Water Cooled, Dual Gel Electrophoresis System

Model P8DS, P9DS, P10DS

Operating and Maintenance Manual 7007335 Rev. 0

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P8

P9

P10

MANUAL NUMBER 7007335

REV	ECR/ECN	DATE	DESCRIPTION	By
0	--	5/7/12	Transfer to Marietta (was Emperor Penguin 03/2003)	ccs

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Caution All internal adjustments and maintenance must be performed by qualified service personnel. ▲

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Section 1 Safety Information

Important Safety Information!

Please read carefully before operating!

- To avoid the risk of personal shock, always disconnect the gel box from the power supply. Further, the power supply must be equipped with a shut-down-on-disconnect circuit.

- **Statement of Proper Use:** Use this product only for its intended purpose as described in this manual. Do not use this product if the power leads are damaged or if any of its surfaces are cracked.

- Running conditions for this unit should not exceed the name plate readings found on the lower buffer chamber.

- Do not move the unit unless the power source to the unit has been disconnected.

- This Owl System is designed to meet IEC 1010-1 safety standards (IEC 1010-1 is an internationally accepted electrical safety standard for laboratory instruments).

Section 2 Introduction

The Water Cooled Dual Gel Electrophoresis System runs one or two gels in three available width glass cassettes (10cm, 16cm or 20cm) and varying heights (8cm, 10cm, 14cm, 16cm, and 20cm). When used with the available combs, spacers, alumina plates and glass, this system is the perfect tool for SDS electrophoresis, two dimensional (2-D) electrophoresis, agarose electrophoresis and native electrophoresis.

The Water Cooled Dual Gel Electrophoresis System is manufactured using time tested acrylic fabrication technology providing a durable, long lasting system backed by a three year warranty. The design allows for a very simple clamping mechanism that makes loading glass cassettes and most manufacturer's pre-cast gels trouble-free.

Casting slab gels with this system combines a clever design and a simple technique. Simply load one or two empty gel cassettes in the upper buffer chamber, pour an agarose plug in the specially designed agarose well, pour acrylamide solution in the cassette and load your sample. The two individual steps of casting and loading the gel are now combined.

The central cooling core is composed of thermally conductive alumina plates and a unique fluid circulation path. This combination allows the gel to be both passively cooled due to the conductive nature of the alumina material and actively cooled by circulating fluid through the core with an external circulator. In both processes, the Water Cooled Dual Gel Electrophoresis System provides even cooling over the entire gel for outstanding resolution and clear banding.

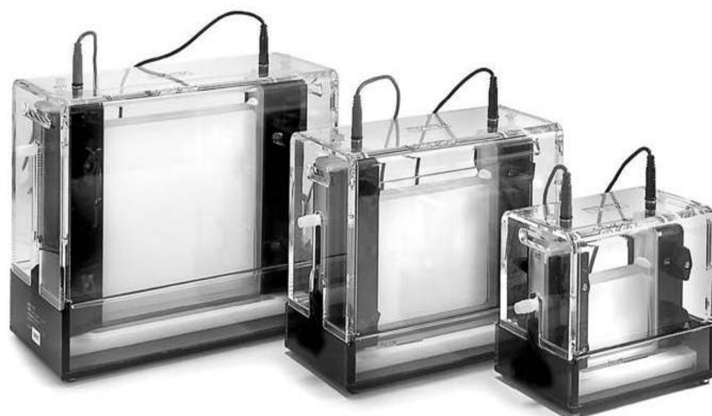


Figure 2-1. Electrophoresis Systems

Section 3 General Information

Before starting, unpack the unit and inventory your order. If any parts are missing, refer to the service page of this manual and contact Technical Services immediately. Reference the order or catalog number on your invoice and check the corresponding parts list.

Table 3-1. Parts List

Description	P8DS	Qty.	P9DS	Qty.	P10DS	Qty.
P8DS-3, P9DS-3 and P10DS-3						
Upper Buffer Chamber (UBC)	P8DS-001	1	P9DS-001	1	P10DS-001	1
Lower Buffer Chamber (LBC)	P8DS-008	1	P9DS-008	1	P10DS-008	1
Safety Lid with Power Supply Leads	P8DS-012	1	P9DS-012	1	P10DS-012	1
P8DS-1, P9Ds-2, and P10DS-2 (includes everything listed above plus the items listed below)						
Blank glass plates 3/32" Thick (size)	P7-10G (10cmW x 10cmL)	4	N/A		N/A	
Blank glass plates 1/8" Thick (size)	N/A		P1-14G (16cmW x 14cmL)	4	P10-20G (20cmW x 20cmL)	4
Notched glass plates 3/32" Thick (size)	P7-10R (10cmW x 10cmL)	2	N/A		N/A	
Notched glass plates 1/8" Thick	N/A		P1-14R (16cmW x 14cmL)	4	P10-20R (20cmW x 20cmL)	4
Notched Alumina Plates 1.0mm Thick	P7-10R (10cmW x 10cmL)	2	N/A		N/A	
Spacers, 0.8mm Thick	P7-SC	2	N/A		N/A	
Spacers, 1.5mm Thick			P1-SD	2	P2-SD	2
Blocking Plate for Single Gel Operation	P8DS-016	1	P9DS-006	1	P10DS-006	1
Well Comb, 10 teeth, 0.8mm thick	MP-10C	2	N/A		N/A	
Well Comb, 10 teeth, 1.5mm thick	N/A		FB-VE16-18	2	N/A	
Well Comb, 15 teeth, 1.5mm thick	N/A		FB-VE16-20	2	N/A	
Well Comb, 15 teeth, 1.5mm thick	N/A		N/A		FB-VE20-17	2
Well Comb, 20 teeth, 1.5mm thick	N/A		N/A		FB-VE20-19	2
Spacer Placer	FB-GC10-15		FB-GC16-10		FB-GC20-10	
Joey Gel Caster	FB-GC10-1	1	FB-GC16-1	1	FB-GC20-1	1
FB-VE20-1 (includes everything listed above except the Joey Gel Caster)						

