



# KETA G Series Molecular Imaging System



Installation and Operation Manual

**Version 3.0**

Item# 01230

***\*This instrument is intended for laboratory use only***

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## **A. Important Notice**

Before setting up and operating the instruments of KETA G series imaging system, please carefully read these instructions to get familiarized with the installation and operation process. Instructions should be read by experienced individuals before operating the instruments.

Any improper usage of the instruments may cause damage. Please refer to the safety notice included with this equipment.

The instruments shall not be modified or altered in any way. Any modification or alteration will void the warranty, void the regulatory certifications and create potential safety hazard. Wealtec is not responsible for any injury or damage caused by using the instruments for any non-intended purpose or injury as a result of modification of the instruments by any person who is not authorized by Wealtec Corp.

### **A-1. Warranty**

KETA G series imaging system is warranted to be free from defects in materials or workmanship for a period of one year from the original invoice date, under normal usage. Any defects occurring during warranty period, Wealtec Corp. will repair or replace defective products or parts without charge unless the defects arise from conditions outlined below. The defects described below are specially excluded from Wealtec warranty policy.

1. Improper operation of the instrument.
2. Repair or modification by any person who is not authorized by Wealtec Corp.
3. Damage caused by any (in)-direct accident, neglect or misuse.
4. Damage caused by disaster.
5. Damage caused by any improper solvents or samples

### **A-2. Technical and Service Contact**

Most of the operation details are described in this instruction manual to assist and guide operator for an appropriate solution. For any other technical/ service questions, please contact your local representative or contact Wealtec international technical/ service specialist by E-mail: [support@wealtec.com](mailto:support@wealtec.com).

### A-3. Safety Notice



KETA G series imaging system uses UV illumination for sample visualization. Transilluminator and other ultraviolet equipment or lamps are powerful sources of ultraviolet radiation which can cause serious damage to unprotected eyes and skin. Always read the product manual before operating the unit.

Before operating any unit, be sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment.

When using a transilluminator, it is recommended that the transilluminator be installed and operated in a darkroom where access and exposure to UV is limited. Each transilluminator is shipped with an ultraviolet blocking cover. **Even though this cover blocks the UV radiation emitted by the unit, it is strongly recommended that the “UV Blocking Eyewear” should be worn as well.** For details in UV transilluminator operation, please refer to Wealtec UV transilluminator instructions.

### A-4. CE Certification



It is not allowed to use a screwdriver to open the enclosures.

- The product must be connected to the AC power supply mains through a three-conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet.
- A certified power supply cord has to be used with this equipment. The relevant national installation and/or equipment regulations shall be considered. A certified power supply cord not lighter than ordinary polyvinyl chloride flexible cord according to IEC 60227 (designation H03 VV-F) shall be used. Alternatively, a flexible cord be of synthetic rubber according to IEC 60245 (designation H05 RR-F) shall be used. The power cord set shall have a power supply cord with conductors providing a cross-sectional area of 3G, 0.75mm<sup>2</sup> minimum.
- The appliance coupler/inlet shall be easily accessible and readily disconnectable.
- For ventilation purpose, suitable space shall be maintained.

## A-5. Symbols

Symbol	Definition of symbol
	Alternating input current
	Push control at on position
	Push control at off position
	Only on built-in power supply for earth terminals
	Protective conductor terminal
	Caution of hazards
	High temperature, do not touch
	UV hazards

## B. Introduction

KETA G series is the computer controlled based Gel Documentation System, the state of the art system consists with three models. Twelve-bit superior B/W CCD camera, computer controlled lens, standard five position motorized filter wheel, high transparency amber filter, 2X close up lens are included. KETA G series use high intensity wall mount white light LED as Epi light source, optional MC 100LED/UV multi color Epi light source for different applications. Large visual area (25cmx25cm) with high intensity low background MD-25K UV transilluminator enhances gel visibility and powerful Magic 1D enables image capture within a second. Moreover, the system is easy upgradeable to fluorescence or chemiluminescence applications by upgrade camera and lens. The KETA G series provides extremely excellent performance and satisfies all scientific research topics or routine use in life science research laboratory. Full range filters are also available. Applicable samples for G series image capturing include nucleic acid gel

visualization (Ethidium Bromide, SYBR® Green, SYBR® Gold\*) and protein gel visualization (Coomassie Blue, Silver Stain, SYPRO® Orange/Red/Ruby\*, Q-dot™).

