

Electrophoresis



APELEX 

Fundamental Principles of Electrophoresis

Nucleic Acids

Proteins

The Dynamics of Gel Electrophoresis

- Sample Mobility
- Electrophoresis System Dynamics
- Ohm's Law

The Matrix

Buffers

- Homogeneous Buffer Systems
- Multiphasic Buffer Systems
- Isotachopheresis
- Buffer Additives

The Electrophoresis Apparatus

Gel Electrophoresis of DNA & RNA

Denaturing Polyacrylamide Gel

Electrophoresis of DNA & RNA

- Sample Preparation
- Gel Preparation
- Run Conditions
- Buffer
- Buffer Gradients

Applications of Denaturing Polyacrylamide Gel

- Electrophoresis of DNA and RNA
- Molecular Weight Determination
- Manual Sequencing
- Maxam & Gilbert Sequencing
- Sequencing - Sanger Method
- Gel Electrophoresis for DNA Sequencing
- Automated Sequencers
- Differential Display
- RNA Mapping
- S1 Mapping
- Ribonuclease Protection
- Primer Extension
- Analysis of DNA / Protein Interaction
- DNase I footprinting
- In-situ DNase Footprinting
- Methylation Interference Assay
- Uracil Interference Assay

Native Polyacrylamide Gel Electrophoresis of DNA

Sample Preparation

Gel Preparation

Applications of Native DNA PAGE

- PCR Analysis
- Mobility Shift Assay
- DNA/RNA Purification from PAGE Gels
- Conformational Analysis
 - Heteroduplex Analysis
 - SSCP Analysis

Agarose Gel Electrophoresis of DNA and RNA

Preparation of Agarose Gels

Preparation of Denaturing Agarose Gels

Applications of Agarose Gel Electrophoresis

Restriction Digest Mapping

DNA/RNA Purification from Agarose Gels

Electroelution

In Gel Enzyme Reactions

Pulsed Field and Field Inversion Gel Electrophoresis

RNA Electrophoresis

Preparation of RNA Samples

Gel Electrophoresis of RNA

Gel Electrophoresis of Proteins

Denaturing Protein Electrophoresis: SDS-PAGE

Sample Preparation

Gel Preparation - Denaturing Protein Gels

Gradient Gels

Applications of Denaturing Protein Electrophoresis

Measuring Molecular Weight

Gradient SDS Gels

Peptide Mapping

Analytical Gels for Peptide Mapping

Protein Purification using Denaturing Electrophoresis

Antibody Production from PAGE Purified Proteins

Native Protein Electrophoresis

Ferguson Plots

Native Gradient Gels

Sample Preparation - Native Protein Electrophoresis

Cell and Tissue Disruption

Gel Preparation - Native Protein Gels

Native Gradient Gels

Applications of Native Protein Gels

Activity Stains

Immuno-Electrophoresis / Immune-Diffusion

Two Dimensional Electrophoresis

Isoelectric Focusing

Post Electrophoretic Analysis

DNA and RNA Detection

Staining of Nucleic Acids

Blotting Nucleic Acids - Northern and Southern

Transfer Techniques

Autoradiography

Protein Detection

Fixing Proteins on Electrophoresis Gels

Staining Proteins in Gels

Guide Strip Technique

Staining of Proteins Immobilized on Membranes

Immunological Detection of Proteins

Enzyme Linked Immunosorbent Assay (ELISA)

Western Blotting

Troubleshooting Denaturing DNA-PAGE Gels page 56

Troubleshooting Agarose DNA Gels page 57

Troubleshooting Denaturing Protein Gels page 58

Useful Information for Electrophoresis page 59

Electrophoresis



Contents...

Listing of Applications you can get on our Web Site: www.apelex.fr

Selection Guide for Tanks and Power Supplies	5
Power Supplies	4-13
• PS 304 - PS 305 - PS 503	6-7
• PS 202 - PS 608 - PS 1006	8-9
• Programmable H.V. Unit for IEF, SSCP, Sequencing - PS 9009 TX	10-11
• Programmable Units - PS 9009 TX - PS 1006 P	10-11
• High Voltage Unit 3000 volts - PS 3003	12
Packs for Nucleic Acids Electrophoresis	13
Tanks for Nucleic Acids Electrophoresis	14-27
• MICROGEL 2	16
• MINIGEL 2	17
• MIDIGEL 2	18-19
• MIDIGEL XL	20-21
• MAXIGEL ECO 2	22-23
• MAXIGEL THERMO 2	24-25
• MAXIGEL XL - MAXIGEL XXL	26-27
Nucleic acids Sequencing	28-29
• Sequencing Unit	28
• Gel Dryers and Vacuum Pump	29
Tanks for Proteins Electrophoresis	30-43
Systems for SDS and Pre-Cast gels	30-43
• MINI-VERTIGEL 2 for 10 x 10 cm gels	32-33
• MINI-WIDE-VERTIGEL 2 for 20 x 10 cm gels	34-35
• MIDI-VERTIGEL 2 for 16 x 18 cm gels	36-37
• H-VERTIGEL 2 for 20 x 20 cm gels	38-39
• Accessories for Vertigel tanks	40-41
• Ma•Gel•In - Low Cost Tank	42-43
Tanks for Blotting	44-47
• Liquid Electro-Blotting	44-45
• Semi-Dry Electro-Blotting	46
• FAQ about Electro-Blotting	47
Packs for Protein Electrophoresis and Electro-Blotting	48
Pre-Mixed gels & Solutions	49
Pre-Cast gels	50-54
Buffers & Solutions	55
Troubleshooting Guide	56-58
Usual Information for Electrophoresis	59
Genetic Code Poster	60

POWER SUPPLIES



PERFORMANCE

APELEX electrophoresis power supplies are developed and produced utilizing the highest quality of components and materials, according to the worldwide standards and safety regulations. APELEX power supplies are equipped with many user-friendly design features which allow quick and simple operation.