Table 3-1. Parts List (continued)

Description	P8DS	Qty.	P9DS	Qty.	P10DS	Qty.
P8DS-1, P9DS-1, and P10DS-1 (includes everything listed above plus the items listed below)						
Gel Caster	JGC-4		JGC-2	1	JGC-3	1

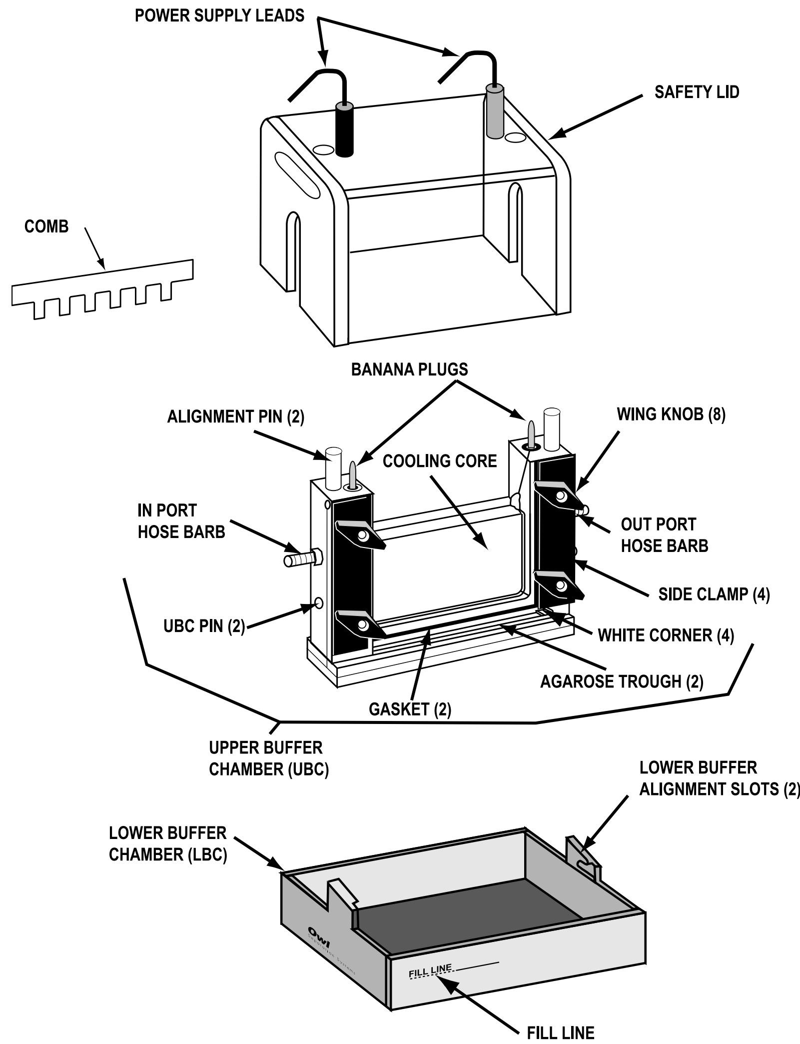


Figure 3-1. Parts Diagram

Figure 3-2. Parts Diagram

Table 3-2. Specifications

Unit/Model Number	P8DS	P9DS	P10DS
Gel size	10cmW x 10cmL 10cmW x 8cmL	16cmW x 14cmL 16cmW x 16cmL	20cmW x 20cmL
Upper Buffer Chamber Capacity	170ml	400ml	600ml
Lower Buffer Chamber Capacity	240ml	300ml	800ml
Total Running Buffer	250ml	650ml	1250ml
Total Buffer Capacity	250ml	650ml	1250ml
Current, Constant	15-35mA/gel	15-50mA/gel	15-75mA/gel
Time Requirements	30-90 min.	60-120 min.	60-180 min.
Sample Capacity	20	30	40
Dimensions (cm) H x W x D	15 x 17 x 12	21 x 24 x 14	24 x 30.5 x 16.5
Glass Size (cm) W x L	10 x 10	16 x 14	20 x 20

Section 4 Setting Up

Procedures for setting the electrophoresis system follow.

