analytik Jena offers a variety of transilluminator configurations, including models with multiple wavelengths and variable intensities as well as the highly uniform, patented FirstLight transilluminator. Refer to the packing slip for the transilluminator included with your system.



IMPORTANT

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

4.6 Fluorescent Focus Target

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



Fluorescent Focus Target

4.7 Optional Equipment

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

4.8 Thermal Printer

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



Thermal Printer

4.9 UV Handheld Lamps for Epi (Overhead) Lighting

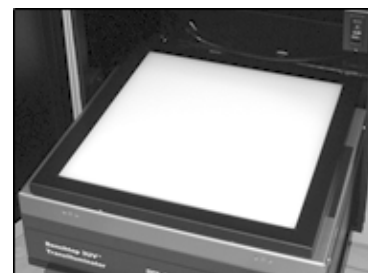
A set of two 4-watt ultraviolet lamps can be connected inside the darkroom to provide epi UV illumination. These lamps can be switched on or off using the switch in front of the darkroom and can also be removed from the darkroom and used as standalone handheld lamps (as seen in the image to the right).



UV Lamp

4.10 LED White Light Plate

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



LED White Light Plate

4.11 Converter Plates

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

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



UV/White Converter Plate

4.12 VisionWorks®LS Analysis Software

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



IMPORTANT

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

5 Set-Up

5.1 Scope of supply

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

- ChemStudio darkroom
- Transilluminator
- Camera with lens and bracket
- Ethidium bromide (EtBr) emission filter
- Power cable
- VisionWorksLS[®] Software
- Supporting documentation

When unpacking and setting up the darkroom, two people are required to move the darkroom.

Place the darkroom on a flat surface which can provide adequate support for up to 100 pounds.



CAUTION! Risk of short circuits!

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



IMPORTANT

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

5.2 Connecting the power cables

1. Inside the darkroom, place the transilluminator on the roll-out tray. Connect the transilluminator to one end of the jumper cable. Connect the other end of the jumper cable to the interior of the darkroom. Turn the UV transilluminator's main power switch (green switch) **ON**.
2. If installing the LED White Light Plate, place the plate on top of the UV transilluminator and connect the power cord coming from inside the darkroom to the back of the Plate.
3. If installing epi UV handheld lamps, place the lamps in the brackets located at the top of the darkroom. Plug the handheld lamps into the outlets provided inside the darkroom. Place the power switches located on the outside of the handheld lamps in the **ON** position.
4. Connect the main power cord from the back of the darkroom to a surge-protected power outlet.

5.3 Installing emission filters

To install the 50 mm² ethidium bromide (EtBr) filter and any other emission filters:

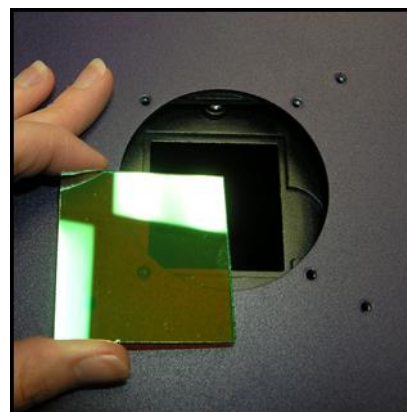
1. Carefully remove the filter from the protective plastic case, holding the filter at the edges to prevent placing fingerprints on the glass surface.



IMPORTANT

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

2. The filter wheel is located inside the top of the darkroom. Before placing the filter in the filter wheel, ensure that the text on the edge of the filter is positioned so it is right side up when facing the installer.
3. Place the filter in the filter wheel.
4. Write the name of the filter on the appropriate label at the front of the darkroom.



Additional and replacement emission filters are available through Analytik Jena. Refer to the “**Replacement Parts and Accessories**” section of this manual for ordering information.

