Mupid®-2plus

Instruction Manual

Mini submarine Electrophoresis System for Molecular Biology

ENGLISH

ADVANCE

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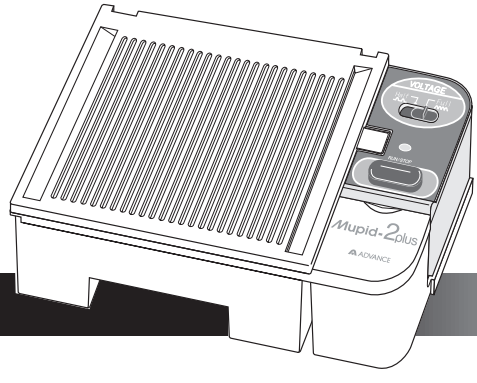
Mupid®-2plus

Submarine-type electrophoresis system



User Manual

Introduction

The Mupid series are mainly used in agarose electrophoresis. The greatest feature is their compactness by the one apparatus power supply. The Mupid-2 has an outstanding track record over some 20 years and has been incorporated into the standard protocol of numerous testing manuals in Japan.

This model, the Mupid-2plus, retains all the performance of the Mupid-2 with improved usability based on the ideas of the researchers using it. The Mupid-2plus can be used under exactly the same test conditions as instructed in previous testing manuals for the Mupid-2.

Please read this user manual carefully. Further information can be seen at the Mupid website (http://www.mupid.com/English/)

Before Use

Before using this product, be sure you fully understand its features as described in this user manual and use it properly.

● **Symbols used in this manual and product** ●

	Indicates a general precaution or warning. Ignoring this instruction could cause a serious accident.
	Indicates danger of an electric shock. Follow these instructions completely.
	Indicates the possibility of personal injury. Follow these instructions completely.
	Indicates the need to unplug the electrical cord. Ignoring this instruction may cause an electric shock.
	Indicates a testing precaution. If this instruction is ignored, the product could fail and test results could be affected.

Safety Precautions

Do not use this product with wet hands.

Always use the special-purpose lid and power supply for the migration tank. We are not responsible for any accidents or damage caused by the use of other devices or equipment.

The power supply cannot be disconnected while the migration tank lid is closed. Attempting to do so can cause damage.

Do not put fingers or objects into the migration tank while electrical current is running.

Always make certain to turn off the power supply after the electrophoretic run.

Always verify that the power supply is OFF and the migration tank lid is opened before detaching the power supply.

When this product is not in use, or when you move it, detach the power supply from the migration tank and remove the plug from the outlet.

If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired.

