# proPAGE Mini Vertical Electrophoresis Units

## Instruction Manual

**Catalogue Numbers**

CVS82BSYS

CVS82BSYS0.75

CVS82BSYS1.5

CVS84BSYS

CVS84BSYS0.75

CVS84BSYS1.5

Record the following for your records:

Model _____

Catalogue No. _____

Date of Delivery _____

Warranty Period _____

Serial No. _____

Invoice No. _____

Purchase Order No. _____

# Contents

# Safety Information

When used correctly, these units pose no health risk. However, these units can deliver dangerous levels of electricity and are to be operated only by qualified personnel following the guidelines laid out in this instruction manual. Anyone intending to use this equipment should read the complete manual thoroughly. The unit must never be used without the safety lid correctly in position. The unit should not be used if there is any sign of damage to the external tank or lid.

These units comply with the following European directives:

***2014/35/EU Low Voltage Directive***

***2014/30/UE (official Title 2004/108/EC) EMC Electromagnetic Compatibility***

*By virtue of the following harmonised standards:*

***BS EN IEC 61010-1: 2010 Safety Testing of Lab Equipment***

***BS EN IEC 61326-1:2013 EMC Electro Magnetic Compatibility***

***ROHS DIRECTIVE 2011/65/EU***

***BS EN 50581:2012 Restriction of Hazardous Substances***

# Packing List

Each proPAGE2 unit includes a tank, wired running module, lid, cables and the following items:

| SKU | Glass Plates | Combs | Caster | Other accessories |
|---|---|---|---|---|
| **CVS82BSYS** | CVS8SP – short plates Pk/5<br>CVS8PGS1.0 – Plain with bonded 1mm spacers, Pk/3<br>CVS8DP – Dummy Plate | 3 of CVS8-10-1.0 10 sample, 1.0mm thick<br>3 of CVS8-15-1.0 15 sample, 1.0mm thick | 2 of CVS8EXCASTER casting stand<br>2 of CVS8CLAMPS casting frames with clamps<br>CVS8DCASTM Silicone Mat Pk/3 | CVS8GPS gel releasers Pk/3<br>CVS8SLAF Sample loading assistant frame |
| **CVS82BSYS0.75** | CVS8SP – short plates Pk/5<br>CVS8PGS0.75 – Plain with bonded 0.75mm spacers, Pk/3<br>CVS8DP – Dummy Plate | 3 of CVS8-10-0.75 10 sample, 0.75mm thick<br>3 of CVS8-15-0.75 15 sample, 0.75mm thick | 2 of CVS8EXCASTER casting stand<br>2 of CVS8CLAMPS casting frames with clamps<br>CVS8DCASTM Silicone Mat Pk/3 | CVS8GPS gel releasers Pk/3<br>CVS8SLAF Sample loading assistant frame |
| **CVS82BSYS1.5** | CVS8SP – short plates Pk/5<br>CVS8PGS1.5 – Plain with bonded 1.5mm spacers, Pk/3<br>CVS8DP – Dummy Plate | 3 of CVS8-10-1.5 10 sample, 1.5mm thick<br>3 of CVS8-15-1.5 15 sample, 1.5mm thick | 2 of CVS8EXCASTER casting stand<br>2 of CVS8CLAMPS casting frames with clamps<br>CVS8DCASTM Silicone Mat Pk/3 | CVS8GPS gel releasers Pk/3<br>CVS8SLAF Sample loading assistant frame |

Each proPAGE4 unit includes a tank, 2 wired running module, lid, cables and the following items:

| SKU | Glass Plates | Combs | Caster | |
|---|---|---|---|---|
| **CVS84BSYS** | CVS8SP – short plates Pk/10<br>CVS8PGS1.0 – Plain with bonded 1mm spacers, Pk/5<br>CVS8DP – Dummy Plate | 5 of CVS8-10-1.0 10 sample, 1.0mm thick<br>5 of CVS8-15-1.0 15 sample, 1.0mm thick | 4 of CVS8EXCASTER casting stand<br>4 of CVS8CLAMPS casting frames with clamps<br>VS8DCASTM Silicone Mat Pk/5 | CVS8GPS gel releasers Pk/5<br>CVS8SLAF Sample loading assistant frame |
| **CVS84BSYS0.75** | CVS8SP – short plates Pk/10 | 5 of CVS8-10-0.75 10 sample, 0.75mm thick | 4 of CVS8EXCASTER casting stand | CVS8GPS gel releasers Pk/5 |

| | | | | |
|---|---|---|---|---|
| | CVS8PGS0.75 – Plain with bonded 0.75mm spacers, Pk/5<br>CVS8DP – Dummy Plate | 5 of CVS8-15-0.75 15 sample, 0.75mm thick | 4 of CVS8CLAMPS casting frames with clamps<br>VS8DCASTM Silicone Mat Pk/5 | CVS8SLAF Sample loading assistant frame |
| **CVS84BSYS1.5** | CVS8SP – short plates Pk/10<br>CVS8PGS1.5 – Plain with bonded 1.5mm spacers, Pk/5<br>CVS8DP – Dummy Plate | 5 of CVS8-10-1.5 10 sample, 1.5mm thick<br>5 of CVS8-15-1.5 15 sample, 1.5mm thick | 4 of CVS8EXCASTER casting stand<br>4 of CVS8CLAMPS casting frames with clamps<br>CVS8DCASTM Silicone Mat Pk/5 | CVS8GPS gel releasers Pk/5<br>CVS8SLAF Sample loading assistant frame |

