GIBCO BRL®

Instruction Manual

HORIZON® 58
Horizontal Gel
Electrophoresis Apparatus

CAT. SERIES 41060

LIFE TECHNOLOGIES®

Essential Technologies for the Science of Life™

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1 Notices to Customer

1.1 Important Information

This product is authorized for laboratory research use only. The product has not been qualified or found safe and effective for any human or animal diagnostic or therapeutic application. Uses for other than the labeled intended use may be a violation of applicable law.

If the product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired.

1.2 Warnings

1. **DANGER! HIGH VOLTAGE!** Although equipped with a safety interlock system, this apparatus should always be operated with extreme caution. Careless handling could result in electrical shock.
2. Never operate damaged or leaking equipment.
3. Always disconnect the power source before opening the apparatus.
4. Always allow the apparatus to cool before touching electrodes.

5. Certain reagents indicated for use in this manual are of a hazardous nature (*e.g.,* ethidium bromide, acetic acid, and boric acid, among others). The researcher is cautioned to read the Material Safety Data Sheets (MSDSs) which are provided by the supplier for these reagents. Care must be exercised in the proper use of equipment in these procedures (*e.g.,* ultraviolet lamps, electrophoresis apparatus, and high voltage power supplies), following the manufacturer's safety recommendations.

2 Overview

2.1 Description

The HORIZON® 58 is a horizontal format gel electrophoresis apparatus (figure 1) designed for rapid, high resolution separation of nucleic acids. It is suitable for agarose gel electrophoresis procedures where buffer recirculation is not required.

2.2 Components

Components of the HORIZON 58 Horizontal Gel Electrophoresis Apparatus are listed below:

Component	Amount
tray support stand	1
buffer tray	1
gel deck	1
gel casting dams	2
combs, DELRIN® (8-tooth, 0.8-mm thick; 14-tooth, 0.8-mm thick)	2
power cords (48-in., pair)	1
instruction manual	1

Report any missing or damaged components to Life Technologies' Customer Relations Department immediately.

The HORIZON 58 Horizontal Gel Electrophoresis Apparatus (figure 1) provides a compact and efficient unit for simplified gel casting and electrophoresis. The components of the apparatus are engineered for easy storage and durability.

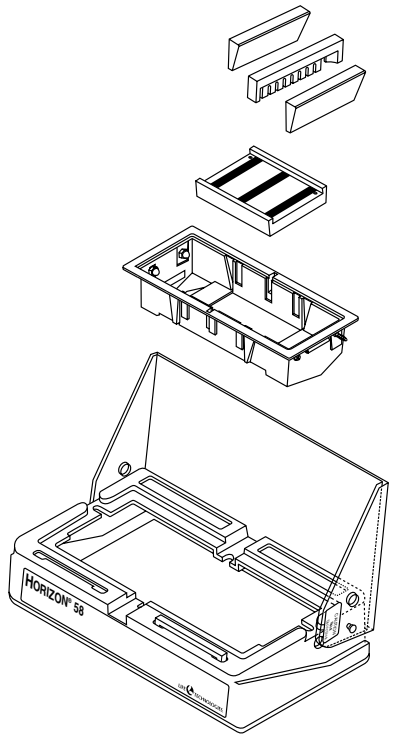

Figure 1. HORIZON 58 Horizontal Gel Electrophoresis Apparatus.

Overview

- ***Tray Support Stand*** (figure 2). The acrylonitrile butadiene styrene (ABS) plastic tray support stand features a clear acrylic safety interlock lid and storage facilities for the combs and gel casting dams.

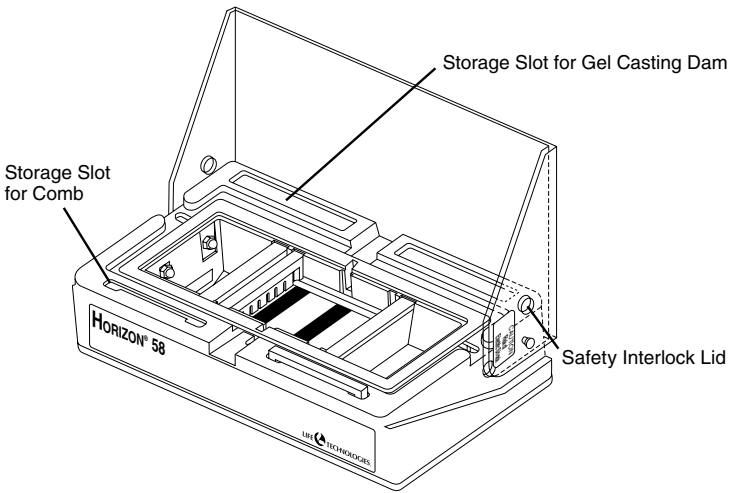

Figure 2. Tray Support Stand.

