OmniPAGE Vertical Electrophoresis Systems
OmniPAGE Mini

Instruction Manual

Catalogue No: **CVS10D**
CVS10DSYS
CVS10PRE
CVS10DSYS-CU

Version 1

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Section 1 Safety Information

1.1 Safety Precaution

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.

Acrylamide is a powerful neurotoxin in solution form. Polymerized gels can contain some unpolymerized solution and protective gloves and clothing must be worn.

These units comply with the following European directives:

2006/95/CE Low Voltage Directive and 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

Section 2 General Information

2.1 Introduction

Cleaver Scientifics' omniPAGE range of Vertical Gel Units combines ease of use with high resolution separations. Four sizes, Mini 10 x 10cm, Mini Wide 20 x 10cm and Maxi 20 x 20cm, VS 30 x 30cm share a host of common features including a guaranteed leak proof seal required for trouble free, rapid and uncomplicated gel casting. Utilising a built in gel running module eliminates time consuming transfer of glass plates during casting, a process which can cause gel damage and misalignment. Glass plates with permanently bonded spacers guarantee perfect spacer alignment. The glass plate sandwich is then simply inserted between pressure bars and the new zero screw slide clamps clicked into position. This ensures fast set up times while even pressure bars and ultra soft seals guarantee leak proof casting. Once the gel has polymerised, the gel running module is just inserted into the gel tank for electrophoresis.

2.2 Product Description

Cleaver Scientifics' vertical electrophoresis units comes as a complete package including Gel Tank, Safety Lid, Gel Casting Inner Module, Glass plates with bonded spacers, Combs, Multipurpose Key, Power Cables and Cooling pads. Detailed description of all the components is written below.

Gel Tank and Safety Lid	Injection moulded gel tank and safety lid provides a sealed electrophoresis system which is compatible with all major types of 8 X 10cm and 10 x 10cm precast gel. All omniPAGE tanks are equipped with specially designed thumb locators for lifting up the safety lid easily. All safety lids are designed to accommodate the polarity design of the unit. They have special tapped holes which connect with the leading edge of the power cables.
Inner Module	Injection moulded inner module gives a twofold effectiveness for gel casting and running, thus no need of transferring the glass plates after casting the gel.
Glass Plates	2mm thick glass plates for the omniPAGE mini and 4mm thick glass plates for rest of the range prevents breakage and have bonded spacers for convenience. All our spacers are colour coded depending upon their thickness.
Multipurpose Key	CVS10KEY or the multipurpose key can be easily used to separate your notched and plain glass plate to release the gel. The same key can be used to open the CVS10 clamping doors.
Power Cables	Cleaver Scientifics' power cables are designed with protective retractable connectors which are compatible with most power supplies.
Cooling Pads	Rapid set up cooling packs enhance resolution eliminating the need of a chiller.
Combs with special gel loading guides	Special combs (Combicombs) are designed with special oval shaped gel loading guides on the other end of an ordinary comb which can be used.

2.3 Packing Lists

CVS10D, CVS10DSYS, CVS10PRE, CVS10DSYS-CU

Each unit includes a tank, lid, internal module, electrodes and the following accessories:

	Glass Plates	Combs	Casting base	Cooling Pack	Cables	Screws
CVS10D	VS10NG – Notched, Pk/2 VS10PGS1 – Plain with bonded 1mm spacers, Pk/2 VS10-DP – Dummy Plate	2 of VS10-12-1 1mm thick, 12 sample		VS10ICB	CSL-CAB	VS10-SCREW x 4
CVS10DSYS	VS10NG – Notched, Pk/2 VS10PGS1 – Plain with bonded 1mm spacers, Pk/2 VS10-DP – Dummy Plate	2 of VS10-12-1 1mm thick, 12 sample	VS10DCAST VS10DCASTM – Mat	VS10ICB	CSL-CAB	VS10-SCREW x 4
CVS10PRE	VS10-DP – Dummy Plate			VS10ICB	CSL-CAB	VS10-SCREW x 4
CVS10DYS-CU	See CVS10DYSYS CVS10EXCASTER	See CVS10DYSYS	See CVS10DYSYS	VS10ICB	CSL-CAB	VS10-SCREW x 4

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.

