



SmartDoc™ 2.0

E5001-SDB

Instruction Manual



Version 11.16

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1. INTRODUCTION

Congratulations on your purchase of a *SmartDoc 2.0 System*. This innovative and easy to use system allows visualization of stained nucleic acids in electrophoresis gels, and can also be used for capturing high quality photos with a smart phone camera. The blue light illumination system produces intense blue light at a wavelength that is ideal for excitation of most of the common, green stains available of the market, including SYBR™ stains and Accuris™ SmartGlow™ stains. The orange filter cover and orange photo filters included with the system are designed to absorb (block) the blue excitation light allowing only the fluorescing sample light to pass through for visualization by eye, or for capturing gel images using a smart phone or tablet with camera.

To ensure proper operation and performance from your *SmartDoc System*, please read this manual in its entirety before use.

2. WARNINGS

Read this manual in its entirety before operating the SmartDoc system, and keep the manual for future reference.



CAUTION: Although the light emitted from the SmartDoc illumination base is within the visible spectrum, and does not pose the same hazards as UV light, this emitted blue light is very bright. It is not recommended to look directly at the blue light array (just as we recommend not to stare at the sun.)



CAUTION: When working in a laboratory environment, it is always important to properly handle all reagents and chemicals. When using a cell phone for capturing gel images, it is very important not to contaminate the phone with any chemicals or reagents. Using 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 from handling gels, or reagent to use of a cell phone, and vice versa. The SmartDoc System components should be cleaned periodically using mild soap and water or 10% bleach solution for decontamination.



CAUTION: If using the SmartDoc enclosure on a UV transilluminator, always use caution to prevent exposure of the skin and eyes to UV light. If working on a UV transilluminator with a viewing surface larger

than the bottom of the SmartDoc housing, use the E5000-MAT UV Blocking Mat to block UV light from emitting around the edges of the SmartDoc.

3. UNPACKING

NOTE: Always handle the *SmartDoc* system with care.

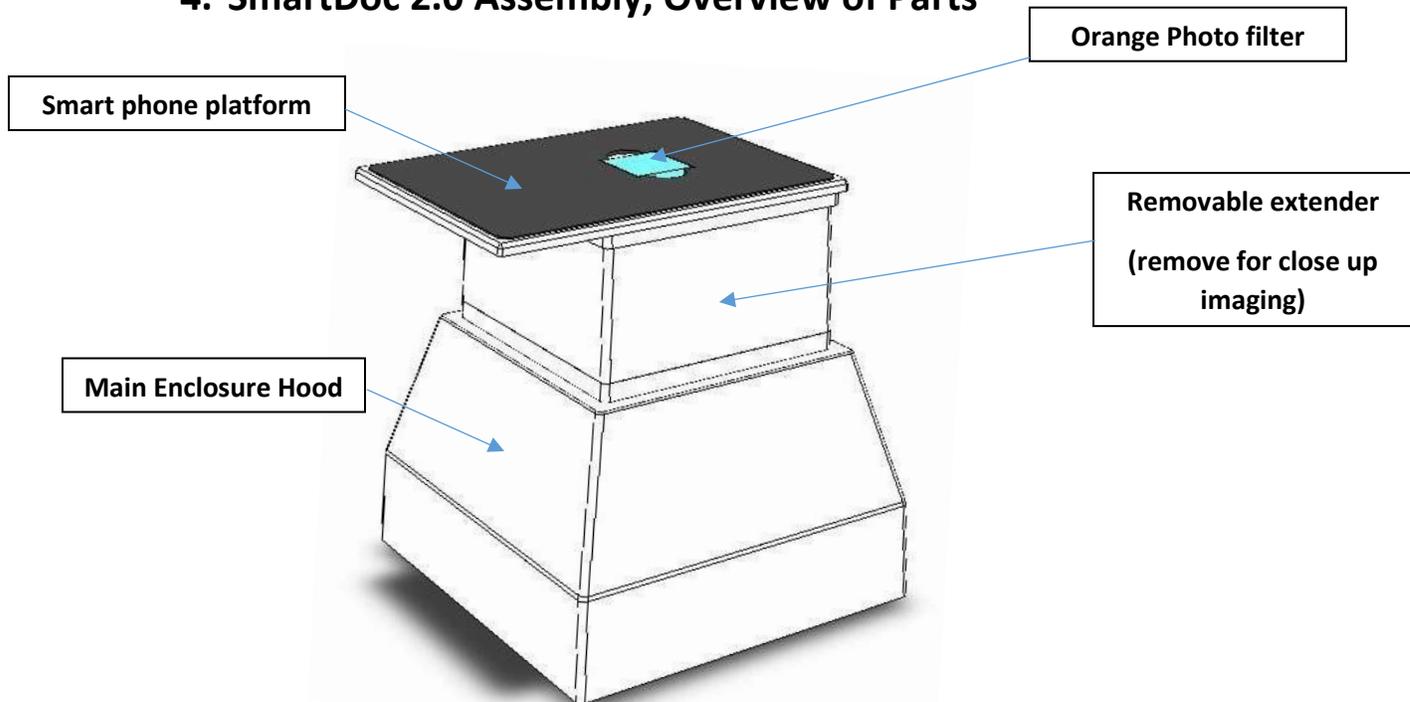
Carefully remove the system and all accessories from the carton and remove any foam protective pieces. Check for shipping damage. In the event of shipping damage, a claim must be filed with the carrier. Check the contents of the package to make sure you have received all of the parts ordered:

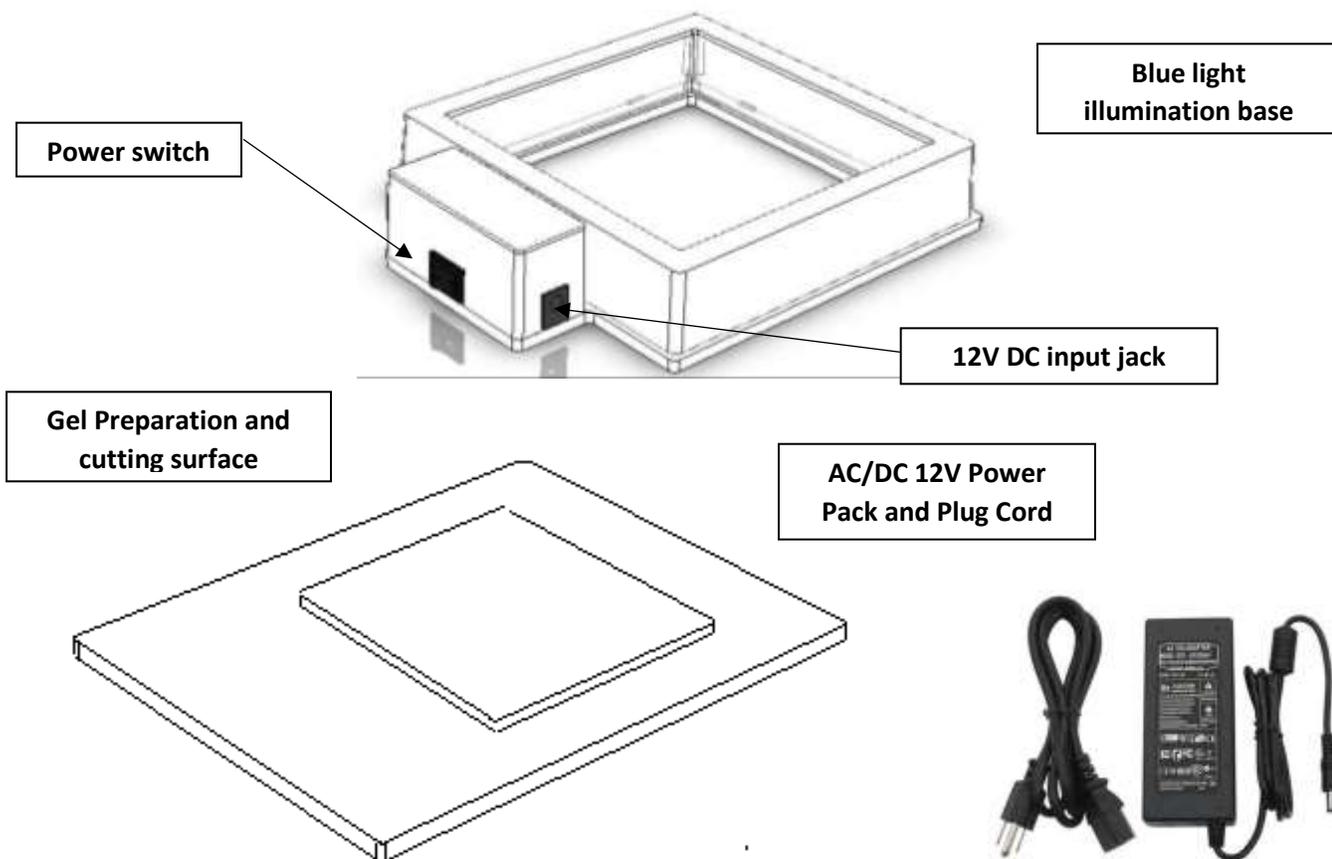
- SmartDoc Imaging Enclosure parts: 1) Main enclosure hood, 2) extending adapter, and 3) top platform for smartphone.
- Orange Photo Filter
- Gel preparation and cutting surface
- Illumination base
- 12 VDC Power Supply with proper cord for local outlet type
- Any additional filters for UV (ordered separately)

If any parts are damaged or missing, please immediately contact Benchmark Scientific Customer Service at 908-769-5555 or email info@benchmarkscientific.com.

IMPORTANT: Save the carton and packing materials for storing and transporting the SmartDoc or returning it for any required servicing.