5.4 Camera Setup

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

- 515 CCD
- 815 CCD

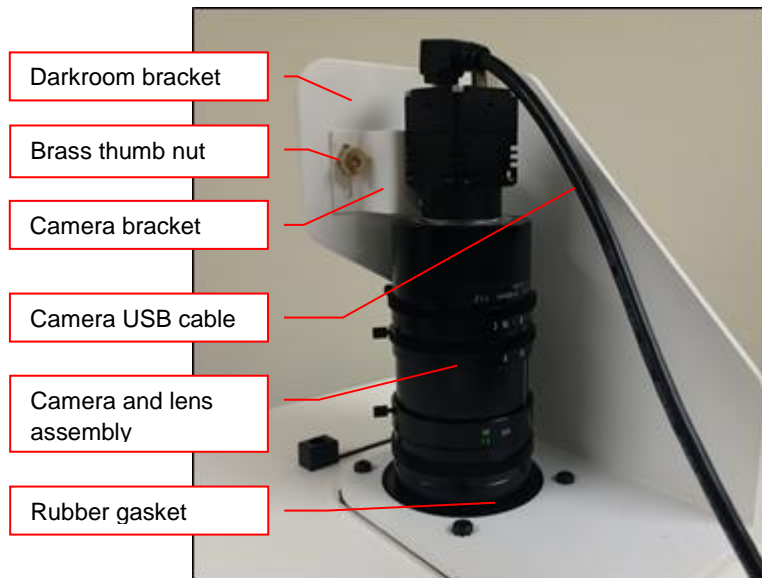
5.4.1 Camera with Manual Lens

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

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

1. Before installing the camera, install the emission filter. Refer to section: 5.3 Installing emission filters.
2. Remove the cap from the lens by pulling off, instead of unscrewing.
3. When using a zoom lens, a step-up ring and diopter should be attached to the lens. The step-up ring and diopter will only fit one way.

4. Using the brass thumb nuts provided, secure the camera assembly bracket to the darkroom base located the top of the system. Ensure that a light-tight seal is made between the end of the lens and the rubber gasket beneath the darkroom bracket.
5. Plug the additional power cables to an external power source.
Do not plug the camera USB into the computer, until VisionWorks LS has been installed!