- ***Buffer Tray*** (figure 3). The clear polycarbonate plastic buffer tray is designed to be used in the tray support stand and **not** as a stand-alone electrophoresis apparatus. Because the buffer tray is removable, the electrophoresis buffer is easily discarded. The buffer tray provides three slots to position the combs and two “V” grooves for the gel casting dams. Electrical contact is disabled when the buffer tray is free from the tray support stand due to the presence of reed switches on the outside ends of the tray.

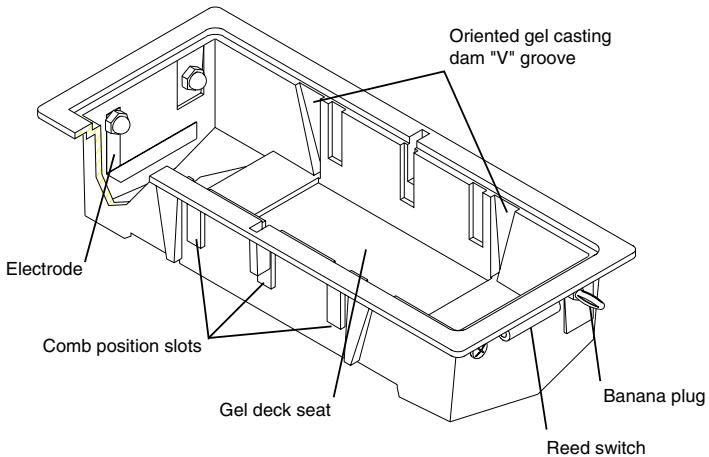

Figure 3. Buffer Tray.

Overview

- ***Gel Deck*** (figure 4). The gel deck provides for a 5.7 x 8.3 cm gel bed and is designed to withstand the high temperatures of molten agarose without warping. Hence, gels may be cast immediately after boiling the agarose solution. The red well visualization strips on the bottom of the gel deck are positioned under the comb to permit easy viewing of the wells when loading the gel. The acrylic used in the gel deck is **not** UV transparent. Gels should be removed from the gel deck for photography.

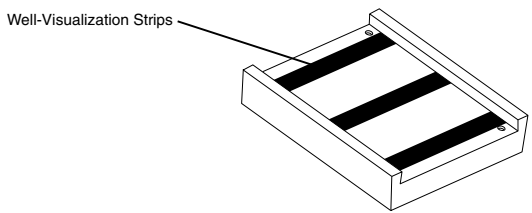

Figure 4. Gel Deck.

- ***Gel Casting Dams*** (figure 5). The gel casting dams are used to seal the ends of the gel deck when pouring agarose gels and eliminate the use of tape.

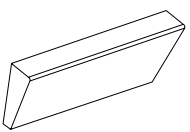

Figure 5. Gel Casting Dam.

- ***Combs*** (figure 6). The white DELRIN combs are used for casting wells in agarose gels. Two combs are standard components of the apparatus: one 8-tooth, 0.8-mm thick and one 14-tooth, 0.8-mm thick. (See table 3 for capacities of wells generated by these combs.)

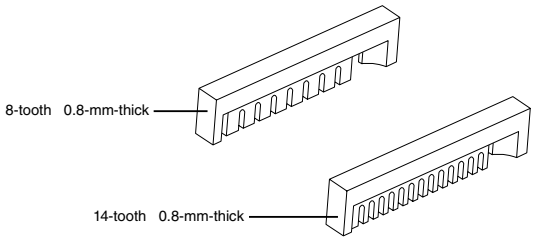

Figure 6. Combs.

- ***Power Cords.*** The red and black power cords are used to connect the apparatus to the power supply. The 48- in. power cords connect the HORIZON 58 to any DC power supply.

Any questions concerning the HORIZON 58 should be directed to the TECH-LINE℠ at one of the numbers listed on the back of this manual.

