EHS34xx/3500/36xx

ExpressCast™ Horizontal Systems

MANUAL

EHS3400 - EHS3410
EHS3500
EHS3600 – EHS3610
EHS3620 – EHS3660

Rev. 12/2018

This manual applies to the following Consort ExpressCast Horizontal Electrophoresis Systems:

EHS3400 - EHS3410 - EHS3500 - EHS3600 – EHS3610 – EHS3620 – EHS3660

WARNING

THESE UNITS ARE CAPABLE OF DELIVERING POTENTIALLY LETHAL VOLTAGE WHEN CONNECTED TO A POWER SUPPLY AND ARE TO BE OPERATED ONLY BY QUALIFIED TECHNICALLY TRAINED PERSONNEL.

PLEASE READ THE **ENTIRE** OPERATOR'S MANUAL THOROUGHLY BEFORE OPERATING THIS UNIT.

Consort is not responsible for any injury or damage caused by operating this electrophoresis system in a manner not specified in this manual.

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Warranty

Consort guarantees that the horizontal electrophoresis system you have received has been thoroughly tested and meets its published specification.

Immediately upon arrival, please check carefully to see that the unit has been received complete and has not been damaged in shipping. Please refer to the System Lists in this manual to confirm that the unit has been received with all the accessories. To report any kind of damage, please notify Consort or your Consort distributor. Please retain all packing materials until the delivery has been completely checked, this will speed the return of goods if required and reduce environmental impact.

This guarantee is valid for 36 months only if the product and functions have been used according to the user manual. No Liability is accepted for loss or damage arising from incorrect use. **Consort's** liability is limited to the repair or replacement of the unit or refund of the purchase price, at **Consort's** option. **Consort** is not liable for any consequential damages.

Consort reserves the right to alter the specification of the Horizontal Electrophoresis Systems without prior notice. This will enable us to implement developments as soon as they arise.

Safety precautions

Please, read the User Manual carefully before using the Horizontal Gel Electrophoresis Unit. This manual contains important operating and safety information. Our electrophoresis units are designed to perform flawlessly for years in the most demanding laboratories. Please take the time to read the manual to ensure that you understand the safety and operating instructions. Alterations could cause serious injury to the user or the system.

Power to the unit is supplied by an external power supply. The power supply must meet safety standards for IEC 1010-1 regulations and must be ground isolated and incorporate a no load detecting circuit.

- Power is supplied to the gel through the lid of the system. Users should not attempt to operate this unit without the safety lid in place. **Always** isolate the units from their power supply before removing the safety lid.
- **Always** disconnect the unit from the power supply to avoid the risk of personal shock. Isolate the power supply from the main power source **FIRST** then disconnected the power cords.
- Running Conditions should not exceed the maximum operating voltage or current.
- Do not fill the units with transfer buffer above the maximum fill line.
- **Always** disconnect the unit from the power supply when you want to move the unit or add running buffer.
- Use this apparatus only for its intended purpose as described in this manual. Do not use this product if the power cords are damaged or if any of its surfaces are cracked.

Environmental conditions for use

- This unit is intended for indoor use only
- This unit can be operated safely at an altitude of 2,000 m
- The normal operating temperature range is between 4ºC and 65ºC
- Maximum relative humidity 80% for temperatures up to 31ºC decreasing linearly to 50% relative humidity at 40ºC

General Care & Cleaning

- Before using, clean and dry unit with **DISTILLED WATER ONLY**; dry parts with clean tissues or air dry. Use care when cleaning or drying the unit near the platinum wire. The connectors should be clean and dry before usage or storage.
- Do **not** use abrasive creams or scourers.
- Do **not** use cleaning brushes in the electrode area
- A thorough rinse with Distilled Water is all that is generally required to clean the unit after use. A mild detergent may also be used. Acrylic can also be exposed to a mild bleach solution (10:1).

WARNING!

Acrylic is not resistant to aromatic or halogenated hydrocarbons, ketones or esters. Organic solvents cause acrylic to "craze" or crack. Do not use ethanol or other organic solvents to clean your unit. Do not autoclave, bake or microwave your unit.

Please refer to the Chemical Compatibility Chart at the end of the manual for our most complete assessment of Laboratory Chemicals and their effect on acrylic.

Introduction

ExpressCast™ Horizontal Gel Horizontal Gel Systems

Consort's ExpressCast™ Horizontal Gel Systems have increased capacity and are ideally suited for labs with large sample sets of DNA or RNA, or labs that need to clearly resolve samples containing a large number of fragments. Screen up to 600 samples per run. All units incorporate our tape-free gel casting to expedite gel preparation. These systems are manufactured of the finest materials and include innovative design features that make them an essential tool in the life science research lab. These systems exhibit the quality manufacturing that characterize the Consort product offering and will perform flawlessly for years.