Packing List Checked by: _____

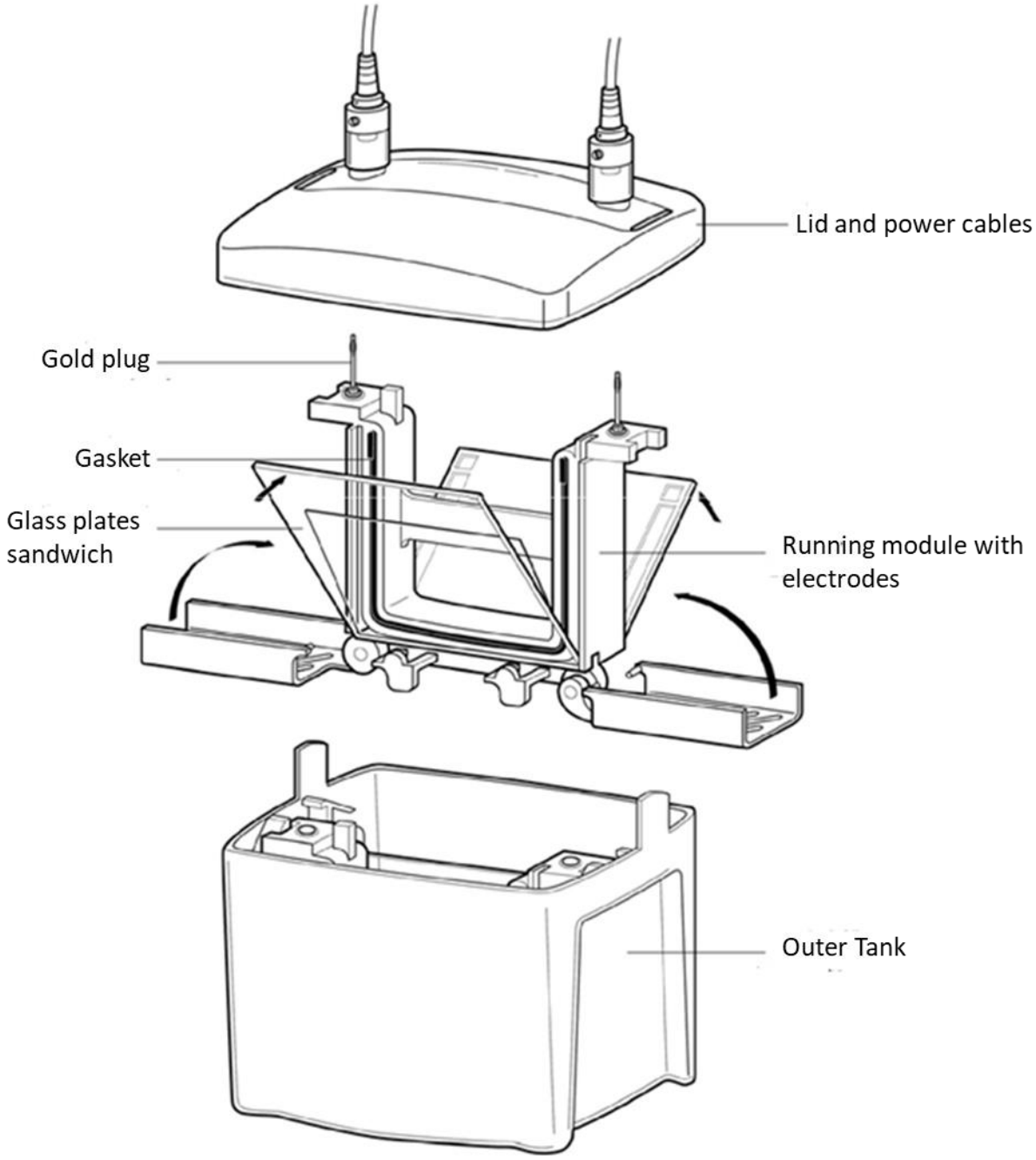
Date: _____

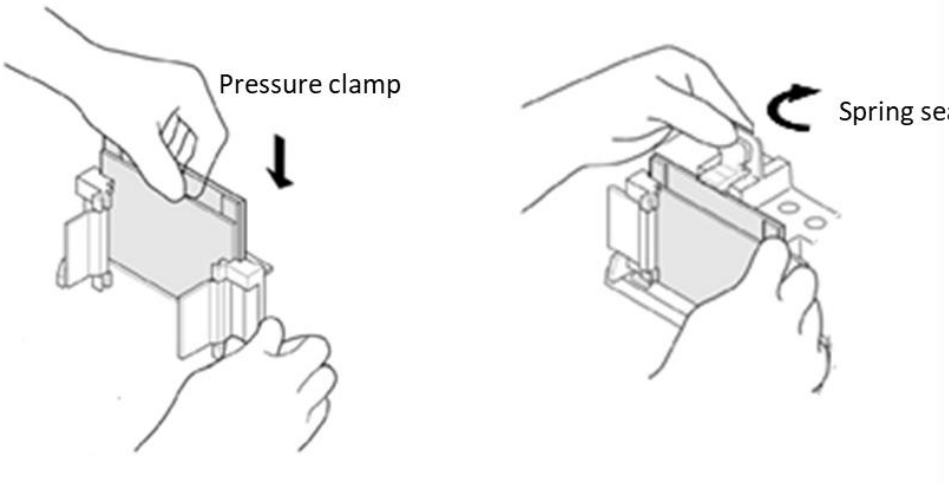
**The packing lists should be referred to as soon as the units are received to ensure that all components have been included. The unit should be checked for damage when received.**

**Cleaver Scientific is liable for all missing or damaged parts / accessories within 7 days after customers have received this instrument package. Please contact Cleaver Scientific immediately regarding this issue. If no response within such period is received from the customer, Cleaver Scientific will no longer be liable for replacement/damaged parts.**