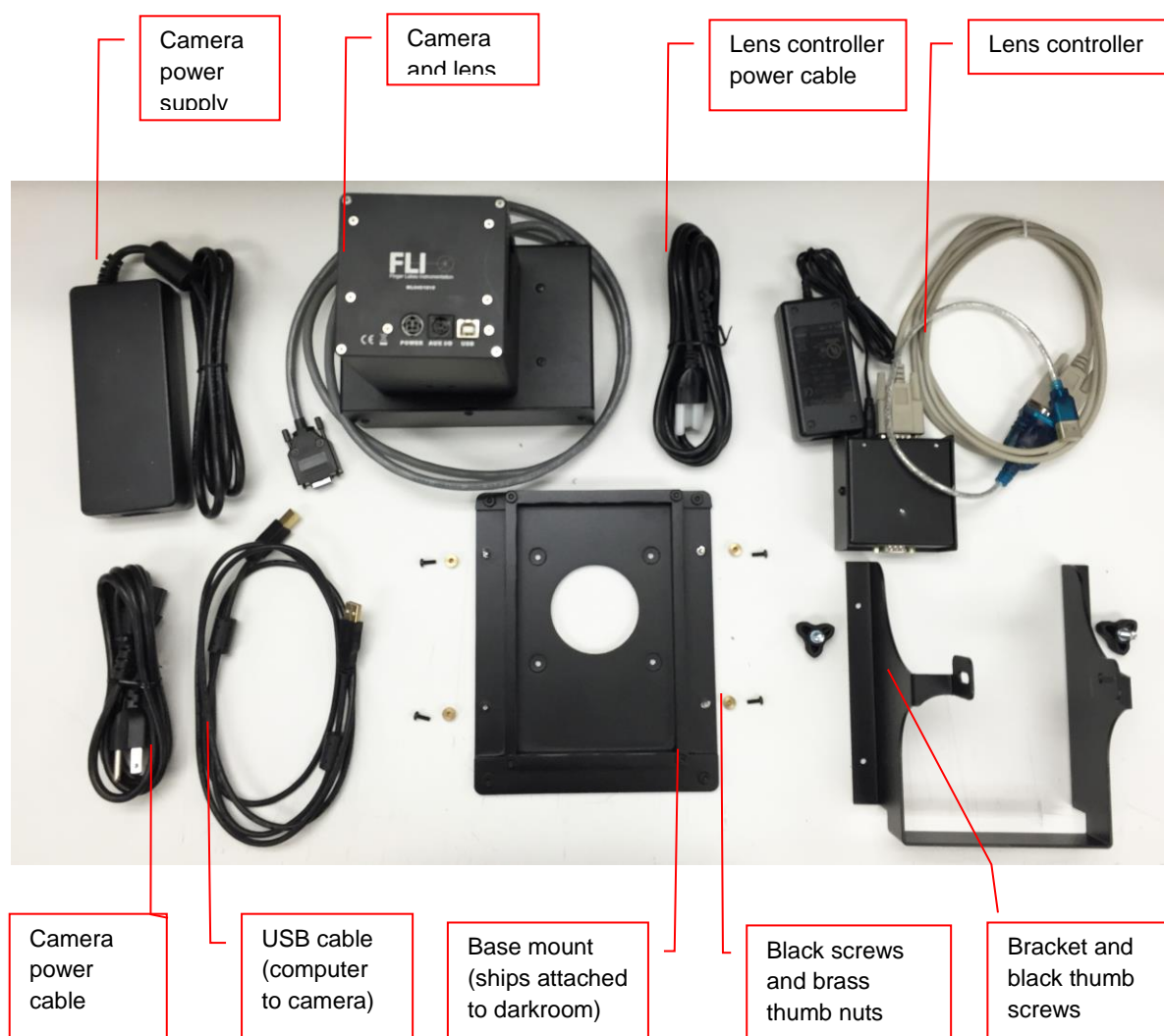


5.4.2 Camera with Motorized Lens

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

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

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



Camera Installation

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

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

1. Check to see if base mount has been mounted to the top of the darkroom. If not, use the black screws or brass thumb nuts to install the mount.
2. Attach the camera bracket to the base mount with the brass thumb nuts.
3. Place the camera/lens assembly in the hole in the base mount, making sure that the label, found on the camera, which states Front, is placed towards the front of the darkroom, facing the user.
4. Use the black thumb screw(s) to tightly secure the camera in place, attaching it through the hole at the top of the bracket.
5. Plug the serial cable from the motorized lens into the lens controller.
6. Plug the camera cable into the top of the camera. Do not plug the other end of the USB cable for the lens controller and camera, into the computer, until VisionWorksLS software has been installed

Note: When looking at the darkroom from the front, the 815 CCD and 515 CCD cameras attach to the bracket with the Black Thumb Screw to the right and/or left of the system. The USB and power cables will extend from the top of the camera, facing the user.

5.4.3 515 CCD Camera with Motorized Zoom Lens

Note: The picture below shows the **12.5-75mm f/1.2 motorized zoom lens**. The camera, zoom lens and diopter are assembled at the UVP factory.

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

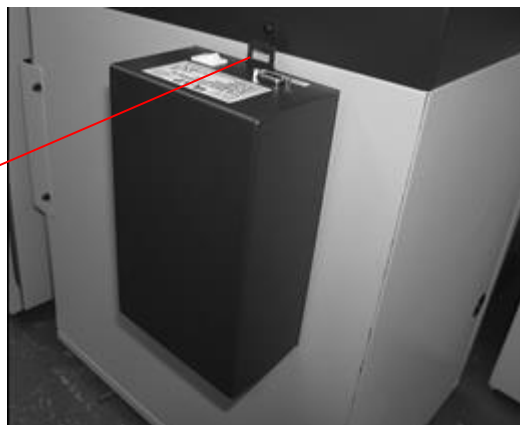


Camera Installation

1. **Note:** If not already removed, take the lens cap off the lens by pulling straight off. Do not unscrew the lens cap as it will simply pull off.
2. Follow steps 1-4 from the **Camera Installation** section under **5.4.2 Cameras with Motorized Lens**.
3. Plug the camera cable into the top of the camera but do not plug in the other end of the USB cable until VisionWorksLS software has been installed.

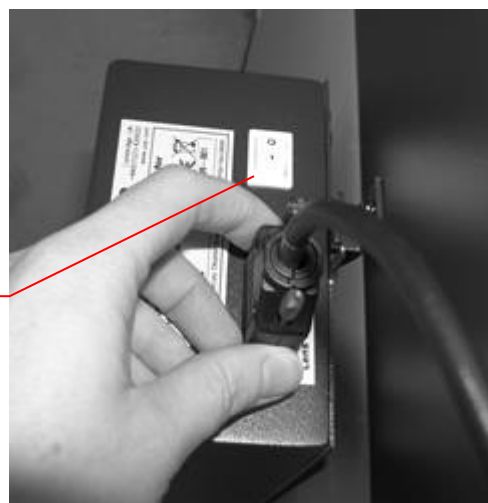
4. Mount the lens control box on the hook located at the back of the darkroom.