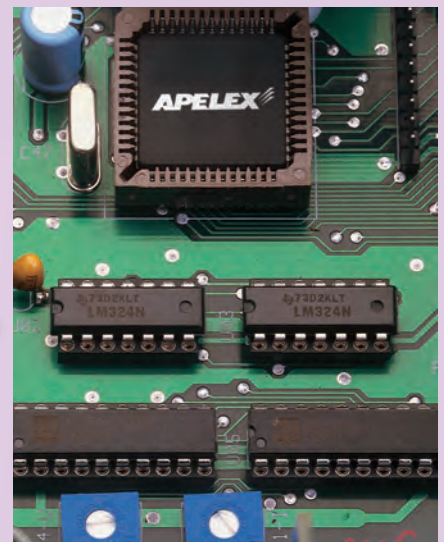
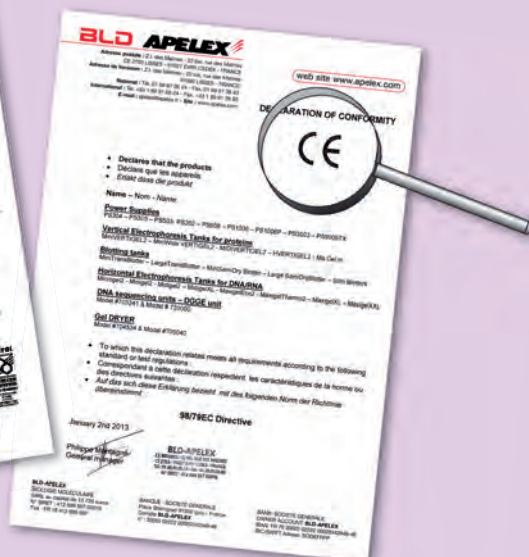


SAFETY

Our power supplies have been designed according international and CE European standards, a strict Quality Control Program ensures the excellence and high performance of all APELEX products.

QUALITY

APELEX warrants these products to be free from defects in materials and workmanship under normal service for 3 years from date of shipment. This is your guaranty that each power supply conforms to rigorous quality standards.



POWER SUPPLIES

COMPLETE RANGE

Features	PS 304 II <i>mini</i> pac	PS 305	PS 503	PS 608	PS 1006	PS 202	PS 1006 P	PS 9009 TX	PS 3003
Maximum voltage (volts)	300	300	500	600	1000	200	1000	3000	3000
Maximum Current (mA)	400	500	300	800	600	2000	600	300	300
Maximum Power (W)	100	100	100	300	300	300	300	300	300
Constant Voltage and Current	■	■	■	■	■	■	■	■	■
Constant Voltage									
Current and Power							■	■	■
Timer/Gel Saver		■/■	■/■	■	■	■	■/■	■/■	
Integrator							■	■	
Programmable							■	■	
Temperature control by external Probe							■	■	
Settings by tactile switches	■	■	■	■	■	■	■	■	■
RS232 Computer compatibility							■	■	■

Applications	PS 304 II <i>mini</i> pac	PS 305	PS 503	PS 608	PS 1006	PS 202	PS 1006 P	PS 9009 TX	PS 3003
DNA/RNA electrophoresis agarose gel	■	■	■	■	●	●	●	●	●
RFLP and DNA Fragments	■	■	■	■	●	●	●	●	●
PCR Screening	■	■	■	■	●	●	●	●	●
Nucleic acid sequencing								■	■
Isoelectro focusing SSCP - DGGE								■	
Protein Electrophoresis	■	■	■	■	■		■		■
Preparative gels SDS - Page	■	■	■	■	■		■	●	●
Semidry Blotting	●	■	●	■	●	■	●		
Western Blotting	■	■		■	●	■	●		

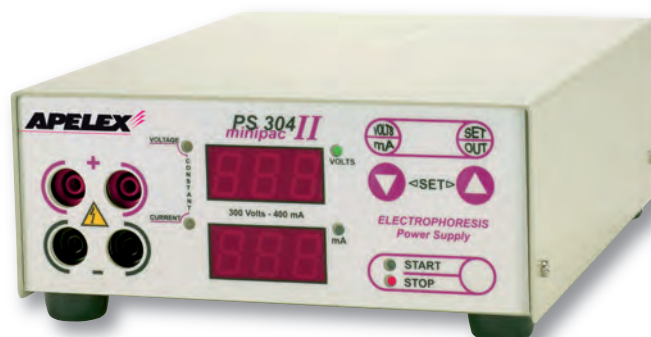
■ Recommended ● Possible

COMPACT, LIGHT WEIGHT AND POWERFUL UNITS

PS 304 II minipac II

Cat. No. 160500

300 Volts • 400 mA



PS 503

Cat. No. 172000

500 Volts • 300 mA
Timer and GEL SAVER



PS 305

Cat. No. 170000


300 Volts • 500 mA
Timer and GEL SAVER

SPECIFICATIONS

	PS 304	PS 503	PS 305
Voltage Output range / Resolution	1 ... 300 V / 1 volt steps	1 ... 500 V / 1 volt steps	1 ... 300 V / 1 volt steps
Current Output range / Resolution	1 ... 400 mA / 1 mA steps	1 ... 300 mA / 1 mA steps	1 ... 500 mA / 1 mA steps
Maximum Power	100 W	100 W	100 W
Minimum regulated value	1 volt - 1 mA	1 volt - 1 mA	1 volt - 1 mA
Minimum non regulated value	1 volt - 15 µA - 0.3 W	1 volt - 15 µA - 0.3 W	1 volt - 15 µA - 0.3 W
Fault detection	stop - audible alarm - message	stop - audible alarm - message	stop - audible alarm - message
Operating temperature	0°C ... 40°C	0°C ... 40°C	0°C ... 40°C
Dimensions (w x d x h)	17 x 24 x 7 cm	17 x 24 x 7 cm	17 x 24 x 7 cm
Weight	1.6 kg	1.6 kg	1.6 kg


WHAT IS THE GEL SAVER FUNCTION? AVOIDING DIFFUSION OF BANDS AFTER THE RUN!

After the timer cut off the run, the bands start to diffuse in the gel.





1

See diffusion of bands four hours after the run.



In order to avoid diffusion, depress the Gel Saver switch when setting the timer.





2

This led is alighted when timer is ON.

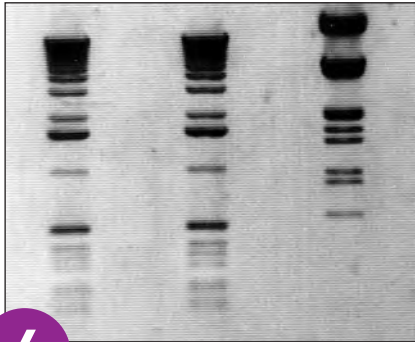
This led is alighted when Gel Saver is ON.

No risk of band diffusion when the function GEL SAVER is ON:
After the timer has cut off the run, a constant low voltage is automatically supplied until the STOP switch is depressed.