**Please contact your supplier if there are any problems or missing items.**

# Specifications



| **Unit specifications** | | | | | |
|---|---|---|---|---|---|
| **Casting stand** | Polycarbonate | | | | |
| **Casting Frames** | Polysulfone | | | | |
| **Gasket** | Silicone | | | | |
| **Electrodes** | Platinum wire, 0.010 inches diameter | | | | |
| **Tank and Lid** | Polycarbonate | | | | |
| **Plates** | Glass: 10 x 8 cm with spacers; 10 x 7 cm short plate | | | | |
| **Unit Dimensions** | 19x13x15cm (W x D x H) | | | | |
| **Max Sample Capacity** | 60 Samples<br>15 Samples per Gel | | | | |
| **Combs Available** | 10 and 15 samples | | | | |
| Teeth Thickness | 0.75, 1, 1.5mm | | | | |
| **Max sample volume per well** | **Wells** | **Well width** | **0.75mm** | **1.0mm** | **1.5mm** |
| | 10 | 5.08mm | 33 µl | 44 µl | 66 µl |
| | 15 | 3.35mm | 20 µl | 26 µl | 40 µl |
| **Buffer Volume** | For 2 gels 700ml,<br>For 4 gels 1000ml | | | | |

# Introduction

proPAGE2 and proPAGE4 electrophoresis system are used to run up to 2 or 4 pre-cast or hand-cast mini vertical gels (depending on the model). The units are compatible with 1D and 2D electrophoresis applications.

# Operating Instructions

## Usage Guidance and restrictions

- Maximum altitude 2,000m.
- Temperature range between 4°C and 65°C.
- Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- Not for outdoor Use.
- Maximum Voltage Limit 600V DC
- Maximum power Limit 500W

This apparatus is rated POLLUTION DEGREE 2 in accordance with IEC 664.

POLLUTION DEGREE 2, states that: "Normally only non-conductive pollution occurs.

Occasionally, however, a temporary conductivity caused by condensation must be expected".

## Casting Unit Preparation

*Cleaning the Glass Plates*

Clean a set of glass plates for each gel first with distilled water and then with 70 % ethanol. One set of glass plates constitutes one short glass plate and one plain glass plate with bonded spacers.

The plain glass plate is positioned outermost, then the short glass plate.

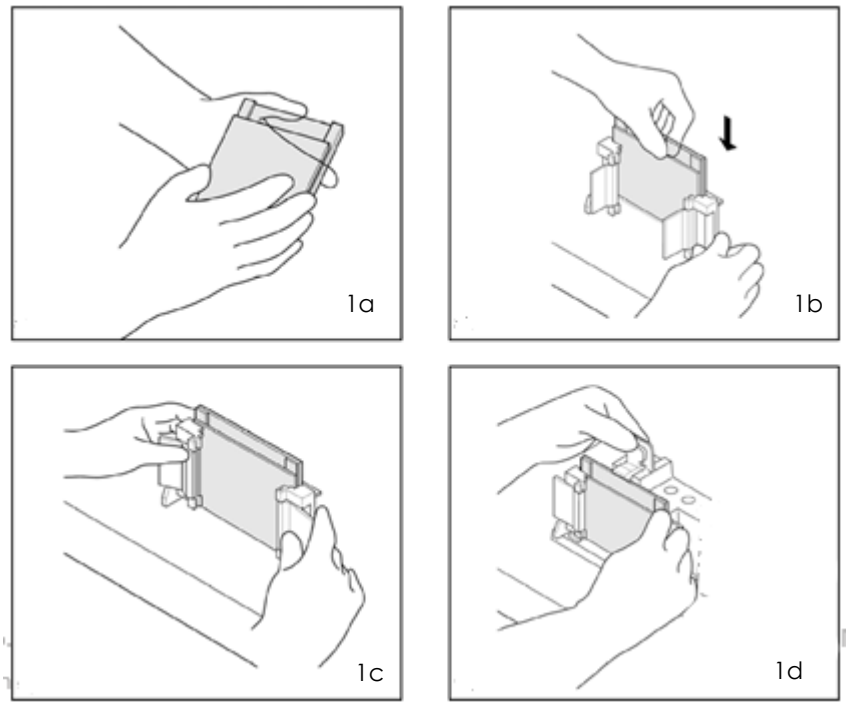
**Note: All glass plates, gel casting modules, casting base and accessories must be completely dry before the set – up. Wet components are more likely to miss-align and cause leaks.**

*Gel Cassette and Casting Assembly*

1. Place the casting frame upright with the pressure cams in the open position and facing forward on a flat surface.

2. Select a spacer plate of the desired gel thickness and place a short plate on top of it (see Figure 1a).
3. Orient the spacer plate so that the labelling is up. Slide the two glass plates into the casting frame, keeping the short plate facing the front of the frame (side with pressure cams) (see Figure 1b).

   **Note: Ensure that both plates are flush on a level surface and that the labels on the spacer plate are oriented correctly. Leaking may occur if the plates are misaligned or oriented incorrectly.**
4. When the glass plates are in place, close the pressure cams to secure the glass cassette sandwich in the casting frame (see Figure 1c). Check that both plates are flush at the bottom.
5. Place the casting frame into the casting stand by positioning the casting frame (with the locked pressure cams facing out) onto the casting gasket while engaging the spring-loaded lever of the casting stand onto the spacer plate (see Figure 1d).
6. Repeat steps 1 to 5 to cast another gel.



## Gel Preparation

Care should be taken when selecting the pore size of the gel to be used. The pore size or % of gel determines the resolving ability given different sizes of protein.