4. SmartDoc 2.0 Assembly, Overview of Parts





4. SETTING UP THE SMARTDOC

Assemble the components of the SmartDoc 2.0 System as pictured in section 3 of the manual. Depending on the size of the gels to be imaged, or the desired detail of the image, the extender piece can be connected or removed. The top, smart phone platform piece connects 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.

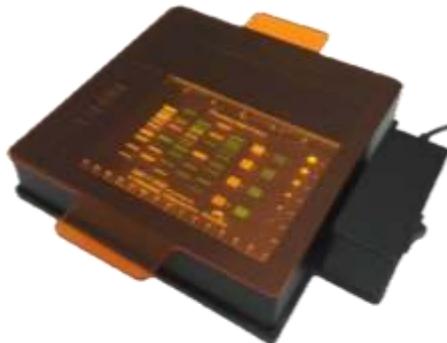
Once the top platform, extender and main housing parts are assembled, these can be fit over the illumination base, which in turn fits over the gel preparation surface.

Locate the SmartDoc 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.

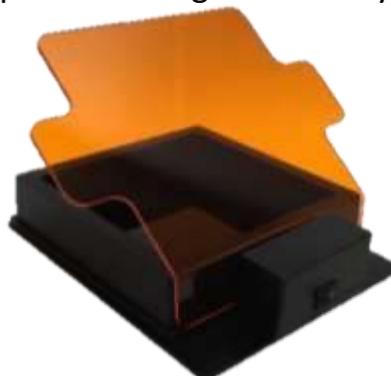
Note: The SmartDoc uses a timing circuit, and the lights will automatically turn off after 5 minutes. This timer prevents excess heat from building up from the powerful LED lights.

5. 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.



Orange filter cover placed for gel viewing



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

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.
4. Note: The maximum sized gel to fit onto the glass surface is 15x15cm, cut away any overhanging edges of the gel if required.
5. Place the blue illumination base over the gel preparation platform, taking care that it nests correctly into place.

6. SMARTDOC PHOTO FILTERS



E5001-ORANGE
(included)



E5001-535
(optional)



E5001-590
(optional)

A photo filter is required to capture quality images with the SmartDoc 2.0 system. The orange photo filter, part E5001-ORANGE, 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.

| | |
|-----------|---|
| E5001-590 | band pass photo filter, 590nm, for imaging EtBR on UV transilluminator |
| E5001-535 | band pass photo filter, 535nm for imaging green stains on UV transilluminator |



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.

7. GEL IMAGING WITH THE SMART DOC

The SmartDoc 2.0 Illumination base produces visible blue light with peak output of 465nm 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™.

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.
4. Note: The maximum sized gel to fit onto the glass surface is 15x15cm, cut away any overhanging edges of the gel if required.
5. Place the blue illumination base over the gel preparation platform, taking care that it nests correctly into place.
6. Place the SmartDoc imaging enclosure over the illumination base.
7. Insert the E5001-ORANGE filter into place on the top platform. The side with the Accuris logo should be facing up.
8. Place a smartphone face down onto the top platform, and align the camera lens with the filter.
9. Press the power switch on the illumination base to turn on the blue LEDs.
10. 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.
11. If required, remove or insert the extender piece to maximize the image size

of the gel in the display.

12. 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.

8. SPECIFICATIONS:

| | |
|------------------------|--|
| Maximum Gel Size: | 15 x 15 cm |
| Excitation Source: | 230 high intensity blue LEDs, peak output 465nm |
| Orange imaging filter: | Orange PMMA, 12mm aperture |
| Orange viewing cover: | Orange PMMA, 18 x 18 cm |
| Dimensions (WxDxH): | 23 x 19 x 22 cm |
| Weight: | 0.9 kg |
| Phone compatibility: | iPhone, Samsung, LG, HTC smartphones and tablets with camera |
| Electrical*: | 12VDC power supply Included. |

9. ACCESSORIES AND CONSUMABLES

| <u>Item No.</u> | <u>Description</u> |
|------------------------|---|
| E5001-ORANGE | Orange photo filter |
| E5001-590 | band pass photo filter, 590nm, for imaging EtBR on UV transilluminator |
| E5001-535 | band pass photo filter, 535nm for imaging green stains on UV transilluminator |
| E5001-OC | Orange filter cover |
| E4500-LD | SmartGlow™ Loading Dye with Safe Green Stain, 1.0ml |
| E4500-LD-S | SmartGlow™ Loading Dye with Safe Green Stain, Sample, 20ul |
| E4500-PS | SmartGlow™ Safe Green Pre Stain, 1.0ml |
| E4500-PS | SmartGlow™ Safe Green Pre Stain, Sample, 40ul |

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PO Box 709
Edison, NJ 08818
USA
Phone: 908-769-5555
Email: info@accuris-usa.com

www.benchmarkscientific.com / www.accuris-usa.com