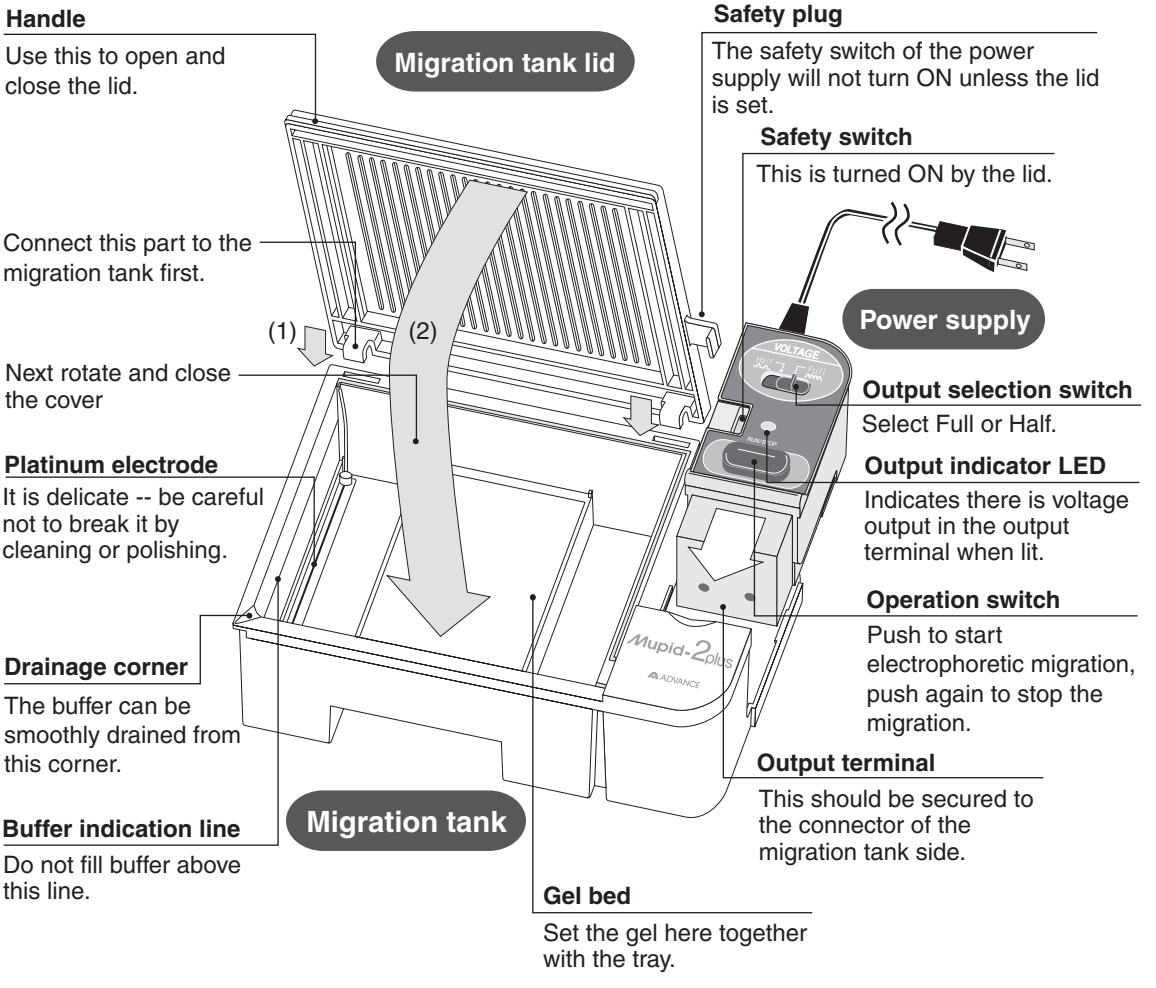
Confirmation of Migration Conditions

- For product safety, if electrical current runs at 0.8 A or more the fuse will blow and operation will stop. In such a case, contact a distributor for repair.

- Even if the fuse does not blow, accurate results are difficult to obtain if the temperature exceeds 40 ˚C during migration, and the following changes should be considered in such a case:
  (1) Change the type of buffer.
  (For example, change TAE buffer to TBE buffer for lower current usage)
  (2) Reduce the concentration of buffer.
  (3) Cool the buffer.

