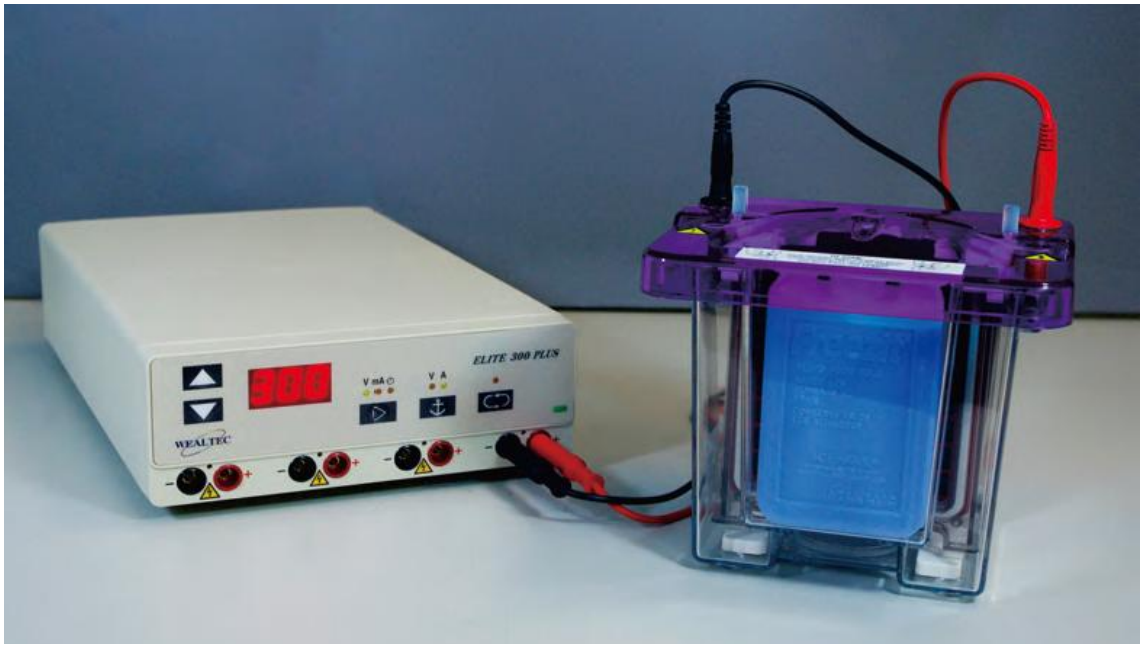
Mini-Vertical Gel Electrophoresis System for Precast Gel



Installation and Operation Manual

Version 1.0

Item# 01140

This instrument is intended for laboratory use only

Index

A. Important Notice

Before setting up and operating the Mini Vertical Gel Electrophoresis System (Mini V-GES), 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 instrument may cause damage. Please refer to the safety notice included with this equipment.

The instrument 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 instrument for any non-intended purpose or injury as a result of modification of the instrument by any person who is not authorized by Wealtec Corp.

A-1. Warranty

Mini Vertical Gel Electrophoresis System (Mini V-GES) 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. For any defects occurred 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.

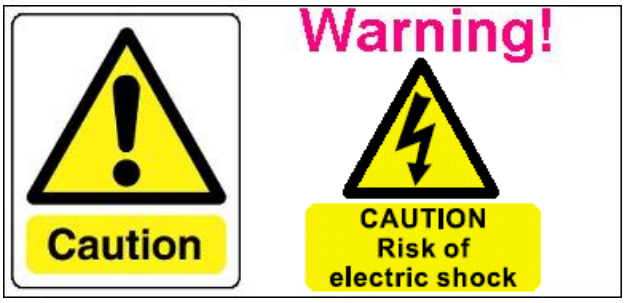
1. Improper operation of the instrument.
2. Repair or modification by any person who is not authorized by Wealtec Corp.
3. Damage caused by any (in)-direct accident, neglect or misuse.
4. Damage caused by disaster.
5. Damage caused by any improper solvents or samples

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.