Gel Cassette Assembly

1. Assemble the gel cassette which is comprised of two glass plates, one blank glass plate and one notched, offset or alumina plate, with spacers between them, running up the left and right sides of the glass (Figure 4-1).

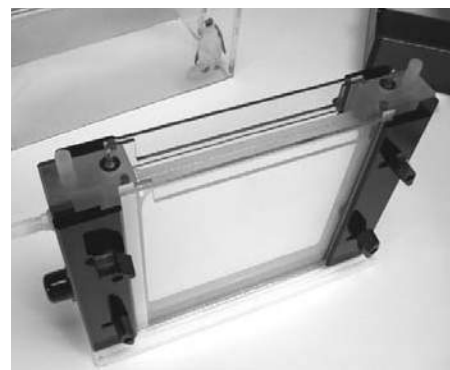


Figure 4-1. Single or Dual Gel Assembly

2. Place the assembled gel cassette with the notched or offset glass plate facing the inside of the upper buffer chamber on the white corners, located at the base of the upper buffer chamber (Figure 4-2). The gel cassette must be placed squarely on these corners in order to provide a good seal with the gasket and avoid leakage of buffer from the upper buffer chamber to the lower buffer chamber.

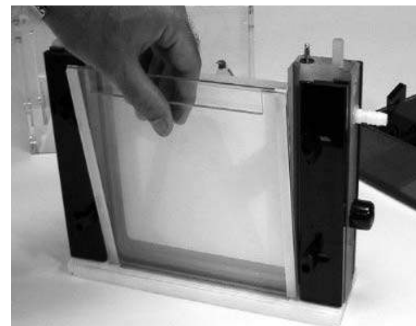


Figure 4-2. Fit on Corners

Gel Cassette Assembly (cont.)

3. Clamp the cassette to the upper buffer chamber by moving the two black side clamps (Figure 4-3) toward the center of the glass cassette.

    a. Slide the spacer placer between the glass, it will keep the spacers parallel during this step (Figure 4-4).

    b. Tighten the four wing knobs until finger-tight and a seal is formed between the gasket and the glass (Figure 4-5). Do not over-tighten the wing knobs as glass plates may break or bow. A seal may be seen as an even flattening of the gasket against the glass. Remove the spacer placer.

Figure 4-3. Move Two Black Clamps

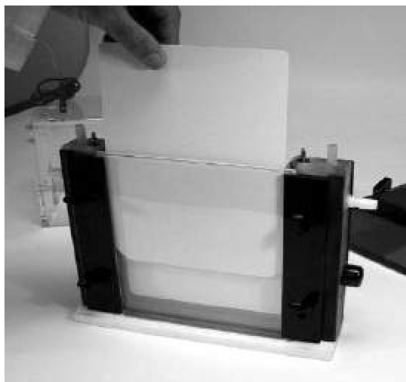


Figure 4-4. Slide Spacer Placer

Figure 4-5. Tighten Wing Knobs

4. Repeat Steps 2 and 3 for a second gel, or use a blocking plate if only running one gel. The combination of the second gel or blocking plate will form the upper buffer chamber.

Pouring the Agarose Plug

1. Place the assembled upper buffer chamber on a level surface.

2. Prepare a 2% solution of agarose. Microwave the agarose solution for approximately 1 minute (this will vary depending on the microwave) and mix to make sure there are no un-dissolved clumps remaining.

Table 4-1. Approximate Agarose Solution for 1 Agarose Trough

Unit/Model Number	P8DS	P9DS	P10DS
~Solution for 1 Trough	6ml	12ml	20ml

If running two gels, prepare two times the amount listed above.

Pouring the Agarose Plug (continued)

3. Pipette the agarose solution into each trough below the glass, located at the base of the upper buffer chamber (Figures 4-6 and 4-7). Half of the agarose solution will fill the area just under the glass, and between the white corners. The remaining agarose solution will seal off the bottom of the gel (Figure 4-8).

Figure 4-6. Trough

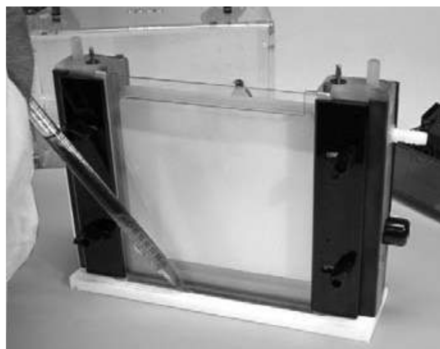


Figure 4-7. Pipette Solution

Figure 4-8. Allow Agarose to Cool

4. Allow the agarose plug to cool/solidify for a minimum of 15 minutes.

Casting the Gel

1. Prepare the appropriate volume of acrylamide gel solution using Table 4-2 as a guide. The volumes in Table 4-2 have been calculated using the glass provided with the unit, available spacers, and subtracting the volume of the spacers and the notch. These are approximate volumes.

