

Electrodialysis

BENEFITS INCLUDE

- Fast dialysis times - due to rapid movement of charged molecules in an electric field
- Re-usable
- Different chambers - for large or small sample volumes
- Membranes available - with MWCOs to suit almost any application or molecule size
- Easy to use
- Leak proof
- Autoclavable
- Inert Teflon construction - minimises non-specific protein and nucleic acid binding to the sample chamber, enhancing sample recovery
- Highly versatile - can be adapted for multiple dialysis applications

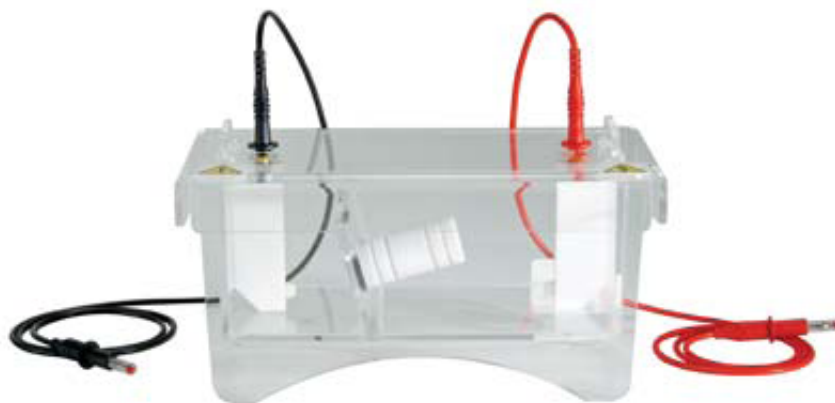
Applications

- Electroelution from gels and solutions - e.g. gel extraction of vector and insert during cloning
- Electrodialysis (with an average buffer exchange time of 5 to 10 minutes)
- On-line electrodialysis
- Electroconcentration
- Selective electrofiltration
- Size-fractionation of DNA and proteins from complex lysates
- Primer removal following PCR amplification
- Salt removal from DNA mini-preps
- Detergent removal
- Dye-Terminator removal

TECHNICAL SPECIFICATION

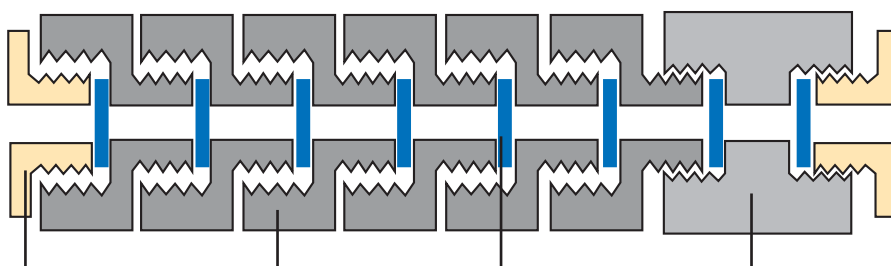
Unit Dimensions (W x L x H)	12.5 x 25 x 14cm
Internal Dimensions (W x L x H)	9.5 x 20 x 8cm
Buffer Volume	1500ml
Recommended Running Conditions	5 to 10mA; 10 minutes run-time
Power Output Connectors (diameter)	Shrouded, 4mm
Recommended Power Supplies	Consort EV243

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The ElectroPrep[®]

The ElectroPrep[®] system from Harvard Apparatus is an extremely versatile patented sample preparation technology based on the principles of electrophoresis and dialysis. This ElectroPrep[®] system is ideal for the rapid purification of proteins, nucleic acids, carbohydrates and other biological molecules. With a run-time of 5 to 10 minutes, ElectroPrep[®] provides speed and convenience, even at the very low 5 to 10mA currents used with this system. The sample chambers are made of Teflon, a completely inert material especially suited to high sample recovery. Membranes with molecular weight cut off points (MWCOs), ranging from 100 to 300,000 Daltons, may be used in combination with different Dialysis and Link Chambers for selective elution, filtration, dialysis, fractionation and concentration of complex samples, while Union chambers enable different Dialysis Chambers to be joined together to increase sample volume.



Teflon Caps - lock membranes into position, and, in their simplest format, are used to concentrate or desalt sample as shown in (iv) over the page.