A-3. Safety Notice

A-3-1. Safety Information



- Do not connect power supply or electricity to Mini V-GES without attaching the cover of the safety-lid. Risk of electric shock to the operator might occur without upper-lid (safety-lid) cover protection.
- Before removing the upper-lid (safety-lid), turn off the power supply and disconnect the black and red electrode-cables.
- Do not use corrosive or high alkaline cleaners which may erode the surface coating of Mini V-GES.
- Do not autoclave or boil any parts of Mini V-GES system.
- Do not soak / immerse upper-lid (safety-lid) in water or any solvent.
- Do not expose the unit to organic solvents like alcohol, chloric solvents, and aromatic solvents which may cause damage to the acrylic material of the Mini V-GES.
- The Mini V-GES may be damaged when exposed or operated at temperature over 80^{o}C.
- It is not recommended to remove rubber frequently. This frequent action may cause damage to the parts.
- Mini V-GES should be operated with DC electrophoresis power supply which should connect to external ground. The maximum electrical limitation of Mini V-GES are:
    - Maximum voltage: 300 V
    - Maximum current: 200 mA
- Mini V-GES is only intended for vertical electrophoresis usage. Do not use Mini V-GES in any other unintended purpose.
- Wear protective gloves, safety glasses and appropriate clothing when operating Mini V-GES.
- If any buffer is spilled into banana jack receptacles in lower reservoir as pointed in the

following figure, dry completely using compressed air! Failure to do this will result in accelerated banana jack corrosion.

B. Introduction

Mini V-GES was designed to be applied for performing SDS-Page, acrylamide nucleic acid separations and electro-blotting. The unit provides the capability of running or blotting two gels simultaneously. This system is designed primarily to be used with a variety of precast gels (see specification for compatible precast gels). Hand-cast gels can also be run in this unit with the use of accessory combs, plates and spacers.

Apparatus includes an electrophoresis tank, an electrode module, two freezer blocks, one single gel adaptor plate and two blotting cassettes with sponge pads. Besides, it can also be applied with hand-made gel which made from the optional handcasting gel kit with 0.75, 1.0, or 1.5 mm thickness and 10, 14, or 16 wells combs. Moreover, it can also be used as wet transfer system with blotting cassettes. During running the Mini-VGES system, freezer blocks can be used to chill down the buffer in the reservoir, especially when operating Western blotting. Wealtec ELITE Power Supply Series is compatible and it is recommended to use as a power source to run the Mini V-GES.

B-1. Specifications

B-1-1. Specification

No. of gels	1 - 2
Compatible Precast Gels	Rapid PAGE/ NuPAGE®*/PAGEr®* Expedeon®*/SERVA Gel®*/ Clear PAGE™*
Precast gel sizes that fit (cm)	10 x 10 / 10 x 9 / 10 x 8
Handcast glass plate set dimensions (cm)	10 (W) x 10 (H)
Total buffer volume for two gels/ blots	940 ml
Gel run time	30-60 minutes
Blot run time	75 minutes

Recommended power supply	Elite 300/ Elite 300 plus/ Elite 200
Physical dimensions (cm)	16.5 (W) x 15.24 (D) x 21.59 (H)
Operating conditions	Temperature : 0-60℃ Humidity: 10% to 90% R.H. Non-condensing

* NuPAGE® is a trademark of Invitrogen Corporation, PAGEr® is a trademark of Lonza, Expedeon® is a trademark of Expedeon, SERVAGel® is a trademark of Serva, and Clear PAGETM is a trademark of C.B.S.

B-2. Product Descriptions

B-2-1. Mini V-GES Hardware Overview

Electrophoresis tank

Electrophoresis tank consists of an acrylic buffer reservoir, an upper-lid, and a pair of electrode cables (Black and red). The buffer reservoir can hold sufficient buffer to passively cool down the temperature of the system. Additionally, freezer blocks can also be fitted into the buffer reservoir for better cooling conditions. The safety lid prevents users from the risk of electric shock. Furthermore, colored electrodes design of the lid minimizes user mistake with electrode direction or with the right operation orientation.