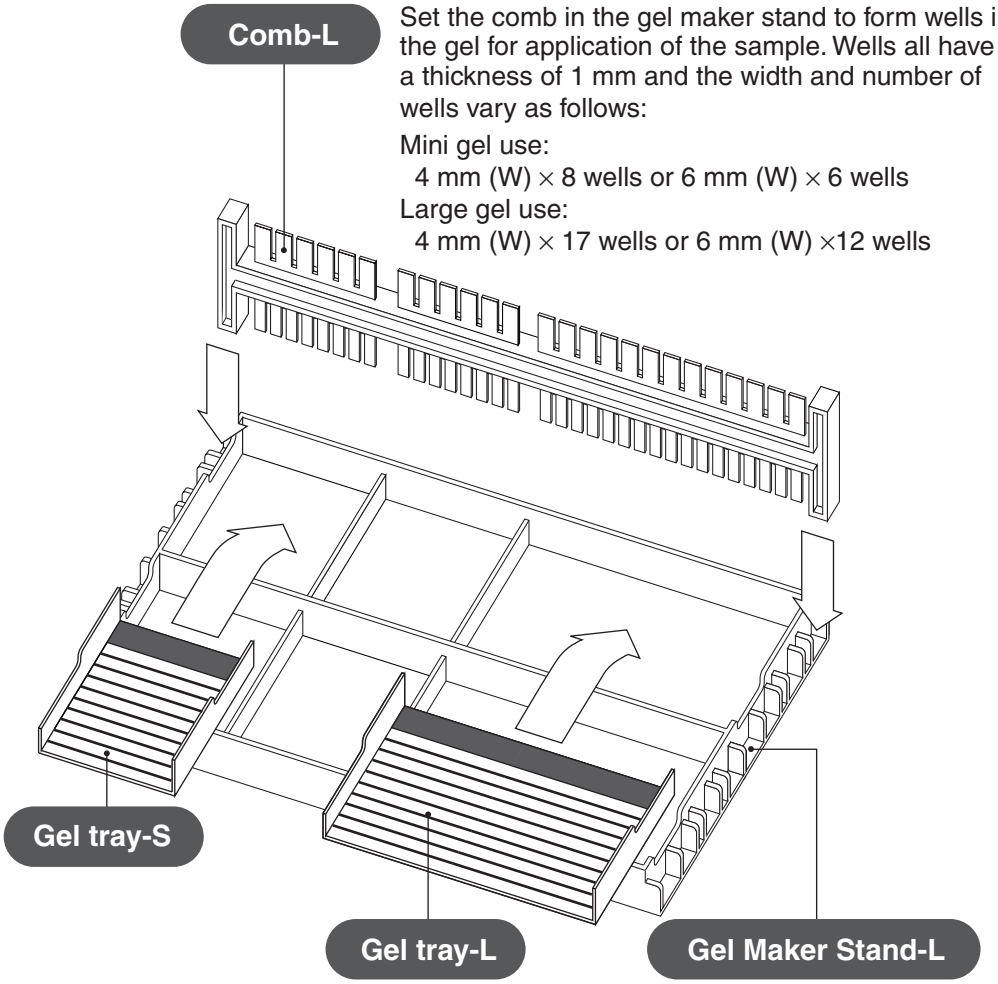
1 Mupid-2plus: Components and Functions

1-1 Electrophoresis System



Standard set contents	
Mupid-2plus migration tank:	1
Mupid-2plus migration tank lid:	1
Mupid-2plus power supply:	1

1-2 Gel Maker Set L



Set the comb in the gel maker stand to form wells in the gel for application of the sample. Wells all have a thickness of 1 mm and the width and number of wells vary as follows:

Mini gel use:
4 mm (W) × 8 wells or 6 mm (W) × 6 wells
Large gel use:
4 mm (W) × 17 wells or 6 mm (W) ×12 wells

Set the gel tray in the gel maker stand, and pour the gel-forming solution here. There are 2 sizes and each of them has a migration indication line.

Gel tray-S: 52 mm (W) × 60 mm (L) [gel size]
Gel tray-L: 107 mm (W) × 60 mm (L) [gel size]

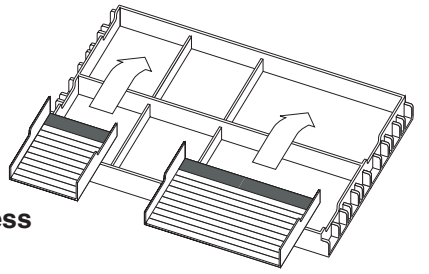
Set the gel tray and comb here to prepare gel.
At maximum, 4 mini gels or 2 large gels can be prepared at once.

Standard set contents			
"Gel maker set L" is standard for Mupid-2plus. The contents of the Gel maker set L are as follows:			
Gel maker stand-L:	1	Gel tray-S:	4
Comb-L:	2	Gel tray-L:	2

Several other Mupid-related options are available.
Please consult our website (http://www.mupid.com/English/).

2 Gel Preparation

(1) Place the gel maker stand level and set the gel tray into the stand. At maximum, four mini gels and two large gels can be prepared at once.