Consort also offer a wide variety of standard, multi-channel compatible, preparative combs, plus wall combs for running shorter gels.

Specifications

Model	EHS3400	EHS3410	EHS3500	EHS3600	EHS3610 EHS3660	EHS3620
System Dimensions	21cmW x 26cmL x 9.5cmH	25.5cmW x 37.5cmL x 10.5cmH	29cmW x 37.5cmL x 10.5cmH	32cmW x 26cmL x 10.5cmH	32cmW x 37.5cmL x 10.5cmH	32cmW x 53cmL x 10.5cmH
Buffer Circulation Port	No	No	No	No	EHS3660 only	No
Gel Size	15cm W x 15cmL	15cmW x 25cmL	20cm W x 25cmL	23.5cm W x 14cm L	23.5cm W x 25cm L	23.5cm W x 40cm L
Comb Slots	6	6	6	6	14	12
UVT Gel Tray	Runs 1, 2, 3 or 4 equal length gels	Runs 1, 2, 3 or 4 equal length gels	Runs 1, 2, 3 or 4 equal length gels	Runs 1, 2, 3 or 4 equal length gels	Runs 1, 2, 3, 4, 5, or 10 equal length gels	Runs 1, 2, 3, 4, 6, or 12 equal length gels
Run lengths	3.5, 5, 7.5, 14 cm	5.5, 7.5, 11.4, 23.2 cm	5.5, 7.5, 11.4, 23.2 cm	5.5, 7.5, 11.5, 14 cm	2, 4.4, 5.5, 7.5, 11.4, 23.2 cm	6, 6.3, 8.9, 12.9, 19.5, 35 cm
Agarose Capacity (0.5cm T)	112 ml	190 ml	250 ml	161 ml	294 ml	460 ml
Max. Sample Capacity	160	160	168	200	500	600
Max. Sample Run, Full Length	40	40	42	50	50	50
Buffer Volume	1020ml	1800ml	2300ml	1700ml	3000ml	4500ml
Voltage	20-250V	20-250V	20-250V	20-250V	20-250V	20-250V
Current	1-150mA	1-150mA	1-150mA	1-150mA	1-150mA	1-150mA
Time required	60-120 min	60-120 min	60-240 min	60-120 min	60-240 min	60-360 min
Safety Lid with attached Power Cords	1	1	1	1	1	1

General instructions

Setting Up

1. Remove the lid from the gel box by holding the front of the buffer chamber with one hand and pulling the lid off by holding the centre of the back of the lid. The cover is attached to the back of the unit at the connection of the power cords to the banana plugs located on the unit.

2. Slide the gasketed end gates into the outermost grooves on either side of the gel tray. The end gates should be inserted tightly into the grooves with the gasket side facing out. Place the sealed gel tray into the buffer chamber and level the system by using the integrated three-point adjustable levelling platform.

3. When preparing the gel, use electrophoresis-grade agarose and compatible electrophoresis buffer. The gel may be prepared in various ways. The percentage of agarose and the buffer used is determined by the size of the samples to be separated and further recovery of the samples. Refer to the Agarose Preparation Table in the Appendix for type and quantity of agarose needed, (be sure to reference the manufacturer's instructions for any specific requirements for the agarose being used).

4. Weigh out the appropriate amount of agarose and empty it into an Erlenmeyer flask. Add buffer to the flask. TBE or TAE buffer are the most widely used buffer choices for DNA separations, (see Appendix for Buffer Formulations). The agarose and buffer are mixed and heated over a heat by stirring or in a microwave oven until the agarose is completely dissolved.

   Important
   To avoid damage to the UVT gel tray, always cool agarose to 60ºC before pouring into the tray. Any bubbles that form while pouring may be popped with a small glass pipette or the edge of a comb tooth. Place comb(s) into the comb slot(s) in the gel tray, being careful not to create bubbles along the teeth of the comb. Allow the gel to solidify for 30 minutes. If numerous gels are to be run in one day, a large volume of gel may be prepared and placed in a covered bottle and stored between 40-60º C in a water bath. This provides a ready gel supply in a warm liquid form that will solidify quickly when gels are cast.

5. The gel may be stained during or following the run with a variety of stains for the photo documentation of samples. The most common stain for DNA is ethidium bromide. Ethidium bromide solution may be added directly to the agarose gel and running buffer to visualize and photograph the separated fragments following the gel run, eliminating the need for an additional staining step. To use this method, add ethidium bromide solution to the gel (after heating) and to the running buffer in a concentration of 0.5µl/ml.