3 Operating Instructions

3.1 Assembly for Gel Casting

Assemble the HORIZON 58 apparatus on a level surface following this procedure. Refer to figure 7 for the gel casting configuration of the components.

1. Open the safety interlocking lid and insert the buffer tray in the tray support stand. (Do **not** cast or electrophorese gels with the buffer tray free from the tray support stand, as it is not a stand-alone unit.)
2. Place the gel deck in the center of the buffer tray with the outermost, well visualization strip towards the left (negative electrode).
3. Slide the gel casting dams down into the "V" grooves of the buffer tray. Apply gentle pressure simultaneously to both gel casting dams to seat the sealing surface against the sides of the gel deck. Do not force the gel casting dams down, as this may displace the gel deck out of level.
4. Insert the comb into the desired comb position slot, with the teeth in line with a well visualization strip on the gel deck. Multiple comb position slots are available for assorted comb placements (refer to Chapter 5, Applications).

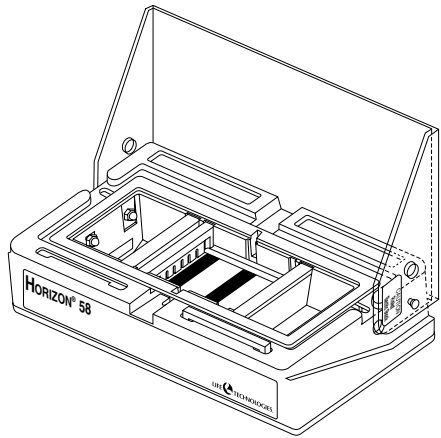

Figure 7. Gel Casting Configuration.

Ensure that the comb is resting unobstructed on the top of the gel deck.

5. Check that the surface of the gel deck is level with a circular "bull's eye" level. Make adjustments if required.

3.2 Preparing Agarose for Gels

To prepare a 1% (w/v) agarose gel, perform the following procedure:

1. Add 1 g of agarose to 100 ml of electrophoresis buffer in a 250-ml bottle or Erlenmeyer flask. Refer to tables 1 and 2 for Tris acetate-EDTA (TAE) and Tris borate-EDTA (TBE) buffer formulas.
2. Loosely cap and weigh the flask.

Operating Instructions

Table 1. TAE Electrophoresis Buffer.

Component	Amount	Concentration
Tris base	48.4 g	400 mM
$Na_2EDTA•2H_2O$	7.4 g	20 mM
Sodium acetate, anhydrous	16.4 g	200 mM
Glacial acetic acid	17.0 ml	296 mM
Deionized water	to 1 liter	-----

Note: This is a 10X concentration solution. Dilute with deionized water prior to use. Final pH should be 7.8.

Table 2. TBE Electrophoresis Buffer.

Component	Amount	Concentration
Tris base	121.1 g	1 M
Boric acid, anhydrous	61.8 g	1 M
$Na_2EDTA•2H_2O$	7.4 g	20 mM
Deionized water	to 1 liter	-----

Note: This is a 10X concentration solution. Dilute with deionized water prior to use. Final pH should be 8.3.

3. Dissolve the agarose in electrophoresis buffer by heating in a microwave oven or boiling water bath with occasional mixing.
4. Weigh the flask and adjust the volume with deionized water to compensate for evaporation.

3.3 Gel Casting

To cast an agarose gel:

1. Pipet the desired volume of molten agarose solution containing electrophoresis buffer into the apparatus assembled for gel casting. There is no need to cool the agarose to 50°C prior to casting the gel, as the gel deck can withstand high temperatures. Volumes required for various thickness gels are listed in table 3.

   WARNING: Do not cast gels with the buffer tray free from the tray support stand.
2. Ensure that the agarose is distributed evenly over the surface of the gel deck and remove any air bubbles.
3. Allow the agarose solution to cool until it solidifies.

For short term storage of gels:

1. Wet the surface of the gel with electrophoresis buffer.
2. Gently remove the comb and gel casting dams.
3. Lift the gel deck out of the buffer tray.
4. Wrap the gel in the gel deck with plastic wrap.
5. Store at 4°C. (Gels can be stored for 1 to 2 days.)

Operating Instructions

Table 3. Loading Capacities for HORIZON 58 Combs Relative to Gel Thickness[a].

