LABGIC

Medium Horizontal Electrophoresis Tank

L-HET-13MD Operations Manual

L-HET-13MD, Version 2023.4.01

Contents

Important Safety Information

This manual contains important operating and safety information. To use this instrument properly, please read and understand this manual carefully before use.

When the instrument is not in use, disconnect it from the power supply to avoid electric shock. The power supply should also be switched off. Before use, check the outer tank for cracks to prevent electrophoresis buffer from leaking through cracks and causing electrical leakage. Also check whether the leads and plugs are loose, whether the insulation is damaged, or whether the wires are corroded or broken, so as to avoid injury during use. Use the instrument only for the purposes described in this manual. Do not continue to use this product if the leads or the instrument are damaged. Disconnect the power before moving the product. During electrophoresis, check whether buffer is leaking from the tank or onto the laboratory bench. If leakage occurs, stop electrophoresis immediately and contact the company or the local office.

Note: The company is not responsible for consequences caused by use that does not follow this manual.

Chapter 1 Product Introduction

1. Overview

The L-HET-13MD medium horizontal electrophoresis tank is mainly used for agarose gel separation electrophoresis of DNA and RNA. It includes a dedicated gel-casting platform and freely combinable trays in multiple specifications, making it convenient to use. The trays have ear-shaped handles for easy operation. Samples can be loaded with a multichannel pipette. The system can be used for electrophoresis experiments with 96-well PCR samples. The instrument mainly includes gel trays, lower tank, upper lid, gel caster, combs, etc., and can run agarose gel electrophoresis in different sizes and sample capacities, including 6.5 x 6.5 cm, 6.5 x 13 cm, 13 x 6.5 cm, and 13 x 13 cm.

2. Structure and Components

After purchasing the instrument and before use, check the accessories against the packing list and inspect whether the instrument has been damaged during transport. If any accessory is missing or incorrect, or if the instrument is damaged, contact the company or the local office immediately. To unpack, gently cut the packing tape with a knife and remove the instrument.

Packing list:

Accessory	Quantity	Accessory	Quantity
Main tank	1 pc	Upper lid and power cord	1 set
Replaceable electrodes	1 pair	Gel-casting frame	1 pc
Gel tray	5 pcs	Comb	9 pcs
	13 x 13 cm, 1 pc		7+7/14 wells, 0.75 mm thick
	13 x 6.5 cm, 1 pc		9+9/19 wells, 0.75 mm thick
	6.5 x 13 cm, 1 pc		12+12/27 wells, 1.0 mm thick
	6.5 x 6.5 cm, 2 pcs		7+7/13 wells, 1.5 mm thick
			9+9/19 wells, 1.5 mm thick
			3+3/3+2 wells, 2.0 mm thick
Instructions	1 copy	Warranty card	1 copy
Certificate of conformity	1 pc		

3. Main Technical Parameters

Model	L-HET-13MD
Dimensions	300×155×100mm
Tray area (W x L)	Standard: 13 x 13 cm, 13 x 6.5 cm, 6.5 x 13 cm, 6.5 x 6.5 cm
Comb	7+7/14 wells, 0.75 mm thick
	9+9/19 wells, 0.75 mm thick
	12+12/27 wells, 1.0 mm thick
	7+7/13 wells, 1.5 mm thick
	9+9/19 wells, 1.5 mm thick
	3+3/3+2 wells, 2.0 mm thick
Number of gels cast simultaneously	1-4 gels
Buffer	1000ml
Weight (net)	1.5kg

The instrument requires a DC power supply. The maximum power parameters that the instrument can withstand are as follows: Maximum voltage 200 V; maximum power 40 W; maximum buffer temperature 40 deg C.

Chapter 2 Operating Procedure

1. Place the gel-casting frame on a level bench. Put the gel tray into the corresponding slot in the casting frame, then place the comb into the groove. As needed, the casting frame can be used to prepare gels of 13 x 13 cm, 13 x 6.5 cm, 6.5 x 13 cm, and 6.5 x 6.5 cm.

2. Prepare an agarose solution of an appropriate concentration in electrophoresis buffer according to the size of the DNA fragments to be separated. Accurately weigh the dry agarose powder and add it to an Erlenmeyer flask or glass bottle containing the measured electrophoresis buffer. Stir evenly with a glass rod, then heat in a boiling water bath or microwave oven until the agarose melts. (For agarose gel concentration selection, see the appendix.)

3. After the gel has cooled slightly, slowly pour it into the gel tray. A gel thickness of 3-5 mm is recommended. (Note: there must be no bubbles in the gel.)

4. Allow the gel solution to solidify completely, 30-45 min at room temperature. (When the gel has partly solidified, it may also be placed in a 4 deg C refrigerator to greatly shorten the solidification time.) Carefully remove the comb and place the gel in the electrophoresis tank with the wells close to the cathode (black end).

5. Add electrophoresis buffer to the tank until it covers the gel by at least 2 mm. (Note: TAE buffer generally should be replaced after 2-3 uses; TBE buffer can be used about 10 times.)

6. Mix an appropriate amount of DNA sample with 10x loading buffer. For analysis of a single DNA sample, such as lambda phage or plasmid DNA, 100-500 ng DNA may be loaded into each 5 mm-wide well. If the sample contains many DNA fragments of different sizes, such as mammalian DNA digestion samples, loading 20-30 ug DNA per well will not cause a significant decrease in resolution. Then load the sample into the wells with a pipette. Be sure to include suitable DNA molecular weight markers, loading them into wells on the left and right sides of the sample wells.

