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.

THESE UNITS COMPLY WITH THE STATUTORY CE SAFETY DIRECTIVES:

EN 61010-1:1993/BS EN 61010-1:1993

THE SIGMA ELECTRO-BLOTTING UNITS ARE DESIGNED TO GIVE LONG SERVICE AND REPRODUCIBLE RESULTS IN YOUR LABORATORY. A FEW MOMENTS SPENT READING THESE INSTRUCTIONS WILL ENSURE THAT YOUR EXPECTATIONS ARE REFLECTED IN THE SUCCESSFUL USE OF THE APPARATUS.

FIRST CHECK THAT THE APPARATUS HAS BEEN RECEIVED COMPLETE AND UNDAMAGED FOLLOWING SHIPMENT. ANY FAULTS OR LOSSES MUST BE NOTIFIED TO SIGMA-ALDRICH IMMEDIATELY, SIGMA-ALDRICH CANNOT ACCEPT RESPONSIBILITY FOR GOODS RETURNED WITHOUT PRIOR NOTIFICATION.
REFER TO THE PACKING LIST AND CHECK THAT ALL COMPONENTS AND ACCESSORIES ARE PRESENT.

PLEASE RETAIN ALL PACKAGING MATERIALS UNTIL THE WARRANTY PERIOD HAS EXPIRED.
SPECIFICATIONS:

Z34,046-4 is a wet blotting module, with cassettes & fibre pads, designed for use with the tank, safety lid and cables from the Sigma Cooled Mini Vertical Gel Electrophoresis set.

Z34,047-2 is a ready-to-use set of wet blotting module, with cassettes and fibre pads, tank, safety lid and cables.

Construction:
- Rugged acrylic construction.
- All acrylic joints chemically bonded.
- Doubly insulated cables, rated safe up to 1,000 volts.
- Gold plated electrical connectors, corrosion-free and rated safe up to 1,000 volts.
- Recessed power connectors, integral with the safety lid.
- 0.2mm diameter platinum electrodes, 99.99% pure.
- User replaceable platinum electrode cassettes.
- Compression cassettes with an open square grid design, which provides a maximum area for transfer.
- Simple compression cassette locking mechanism

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

- The apparatus is rated POLLUTION DEGREE 2 in accordance with IEC 664. POLLUTION DEGREE 2, states that: “Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected”.
**Operational:**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Dimensions (WxLxH)</td>
<td>12 x 13 x 21cm</td>
</tr>
<tr>
<td>Approx. Total Buffer Volume (L)</td>
<td>1L</td>
</tr>
<tr>
<td>Electrode separations</td>
<td>8cm</td>
</tr>
<tr>
<td>No. of Gel Cassette Slots</td>
<td>4</td>
</tr>
<tr>
<td>No. Electrode Coils per Face</td>
<td>6 (1.5cm apart)</td>
</tr>
<tr>
<td>Approx. Electrode length per Face</td>
<td>68cm</td>
</tr>
<tr>
<td>Approx. Gel Sizes: up to</td>
<td>8.5 x 9.5cm</td>
</tr>
<tr>
<td>Max. Operating Voltage</td>
<td>500 Volts</td>
</tr>
<tr>
<td>Max. Operating Current</td>
<td>2 Amps</td>
</tr>
<tr>
<td>Electrical Connectors</td>
<td>4mm male fully shrouded.</td>
</tr>
</tbody>
</table>
USING THE ELECTRO-BLOTTING UNITS

A. Safety Precautions

- **READ** the instructions before using the apparatus.
- Always isolate the units from their power supply before removing the safety lid. Isolate the power supply from the mains **FIRST** then disconnect the leads.
- **DO NOT** exceed the maximum operating voltage or current (see Specifications).
- **DO NOT** operate the units in metal trays.
- Acrylamide is a volatile, cumulative neurotoxin and suspected carcinogen. Wear effective clothing and follow the recommended handling and disposal procedures.
- Polymerised gels contain some unpolymerised monomer. Handle only with gloves.
- Following the replacement of a platinum electrode, have the unit inspected and approved by your safety officer prior to use.
- **DO NOT** fill the units with transfer buffer above the maximum fill lines.
- **DO NOT** move the unit when it is running.
- **CAUTION:** During electrophoresis very low quantities of various gases are produced at the electrodes. The type of gas produced depends on the composition of the buffer being employed. To disperse these gases make sure that the apparatus is run in a well ventilated area.