   Important
   Ethidium Bromide is a mutagen and can cause serious skin and eye irritation. Always wear gloves when handling.

Operation

1. Once the gel has solidified, carefully remove the end gates to expose the open ends of the agarose to the buffer. **Be sure the gel tray is placed in the proper orientation; the first comb slot should be closest to the cathode (black) electrode.** The banana plugs have been sealed against corrosion with color-coded sealant to ensure proper orientation.

2. Pour enough compatible running buffer into the unit to fill the chamber and completely cover and submerge the gel. The level of buffer should cover the gel by at least 2-3 mm. A 'Fill Line' is located on each unit to clearly mark the correct buffer level. See 'System Overview' for approximate buffer volumes needed for your unit. Too little buffer may cause the gel to dry out during the run, while excess buffer may slow DNA migration in the gel.

   Carefully remove the comb(s) by tapping lightly to loosen, and slowly lifting straight up out of the gel tray to avoid damage to the wells. **If you are using a high percentage agarose gel it is especially important to cover the gel with buffer before attempting to remove the comb.**

3. Load prepared samples into the wells. Samples should be mixed with an appropriate volume of 10X sample loading buffer (giving weight to the samples so that they drop evenly into the wells) and contain tracking dye to monitor the gel run.

4. To load samples, angle pipette tip into the well and slowly underlay into the well. Take care not to push pipette tip through the bottom of the sample well as this will result in significant well-to-well leakage of samples.

   NOTE
   It is wise to always run a sample lane of a known 'standard ladder' to determine concentration and size of separated fragments after the gel run, and to aid in photo documentation and analysis.

5. Carefully slide the lid with the attached power cords onto the unit. This will connect the power cords to the banana plugs to complete the circuit. Plug the other end of the cords into the appropriate power supply.

   Confirm the proper orientation of the electrical field. Remember that nucleic acids are negatively charged in alkaline to neutral surroundings and therefore will migrate to the positively charged anode. In general the colour coding for the positively electrode is red.

6. Turn on the power supply and set to the appropriate voltage level and begin electrophoresis. **Recommended running conditions are 5 volts/cm of inter-electrode distance.**

Note that in 0.5 x TBE gels, bromophenol blue co-migrates at 300 bp and xylene cyanol at 4 kbp with DNA fragments.

Visualization

1. When the gel run is completed; the tracking dye has migrated as far through the gel as desired or to 5mm from the end of the gel, turn off the power supply and detach the power cords from the power supply. Remove the lid of the chamber and carefully remove the tray containing the gel. The UV transparent gel tray makes visualization and photography with a UV light.

2. Stain the gel with Ethidium Bromide solution or other suitable stain for agarose gels.

   Important
   Ethidium Bromide is a mutagen and can cause serious skin and eye irritation. Always wear gloves when handling.

3. Ethidium Bromide Staining: Once electrophoresis has been completed, prepare 200ml of staining solution. Add 10µl of 10mg/ml ethidium bromide solution to 200ml de-ionized water. Soak the gel for 15 minutes with gentle shaking and then de-stain in fresh de-ionized water for 15 minutes. The gel may then be viewed using a transilluminator.

Cleaning

It is important to rinse the gel tank with de-ionized water after every use to keep it clean. Use a mild detergent to get rid of any debris. It is recommended to allow the tank to air dry rather than drying with a towel to avoid damage to the electrode wires.

Warning!

Do not use ethanol or other organic solvents to clean acrylic products. Organic solvents cause acrylic to 'craze' or crack. See list of laboratory chemicals and compounds and their compatibility with acrylic in the Appendix.

Preparation & Properties of TAE and TBE Buffer Systems

These buffers are used because they both have a basic pH that gives the phosphate group of the DNA a net negative charge allowing migration of the DNA toward the positive (red) anode in the gel unit. Electrophoresis Buffers supply the ions necessary for electrophoresis and establishing a certain pH value in which the target molecule adapts to its required electric charge. Nucleic acids for example will be negatively charged in an alkaline to neutral surrounding. Additionally, electrophoresis buffers often contain reagents which protect the target molecule from degradation (e.g. EDTA complexes bivalent cations and therefore inhibits DNases). If electrophoresis under denaturing conditions is desired (like for the electrophoresis of RNA), electrophoresis buffers will additionally contain reagents that eliminate the formation of secondary structures.