Gel running core

Gel running core is designed for various precast gels placement and removal without the need for adaptors. Sealing rubber design ensures that the pressure applied to the gel is even. The combination of banana-plugs and platinum electrode wire generate an even electric field distribution. With single gel adaptor plate, Mini V-GES allows running only one precast gel.

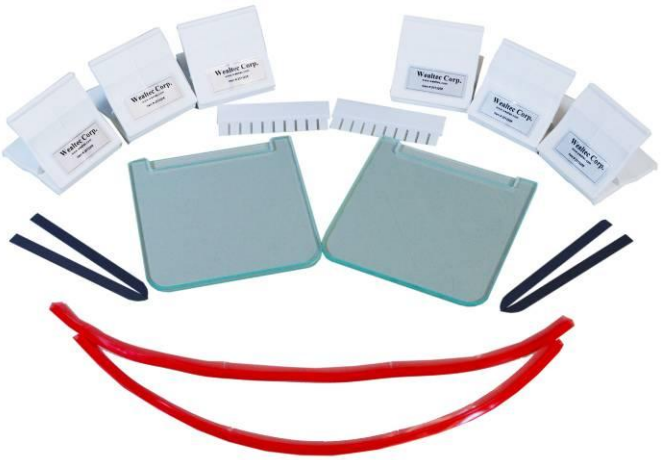
Blotting Cassettes with sponge pads

Mini V-GES package consists with two blotting cassettes with sponge pads for most even electric

field distribution blotting. Cassettes were colored with red and black that indicate facing side toward different electrodes, respectively.

Dual gel handcasting kits (Optional)

The dual handcasting kit consists of six white spring clamps, two glass plate sets, two leak-free gel gaskets, spacer set, and two combs. Mini V-GES handcasting kit allows casting with a 10 x 10 cm of maximum gel size. Selectable spacers (0.5, 0.75 and 1.0mm thickness) and combs (10, 12 or 15-number of teeth) allows user to cast the gels with different thickness and wells. The comb is specifically designed in a way that prevents the comb from sinking into the gel and maintains the teeth at the same position in the gel.



C. Installation of Mini V-GES System

1. Unpack the package and remove the Mini V-GES unit out of the box. Remove the plastic protection cover from the unit.
2. Use water to wash all the parts **except the safety-lid**, and rinse washed parts with de-ionized water to make sure no ionic material remained. Air-dry all parts before the usage.

D. Operation

D-1. <u>Applied with Precast Gels</u>

1. Place the Mini V-GES on an appropriate place and environment for operation. Remove

safety lid from the assembled unit by simultaneously pressing down on white push pins while lifting up on safety-lid as shown in figure D-1.**Do not remove safety-lid by pulling up on leads!**

Figure D-1

Figure D-2

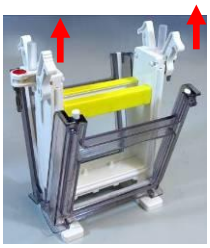


Figure D-3

2. Remove electrode module from lower reservoir by grasping with one hand and lifting directly up as shown in figure D-2.
3. Open doors on the electrode module by pulling up on the white latches, as shown in figure D-3.
4. Slide precast gel cassette or handcasting glass-gel sandwich plate set(s) into the electrode module with the notched plate facing in towards the upper buffer reservoir as shown in figure D-4. If using a precast gel which stored at 4°C, allow to warm to room temperature. If pouring handcasting gels, please refer to Section D-2 to prepare the gel prior to perform this step.