B. General Care and Maintenance

- To remove the safety lid, push down on the plastic lugs and lift the lid vertically with your fingers.
- Before use clean and dry the apparatus with **DISTILLED WATER ONLY.** **IMPORTANT:** Acrylic plastic is **NOT** resistant to aromatic or halogenated hydrocarbons, ketones, esters, alcohols (over 25%) and acids (over 25%).
- Before use, and then on a monthly basis, check the unit for any leaks at the chemically bonded joints. Place the unit on a sheet of dry tissue paper and then fill with **DISTILLED WATER ONLY**, to the maximum fill line. Any leakage will be seen on the tissue. If any leakage is seen, **DO NOT ATTEMPT TO REPAIR OR USE THE APPARATUS**, but notify SIGMA immediately.
- When cleaning the replacement platinum electrodes DO NOT use cleaning brushes. Usually, a thorough rinse with distilled water is all that is required.
- Ensure that the connectors are clean and dry before usage or storage.
C. Operating Instructions:

- Cool and degas the appropriate volume of transfer buffer (see specifications). The buffer should be degassed prior to the addition of SDS. The most commonly used transfer buffer is:

25mM Tris, 192mM glycine, 20% methanol pH8.3, Ref. Towbin et al (1979).
This buffer can be used with or without 0.05-0.1% (w/v) SDS.

Other transfer buffers include:

1. 48mM Tris, 39mM glycine, 20% methanol pH9.2, Ref. Bjerrum and Schafer-Nielsen (1986)
2. 10mM NaHCO₃, 3mM Na₂CO₃, 20% methanol pH9.9, Ref. Dunn (1986).

- Half fill the tank with transfer buffer.
- Connect the cooling water supply to the tank base hose connectors. Use hose clips to secure the tubing.
- Add a magnetic flea to the tank to maintain uniform temperature and conductivity during electrophoretic transfer.
- Use gloves when handling the compression cassette components described below.
- Pre-equilibrate the gel in cool transfer buffer to remove SDS and salts. This serves to prevent the gel changing size during transfer and to reduce heating effects.
- Soak a gel-sized piece of transfer membrane in transfer buffer for 15 minutes.
- Cut four pieces of laboratory grade blotting paper to a size 5mm larger than the gel to be blotted. Soak them in transfer buffer.
- Soak the fibre pads in transfer buffer. If the pads are larger than the gels you routinely use they can be trimmed down with a pair of scissors.
- Familiarise yourself with the interlocking hinge of the compression cassette.
- Carefully align and overlay the transfer membrane onto the gel in one smooth action. Work from the centre and let the ends progressively roll down. Do not attempt to reposition the membrane as some transfer may occur on contact. Use a clean glass rod wetted in transfer buffer to roll out any trapped bubbles.
- Assemble the gel/membrane sandwich in the compression cassette as described below and as illustrated in figure 1. Note the orientation of the gel relative to the membrane and use a pencil or marker pen (on the clamp) to mark the +ve side (i.e. membrane side) of the cassette.
- Finally, gently squeeze the cassette sides together and slide the clamping clip onto the top edge.
• Insert the cassette into one of the tank slots with the transfer membrane on the +ve side.
• Add further transfer buffer until the top loops of the platinum coils are just covered.
• Apply the safety lid and refer to Table 2 for operating conditions. Note that operating conditions should be optimised for your applications. Factors that will affect the success of transfer include: gel porosity, buffer composition and pH, transfer time, transfer field density (V/cm), molecular weight range, stirring of buffer and temperature control, choice of membrane and the detection system chosen. Residual salts in the gel could cause the system to heat up so pre-equilibration of the gel with transfer buffer is important.
• Initially, chose a buffer system such as that of Towbin et al (1979) and perform a pilot time course experiment, transferring molecular weight markers from your gel to the membrane of your choice. It is better to start with low current or voltage setting, monitoring the temperature as the run proceeds. If the temperature is controlled and transfer is successful you could try higher settings for subsequent runs.

**Table 2**

<table>
<thead>
<tr>
<th>Transfer Buffer *</th>
<th>Overnight</th>
<th>1 hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towbin Buffer</td>
<td>25 - 40 V</td>
<td>50 - 100 V</td>
</tr>
<tr>
<td></td>
<td>40 - 80mA</td>
<td>200 - 400mA</td>
</tr>
<tr>
<td>Bjerrum Buffer</td>
<td>25 - 40 V</td>
<td>50 - 100 V</td>
</tr>
<tr>
<td></td>
<td>40 - 80mA</td>
<td>200 - 400mA</td>
</tr>
<tr>
<td>Dunn Buffer</td>
<td>10 V</td>
<td>40 - 80 V</td>
</tr>
<tr>
<td></td>
<td>40 - 80mA</td>
<td>200 - 500mA</td>
</tr>
</tbody>
</table>

* Do not pH with acid or alkali. The pH may vary slightly according to the purity of reagents and accuracy of weighing. Adding ions may cause overheating during transfer.