You will find recipes below for TAE and TBE, two of the most commonly used buffers for the electrophoresis of DNA. If the intention is to eventually isolate DNA from the gel, TAE buffer should be chosen. In comparison to TBE, migration will be faster and a better resolution of supercoiled DNA will be achieved when using TAE. However, because of TAE's limited buffering capacity, TBE should be selected for performing extended electrophoresis separations and if the electrophoresis chamber does not have a system for buffer recirculation. Since agarose tends to create finer pore sizes and a more solid matrix in TBE, diffusion of DNA will be reduced and a more discrete band pattern will be achieved.

TAE – Tris-Acetate with EDTA (40mM Tris-Base, 40mM Acetic Acid, 1mM EDTA)

50X Stock Solution, pH 8.5	1X Working Solution
242g Tris-Base	40mM Tris Acetate
57.1 ml Glacial Acetic Acid	
100 ml 0.5M EDTA (pH 8.0)	1mM EDTA
Distilled Water to 1 Liter Final Volume	

TBE – Tris-Borate with EDTA (89mM Tris-Base, 89mM Boric Acid, 1 mM EDTA)

10X Stock Solution	1X Working Solution
108g Tris-Base	89mM Tris-Base
55g Boric Acid	89mM Boric Acid
20 ml 0.5 M EDTA (pH 8.0)	1mM EDTA
Distilled Water to 1 Liter Volume	
DO NOT ADJUST pH	

Suggested Uses & Comments

TAE BUFFER

- Use when DNA is to be recovered (i.e. by low melting agarose gels)
- Use for electrophoresis of large (≥20kb) DNA fragments
- Applications requiring high resolution
- Under conditions with low ionic strength and low buffering capacity, re-circulation may be necessary for long runs (≥4 hours)

TBE BUFFER

- General Purpose Buffer
- Can be re-used
- Use for electrophoresis of small (≤1kb) DNA fragments
- Decreased DNA mobility
- High ionic strength and high buffering capacity, no re-circulation needed for extended run times
- TBE Buffer reacts with the agarose making smaller pores and a tighter matrix. This reduces broadening of the DNA bands for sharper resolutions.

Agarose to prepare

Amount

Gel volume is determined by the following formula:

gel width(cm) x gel length(cm) x gel thickness(cm) = ml of agarose

Gel Width (cm)	Gel Length (cm)	Gel Thickness (cm)	Gel Volume(ml)
13	25	0.25	81
13	25	0.50	163
13	25	0.75	244
15	25	0.25	94
15	25	0.50	187
15	25	0.75	281
20	25	0.25	125
20	25	0.50	250
20	25	0.75	375
23.5	25	0.25	147
23.5	25	0.50	294
23.5	25	0.75	441
23.5	40	0.25	235
23.5	40	0.50	470
23.5	40	0.75	705

Agarose percentage and separation of DNA fragments

The optimal range of DNA fragment sizes separated by any electrophoresis experiment is dependent on the agarose concentration of the gel. The higher the agarose concentration, the better small fragments are separated from each other and vice versa. However, for the smallest or largest fragment lengths, the usage of specialized agaroses or polyacrylamide gels should be considered (see table below) since a 3% agarose solution solidifies rapidly and a 0.3% agarose gel is very soft and difficult to handle.

Agarose content (w/v)	Agarose (g)	Buffer (ml)	Optimal Separation Range (kb)
0.3 %	0.3	100	5-30
0.5 %	0.5	100	1-15
0.7 %	0.7	100	0.8-10
1.0 %	1.0	100	0.5-7
1.2 %	1.2	100	0.3-6
1.5 %	1.5	100	0.2-4
2.0 %	2.0	100	0.1-3
3.0 %	3.0	100	≤0.1

Ethidium Bromide

For photo documentation of samples, the gel may be stained during or following the run with a variety of stains. The most common stain for DNA is ethidium bromide. Ethidium bromide may be added directly to the gel and running buffer to visualize and photograph the separated fragments following the gel run without the need for an additional staining step. The ethidium bromide is added to both the gel (after heating) and the electrophoresis buffer at a concentration of 0.5μg/ml. Conversely, the gel may be stained in a concentrated ethidium bromide solution after the gel run and rinsed for visualization.

Note

Ethidium bromide is a potential carcinogen. Care in handling the powder and stock solution must be taken. Always wear gloves when handling the powder, solutions and all gels that contain ethidium bromide.