Link Chamber - available in 25, 50, 100, 250 and 500µl volumes - can be connected to a Dialysis Chamber of greater volume to concentrate dialysed product, or can be joined in series with other link chambers and membranes of different MWCOs for the size-fractionation of different dialysed products

Membranes - with different MWCOs to accommodate biological molecules ranging from 100 to 300,000Da

Dialysis Chamber - the major receptacle for sample or dialysed product

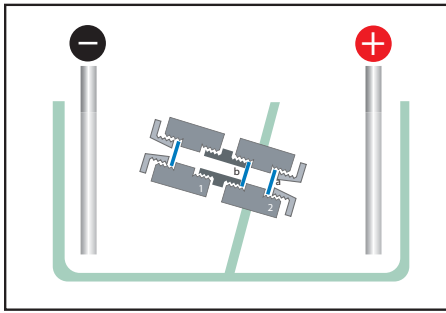
ORDERING INFORMATION

Unit Only	Part No.
ElectroPrep [®] Tank, including 4mm shrouded power connectors	EP-74-1101

Replacement Parts & Accessories

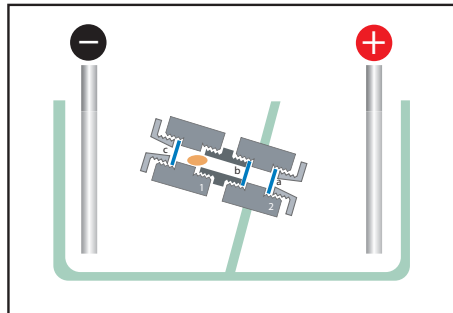
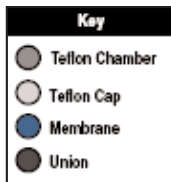
2 x 1-metre power leads with shrouded 4 mm power output connectors	CABLE-4
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See Tables 1a, 1b, 2a & 2b to order Dialysis Chambers, Link Chambers, Unions and Membranes



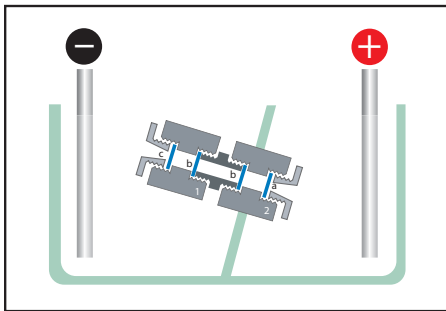
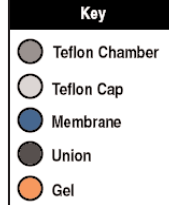
(i) Rapid and Selective Electro-Filtration / Concentration

The sample is placed in a compartment comprising the Dialysis Chamber (1) and the Union. The MWCO of membrane (b) is larger than the molecular weight of the biological molecule of interest, while the MWCO of membrane (a) is smaller. Upon application of the electric field, the biological molecule of interest will pass through membrane (b) and collect in Dialysis Chamber (2) while smaller molecules will pass through membranes (a) and (b) and Dialysis Chamber (2) as a result. This is a fast and effective method for the concentration of small samples as well as selective filtration.



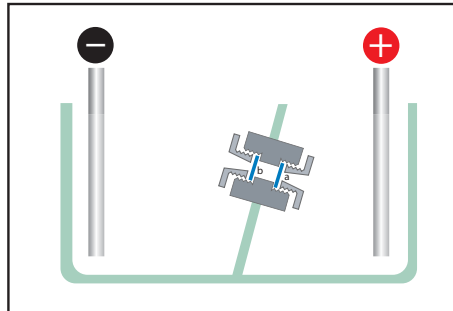
(ii) Gel extraction of DNA and protein by Electroelution

By using the ElectroPrep[®] system as shown in the schematic diagram, proteins and DNA can be eluted from a gel slice quickly and easily with excellent recovery. By using a Union, Dialysis Chambers can be joined in any combination necessary to accommodate the size of the gel slice. Samples can be concentrated if desired, by choosing a receiving chamber with a smaller volume. The MWCO of the membranes (a and b) can also be chosen to achieve very selective filtration. Membrane (b) should have a MWCO greater than the molecular weight of the sample of interest, while membranes (a) and (c) are smaller. The same principle applies as described in (i).



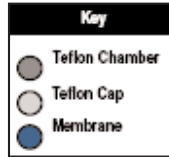
(iii) Selective Electro-Filtration / Concentration / Separation Based on Different Charges of Biological Molecules

In this configuration of the ElectroPrep[®], the sample is placed in a Union between two membranes (b), both of which should have a MWCO larger than the molecular weight of the molecule of interest, while the MWCOs of membranes (a) and (c) are smaller. Each biological molecule, including the molecule of interest, will then move either to Dialysis Chamber (1) or Dialysis Chamber (2), depending on its respective charge polarity (i.e. positive or negative), whereas those biological molecules with molecular weights lower than the sample of interest will migrate through membranes (a) and (c) into the tank. Biological molecules with unknown isoelectric points can also be separated and purified in this manner. Dialysis Chambers of smaller volumes can be used to concentrate dialysed product.