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

2.4 Specifications of OmniPAGE Vertical Electrophoresis Units

	omniPAGE Mini	omniPAGE Mini Wide	omniPAGE Maxi	omniPAGE VS30
Plate Dimensions Gel Dimensions (WxL)	10x10cm 7.5x8cm	20 X 10cm 18 X 8cm	20 X 20CM 16 X 17.5CM	30 X 22cm 28 X 20cm
Unit Dimensions	19x13x15cm (W x D x H)	26 X 16 X 16cm (W X D X H)	26 X 16 X 28CM (W X D X H)	36 X 33 X 18CM (W X H X D)
Max Sample Capacity	80 Samples 20 Samples per Gel	192 Samples 48 Samples per Gel	192 Samples 48 Samples per Gel	300 Samples per Run 75 Samples per Gel
Buffer Volume	Min 250ml, Max 1200ml	Min 600ml Max 2800ml	Min 1200ml Max 5600ml	Min1800ml Max 8400ml
Combs Available No. of Teeth Thickness	1, 5, 8MC, 9, 10, 12, 16MC, 20 0.75, 1, 1.5, 2mm	1, 5, 10, 18MC, 24, 30, 36MC, 48 0.75, 1, 1.5, 2mm	1, 5, 10, 18MC, 24, 30, 36MC, 48 0.75, 1, 1.5, 2mm	1, 2, 4, 28MC, 56MC, 75 0.25, 0.35, 0.5, 1, 1.5, 2.0mm
Environmental Operating Conditions	Maximum Altitude 2,000 m Temperature Range 4°C - 65°C Humidity Upto 80% Not for outdoor Use	Maximum Altitude 2,000 m Temperature Range 4°C - 65°C Humidity Upto 80% Not for outdoor Use	Maximum Altitude 2,000 m Temperature Range 4°C - 65°C Humidity Upto 80% Not for outdoor Use	Maximum Altitude 2,000 m Temperature Range 4°C - 65°C Humidity Upto 80% Not for outdoor Use

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”.

2.5 Care and Maintenance

Cleaning Large Format Vertical Units
Units are best cleaned using warm water and a mild detergent. **Water at temperatures above 60^0 C can cause damage to the unit and components.**
The inner module should be thoroughly rinsed with warm water or distilled water to prevent buildup of salts but care should be taken not to damage the enclosed electrode and vigorous cleaning is not necessary or advised. Air drying 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 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 pyrocarbonate) 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.

Section 3 Operating Instructions

3.1 Setting up the omniPAGE Gel Tank

Note: Before setting up the Gel Tank please ensure that it has been properly cleaned and dried.

1. Note the position of the lid on the unit. This shows the correct polarity and the correct orientation of the cables, black is negative and red positive.
2. Remove the lid from the unit.

Note: If the lid is not removed, fitting the cables may result in un-tightening of the gold plug and damage the electrode.

3. Screw the cables into the tapped holes as fully as possible so that there is no gap between the lid and the leading edge of the cable fitting.
4. Refit the lid and the unit is now ready to be used.

3.2 Gel casting

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 notched glass plate and one plain glass plate with bonded spacers.

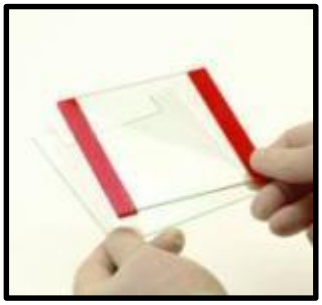
When using a triple glass plate sandwich, two notched glass plates are required, one set of free spacers and a set of plain glass plates with bonded spacers. The plain glass plate is positioned outermost, then a notched glass plate, free spacers and second notched glass plate. Alternatively, accessory notch glass plates with bonded spacers are available.