\*SYBR, SYPRO are registered trademark of Molecular Probes Inc.

## **B-1. Specifications**

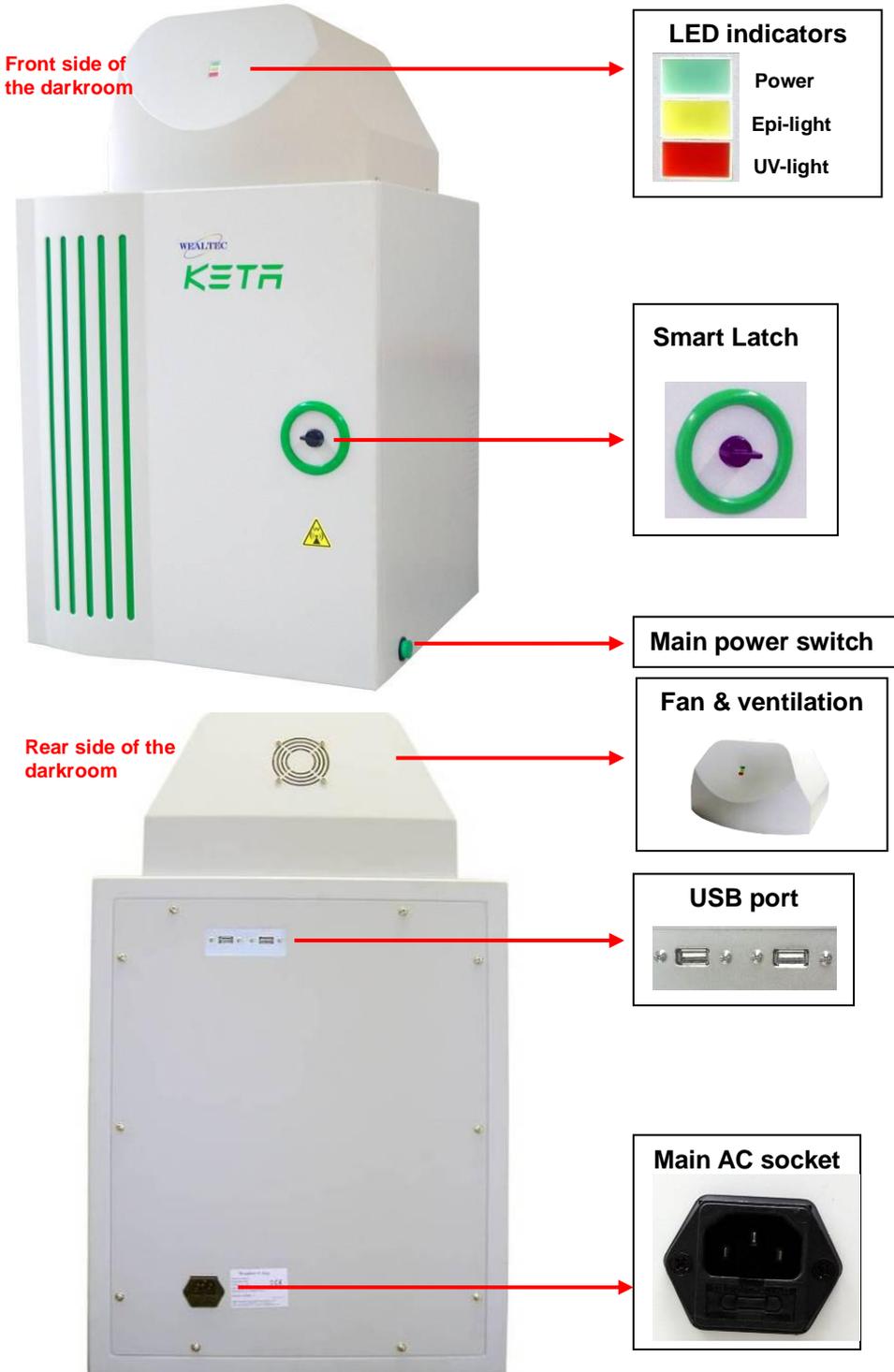
	<b>KETA G</b>	<b>KETA GL</b>	<b>KETA GLX</b>
Camera	K12R	K12C	K12CH
CCD depth	12 bit	12 bit cooled	12 bit cooled
Operation temp	R-T	Ambient -30°C	Ambient -30°C
Chip size	1/2"	1/2"	2/3"
Megapixels	1.4	1.4	1.4
Cooling	Air	Peltier	Peltier
Filter wheel	*FW 55	*FW 55	*FW 55
Single sample stage	-	Option	-
AS 100 stage	-	-	Option
Lens adjustment	Motorized	Motorized	Motorized
U10 LED	Standard	Standard	Standard
MC 100 LED/UV	-	-	Option
Transilluminator	MD-25K	MD-25K	MD-25K
Smart latch	Standard	Standard	Standard
Safety interlock	Standard	Standard	Standard
Close up lens	2 X	2 X	2 X
Magic 1D	Standard	Standard	Standard
OS system	Windows XP, Vista, 7	Windows XP, Vista, 7	Windows XP, Vista, 7
Thermo printer	Digital (optional)	Digital (optional)	Digital (optional)
Filter	WK 101	WK 101	WK 101
Dimension (L x W x H)	46 x 45 x 72.5 cm <sup>3</sup>	46 x 45 x 72.5 cm <sup>3</sup>	46 x 45 x 72.5 cm <sup>3</sup>
Weight	42.2 Kg	42.2 Kg	42.2 Kg
Operation environment	1) Indoor use 2) Altitude up to 2,000 m 3) Main supply voltage fluctuations up to ±10 % 4) OVC II 5) Pollution degree II		

