BG-verMini vertical electrophoresis system user manual

Executive standard: GB/T 29248-2012
Product Record: Jingshun Machinery Equipment 20140002
Production Record： Jingshun Food and Drug Administration Production Equipment 20140001
Version: V1.1 Mar.2019

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CONTENT

Important safety information!

Please read carefully before use!

This manual contains important operational and safe use information! In order to use this instrument better, please read the contents of this manual carefully before use!

To avoid the risk of electric shock when the instrument is not in use, disconnect the instrument from the power source. The power supply should also be in a power down state. Before use, please check the outer tank for cracks to avoid leakage of buffer from the crack during electrophoresis, resulting in electric leakage. In addition, please check the wire and plug for loose connection, broken rubber, wire corrosion, wire disconnection, etc., so as to avoid harm to the human body during use. The instrument is intended for use only for the purposes described in this manual. Do not continue to use this product if the wire or instrument is damaged. Please disconnect the power when moving the product. When electrophoresis, inspect the base and workbench of any signs of buffer leakage. if leaking buffer is detected, disconnect the power immediately and contact our company or local office.

Note: The company is not responsible for any consequences caused by not following the instructions.

Chapter I Product Introduction

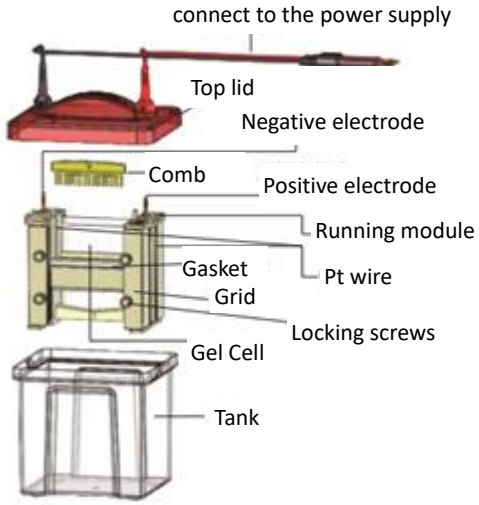
1.1 Introduction

The BG-verMini vertical electrophoresis system is the mini type one used mainly for quick gel electrophoresis of protein samples. You can run mini size precast or hand cast gels with this system. You needn't reset the gel set from the gel casting module to the electrophoresis running module with the special in-situ gel cast set combine to the electrophoresis running module, which avoid any miss during these operations. The tray has a patented ear structure which is for easy handling. The instrument mainly includes the tank，the running module, gel cast stand, plates and combs, etc. The system can carry 1 or 2 gels one run. It can be used in Western blot experiment with BG-verBLOT Mini Vertical Transfer system or Mini transfer core.

The BG-Power600/600i/300 provides the power required for the BG-verMini vertical electrophoresis system.

1.2 Structure and composition

After purchase the instrument, please check the accessories on the packing list before use and check if the instrument is damaged due to transportation. If the number of accessories is more or less than that noted on packing list or the instrument is damaged, please contact the company or local office immediately. When unpacking, use a knife to cut the packing tape gently and take out the instrument.



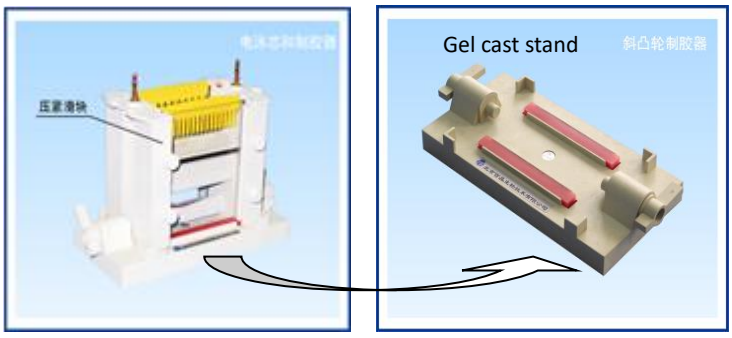


Fig. 2 The in-situ gel cast set

(the running module and the gel cast stand)