• If an acidic buffer is chosen, e.g. 0.7% acetic acid the direction of transfer will be the opposite of normal, i.e. transfer will be from anode to cathode. Such a buffer would be suitable for IEF gels or basic protein gels (native).
Assemble in the order:

2. Pre-wetted pad.
3. 2 pre-wetted blotting papers.
4. Gel
5. Pre-wetted transfer membrane.
6. 2 pre-wetted blotting papers.
7. Pre-wetted pad.
8. Cassette clamp +ve side.

Figure 1. Assembly of the gel/membrane sandwich in the compression cassette.
D. Cleaning and Storage

After use, thoroughly rinse all components in deionised water and gently dry the gold electrode connectors with a soft tissue. **NEVER USE ORGANIC SOLVENTS.**

E. References


F. Further Reading

**Related Products**

The following Sigma-Aldrich chemical and other consumable products are mentioned in this manual. For up-to-date packs and prices, see [www.sigma-aldrich.com](http://www.sigma-aldrich.com) or contact your local Sigma-Aldrich sales office (see back of manual).

<table>
<thead>
<tr>
<th>Related product</th>
<th>Sigma-Aldrich Prod. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tris</td>
<td>T1503</td>
</tr>
<tr>
<td>Glycine</td>
<td>50050</td>
</tr>
<tr>
<td>Methanol</td>
<td>M1770</td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>S7795</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>S6297</td>
</tr>
<tr>
<td>SDS</td>
<td>71729</td>
</tr>
<tr>
<td>Nylon membranes</td>
<td>N1031 and N4781</td>
</tr>
<tr>
<td>Blotting paper</td>
<td>Z27,090-3</td>
</tr>
<tr>
<td>(Whatman 3MM Chr)</td>
<td></td>
</tr>
</tbody>
</table>
### PACKING LIST Z34,046-4

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Description</th>
<th>Part Number</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Blotting module</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Compression Cassettes</td>
<td>Z340480</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Fibre Pads, 10 x 10cm, PK/4</td>
<td>Z340499</td>
<td></td>
</tr>
</tbody>
</table>

### PACKING LIST Z34,047-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Description</th>
<th>Part Number</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Tank &amp; safety lid with cables</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Blotting module</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Compression Cassettes</td>
<td>Z340480</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Fibre Pads, 10 x 10cm, PK/4</td>
<td>Z340499</td>
<td></td>
</tr>
</tbody>
</table>

### QUALITY CHECK LIST

- **Model**.............................     **Serial Number**.............................

1. Tank Leak Tested Check.........................
2. Electrode Conductivity Test Check...............  
3. Labels Positioned Check.........................
4. Labels Test/Serial No. Check....................
5. Unit Scratch/Blemish Free Check................
6. Accessories - See Packing List Check...........
7. Instructions Check............................

**ALL SIGMA PRODUCTS ARE SUPPLIED HAVING PASSED RIGOROUS QUALITY CONTROL PROCEDURES.**

**IF YOU HAVE A QUERY, CONTACT YOUR LOCAL SIGMA-ALDRICH SALES OFFICE FOR TECHNICAL SUPPORT.**

SIGNED....................................... QUALITY CONTROL ASSESSOR
WARRANTY

SIGMA-ALDRICH guarantees that the unit you have received has been thoroughly tested and meets its published specification.

This unit (excluding all accessories) is warranted against defective material and workmanship for a period of twelve (12) months from the date of shipment ex factory.

SIGMA-ALDRICH will repair all defective equipment returned during the warranty period without charge, provided the equipment has been used under normal laboratory conditions and in accordance with the operating limitations and maintenance procedures outlined in this instruction manual and when not having been subject to accident, alteration, misuse or abuse.

No liability is accepted for loss or damage arising from the incorrect use of this unit. SIGMA-ALDRICH’s liability is to the repair or replacement of the unit or refund of the purchase price, at SIGMA-ALDRICH’s option. SIGMA-ALDRICH is not liable for any consequential damages.

SIGMA-ALDRICH reserves the right to alter the specification of its products without prior notice. This will enable us to implement developments as soon as they arise.

SIGMA-ALDRICH products are for research use only.

A return authorisation must be obtained from SIGMA-ALDRICH before returning any product for warranty repair on a freight-prepaid basis.

WARNING

DO NOT attempt to remove the outer casing or make repairs to our electrical range of products, should any unit fail. Contact SIGMA-ALDRICH immediately if the need for repair or servicing should arise.