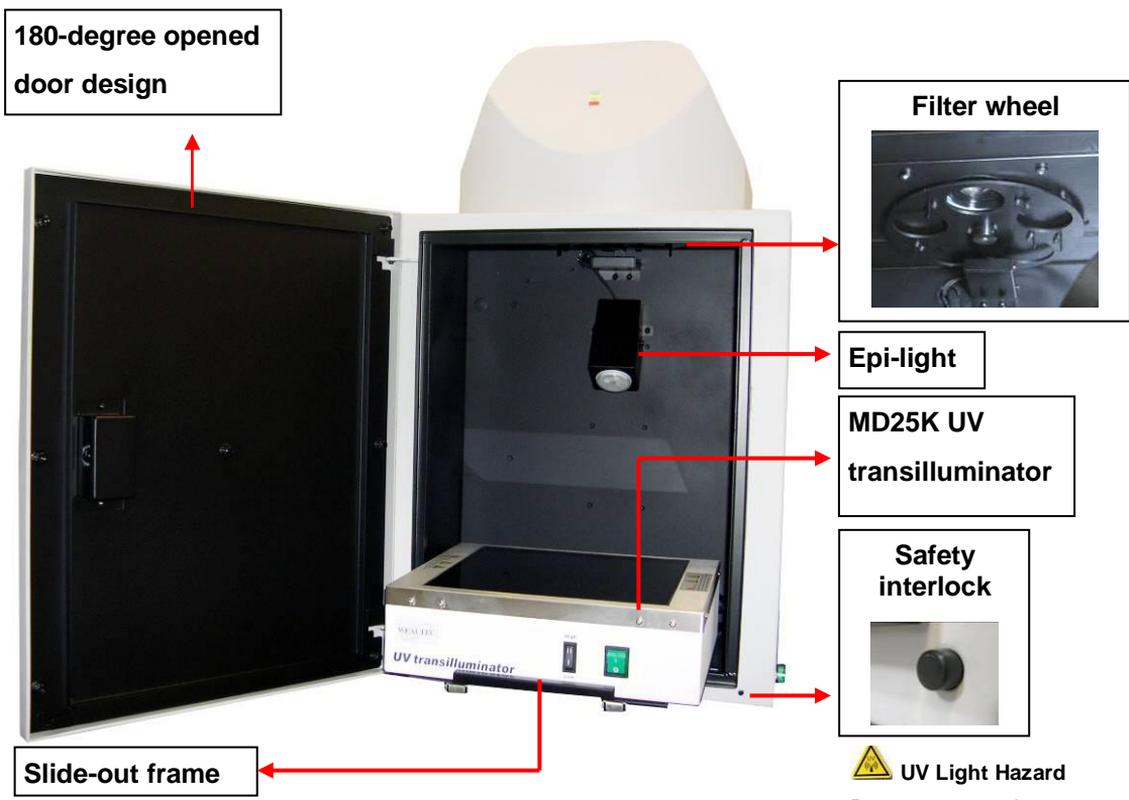
\*Five position 55 mm filter wheel

※ Minimum computer system requirement for software analysis: PIV# 2.6 GHz, 1G RAM with **English version** Windows XP/VISTA/7 system or higher, USB (2.0) supported. Pentium is a registered trademark of Intel Corp. Windows and Windows XP/VISTA/7 are trademarks of Microsoft, Inc.

## B-2. Product Description

### B-2-1. KETA G series Imaging System Hardware Overview





**UV Light Hazard**  
 Do not press on the "Safety Interlock" if it is not necessary.

**CCD camera**

All models camera for KETA imaging system are using progressive CCD camera communication via USB 2.0. Features with low dark current, high QE values, and excellent performance, all cameras are ideal for bio imaging or molecular imaging. Three types of CCD camera offer the most efficient choice for gel documentation purpose.

**KETA G** system equipped with K12R camera which is 1/2" CCD element with 1.4 mega pixels, K12R can perform with high quality documentations with all kinds of gels.

**KETA GL** equipped with K12C camera which is 1/2" Peltier cooled CCD element with 1.4 mega pixels, The KETA GL system can catch basic Chemiluminescence signal for entry level Chemiluminescence applications.

**KETA GLX** system equipped with 2/3" Peltier cooled CCD element provides the excellent sensitivity in KETA G family. In the integration mode, camera allows the electronic shutter to remain open for a long period of time to collect photons signal from low light scenes for full

dynamic range. The Peltier cooled CCD camera down to -30°C below ambient and reduces dark current noise to facilitate useful long integration time. All signals are digitized by a 12 bit ADC and connect to the computer via the USB 2.0 .

## Motorized lens

KETA G and GL system equipped with focal F1.0, 1/2",8-48 mm (6X) motorized lens with C mount, GLX system equipped with focal F1.4, 2/3",11.5-69 mm (6X) motorized lens with C mount. 2X close up lens and high transparent amber filter are standard configuration in G family.

## Light source

An Epi-white LED light source, U10 in the KETA G family provides stable, high intensity, and long life time (50,000 working hours) illumination for visualization of colorimetric samples, X-ray film and negative film. Optional MC100 (WRGB LED/UV) Epi-light is available for upgrade. For fluorescence samples, UV transilluminator with 6 x 8 Watt tubes emits 302 nm of UV light to excite the dye up to 25 x 25 cm filter area.