Hook for the
Lens Control Box



5. Plug the serial cable from the motorized lens into the lens control box.

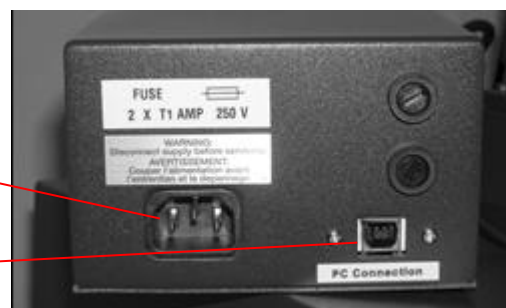
Power switch for the Lens
Control Box



6. Connect the USB cable to the PC connection port on the lens control box. Leave the other end of the USB cable unplugged until installation of VisionWorksLS is complete.
7. Connect the power supply to the lens control box and into the power outlet.

Power supply
on the Lens Control Box

PC Connection on the Lens
Control Box



6 Software Installation

6.1 Installing VisionWorksLS Software

1. Insert the VisionWorksLS flash drive into the computer.
2. Click on the **Install** button for VisionWorksLS.
3. Click **OK, Next**, agree to “I accept terms of licensing agreement”, then **Next**. Leave all options in their default settings. Then click **Next, Next, Install** and finally **Finish**.

6.2 Registering the Software

1. Double click the VisionWorksLS software icon on the desktop.
2. To activate the software, registration is required. To immediately activate the software online, choose **On-the-Fly activation**. Activation can also be done **using a smartphone**.



Activation can also be done at REG.UVP.com using any other web connected device. A Config ID will be needed for this option and can be found by clicking **Next** after selecting **On the fly activation**. It will be displayed under **Configuration ID**.

3. Click **Next** to continue.
4. The **Already have an activation ID** option is useful when reloading the software after receiving an initial activation code.
5. Complete all required information on the form.
6. Fill out the Serial Number located on the box delivered with the flash drive. The number should be four sets of six numbers.
7. Once the form is completed, click on **Get Activation No.** and then click **Activate** once the Activation Number appears in the box.

8. If the computer is not connected to the Internet, click **Offline activation** to register the software. This allows the user to obtain the activation code and enter it at another time.
9. Click **Next** to continue.
10. Click the link provided and complete the form to obtain registration instructions. Click **Finish**.

6.3 Installing Camera Drivers

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

Note:

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

7 Using the imaging system

7.1 Powering up the system

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

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

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

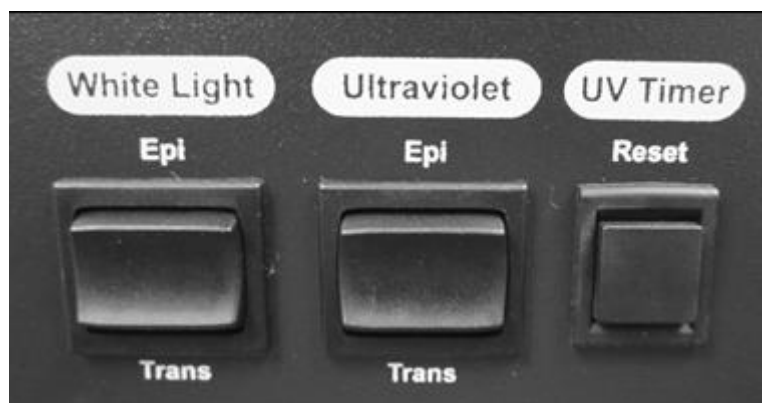
7.1.1 UV Timer

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



IMPORTANT

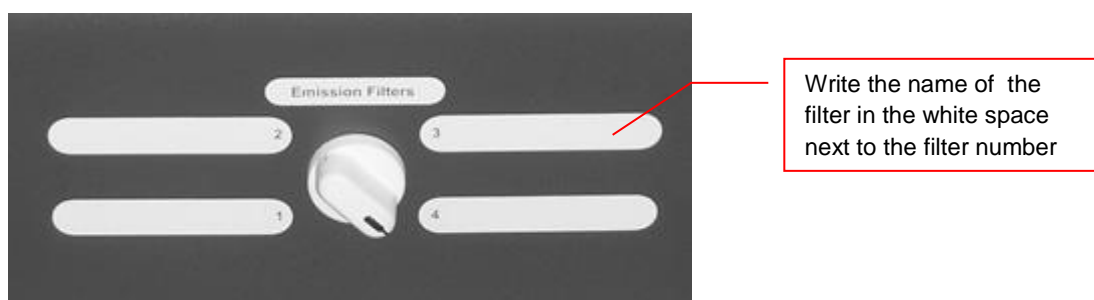
When the darkroom door is opened and closed again, the UV timer is automatically reset.