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.

Glass cassette Assembly

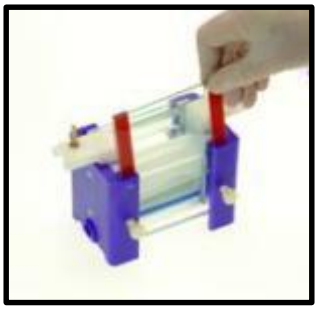
Assemble the glass plates so that the bottom of the glass plates and the spacers are perfectly aligned.

For triple plate sandwiches, the free spacers Need to be perfectly aligned which is best performed using a small spacer or comb to push the spacers apart. Notched glass plates with bonded spacers do not need manual alignment.



NOTE: The glass plates with bonded spacers have an arrow in the top of the spacers which are slightly longer than the glass plate to indicate the top.

Casting Stand Assembly



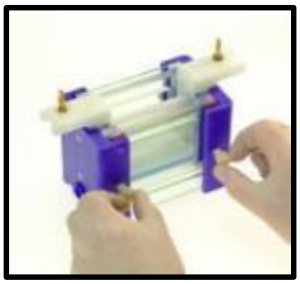
Position the Slab Gel Insert on a flat surface.

Insert the glass plates into the Slab Gel Insert between the pressure bar and the blue gasket.

The Slab Gel Insert contains pressure bars which impart even pressure onto the glass plates and allow even screw pressure transfer onto the sealing edge of the glass plate, ensuring complete sealing. Ensure that the pressure bars are adequately open for the thickness of spacer used. The bar can be opened by loosening the screws or by sliding the clamps. When using a triple glass plate sandwich, the pressure bars will need to be in the completely open position.

Then fully tighten the pressure bar screws in the order top then bottom.

SCREW VERSION



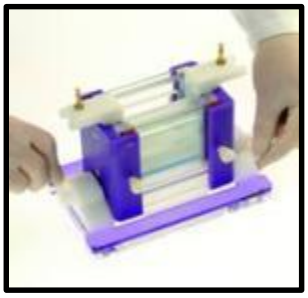
SLIDING CLAMP VERSION

Fully tighten the screw for the Mini vertical and the screws sequentially and in an even manner for the maxi vertical in the order middle two, top then bottom, making sure not to wobble the unit. When using the Slide Clamp Mini version, simply slide both gates outwards until fully tightened. When only one gel is being run, the dummy plate must be used in the second position and fully tightened.

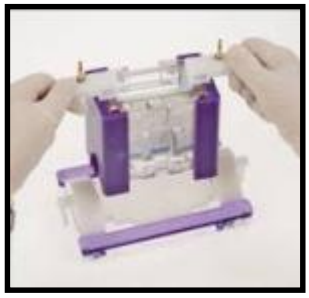
NOTE: At this stage, check that the bottom edges of the spacers and glass plates are perfectly aligned.

Position the Slab Gel Insert in the casting base such that the Cam pins have handles pointing downwards and are located in the insert holes. The top of the GRM may need to be pushed down very slightly to locate the cam pins.

SCREW VERSION



SLIDING CLAMP VERSION



With the cam pin handles facing directly downwards, turn the cam pins fully through 180^0 or until the insert has tightened onto the silicone mat.

NOTE: It is best to turn the cams in opposite directions to each other. Do not overturn as this will cause the glass plates to push upwards and the assembly will be more likely to leak. The unit is now ready for gel preparation and pouring.

Always reverse the silicone mat after casting to avoid indentations from persisting. Never leave the casting up-stand with glass plates tightened into the casting base for long periods of time as this will also cause indentations in the silicone mat.

