

# SafeBlue Electrophoresis System

## Instruction manual

Catalog No. MBE-150  
MBE-150-PLUS  
MBE-TLC



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# Packing List

## MBE-150

- 1x SafeBlue Electrophoresis System Base Unit
- 1x Power Adaptor
- 1x Power Cord
- 1x Instruction Manual

## MBE-150-PLUS

- 1x SafeBlue Electrophoresis System Base Unit
- 1x Filter Lid
- 1x Power Adaptor
- 1x Power Cord
- 1x Instruction Manual
- SafeBlue electrophoresis gel tank image enhancer film
- 1x SafeBlue Electrophoresis Tank, including:

Tray	Tray Dams	Combs	Loading Guides	Cables
ME15-UV7 ME15-UV10 ME15-UV15	ME15-UVDAM Pack of 2	2 x MS15-20-1-U , 20 sample	Loading Guides (set)	MBE-150-CABLE

## MBE-TLC

- 1x Instruction Manual
- 1x Filter Lid
- SafeBlue electrophoresis gel tank image enhancer film
- 1x SafeBlue Electrophoresis Tank, including:

Tray	Tray Dams	Combs	Loading Guides	Cables
ME15-UV7 ME15-UV10 ME15-UV15	ME15-UVDAM Pack of 2	2 x MS15-20-1-U , 20 sample	Loading Guides (set)	MBE-150-CABLE

Signed by:

Date:

**Major Science is liable for all missing or damaged parts / accessories within 7 days after customer received this instrument package. Please contact Major Science immediately regarding this issue. If no response within such time period from consignee party, that will be consignee party's whole responsibility.**

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## Warning

Major Science SafeBlue Electrophoresis System has been tested and found to comply with the limits for the CE regulation. Also, it is RoHS compliant to deliver confident product which meets the environmental directive. These limits are designed to provide reasonable protection against harmful interference when the instrument series is operated in a commercial environment. This instrument series used together with power supply unit generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this instrument series in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. It is strongly recommended for the user to read the following points carefully before operating this equipment.

1. Read and follow the manual instructions carefully.
2. Do not alter the equipment. Failure to follow these directions could result in personal and/or laboratory hazards, as well as invalidate equipment warranty.
3. Use a properly grounded electrical outlet with correct voltage and current handling capacity.
4. Disconnect from power supply before maintenance and servicing. Refer servicing to qualified personnel.
5. Never use this instrument series without having the safety cover correctly in position.
6. Do not use the unit if there is any sign of damage to the external tank or cover. Replace damaged parts.
7. Do not use in the presence of flammable or combustible material; fire or explosion may result. This device contains components which may ignite such materials.
8. Refer maintenance and servicing to qualified personnel.
9. Ensure that the system is connected to electrical service according to local and national electrical codes. Failure to make a proper connection may create fire or shock hazard.
10. Use appropriate materials and operate correctly to avoid possible hazards of explosion, implosion or release of toxic or flammable gases arising from overheated materials.

11. The unit shall be operated only by qualified personnel.

### **Safety Information**

Use high level of precaution against any electrical device. Before connecting the electrical supply, check to see if the supply voltage is within the range stated at the rating label, and see to it that the device be seated firmly. Place the unit in a safe and dry location; it must NOT touch the surrounding. Follow the safety precautions for chemicals / dangerous materials. If needed, please contact qualified service representative or [service@majorsci.com](mailto:service@majorsci.com)

### **Environmental Conditions**

Ensure the instrument is installed and operated strictly under the following conditions:

1. Indoor use only
2.  $\leq 95\%$  RH
3. 75 kPa – 106 kPa
4. Altitude must not exceed 2000 meters
5. Ambient to 40°C operating temperature
6. Pollution degree: 2
7. Mains supply voltage fluctuations up to  $\pm 10\%$  of the normal voltage

### **Avoiding Electrical Shock**

Follow the guidelines below to ensure safe operation of the unit.

The SafeBlue Electrophoresis System has been designed to utilize shielded wires thus minimizing any potential shock hazard to the user. Major Science recommends against the use of unshielded wires.