Gel Thickness (mm)	Agarose Volume (ml)	Comb Thickness (mm)	Number of Teeth	Capacity Per Well (µl)
3	15	0.8	5	15
			8	7
			14	3
			3[b]	140
		1.5	5	30
			8	15
			14	7
4	20	0.8	5	20
			8	10
			14	5
			3[b]	200
		1.5	5	40
			8	20
			14	10
5	25	0.8	5	30
			8	15
			14	7
			3[b]	250
		1.5	5	50
			8	25
			14	13

[a]Low percentage gels (<0.6%) and low melting point agarose gels may have lower sample volume.

[b]Includes one preparative well and two flanking reference analytical wells for standards (dimensions and capacity values are for the central, preparative well).

3.4 Electrophoresis

To perform the electrophoresis procedure:

1. Remove the gel casting dams and return them to their storage slots in the tray support stand.
2. Pour 100 to 150 ml of electrophoresis buffer into the buffer tray. The surface of the gel should only be covered with 1 to 2 mm of electrophoresis buffer.
3. Gently remove the comb. To avoid tearing the bottom of the wells, gently wiggle the comb to free the teeth from the gel. Slightly lift up one side of the comb, then the other. Return the comb to its storage slot in the tray support stand.
4. Remove any trapped air bubbles to ensure that the wells fill with buffer.
5. Use a micropipette or automatic pipette to load the samples on the floor of the wells. Samples should contain sufficient glycerol or sucrose to be denser than the electrophoresis buffer. The formulation for a sample loading buffer is presented in table 4. Loading capacities for each comb versus gel thickness are listed in table 3.
6. Close the safety interlock lid.
7. Connect the HORIZON 58 to a 200-V DC power supply, such as the Model 200 Electrophoresis Power Supply.
8. Turn on the power supply and select the desired voltage. Tiny bubbles rise from the electrodes when the HORIZON 58 is properly connected. Nominal electrophoresis times for TAE and TBE buffers are listed in table 5.

Operating Instructions

Table 4. Sample Loading Buffer.

Component	Amount	Final Concentration (10X)
Glycerol	5 ml	50% (v/v)
$Na_2EDTA•2H_2O$	0.37 g	100 mM
Sodium dodecyl sulfate	0.1 g	1% (w/v)
Bromophenol blue	0.01 g	0.1% (w/v)
Deionized water	to 10 ml	-----

Caution: Do not exceed the recommended voltage of the power supply. When using high voltages (>175 V) the gel needs to be cooled during electrophoresis. This can be done by running the unit at 4°C.

9. Monitor the electrophoresis by following the migration of the bromophenol blue (BPB) dye. Nucleic acids bear a net negative charge and migrate toward the right (positive electrode).
10. Turn off the power supply when the electrophoresis is complete and disconnect the power cords from the power supply and the HORIZON 58 apparatus.

Add 1/10 volume of 10X sample loading buffer to samples. Apply directly to gel. Only samples containing cohesive ends (*e.g.,* lambda DNA restriction fragments) should be heated at 65°C for 10 min prior to loading. For additional sample loading buffers, refer to Maniatis *et al.* (1) or Rickwood and Hames (2).

Table 5. Nominal Electrophoresis Time for 1% Agarose Gels at Constant Voltage[a].

Voltage (V)	Buffer[b]	Electrophoresis Time[c]
25	TBE	5 h
	TAE	5 h
50	TBE	2.25 h
	TAE	2.25 h
75	TBE	1.5 h
	TAE	1.4 h
100	TBE	1 h
	TAE	56 min
125	TBE	45 min
	TAE	42 min
150	TBE	36 min
	TAE	34 min
175	TBE	29 min
	TAE	27 min
200	TBE	24 min
	TAE	22 min

[a]Measurements were made with the gel submerged 1 to 2 mm and at normal operating current ranging from 5 to 125 mA.

[b]Formulations for TAE and TBE electrophoresis buffers are listed in tables 1 and 2.

[c]Time required for BPB dye to migrate 6.5 cm from the origin. For a 1% gel, BPB co-migrates with DNA fragments of approximately 200 bp in 1X TBE and 400 bp in 1X TAE.

Note: Current and electrophoresis time vary with the volume of buffer, gel thickness, and voltage applied.