3

**Gel saver made a Good Job!
Bands are still on line
4 hours after the timer
has cut off the run!**



4

Compare with separations shot just after the run.

POWER SUPPLIES FEATURES

Last settings are automatically restored at power up.

Tactile membrane panel for precise, easy input of parameters. Easy to clean.

- Constant voltage or constant current with automatic crossover between parameters.
- Two red LEDs indicate the constant parameter.

It is possible to perform electrophoresis with constant current whilst limiting the voltage to a selected value and vice versa. Automatic cut off in case of ground leakage detection, short circuit, open circuit or sudden overload.

Automatic restart in case of power failure. When the power returns, an audible alarm rings for 10 seconds then the START mode turns on automatically at the preset values.

POWER SUPPLIES

POWERFUL, EASY TO USE AND ROBUST

PS 202

For Blotting

Cat. No. 176000

200 Volts • 1998 mA

PS 608

All Application

Cat. No. 173000

600 Volts • 800 mA

PS 1006

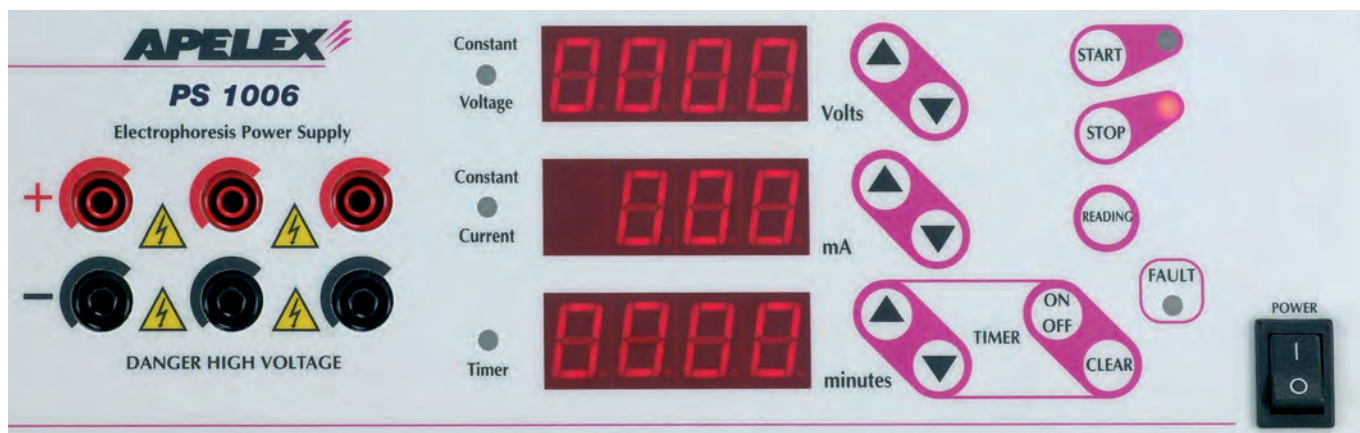
For Proteins

Cat. No. 174000

1000 Volts • 600 mA



EASY TO USE



ALL POWER SUPPLIES FEATURES

Last settings are automatically restored at power up. Tactile membrane panel for precise, easy input of parameters. Easy to clean.

- Constant voltage or constant current with automatic crossover between parameters.
- Two red LEDs indicate the constant parameter.
- The units may be operated in timed mode and will automatically terminate output. Continuous mode may also be operated.

It is possible to perform electrophoresis with constant current whilst limiting the voltage to a selected value or with constant voltage whilst limiting the current to a selected value.

If one of the non controlling output set values is reached during the run, the power supply will automatically crossover and control the output relative to that parameter.

Automatic RESTART in case of power failure during a cycle. When the power returns, an audible safety alarm rings for 10 seconds then the START mode turns on automatically at the preset values.

These microprocessor controlled power supplies are equipped with a circuit breaker which automatically cuts the electrical supply in case of ground leakage detection, (500 μ A) short circuit, open circuit (no load connected) or overload.

SPECIFICATIONS

	PS 608	PS 1006	PS 202
Output range / Resolution	1 ... 600 volt / 1 volt steps	2 ... 998 volt / 2 volt steps	1 ... 200 volt / 1 volt steps
Current Output range / Resolution	1 ... 800 mA / 1 mA steps	1 ... 600 mA / 1 mA steps	2 ... 2000 mA / 2 mA steps
Timer range / Resolution	0 ...9999 min. / 1 min. steps	0 ...9999 min. / 1 min. steps	0 ...9999 min. / 1 min. steps
Power	0.3 ... 300 watts	0.3 ... 300 watts	0.3 ... 300 watts
Displays	3	3	3
Minimum regulated value	5 volt - 1mA	10 volt - 1mA	5 volt - 2 mA
Minimum non regulated value	1 V - 15 μ A - 0.3 W	2 V - 15 μ A - 0.3 W	1 V - 15 μ A - 0.3 W
Fault detection	stop - audible alarm - fault Led	stop - audible alarm - fault Led	stop - audible alarm - fault Led
Operating temperature	0°C ... 40°C	0°C ... 40°C	0°C ... 40°C
Dimensions (w x d x h)	27 x 34 x 11 cm	27 x 34 x 11 cm	27 x 34 x 11 cm
Weight	4 kg	4 kg	4 kg

APPLICATIONS	PS 608	PS 1006	PS 202
DNA/RNA Electrophoresis agarose gel	■	●	●
RFLP and DNA Fragments	■	●	●
PCR Screening	■	●	■
Protein Electrophoresis	■	■	■
2-D Electrophoresis	●	■	
Preparative gel. SDS Page	■	■	●
Semidry Blotting	■	●	■
Western Blotting	■	●	■