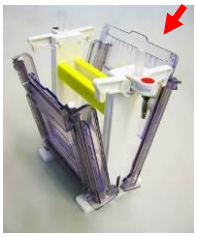


Figure D-4

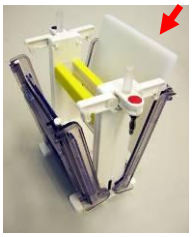


Figure D-5

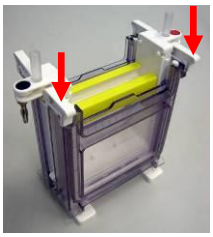


Figure D-6

5. If running one gel, slide adaptor plate into the side without the gel as in figure D-5.
6. Close the doors and lock by pressing down on the white latches as shown in figure D-6.
7. Place electrode stand into lower reservoir. The anode (red) and cathode (black) electrodes are color-coded on both the electrode/cassette assembly and lower reservoir. See figure D-7.
8. Ensure the red dot on the cassette assembly is on the same side as the red receptacle on the lower reservoir. Fill electrode upper reservoir with freshly prepared buffer (~ 190mls).

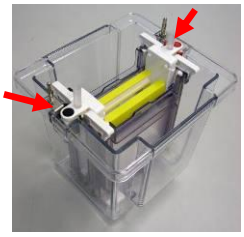


Figure D-7

Figure D-8

9. **Important note if you are using the freezer cooling blocks:** Use table below to determine approximate buffer volume of lower reservoir. Each freezer block displaces 125mls of buffer. Add buffer to lower chamber only *after* freezer blocks are in place. Sample loading: Load the sample dye mixtures into the wells with a micropipette.

Number of freezer block(s)	Maximum Buffer required in lower reservoir
0	810 ml
1	685 ml
2	560 ml

10. Pour enough freshly prepared buffer into lower reservoir so that the final buffer level (including freezer block displacement) is just cover the sample wells. Using a pipette or syringe, thoroughly flush out the wells in the glass plate sandwich with buffer. Load samples. If outer lanes do not contain sample, it is recommended that you run standards and/or fill outer lanes with loading buffer to reduce smiling and wrap-around effects.
11. Attach safety-lid and turn on magnetic stirrer. The closed unit ready for power is shown in figure D-8.
12. Apply with power supply, matching the color-coded red to red and black to black as in figure D-9. Refer to the recommended conditions to set the power supply and begin the sample separation by electrophoresis.

Figure D-9

Figure D-10

13. Turn the power supply off and disconnect the leads from the power supply. Remove the safety-lid from the unit, by placing thumbs on white posts next to red & black connectors, then pushing down while pulling up with fingers under lid as shown in figure D-10.**Do not remove safety lid by pulling up on leads!**

14. Pull up on door latches, and open the door of electrode. Remove gel glass plate sandwich from the assembly. Stain and fix according to your preferred method.

D-2. Preparation of Handcasting Gel (Optional)

1. Prepare gel handcasting kit with two glass plate sets, gel casting white spring clamps, leak-free gel gasket, spacer set, comb, and polyacrylamide solution.

2. Clean the glass plates by hand washing both plates with a high quality lab detergent followed by completed rinsing with distill water. Air-dry or use a lint-free tissue. Spray/wipe the chosen inner surfaces of the plate set with 95% ethanol and dry with lint-free tissue.

3. Hold the 3 mm thick and notched back plate with the rounded bottom corners and applying the gasket around one side of the glass plate. **Note: one side of the "U" shaped gasket is flat, and the other side has tubing that will act as a seal around the spacers.**

Figure D-11

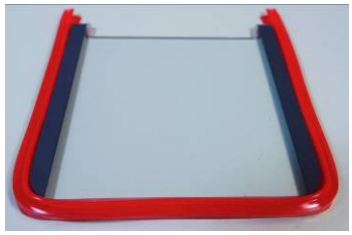


Figure D-12

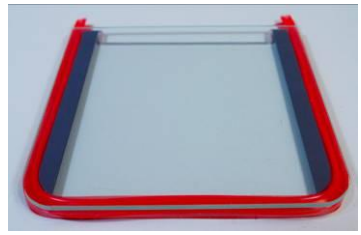


Figure D-13

4. When applying the gasket over the rounded corners of the notched glass plate, make sure the cuts on the gasket align with the rounded corners of the glass plate. Once the gasket is pushed over the bottom edge and corners, work it down the remaining side.