The slide clamp version CVS10 also includes screws. This system can be used either with the slide clamps or screws as preferred by the user. For those that prefer to use the screws rather than clamps, the screws can be simply inserted into the screw holes. The clamps can be removed by placing each clamp in the fully open position and gently bending the clamp upwards from the slanted end. The holding pin will then slowly release and the clamp can be removed.

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. 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.
7. Prepare the stacking gel solution.
8. 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.
9. Carefully pour the stacking gel solution, avoiding generating air bubbles.
10. 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.
11. Allow the stacking gel polymerize.
12. Once the gel is polymerized it is ready for the electrophoresis run.

Casting a gel without stacking layer

1. Prepare the resolving gel solution. Mix well and avoid generating air bubbles.
2. Pour the solution smoothly into the glass plates avoiding any air bubbles until the top of the notched glass plate is reached.
3. 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.
4. 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.
5. Once the gel is polymerized it is ready for the electrophoresis run.

Using Precast Gels

1. omniPAGE mini is compatible with all the precast gels available in the market.
2. Simply remove the precast gel from the storage pouch.
3. Gently remove the comb.
4. Keep the Inner module upstand on a flat surface and place the precast gel between the pressure bar and the blue gasket.

3.3 omniPAGE module assembly and Sample loading

1. If desired, fit the cooling pack(s) into the end of the tank. These should be pre-frozen and fitted with the longest side positioned sideways with the end(s) of the tank and pressed into the recess. Or these can be fitted down the front of the tank.

Note: NEVER FIT THESE UNDERNEATH THE MODULE IN THE BOTTOM OF THE TANK AS THIS WILL PREVENT THE FLOW OF CURRENT THROUGH THE GEL AND CAUSE SLOW RUNS AND OVER-HEATING.

Note one pack is supplied as standard. Additional packs can be purchased.

2. Transfer the Inner gel 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.
3. Fill the outer tank with 1 x reservoir buffer. See Page 22 for recommended running buffer solution. **Table 7** shows the volume of buffer required.
4. Load the samples into the wells using a pipette tip taking care not to damage the wells or induce any air bubbles.
5. Fill any unused wells with 1 X sample buffer.
6. 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.

3.4 Gel Running

1. Fit the lid and connect to a power supply.
2. Consult Table 8 for details on recommended power supply voltage settings.

3.5 Gel Removal

1. Turn the power supply off when the loading dye reaches the bottom of the gel, sooner if your proteins are below 4Kd 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. Unscrew the glass plates with the Screw version. To open the sliding door version insert the CVS10KEY into the recess arch of the clamping door. Twist key applying pressure to both the clamping door and the CVS10D side cheek. The door will now click open. Repeat this process until you have opened both the doors.
4. Remove the glass plates. Then using CSLKEY separate notched and the plain glass plates. Place the wedged end of the key 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.

Section 4 Gel Preparation

4.1 Gel Selection

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.

See Table 1 below explaining which percentage of gel to use to separate the sizes of proteins indicated.

Table 1 Acrylamide percentages

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

4.2 Volumes required per gel

Table 2 shows the total amount of gel solution required.

omniPAGE Mini CVS10D, CVS10DSYS, CVSPRE, CVS10DSYS-CU		
Number of gels	Gel Thickness (mm)	Volume (ml)
Single – one gel, one dummy plate	O.5 1.0 1.5 2.0	3.8 7.5 11.3 15.0
Double – two gels	O.5 1.0 1.5 2.0	7.5 15.0 22.5 30.0
Using a Triple Plate sandwich – four gels	O.5 1.0 1.5 2.0	10.0 30.0 45.0 60.0

4.3 Gel Preparation

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.

Table 3 Preparation of the separating gel solution for two 10 x 10cm CVS10D gels using 1 mm spacers.

