

**INSTRUCTIONAL MANUAL**  
**CAT. #87057-Series**  
**#87057-01, #87057-02, #87057-03**

**EMS SmartDoc™ 2.0**



**Electron Microscopy Sciences**

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## Safety Symbols Used in this Instruction Manual



**Caution** –This alerts you to the possibility injury to person or dangerous environment.

Please read and understand this entire manual before using the system to ensure proper operation and optimum performance from the SmartDoc System 2.0

## Introduction

The SmartDoc™ system is ideal for quickly obtaining quality images of your gels for your records or analysis. Most gel imaging systems cost thousands of dollars as they include a high resolution camera, color display, complicated control panel, computer and more. The SmartDoc™ uses the camera and computer that we already have... our smart phone.

To use the SmartDoc™, simply place the enclosure over your gel and transilluminator. Lay your smart phone or tablet onto the non-slip, rubber pad, and align the camera lens over the filter. Raising and lowering the platform allows optimization of focus and image size. Filters are available for compatibility with multiple light sources and dyes.

The Blue Light model includes high intensity blue LEDs to excite green dyes. This eliminates the need for hazardous and DNA-damaging UV light.

The SmartDoc™ imaging enclosure includes an orange photo filter for photography of the gels with a smart phone. An extending adapter can be inserted for full dimension imaging of gels up to 15 x 15 cm or removed for close up pictures. The enclosure can also be used directly on any other existing UV or blue light transilluminator. Additional filters are available for imaging gels on a UV transilluminator.

The illumination base emits an intense blue light with a peak output of 460 nm for optimum excitation of nucleic acids stained with green fluorescent dyes (SYBR® Green, SmartGlow™, GelStar™, GelGreen™, etc). The orange cover fits on top of the illumination base and acts as a filter to absorb blue light, allowing visualization of the fluorescing samples. The cover can also be set at an angle for gel access and cutting out DNA bands for further study.

Images can be previewed on the device's display before capturing the picture. Images are easily shared, printed or transferred via text message, email or cloud sharing apps.

When using the SmartDoc enclosure on transilluminators with a large illuminating surface (exceeding 19 x 19 cm), use the UV Blocking MAT to block light around the edge.



### Cautions

- Always handle the SmartDoc system with care.
- DO NOT look directly at the blue light array. Even though the blue light emitted by this unit is very bright, it is within the visible spectrum and does not pose the same hazards as UV light.
- Handle all reagents and chemicals responsibly.
- DO NOT contaminate the cell phone when capturing gel images. Use proper and common laboratory safety practices when working with reagents and gels stained with DNA dye.
- Always wear gloves and always change gloves when switching between handling gels/reagents to using a cell phone.
- The SmartDoc System components should be cleaned periodically using mild soap and water or 10% bleach solution for decontamination.

**⚠ Cautions**

- Always be careful to prevent skin and eye exposure to UV light, especially when using the SmartDoc enclosure on a UV transilluminator. If working on a UV transilluminator with a viewing surface larger than the bottom of the SmartDoc housing, use the UV Blocking Mat (CAT. # 87057-04) to block UV light from emitting around the edges of the SmartDoc.