5. Place the gasket plate on the lab bench with the tubing side up as in figure D-11. Place the spacers align to the inside edges of the gasket. Be sure the rounded corner end of each spacer is facing the outside bottom of the plate, following the radius of the glass as in figure D-12.

6. Place the thinner unnotched back plate on top of the bottom assembly, starting from the bottom edge and gently easing the plate down. Verify the gasket is smooth around the edges and then clamp along the bottom as in figure D-13.

7. Lift the assembly and stand it on the base of the clamp. For leveling, push glass plate assembly down until it stops against clamp body. Clamp the sides of the assembly with additional casting clamps on either side. As each clamp is attached, be sure the gasket is aligned between the plates forming a seal.

Figure D-11

Figure D-12

8. Apply with resolving gel solution, and level the gel with 75% EtOH. After the resolving gel polymerized, apply with stacking gel and align with combs as in figure D-12.
9. After polymerization, remove the gasket and the clamp, gel-glass plate sandwich can be applied in Mini V-GES system as in Section D-1.

D-3. Wet Transfer with Mini V-GES

1. Place the Mini V-GES on an appropriate place and environment for operation. Remove safety lid from the assembled unit by simultaneously pressing down on white push pins while lifting up on safety-lid as shown in figure D-13.**Do not remove safety-lid by pulling up on leads!**

Figure D-13

Figure D-14

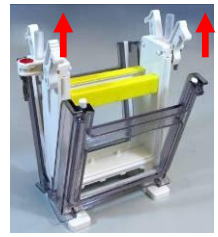
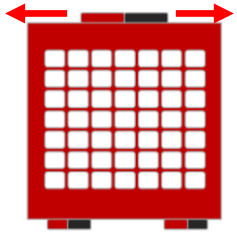


Figure D-15

2. Remove gel running core from lower buffer reservoir by grasping with one hand and lifting directly up as shown in figure D-14.
3. Open doors on the gel running core by pulling up on the white latches, as shown in figure D-15.
4. Open blotting cassette as shown in figures D-16 and lay it flat on the bench.
5. Assemble blotting stack as shown in figure D-17. With cassette wide open assemble components on black side in the following order: foam pad, gel, buffer saturated transfer membrane, and then buffer saturated blotting paper. Smooth with gloved finger or roll with glass rod to be sure no bubbles exist between the gel and the transfer membrane.

   Note: While preparing the stack, make sure the high molecular weight side face toward the bottom of the cassette. So that it can have stronger electric field to have

better transfer efficiency.



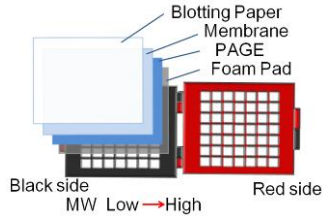


Figure D-16 **Figure D-17**

6. Insert blotting cassettes into gel running core making sure that red side faces outward as in the figure D-18. If transfer with only one cassette, slide adaptor plate into the side without the cassette as in figure D-19.

Figure D-18 **Figure D-19**

7. Close the doors and lock by pressing down on the white latches as shown in figure D-18.

8. Place electrode stand into lower reservoir. The anode (red) and cathode (black) electrodes are color-coded on both the electrode/cassette assembly and lower reservoir. See figure D-20.

9. Ensure the red dot on the cassette assembly is on the same side as the red receptacle on the lower reservoir.

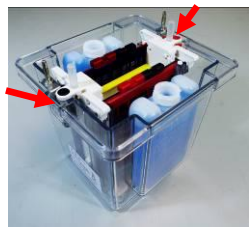


Figure D-20 **Figure D-21**

10. Pour enough freshly prepared transfer buffer into lower reservoir so that the buffer level (including freezer block displacement) can cover the cassettes.