To avoid electrical shock:

1. In the event of solution spilling on the instrument, it must be dried out for at least 2 hours and restored to NORMAL CONDITION before each operation.
2. Never connect or disconnect wires loading from the power jacks when the red indicator light of power switch is on.
3. WAIT at least 5 seconds after stopping a run before handling output leads or any connected apparatus.
4. ALWAYS make sure that your hands, work area, and instruments are **clean** and **dry** before making any connections or operating the power supply.
5. ONLY connect the power cord to a properly grounded AC outlet.

## Avoiding Damage to the Instrument

1. Do not attempt to operate the device if damage is suspected.
2. Protect this unit from physical damage, corrosive agents and extreme temperatures (direct sunlight, etc.).
3. For proper ventilation and safety concerns, keep at least 10 cm of space behind the instrument, and at least 5 cm of space on each side.
4. Use high level of precaution against the damages on the unit.
5. Do not operate the unit out of environmental conditions addressed above.
6. Prior to applying any cleaning or decontamination methods other than manufacturer's recommendation, users should check with the manufacturer's instruction to see if the proposed method will damage the equipment.

## Equipment Operation

Follow the guidelines below to ensure safe operation of the unit:

1. NEVER access dangerous chemicals or other materials to prevent possible hazard of explosion and damage.
2. Do not operate the unit without lids or covers to prevent possible hazards.
3. A temporary conductivity caused by condensation might occur even though this series is rated Pollution Degree 2 in accordance with IEC 664.

## Symbol

Symbols used on the power supply is explained below.



Indicates an area where a potential shock hazard may exist. Consult the manual to avoid possible personal injury or instrument damage.



Indicates disposal instruction. **DO NOT** throw this unit into a municipal trash bin when this unit has reached the end of its lifetime. To ensure utmost protection of the global environment and minimize pollution, please recycle this unit.

## Limited Use Label License

This product incorporates Clare Chemical Research, Inc's, Dark Reader<sup>®</sup> transilluminator technology.

## Section 1 Introduction

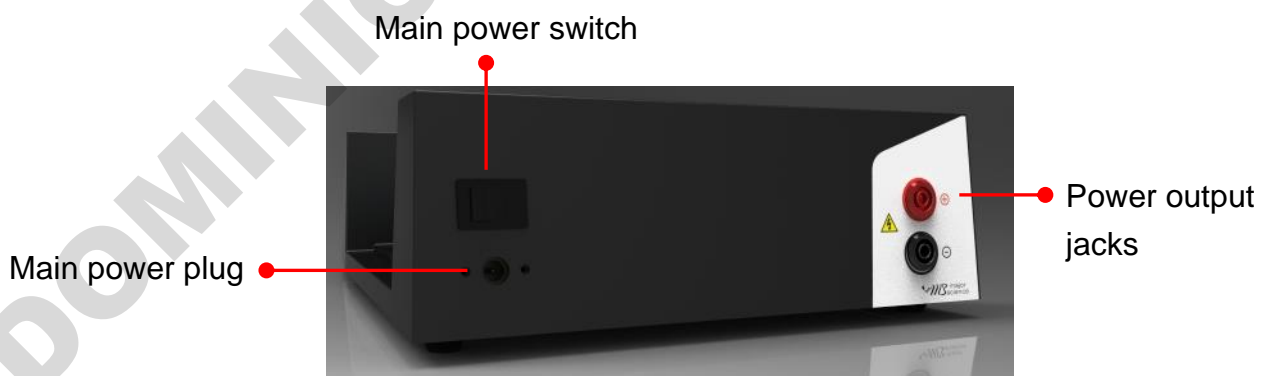
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### 1.1 Overview

The Major Science SafeBlue Electrophoresis System is recognized as a unique Electrophoresis System equipped with very powerful specifications to cover the majority of electrophoresis and power supply demands. The SafeBlue Electrophoresis System uses blue light LEDs to allow for immediate visualization of DNA/RNA bands while running agarose electrophoresis gels. The system is RoHS and CE compliant for environmental and safety concerns. The system is also offered in different packages to accommodate varying budgets and requirements.



Front view



Rear view



## 1.2 Product Description & Feature

The newly redesigned SafeBlue Electrophoresis System is an ideal choice for any researcher. The system uses blue light LEDs to allow for immediate visualization of DNA/RNA bands while running agarose electrophoresis gels. The innovative and space-saving design combines power supply, gel tank, blue light illumination source, and amber filter lid. The complete unit comes with three gel trays, 15 x 7cm, 15 x 10cm, and 15 x 15cm. The system is compact, versatile, and suitable for personal use within the laboratory.