Fig. 1 Main components

Fig. 3 Plate, comb and gel releaser

The packing list is as follows：

Accessories	Quantity
Main tank	1
Running module	1 set
Top lid and power cord	1 set
Gel Cast stand	1 set
Plate	100×105mm, 1.0 mm，3 sets
	100×105mm,0.75 mm（Opitional）
	100×105mm, 1.5mm（Opitional）
	100×84mm,1.0mm(Opitional)
	100×84mm，0.75mm(Opitional)
	100×84mm,1.5mm(Opitional)
Comb	9、10、15&18 wells，1.0mm，8 sets
	10%15 wells，0.75mm（ Opitional ）
	10%15 wells，1.5mm（ Opitional ）
Multifunction el releaser	1
Mini Cell Buffer Dam	1
Manual	1
Certification	1
Warranty Card	1

1.3 The main technical parameters

Size	159×144×184mm
Plate Area（W*L）	Standard：100×105cm（Gel area: 83×97mm）
	Optional：100×84cm（Gel area: 83×75mm）
Number of gels that can be made at the same time	1-2
Upper cell buffer volume	200ml
Lower cell buffer volume	800ml
Comb	Standard: 9，10，15&18 well，1.0mm
	Optional：10&15 well，0.75mm
	Optional：10&15well，1.5mm

Weight (net weight)	0.66Kg

The power required for the instrument to work is DC power. The BG-Power600/600i/300 provide the power required for the BG-verMini vertical electrophoresis system. If you want you use other power supply, please confirm with our engineers.

The maximum power parameters of the instrument are as follows:

Max. voltage	300V
Max. power	15W
Max. buffer temperature	50 ° C

Chapter II Operating Procedures

1. Assembly of the instrument

Note：Before assembly, clean the plate with the detergent and dry.

a. Assembly of the clear spacer plate and the groove plate (the spacer inside the two plates), which form the gel cassette sandwich.

b. Place the running module horizontally. Loose the screws and the left and right sliders of the grids（fig1）.

c. Place the gel cassette sandwich with the groove of the plate to the side of the electrodes (fig 2). Close the sliders of the grids. Place the running module vertically and lock the gel cassette sandwich by screwing down both the up and down screws. (fig 3)

d. Check the bottom of the two plates and confirm it evenly close to the bottom of the running module. If no, unscrew of the screws and press down the two plates with the thick side of the gel releaser and make them flush. (Note: Gel leak may happen if not flush and close)

e. Pull the cams of the gel cast stand to both sides. （fig 4） Place the running module in it(fig 5). Insert and tighten cams to make the bottoms of the plates press at the gaskets of the gel cast stand (fig 6). Then you can pour the gel.

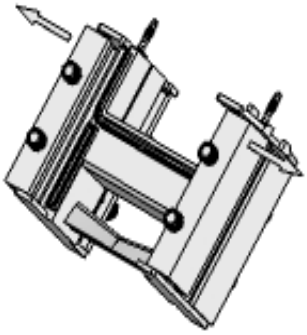


Fig. 1 Pull the sliders of the both sides

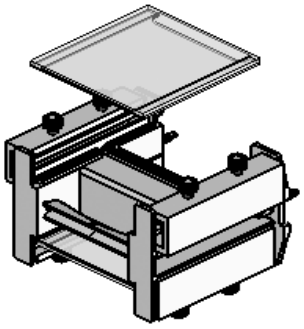


Fig. 2 Place the gel cassette sandwich

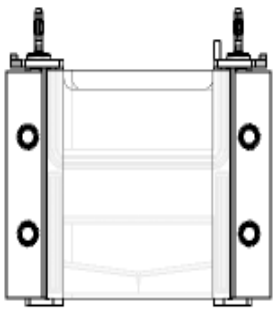


Fig. 3 Pull the sliders of the both sides

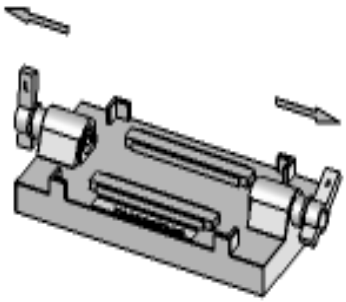


Fig. 4 Pull the cams to both sides

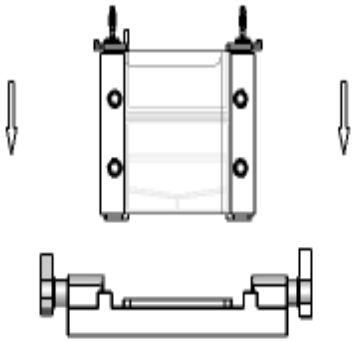


Fig. 5 Place the module in the gel cast stand

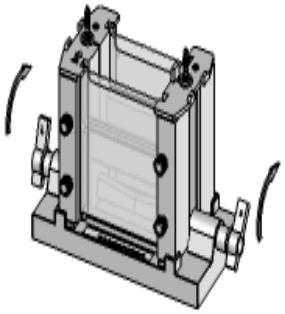


Fig. 6 Insert and tighten the cams

2. Gel Casting (Discontinuous Denatured Polyacrylamide Gels)

(1) The resolving gel casting:

Choose the proper concentration of the gel according to the molecular weight of the protein. Prepare the resolving gel as the attached table. (The volume of the gel needed for one pair of standard plates is 6ml. Please prepare more than 6ml for enough) Mix the gel monomer solution before add TEMED and AP. Since the gel formulates soon once add TEMED, mix and pour the gel solution with 1ml or 5ml pipette between the two plates quickly after add APS and TEMED to 8cm high. Immediately overlay the monomer solution with water or t-amyl alcohol with 1ml pipette to 3-4mm high to make the top the gel flush. (Note: If water is used, add it slowly and evenly to prevent mixing). Allow the gel to polymerize for about 30min, check it to make sure it formulates completely. Remove the water and dry the top of the resolving gel with filter paper before pouring the stacking gel. (Note: the paper does not touch the surface of the gel)

(2) The stacking gel casting:

Prepare the stacking gel according to the attached table. (The volume of the gel needed for one pair of standard plates is 2ml. Please prepare more than 2ml for enough). Mix and pour the gel solution with 1ml pipette on the top of the resolving gel until about 0.5cm to the top of the short plate reached. Insert the comb carefully and prevent the air bubbles. Allow the gel to polymerize for about 30min and wait it formulate completely for about 20-30min more. Loose the cam and take out the running module. Place it into the main tank and pour the pH8.3 Tris-Glycine buffer to the upper and lower tray until 0.5cm higher than the short plate. Remove the comb carefully and ready to load samples.

3. Sample preparation and loading

Resolve the protein samples and markers with the loading buffers and make the concentrations about 0.5~1mg/mL (Note: The result of the electrophoresis will not ideal when sample concentrations to high or too low.) Heat the samples with boiled water about 3min, cool down to room temperature. Heat the samples with boiled water about 1min when using long time stored treated samples to avoid the metastable state polymerization. In general, the loading volume is 10-15uL (2-10ug protein). Add the samples to the bottoms of wells carefully with pipette. Start to electrophoresis after load all samples. (Add the same volume of loading buffers to the rest wells and the edge effect.)

4. Electrophoresis

After loading the samples, closing the lid and connect wire to power supply (BG-Power600/600i/300 etc.). Make sure the red electrode to the red connector and the black electrode to the black one. Open the power supply and set the voltage about 50-80V first. After the samples run to the resolving gel, rise the voltage about 150-200V. Ture off the power until the blue dye move to the bottom of the gel or other expected position. Disassemble the electrophoresis system and take out the plates. Separate one plate with the gel releaser and mark the orientation of the gel by cut the edge of it. The take out the gel to the down streamed applications such as western blot with BG-verBLOT mini transfer system.

The protein samples separated by electrophoresis can be stained with Coomassie blue. In general stain the gel 1-2h or overnight. Then wash with the wash buffer on the shaker until the wash buffer clear. The sensitivity of the assay is 0.2-1.0mg. The stained gel can be sealed with water after wash with long time. You can also take photos or dry the gel for permanent record. (Note: Gel stained with Coomassie blue cannot be transfer to the PVDF membrane).

Chapter III Care and Maintenance

1. After using the instrument, clean the plate with mild detergent and flush over 3 times with the deionized water and dry soon. Wash the running module and tank over 3 times with the water and dry soon.
2. Do not soak the plate (especially the spacer plate) into detergent long time. Also, not into the acid, basic, alcohol solutions and other organic solvent to avoid the spacer corrosion and apart from the plate.
3. Operate the plate carefully to avoid broken.
4. After the electrode tip gets wet, dry it with absorbent paper as soon as possible to prevent rust. After using for a while, the electrode tip could be rusted or poor contacted, you can unscrew the electrode tip and replace it with a new one.
5. When not in using, keep the instrument in a dry and well-ventilated room without corrosive gas at temperatures from 4°C to 60°C.
6. Please keep the electrophoresis apparatus away from acid and alkali solution to prevent corrosion and damage to the apparatus.