7.2 Using the Filters

When installing emission filters in the ChemStudio, the user should note the location of the emission filter selector knob located on the front of the system (pictured below). After installing all filters, write the name of the filter in the white area next to the filter numbers (1 - 4).

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



7.3 Using the Transilluminator

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

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



IMPORTANT

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

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

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

7.4 Using the Overhead (Epi) Lighting

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

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

7.5 Using the UV Gel Viewer Window

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

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



IMPORTANT

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

8 Capturing Images and Using Templates

8.1 Image Focusing

8.1.1 Manual Lens

Prior to capturing an image, prepare the image focus:

1. Turn on the transilluminator and place the **Fluorescent Focus Target** (see “System Components”) on the transilluminator surface.
NOTE: The darkroom has a UV safety switch that turns off the transilluminator and optional UV handheld lamps when the door is open. After closing the door, open the **UV Gel Viewer Window** to ensure that the transilluminator is on and that all other lighting is off.
2. With VisionWorksLS open, preview the image. Adjust the camera settings, including exposure time, to enhance the image of the sample. To adjust the settings, go to the Acquisition Action Tab and click on the Camera Menu Button. Adjust the exposure time from the Exposure Time section of the Camera Menu.
3. Rotate the lens f-stop adjustment (top ring) so that the image is bright enough to be seen on the screen.
4. Rotate the lens focus adjustment (bottom ring) on the lens. Adjust the focus so that the image appears clear on the screen.
5. Rotate the zoom lens adjustment (middle ring, if zoom lens is used) on the lens so that the image is ideally zoomed. Readjust the focus ring (bottom ring) on the lens, making the image clear. Adjust the zoom so that the object of interest is within the image preview area.

8.1.2 Motorized Lens (815 CCD and 515 CCD)

Prior to capturing an image, prepare the image focus:

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

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

2. Open VisionWorksLS software, click on the Acquisition Action Tab, and then click on the Lighting Menu Button. Adjust the aperture, zoom (if applicable) and focus controls from the Lens Control section of the Lighting Menu until an ideal image is seen.
3. Adjust the camera settings, including exposure time, to enhance the image of the sample. To adjust the settings, go to the Acquisition Action Tab and click on the Camera Menu Button. Adjust the exposure time from the Exposure Time section of the Camera Menu.

8.2 Capturing Images

1. Depending on the sample type, place the sample on the chemi tray, transilluminator or white light plate.
2. For a chemiluminescent sample, turn off all darkroom lighting, place the black chemi tray on top of the transilluminator and place the sample on the tray. For a fluorescent gel sample, turn on the UV transilluminator.
3. Adjust the capture settings in VisionWorksLS.
4. Click the **Capture** button.

8.2.1 Recommended Settings for Short Exposures and Focusing

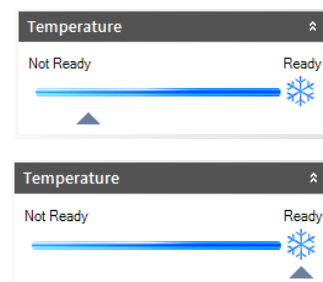
1. Increasing the Binning will increase the camera’s refresh rate and sensitivity. However, it also exponentially decreases overall image resolution. Binning works by combining smaller pixels into one larger pixel. For example, 2 x 2 binning will take a 2 x 2 area of pixels (4 pixels all together) and combine them into one large pixel, 4 x 4 binning will combine a 4 x 4 area of pixels (16 pixels all together) into one large pixel, and so forth, thus increasing image sensitivity but decreasing overall image resolution.
2. In most cases, 4 x 4 preview binning is recommended for general focusing and the fastest possible frame rates. (**NOTE:** Binning is not available on 300-series cameras)
3. Decrease the preview exposure time to 15 - 100 ms.
4. Always focus at a lower (faster) f-number than the capture setting. Increasing the f-number will increase the “depth of field,” creating a better focus on the target.

8.2.2 Capturing Longer Image Exposure with the Least Noise

1. **Binning** can be ideal for very dim images where high sensitivity is needed. Binning of at least 2 x 2 is recommended for exposures over 1 - 2 minutes.
2. Ensure that the camera has had an adequate amount of time to cool before taking long exposure images. This can be verified by referencing the “CCD Temperature” status

in the lower-left corner of VisionWorksLS.

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



8.3 Using Templates

8.3.1 Set Up and Save Camera Templates



IMPORTANT

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

Chemi Blot Pre-Capture Positioning: For this application, use a preview binning of 4 x 4, a capture binning 1 x 1 and an exposure time of 0.2 sec. Have the darkroom door cracked open to let in some ambient light.