### Features:

- Detachable electrophoresis gel tank and base unit
- Compatible with gel trays 15 x 15cm or smaller
- Gel tank or UV tray can directly be placed on the viewing platform for gel observation
- Suitable for SYBR Green I/II, SYBR gold, SafeView and Midori Green dyes
- Save time with immediate visualization of DNA/RNA band migration
- Blue light LEDs do not require UV safety equipment

## Section 2 Technical Specification

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<b>Cat. No.: MBE-150</b>	
Output Voltage / Inc.	10 – 150V / 1V
Output Current / Inc.	10 – 300mA / 1mA
Max. Power	30 W
Operating Mode	Constant Voltage or Current
Timer	1 – 999 minutes with alarm, continuous
Safety Device	No load detection
Blue Light Wavelength	470nm
LED life	9000 hours
Operating Temperature	Ambient to 40°C
Dimension (W x L x H)	293 x 200 x 80mm
Weight	Approx. 1.1 kg
Material	Polycarbonate housing and aluminum base plate
Power adaptor	Input: 100 – 240VAC, 50/60Hz, 1.4A
	Output : 15VDC, 4.0A, 60W max.
<b>Cat. No.: MBE-TANK</b>	
Dimension (W x L x H)	265 x 175 x 90mm
Gel Dimension (W x L)	150 x 70mm
	150 x 100mm
	150 x 150mm
Maximum Sample	70 for 150 x 70mm Tray (2 x 35 sample combs)
	140 for 150 x 100mm Tray (4 x 35 sample combs)
	210 for 150 x 150mm Tray (6 x 35 sample combs)
Buffer Volume	500ml
Material	Acrylic (Injection molded construction)
	Durable, leak proof environment for complete safety and long life
Cassette Type Electrode	Inexpensive, easy to replace
Electrical Safety	Lid can only be fastened in one way
	On removal, power is disconnected from buffer chamber
Rapid Casting Gel	Use casting dams

<b>Cat. No.: MBE-LID-Y1</b>	
Dimension (W x L x H)	176 x 268 x35mm
Filter Type	Amber filter(Ideal for SYBR green I/II, SYBR gold, SafeView and Midori Green)
Lid Filter Wiper	Used to remove condensation
Material	Polycarbonate

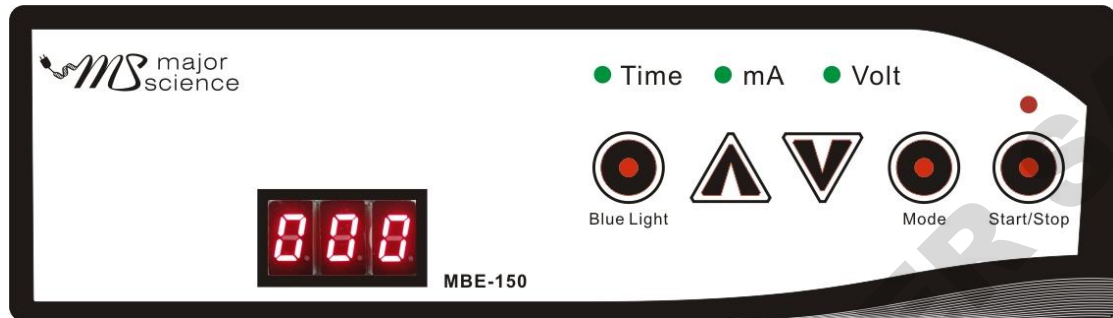
### **Section 3 Installation Instructions**

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Place the unit on a sturdy and level surface, in a safe and dry area. Plug in the power cord.

## Section 4 Operation Instructions

### 4.1 Control interface






There are five buttons and 4 LED indicators located on the faceplate. The LED lights indicate the status of the unit.

-  1. **Mode** – Select Voltage, Current and Time
-  2. **Blue Light** – Open or Close Blue Light
-  3. **Up Arrow** – Increase the Voltage, Current or Time
-  4. **Down Arrow** – Decrease the Voltage, Current, or Time
-  5. **Start/Stop** – Start or stop the unit

#### a. Setup Mode (before pressing RUN/Start)

LED light indicates your current parameter. If you are setting a value for

Voltage, the Voltage LED will be lit. Use  **Mode** to switch between Voltage,

Current and Time. Once selected, use  or  to adjust value.