Table 4-2. Volumes of gel solution required for gels

Unit/Size	0.5mm spacer	0.8mm spacer	1.5mm spacer
P8-DS/10 x 10	4.2	6.2	12.5
P8DS/10 x 8	3.6	5.4	10.8
P9DS/16 x 14	-	13.5	26.9
P9DS/16 x 16	-	15.0	29.9
P10DS/20 x 20	-	24.6	49.1

Casting the Gel (continued)

2. Transfer the acrylamide gel solution to the assembled cassette (Figure 4-9). Place the comb in the gel. If a stacking layer is desired, pour the stacking acrylamide solution on the top of the gel and then add the comb (Figure 4-10). DO NOT adjust or remove the cassette. Wait a minimum of 15 minutes for gel to polymerize. Repeat for second gel.

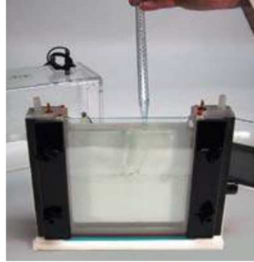


Figure 4-9. Gel to Cassette

Figure 4-10. Add Comb

3. Once the acrylamide has polymerized, place the upper buffer chamber into the lower buffer chamber (Figure 4-11). Slide the upper buffer chamber towards the center of the lower buffer chamber until the UBC pins on the side of the upper buffer chamber slide into the UBC slots of the lower buffer chamber.

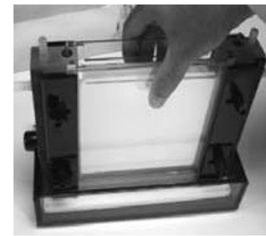


Figure 4-11. Upper into Lower

Note The UBC may be placed in the LBC prior to preparing and pouring the gel solutions. ▲

Section 5 Using the System

Cooling Core

These systems have an integral cooling core. It is needed when running the gels at higher current or when the bioactivity of an enzyme has to be preserved.

Heating of the gel can cause smiling and other problems with the resolution of the protein bands. This is particularly pronounced on larger gels. Running coolant or water is recommended through the cooling core on these units. When ramping up voltage or current, consider at least tap water cooling.

For Optional Cooling

1. Attach a separate piece of 3/8” ID clear flexible lab tubing to each hose barb on the upper buffer chamber marked as “in” and “out”.
2. Attach the tubing on the same side of the unit as the black electrode (“in”) to a cold water tap or recirculator chiller. Water flow should not exceed 2L per minute at 30 psi.
3. Put the drain tube attached to the same side as the red electrode (“out”) into a sink to drain or back to a circulator chiller.
4. Turn on the water. When water has started to circulate through the system, connect the power cords to a power supply and begin the run.

Running the Gel

1. Add running buffer to the upper buffer chamber (see Table 5-1 for volumes) making sure the running buffer is 3mm below the top of the blank glass, ensuring sufficient contact with the top of the gel surface. Be sure that the running buffer is not leaking from the upper buffer chamber to the lower buffer chamber. If buffer is leaking, you will need to drain the UBC and reset the cassettes.

Table 5-1. Maximum Buffer Volumes

Unit	**P8DS**	**P9DS**	**P10DS**
Upper Chamber	170ml	400ml	600ml
Lower Chamber	240ml	300ml	800ml

Running the Gel (continued)

2. Remove combs by gently pulling straight up from the gel. Carefully load samples into the wells formed by the comb.

3. Add buffer to the lower buffer chamber to approximately 2-3mm above the base of the gel using the fill line as a guide. The bottom end of the gel/agarose assembly should be in contact with the running buffer.

4. Set the safety lid onto the unit so that the power supply leads are connected in the proper position (red to red, black to black). See Figure 5-1.

Figure 5-1. Safety Lid

5. Begin the run. Recommended running conditions are listed in Table 5-2.

Table 5-2. Recommended Running Conditions

Unit/Model Number	P8DS	P9DS	P10DS
Current, Constant	15-35mA/gel	15-50 mA/gel	15-75mA/gel
Time Requirements	30-90 min.	60-120 min.	60-180 min.

Running Conditions

Running conditions depend on several parameters:

- Buffer system used
- Whether or not heating would affect subsequent processing of the proteins or gel
- Thickness of the gel
- How fast the gel will be run - for example, set it up in the late afternoon and have the gel done the next morning, or have it done in 45 minutes or less

A guideline for 2nd dimension gels; the range would be 30-80mA constant current.

Example: For an SDS-PAGE gel in the P8DS that is 0.8mm thick and temperatures over 37°C are not an issue, 40mA per gel is appropriate. If the gel were 1.5mm thick, the setting could be 60mA or higher.

Section 6 Finishing Up

After the Gel Run

1. Turn off power supply and water (if using optional cooling).

2. Remove the lid by pushing on the acrylic alignment pins protruding through the safety lid on the top of the unit. Slide and lift the upper buffer chamber from the lower buffer chamber and drain buffer chambers separately.

3. Loosen wing knobs and slide side clamps to remove gel cassettes. The gel(s) are ready for staining and blotting.

4. The agarose plug may be saved and re-melted. Use caution to avoid cross contamination from radioactive or biohazard samples.

Section 7 Technical Tips

Combs

STANDARD

0.5mm (A), 0.8mm (C) and 1.5mm (D) thicknesses

PREPARATIVE

One long well and one marker lane

CUSTOM

Call Technical Services for more information.