Loading Buffer/Sample buffer

Samples are prepared and combined with gel loading buffer before being loaded into the prepared gel. Sample buffers usually contain similar components to the running buffer, dyes for visibility, and glycerol to provide weight to the samples. This increased sample density and colour allows easy visualization of the samples and ensures samples load evenly into the wells and do not float out during loading. Dyes also migrate toward the anode end of the electrophoresis chamber at predictable rates allowing the gel run to be monitored. In 0.5 x TBE gels, bromophenol blue migrates at the same rate as 300 bp DNA fragments and xylene cyanol approximately at the same rate as 4 kbp DNA fragments.
The most commonly used loading buffer is glycerol, bromophenol blue, and xylene cyanol

6 X DNA sample buffer

0.25% (w/v) bromophenol blue
0.25% (w/v) xylene cyanol FF
30% (v/v) glycerol in water

Molecular weight marker

Markers are run on each gel to monitor the quality of sample separation and to enable a size estimation of specific bands. By running a known marker of a specific concentration in parallel, the DNA amount of the unknown samples can be estimated.

Technical Tips

Running a Standard Ladder

It is recommended to always run a sample lane of a known "standard Ladder" or "marker" to determine concentration and size of separated fragments after the gel run, and to aid in the photo-documentation and analysis.

Loading Samples

It is sometimes easier to load the sample wells dry before placing buffer into the buffer chamber. After the gel solidifies, if cast in the buffer chamber, remove the gel tray from the buffer chamber and place the tray on the lab bench. Carefully remove the sample combs by tapping and lifting straight up. Samples mixed with loading buffer that does not contain dye may be easier to load dry, especially in larger gel units to avoid cross contamination. After loading all the sample lanes, place the gel tray into the buffer chamber in the running position with the end gates removed and slowly fill the chamber with buffer using the Fill Line on the side of the chamber as a guide.

Comb Options

The combs are heavy duty and hand fabricated into one piece. The middle piece is machined from polycarbonate. Acrylic spines are secured to both sides of the comb for balance and rigidity. Our combs do not require set-up, screws, or any other miscellaneous parts. The fixed height, all-in-one comb drops into a precision-cut comb slot. The resulting sample wells are pre-set for consistency and accuracy. All combs are available in 1.0 mm and 1.5mm thicknesses standard.

Micro-titre Format

Micro-titre format combs are designed for use with multi-channel pipettes loading from a 96-well multi-channel plate. The multi-channel pipette is set so that the pipette tips are 9mm apart. A researcher can take up 4, 8 or 12 samples simultaneously from the plate. When the distance between the centre of one tooth to the centre of the next is 9 mm the comb is a 1X comb, when the distance is 4.5 mm, the comb is a 2X comb. When loading a 2X comb you fill every other well. Sample loading Guides are available for improved reliability when loading micro-titre format combs.

Combs

Comb Loading Volume

Comb loading volumes are calculated as 75% of the total well volume. The placement of the comb leaves 0.2 cm of agarose under the sample well. So that a 0.5 cm thick gel will have a sample well that is 0.3 cm deep.

Loading volume is calculated as:

Thickness of Tooth x Width of Tooth x Depth of Sample Well (Gel Thickness – 0.2 cm) x 0.75

Comb specifications

For 15 cm gel width: EHS3400 – EHS3410

Catalogue Number	Teeth	Thickness	Width	0.25 cm	0.5 cm	0.75 cm	1.0 cm
EHS3400-C10-1.0	10	1.0 mm	13.5 mm		30 µl	56 µl	
EHS3400-CMT17-1.0	17	1.0 mm	7.2 mm		16 µl	30 µl	
EHS3400-C20-1.0	20	1.0 mm	5.9 mm		13 µl	24 µl	
EHS3400-CMT34-1.0	34	1.0 mm	2.7 mm		6 µl	11 µl	
EHS3400-C40-1.0	40	1.0 mm	2.0 mm		5 µl	8 µl	
EHS3400-C10-1.5	10	1.5 mm	13.5 mm		46 µl	84 µl	
EHS3400-CMT17-1.5	17	1.5 mm	7.2 mm		24 µl	45 µl	
EHS3400-C20-1.5	20	1.5 mm	5.9 mm		20 µl	37 µl	
EHS3400-CMT34-1.5	34	1.5 mm	2.7 mm		9 µl	17 µl	
EHS3400-C40-1.5	40	1.5 mm	2.0 mm		7 µl	12 µl	