Gel percentage for various protein sizes are shown below:

| Acrylamide Percentage | Separating Resolution |
|---|---|
| **5 %** | 60 - 220 KD |
| **7.5 %** | 30 - 120 KD |
| **10 %** | 20 - 75 KD |
| **12%** | 17 – 65 KD |
| **15 %** | 15 -45 KD |
| **17.5%** | 12 – 30 KD |

Gel Volumes for the proPAGE Mini Unit are shown below:

The volumes listed are required to completely fill a gel cassette. Amounts may be adjusted depending on the application (with or without comb, with or without stacking gel, etc.).

| Number of gels | Gel Thickness (mm) | Volume (ml) |
|---|---|---|
| **Single – one gel, one dummy plate** | 0.5<br>1.0<br>1.5<br>2.0 | 2.8<br>4.2<br>5.6<br>8.4 |

Prepare gel solutions as per tables below. These give the volumes of solutions from the standard stock solutions. These should be gently mixed avoiding generation of bubbles which will inhibit polymerization by removing free radicals.

10ml Resolving Gel:

| Solution | 5 % | 7% | 10 % | 12% | 15 % | 17% |
|---|---|---|---|---|---|---|
| **Distilled Water** | 5.7ml | 5.1ml | 4.1ml | 3.4ml | 2.4ml | 1.7ml |
| **30 % Stock Acrylamide Solution** | 1.7ml | 2.3ml | 3.3ml | 4ml | 5ml | 5.7ml |
| **4 X Resolving Tris Solution** | 2.5ml | 2.5ml | 2.5ml | 2.5ml | 2.5ml | 2.5ml |

Add 10 µl of TEMED and 100µl 10 % Ammonium Persulphate to the resolving gel solution **just before pouring** to initiate polymerisation

5ml of 5% Stacking Gel:

| Solution | Volume |
|---|---|
| **Distilled Water** | 2.87ml |
| **30 % Stock Acrylamide Solution** | 0.83ml |
| **4 X Stacking Gel Tris Solution** | 1.25ml |

Add 50µl of 10 % Ammonium Persulphate and 5µl TEMED before pouring.

## Preparation of denatured protein samples for loading

The instructions given below are for denatured samples. For Native samples, please consult a laboratory handbook.

1. Prepare the protein samples for loading. The volume of sample depends on the capacity of the wells.
2. Using a 0.5 ml micro-centrifuge tube or other convenient receptacle, combine the protein sample and 4 X sample buffer. It is always advisable to use protein markers in one of the end lanes to indicate sizes of bands. These should be prepared according to the manufacturer's instructions.
3. Heat the samples in a water bath or heating block for 2 minutes at 95$^{o}$C to denature the samples.
4. Centrifuge the samples in a micro-centrifuge for 20 seconds at 12,000 rpm. The protein samples are now ready to load.

## Gel Pouring

*Casting a gel with stacking layer*

1. Place a comb into the gel cassette assembly with any gel and mark the glass plate below the comb teeth. This is the reference level to which the resolving gel should be poured.
2. Prepare the resolving gel solution. Mix well and avoid generating air bubbles.
3. Fill the glass plates smoothly till the mark avoiding generating any air bubbles. Filling must be performed quickly before the TEMED causes the gel to become too viscous.
4. Overlay the gel extremely carefully with 1 ml of Isobutanol, Isopropanol or distilled water. When using distilled water extra care must be taken to ensure there is no mixing with the gel solution.
5. Let the resolving gel polymerize. Usually this takes around 15 to 30 minutes, but this can vary due to the freshness of the reagents used. If polymerization is taken a lot longer than this, use fresher stock solutions or add more APS and TEMED.
6. Prepare the stacking gel solution.
7. Before casting the stacking gel, insert a piece of filter paper to dry the area in between the glass plates above the resolving gel. Take care not to touch the surface of the gel.
8. Carefully pour the stacking gel solution, avoiding generating air bubbles.
9. Carefully insert the comb making sure that no air bubbles get trapped under the ends of the comb teeth as these will inhibit sample progression.
10. Allow the stacking gel to polymerize.
11. Once the gel is polymerized it is ready for the electrophoresis run.

*Casting a gel without stacking layer*

- Prepare the resolving gel solution. Mix well and avoid generating air bubbles.
- Pour the solution smoothly into the glass plates avoiding any air bubbles until the top of the notched glass plate is reached.

- Carefully insert the comb making sure that no air bubbles get trapped under the ends of the comb teeth as these will inhibit sample progression.
- Let the gel polymerize. Usually this takes from 15 to 30 minutes, but this can vary due to the freshness of the reagents used. If polymerization is taken a lot longer than this, use fresher stock solutions or add more APS and TEMED.
- Once the gel is polymerized it is ready for the electrophoresis run.

*Using Precast Gels*

1. proPAGE mini is compatible with BioRAD mini precast gels.
2. Simply remove the precast gel from the storage pouch and remove the bottom tape to expose the bottom edge of the gel.
3. Gently remove the comb.
4. Insert the gel in the Running module

**Note: If only one or three gels are required, use the dummy plate**

## Gel assembly and Sample loading

**Note: when running 2 gels only, use the electrode assembly (the one with the banana plugs), not the companion running module (the one without the banana plugs). When running 4 gels, both the electrode assembly and the companion running module must be used, for a total of 4 gels (2 gels per assembly).**

1. Set the clamping frame to the open position on a clean flat surface (see Figure 2a).
2. Place the first gel sandwich or gel cassette (with the short plate facing inward) onto the gel supports; gel supports are molded into the bottom of the clamping frame assembly; there are two supports in each side of the assembly. Note that the gel will now rest at a 30° angle, tilting away from the center of the clamping frame. Please use caution when placing the first gel, making sure that the clamping frame remains balanced and does not tip over. Now, place the second gel on the other side of the clamping frame, again by resting the gel onto the supports. At this point there will be two gels resting at an angle, one on either side of the clamping frame, tilting away from the center of the frame (see Figure 2b).