Caution: Electrophoresis >175 V generates sufficient heat to melt agarose gels. Do not exceed the high voltage electrophoresis times listed in table 5 without cooling the gel during electro-phoresis. Do not run low melting point agarose gels at high voltages.

3.5 Post-Electrophoresis

After disconnecting the HORIZON 58 apparatus from the power supply:

1. Open the safety interlock lid and lift the gel deck from the buffer tray.
2. Slide the gel out of the gel deck for staining or subsequent analysis (see Chapter 5, Applications). Remove the gel with care as agarose tears if not properly supported.
3. Remove the buffer tray from the tray support stand and properly discard the electrophoresis buffer. Do not reuse the buffer.
4. Rinse the buffer tray with deionized water.
5. Remove any residual agarose from the gel deck, gel casting dams, and combs by rinsing with deionized water.
6. Store all components in the tray support stand.

4 Troubleshooting Guide

Many instrument problems can be solved by reading and carefully following the instructions in this manual. Some suggestions for troubleshooting are included herein. Should these suggestions not resolve the problem, the unit should be returned to Life Technologies for repair. A full description of the problem should be included.

Contact the Customer Service Department for shipping instructions. Questions regarding procedures should be directed to the Life Technologies TECH-LINE. Customers outside of the United States should contact their local distribution center for information regarding repairs.

Problem	Comment
Bubbles do not appear on electrodes when DC voltage is connected.	Verify that the buffer tray is properly seated in the tray support stand. Verify that the DC power supply is operating properly. Verify that the power cords have continuity by using an ohmmeter. Verify continuity of electrodes by using an ohmmeter.
Electrodes turn gray.	This occurs under normal operating conditions.
Agarose solution leaks during casting.	Verify that sealing surfaces of the gel deck and gel casting dams are clean. Verify proper seating of gel casting dams.

Problem	Comment
Bromophenol blue dye turns yellow (pH change) during electrophoresis; results are uninterpretable.	Check the pH of the electrophoresis buffer (refer to tables 1 and 2). Be sure to use Tris Base and **not** Tris-HCl. Mix the buffer periodically during electrophoresis.
Samples leak underneath the gel upon loading.	The bottom of the wells were torn when the comb was removed. Refer to Section 3.4 for comb removal.
Lane artifacts: Pronounced "smiling" along one edge of the gel (*i.e.,* corresponding bands in different lanes migrate slower towards the edges of the gel)	Gel was cast or electrophoresed out of level. Use a circular “bull’s eye” level to check the surface of the gel deck prior to casting gels.
“S” shaped lanes (*i.e.*, anomalous migration front results in lanes that are not all running perpendicular with respect to the top of the gel)	Mix the buffer periodically during electrophoresis. Switch to a low conductivity/high buffering buffer, *i.e.*, from 1X TAE or 1X TBE to 0.5X TBE. Reduce salt concentration of sample.
Band artifacts: “Flaming” bands (*i.e.,* excessive florescence appearing as a trail above the band)	Reduce amount of sample. Reduce protein and/or glycerol in the sample. Reduce rate of electrophoresis.

Problem	Comment
"Wiggly" or "slanting" bands (*i.e.,* bands are not straight lines or parallel to the top edge of the gel)	Verify that wells are free of particles and bubbles. Verify that the agarose is completely dissolved before casting gels. Remove any particulate matter from the agarose before casting gels.
All bands appear as "doublets" (*i.e.,* each band is represented twice within the same lane)	Concentrate the sample and run a thin gel (2 to 3-mm) cast with 0.8-mm wells. Prevent gel movement during photography. Reduce voltage. Band doublets may result due to denaturation from excess heat from running gel at high voltage.

5 Applications

5.1 Considerations for Agarose Gel Electrophoresis

The selection of a percentage of agarose in a gel depends on the range of fragment sizes to be separated. Typically, 0.3% to 2% agarose gels are used. Large DNA fragments require low percentage gels, while small DNA fragments resolve on high percentage gels. Gels containing less than 0.5% agarose are very weak and electrophoresis should be performed at a low temperature (4°C). For routine electrophoresis, 0.75% to 1% agarose gels provide a wide range of separation (0.15 to 10 kb). A more complete treatment of factors that affect the separation of nucleic acids in agarose gels may be found in Maniatis *et al.* (1) or Rickwood and Hames (2).