For 20 cm gel width: EHS3500

Catalogue Number	#	Thickness	Width	0.25 cm	0.5 cm	0.75 cm	1.0 cm
EHS3500-C8-1.0	8	1.0	22.7	8.5	51	94	136
EHS3500-C12-1.0	12	1.0	14.5	5.4	33	60	87
EHS3500-C16-1.0	16	1.0	10.4	3.9	23	43	62
EHS3500-CMT18-1.0	18	1.0	7.2	2.7	16	30	43
EHS3500-C20-1.0	20	1.0	8.0	3.0	18	33	48
EHS3500-CMT-21-1.0	21	1.0	7.2	2.7	16	30	43
EHS3500-C24-1.0	24	1.0	6.4	2.4	14	26	38
EHS3500-C28-1.0	28	1.0	5.2	1.9	12	21	31
EHS3500-C32-1.0	32	1.0	4.3	1.6	10	18	26
EHS3500-C36-1.0	36	1.0	3.7	1.3	8	15	22
EHS3500-CMT42-1.0	42	1.0	2.7	1.0	6	11	16
EHS3500-C8-1.5	8	1.5	22.7	12.7	77	140	204
EHS3500-C12-1.5	12	1.5	14.5	8.1	49	90	131
EHS3500-C16-1.5	16	1.5	10.4	5.8	35	64	94
EHS3500-CMT18-1.5	18	1.5	7.2	4.0	24	45	65
EHS3500-C20-1.5	20	1.5	8.0	4.5	27	50	72
EHS3500-CMT-21-1.5	21	1.5	7.2	4.0	24	45	65
EHS3500-C24-1.5	24	1.5	6.4	3.6	22	40	58
EHS3500-C28-1.5	28	1.5	5.2	2.9	18	32	47
EHS3500-C32-1.5	32	1.5	4.3	2.4	15	27	39
EHS3500-C36-1.5	36	1.5	3.7	2.0	13	23	33
EHS3500-CMT42-1.5	42	1.5	2.7	1.5	9	17	24

For 23.5 cm gel width: EHS3600 – EHS3610 – EHS3620 – EHS3660

	Teeth (Dimensions in mm)			**Recommended loading Volume (µl)/gel thickness**			
Catalogue Number	#	Thickness	Width	0.25 cm	0.50 cm	0.75 cm	1.0 cm
EHS3600-CMT25-1.0	25	1.0	7.2	2.7	16	30	43
EHS3600-CMT26-1.0	26	1.0	7.2/3.0	2.7/1.1	16/7	30/12	43/18
EHS3600-CMT-50-1.0	50	1.0	3.0	1.1	7	12	18
EHS3600-CMT25-1.5	25	1.5	7.2	4.0	24	45	65
EHS3600-CMT26-1.5	26	1.5	7.2/3.0	4.0/1.6	24/10	45/19	65/27
EHS3600-CMT-50-1.5	50	1.5	3.0	1.6	10	19	27

Wall Comb

The wall comb is used in your existing gel tray to cast shorter gels. The following are two suggestions on how to use the wall comb to ensure a leak-proof seal.

Tape Method

Using casting tape, transparent tape, or masking tape, cut a piece long enough to cover the full length of the wall comb with ½" overhang on each end. Firmly press the tape only the length of the comb leaving three open edges loose (at least ½" of tape free on all sides). Place the comb with tape into the gel tray at the desired comb slot position. The taped side of the comb should be placed away from the gel itself. Angle the comb as it is being placed into the comb slot so that the loose tape edge is free. Once the comb is in place, press down firmly on the tape to seal the bottom and sides of the comb to the tray. You may want to add extra small pieces of tape to the corners to reinforce the edges and secure the seal. Add cooled agarose (≤ 60˚C), to the gel tray and allow it to solidify completely.

To remove the comb, gently remove excess tape and loosen the tape from the bottom and sides of the tray. Carefully pull the comb straight up and out of the comb slot. The edge of the gel may appear irregular, but the gel run will not be affected.

Agarose Plug Method

Place the wall comb into the desired comb slot. Prepare agarose as usual and remove about 3ml to a test tube. Allow it to cool and thicken enough to make a thin partially solid coil of agarose. Gently place a small stream of agarose along all three open comb edges, the bottom and two sides. Allow this "plug" to solidify completely. Add cooled agarose (≤ 60˚C) to the tray. After the gel is completely solidified, gently rock the comb back and forth to loosen it when removing. Adding running buffer to the buffer chamber prior to removing the wall comb may make the removal easier.

Casting Dam

Aluminium adjustable bar for casting shorter gels. Available for 15, 20 & 23cm wide gel trays.