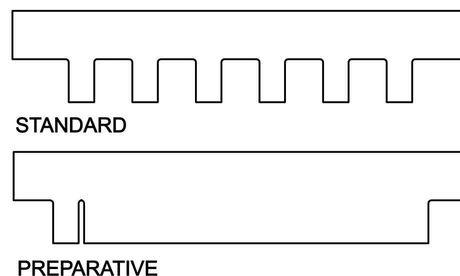


Figure 7-1. Combs

Notched Alumina Plates - For P8DS, (10x10cm) Models Only

Notched Alumina plates can take the place of the notched glass when casting and allows for better heat exchange than glass. This is important when the protein is heat sensitive or if a gel needs to be run a little faster without the negative effects of heating. Heating the gel during the run can cause smiling.

Offset vs. Notched Glass

All units require a blank piece of glass and an offset or notched piece of glass. Offset glass is glass that is about 2cm shorter than the blank piece without "ears" on the sides. Notched glass has two "ears" that are left behind when a cut is made in the middle of the top of the glass. Both offset glass and notched glass allow the gel and samples to make contact with the upper buffer chamber. Offset glass has to be used with sponge tips, which take the place of the notches on the glass. The advantage of offset glass is that this glass is more rigid. Notched glass is easier to use and does not require the addition of sponge tips.

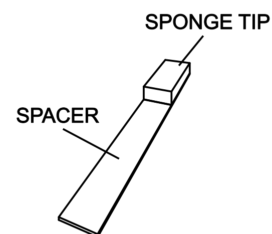


Figure 7-2. Spacer

Glass

BLANK

The plate which faces you during electrophoresis. All gel sandwiches require one piece of blank glass.

NOTCHED

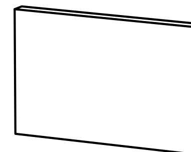
The plate which faces the chamber during electrophoresis. Spacers are placed over the "ears" of the plate when casting vertical gels. Buffer accesses the gel between the ears.

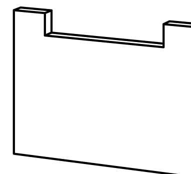
OFFSET

Offset plates may be used in place of notched plates. They require sponge tips mounted on the spacers. Sponge tips take the place of the "ears", and prevent buffer from running out of the upper buffer chamber from the sides.

FROSTED

Frosted plates are used for vertical agarose electrophoresis. One side of the plate has a rough surface to prevent agarose from sliding down.





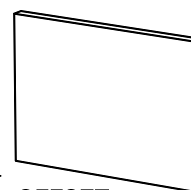


Figure 7-3. Glass

Spacers

STANDARD

Protein spacer sets include two side spacers and one bottom spacer. Spacers and combs must be of identical thickness to be used together.

WEDGE

Linear wedge spacers (0.4 - 0.8mm) provide a current gradient allowing a single percent gel to separate disparate sized DNA fragments.

Reagent Information

RUNNING BUFFER

TGS

Tris - 3.0285g/L

Glycine - 14.4g/L

SDS - 1.0g/L

pH 8.3 (Laemmli, 1970)

q.s. to 1L

Note For Native Protein Electrophoresis, do not add SDS. ▲

Reagent Information (continued)

Table 5-1. Sample Buffer

2X Concentration Stock		/L	/10 mL	Final Concentration With Sample*
2%	SDS	20g	0.2	1%
10%	BME	10mL	0.1	5%
250mM	Tris	6.057g	.0606g	125mM
30%	Glycerol	300 mL	3 mL	15%
0.002%	Bromo Phenol Blue	.02g	.0002g	0.001%

** add sample buffer 1:1 with sample solution.*

Caution 2X Sample Buffer containing 2-mercaptoethanol should be prepared in a fume hood. 0.2M (final concentration) Dithiothreitol (DTT) may be used in place of 2-mercaptoethanol. ▲

Acrylamide Solution

Stock acrylamide solution for table 5-2:

= 29.2g Acrylamide and .8g bis-Acrylamide, q.s. 100mL H2O

Table 5-2. Gel Preparation (SDS-Page continuous buffer system)

% Acrylamide*					
Stock Solution	20.0	15.0	12.5	10.0	5.0
Acrylamide-Bisacrylamide (30:0.8)	20.0	15.0	12.5	10.0	5.0
0.5 M Sodium Phosphate Buffer pH 7.2	6.0	6.0	6.0	6.0	6.0
10% (w/v) SDS	0.3	0.3	0.3	0.3	0.3
Water	2.2	7.2	9.7	12.2	17.2
1.5% (w/v) APS	1.5	1.5	1.5	1.5	1.5
TEMED	0.015	0.015	0.015	0.015	0.015