7. After loading, cover the electrophoresis tank and connect the electrophoresis power supply. Apply a voltage of 5-8 V/cm, where the distance is measured between the anode and cathode. Bubbles will form at the anode and cathode because of electrolysis. DNA should migrate toward the anode (red plug). The electrophoresis time depends on the gel length, voltage, and DNA fragment size. The longer the gel, the lower the voltage, and the larger the DNA fragment, the longer the required time. However, when high voltage is used, the resolution of large DNA fragments is poor and the bands are unclear. (Do not exceed 8 V per cm of gel. Excessive voltage will reduce resolution. Only at low voltage

is the electrophoretic mobility of linear DNA molecules proportional to the applied voltage.)

8. When the tracking dye has migrated to the bottom of the gel, switch off the power, remove the sample, and stain it in pre-prepared EB solution for 5-10 min. (EB decomposes in light and should be kept in a dark room.) Observe on a UV transilluminator and photograph with a digital camera if desired. EB may also be added to the gel during casting.

Chapter 3 Maintenance

1. Operating environment: temperature 4-40 deg C, relative humidity not exceeding 95%, no corrosive gases, and good ventilation.
2. After using the instrument, carefully clean the gel tray, lower tank, gel caster, and combs with a mild detergent.
3. If the electrode head becomes wet, dry it with absorbent paper as soon as possible to prevent rust.
4. Do not allow the electrophoresis apparatus to contact acidic or alkaline solutions, as this may corrode and damage the instrument.

Chapter 4 Troubleshooting

mptom	Cause analysis	Corrective action
DNA bands are blurred	DNA degradation	Avoid nuclease contamination during the experiment.
	Electrophoresis buffer is old	After repeated use, the electrophoresis buffer has reduced ionic strength, lower pH, and weaker buffering capacity, affecting electrophoresis. Replace the buffer frequently.
	Electrophoresis conditions are unsuitable	During electrophoresis, voltage should not exceed 8 V/cm and temperature should be below 30 deg C. For very large DNA chains, temperature should be below 15 deg C. Check whether the electrophoresis buffer has sufficient buffering capacity.
	Too much DNA loaded	Reduce the amount of DNA loaded.
	DNA sample has high salt content	Remove excess salt by ethanol precipitation before electrophoresis.
	Protein contamination	Remove protein by phenol extraction before electrophoresis.
	DNA denaturation	Do not heat before electrophoresis; dilute DNA with 20 mM NaCl buffer.
Irregular DNA band migration	Reannealing of cos sites in lambda/Hind III fragments	Heat at 65 deg C for 5 min before electrophoresis, then cool on ice for 5 min.
	Electrophoresis conditions are unsuitable	During electrophoresis, voltage should not exceed 8 V/cm and temperature should be below 40 deg C. Replace the electrophoresis buffer frequently.
	DNA denaturation	Dilute DNA with 20 mM NaCl buffer. Do not heat before electrophoresis.

Weak bands or no DNA bands	Insufficient DNA loaded	Increase the amount of DNA loaded.
	DNA degradation	Avoid DNase contamination.
	DNA has run out of the gel	Shorten electrophoresis time, reduce voltage, and increase gel concentration.
	For EB-stained DNA, the light source used is unsuitable	Use a short-wavelength (254 nm) UV light source.
DNA bands are missing	Small DNA bands have run out of the gel	Shorten electrophoresis time, reduce voltage, and increase gel concentration.
	DNA fragments of similar size are difficult to resolve	Increase electrophoresis time and use the correct gel concentration.
	DNA denaturation	Do not heat DNA chains at high temperature before electrophoresis; dilute DNA with 20 mM NaCl buffer.
	DNA chains are very large; conventional gel electrophoresis is unsuitable	Analyze by pulsed-field gel electrophoresis.
Sample lanes are not straight	Gel did not solidify completely; comb teeth were tilted; gel contained bubbles	Allow the gel to solidify for at least 30-40 min. Check the comb. Make sure there are no bubbles in the gel during casting.
High-molecular-weight bands are clear, but low-molecular-weight bands are diffuse	Gel concentration is low	Use a gel of appropriate concentration. Switch to polyacrylamide gel for separation.
Gel has melted	Temperature is too high	Select an appropriate voltage. The buffer has been used too many times or was prepared incorrectly; prepare it again.
Sample bands are diffuse	Salt concentration in the sample is high; temperature is too high; too much sample was loaded; sample is degraded; sample wells were damaged during gel casting	Reduce the salt concentration of the sample. Reduce the voltage or prepare fresh buffer. Increase gel thickness or load an appropriate amount of sample. Extract the sample again. Cast the gel again.

Chapter 5 Transport and Storage

1. Do not place heavy objects on the product during transport or storage. Handle with care when moving.

2. The packaged product should be stored indoors at -20 deg C to 55 deg C, with relative humidity not exceeding 93%, no corrosive gases, and good ventilation.

Chapter 6 Warranty

Agarose gel concentration (w/v)	Resolvable linear DNA fragment size (kb)
0.4 %	5~60
0.7 %	0.8~10
1.0 %	0.4~6
1.5 %	0.2~4
1.75 %	0.2~3
2.0 %	0.1~3

1. The complete instrument is covered by a five-year free warranty from the date of sale.

2. The following conditions are not covered by the free warranty, but paid repair and lifetime service are available:

a. Comb teeth may darken after long-term exposure to high-temperature pouring;

b. natural wear or human-caused breakage of platinum wire;

c. natural rusting of both ends of the power cord caused by evaporation of corrosive gases, resulting in circuit failure;

d. obvious scratches on trays caused by long-term use;

e. accidents or operation not in accordance with the manual;

f. products beyond the warranty period that can still be used after repair;

g. inability to present the warranty card and invoice, or altered invoices.