■ Recommended

● Possible

PROGRAMMABLE

PS 9009 TX

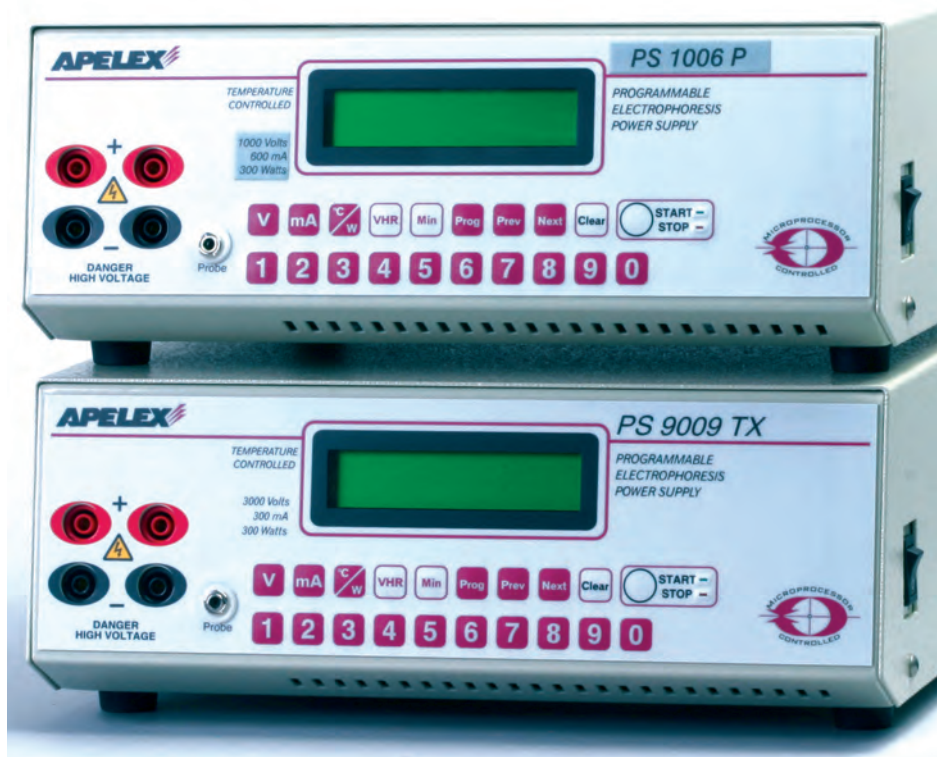
Cat. No. 119030

3000 Volts • 300 mA
300 Watts

PS 1006 P

Cat. No. 119050

1000 Volts • 600 mA
300 Watts



FEATURES

Memory capable of storing:

- 16 "one step" programs with automatic cut off.
- 8 sequenced programs with up to 10 steps which automatically follow preset values for each step.
- 1 specific program for low current $15 \mu\text{A}$ (IEF).

LCD display with 2 lines of 20 characters.
Twenty switch keyboard for monitoring each function.

Four operating modes: Constant voltage, constant current, constant power or temperature limitation.

It is possible to perform electrophoresis with a constant parameter whilst limiting the others to selected values, including temperature.

Automatic crossover from one mode to another when output limits are reached. Flashing display indicates the constant mode.

Automatic RESTART in case of power failure during a cycle. When the power returns, an audible safety alarm rings for 10 seconds then, the START mode turns on automatically at the preset values.

Recommended for over night electrophoresis and sequencing.

Automatic storage of the preset and elapsed values (minutes and V/Hr) in case of power failure or voluntary interruption during the cycle.

This microprocessor controlled power supply is equipped with a circuit breaker which automatically cuts the electrical supply in case of ground leakage detection, (500 μA) short circuit, open circuit or overload. Specific messages are displayed.

POWER SUPPLIES

TEMPERATURE CONTROL

The power supplies are designed for automatic temperature regulation as well as that for Voltage, Current and Power.

The optional temperature probe maintains constant temperature during electrophoresis by reducing or stopping the voltage and current output when the set temperature is surpassed. Once the temperature drops below the set point, both voltage and current output is resumed at the set levels. The use of the temperature regulation mode prevents the activation of the power (Watt) regulation mode.

The display (Min R) is a dedicated timer for increments of minutes while the power supply is monitored by the temperature function. This timer increments minutes only when voltage and current are turned off during the temperature regulation mode.

The main timer (Min T) remains operational at all times during the operation of the power supply and provides the automatic termination of the voltage and current output.

After the electrophoresis has automatically stopped, it may be necessary to continue electrophoresis for the time that the voltage was discontinued.



Display 1:

- Volt-mA-Watt.
- Integrator-Timer for automatic cut off.



Display 2:

- Volt-mA-Temperature limit.
- Dedicated timer indicating in minutes the duration of the temperature control timing.
- Timer for automatic cut off.



Cat. No. 119020

Optional probe for temperature control.

SPECIFICATIONS

	PS 9009 TX	PS 1006 P
Output voltage range / Resolution	10 ... 3000 Volt / 10 Volt steps	10 ... 1000 Volt / 10 volts steps
Output current range / Resolution	15 µA ... 300 mA / 1 mA steps	15 µA ... 600 mA / 1 mA steps
Output current range with Prog. #28	0 mA ... 300 mA	-
Output power range / Resolution	0.3 ... 300 watts / 1 watt steps	0.3 ... 300 watts / 1 watt steps
Temperature range / Resolution	0 ... 99°C in 1°C steps	0 ... 99°C / 1°C steps
Integrator range / Resolution	1 ... 99999 Volt-Hr / 1 Volt-Hr steps	1 ... 99999 Volt-Hr / 1 Volt-Hr steps
Timer range / Resolution	1 ... 9999 minutes / 1 minute steps	1 ... 9999 minutes / 1 minute steps
Minimum regulated value	10 Volt - 1 mA - 1 watt	10 Volt - 1 mA - 1 watt
Value display range / Resolution	0 ... 3000 Volt / 10 Volt 0 ... 300 mA / 1 mA 0 ... 300 watts / 1 watt 0 ... 99°C / 1°C 0 ... 99999 Volt-Hr / 1 Volt-Hr steps 0 ... 9999 minutes / 1 mn steps	0 ... 1000 Volt / 10 Volt 0 ... 600 mA / 1 mA 0 ... 300 watts / 1 watt 0 ... 99°C / 1°C 0 ... 99999 Volt-Hr / 1 Volt-Hr steps 0 ... 9999 minutes / 1 mn steps
Minimum non regulated value	10 Volt - 15 µA - 0.3 W	10 Volt - 15 µA - 0.3 W
Minimum output with program #28	10 Volt - 0 mA - 0 W	10 Volt - 0 mA - 0 W
Fault detection	stop, audible alarm and displayed messages	stop, audible alarm and displayed messages
Dimensions (w x d x h)	27 x 34 x 11 cm	27 x 34 x 11 cm
Weight	4 kg	4 kg