(iv) Electro dialysis through Simultaneous Exchange of Buffers - e.g. cleaning up PCR products

Following amplification, the PCR[®] product is placed in the Dialysis Chamber between membranes (a) and (b), each membrane having a MWCO lower than the molecular weight of the PCR[®] product but not the primer. Upon application of the electric field, dialysis occurs quickly by the simultaneous exchange of buffer, resulting in the migration of the lower molecular weight primers through membranes (a) and (b) while the purified PCR[®] product is retained in the Dialysis Chamber. Electro dialysis is also effective for desalting neutral molecules that do not move in an electric field (such as sugars) or charged molecules at their isoelectric point.



How to select your chamber and membrane configurations?

1. Decide upon your application - e.g. electroelution, electro dialysis, electrofiltration or electroconcentration
2. Select a Dialysis Chamber able to accommodate the desired sample volume - e.g. 50, 100, 200, 500, 1000 or 1500µl - N.B. a Dialysis Chamber can be joined to a Union to increase the sample volume
3. Choose membranes with the appropriate MWCO, depending on the technique being performed (see i to iv) and the molecular weight of the biological molecule of interest (dialysed product), taking into account each membrane's suitability for use in aqueous solutions or organic solvents
 - For organic solvents, use either regenerated cellulose or polycarbonate
 - For aqueous solutions, use cellulose acetate
4. Connect the Dialysis Chamber via a membrane and Union to another Dialysis Chamber for electrofiltration (i) or electroelution (ii); a Dialysis Chamber of smaller volume can also be attached to concentrate the dialysed product (iii)
5. When desalting PCR[®] products, membranes can be secured at each end of the Dialysis Chamber by Teflon end caps (iv)
6. Link chambers can be attached to the Dialysis Chamber via a membrane to filter samples according to their size; multiple link chambers can be used with different membranes for size-fractionation of different dialysed products

Membranes

Scie-Plas provides multiple membranes designed for use with different Dialysis Chambers, Link Chambers and Unions.

Cellulose Acetate

These membranes are low-protein-binding and have a sharp MWCO range. The membranes are pre-cut and supplied in 0.05% sodium azide solution. They are ready to use after rinsing with deionised water and buffer. Glycerol, sulphur, and heavy metals are not present in these membranes. Cellulose acetate membranes are intended only for aqueous solutions, and the presence of an organic solvent is not recommended.

Regenerated Cellulose

These membranes are more stable in organic solvents, but the MWCO range is not as sharply defined as that of cellulose acetate membranes.

Regenerated Cellulose membranes are pre-cut, and supplied in a 0.05% sodium azide solution. They are ready to use after rinsing with deionised water and buffer. Glycerol, sulphur, or heavy metals are not present in these membranes.

Polycarbonate

These membranes are more stable in organic solvents. They are available in four highly controlled pore sizes for a well-defined MWCO range.

1a. Direct Compatibility Table to Connect Dialysis Chambers (50-200µl) and Link Chambers (25-100µl)

Dialysis Chamber			Union(s)				Link Chamber(s)		
Quantity	Volume	Part No.	Quantity	Volume	Part No.	See Option.	Quantity	Volume	Part No.
1	50µl	EP-74-0408	1	25-200µl	EP-74-0100	A	1	25µl	EP-74-1619
5	50µl	EP-74-0400		to 25-200µl			5	25µl	EP-74-1620
1	100µl	EP-74-0409	OR				1	50µl	EP-74-1611
5	100µl	EP-74-0401					5	50µl	EP-74-1615
1	200µl	EP-74-0410	1	25-200µl	EP-74-0102	B	1	100µl	EP-74-1612
5	200µl	EP-74-0402		to 250-1500µl			5	100µl	EP-74-1616

Option A: Use Union EP-74-0100 to connect together any two of the 50-200µl Dialysis Chambers (EP-74-0408 to EP-74-0402).

All 50-200µl Dialysis Chambers (EP-74-0408 to EP-74-0402) are directly compatible with all 25-100µl Link Chambers (EP-74-1619 to EP-74-1616).