## Darkroom

Light-tight designed KD 100 Dark Room allows all kinds of application in molecular imaging. UV radiation safety interlock switch and smart latch as standard configuration keeps operators in safety environment. 180° fully closed / opened door easy for gel cutting.



**Caution: Do not press on the “Safety Interlock” while the door open.** If it is necessary, be sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment. Even personnel close to the KETA G series system should be properly protected.

## B-2-2. Magic 1D Software Features Overview

Features	Descriptions
Automatic lane, band, colony and spot detection	Automatic detection capability, allows Magic 1D software for gel data analysis. It is also convenient for colony counting, and spot image assay.

User-friendly quick guide operation	The step-by-step quick guide function provides the user guidance from capturing image to fast image analysis. Ability to learn a complicated software operation is not necessary.
Compatible image files format	Various images file format JPG, BMP, JPEG, DFN, TIF, TIFF, PCX, GIF, and TGA is supported as can be loaded, analyzed and saved.
Short time (Within one minute) data analysis	Various options under “Analysis“ function allows user to run the software automatically for various analysis and reports.
Traceable image enhancement function	While analyzing image, Magic 1D software provides convenient tools such as text, line, color adjustment, rotation, flipping, invert etc. With all this convenient tools, “Record” function allows users to track previous action easily.
Ability to identify smiling gel accurately	Magic 1D software can identify bands, even if the gel is deformed as smiling gel.
Image profile & 3-D display	Image data can be visualized in lane profile and 3-D display
Image blending function	Blending of image can have precise comparison between two different images
Support GLP/GMP mode	Image data can be protected by password log-in setting to avoid uncertain modification

### **Minimum computer system requirement for Magic 1D software**

Pentium IV 2.6 GHz, 1 G RAM with English version Windows XP/VISTA/7 system or higher, USB (2.0) supported.