TROUBLESHOOTING

Problem	
Comb wells get damaged when comb is removed	Always make sure to allow the gel to solidify completely before moving the Gel tray, the unit or removing the comb. Gently rock the comb back and forth lightly to loosen it – the rocking helps to avoid suction as the comb is being removed. If a high % agarose gel is cast it may be difficult to remove the comb, Place the gel tray into the buffer tank and add running buffer before removing the comb
Samples do not band sharply and appear diffuse in the gel before running	Gels should be allowed to solidify completely. For standard agarose - 30 minutes. If low melting agarose is used it may be necessary to completely solidify gels at a cooler temperature in the refrigerator or cold room. Gels should be submerged in 3-5mm of buffer to avoid gel dry out, but Excess buffer ≥ 5mm can cause decreased DNA mobility and band distortion.
Bands are not sharp, clear and even	Always follow the proper procedure for preparing the agarose according to the manufacturer's instructions. When preparing the agarose, be sure all the agarose powder is in solution before heating. Swirl occasionally while heating to melt and mix completely.
Gel "Smiling:	Gel may be uneven. Be sure to pour gel on a level surface Voltage may be too high, lower voltage setting on power supply, see instructions
No migration	No power is contacting the gel. Be sure all contacts are made between the power supply and the electrophoresis ta Check buffer preparation to be sure the proper ionic strength buffer was prepared. Check integrity of electrodes to be sure no breakage has occurred. Any breaks in the electrode will cause slow migration or none at all. To test unit, fill tank with running buffer and attach to power supply without the gel tray in the tank. The platinum wire electrodes will produce small bubbles as the current passes thro a complete circuit does not exist, there will be few to no bubbles.
Slow migration	Check buffer preparation to be sure proper ionic strength buffer was prepared. Voltage too low, increase voltage, see instructions Check integrity of electrodes to be sure no breakage has occurred. Any breaks in the electrode will cause slow migration or none at all.
The gel seems to run slower under the usual running conditions	The volume of running buffer used to submerge the gel should only be 3-5mm over the gel surface. Gel should be completely submerged to avoid the gel from drying out, which can smear the bands and possibly melt the gel due to overheating. If excessive buffer is added the mobility of the DNA decreases and band distortion may result
Excessive heat	Ionic strength of buffer is too high. Check buffer preparation to be sure proper ionic strength buffer was prepared. Voltage may be too high, lower voltage setting on power supply, see instructions.
One side of gel running slower	Gel may be uneven. Be sure to pour gel on a level surface. Check integrity of electrodes to be sure no breakage has occurred. Any breaks in the electrode will cause slow migration or none at all.
No bands visible	Be sure the gel tray was placed in the electrophoresis tank in the proper orientation. If orientation or polarity is reversed, the samples will migrate off the gel. If DNA marker was used and is present on the gel, check the integrity of the Sample. Shorten run time. Gel should be stopped when the dye front has migrated to approximately 5mm from the end of the gel.

<u>**Additional Resources for Reference**</u>

Maniatis T., E. F. Fritsch and J. Sambrook, **Molecular Cloning: A Laboratory Manual,** Cold Spring Harbor Laboratory, Cold Spring Harbor, NY

Short Protocols in Molecular Biology – A Compendium of Methods from Current Protocols in Molecular Biology, Edited by Frederick M. Ausubel, et. al.

Adams, D., and R. Ogden, **Electrophoresis in Agarose and Acrylamide Gels. Methods in Enzymology,** Vol. 152 (1987) Academic Press, Inc.

Fotador, U., **Simultaneous Use of Standard and Low-Melting Agarose for the Separation and Isolation of DNA by Electrophoresis,** Biotechniques, Vol. 10, No. 2, (1991)

Boots, S., **Gel Electrophoresis of DNA,** Analytical Chemistry, Vol. 61, No. 8, April 15, 1989

Ordering codes

EHS3400 Unit and Replacement Parts

Item Description	Catalogue Number
ExpressCast™ Complete System, 15cmW x 15cmL gel	EHS3400-SYS
Accessories	
U. V. Transmissible Gel Tray with Gasketed End Gates	EHS3400-TRAY
Replacement Gaskets, set of (2)	EHS3400-GASKET
Replacement End Gates with Gaskets, set of (2)	EHS3400-GATE
Casting dam for 15cmW gel trays	EHS3400-DAM

EHS3410 Unit and Replacement Parts

Item Description	Catalogue Number
ExpressCast™ Complete System, 15cmW x 25cmL gel	EHS3410-SYS
Accessories	
U. V. Transmissible Gel Tray with Gasketed End Gates, 15cmW x 25cmL gel	EHS3410-TRAY25
U. V. Transmissible Gel Tray with Gasketed End Gates, 15cmW x 20cmL gel	EHS3410-TRAY20
Replacement Gaskets, set of (2)	EHS3400-GASKET
Replacement End Gates with Gaskets, set of (2)	EHS3400-GATE
Casting dam for 15cmW gel trays	EHS3400-DAM

EHS3500 Unit and Replacement Parts

Item Description	Catalogue Number
ExpressCast™ Complete System, 20cmW x 25cmL gel	EHS3500-SYS
Accessories	
U. V. Transmissible Gel Tray with Gasketed End Gates, 20cmW x 25cmL gel	EHS3500-TRAY
Replacement Gaskets, set of (2)	EHS3500-GASKET
Replacement End Gates with Gaskets, set of (2)	EHS3500-GATE
Casting dam for 20cmW gel trays	EHS3500-DAM