Option B: Union EP-74-0102 is used to connect one 50-200µl Dialysis Chamber (EP-74-0408 to EP-74-0402) with one 500-1500µl Dialysis Chamber (EP-74-0411 to EP-74-0405).

All 500-1500µl Dialysis Chambers (EP-74-0411 to EP-74-0405) are directly compatible with all 250-500µl Link Chambers (EP-74-1613 to EP-74-1618).

1b. Membranes Compatible with 50-200µl Dialysis Chambers and 25-100µl Link Chambers

MWCO (kDa)	Cellulose Acetate Part No.		Regenerated Cellulose Part No.		Polycarbonate Part No.	
	24/pack	96/pack	24/pack	96/pack	24/pack	96/pack
0.1	EP 74-2410	EP 74-2400				
0.5	EP 74-2411	EP 74-2401				
1	EP 74-2412	EP 74-2402	EP 74-2706	EP 74-2700		
2	EP 74-2413	EP 74-2403	EP 74-2707	EP 74-2701		
5	EP 74-2414	EP 74-2404	EP 74-2708	EP 74-2702		
10	EP 74-2415	EP 74-2405	EP 74-2709	EP 74-2703		
25	EP 74-2416	EP 74-2406	EP 74-2710	EP 74-2704		
50	EP 74-2417	EP 74-2407	EP 74-2711	EP 74-2705		
100	EP 74-2418	EP 74-2408				
300	EP 74-2419	EP 74-2409				
Membrane Pore Sizes						
0.01µM					EP 74-3103	EP 74-3100
0.05µM					EP 74-3104	EP 74-3101
0.10µM					EP 74-3105	EP 74-3102

2a. Direct Compatibility Table to Connect Dialysis Chambers (500-1500µl) and Link Chambers (250-500µl)

Dialysis Chamber			Union(s)				Link Chamber(s)		
Quantity	Volume	Part No.	Quantity	Volume	Part No.	See Option.	Quantity	Volume	Part No.
1	500 µl	EP-74-0411	1	250-1500µl to	EP-74-1105	A	1	250µl	EP-74-1613
5	500µl	EP-74-0403		250-1500µl			5	250µl	EP-74-1617
1	1000µl	EP-74-0412	OR				OR		
5	1000µl	EP-74-0404							
1	1500µl	EP-74-0413	1	25-200µl to	EP-74-0102	B	1	500µl	EP-74-1614
5	1500µl	EP-74-0405		250-1500µl			5	500µl	EP-74-1618

Option A: Use Union EP-74-1105 to connect together any two of the 500-1500µl Dialysis Chambers (EP-74-0411 to EP-74-0405).

All 500-1500µl Dialysis Chambers (EP-74-0411 to EP-74-0405) are directly compatible with all 250-500µl Link Chambers (EP-74-1613 to EP-74-1618).

Option B: Union EP-74-0102 is used to connect one 50-200µl Dialysis Chamber (EP-74-0408 to EP-74-0402) with one 500-1500µl Dialysis Chamber (EP-74-0411 to EP-74-0405).

All 500-1500µl Dialysis Chambers (EP-74-0411 to EP-74-0405) are directly compatible with all 250-500µl Link Chambers (EP-74-1613 to EP-74-1618).

2b. Membranes Compatible with 250-1500µl Dialysis Chambers and Link 250-500µl Chambers

MWCO (kDa)	Cellulose Acetate Part No.		Regenerated Cellulose Part No.		Polycarbonate Part No.	
	24/pack	96/pack	24/pack	96/pack	24/pack	96/pack
0.1	EP 74-2510	EP 74-2500				
0.5	EP 74-2512	EP 74-2501				
1	EP 74-2513	EP 74-2502	EP 74-2806	EP 74-2800		
2	EP 74-2514	EP 74-2503	EP 74-2807	EP 74-2801		
5	EP 74-2515	EP 74-2504	EP 74-2808	EP 74-2802		
10	EP 74-2516	EP 74-2505	EP 74-2809	EP 74-2803		
25	EP 74-2517	EP 74-2506	EP 74-2810	EP 74-2804		
50	EP 74-2518	EP 74-2507	EP 74-2811	EP 74-2805		
100	EP 74-2519	EP 74-2508				
300	EP 74-2520	EP 74-2509				
Membrane Pore Sizes						
0.01µM					EP 74-3203	EP 74-3200
0.05µM					EP 74-3204	EP 74-3201
0.10µM					EP 74-3205	EP 74-3202