### **B-2-3. Printer (Optional)**

An optional digital thermal printer or inject printer is applicable for KETA G series. It is controllable using PC through Magic 1D software.

## C. Installation of KETA G and Magic 1D Software

### C-1. Package List

Item	Quantity
<p><b>KETA G series darkroom</b></p> 	1
<p><b>WK101 High transparent amber filter (55mm)</b></p> 	1
<p><b>USB cable</b></p> 	2
<p><b>UV transilluminator (25 x 25 cm filter size) MD25K</b></p> 	1
<p><b>Power cable</b></p> 	1
<p><b>Instruction package</b> (One Instruction and Operation Manual, one Gel Analysis Software Operation Manual, one ruler, and one calibration chart.)</p>	1

	
<p><b>Magic 1D software</b> (Including installation CD and USB protection key [USB key-pro])</p> 	1

## C-2. Installation of KETA G System

### C-2-1. Space Requirement

Minimum area of 46 cm (L) x 45 cm (W) x 72.5 cm (H) is required, excluding computer and printer.

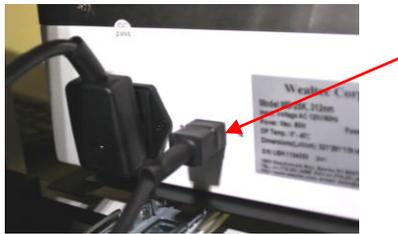
### C-2-2. Installation Procedure

- 1. Place Darkroom unit:** Carefully pull the darkroom out of the package box and place it at the workbench. The workbench should provide the space with the minimum size of 46 cm (L) x 45 cm (W) x 72.5 cm (H).
- 2. Install UV Transilluminator:** Open KETA G series darkroom cabinet door and pull sliding frame out of the darkroom unit. Remove the tape from the UV transilluminator power cord.



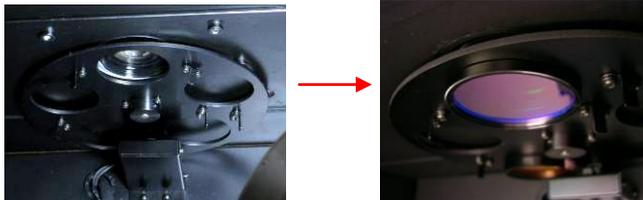
Position the UV transilluminator on the sliding frame of the darkroom with the UV transilluminator power switch facing the installer. Inside the darkroom unit, plug the UV transilluminator power cord to the UV transilluminator AC socket and light intensity controlling cable nearby at the rear side of the UV transilluminator.

**Note:** It's highly recommended to use heat gun to tighten the heat shrinkable tubing at the connection site after installation to prevent the malfunction of the UV transilluminator.



**3. Install the filter:**

Take the WK 101 Amber filter (ID = 55 mm) and fix it onto the filter wheel. (Refer to the order information to have more filters other than amber filter.)



**4. Connect the USB cable to the computer: (USB 2.0)**

Connect two USB cables in the back of the machine.



Connect the other side of USB cables to the computer.  
(Make sure to connect with USB 2.0 port.)



**5. Setting Default Switching Positions:**

**UV Transilluminator:**

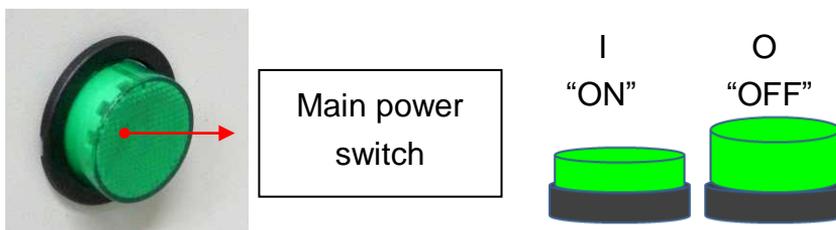
Ensure the UV transilluminator light intensity switch is switched to low and switch ON the UV transilluminator power (marked "I") as shown in the following picture.