11. Apply with power supply, matching the color-coded red to red and black to black as in figure D-9. Refer to the recommended conditions to set the power supply and begin the sample transferring.

Figure D-9

Figure D-10

12. Turn the power supply off and disconnect the leads from the power supply. Remove the safety-lid from the unit, by placing thumbs on white posts next to red & black connectors, then pushing down while pulling up with fingers under lid as shown in figure D-10.**Do not remove safety lid by pulling up on leads!**

13. Pull up on door latches, and open the door of running core. Remove cassettes from the assembly. Take out the membrane and present according to your preferred method.

E. Recommended running conditions

E-1. Rapid PAGE gels

Run Voltage	Starting Current	Ending Current	Approx. Run Time
180VDC	90mA/gel	40mA/gel	30-75 minutes

1. **General Recommendatios**

If running only one gel, keep the volts the same but reduce the mA's by half. Keep in mind that as the thickness of gel increases, the mA's increase proportionally.

At constant voltage, the proteins will migrate at a constant rate during electrophoresis with adequate heating appropriate for denaturing gels. Increasing the voltage/mA (for a single gel thickness and percentage) will speed mobility but increase the risk of overheating.

If using freezer blocks, the power input and the migration rate can be increased. The joule heating generated by the higher power is offset by the cooling effect of the buffer between the gels. Exact conditions should be determined empirically. We recommend using at least one freezer block for 2 reasons; less buffer usage and cooler buffer temperature. If using both freezer blocks, outside lanes can still be viewed through the corners of the tank. If it is important to view the entire gel during electrophoresis, use only

1 freezer block and place it at the back of the tank.

2. **Tris-Glycine Gels**

 For SDS-PAGE Tris-Glycine (Laemmli) buffer systems with **two** 1.0mm thick gels at room temperature use the following conditions at constant voltage:
80VDC until samples have fully entered stacking gel 120VDC @ 60mA-90mA/gel (depending on gel type) thereafter until dye is near bottom of gel.

E-2 Electro-Blotting

As a general recommendation, equilibrate gels (after running) with the diluted transfer buffer for 5 to 10 minutes before transfer.

Blotting Buffer	
Rapid transfer Transfer Buffer 10X/20X cat. # 2013423 (see	100ml (1:10 dilution)
Methanol	200ml
Ultrapure water	720ml

Typical Blotting conditions for Mini V-GES	
Power Supply Setting	200V constant
Blot time	1.5 - 2.0 hours with stirring, cooling blocks
Expected current	180mA / 1 gel 220mA / 2 gels

E-3. Recommended Rapid PAGE Buffer Formulations

As an alternative to the RapidPAGE buffers available for purchase, these formulations may be used to prepare buffers yourself. Use high-quality, low-conductance ingredients. Do NOT use acid or base to adjust the pH!

Standard SDS Running Buffer, 20X for Reduced Samples (2013414)

*pH should be between 8.4 and 8.5 at 25°C.

Ingredient	MW	Molarity	Qty/Liter
Tricine (free acid)	179.17	0.8M	143.4 g
Tris (free base)	121.14	1.2M	145.2 g
SDS (2%)	288.38	-	20.0 g
Sodium Meta-bisulfite	104.06	50mM	5.0 g
Ultrapure water (fill to)	-	-	1000ml

* For non-reduced samples (especially antibodies), omit the Sodium Meta-bisulfite

Turbo SDS Running Buffer, 20X (2013422) *pH should be between 8.3 and 8.4 at 25°C

Ingredient	MW	Molarity	Qty/Liter
MPS (free acid)	209.26	0.6M	125.6 g
Tris (free base)	121.14	1.2M	145.2 g
SDS (2%)	288.38	-	20.0 g
Sodium Meta-bisulfite	104.06	50mM	5.0 g
Ultrapure water (fill to)	-	-	1000