** The columns represent volumes (ml) of stock solutions required to prepare 30ml of gel mixture.*

Section 8 Troubleshooting

Problem	Cause	Solution
Broad lanes at bottom of gel	Will occur when adjoining lanes are loaded with dissimilar samples.	Normal in gradient gels
Skewed bands	Gel has not polymerized properly at wells	Degas gel solution before casting and increase APS and TEMED concentrations. The comb can be wiped with TEMED just prior to casting to improve polymerization.
	Salt concentration is too high	Dialyze sample or use desalting column
	The upper buffer chamber is leaking either through the gel or along the sides	Check gel to make sure that it is a solid slab inside the glass and check the set-up of the apparatus to ensure a secure seal with the gasket.
Streaked bands	Overloading of sample.	Use less protein or sample when loading
	Sample has precipitated	Centrifuge sample before adding a sample buffer or use a lower % acrylamide gel.
Frowning of outside lanes	Leakage of buffer along sides or along spacers inside the gel assembly	Do not move spacers after polymerization and make sure that gasket is seated firmly against the glass. Always load your samples with an empty lower buffer chamber so that leaks are caught before you begin the run.
Double bands (“doublets”)	Due to reoxidation or insufficient reduction of the sample.	If using a reducing agent, prepare fresh sample buffer every 30 days. Increase the concentration of 2-mercaptoethanol or dithiothreitol in the sample.
Glass cracks when putting gel assembly in unit	Gel is too thin for the clamping system	Use glas appropriate for the unit. If this is not possible, use an extra piece of blank glass to take up the space. If the clamps are used with their flat side against the glass, thinner glass may often be used.
	Gasket is old or flattened making it impossible to make a good seal.	Wash gasket after each use to remove salts. If gasket is old and has lost its flexibility, it may need to be replaced. If unit has been previously overtightened, the gasket need to be removed and reseated. A cracked and dry gel often is an indicator of overheating.

Problem	Cause	Solution
Longer run time	Buffer is too diluted	Check buffer recipe; remake buffer and try again. See if voltage produced by the current you are running is the same. If it differs significantly, your buffer may not have made up correctly.
	Upper buffer chamber is leaking	Make sure the gel assembly is seated firmly against the gasket. Remove gasket, wash in warm water to remove excess salts, and place the gasket back in the groove. If the clamps have been overtightened in the past, the gasket can be pushed too far into the gasket groove and will not make a good seal.
	Running at too low a current	Use running conditions as stated in Table 5-2. When running at constant current, the current value is per gel.
Running too fast	Buffers are too concentrated	Check buffer recipe; remake and try again. If voltage is lower than usual when running at constant current, the buffer is probably too diluted.
	Voltage or current set too high	Turn down current setting
Smiling of dye front	Center of gel is running hotter that the ends	Use coolant or cold tap water in cooling core.
		Turn down current setting
Bands spreading outward	Diffusion of sample when loading	Make sure that the samples are loaded quickly and the power is applied as soon as possible after loading.
	Diffusion of sample during run in stacking gel	Increase % of stacking gel or increase current by 25% when stacking
	Lower ionic strength of sample	Match the ionic strength of the sample with that of the gel.
Bands are narrower than sample wells	Ionic strength of sample is higher than that of gel	Desalt the sample or use sample buffer of the same strength as the gel

Section 9 Care and Cleaning

Warning Organic solvents cause acrylic to “craze” or crack. Clean all Owl acrylic systems with warm water and a mild detergent. Do not use ethanol or other organic solvents to clean these products. Do not autoclave, bake, or microwave your unit. Temperatures over 50°C can do damage to the acrylic. ▲

Note If an RNase free electrophoresis system is desired, there are various methods to rid the system of RNA contamination. For fast and easy decontamination, use RNase AWAY®*. Spray, wipe or soak labware with RNase Away then wipe or rinse the surface clean; it instantly eliminates RNase. RNase Away eliminates the old methods that include treatment with 0.1% Diethyl Pyrocarbonate (DEPC) treated water and soaking in dilute bleach. DEPC is suspected to be a carcinogen and should be handled with care. This electrophoresis system should never be autoclaved, baked, or placed in a microwave. ▲

To order RNase AWAY®, contact Technical Services:

<u>Part Number</u>

21-236-21 . . . . .250ml bottle
21-402-178 . . . . .475ml spray bottle
14-375-35 . . . . .1 liter bottle
14-754-34 . . . . .4 liter bottle

**Rnase AWAY® is a registered trademark of Molecular BioProducts*

Care of Acrylic

The following chemical compatibility chart is supplied for the convenience of our customers. Although acrylic is compatible with most solvents and solutions found in the biochemical laboratory, some solvents can cause substantial damage. Keep this chart handy to avoid harm to your apparatus by the use of an inappropriate solvent.

Codes:

S - Safe (no effect, except possibly some staining)

A - Attacked (slight attack by, or absorption of, the liquid)
(slight crazing or swelling, but acrylic has retained most of its strength)

U - Unsatisfactory (softened, swollen, slowly dissolved)

D - Dissolved (in seven days, or less)