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

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

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



IMPORTANT

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

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

8.3.2 To Process a Blot

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



IMPORTANT

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

9 Maintenance, replacement parts/accessories

9.1 Care and cleaning



CAUTION! Risk of electrical shock!

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

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

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

- Clean the instrument only from outside.

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

Transilluminator

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

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

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

9.2 Replacement parts and accessories

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

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

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

Replacement Part Description	Part Number
Fuses	
Fuse, 3.15 A (for Darkroom)	849-56-0022-04 (2 Required)
Fuse, 2 A/250 V, 0.25" x 1.25", slow-blo (for Transilluminators)	849-56-0002-01 (2 Required)
<u>UV Handheld Lamps for epi-UV light:</u>	
UV Handheld Lamp, 254/365 nm, 4 watt (115 V)	849-20700-4 (2 Recommended)
UV Handheld Lamp, 254/365 nm, 4 watt (230 V)	849-20700-0 (2 Recommended)
UV Handheld Lamp, 365 nm, 4 watt (115 V)	849-20701-4 (2 Recommended)

UV Handheld Lamp, 365 nm, 4 watt (230 V)	849-20701-0 (2 Recommended)
UV Handheld Lamp, 254 nm, 4 watt (115 V)	849-20702-4 (2 Recommended)
UV Handheld Lamp, 245 nm, 4 watt (230 V)	849-20702-0 (2 Recommended)
Emission Filters	
Filter, Ethidium Bromide, 50 mm Square	849-00400-0
Filter, SYBR [®] Green, 50 mm Square	849-00401-0
Filter, SYBR [®] Gold, 50 mm Square	849-00402-0
Transillumination Accessories	
LED White Light Plate	849-20500-0
Converter Plate UV-to-white, 21 cm x 26 cm	849-20510-0
Converter Plate UV-to-white, 25 cm x 26 cm	849-20511-0
Converter Plate UV-to-blue "Visi-Blue", 21 cm x 26 cm	849-20520-0
Converter Plate UV-to-blue "Visi-Blue", 25 cm x 26 cm	849-20521-0
Converter Plate UV302-to-UV365, 25 cm x 26 cm	849-20523-0
Gel Accessories and Protective Equipment	
Gel Cutter (2 pieces)	849-20603-0
Gel Scooper, scoop area 14 cm x 15 cm, UV transparent	846-057-013
Gel Tray, 29 cm x 23 cm, UV transparent	849-20605-0
Gel Ruler, UV fluorescent (2 pieces)	849-20600-0
Faceshield, UV blocking	849-20602-0
Safety spectacles, UV blocking	846-055-002

9.3 Troubleshooting

9.3.1 No power to the darkroom or transilluminator

1. Recheck the main power cord connection to the ChemStudio darkroom as well as the power cables between the darkroom and transilluminator, LED White Light Plate or optional UV handheld lamps.
2. Check the fuses located at the back of the unit next to the power port. A small flat-head screwdriver or similar tool will be required. Turn the fuseholder cap counterclockwise and the fuse holder will pop out. Inspect the thin wire within the glass fuse to see if there is a break in the wire. If so, replace the fuse(s). If fuses are blowing repeatedly, contact Analytik Jena Technical Support for additional troubleshooting.

9.3.2 A partial image appears on the screen

1. Ensure that the filter wheel is not off center by turning the filter wheel selector until it fully engages or “clicks” into place.
2. Remove the camera/lens combination and verify that the emission filter is fully seated in the filter wheel.

9.3.3 Transilluminator will not turn on

1. In addition to the Ultraviolet: Trans power switch on the front of the ChemStudio darkroom, the transilluminator itself has a power switch. Make sure that the green transilluminator power switch, located on the front of the transilluminator, is in the ON position.
2. For UV protection and to extend the life of the UV transilluminator, there is a ten-minute transilluminator shutoff timer installed in the system. The timer shuts off the transilluminator after ten minutes of operation. Push the reset button on the front of the darkroom to reset the timer.

9.3.4 Error messages appear on the screen

1. An error message that is related to the VisionWorksLS software interface or Microsoft Windows may appear on the screen. If the message is related to Microsoft Windows, such as a reminder to activate or update the copy of Windows, please contact your system administrator for assistance.
2. If an error message appears repeatedly and your system administrator does not recognize it as a Microsoft Windows error, contact Analytik Jena Technical Support for further assistance.

10 Disposal

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