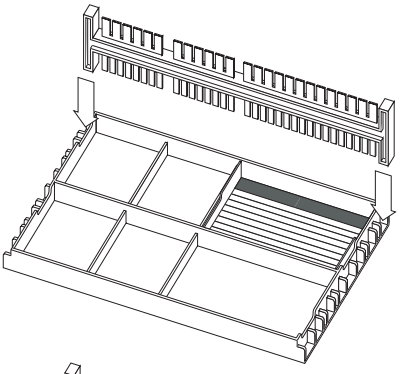
If the gel tray is not placed level, the thickness of the gel will not be uniform and migration may be affected.

(2) Weigh the required amounts of agarose powder and buffer solution in a conical flask or other vessels, and completely dissolve the agarose by applying heat.

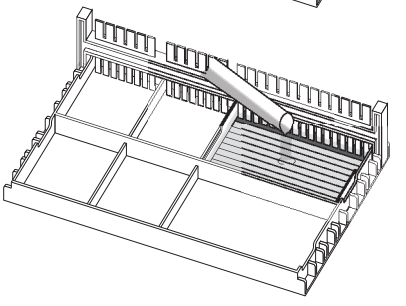
(3) Let the agarose solution stand until it cools to 70 °C or below.

If preparation is conducted at 80 °C or higher, there is a danger of deforming the gel maker stand and gel tray.

(4) Set the comb into the gel maker stand. Choose the small-toothed side (4 mm × 8 or 17 wells) or the large-toothed side (6 mm × 6 or 12 wells) depending on the purpose. Multiple combs can also be set for a single gel.

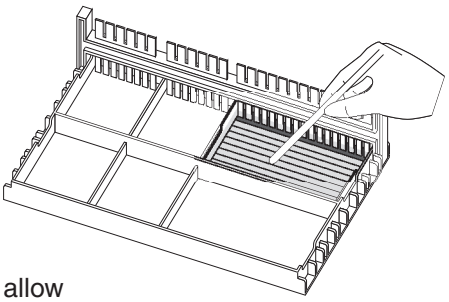


(5) Pour the appropriate amount of agarose solution into the gel tray. To prepare a gel of about 4 mm thickness, approximately 13 mL of agarose solution is required for a mini gel and 26 mL for a large gel.



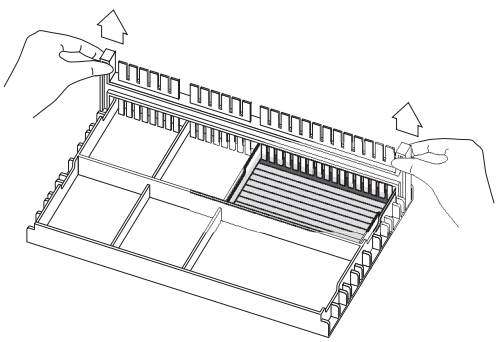
The order of steps (4) and (5) can be reversed. For high-viscosity gels in which air bubbles may be apt to remain, performing step (5) first is recommended.

(6) Before the solution gels, remove air bubbles from the bottom surface of the gel tray using a glass rod or other tools. Because bubbles on or in the gel will affect migration, they should be drawn out with a dropper, etc.

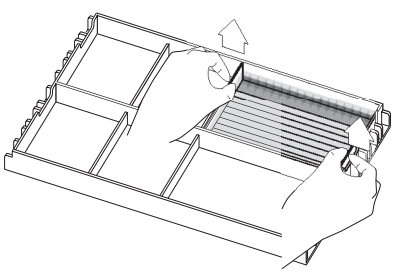


(7) Let it stand at room temperature for 15-20 minutes to allow the solution to gel. Gelation may require more time if the agarose concentration is low.

(8) When the solution has sufficiently gelled, hold the comb at each end and gently lift it upward. Confirm the rectangular shape of the wells and the absence of air bubbles.



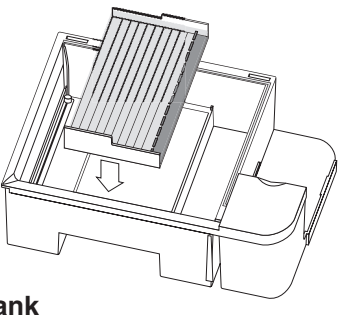
(9) Grasp the both sides of the gel tray with hands and lift it up and out. Because the gel is placed in the migration tank together with the gel tray, preparation is complete at this point.