Solution	**5 %**	**7.5%**	**10 %**	**12%**	**15 %**	**17.5%**
Distilled Water	8.7ml	7.5ml	6.3ml	5.25ml	3.75ml	2.5ml
30 % Stock Acrylamide Solution	2.5ml	3.75ml	5ml	6ml	7.5ml	8.75ml
4 X Resolving Tris Solution	3.75ml	3.75ml	3.75ml	3.75ml	3.75ml	3.75ml
10 % Ammonium Persulphate	150µl	150µl	150µl	150µl	150µl	150µl

Add 15µl of TEMED to the resolving gel solution for CVS10D sized gels.

4.4 Stacking Gel Preparation

Table 4 A guide to preparing the stacking gel

Solution	**CVS10D**
Distilled Water	4.2ml
30 % Stock Acrylamide Solution	0.65ml
4 X Stacking Gel Tris Solution	1.6ml
10 % Ammonium Persulphate	67µl

4.5 Buffer Volume

Table 5 Buffer Volumes

Buffer Volume	**CVS10D**
Minimum – Inner tank is filled to above the wells. Outer Tank is filled to just flood the bottom of the glass plates. Cooling potential is at a minimum which may affect resolution.	250ml 500ml
Maximum – Inner tank is filled to above the wells. Outer Tank is filled to the maximum fill line. Cooling is high offering good resolution of samples.	1200ml 2.8 Litres
Using the cooling packs – Inner tank is filled to above the wells. Cooling packs are inserted behind the gels. Outer Tank is filled to the maximum fill line. Cooling is at a maximum.	1000ml 2.3 Litres

4.6 Gel Running Conditions

Table 6 Gel Running Conditions

Recommended Voltages and Resultant Current for 1mm thick, 12% gels.	**CVS10D**
One gel	90-225V 20-45mA
Two gels	90-225V 40-90mA
Three gels	90-225V 60-135mA
Four gels	90-225V 80-180mA

4.7 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 (See Comb specifications section 6.2).
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 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.

4.8 Stock Solutions (For SDS PAGE gels)

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.