The sample loading capacities that can be loaded per well for each available comb are listed in table 3. For analytical purposes, the sample volume should be kept to a minimum. Generally, 0.8-mm wells provide sharper band definition than 1.5-mm wells.

Thin gels (2 to 3 mm) photograph better than thick gels. This is due to parallax and the increased opaqueness of thicker gels.

The amount of DNA that can be loaded per well is variable and depends upon the number and size of

the DNA fragments and the cross-sectional area of the well. As a general rule, the minimum amount of DNA detectable by ethidium bromide staining is 1 ng in a 5-mm wide band. For preparative purposes, 50 ng per 5-mm wide band should not be exceeded. Overloading the gel causes trailing and distortion of the bands.

The multiple comb slots in the HORIZON 58 apparatus lend themselves to a variety of applications. Two rows of wells increase the sample capacity of the gel for rapid screening of "mini-prep" plasmids. A row of wells at the bottom of the gel is convnient to load quantitative standards for Southern blot hybridization just prior to terminating the electrophoresis.

5.2 Staining Double-Stranded DNA with Ethidium Bromide

To visualize double-stranded DNA after electrophoresis, the gel deck is removed from the buffer tray, and the gel is transferred to a solution of 0.5 µg/ml ethidium bromide in deionized water. The gel is stained for 10 to 15 min. Subsequent destaining in deionized water is optional.

Alternatively, ethidium bromide may be added directly to the agarose prior to casting, so that the gel is electrophoresed in the presence of ethidium bromide. However, this reduces the migration rate and may alter the relative electrophoretic mobility of nucleic acids (3).

5.3 Photographing the Gels

A dark room or light-tight enclosure, camera, and UV light source are required for photography of ethidium bromide stained gels. The stained gel is placed directly on top of a 300-nm transilluminator and photographed for a few second exposure at maximum aperture (f 4.5) with Polaroid Type 57 film (ASA 3000). The intensity of the light source, the distance between the gel and the camera lens, the film speed, lens aperture, and the choice of photographic filters determine the exact exposure.

Note: The gel deck is not UV transparent and gels must be removed for photography.

Highest sensitivities (1 ng DNA in a 5-mm wide band) are obtained by photographing the gels with transmitted UV light. A UV blocking filter (Kodak 2B Wratten filter), used in conjunction with a red gelatin filter (Kodak 23A Wratten filter), provides the highest contrast. Due to the fluorescence of the 2B filter, it is imperative that the two filters are oriented such that the red 23A filter is adjacent to the camera lens. The ethidium bromide-DNA complex fluoresces at 590 nm upon excitation at 302 nm (2). Short wave (254 nm) sources provide an equivalent level of sensitivity, however photodimerization and nicking of the DNA occurs. Long wave transilluminators (366 nm) are much less efficient. Photography under incident UV light is approximately 10-fold less sensitive than transmitted UV.

5.4 Considerations for Electrophoresis Buffers

For electrophoresis of agarose gels of the same concentration and at a fixed voltage, TAE buffer provides better resolution of high molecular weight fragments (>4 kb), while TBE buffer offers better low molecular weight resolution (0.1 to 3 kb). TBE has a higher buffering capacity and lower conductivity than TAE buffer. Hence, TBE is better suited for high voltage (>150 V) electrophoresis than TAE. TBE generates less heat at an equivalent voltage and maintains a constant pH.

Band compression of high molecular weight fragments (>5 kb) occurs as voltage increases. This effect is observed in both TBE and TAE buffers. Band definition remains sharp, even in excess of 200 V providing the gel is not overloaded. Linear DNA fragments from 0.15 to 10 kb (25 ng total) are easily resolved on a 0.8% agarose gel in 0.5X TBE run for 15 min at 200 V.

Electrophoresis at high voltages generates heat. High conductivity buffers, such as TAE, generate more heat than low conductivity buffers. Caution should be exercised in electrophoresis of gels >175 V. The heat build-up can cause gel artifacts such as “S” shaped migration fronts, and prolonged electrophoresis can melt the agarose gel. Low melting point agarose gels should not be electrophoresed at high voltages. Nominal electrophoresis times for agarose gels in 1X TBE and TAE buffers at various voltages are listed in table 5.