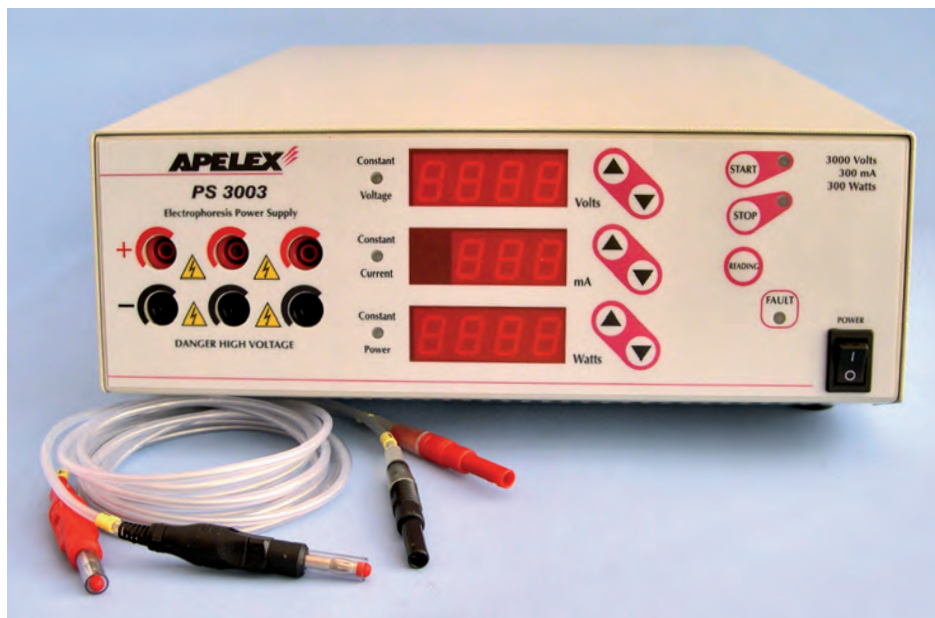
POWERFUL, EASY TO USE, ROBUST

PS 3003

Cat. No. 178000

3000 Volts • 300 mA
300 Watts

- Constant Voltage
- Constant Current
- Constant Power



FEATURES

Last settings are automatically restored at power up.

Tactile switches for precise and easy input of parameters.

Three operating modes:

Constant voltage, constant current, constant power. Three red LEDs indicate the constant parameter. It is possible to perform electrophoresis with constant mode whilst limiting the others to selected values, e.g.: constant power whilst limiting current and voltage.

Automatic crossover from one mode to another when preset output limits are reached.

Three push buttons permit selection of the following functions:

- START with green LED.
- STOP with red LED.
- PRESET for reading the preset values during electrophoresis.

Automatic RESTART in case of power failure during a cycle.

When the power returns, an audible safety alarm rings for 10 seconds then the START mode turns on automatically at the preset values.

Recommended for DNA/RNA sequencing and agarose electrophoresis, available for Protein electrophoresis.

Three clear displays for reading the actual and preset voltage, current and power.

Three safety outlets.

This microprocessor controlled power supply is equipped with a circuit breaker which automatically cuts the electrical supply in case of ground leakage detection, (500 μ A) short circuit, open circuit (no load connected) or overload.

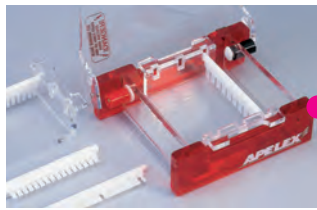
A yellow blinking LED and an audible safety alarm ringing for 10 seconds indicate the FAULT situation.

SPECIFICATIONS

Output range/ resolution	10-3000 volts/10 volts 15 μ A-300mA/1mA 0.3-300 watts/1 watt
Maximum power	300 watts
Minimum regulated value	10 volts-1mA-1 watt
Value display range	0/3000 volts/10 volts 0-300mA/1mA 0-300 watts/1 watt
Minimum output	10 volts-15 μ A-0,3 W
Fault detection	stop and audible alarm
Operating temperature	0°C - 40°C
Dimensions (w x d x h)	27 x 34 x 11 cm
Weight	4 kg

POWER SUPPLIES

COST EFFECTIVE SOLUTIONS
WITH OUR DNA ELECTROPHORESIS PACKS



PACK A
MINIGEL 2

PS 304



PACK 96S
MIDIGEL XL 96 samples

PS 304



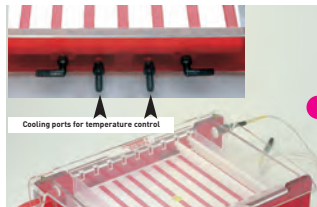
PACK B
MIDIGEL XL

PS 304



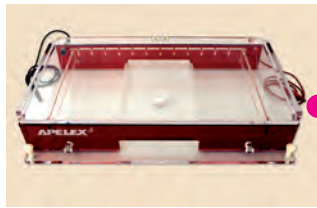
PACK C
MAXIGEL ECO 2

PS 305



PACK F
MIDIGEL 2

PS 304



PACK G
MAXIGEL THERMO 2

PS 305



PACK H
MAXIGEL XXL

PS 608

REFERENCES

DNA Tanks - Pages 14-27

PACK A	Cat. No. 3110PA	Tank MINIGEL 2	Cat No. 311000	+	Power Supply PS 304	Cat. No. 160500
PACK 96S	Cat. No. 371696	Tank MIDIGEL XL 96 samples	Cat No. 371000	+	Power Supply PS 304	Cat. No. 160500
PACK B	Cat. No. 3700PB	Tank MIDIGEL XL	Cat No. 370000	+	Power Supply PS 304	Cat. No. 160500
PACK C	Cat. No. 3410PC	Tank MAXIGEL ECO 2	Cat No. 341000	+	Power Supply PS 305	Cat. No. 170000
PACK F	Cat. No. 3210PF	Tank MIDIGEL 2	Cat No. 321000	+	Power Supply PS 304	Cat. No. 160500
PACK G	Cat. No. 3310PG	Tank MAXIGEL THERMO 2	Cat No. 331000	+	Power Supply PS 305	Cat. No. 170000
PACK H	Cat. No. 8100PH	Tank MAXIGEL XXL	Cat No. 812340	+	Power Supply PS 608	Cat. No. 173000