Section 5 Troubleshooting Guide

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. Add endonucleases (for each benzonases). Precipitate protein with TCA/acetone to diminish carbohydrate content.
Problem: Gel casting and sample loading	**Cause**	**Solution**
Poor well formation	Incorrect catalyst used Monomer solution not degassed (oxygen inhibits polymerization)	Prepare Fresh catalyst solution. Increase catalyst concentration of stacking gel to 0.06% APS and 0.12% TEMED. Degas monomer solution immediately prior to casting stacking gel.
Webbing; excess acrylamide behind the comb	Incorrect catalyst concentration	Prepare fresh catalyst solution. 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 Failure to degas Temperature too low Poor quality acrylamide or bis Old APS	Use 0.0.05% APS and 0.05% TEMED. Degas monomer solutions 10-15min. Cast at room temperature, warming glass plates if necessary. Use electrophoreses-grade reagents Prepare fresh APS.
Swirls in the gel	Excess catalysts; polymerization time < 10min Gel inhibition; polymerization time >2hr	Reduce APS and TEMED by 25% each. Increase APS and TEMED by 50%; degas.
Gel feels soft	Low %T Poor quality acrylamide or bis Too little cross-linker	Use different %T. Use electrophoresis- grade reagents. 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 Pipetting, loading error	Induce 10% glycerol in sample to make it denser than surrounding buffer. 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 Insufficient buffer in inner buffer chamber Insufficient buffer in outer buffer chamber Electrical disconnection	Remove tape. Fill buffer chamber with running buffer. Fill inner and outer buffer chambers to ensure wells are completely covered. 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 Running or reservoir buffer too dilute Voltage too high	Check buffer composition and type. Check buffer protocol and concentrate if necessary. Decrease voltage by 25-50%.
Gels run slower than expected	Incorrect running buffer composition or type Excessive salt in sample	Check buffer composition and type. 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 Imaging system malfunctioning Incorrect imaging parameters were used	Stain with another method to confirm there is protein. Check instrument manual for troubleshooting or contact imaging instrument manufacturer. Check Instrument manual.
Poor staining sensitivity	Dirty staining trays Insufficient stain volume Insufficient staining time Reuse of staining solution	Clean staining trays and other equipment with laboratory glassware cleaner. Follow recommendations for stain volume (appropriate to gel size). Increase staining time. Repeat staining protocol with fresh staining solution.
High or uneven background staining	Staining trays or equipment dirty Too much time in staining solution Reagent impurities	Clean staining trays and other equipment with laboratory glassware cleaner. Restrict duration of incubation in staining solutions as recommended in protocol. Wash gel in water or retrospective destaining solution for >30min. 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. Decrease time that gels and staining solution are exposed to open air. 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 Old SDS or sample buffer Gel temperature too high	Use electrophoresis-grade reagents. Check polymerization conditions. Prepare fresh solutions. 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 Power conditions excessive Insufficient buffer	Check buffer compostion; buffer not mixed well, or buffer in upper chamber too concentrated. Prepare new buffer, ensuring thoroughly mixing, especially when diluting 5x or 10x stock. 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. Fill inner and outer buffer chambers to ensure that wells are completely covered.
Smiling or frowning bands with gel lane	Overloaded proteins Sample preparation/ buffer issues Incorrect running conditions	Load less protein. Minimize salts, detergents and solvents in sample preparation and sample buffers. Use correct voltage.
Skewed or distrorted bands, lateral band spreading	Excess salt in samples Ionic strength of sample lower than that of gel Insufficient sample buffer or wrong formulation Diffusion prior to turning on current Diffusion during migration through stacking gel Uneven gel interface	Remove salts, from sample by dialysis or desalting column prior to sample preparation. Use same buffer in samples as in gel. Check buffer composition and dilution instructions. Minimize time between sample application and power startup. Increase %T of stacking gel to 4.5% or 5%T. Increase current by 25% during stacking. Decrease polymerization rate. Overlay gels carefully. Rinse wells after removing comb to remove residual acylamide.
Vertical streaking	Overloaded samples Sample precipitation	Dilute sample. Selectively remove predominant protein in sample (fractionate). Reduce voltage by 25% to minimize streaking. Centrifuge samples to remove particulate prior to sample loading. 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.

Section 6 Product Information

6.1 Catalogue numbers and product descriptions

Catalogue No.	Product description
CVS10D	omniPAGE Mini, 10 x 10cm Dual, 2 sets of Glass Plates, 1mm thick bonded Spacers, 2 x 12 sample, 1mm thick combs. CLAMP VERSION
CVS10DSYS	omniPAGE Mini, 10 x 10cm Dual, 2 sets of Glass Plates, 1mm thick bonded Spacers, 2 x 12 sample, 1mm thick combs including caster. CLAMP VERSION
CVS10PRE	omniPAGE Mini, 10 x 10cm Dual. No accessories. CLAMP VERSION
CVS10DSYS-CU	omniPAGE Mini, 10 x 10cm Dual, 2 sets of Glass Plates, 1mm thick bonded Spacers, 2 x 12 sample, 1mm thick combs including caster. CLAMP VERSION, External casting upstand
CVS10EXCASTER	External Casting Stand - No Casting Base
CVS10EXCASTERSYS	External Casting System - Upstand+ Base
VS10DCAST	10 x 10cm Casting Base
VS10DCASTM	Replacement Silicone Mat for 10 x 10cm Casting Base
CVS10DIRM	Inner Running Module
VS10ICB	Mini Cooling Pack
VS10NG	10 x 10cm Notched Glass Plates 2mm thick (pk/2)
VS10PG	10 x 10cm Plain Glass Plates 2mm thick (pk/2)
VS10NGS0.75	10 x 10cm Notched Glass Plates with 0.75mm Bonded Spacers (pk/2)
VS10PGS0.75	10 x 10cm Plain Glass Plates with 0.75mm Bonded Spacers (pk/2)
VS10NGS1	10 x 10cm Notched Glass Plates with 1mm Bonded Spacers (pk/2)
VS10PGS1	10 x 10cm Plain Glass Plates with 1mm Bonded Spacers (pk/2)
VS10NGS1.5	10 x 10cm Notched Glass Plates with 1.5mm Bonded Spacers (pk/2)
VS10PGS1.5	10 x 10cm Plain Glass Plates with 1.5mm Bonded Spacers (pk/2)
VS10NGS2	10 x 10cm Notched Glass Plates with 2mm Bonded Spacers (pk/2)
VS10PGS2	10 x 10cm Plain Glass Plates with 2mm Bonded Spacers (pk/2)
VS10DP	Dummy Plate, 10 x 10cm
VS10S0.75	10cm Spacers - 0.75mm (pk/2)