Table 9-1. Chemical Compatibility for Acrylic-Based Products

Chemical	Code	Chemical	Code	Chemical	Code
Acetic acid (5%)	S	Ethyl alcohol (50%)	A	Naptha	S
Acetic acid (Glacial)	D	Ethyl alcohol (95%)	U	Nitric acid (10%)	S
Acetic Anhydride	A	Ethylene dichloride	D	Nitric acid (40%)	A
Acetone	D	Ethylene glycol	S	Nitric acid concentrate	U
Ammonia	S	2-Ethylhexyl Sebacate	S	Oleic acid	S
Ammonium Chloride (saturated)	S	Formaldehyde (40%)	S	Olive oil	S
Ammonium Hydroxide (10%)	S	Gasoline, regular, leaded	S	Phenol 5% solution	U
Hydroxide (10%)	S	Glycerine Heptane (commercial grade)	S	Soap solution (Ivory)	S
Ammonium Hydroxide concentrate	S	Hexane	S	Sodium carbonate (2%)	S
Aniline	D	Hydrochloric acid (10%)	S	Sodium carbonate (20%)	S
Benzene	D	Hydrochloric acid concentrate	S	Sodium chloride (10%)	S
Butyl Acetate	D	Hydro uoric acid (40%)	U	Sodium hydroxide (1%)	S
Calcium chloride (saturated)	S	Hydrogen peroxide (3% solution)	S	Sodium hydroxide (10%)	S
Carbon tetrachloride	U	Hydrogen peroxide (28% solution)	U	Sodium hydroxide (60%)	S
Chloroform	D	Isooctane	S	Sodium hydrochlorite (5%)	S
Chromic acid (40%)	U	Isopropyl alcohol (100%)	A	Sulfuric acid (3%)	S
Citric acid (10%)	S	Kerosene (no. 2 fuel oil)	S	Sulfuric acid (30%)	S
Cottonseed oil (edible)	S	Lacquer thinner	D	Sulfuric acid concentrate	U
Detergent Solution (Heavy Duty)	S	Methyl alcohol (50%)	A	Toluene	D
Diesel oil	S	Methyl alcohol (100%)	U	Trichloroethylene	D
Diethyl ether	U	Methyl Ethyl Ketone	U	Turpentine	S
Dimethyl formamide	U	Methylene chloride	D	Water (distilled)	S
Dioctyl phthalate	A	Mineral oil (white)	S	Xylene	D
Ethyl acetate	D				

This list does not include all possible chemical incompatibilities and safe compounds. Acrylic products should be cleaned with warm water, a mild detergent such as Alconox™, and can also be exposed to a mild bleach solution (10:1). In addition, RNAse removal products are also safe for acrylic.

Section 10 Optional Equipment

Table 10-1. Comb Options

Model P8DS					
Catalog Number	**Comb Type**	**Number of Teeth**	**Thickness of Tooth (mm)**	**Width of Teeth (mm)**	**EST Well Volume (ul)**
MP-6A	Well	6	0.5	11.1	89
MP-6C	Well	6	0.8	11.1	142
MP-6D	Well	6	1.5	11.1	266
MP-8A	Well	8	0.5	7.7	62
MP-8C	Well	8	0.8	7.7	99
MP-8D	Well	8	1.5	7.7	185
MP-10A	Well	10	0.5	5.7	46
MP-10C	Well	10	0.8	5.7	73
MP-10D	Well	10	1.5	5.6	134
MP-12A	Well	12	0.5	4.3	34
MP-12C	Well	12	0.8	4.3	55
MP-12D	Well	12	1.5	4.3	103
MP-15A	Well	15	0.5	2.9	23
MP-20A	Well	20	0.5	1.6	13
XCM	Custom		0.5, 0.8		

Table 10-2. Comb Options (continued)

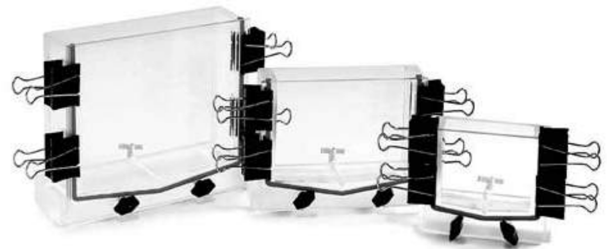
Model P9DS					
Catalog Number	**Comb Type**	**Number of Teeth**	**Thickness of Tooth (mm)**	**Width of Teeth (mm)**	**EST Well Volume (ul)**
P1-10C	Well	10	0.8	10.4	183
P1-10D	Well	10	1.5	10.4	343
P1-15C	Well	15	0.8	6.1	107
P1-15D	Well	15	1.5	6.1	201
P1-20C	Well	20	0.8	3.9	69
P1-20D	Well	20	1.5	3.9	129
P1-24C	Well	24	0.8	2.9	51
P1-24D	Well	24	1.5	2.9	96
P1-PREP	Prep	2	1.5	119.7/4.7	3630/152
XCM	Custom		0.5, 0.8, 1.5, 2.0, 3.0		

Table 10-3. Comb Options (continued)

Model P10DS					
Catalog Number	**Comb Type**	**Number of Teeth**	**Thickness of Tooth (mm)**	**Width of Teeth (mm)**	**EST Well Volume (ul)**
P2-10C	Well	10	0.8	13.6	239
P2-10D	Well	10	1.5	13.6	449
P2-15C	Well	15	0.8	8.2	144
P2-15D	Well	15	1.5	8.2	271
P2-20C	Well	20	0.8	5.5	97
P2-20D	Well	20	1.5	5.5	182
P2-25C	Well	25	0.8	3.9	69
P2-25D	Well	25	1.5	3.9	129
P2-PREP	Prep	2	1.5	148.1/4.7	4885/155
XCM	Custom		0.5, 0.8, 1.5, 2.0, 3.0		

MULTIPLE GRADIENT CASTER

The Multiple Gradient Caster System features an easy-to-use casting base and specially designed spacer plates for quick casting of high quality linear or gradient gels. Using the acrylic and foam spacer plates allows you to cast from one to five gels simultaneously. A silicone gasket provides a leak proof seal and the casting port allows the casting of gradient gels from the base of the caster.