Applications

For the analysis of supercoiled DNA, TAE buffer produces better results. Anomalous migration of supercoiled DNA occurs when electrophoresed in TBE buffer >75 V. This effect is particularly pronounced with high molecular weight supercoiled DNA (>7 kb). The ability to resolve supercoiled DNAs from nicked circular and linear DNAs in the absence of ethidium bromide is also reduced. In order to accurately size supercoiled DNA, it is essential to electrophorese a standard in an adjacent lane (3).

The surface of the gel should only be covered with 1 to 2 mm of electrophoresis buffer. This prevents drying of the gel and ensures an even voltage gradient across the gel. Submerging the gel deeper than 2 mm is not necessary and results in an increased current.

6

References

1. Maniatis, T., Fritsch, E.F. and Sambrook, J. (1982) *Molecular Cloning: A Laboratory Manual,* Cold Spring Harbor Laboratory, Cold Spring Harbor, New York.
2. Rickwood, D. and Hames, B.D. (eds.) (1982) *Gel Electrophoresis of Nucleic Acids: A Practical Approach,* IRL Press, Oxford, England.
3. Longo, M.C. and Hartley, J.L. (1986) *Focus® 8:3,* 3.

7 Related Products

Product	Size	Cat. No.
Apparatus:		
Blot Transfer System 58	-----	21059-019
Model 125 Power Supply	-----	31061-096
Model 250 Power Supply	-----	11066-016
Model 250EX Power Supply	-----	11066-081
Membranes:		
Nitrocellulose-1 Roll	-----	11467-065
Supported Nitrocellulose-1 Roll	-----	11465-077
Reagents:		
Agarose	100 g 500 g	15510-019 15510-027
10 mg/ml Ethidium Bromide	10 ml	15585-011
10X TBE Buffer	1 L	15581-010
10X TAE Buffer	1 L	15558-018
Molecular Size Standards:		
10 bp DNA Ladder	50 µg	15631-013
1 Kb DNA Ladder	250 µg 1 mg	15615-016 15615-024
Low DNA Mass Ladder	200 µl	10068-013
Supercoiled DNA Ladder	25 µl	15622-012
Purification Reagents:		
CONCERT™ Rapid Gel Extraction System	50 rxns. 250 rxns.	11456-019 11456-027
CONCERT Matrix Gel Extraction System	150 rxns.	11457-017

Product	Size	Cat. No.
Accessories:		
Preparative DELRIN Comb with marker lanes: 1.5-mm thick	-----	21065-131
Analytical DELRIN Combs		
5-tooth: 0.8-mm thick	-----	21065-099
1.5-mm thick	-----	21065-107
8-tooth: 0.8-mm thick	-----	21065-073
1.5-mm thick	-----	21065-081
14-tooth: 0.8-mm thick	-----	21065-115
1.5-mm thick	-----	21065-123
Gel Casting Dams (acrylic; pair)	-----	21065-057
Gel Casting Dams (aluminum; pair)	-----	21065-065
Gel Casting Dams (aluminum; pair) with Gasket	-----	41060-054
Gel Deck		
with 3 visualization strips	-----	21065-164
with 4 visualization strips	-----	21065-032
Power Cords 48-in. pair	-----	11099-041
Replacement Parts:		
Electrode Replacement	-----	21059-027
Reed Switch Replacement (reed switch only)	-----	11950-011
Reed Switch Hardware Replacement Kit (see figure 8) (Includes: 2 O-rings, 2 red cap nuts, 2 black cap nuts, 2 rubber washers, 2 electrode boots, 2 hex nuts, 2 screws, 2 banana plugs, 2 lock washers)	-----	21065-156
Magnet Replacement	-----	21065-222
Buffer tray	-----	21065-024