VS10S1	10cm Spacers - 1mm thick (pk/2)
VS10S1.5	10cm Spacers - 1.5mm thick (pk/2)
VS10S2	10cm Spacers - 2mm thick (pk/2)
RPW-0.2	Replacement Platinum Wire - 0.2mm, 50cm

Multiple Minigel Casting

CSL-6CAST	6 gel caster for 8 x 10cm or 10 x 10cm gels
CSL-12CAST	12 gel caster for 8 x 10cm or 10 x 10cm gels
CSL-24CAST	24 gel caster for 8 x 10cm or 10 x 10cm gels

6.2 Combs – MC Denotes Multi Channel Pipette compatible

Code	Description	Sample Volume µl for a 5mm thick gel
VS10-1-0.75	Comb 1 Prep, 1 Marker, 0.75mm thick	500
VS10-5-0.75	Comb 5 sample, 0.75mm thick	70
VS10-8MC-0.75	Comb 8 sample MC, 0.75mm thick	40
VS10-9-0.75	Comb 9 sample, 0.75mm thick	35
VS10-12-0.75	Comb 12 sample, 0.75mm thick	25
VS10-16MC-0.75	Comb 16 sample MC, 0.75mm thick	20
VS10-20-0.75	Comb 20 sample, 0.75mm thick	15
VS10-1-1	Comb 1 Prep, 1 Marker, 1mm thick	650
VS10-5-1	Comb 5 sample, 1mm thick	100
VS10-8MC-1	Comb 8 sample MC, 1mm thick	60
VS10-9-1	Comb 9 sample, 1mm thick	50
VS10-10-1	Comb 10 sample, 1mm thick	40
VS10-12-1	Comb 12 sample, 1mm thick	35
VS10-16MC-1	Comb 16 sample MC, 1mm thick	25
VS10-20-1	Comb 20 sample, 1mm thick	20
VS10-1-1.5	Comb 1 Prep, 1 Marker, 1.5mm thick	1000
VS10-5-1.5	Comb 5 sample, 1.5mm thick	140
VS10-8MC-1.5	Comb 8 sample MC, 1.5mm thick	80
VS10-9-1.5	Comb 9 sample, 1.5mm thick	70
VS10-10-1.5	Comb 10 sample, 1.5mm thick	30
VS10-12-1.5	Comb 12 sample, 1.5mm thick	50

VS10-16MC-1.5	Comb 16 sample MC, 1.5mm thick	40
VS10-20-1.5	Comb 20 sample, 1.5mm thick	30
VS10-1-2	Comb 1 Prep, 1 Marker, 2mm thick	1300
VS10-5-2	Comb 5 sample, 2mm thick	200
VS10-8MC-2	Comb 8 sample MC, 2mm thick	120
VS10-9-2	2 Comb 9 sample, 2mm thick 100	100
VS10-10-2	Comb 10 sample, 2mm thick	80
VS10-12-2	Comb 12 sample, 2mm thick	70
VS10-16MC-2	Comb 16 sample MC, 2mm thick	50
VS10-20-2	Comb 20 sample, 2mm thick	40