**Note: It is critical that gel cassettes are placed into the clamping frame with the short plate facing inward. Also, the clamping frame requires 2 gels to create a functioning**

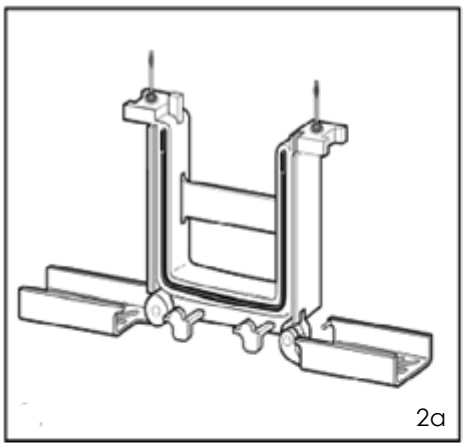
**assembly. If an odd number of gels (1 or 3) is being run, you must use the buffer dam (see Figure 4b)**.

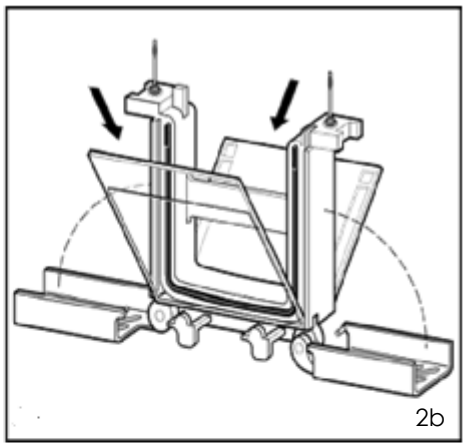
3. Using one hand, gently pull both gels towards each other, making sure that they rest firmly and squarely against the gaskets that are built into the clamping frame; make certain that the short plates sit just below the notch at the top of the gasket.
4. While gently squeezing the gel sandwiches or cassettes against the gaskets with one hand (keeping constant pressure and both gels firmly held in place), slide the purple arms of the clamping frame over the gels, locking them into place. Alternatively, you may choose to pick up the entire assembly with both hands, making sure that the gels do not shift, and simultaneously sliding both arms of the clamping frame into place (see Figure 2c). The arms of the clamping frame push the short plates of each gel cassette up against the notch in the gasket, creating a leak-proof seal.
5. At this point, the sample wells can be washed out with running buffer, and sample can be loaded (Figure 2d).

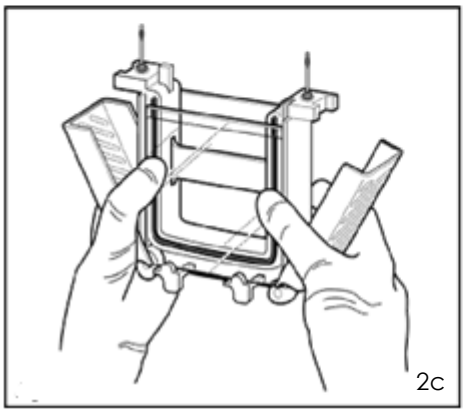
**Note: If running more than 2 gels, repeat steps 1a–d with the companion running module.**

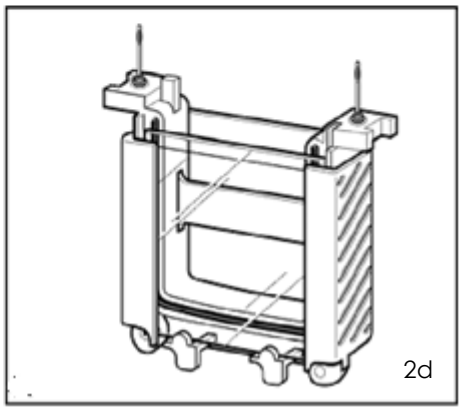
**Important Note:** Do not attempt to lock the purple arms of the clamping frame, without first ensuring that the gel cassettes are perfectly aligned and stabilized against the notches on the gaskets of the module. To prevent the gels from shifting during the locking step, firmly and evenly grip them in place against the core of the module with one hand.

**Caution: When running 1 or 2 gels only, do not place the companion running Module in the tank. Doing so will cause excessive heat generation and prevent electrophoretic separation.**




6. Transfer the Running module containing cast gels into the main tank in the correct orientation as indicated - +ve on the module aligned with +ve on the tank, -ve on the module aligned with –ve on the tank.
7. Fill the outer tank with 1X reservoir buffer. See "Solutions" for recommended running buffer solution.
8. Load the samples into the wells using a pipette tip taking care not to damage the wells or induce any air bubbles.
9. Fill any unused wells with 1 X sample buffer.

**Note: It is a good idea to note the orientation and order the samples were loaded in. This can be done by noting which samples were loaded adjacent to each electrode.**

## Gel Running

1. Fit the lid and connect to a power supply.
2. Gels should be run at constant voltage, with voltage dependent on the size of the proteins undergoing separation. An initial setting of 100V with constant observation of migration and heat production is

recommended. An exploratory study may be required to determine the optimal settings for individual proteins.