TANKS FOR NUCLEIC ACIDS

SUBMARINE AGAROSE GELS

ROBUSTNESS

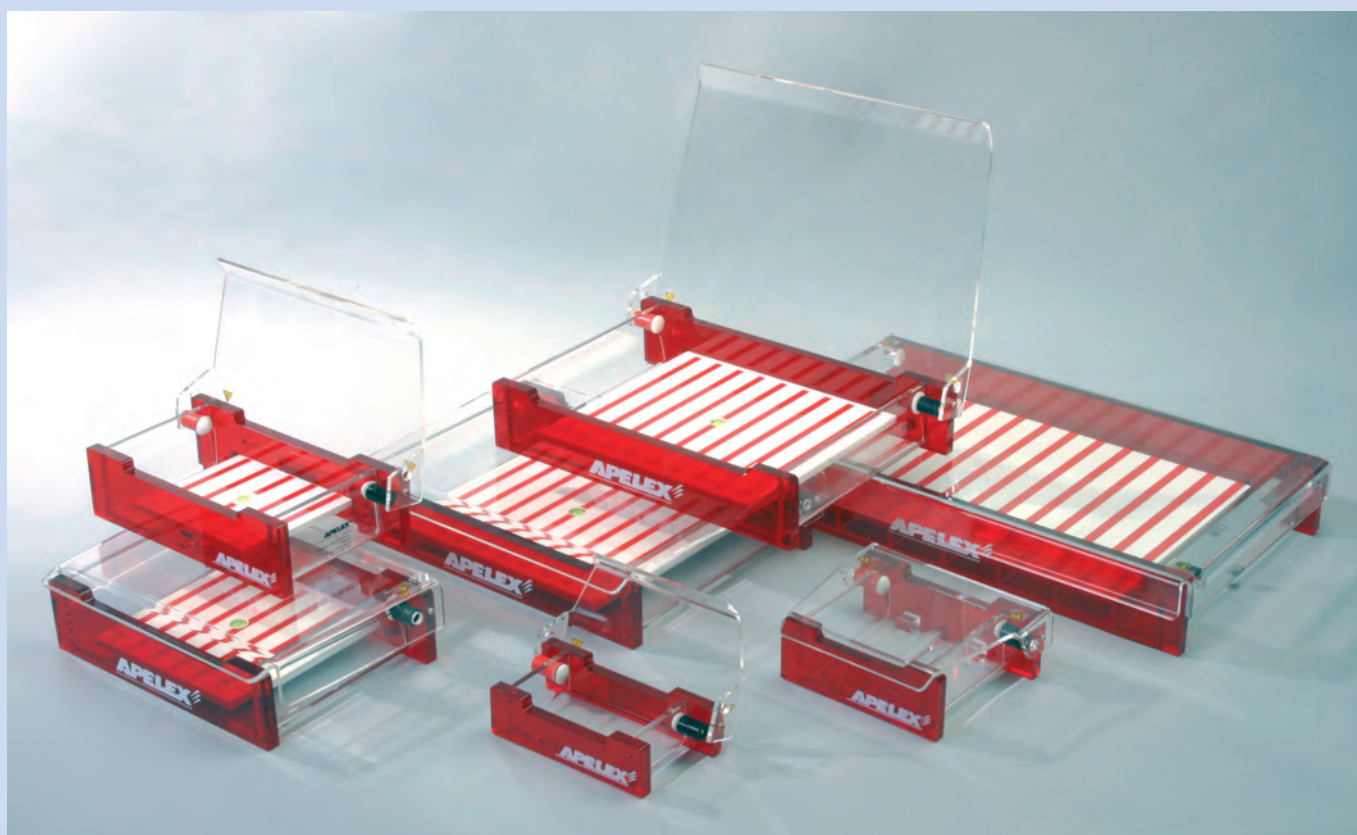
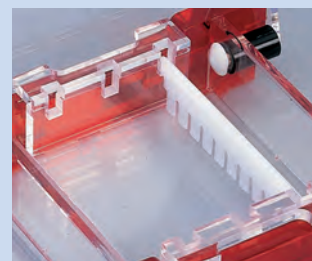
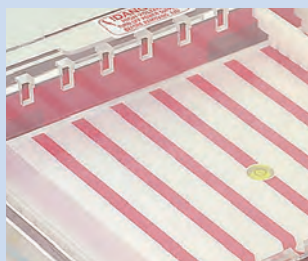
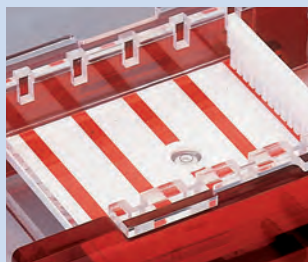
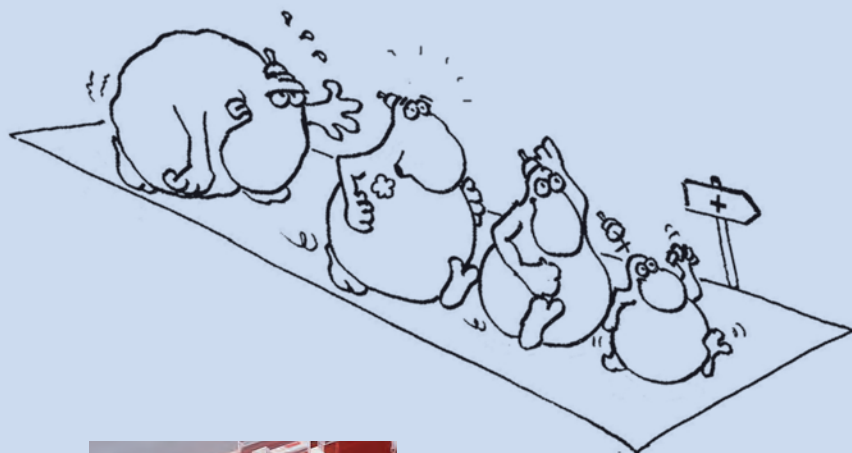
Tanks, lids and gel trays are made of 10 or 6 mm thick acrylic. No injection molded part, no warping in the event of too hot media being poured or overheating running situations.