EHS3600 Unit and Replacement Parts

Item Description	Catalogue Number
ExpressCast™ Complete System, 23.5cmW x 14cmL gel	EHS3600-SYS
Accessories	
U. V. Transmissible Gel Tray with Gasketed End Gates, 23.5cmW x 14cmL gel	EHS3600-TRAY
Replacement Gaskets, set of (2)	EHS3600-GASKET
Replacement End Gates with Gaskets, set of (2)	EHS3600-GATE
Casting dam for 23.5cmW gel trays	EHS3600-DAM

EHS3610/EHS3660 Units and Replacement Parts

Item Description	Catalogue Number
ExpressCast™ Complete System, 23.5cmW x 25cmL gel	EHS3610-SYS
ExpressCast™ Complete System with Buffer Circulation Port, 23.5cmW x 25cmL gel	EHS3660-SYS
Accessories	
U. V. Transmissible Gel Tray with Gasketed End Gates, 23.5cmW x 25cmL	EHS3610-TRAY
Replacement Gaskets, set of (2)	EHS3600-GASKET
Replacement End Gates with Gaskets, set of (2)	EHS3600-GATE
Casting dam for 23.5cmW gel trays	EHS3600-DAM

EHS3620 Unit and Replacement Parts

Item Description	Catalogue Number
ExpressCast™ Complete System, 23.5cmW x 40cmL gel	EHS3620-SYS
Accessories	
U. V. Transmissible Gel Tray with Gasketed End Gates, 23.5cmW x 40cmL gel	EHS3620-TRAY
Replacement Gaskets, set of (2)	EHS3600-GASKET
Replacement End Gates with Gaskets, set of (2)	EHS3600-GATE
Casting dam for 23.5cmW gel trays	EHS3600-DAM

Chemical compatibility of Acrylic

This chart is supplied for your convenience. Acrylic is compatible with most solvents and solutions found in the biochemical laboratory. However, some solvents can cause substantial damage. Keep this chart handy to avoid harm to your unit.

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

Chemical Compatibility for Acrylic-Based Products

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)

Chemical	Code	Chemical	Code
Acetic Acid (5%)	S	Acetic Anhydride	A
Ammonia	S	Dioctyl Phthalate	A
Ammonium Chloride (saturated)	S	Ethyl Alcohol (50%)	A
Ammonium Hydroxide (10%)	S	Isopropyl Alcohol (100%)	A
Ammonium Hydroxide concentrate	S	Methyl Alcohol (50%)	A
Calcium Chloride (saturated)	S	Nitric Acid (40%)	A
Citric Acid (10%)	S		
Cottonseed Oil (edible)	S	Carbon Tetrachloride	U
Detergent Solution (Heavy Duty)	S	Chromic Acid (40%)	U
Diesel Oil	S	Diethyl Ether	U
2-Ethylhexyl Sebacate	S	Dimethyl Formamide	U
Ethylene Glycol	S	Ethyl Alcohol (95%)	U
Formaldehyde (40%)	S	Hydrofluoric Acid (40%)	U
Gasoline, regular, leaded	S	Hydrogen peroxide (28% solution)	U
Glycerine Heptane (commercial grade)	S	Methyl Alcohol (100%)	U
Hexane	S	Methyl Ethyl Ketone	U
Hydrochloric Acid (10%)	S	Nitric Acid concentrate	U
Hydrochloric Acid concentrate	S	Phenol 5% solution	U
Hydrogen peroxide (3% solution)	S	Sulfuric Acid concentrate	U
Hydroxide (10%)	S		
Isooctane	S		
Kerosene (no. 2 fuel oil)	S	Acetone	D
Mineral Oil (white)	S	Aniline	D
Naptha	S	Benzene	D
Nitric Acid (10%)	S	Butyl Acetate	D
Oleic Acid	S	Chloroform	D
Olive Oil	S	Ethyl Acetate	D
Soap Solution (Ivory)	S	Ethylene Dichloride	D
Sodium Carbonate (2%)	S	Lacquer Thinner	D
Sodium Carbonate (20%)	S	Methylene Chloride	D
Sodium Chloride (10%)	S	Toluene	D
Sodium Hydrochlorite (5%)	S	Trichloroethylene	D
Sodium Hydroxide (1%)	S	Xylene	D
Sodium Hydroxide (10%)	S		
Sodium Hydroxide (60%)	S		
Sulfuric Acid (3%)	S		
Sulfuric Acid (30%)	S		
Turpentine	S		
Water (distilled)	S		