**Unpacking the SmartDoc System 2.0**

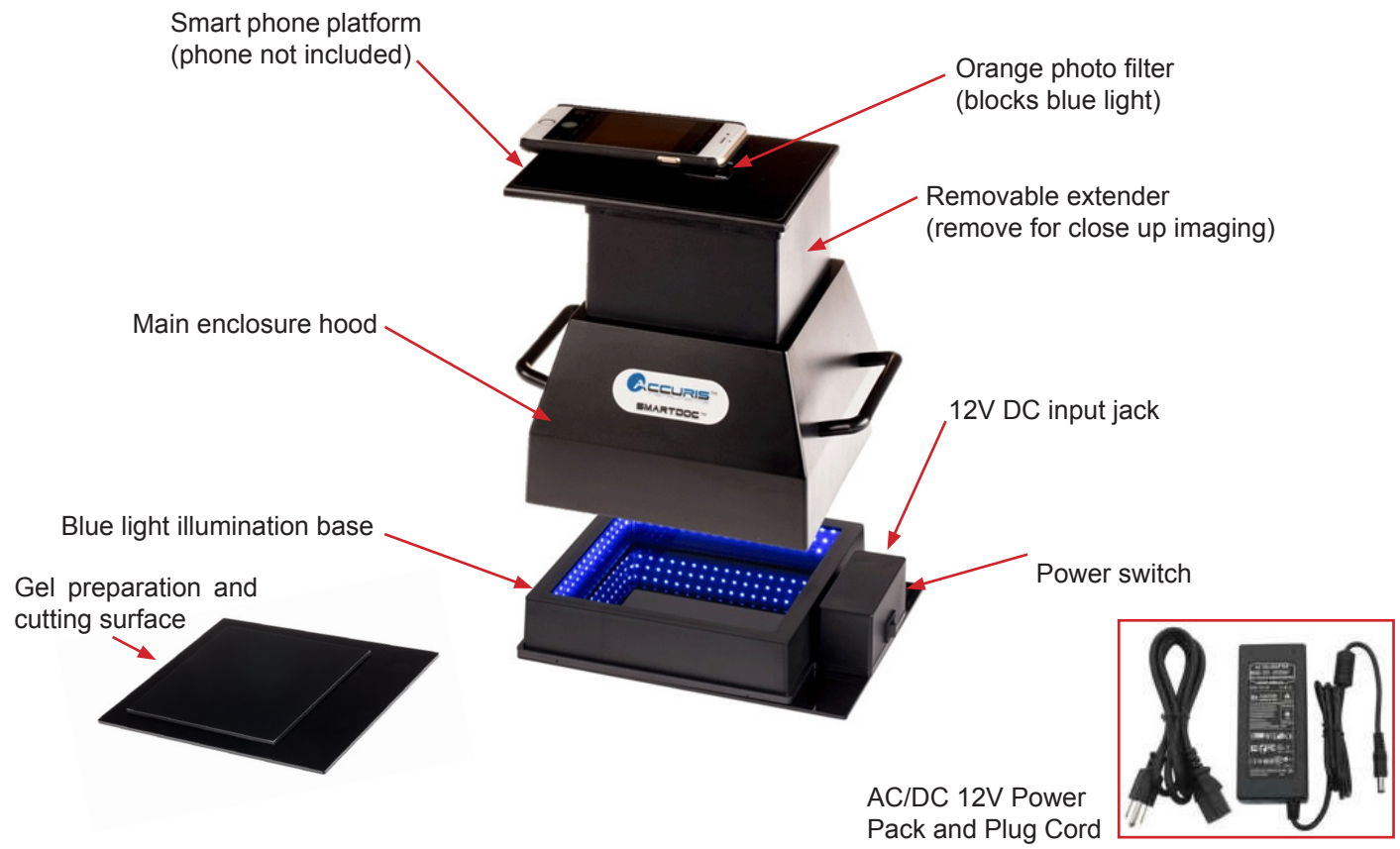
- Carefully remove the system and all accessories from the carton and remove any foam protective pieces.
- Check the contents of the package to make sure you have received all of the parts ordered.
- Check for shipping damage. **NOTE:** In the event of shipping damage, a claim must be filed with the carrier.
- Save the carton and packing materials for storing and transporting the SmartDoc or returning it for any required servicing.

The System includes:

- Main enclosure hood
- extending adapter
- Top platform for smartphone
- Orange Photo Filter
- Gel preparation and cutting surface
- Illumination base
- 12 VDC Power Supply with proper cord for local outlet type
- Any additional filters for UV (*optional, ordered separately*)

**NOTE:** If any parts are damaged or missing, please immediately contact EMS Customer Service at 1-800-523-5874.

**Components of the SmartDoc System 2.0**



## Set Up

1. Assemble the components of the SmartDoc 2.0 System as pictured on page two. The extender piece can be connected or removed depending on the size of the gels to be imaged or the desired resolution of the image.
2. Connect smart phone platform piece either to the top of the extender or to the top of the main enclosure. (These parts will snap together and pull apart with gentle pressure.)
3. Once the top platform, extender and main housing parts are assembled, fit them over the illumination base, which in turn fits over the gel preparation surface.
4. The SmartDoc must be near an electrical outlet. Plug the appropriate end of the power adapter cord into the 12V DC input jack on the illumination base. Plug one end of the power cord into the adapter box and the other end into a suitable outlet. Press the power switch to check operation of the lights.

**NOTE:** The SmartDoc uses a timing circuit, and the lights will automatically turn off after 5 minutes. This timer prevents excess heat from building up from the powerful LED lights.

## Gel Viewing and Band Cutting

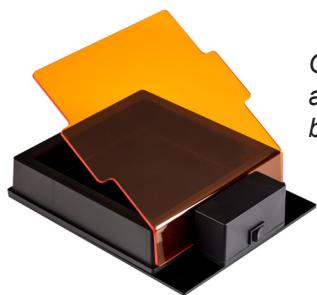
The SmartDoc Illumination Base can be used with the orange filter cover for visualizing stained nucleic acids gel viewing separated on agarose or acylamide gels.