## b. Operation Mode



Press **Start/Stop** to start electrophoresis. After you start the experiment, the LED light next to the Start/Stop button will light up to indicate the unit is under



operation. Use **Mode** to monitor the changes in current, voltage and remaining time.

## c. Blue Light



The **Blue Light** button can operate in two modes to visualize the nucleic acid sample during electrophoresis:

1. A single press will turn on the blue light source for 10 seconds.
2. You also can also hold down the  **Blue Light** button for 3 seconds to keep the blue light on continuously.

## 4.2 Operating Procedure

To have a better result when documenting with the blue light as lighting source, the recommended stain selection guide table is provided below, choose the appropriate dye to have the gel stained:

Nucleic Acid Stain	Performance	Experimental Protocol		
		Pre-staining	Post Staining	Sample Staining
Major Blue	Excellent			√
SYBR® Green I (DNA)	Excellent	√	√	√
SYBR® Green II (RNA)	Excellent		√	√
SYBR® Gold	Excellent	√	√	
Midori Green Direct	Excellent			√
Hydra Green™ Safe DNA Dye	Excellent	√	√	
HD Green™ DNA Stain	Excellent	√	√	
Novel Juice	Excellent			√
SafeView DNA Stain	Good	√		
SYBR® Safe	Good	√	√	
Midori Green	Good	√	√	
Midori Green Advanced	Good	√	√	
Serva DNA Stain Clear G	Good	√	√	
GelGreen™	Good	√	√	
GelRed™	NR	√	√	
Ethidium Bromide	NR	√	√	
HealthView™	NR	√		

\*NR= Not recommended

Once the gel is ready, follow the steps below to operate the device and analyze your experiment result.

**Note:**

This selection guide serves as a reference only. For the best staining procedures and stain spectrums please refer to manufacturer's protocol/user guide.

#### 4.2.1 Operating the SafeBlue electrophoresis system (complete system)

1. Prepare the gel according to lab protocols. Suggested buffer volumes for gel preparation are shown below:

Tray	15 x 7cm	15 x 10cm	15 x 15cm
Gel volume for a 5mm thick gel	52.5ml	75ml	112.5ml

Pre-staining of gel with a suitable dye is necessary to visualize the migration of bands in real-time.

2. Ensure that the SafeBlue base unit (MBE-150) is placed on a level bench. Plug the power cord into an electrical outlet.
3. Switch the SafeBlue base unit on using the ON/OFF button which located on the back side of the base unit.
4. Connect the one end of the red(+) and black(-) cable to the amber filtered lid (MBE-LID). Make sure to screw it firmly. Connect the other end to the base unit.
5. Place the electrophoresis tank (MBE-TANK) onto the base unit
6. Place your agarose gel in the middle of the electrophoresis tank in the correct orientation (the wells should be placed at the left hand side, closer to the positive/black electrode)
7. Pour your TAE or TBE buffer.
8. Load your DNA samples.
9. Select your settings accordingly. To run at constant voltage, switch the mode button to Voltage setting and change the values (you will see the Volt green LED light up).


Use the same method to adjust for the constant current settings.

**Note: To operate under constant voltage or constant current modes, adjust the other parameter to the maximum value. For example, to operate under constant voltage, adjust current to max before running using constant voltage, and vice versa.**




10. Press  button to initiate the electrophoresis process. If you wish to




pause a running experiment, press  again to stop the

electrophoresis.

11. While running the gel, you can turn on the blue light  to monitor the DNA migration in real time.


12. Once the electrophoresis is completed, the display will show “End” and you

will hear continuous beeping sound. Press the  button again to stop the sound.

Note: the specially designed wiper on the amber filter lid is designed to wipe away the water vapor generated from the electrophoresis while viewing the experiment in real time.

#### 4.2.2 Operating the SafeBlue electrophoresis system as a Blue Light Transilluminator



1. Ensure that the SafeBlue based unit (MBE-150) is placed on a level bench. Plug the power cord into an electrical outlet.
2. Switch the SafeBlue base unit on using the ON/OFF button which located on the back side of the base unit.
3. Before handling your gel or sample, ensure that the personal safety equipment you are using is appropriate for the hazards posed by the chemicals that are present. Place the gel or sample onto the surface of the SafeBlue base unit.