## Gel Removal

1. Turn the power supply off when the loading dye reaches the bottom of the gel, sooner if your proteins are below 4 kDa in size.
2. Remove the gel running module, first emptying the inner buffer into the main tank. Buffer can be re-used but this may affect run quality if continued.
3. Release the gels cassettes by opening the purple arms.
4. Remove the glass plates. Then using gel releaser, separate short and the plain glass plates. Place the wedged end of the releaser between the two plates and gently twist until the plates pull apart. The gel will usually stick to one of the plates and can be removed by first soaking in buffer and then gently lifting with a spatula.
5. The gel is now ready to be stained with Coomassie or silver stain or the proteins in the gel can be transferred to a membrane by electroblotting for specific band identification and further analysis.

## Solutions (For SDS-PAGE)

### Stock 30% Acrylamide Gel Solution:

30.0 g acrylamide

0.8 g methylene bisacrylamide

Distilled Water to 100ml

### Stock 4 X Resolving Gel Tris (1.5 M Tris·HCl pH8.8, 0.4 % SDS)

To 110ml Distilled Water add 36.4 g of Tris base

Add 8ml of 10 % SDS

Adjust pH to 8.8 with 1N HCl

Adjust the final volume to 200ml with Distilled Water.

**Stock 4  X Stacking Tris (0.5 M Tris·HCL pH6.8, 0.4 % SDS)**

To 110ml Distilled Water add 12.12 g of Tris base

Add 8ml of 10 % SDS

Adjust pH to 6.8 with 1N HCl

Add Distilled Water to a final volume of 200ml

**Stock 4 X Tris-glycine tank buffer - SDS**

36 g Tris base

172.8 g glycine

Distilled Water to 3 L

**1 x Tris-glycine tank buffer - SDS**

750ml of 4 X Tris-glycine reservoir buffer - SDS

30ml of 10 % SDS

Distilled Water to 3L

**10 % AP (ammonium persulphate solution)**

0.1 g ammonium persulphate

1ml Distilled Water

**TEMED**

**Stock 4 X Sample Buffer**

4ml glycerol

2ml 2-mercaptoethanol

1.2 g SDS

5ml 4 X Stacking Tris

0.03 g Bromophenol blue

Aliquot into 1.5ml micro centrifuge tubes. Store at -20°C.

# Troubleshooting

| **Problem: Sample Preparation** | **Cause** | **Solution** |
|---|---|---|
| **Laemmil sample buffer turns yellow** | Sample buffer too acidic | Add Tris base until buffer turns blue again. |
| **Sample very viscous** | High DNA or carbohydrate content | Fragment DNA with ultrasonic waves during cell lysis and protein solubilization.<br>Add endonucleases<br>Precipitate protein with TCA/acetone to diminish carbohydrate content. |
| | | |
| **Problem: Gel casting and sample loading** | Cause | Solution |
| **Poor well formation** | Incorrect catalyst used<br><br>Monomer solution not degassed (oxygen inhibits polymerization) | Prepare Fresh catalyst solution.<br>Increase catalyst concentration of stacking gel to 0.06% APS and 0.12% TEMED.<br>Degas monomer solution immediately prior to casting stacking gel. |
| **Webbing; excess acrylamide behind the comb** | Incorrect catalyst concentration | Prepare fresh catalyst solution.<br>Increase catalyst concentration of stacking gel to 0.06% APS and 0.12% TEMED. |
| **Gel does not polymerize** | Too little or too much APS or TEMED<br>Failure to degas<br>Temperature too low<br><br>Poor quality acrylamide or bis<br>Old APS | Use 0.0.05% APS and 0.05% TEMED.<br>Degas monomer solutions 10-15min.<br>Cast at room temperature, warming glass plates if necessary.<br>Use electrophoreses-grade reagents<br>Prepare fresh APS. |
| **Swirls in the gel** | Excess catalysts; polymerization time < 10min<br>Gel inhibition; polymerization time >2hr | Reduce APS and TEMED by 25% each.<br>Increase APS and TEMED by 50%; degas. |
| **Gel feels soft** | Low %T<br>Poor quality acrylamide or bis<br>Too little cross-linker | Use different %T.<br>Use electrophoresis- grade reagents.<br>Use correct %C. |
| **Gel turns white** | Bis concentration too high | Check solutions or weights. |
| **Gel brittle** | Cross-linker too high | Use correct % cross-linker |
| **Sample floats out of the well** | Sample is not dense enough | Induce 10% glycerol in sample to make it denser than surrounding buffer. |

| | | |
|---|---|---|
| | Pipetting, loading error | Slowly pipet sample into well. Do not squirt sample quickly into well as it may bounce off bottom or sides and flow into next well. Do not pipet tip from well before last of sample has left the tip. |
| | | |
| **Problem: Electrophoresis** | Cause | Solution |
| **Current zero or less than expected and samples do not migrate into gel** | Tape at the bottom of precast gel cassette not removed<br>Insufficient buffer in inner buffer chamber<br>Insufficient buffer in outer buffer chamber<br>Electrical disconnection | Remove tape.<br>Fill buffer chamber with running buffer.<br>Fill inner and outer buffer chambers to ensure wells are completely covered.<br>Check electrodes and connections. |
| **Gels run faster than expected** | Running buffer too concentrated and gel temperature too high; incorrect running buffer concentration or type used<br>Running or reservoir buffer too dilute<br>Voltage too high | Check buffer composition and type.<br>Check buffer protocol and concentrate if necessary.<br>Decrease voltage by 25-50%. |
| **Gels run slower than expected** | Incorrect running buffer composition or type<br>Excessive salt in sample | Check buffer composition and type.<br>Desalt sample. |
| **Buffer leaking from inner chamber** | Incomplete gasket seal | Set up again with sliding clamps tighter. |
| | | |
| **Problem: Total Protein Staining** | Cause | Solution |
| **Bands not visible** | No protein in gel<br>Imaging system malfunctioning<br>Incorrect imaging parameters were used | Stain with another method to confirm there is protein.<br>Check instrument manual for troubleshooting or contact imaging instrument manufacturer.<br>Check Instrument manual. |
| **Poor staining sensitivity** | Dirty staining trays<br>Insufficient stain volume<br>Insufficient staining time<br>Reuse of staining solution | Clean staining trays and other equipment with laboratory glassware cleaner.<br>Follow recommendations for stain volume (appropriate to gel size).<br>Increase staining time.<br>Repeat staining protocol with fresh staining solution. |