If the gel will not be used immediately, pour a small amount of buffer solution over the gel and wrap it to prevent drying or contamination.

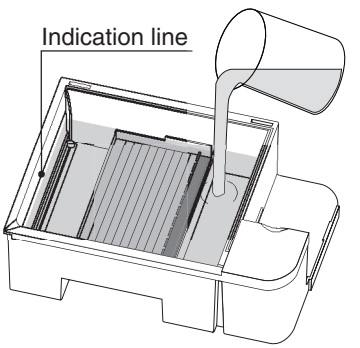
3 Electrophoresis

(1) Place the prepared gel on the gel bed of the migration tank together with the tray. Since the side near the power supply is cathode, wells should be placed on the right for migration of nucleic acids in most cases. Wipe off any excess gel that is adhering around and bottom surface of the gel tray.

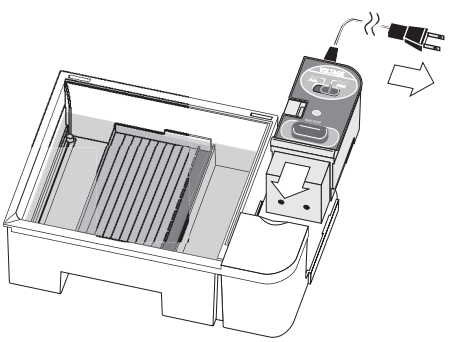


Migration may be affected if the migration tank is not placed on a level surface.

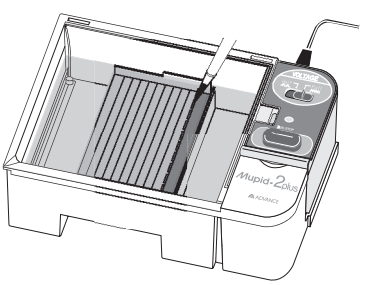
(2) Pour buffer solution to a level of about 3 mm above the surface of the gel. However, do not fill above the level of the buffer indication line. 250-300 mL of buffer is required.



(3) Connect the power supply to the migration tank and inset the electric plug into an outlet. The electric current cannot be turned on with the lid open.



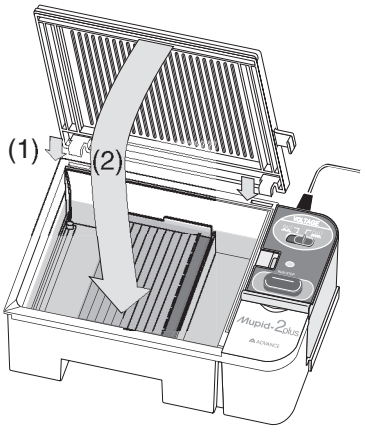
(4) Apply the sample to the wells using a pipette. The amount of applicable sample depends on the thickness of the gel; for example, a 4 mm well will take about 5-8 μl and a 6mm well about 8-12 μl. Note that the wells do not correspond to the pitch of a multipipette.



(5) After verifying that the operation switch of the power supply is OFF, close the migration tank lid.

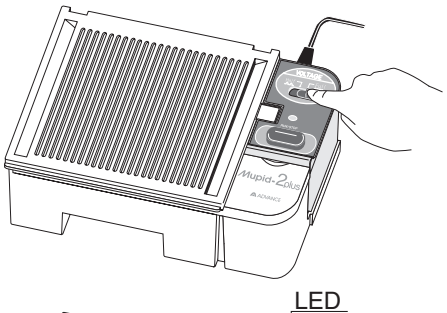
Do this as follows:

1) First insert the 2 tabs on the cover into the holes in the migration tank.
2) Then rotate the cover forward to close it.