Chapter IV Troubleshooting

Symptoms	Cause	Solution
Smile effect	Center of the gel running hotter than either end Power conditions excessive and the electrophoresis temperature is too high or low	1. Choose the proper voltage 2. Buffer not mixed well or buffer in upper chamber too concentrated. Remake buffer, ensuring thorough mixing, especially when diluting 5x or 10x stock 3. If need high voltage, run in the 4℃ fridge.
Distorted or wave band	Gel factors	1. Avoid bubbles during gel preparation and casting 2. Insert the comb quickly with equal strength on both sides to avoid bubbles. 3. Overlay the resolving gel with water to flatten the surface of it.
	Sample factors	1. Remove the salt by dialysis to reduce the salt concentration. 2. Centrifuge the samples to remove the sediments
Blur bands	Gel factors	1. Choose the highly purified reagents 2. Change the gel not fresh or kept long time. 3. Make sure the pH value of the Tris-HCL buffer is 6.8 and the Tris-Glycine buffer is 8.8 4. Reduce of the voltage or electric current
	Sample factors	1. Choose the same sample buffer as the gel casting buffer to avoid much lower concentration of the ion in samples than in gel 2. Choose the proper sample concentrations. 3. Heat the samples and put into ice immediately just before loading

		4．Store the sample in fridge to avoid degradation.
The sample band doesn’ t become a sharp line when running into the resolving gel from the stacking gel.	Stacking gel problem	1．The stacking gel is too short. Increase the volume of the stacking gel. 2．Choose the highly purified reagent 3．The concentrations of the Na^+ and the K^+ are too high in the samples. Decrease the ion concentrations in the samples.
The sample bands cannot be separated enough.	Gel concentration problem Sample problem	1．Adjust the concentration of the gel 2．Make sure the enough SDS concentration of the sample buffer and enough heated to ensure the protein subunits are separated enough. The protein subunits are not separated enough.
Leaking during gel casting	The plates are not assembled well	1．Make sure that the bottoms of the plates are flush 2．Tighten the screws 3．Tighten the cams
Leakage of the buffer in the upper cell	The plates are not assembled well	Assemble the plates again ensure that the bottoms of the plates are flush. Tighten the screws
The gel between the sample wells can’ t formulate well	The temperature is too low for gel to formulate within the normal time	Control the temperature for gel to formulate at 25℃-30℃
Run too fast	Running buffer too dilute Voltage too high	1．Check the buffer protocol and prepare again 2．Choose the proper voltage
Run too slow	Running buffer too concentrated Voltage too low Excessive salt in sample	1．Check the buffer protocol and prepare again 2．Choose the proper voltage 3．Desalt sample
Lanes constricted at	Ionic strength of	Desalt sample and neighboring samples

the bottom of the gel when electrophoresis completes	sample higher than the surrounding gel	

Chapter V Transportation and Storage

1. Do not place heavy objects during transportation or storage. When transport, please take it gently.
2. The packaged product should be stored in a well-ventilated room with a temperature of -20 ° C ~ 55 ° C, a relative humidity of no more than 93% with no corrosive gas.

Chapter VI Warranty

1) The product come with one-year machine warranty free of charge from the date of sold and all-life services.
2) This warranty free of charge shall not apply to any product that has been subjected to any following situation. We provide fee-based services for these cases.
a. Certificates, warranty cards and invoices cannot be presented.
b. Altered invoice.
c. Damage caused by accidental factors or disaster; Improper operation and operate not according to the instruction manual.
d. Damage caused by self-repair
e. Out of the expiration date, while it can still be used after repair.

Attachment: (for reference)

Table 1 Preparations of Tris-Glycine SDS PAGE resolving gel solutions

Solution Component	Total volume: 5ml	Total volume: 10ml	Total volume: 15ml	Total volume: 20ml	Total volume: 25ml	Total volume: 30ml
6%						
Water	2.6ml	5.3ml	7.9ml	10.6ml	13.2ml	15.9ml
30% Acrylamide	1.0ml	2.0ml	3.0ml	4.0ml	5.0ml	6.0ml
1.5M Tris	1.3ml	2.5ml	3.8ml	5.0ml	6.3ml	7.5ml