| | | |
|---|---|---|
| **High or uneven background staining** | Staining trays or equipment dirty<br><br>Too much time in staining solution<br><br>Reagent impurities | Clean staining trays and other equipment with laboratory glassware cleaner.<br>Restrict duration of incubation in staining solutions as recommended in protocol.<br>Wash gel in water or retrospective destaining solution for >30min.<br>Use high-purity water and reagents for staining. |
| **Speckles or blotches in gel image** | Particulate material from reagents, staining tray, dust or gloves | Clean staining trays thoroughly.<br>Decrease time that gels and staining solution are exposed to open air.<br>Use dust-free gloves and handle gels only by edges. |
| **Uneven staining** | Insufficient shaking during staining | Agitate gel during staining. |
| **Gel shrinkage** | Gel dehyrated | Transfer gel to water for rehydration. |
| Problem: Evaluation of Separation | Cause | Solution |
| **Diffuse or broad bands** | Poor quality acrylamide or bis-acrylamide incomplete polymerization<br>Old SDS or sample buffer<br>Gel temperature too high | Use electrophoresis-grade reagents.<br>Check polymerization conditions.<br><br>Prepare fresh solutions.<br>Use external cooling during run or run out a lower voltage. |
| **Bands 'smile' across gel, band pattern curves upward at both sides of gel** | Excess heating of gel; center of gel runs hotter than either end<br><br>Power conditions excessive<br><br>Insufficient buffer | Check buffer compostion; buffer not mixed well, or buffer in upper chamber too concentrated.<br>Prepare new buffer, ensuring thoroughly mixing, especially when diluting 5x or 10x stock.<br>Do not exceed recommended running conditions. Decrease power setting from 200V to 150V or fill lower chamber to within 1cm of top of short plate.<br>Fill inner and outer buffer chambers to ensure that wells are completely covered. |
| **Smiling or frowning bands with gel lane** | Overloaded proteins<br>Sample preparation/ buffer issues<br><br>Incorrect running conditions | Load less protein.<br>Minimize salts, detergents and solvents in sample preparation and sample buffers.<br>Use correct voltage. |
| **Skewed or distorted bands, lateral band spreading** | Excess salt in samples | Remove salts, from sample by dialysis or desalting column prior to sample preparation.<br>Use same buffer in samples as in gel. |

| | | |
|---|---|---|
| | Ionic strength of sample lower than that of gel<br>Insufficient sample buffer or wrong formulation<br>Diffusion prior to turning on current<br><br>Diffusion during migration through stacking gel<br><br>Uneven gel interface | Check buffer composition and dilution instructions.<br>Minimize time between sample application and power start-up.<br>Increase %T of stacking gel to 4.5% or 5%T.<br>Increase current by 25% during stacking.<br>Decrease polymerization rate.<br>Overlay gels carefully.<br>Rinse wells after removing comb to remove residual acrylamide. |
| **Vertical streaking** | Overloaded samples<br><br>Sample precipitation | Dilute sample.<br>Selectively remove predominant protein in sample (fractionate).<br>Reduce voltage by 25% to minimize streaking.<br>Centrifuge samples to remove particulate prior to sample loading.<br>Dilute sample in sample buffer. |
| **Fuzzy or spurious artefactual bands** | Concentration of reducing agent too low | Use 5% BME or 1% DTT. |
| **Protein bands do not migrate down as expected** | Bands of interest may be neutral or positively charged in buffer used; pH of bands must be -2pH units more negative than pH of running buffer | Use SDS-PAGE or a different buffer system in native PAGE or IEF. |

# Care and Maintenance

## Cleaning Vertical Units

Units are best cleaned using warm water and a mild detergent. **Water at temperatures above 60°C can cause damage to the unit and components.**

The tank should be thoroughly rinsed with warm water or distilled water to prevent build-up of salts, but care should be taken not to damage the enclosed electrode and vigorous cleaning is not necessary or advised.

Air drying is preferably before use.

**The units should only be cleaned with the following:**

Warm water with a mild concentration of soap or other mild detergent.

Compatible detergents include dishwashing liquid, Hexane and Aliphatic hydrocarbons

The units should not be left to in detergents for more than 30 minutes.

**The units should never come into contact with the following cleaning agents, these will cause irreversible and accumulative damage:**

Acetone, Phenol, Chloroform, Carbon tetrachloride, Methanol, Ethanol, Isopropyl alcohol, Alkalis.

## RNAse Decontamination

This can be performed using the following protocol:

Clean the units with a mild detergent as described above.

Wash with 3% hydrogen peroxide (H2O2) for 10 minutes.

Rinsed with 0.1% DEPC-(diethyl pyro carbonate) treated distilled water,

**Caution:** DEPC is a suspected carcinogen. Always take the necessary precautions when using.

RNaseZAP™ (Ambion) can also be used. Please consult the instructions for use with acrylic gel tanks.