4. Switch the blue light feature on using the  button located on the front panel of the instrument.
5. Any SYBR®- stained DNA present (in solution or in gel bands) should be immediately visible when viewing through the amber filter lid or through amber filter viewing glasses.
6. No UV protective eyewear is required when viewing the Blue Light Transilluminator.



## Section 5 Trouble shooting and Maintenance

Many operating problems may be solved by carefully reading and following the instructions in this manual accordingly. Some suggestions for troubleshooting are given below. Should these suggestions not resolve the problem, contact our SERVICE DEPARTMENT or a distributor in your region for assistance. If troubleshooting service is required, please include a full description of the problem.

Problem	Cause	Solution
No Display / lights	No AC power	Check if the power supply is unplugged, or AC power source problem
Operation stops	Electrophoresis leads are not connected to the power supply or to the electrophoresis unit(s), or there is a broken circuit in the electrophoresis cell	Check the connections to the power supply and on your electrophoresis cell to make sure the connection is intact; check condition of wires in electrophoresis unit. Close the circuit by reconnecting the cables. Press <b>START/STOP</b> to restart the run.
	High resistance due to tape left on a pre-cast gel, incorrect buffer concentration, or incorrect buffer volumes in the electrophoresis cell	Correct the condition by making sure the tape is removed from the pre-cast gel, buffers are prepared correctly, and the recommended volume of buffer is added to the electrophoresis unit.
 Error message	Over voltage(will show error if the 170Volt safety limit is reached)	Press <b>START/STOP</b> button to clear the error message. Contact MS service dept. if the problem persists.
 Message	No load is detected	(1) Check the connections (2) Check the buffer condition / buffer level

 Alarm message	Max. watts(30W) of power reached	Warning message for reference
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### Encountering Problems

1. Check the troubleshooting section.
2. Call Technical Service or e-mail to [service@majorsci.com](mailto:service@majorsci.com)
3. If the unit must be shipped back for repair, contact Major Science or the distributor for a Return Authorization Number and shipping instructions. The unit will be repaired and returned to you as quickly as possible.

### Maintenance

The Safe Blue Electrophoresis System uses all solid-state components and should require no maintenance or recalibration under normal use. If the unit must be returned for repair, contact our **SERVICE DEPARTMENT** or your local distributor for shipping instruction.

### Cleaning

Cleaning of the device should be handled with care and in professional manners. Otherwise the manufacturer assumes no liability to damage caused by improper handling.

For the daily clean and maintains process. Clean the tanks, trays etc. with a soft cloth and clean with mild detergent and distilled water.

Dry in the shade. Then put away in safe place without exposure of sunlight and stay away from the dust.

\* Trays are particularly vulnerable to scratch. Make sure cleaning with care.

## Section 6 Ordering Information

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<b>Cat. No.</b>	<b>Description</b>
MBE-150-PLUS	Package of MBE-150 and MBE-TLC
MBE-150	SafeBlue Base Unit
MBE-TLC	Package of MBE-TANK, MBE-LID-Y1 and MBE-150-CABLE
<b>Accessories</b>	
MBE-TANK	Electrophoresis Tank for SafeBlue (without lid and Red/Black Cables)
MBE-150-CABLE	MBE-150 Red/Black Cables
MBE-LID-Y1	MBE-150 Lid with amber filter
MBE-G-Y1	Amber filter viewing glasses (optional)
MBE-150-3	Base Unit platform protective film
MBE-TANK-01	SafeBlue electrophoresis gel tank image enhancer film
MBE-150-01	SafeBlue Imager System, Darkroom Viewer
MBE-150-02	SafeBlue gel cutting tray

## Section 7 Warranty

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Major Science warrants apparatus of its manufacture against defects in materials and workmanship, under normal service, for **one year from the shipping date to purchaser**. This warranty excludes damages resulting from shipping, misuse, carelessness, or neglect. Major Science's liability under the warranty is limited to the receipt of reasonable proof by the customer that the defect is embraced within the terms of the warranty. All claims made under this warranty must be presented to Major Science within one year following the date of delivery of the product to the customer.

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