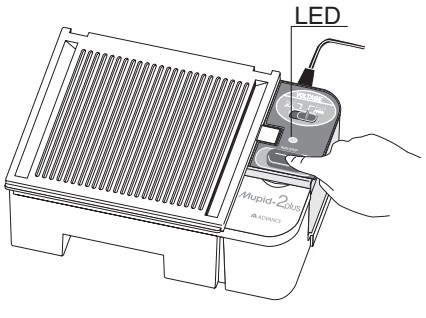
(6) Set the desired voltage using the output selection switch.

When changing the output, make certain that the operation switch is OFF. In this case the output indicator LED will be unlit.



(7) Push the operation switch to start migration. At this time verify that the output indicator LED is lit and that bubbles are forming on the platinum electrodes.

Take care not to put any foreign objects into or touch inside of the migration tank during migration.



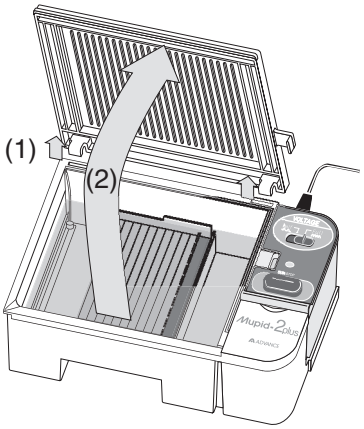
(8) Migration distance may be estimated using the line printed on the gel tray or the slits on the migration tank lid. Be sure to turn the operation switch OFF when sufficient migration has been attained.

(9) Then proceed quickly to the operation of staining the gel.

4 Gel Staining and Band Confirmation

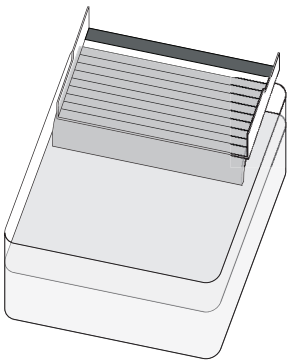
(1) Verify that the operation switch is OFF, the output indicator LED is unlit and that the platinum electrode is not forming bubbles.

(2) Remove the migration tank lid. It can be removed by grasping the handle on the front of the lid and rotating it open.



Because of the danger of overturning the migration tank, do not lift the lid directly over it.

(3) After preparing the dye in a sealable container, remove the gel tray from the migration tank. Submerge the gel in the stain solution, either together with the gel tray or after removing it from the gel tray.



Because stains act directly on biological molecules such as DNA, they are potentially harmful to the human body. Handle them carefully, wearing gloves and avoiding direct contact with the skin.

(4) After allowing it to stand for the required amount of time, remove or de-stain the gel and place it on the transilluminator for observation.

When using ultraviolet light, be sure to protect eyes and skin by wearing UV-protective goods such as a faceshield.

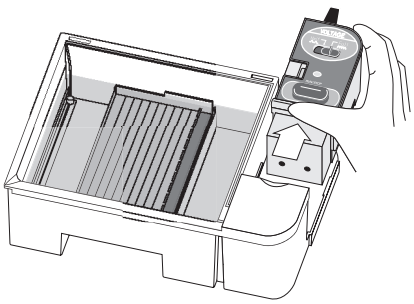
Stained gels and buffer solutions, etc. should be disposed of as directed in the instructions for the stain. Clean off all stains that adhere to the migration tank, gel tray or other components.

5 Product Maintenance

Do not let buffer stand in the migration tank for a long time or re-use it. This can not only prevent accurate test results, but can also cause damage.

Detach the power supply when discarding buffer or cleaning the migration tank.

When detaching the power supply, push the top with the thumb as illustrated in the figure at right. Don't pull on the electric cord.



If buffer is spilled on the power supply, dry it thoroughly and have it checked at a distributor as a precautionary measure.

Although the migration tank does not have any electrical switch, do not clean it by immersion in water.

Polishing or cleaning the electrode with a brush can cause breakage and should be avoided.

After cleaning, allow it to dry it in a place out of direct sunlight. Do not dry it under severe conditions such as a dry oven, or a hair dryer.

Do not clean this product with organic solvents such as acetone. Deformation could result.

Do not attempt to modify this product.