* For non-reduced samples (especially antibodies), omit the Sodium Meta-bisulfite

LDS Sample Buffer, 4x (2013402) ***pH should be between 7.7 and 7.8 at 25**°C

Ingredient	MW	Molarity	Qty/Liter
Glycerol (40%)	-	-	400 g
Ficoll-400 (4%)	-	-	40 g
Triethanol amine, pH7.6	149.2	0.8M	120.0
6 N HCL	36.46	-	93.0 g
Lithium Dodecyl Sulfate (4%)	-	-	40 g
EDTA Di-Sodium	372.2	2mM	7.44 g
Brilliant Blue G250 (0.025%)	-	-	0.25g
Phenol Red	-	-	0.25 g
Ultrapure water (fill to)	-	-	1000 ml

Tris-Glycine-SDS Transfer Buffer (10X or 20X) & Rapid PAGE "Classics Run Buffer (20X) (2013423) *pH should be between 8.4 and 8.6 at 25°C

Ingredient	MW	Molarity	Qty/Liter
Tris (free base)	121.14	0.25M	30.3 g
SDS (2%)	288.38	-	20.0 g
Glycine	75.07	1.92M	144.1 g
Ultrapure water (fill to)	-	-	1000 ml

Standard DNA/Native Running Buffer, 20X (2013534)

*pH should be between 8.35 and 8.45 at 25°C

Ingredient	MW	Molarity	Qty/Liter
Tricine (free acid)	179.17	0.8M	143.4 g
Tris (free base)	121.14	1.2M	145.2 g
Ultrapure water (fill to)	-	-	1000ml

DNA/Native Sample Buffer, 4x (2013531) ***pH should be 7.6 at 25°C

Ingredient	MW	Molarity	Qty/Liter
Glycerol (40%)	-	-	400 g
Ficoll-400 (4%)	-	-	40 g
Triethanol amine, pH7.6	149.2	0.8M	120.0
6 N HCL	36.46	-	93.0 g
EDTA Di-Sodium	372.2	2mM	7.44 g
Brilliant Blue G250 (0.025%)	-	-	0.25g
Phenol Red	-	-	0.25 g
Ultrapure water (fill to)	-	-	1000 ml

F. Care and Maintenance

➲ All Mini V-GES parts **except the upper lid** should be washed with clean water to avoid all possible contaminations and damages to the instruments. Organic solvents or strong detergents may damage the instrument and should not be used.

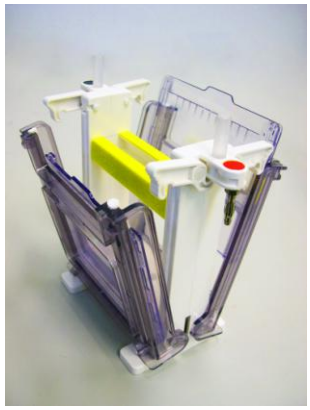
- Soft sponge is recommended to clean the lower and the glass plates. Do not use hard tissues to wipe the surface of the Mini V-GES.

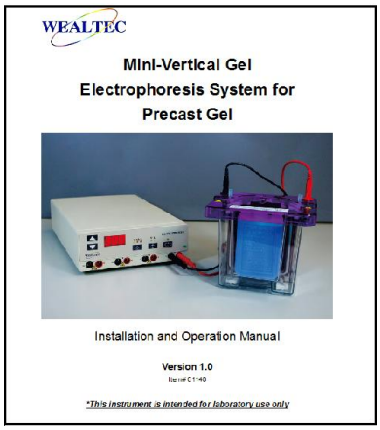
- Rinse the tank and plates with de-ionized water to ensure no ionic material remains or presents.

- Avoid washing or immersing the upper lid in water because this will damage the electrode terminals and cables. The electrodes should be protected from all possible moisture, organic solvents and detergents. Clean the upper lid with pre-moistened soft tissue soaked with clean water if necessary.