**Note:** When the MD25K is used in the KETA series imaging system, the light intensity switch should be switched to “Low” in order for the Magic 1D to control the light intensity switching.

### Main Power Switch:

Ensure the main power switch is switched off (light off) as shown in the following picture.



### 6. Connect Power Cable:

Ensure the working voltage of the imaging system matches the local voltage. The AC socket is located at the rear side of the darkroom unit and thermal printer (If printer is purchased). Connect power cable to the AC socket and plug it into main power source.

### 7. Examine Installation Functionality:

 **Caution:** Before examining the Epi or UV light, be sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment. Even personnel close to the KETA G series should be properly protected. **It is strongly recommended not to operate the unit without UV-blocking cover installed.**

Turn on the main power switch and ensure the main power switch, main power LED indicator is illuminated (Green) and CCD cooling fan is turned on.

## D. Operation

While operating with cooled CCD camera, connection of software to machine needs five minutes to wait for the cooling of the camera. Please remember to turn on the imaging system and connect with the software prior to operate.

### D-1. Magic 1D Software

Please refer to Magic 1D software installation and operation manual for details.

### D-2. KETA G series Imaging System Hardware Operation

#### D-2-1. General Operation:

1. Turn on the computer system and KETA G series main power switch (green switch located right side of the darkroom) to start G/GL/GLX systems. GL and GLX systems

need five minutes waiting time for cool-down of the CCD.

2. Start Magic 1D software with image capturing window and select live mode for image visualization. (Please refer to Magic 1D software operation manual for details)
3. After five minutes, turn the smart latch counterclockwise to open the KETA G series darkroom cabinet door and pull out the slide-out frame.
4. For trans-white light applications, operator shall place the optional UV/white light converter plate (Item# 1146001) on the UV transilluminator to transform UV light to visible white light. (For UV-applications, make sure to remove tray for chemiluminescence applications from inside the cabinet).
5. Place and position the capturing target on the surface of UV transilluminator.
6. Push the slide-out frame back into darkroom and close the darkroom cabinet door.
7. Select the preferred Epi or UV light source and turn on the light by using the Magic 1D software. Adjust the lens assembly to the perfect iris, zoom and focal on the targeted sample image and select the preferred filter.
8. Capture image using Magic 1D software and save the image data to process or for further analysis.
9. Disconnect the software with the imaging system first and turn off the main power switch upon capturing the image. Open the darkroom cabinet door and remove the captured target from KETA G series gel imaging system.
10. Touched sample surface shall be cleaned with pre-moistened soft tissue after every use to avoid any possible contaminations and damages to the instrument.
11. Use Magic 1D software to analyze the captured image.

## **D-2-2. Gel Excision**



**Caution:** Before opening the darkroom cabinet door under UV light excitation mode, be sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment. Even personnel close to the KETA system should be properly protected. **It is strongly recommended not to operate the unit without UV-blocking cover installed.**

1. Turn on the KETA G series main power switch (Green switch located at darkroom's front top right side) and the system will be initiated.
2. Open the darkroom cabinet door and pull out the drawer.
3. Place and position the capturing target on the surface of UV transilluminator.
4. Start up the Magic 1D software and enter the capturing interface.
5. Select the light source to "EPI" and turn on the light in the capturing interface in the Magic 1D software.
6. Click on the **Safety Switch** icon to "SAFETY OFF" mode (as followed image) to inactivate the darkroom cabinet door-open control safety interlock so as trans-UV light will continue light ON when darkroom cabinet door is opened during gel excision. Click "Yes" while the warning window pops up.



7. Place the gel in the middle of the UV transilluminator.
8. Select the light source from "EPI" to "Trans-UV(Low)".
9. Gel Excision. (**Note:** Do not scratch the UV transilluminator filter during gel excision).
10. Push the drawer back into darkroom and close the darkroom cabinet door. After turn off the Magic 1D software, system can be switched off.

11. Touched sample surface shall be cleaned with pre-moistened soft tissue after every use to avoid any possible contaminations and damages to the instrument.