Related Products

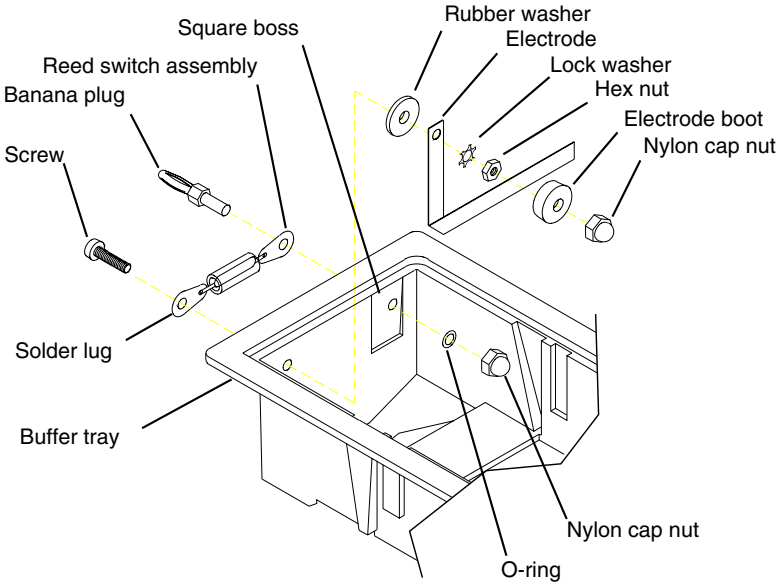

Figure 8. Reed Switch Replacement.

8 Additional Information

8.1 Care and Handling

The HORIZON 58 apparatus and related accessories are fabricated from ABS, polycarbonate, and cast acrylic plastics. As with any laboratory instrument, adequate care yields consistent and reliable performance.

The components can be gently washed with water and nonabrasive soap or detergent and rinsed well in deionized water. The apparatus can be dried with a soft cloth or allowed to air dry. Grease and oils may be removed with a light application of hexane, kerosene, or aliphatic naphtha. Abrasive cleaners, window sprays, or rough cloths may damage the surface and should be avoided.

Additional cautions are:

- Do not autoclave or dry-heat sterilize the apparatus or components.
- Do not expose the apparatus to phenol, acetone, benzene, halogenated hydrocarbon solvents, or undiluted laboratory alcohols.
- Avoid prolonged exposure of the apparatus to UV light.

Additional Information

8.2 Specifications

"Installation Category I"

Weight ..... 0.64 kg (1.3 lb.)

Dimensions:
W x L x H .....15.2 x 24.0 x 7.0 cm
(6.0 x 9.4 x 2.8 in.)

Construction.....ABS plastic, acrylic,
polycarbonate, and DELRIN

Voltage Range .....200 V DC Max

Current Range .....4-360 mA, 0.5 A Max

Operating Temperature Range .....4°C - 30°C
(non-condensing atmosphere)

Gel dimensions:
W x H x D.....5.7 x 8.3 x 0.05 cm
(2.25 x 3.25 x 0.2 in.)

Buffer volume.....100 to 150 ml

Electrode material.....platinum-niobium laminate

Combs (included).....8-tooth, 0.8-mm thick
14 tooth, 0.8-mm thick

8.3 Warranty

Life Technologies, Inc. warrants apparatus of its manufacture against defects in materials and workmanship, under normal service, for one year from the date of receipt by the purchaser. This warranty excludes damages resulting from shipping, misuse, carelessness, or neglect. Life Technologies' liability under the warranty is limited to the repair of such defects or the replacement of the product, at its option, and is subject to receipt of reasonable proof by the customer that the defect is embraced within the terms of the warranty. All claims made under this warranty must be presented to Life Technologies within one year following the date of delivery of the product to the customer.

This warranty is in lieu of any other warranties or guarantees, expressed or implied, arising by law or otherwise. Life Technologies makes no other warranty, expressed or implied, including warranties or merchantability or fitness for a particular purpose. Under no circumstances shall Life Technologies be liable for damages either consequential, compensatory, incidental, or special, sounding in negligence, strict liability, breach of warranty, or any other theory, arising out of the use of the product listed herein.

Life Technologies reserves the right to make improvements in design, construction and appearance without notice.

Additional Information

8.4 Declaration of Conformity and CE Mark

Note: The information outlined in this section applies only to customers located in the European Union (EU). The EU is currently comprised of 15 member countries.

This laboratory apparatus is identified with the **CE** mark. This mark indicates that the product complies to the following EU Directives and Standards:

Application of Council Directive(s):
73/23/EEC Low Voltage Directive
Standards:
EN 61010-1:1993 Product Safety
EU Representative:
Life Technologies Ltd.

EU Address:
3 Fountain Dr.
Inchinnan Business Park
Paisley, PA49RF Scotland

A copy of the Declaration of Conformity certificate is available upon request.

Notes

Part No. 11612
Lot No. NCNP01-0300