See back cover for contact details of your local Sigma-Aldrich office.
Sigma-Aldrich Sales Offices in Europe

Austria
SIGMA-ALDRICH Handels GmbH
Hebbelplatz 7
1100 Wien
Tel: 01-605 81 10
Fax: 01-605 81 20
E-mail: sigma@sigma.co.at

Belgium
SIGMA-ALDRICH nv/sa
K.Cardijnplein 8
B-2880 Bornem
Tel: 03 899.13.01
Fax: 03 899.13.11
E-mail: sialbe@sial.be

Czech Republic
SIGMA-ALDRICH s.r.o.
Pobrezni 46
186 00 Praha 8
Tel: 00420-2-2176 1300
Fax: 00420-2-2176 3300
E-mail: CZECustSV@eurnotes.sial.com

Denmark
SIGMA-ALDRICH Denmark S/A
Vejlegaardsvej 65 B
DK-2665 Vallensbaek Strand
Tel: +45 43 56 59 00
Fax: +45 43 56 59 05
E-mail: denorder@eurnotes.sial.com

Eire
SIGMA-ALDRICH Ireland Ltd
Airton Road
Tallaght
Dublin 24
Tel: 01 404 1900
Fax: 01 404 1910
E-mail: EICustsv@eurnotes.sial.com

Finland
SIGMA-ALDRICH Finland
VA-Kemia Oy
Teerisuonkuja 4
00700 Helsinki
Tel: (09) 350-9250
Fax: (09) 350-9255
E-mail: finorder@eurnotes.sial.com

France
SIGMA-ALDRICH Chimie S.a.r.l
L’Isle D’Abeau Chesnes
B.P. 701
38297 St.Quentin Fallavier Cedex
Tel Numero Vert: 0800 21 14 08
Fax Numero Vert: 0800 03 10 52
E-mail: fradvsv@eurnotes.sial.com

Germany
SIGMA-ALDRICH Chemie GmbH
Gruenwalder Weg 30
D-82041 Deisenhofen
Tel: +49(0)89-6513-0
Fax: +49(0)89-6513-1169
E-mail: DeOrders@eurnotes.sial.com

Greece
SIGMA-ALDRICH (o.m) Ltd
72 Argonaton Str
16346 Ilioupoli, Athens
Tel: 30-1-9948010
Fax: 30-1-9943831
E-mail: GRCustSV@SIALEUROPE

Hungary
SIGMA-ALDRICH Kft
1399 Budapest
Pf. 701/400
Magyaronszag
Tel: 02-35-9055
Fax: 06-1-235-9050
E-mail: info@sigma.sial.hu

Italy
SIGMA-ALDRICH S.r.l.
Via Gallarate 154
20151 Milano
Tel: 02-3347-310
Fax: 02-38010.737
E-mail: itorder@eurnotes.sial.com

Netherlands
SIGMA-ALDRICH Chemie BV
Stationsplein 4 E
Postbus 27
NL-3320 AA Zwijndrecht
Tel: 078-620 54 11
Fax: 078-620 54 21
E-mail: nlcustsv@eurnotes.sial.com

Norway
SIGMA-ALDRICH Norway AS
PO Box 4297 – Torshov
Sandakerveien 102
N-0401 OSLO
Tel: 47 22 091500
Fax: 47 22 091510
E-mail: nororder@eurnotes.sial.com

Poland
SIGMA-ALDRICH Sp.zo.o
Szelagowska 30
61-626 Poznan
Tel: (48-61) 823-24-81
Fax: (48-61) 823-27-81
E-mail: plcustsv@eurnotes.sial.com

Portugal
SIGMA-ALDRICH Quimica S.A.
(Sucursal em Portugal)
Aptdo. 131
2710 Sintra
Free phone: 0800-202180
Free fax: 0800-202178
E-mail, encomendas: poorders@eurnotes.sial.com

Spain
SIGMA-ALDRICH Quimica S.A.
Aptdo. 161
28100 Alcobendas (Madrid)
Tel: 91-6619077
Fax: 91-6619642
E-mail, pedidos: esorders@eurnotes.sial.com

Sweden
SIGMA-ALDRICH Sweden AB
Solkraftsvagen 14C
135 70 Stockholm
Tel: 020-35 05 10
Fax: 020-35 25 22
E-mail: sweorder@eurnotes.sial.com

Switzerland
SIGMA-ALDRICH Chemie
A division of Fluka Chemie AG
Postfach 260
CH-9471 Buchs
Tel: 081-755 27 21
Fax: 081-755 28 40
E-mail: Fluka@sial.com

United Kingdom
SIGMA-ALDRICH Company Ltd
The Old Brickyard, New Road
Gillingham, Dorset SP8 4XT
Tel: 01747 833000
Fax: 01202 715460
E-mail: ukcustsv@eurnotes.sial.com