- Air-dry all the Mini V-GES parts before the usage.

G. Package list

Item	Quantity
Upper lid with electrode cables 	1
Gel running core with yellow loading background 	1
Buffer Reservoir 	1

Blotting cassette, including sponge pad 	2
Freezer Block 	2
Adaptor plate 	1
Operation and instruction manual 	1

I. Order Information

Mini V-GES System

Catalog No.	Description
2013031P	Mini V-GES complete system for precasting gel only

Mini V-GES System with Power Supply

Catalog No.	Description
2013001H	Mini V-GES complete system with Elite 300 plus power supply, 120V and dual gel handcasting kit 0.75 mm for both precasting and handcasting gels
2013002H	Mini V-GES complete system with Elite 300 plus power supply, 230V and dual gel handcasting kit 0.75 mm for both precasting and handcasting gels
2013003H	Mini V-GES complete system with Elite 300 plus power supply, 120V and dual gel handcasting kit 1.0 mm for both precasting and handcasting gels
2013004H	Mini V-GES complete system with Elite 300 plus power supply, 230V and dual gel handcasting kit 1.0 mm for both precasting and handcasting gels
2013005H	Mini V-GES complete system with Elite 300 plus power supply, 120V and dual gel handcasting kit 1.5 mm for both precasting and handcasting gels
2013006H	Mini V-GES complete system with Elite 300 plus power supply, 230V and dual gel handcasting kit 1.5 mm for both precasting and handcasting gels
2013011H	Mini V-GES complete system with dual gel handcasting kit includes 0.75mm, 10wells for both precasting and handcasting gels
2013012H	Mini V-GES complete system with dual gel handcasting kit includes 1.0 mm, 10wells for both precasting and handcasting gels
2013013H	Mini V-GES complete system with dual gel handcasting kit includes 1.5 mm, 10wells for both precasting and handcasting gels
2013021P	Mini V-GES complete system with Elite 300 Plus power supply, 120V
2013022P	Mini V-GES complete system with Elite 300 Plus power supply, 230V

Mini V-GES Accessories – For Handcast Kit

Catalog No.	Description
2013101	Dual gel handcastingl kit includes 0.75 mm, 10 wells
2013102	Dual gel handcastingl kit includes 0.75 mm, 14 wells

2013103	Dual gel handcasting kit includes 0.75 mm, 16 wells
2013104	Dual gel handcasting kit includes 1.0 mm, 10 wells
2013105	Dual gel handcasting kit includes 1.0 mm, 14 wells
2013106	Dual gel handcasting kit includes 1.0 mm, 16wells
2013107	Dual gel handcasting kit includes 1.5 mm, 10 wells
2013108	Dual gel handcasting kit includes 1.5 mm, 14 wells
2013109	Dual gel handcasting kit includes 1.5 mm, 16 wells
2013131	Leak-free gasket 0.75mm
2013132	Leak-free gasket 1.0mm
2013133	Leak-free gasket 1.5mm
2013134	Comb 0.75mm x 1 well
2013135	Comb 0.75mm x 10 well
2013136	Comb 0.75mm x 14 well
2013137	Comb 0.75mm x 16 well
2013138	Comb 1.0mm x 1 well
2013139	Comb 1.0mm x 10 well
2013140	Comb 1.0mm x 14 well
2013141	Comb 1.0mm x 16 well
2013142	Comb 1.5mm x 1 well
2013143	Comb 1.5mm x 10 well
2013144	Comb 1.5mm x 14 well
2013145	Comb 1.5mm x 16 well
2013151	spacer set 0.75mm
2013152	spacer set 1.0mm
2013153	spacer set 1.5mm
2013171	glass plate set

Mini V-GES Accessories

Catalog No.	Description
2013201	Blotting cassette, including sponge pad
2013202	Sponge pads, set of 4
2013203	Freezer block

2013204	Shim for Lonza gels, 10x9cm precast gels
2013205	Single gel adapter plate

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