### **D-2-3. Chemiluminescence Detection**

**\*Operator should purchase Magic Chemi software for better chemiluminescence applications.**

1. Turn on your computer system and KETA G series main power switch five minutes before operation (Green switch located at the bottom right hand side of the darkroom).
2. Start Magic 1D software with image capturing window and select live mode for image visualization. (Please refer to Magic 1D software operation manual for details)
3. After five minutes, open KETA G series darkroom cabinet door and place the sample tray on the tray support in the darkroom cabinet. Place and position a fluorescence ruler or white paper with text on the sample tray.
4. Open the image capture window from Magic 1D software and select live mode for image visualization. (Please refer to Magic 1D software operation manual for more details)
5. Adjust the height of the sample tray. Usually, a short distance between the CCD-camera and sample is needed in order to optimize light capture by the CCD.
6. Roughly adjust zoom, iris and focus with the ruler or a calibration chart as a reference.
7. Remove the fluorescence ruler or the calibration chart from the sample tray.
8. Place the chemiluminescence sample, e.g. a blotting membrane wrapped in cling film on the sample tray on the relative focused position and close darkroom cabinet door. Additional manual fine tuning of sample position as well as tray height, zoom and focus may be needed.
9. Turn the iris to 50-100 % and turn off the Epi-light source. A fully opened iris (100 %) gives

the highest light throughput; however, the captured image may appear blurry. Less than maximally opened iris gives better resolution, but generally requires longer exposure times in order to generate the same light throughput. Individual samples require optimization in sample tray height, iris adjustments and exposure times in order to generate high resolution images of good sensitivity.

10. Capture image using Magic 1D software and save the image data to process or for further analysis. **Note:** Batch capture setting is necessary for various samples and chemiluminescent reagents. (Please refer to Magic 1D software operation manual for details)
11. After capture, disconnect the software with the imaging system and turn off the main power switch upon capturing the image. Open the darkroom cabinet door and remove the captured target from KETA G series imaging system.
12. Touched sample surface shall be cleaned with pre-moistened soft tissue after every use to avoid any possible contaminations and damages to the instrument.
13. Use Magic 1D software to analyze the captured image.

## E. Care and Maintenance

- Darkroom of KETA G series can be cleaned with pre-moistened soft tissue soaked with clean water. Organic solvents or strong detergents may damage the instrument and should not be used.
- Sample touched surface of KETA G series should be cleaned with pre-moistened soft tissues after every usage to avoid all possible contaminations and damages to the instruments.
- KETA G series imaging system should be disconnected with the software if the camera is not going to use within 30 minutes.
- CCD camera should be protected from all possible moisture, organic solvents and detergents.

## F. Order Information

### KETA G series imaging system

Catalog No.	Description
1150001	KETA G gel documentation system & Magic 1D software, 120V 60 Hz
1150002	KETA G gel documentation system & Magic 1D software, 230V 50 Hz
1150003	KETA G gel documentation system & Magic 1D software, 100V 50/60 Hz
1150011	KETA GL high resolution gel documentation system & Magic 1D software, 120V 60 Hz
1150012	KETA GL high resolution gel documentation system & Magic 1D software, 230V 50 Hz
1150013	KETA GL high resolution gel documentation system & Magic 1D software, 100V 50/60 Hz
1150021	KETA GLX high resolution high sensitivity gel documentation system & Magic 1D software, 120V 60 Hz
1150022	KETA GLX high resolution high sensitivity gel documentation system & Magic 1D software, 230V 50 Hz
1150023	KETA GLX high resolution high sensitivity gel documentation system & Magic 1D software, 100V 50/60 Hz
1155002	AS 100 motorized sample stage (factory install)
1155004	MC 100 Multi-color W/R/G/B instead of U10 as Epi source (factory install)
1155005	MC 100-1 Multi Color W/G/B/UV (365 nm) instead of U10 as Epi source (Factory install)
1155006	MC 100-1 Multi Color W/G/B/UV (365 nm) instead of MC 100 W/R/G/B as Epi source (factory install)
1146001	UV/White light converter plate
1146011	UV/Blue light converter plate
1146003	Digital thermal printer
1153001	Magic 1D gel analysis software for single user key only
1153002	Magic 1D gel analysis software for three user keys
1153005	Magic Chemi software package, single user key only
1153006	Magic Chemi software package, three user keys