### Directions

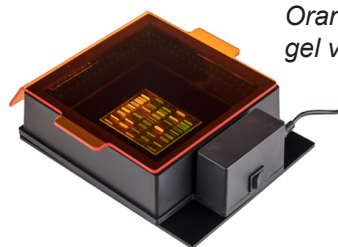
1. Set the gel preparation platform onto a level lab bench or table.
2. Glean the glass surface with alcohol or glass cleaner and allow to dry.
3. Carefully place a stained electrophoresis gel onto the square glass surface using care to eliminate bubbles under the gel.

**NOTE:** 15 x15 cm is the maximum sized gel to fit onto the glass surface. If necessary, cut away any gel edges that overhang.

4. Place the blue illumination base over the gel preparation platform, taking care that it nests correctly into place.



*Orange filter cover set at an angle for gel access and band cutting.*



*Orange filter cover placed for gel viewing.*

## Photo Filters



**Caution:** Using the SmartDoc on a UV Transilluminator without an appropriate filter in place can cause eye or skin exposure to UV radiation. The SmartDoc filters effectively block harmful UV radiation, and should always be properly installed when using UV illumination.

A photo filter is required to capture quality images with the SmartDoc 2.0 system. The orange photo filter is included with the system. This filter blocks the visible blue wavelengths coming from the illumination base or other blue light transilluminators and allows through the emission wavelengths from fluorescing nucleic acid stains.

Additional filters are available separately for the SmartDoc and are recommended for using the SmartDoc enclosure on a UV Transilluminator. These glass band pass filters block the UV light so the UV bulbs will not be seen in the images, and they also eliminate background wavelengths from the excitation source.

## Gel Imaging with the Smart Doc

The SmartDoc 2.0 Illumination base produces visible blue light with peak output of 465 nm for excitation of common nucleic acid stains. Compatible stains include Accuris SmartGlow™ PS (Pre Stain), SmartGlow™ LD (Loading Dye), SYBR® Green I and II, SYBR® Safe, SYBR® Gold, Gel Star, Gel Green, and Green Glo™.

### Directions

1. Set the gel preparation platform onto a level lab bench or table.
2. Glean the glass surface with alcohol or glass cleaner and allow to dry.
3. Carefully place a stained electrophoresis gel onto the square glass surface using care to eliminate bubbles under the gel.

**NOTE:** The maximum sized gel to fit onto the glass surface is 15x15 cm, cut away any overhanging edges of the gel if required.

4. Place the blue illumination base over the gel preparation platform, taking care that it nests correctly into place.
5. Place the SmartDoc imaging enclosure over the illumination base.
6. Insert the E5001-ORANGE filter into place on the top platform. The side with the logo should be facing up.
7. Place a smartphone face down onto the top platform, and align the camera lens with the filter.
8. Press the power switch on the illumination base to turn on the blue LEDs.
9. Select the Camera Mode on your Smart Phone, and turn off the flash setting. When properly positioned, the gel will be seen in the device's display screen. Focus as required.
10. If required, remove or insert the extender piece to maximize the image size of the gel in the display.
11. A zoom function on the camera phone can be used to enlarge the gel image in the display, but this can decrease the resolution of the image.

## Specifications

<b>Maximum Gel Size:</b>	15 x 15 cm
<b>Excitation Source:</b>	230 high intensity blue LEDs, peak output 465nm
<b>Orange imaging filter:</b>	Orange PMMA, 12mm aperture
<b>Orange viewing cover:</b>	Orange PMMA, 18 x 18 cm
<b>Dimensions (WxDxH):</b>	23 x 19 x 22 cm
<b>Weight:</b>	0.9 kg
<b>Phone compatibility:</b>	iPhone™, Samsung™, LG™, HTC™ Smartphones and Tablets with cameras
<b>Electrical:</b>	12VDC power supply (Included)

## Accessories

Catalog #	Description
87057-01	EMS SmartDoc™ 2.0 Gel Imaging Enclosure
87057-02	EMS SmartDoc™ 2.0 Gel Imaging System with Blue Light Illumination, 115V
87057-03	EMS SmartDoc™ 2.0 Gel Imaging System with Blue Light Illumination, 230V
87057-04	UV Blocking Mat
87057-05	535 nm Band Pass Filter for Green Stains
87057-06	590 nm Band Pass Filter for EtBr

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For any questions or for ordering information,  
please contact Customer Service at

**1-800-523-5874**

Thank you for choosing  
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