QUALITY

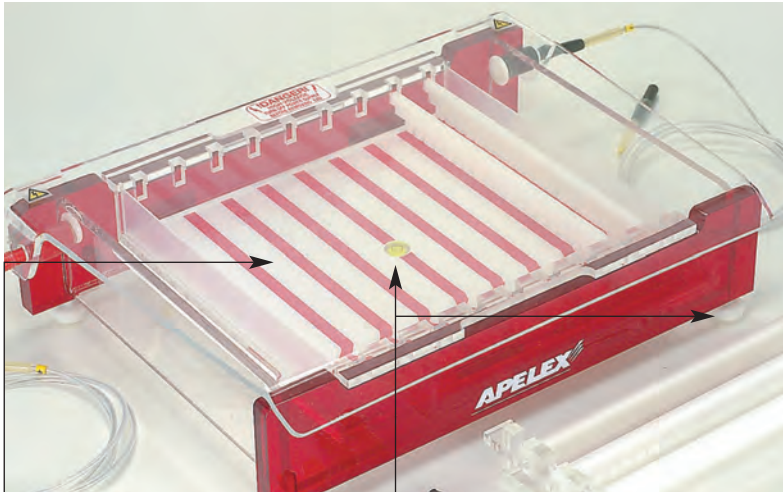
A wide range of precision-made DELRIN combs LIFE GUARANTIED. Many thicknesses and tooth configurations accomodate many samples including compatibility with multichannels pipettes or large sample volume.

EASE OF USE

U.V. transparent gel trays which enable to view ethidium bromide stained gels. Include a fluorescente rule.

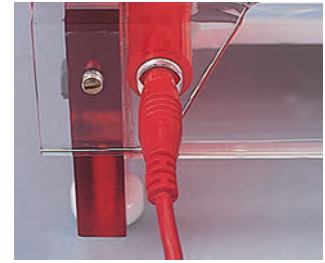


TANKS FOR NUCLEIC ACIDS

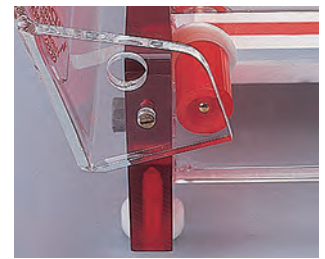


White gel table with bright red visualization strips to enhance visibility and make sample loading easier.

Levelling feet at each corner and levelling bubble allow perfect long size gel running MINIGEL 2 and MICROGEL 2 have rubber feet to reduce slipping.



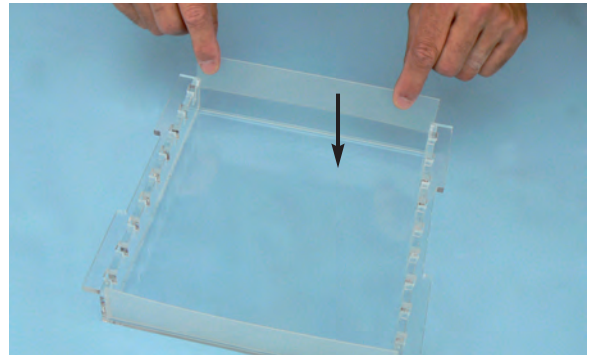
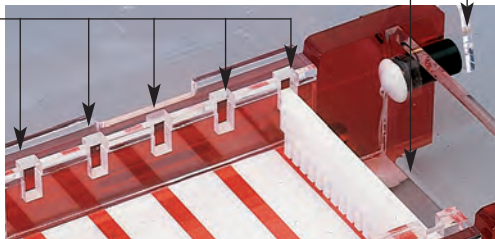
When the lid is closed, power cords must be completely removed to allow the opening.



When the lid is open a barrier prevents power leads to be connected to the tank.

Gold plated connectors and platinum electrodes avoid corrosion and poor electrical contact.

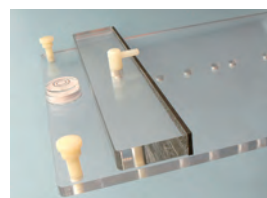
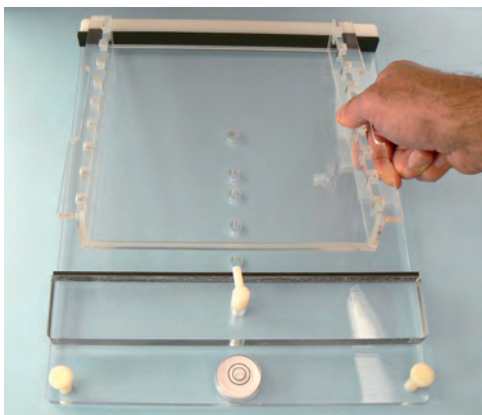
Multiple comb slots allow flexible capacities. Direct position of the comb, the height does not have to be adjusted.



Removable casting gates fit into grooves at each side of the gel tray to create tape free seals. The gel is directly poured in the gel tray outside or inside the tank. One set of two removable casting gates is provided with each gel tray.

OPTION: Separate Gel casting base

Designed for the full range of gel trays, the casting base Cat. No. 340500 and Cat. No. 340600 can be separately provided. They are equipped by three adjustable feet and one levelling bubble.



TANKS FOR NUCLEIC ACIDS

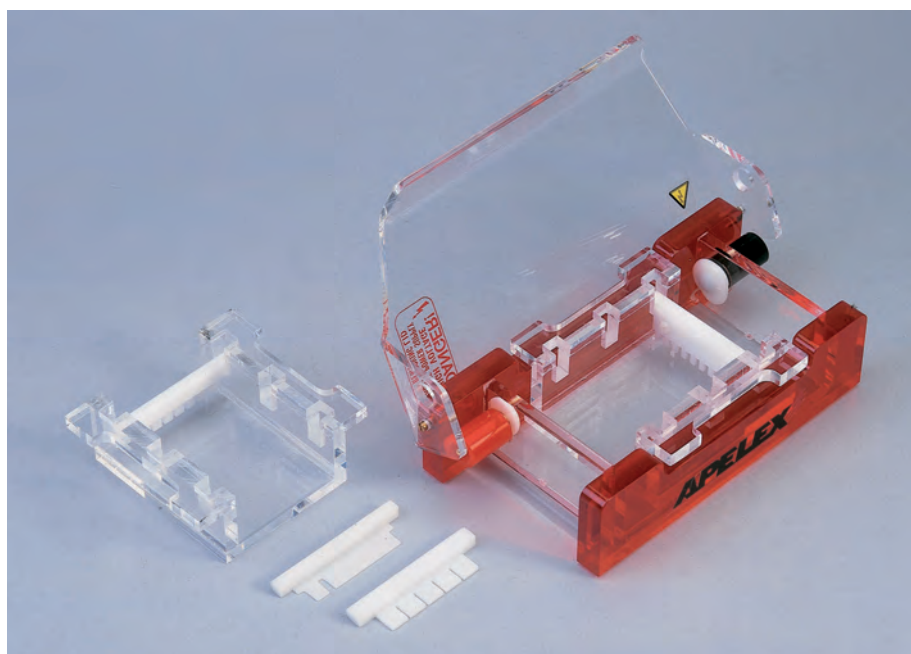
MICROGEL 2

Gel dimension 5 x 8 cm (w x l)
2 comb Slots

APPLICATION: Designed for very fast separations and small scale procedures of nucleic acids, restriction fragments in agarose gel.