Model	P7-CST	P1-CST	P2-CST
Gel Size	10cmWX 10cmL	16cmW x 14cmL	20cmW x 20cmL

GEL CASTER

The patented Gel Casting System provides a simple method of casting acrylamide gels without taping or special sealing of the gel plates. Plastic pouches hold glass plates and spacers snugly together in the casting stand while pouring. These pouches meet specific measurement tolerances to allow for a tight fit around glass plates. Gels may be cast ahead of time and sealed inside the plastic pouch, creating your own pre-cast gels. Up to four gels may be cast at one time using this caster.

Model	JGC-4	JGC-2	JGC-3
Gel Size	10cmWX 10cmL	16cmW x 14cmL	20cmW x 20cmL

Table 10-4. Replacement Parts

Description	P8DS	P9DS	P10DS
Power Supply Leads	PSL-5	PSL-5	PSL-5
Clamp Assemblies	P8-CL	P9-CL	P10-CL
Replacement Gaskets	R12009	P9-GK	P10-GK
Blank glass plates 3/32" Thick	P8DS, 10cmW x 10cmL	N/A	N/A
Blank glass plates 3/16" Thick	N/A	N/A	P2-20G, 20cmW x 20cmL
Blank glass plates 1/8" Thick	N/A	P1-14G, 16cmW X 14cmL	P10-20G, 20cmW x 20cmL
Notched glass plates 3/32" Thick	P7-10R, 10cmW x 10cmL	N/A	N/A
Notched glass plates 3/16" Thick	N/A	N/A	P2-20R, 20cmW x 20cmL
Notched glass plates 1/8" Thick	N/A	P1-14R, 16cmW x 14cmL	P10-20R, 20cmW x 20cmL
Frosted Notched glass plates 3/32" Thick	P7-10FR, 10cmW x 10cmL	N/A	N/A
Frosted Notched glass plates 3/16" Thick	N/A	N/A	P2-20FR, 20cmW x 20cmL
Frosted Notched glass plates 1/8" Thick	N/A	P1-14FR, 16cmW x 14cmL	N/A
Frosted Blank Glass Plates 3/32" Thick	P7-10FG, 10cmW x 10cmL	N/A	N/A
Frosted Blank Glass Plates 3/16" Thick	N/A	N/A	P2-20FG, 20cmW x 20cmL
Frosted Blank Glass Plates 1/8" Thick	N/A	P1-14FG, 16cmW x 14cmL	N/A
Offset Glass 3/16" Thick	N/A	N/A	P2-18G, 20cmW x 18cmL
Offset Glass 1/8" Thick	N/A	P1-12G, 16cmW x 14cmL	P10-18G, 20cmW x 18cmL
Notched Alumina Plates 1.0mm Thick	P7-10RA, 10cmW x 10cmL	N/A	N/A
Spacers, 0.5mm Thick	P7-SA	N/A	N/A
Spacers, 0.8mm Thick	P7-SC	P1-SC	P2-SC
Spacers, 1.5mm Thick	P7-SD	P1-SD	P2-SD
Blocking Plate for Single Gel Operation	P8DS-016	P9DS-006	P10DS-006
Spacer Placer (pkg of 3)	JG4-PL	JG2-PL	JG3-PL

RELATED PRODUCTS

- Semi-dry Electroblotter
- Tank Style Electroblotter
- Silver Stain
- Single Sided Vertical Gel Electrophoresis System
- Powdered Buffers

THERMO FISHER SCIENTIFIC OWL PRODUCTS WARRANTY USA

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner.

During the first thirty-six (36) months, component parts proven to be non-conforming in material or workmanship will be replaced at Thermo's expense, including labor. Installation, calibration and certification is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters and gaskets are excluded from this warranty.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages to lost profits or loss of products.

Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-800-438-4851 (USA and Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contract your local distributor for warranty information.

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THERMO FISHER SCIENTIFIC OWL PRODUCTS WARRANTY INTERNATIONAL

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During the first thirty six (36) months, component parts proven to be non-conforming in material or workmanship will be replaced at Thermo's expense, excepting labor. Installation, calibration and certification is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to performance of any repairs. Expendable items, glass, filters and gaskets are excluded from this warranty.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original warranty period. The Technical Services Department must give prior approval for return of any component or equipment. At Thermo's option, all non-conforming parts must be returned to Thermo postage paid and replacement parts are shipped FOB destination.

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Your local Thermo Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-800-438-4851 (USA or Canada) or 1-740-373-4763. We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contract your local distributor for warranty information.

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