6.3 Catalogue numbers and product descriptions for CSL Related Products

Catalogue No.	Product description
CSL-PPL	CSL Pink Plus Prestained Protein Ladder, 10-175kDa, with 10, 40 & 90kDa reference bands, 1x 500µL vial.
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 - 10 Pouches(10 litres/pk)
CSL-TGP	Powdered Tris-Glycine Running buffer - 10 Pouches(10 litres/pk)
CSL-TTSDSP	Powdered Tris-TRICINE-SDS Running buffer - 10 Pouches(10 litres/pk)
CSL-MSDSP	Powdered MOPS-SDS buffer Running buffer - 10 Pouches(10 litres/pk)
TG10X1L	Cleaver Buffer Tris-Glycerine 10 x 1litre
TG10x5L	Cleaver Buffer Tris-Glycerine 10 x 5litre
TG-SDS10X1L	Cleaver Buffer Tris-Glycerine SDS 10 x 1litre
TG-SDS10X5L	Cleaver Buffer Tris-Glycerine 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
CS-300V	OmniPAC, MIDI 300V 700mA 150W - 110/230V
CS-500V	OmniPAC, MAXI 500V 400mA 200W - 110/230V
VS10BI	OmniBlot Mini Insert - including 4 cassettes, 16 foam pads
VS10DCi	omniPAGE Mini Tube Gel Insert - including 10 glass tubes
OMNIDOCIPROSAFE	OMNIDOC-i plus Blue LED Epi-illumination Module (OMNIDOC-BL), and 520, 560 & 580nm filters (OMNIDOC-SYBR, -AF560 & -AF580); and White Light Table (OMNIDOC-WLT)
CVS10CBS	Complete system for Mini Vertical Electrophoresis & Blotting including: Vertical unit, Blotting insert & accessories. CLAMP VERSION.
SB10	OmniBlot Mini, 10 x 10cm Blotting System, including 4 cassettes
SB20	OmniBlot Maxi, 20 x 20cm Blotting System, including 4 cassettes
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
CSL-UVCAB	UV sterilisation cabinet with timer, four UV lights and white light, no Tray - 230V
SD20	Semi Dry Maxi, 20 x 20cm System
VS10WD	omniPAGE Mini Wide, 20 x 10cm Dual, 2 sets of Glass Plates with 1mm thick bonded Spacers, 2 x 24 sample, 1mm thick combs, cooling pack
VS10WDSYS	omniPAGE Mini Wide, 20 x 10cm Dual, 2 sets of Glass Plates with 1mm thick bonded Spacers, 2 x 24 sample, 1mm thick combs, cooling pack including caster
VS10WDSYS-CU	omniPAGE Mini Wide, 20 x 10cm Dual, 2 sets of Glass Plates, 1mm thick bonded Spacers, 2 x 24 sample, 1mm thick combs including caster, External casting upstand
VS20WAVESYS	VS20WAVE Maxi, 20 x 20cm Dual with Glass Plates with bonded 1mm thick spacers, 2x 24 sample combs, cooling coil, dummy plate and Casting Base
VS20WAVESYS-CU	VS20WAVE Maxi, 20 x 20cm Dual, 2 sets of Glass Plates, 1mm thick bonded Spacers, 2 x 24 sample, 1mm thick combs, cooling coil, dummy plate;includes caster and External casting upstand
VS20WAVE-EC	VS20WAVE External Casting Stand - No Casting Base

Section 7 Warranty

The Cleaver Scientific Ltd. (CSL) 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 CSL:

Cleaver Scientific Ltd.
Unit 41
Somers Road Industrial Estate
Rugby
Warwickshire
CV22 7DH
Tel: +44 (0)1788 565300
Fax: +44 (0)1788 552822
Email: info@cleaverscientific.com

Record the following for your records:

Model _____

Catalogue No. _____

Date of Delivery _____

Warranty Period _____

Serial No. _____

Invoice No. _____

Purchase Order No. _____