This product is designed to run on input of 100-120 V of alternating current; if using it in a country where voltage is higher, be sure to use a step-down transformer. When there is the necessity of keeping the temperature of buffer liquid low, It recommends using it in 100 VAC.

6 Troubleshooting

Problem	Causes and Measures
The indicator LED does not light and samples cannot be migrated.	- Make sure that the electric cord is plugged into the outlet. - Make sure that the operation button has been pressed. - If the migration tank lid is not closed properly the safety switch cannot go ON; make sure the lid is closed firmly. - The fuse may have blown; contact a distributor or our service center for repair.
The indicator LED is lit but samples cannot be migrated.	- Make sure that the power supply is firmly connected to the migration tank. - Make sure that the type and concentration of buffer are correct. - Make sure that the gel is fully suffused with buffer. - The electrode may be broken; contact a distributor for repair.
Migration is slow.	- Make sure that the voltage setting is correct. - The type, concentration or temperature of the gel and buffer can make a great difference. - Make sure that buffer is not being re-used.
Bands are distorted.	- Make sure there are no air bubbles in the gel. - Agarose may not have sufficiently dissolved at the time of gel preparation. - Make sure that the migration tank was set up on a level surface. - Make sure that the gel was prepared evenly. - Make sure that the wells have a good rectangular shape.
The bands cannot be observed.	- Check if the concentration of stain is too low, or if it has been re-used. - Try extending the staining time. - Make sure the amount of sample is sufficient. - Make sure that the light source of the appropriate wave length for the stain is used. - If the gel is being observed in the migration tank or gel tray, try observing the gel alone. - Try testing again using a shorter migration time.

7 Product Specifications

Migration tank

Outside dimensions:	187.5 mm (W) × 139.5 mm (L) × 57.0 mm (H)
Migration tank internal dimensions:	133.0 mm (W) × 120.6 mm (L) × 47.5 mm (H)
Buffer capacity:	Approx. 250-280 mL (maximum 300 mL when setting gel)
Material:	PPHOX
Weight:	260 g
Lid outside dimensions:	157.0 mm (W) × 139.5 mm (L) × 13.0 mm (H)

Power supply

Outside dimensions:	43.0 mm (W) × 109.0 mm (L) × 52.0 mm (H) (cord excluded)
Input:	100-120 VAC, 50 Hz/60 Hz, 25 VA (A step-down transformer is required for use at 220-240 VAC, over 120 VAC) (When there is the necessity of keeping the temperature of buffer liquid low, it recommends using it in 100 VAC.)
Output:	Half or all rectified waveform at input voltage Half: 45 V (avg), 71 V (rms), Full: 90 V (avg), 100 V (rms) in case of 100 VAC Half: 54 V (avg), 85 V (rms), Full: 108 V (avg), 120 V (rms) in case of 120 VAC
Fuse:	250 V, 0.8 A
Weight:	155 g

Gel maker set L

Gel maker stand dimensions:	240.0 mm (W) × 126.0 mm (L) × 17.5 mm (H)	
Number of gels:	2 large gels, 4 mini gels	
Gel tray dimensions:	Large size:	109 mm (W) × 60 mm (L)
	Mini size:	55 mm (W) × 60 mm (L)
Comb dimensions:		10 mm (W) × 240 mm (L) × 42 mm (H)
Well shape:	Large gel:	6 mm (W) × 1 mm (L) × 12 wells
		4 mm (W) × 1 mm (L) × 17 wells
	Mini gel:	6 mm (W) × 1 mm (L) × 6 wells
		4 mm (W) × 1 mm (L) × 8 wells

Environmental conditions

Operating temperature:	5-35 °C
Humidity:	20-80 % RH non-condensing
Operating environment:	Indoor use only
Altitude:	Up to 2000 m (6500 ft)
Transient overvoltage:	Installation Category II
Protection class:	Pollution Degree 2

Standard set contents

Mupid-2plus migration tank:	1
Mupid-2plus migration tank lid:	1
Mupid-2plus power supply:	1
Gel maker set-L:	1
- Gel maker stand-L:	1
- Gel tray-L:	2
- Gel tray-S:	4
- Comb-L:	2