# Ordering information

| Catalogue No. | Product description | Standard Quantity |
|---|---|---|
| **CVS82BSYS0.75** | ProPAGE2 2 gel mini vertical System, with 0.75mm bonded space | 1 |
| **CVS82BSYS** | ProPAGE2 2 gel mini vertical System, with 1.0mm bonded space | 1 |
| **CVS82BSYS1.5** | ProPAGE2 2 gel mini vertical System, with 1.5mm bonded space | 1 |
| **CVS84BSYS0.75** | ProPAGE4 4 gel mini vertical System, with 0.75mm bonded space | 1 |
| **CVS84BSYS** | roPAGE4 4 gel mini vertical System, with 1.0mm bonded space | 1 |
| **CVS84BSYS1.5** | roPAGE4 4 gel mini vertical System, with 1.5mm bonded space | 1 |
| **CVS8-10-1.0** | Comb 10 sample, 1.0mm thick | 5 |
| **CVS8-15-1.0** | Comb 15 sample, 1.0mm thick | 5 |
| **CVS8-10-0.75** | Comb 10 sample, 0.75mm thick | 5 |
| **CVS8-15-0.75** | Comb 15 sample, 0.75mm thick | 5 |
| **CVS8-10-1.5** | Comb 10 sample, 1.5mm thick | 5 |
| **CVS8-15-1.5** | Comb 15 sample, 1.5mm thick | 5 |
| **CVS8PGS0.75** | 10 x 8cm Plain Glass Plates with 0.75mm Bonded Spacers | 5 |
| **CVS8PGS1.0** | 10 x 8cm Plain Glass Plates with 1mm Bonded Spacers | 5 |
| **CVS8PGS1.5** | 10 x 8cm Plain Glass Plates with 1.5mm Bonded Spacers | 5 |
| **CVS8SP** | 10X 7cm Short Plates | 5 |
| **CVS8EXCASTER** | casting stand | 1 |
| **CVS8CLAMPS** | casting frames with clamps | 1 |
| **CVS8DCASTM** | Silicone mat | 5 |
| **CVS8DP** | Dummy Plate | 1 |
| **CVS8GPS** | Gel Releasers | 5 |
| **CVS8USS** | U-sealing Gasket Strip | 4 |

| | | |
|---|---|---|
| **CVS8DIRM** | proPAGE - Inner Running Module with Electrode Banana plugs | 1 |
| **CVS8DIRMN** | proPAGE - Inner Running Module without Electrode without Banana plugs | 1 |
| **CVS8LIDC** | CVS8 lid (Black & Red cables included) | 1 |
| **CVS8TANK** | CVS8Tank | 1 |

**Related Products**

| Catalogue No. | Product description |
|---|---|
| **CVS8-BI** | miniBlot Mini 10 x 8cm Blotting System |
| **CVS8BI-HI** | High Intensity miniBOLT Blot Mini insert |
| **CVS8BI-BC** | miniBLOT Blot Clip |
| **CVS8BI-MS** | miniBLOT Macroporous Sponge |
| **CVS8BI-CB** | miniBLOT Cooling Block |
| **CSL-BBL** | CSL BLUE Wide Range Prestained Protein Ladder, 10-245kDa, with 25 & 75kDa reference bands, 1x 500µL vial. |
| **CSL-TGSDSP** | Powdered Tris-Glycine-SDS Running buffer – To make 1L of 10x Stock |
| **CSL-TGP** | Powdered Tris-Glycine Running buffer – To make 1L of 10x stock |
| **TG10X1L** | Cleaver Buffer Tris-Glycine 10 x 1litre |
| **TG10x5L** | Cleaver Buffer Tris-Glycine 10 x 5litre |
| **TG-SDS10X1L** | Cleaver Buffer Tris-Glycine SDS 10 x 1litre |
| **TG-SDS10X5L** | Cleaver Buffer Tris-Glycine SDS 10 x 5litre |
| **CSL-GELX4** | 4mm x 1mm, Gel Cutting Tips, 250/ bag |
| **CSL-GELX4RACK** | 4mm x 1mm, Gel Cutting Tips, 5 racks of 48 |
| **CSL-GELX6.5** | 6.5mm x 1mm, Gel Cutting Tips, 250/ bag |
| **CSL-GELX6.5RACK** | 6.5mm x 1mm, Gel Cutting Tips, 5 racks of 48 |
| **POWERPRO300** | Power Supply MIDI 300V 700mA 150W - 110/230V |
| **POWERPRO500** | Power Supply MAXI 500V 800mA 200W - 110/230V |
| **CV20** | Cleaver Pipette - Volume; 2 - 20ul |
| **CSLVORTEX** | Cleaver Vortex Mixer with general purpose head, 230V |
| **CSLQSPIN** | Mini Centrifuge complete with 1.5/2.0 ml rotor, strip tube rotor, 0.5 and 0.4 ml adapters, 230V, Purple lid |
| **TCDB-01** | The Cube Dry Bath Incubator (one block unit); without block 220V |

# Warranty

The Cleaver Scientific Ltd. (CSL) proPAGE Vertical Electrophoresis units have a warranty against manufacturing and material faults of twelve months from date of customer receipt.

If any defects occur during this warranty period, CSL will repair or replace the defective parts free of charge.

This warranty does not cover defects occurring by accident or misuse or defects caused by improper operation.

Units where repair or modification has been performed by anyone other than CSL or an appointed distributor or representative are no longer under warranty from the time the unit was modified.

Units which have accessories or repaired parts not supplied by CSL or its associated distributors have invalidated warranty.

CSL cannot repair or replace free of charge units where improper solutions or chemicals have been used. For a list of these please see the Care and Maintenance subsection.

If a problem does occur, then please contact your supplier or Cleaver Scientific Ltd:

Cleaver Scientific Ltd.

Unit 41, Somers Road Industrial Estate

Rugby, Warwickshire, CV22 7DH

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Email: info@cleaverscientific.com