(pH 8.8)						
10% SDS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
10%APS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
TEMED	0.004ml	0.008ml	0.012ml	0.016ml	0.02ml	0.024ml
8%						
Water	2.3ml	4.6ml	6.9ml	9.3ml	11.5ml	13.9ml
30% Acrylamide	1.3ml	2.7ml	4.0ml	5.3ml	6.7ml	8.0ml
1.5M Tris (pH 8.8)	1.3ml	2.5ml	3.8ml	5.0ml	6.3ml	7.5ml
10% SDS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
10%APS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
TEMED	0.003ml	0.006ml	0.009ml	0.012ml	0.015ml	0.018ml
10%						
Water	1.9ml	4.0ml	5.9ml	7.9ml	9.9ml	11.9ml
30% Acrylamide	1.7ml	3.3ml	5.0ml	6.7ml	8.3ml	10.0ml
1.5M Tris (pH 8.8)	1.3ml	2.5ml	3.8ml	5.0ml	6.3ml	7.5ml
10% SDS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
10%APS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
TEMED	0.002ml	0.004ml	0.006ml	0.008ml	0.01ml	0.012ml
12%						
Water	1.6ml	3.3ml	4.9ml	6.6ml	8.2ml	9.9ml
30% Acrylamide	2.0ml	4.0ml	6.0ml	8.0ml	10.0ml	12.0ml
1.5M Tris (pH 8.8)	1.3ml	2.5ml	3.8ml	5.0ml	6.3ml	7.5ml
10% SDS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
10%APS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
TEMED	0.002ml	0.004ml	0.006ml	0.008ml	0.01ml	0.012ml
15%						
Water	1.1ml	2.3ml	3.4ml	4.6ml	5.7ml	6.9ml
30% Acrylamide	2.5ml	5.0ml	7.5ml	10.0ml	12.5ml	15.0ml
1.5M Tris (pH 8.8)	1.3ml	2.5ml	3.8ml	5.0ml	6.3ml	7.5ml

10% SDS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
10%APS	0.05ml	0.1ml	0.15ml	0.2ml	0.25ml	0.3ml
TEMED	0.002ml	0.004ml	0.006ml	0.008ml	0.01ml	0.012ml

Table 2 Preparations of 5% Tris-Glycine SDS PAGE stacking gel solutions

Solution Component	Total volume: 3ml	Total volume: 4ml	Total volume: 5ml	Total volume: 6ml	Total volume: 8ml
Water	2.1ml	2.7ml	3.4ml	4.1ml	5.5ml
30% Acrylamide	0.5ml	0.67ml	0.83ml	1.0ml	1.3ml
1M Tris (pH 6.8)	0.38ml	0.5ml	0.63ml	0.75ml	1.0ml
10% SDS	0.03ml	0.04ml	0.05ml	0.06ml	0.08ml
10%APS	0.03ml	0.04ml	0.05ml	0.06ml	0.08ml
TEMED	0.003ml	0.004ml	0.005ml	0.006ml	0.008ml

Table 3 The Max and the recommended sample loading volume of each well of BG-verMINI comb

Number of well of comb	Width of well	0.75mm	1.0mm	1.5mm
9	5.80mm	37μl	47μl	71μl
10	5.08mm	33μl	44μl	66μl
15	3.35mm	20μl	26μl	40μl
18	2.90mm	12μl	16μl	30μl

Table 4 Related Instrument and Accessories Ordering Information Sheet

Description	**Product code**
BG-Power300 power supply	100-010-001
BG-Power600i power supply	100-030-001
BG-Power600 power supply	100-020-001
BG-transBLOT mini Transfer Core	101-540-002
BG-verBLOT mini vertical Transfer System	101-540-001
verMINI Main Tank（power cord included）	101-510-027
verMINI Black gasket	101-510-026
verMINI gel casting stand	101-510-016
verMINI running module (Pt wire excluded)	101-510-005
verMINI running module (Pt wire included)	101-510-004
verMINI Groove plate(10x10.5cm)	2030020
verMINI spacer plate 1.5mm(10x10.5cm)	2030019
verMINI spacer plate 1.0mm(10x10.5cm)	2030018
verMINI spacer plate 0.75mm(10x10.5cm)	2030017
verMINI dam for less buffer used	2030014

verMINI screw	2030013
verMINI gel releaser	2030011
verMINI buffer dam	2030010
verMINI short spacer 0.75mm(10x8.4cm)	2030021
verMINI short spacer1.0mm(10x8.4cm)	2030022
verMINI short spacer1.5mm(10x8.4cm)	2030023
verMINI groove plate(10x8.4cm)	2030024
verMINI gel gaske	2030012
verMINI lower tank	101-510-002
verMINI top lid (power fixing base and the screw included)	101-510-003

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