- Compact size.

Whole unit can be placed on U.V. table



ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS

TECHNICAL SPECIFICATIONS

Buffer Volume	150 ml
Maximum number of samples	20
Unit dimensions (w x l x h)	19 x 11 x 6 cm

ORDERING INFORMATION

301000	MICROGEL 2. Includes: Removable U.V. transparent gel tray 5 x 8 cm (w x l), 2 removable casting gates, 1.0 mm thickness 10 teeth comb, sample volume 10 µl*, safety lid, set of power leads, user's manual			
	Thickness	Teeth	Sample volume*	Well width
300051	Comb 1.0 mm	5	24 µl	6.0 mm
300101	Comb 1.0 mm	10	10 µl	2.5 mm
300052	Comb 2.0 mm	5	48 µl	6.0 mm
300102	Comb 2.0 mm	10	20 µl	2.5 mm
300111	Prep Comb 1.0 mm 1 sample/1marker		160 µl/10µl	40.0/2.5 mm
301115	Prep Comb 1.5 mm 1 sample/1 marker		240 µl/15 µl	40.0/2.5 mm
301100	U.V. transparent tray 5 x 8 cm (w x l) Supplied with 2 removable casting gates			
320700	Set of power leads			
340500	Separate gel Casting base with adjustable feet and bubble			

* for a 5 mm thickness gel

SUGGESTED POWER SUPPLIES FOR MICROGEL 2 & MINIGEL 2

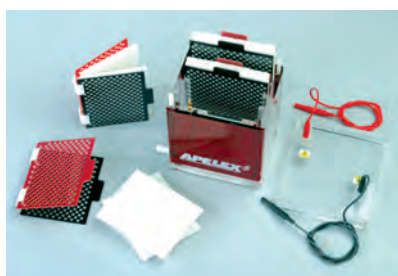


Cat. No. 160500
Page 6



Cat. No. 170000
Page 6

SUGGESTED BLOTTING TANKS FOR MICROGEL 2 & MINIGEL 2



MiniGel Transblotter
Cat. No. 430000
Page 44



Slim blotter
Cat. No. 504002
Page 45

TANKS FOR NUCLEIC ACIDS

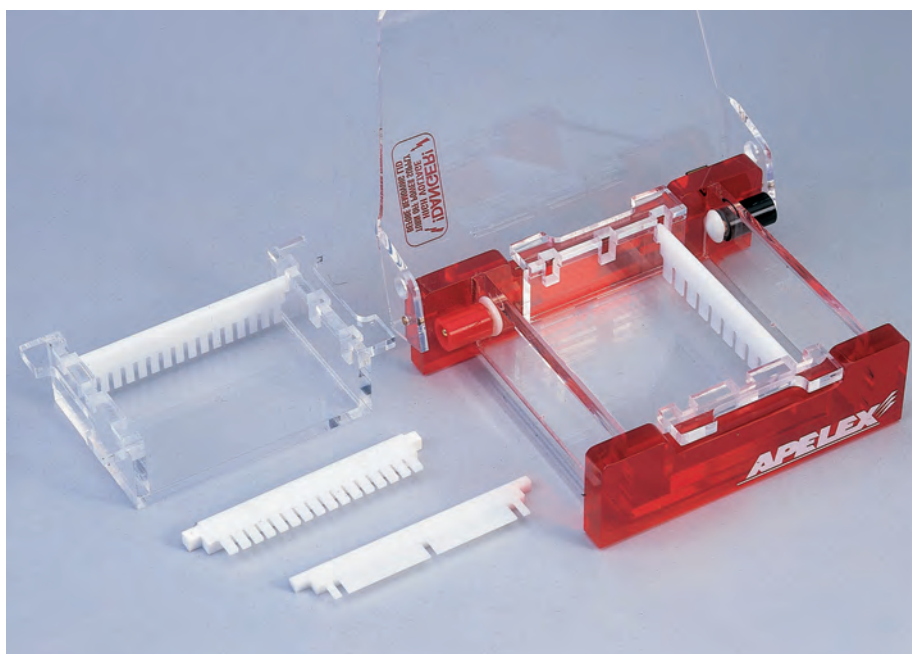
MINIGEL 2

Gel dimension 10 x 8 cm (w x l)
2 comb Slots

APPLICATION: Designed for very fast separations and small scale procedures of nucleic acids, restriction fragments in agarose gel.

- Compact size.

Whole unit can be placed on U.V. table



TECHNICAL SPECIFICATIONS	
Buffer Volume	250 ml
Maximum number of samples	36
Unit dimensions (w x l x h)	19 x 16 x 6 cm

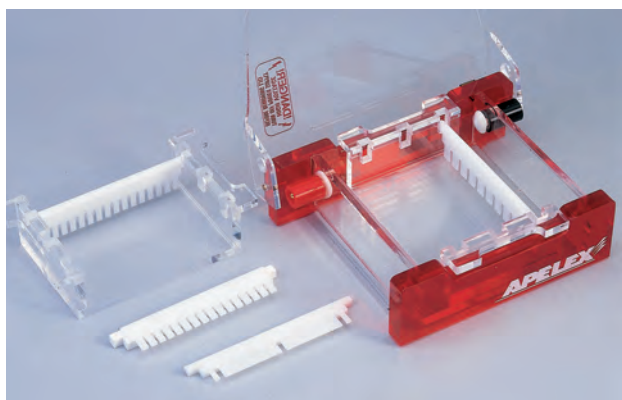
ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS

ORDERING INFORMATION

311000	MINIGEL 2. Includes: Removable U.V. transparent gel tray 10 x 8 cm (w x l), 2 removable casting gates, 1.0 mm thickness 16 teeth comb, sample volume 12 µl*, safety lid, set of power leads, user's manual			
3110PA	PACK A. Includes: MINIGEL 2 Fully equipped as above Cat. No. 311000 + Power supply PS 304			
	Thickness	Teeth	Sample volume*	Well width
320101	Comb 1.0 mm	10	24 µl	6.0 mm
320102	Comb 2.0 mm	10	48 µl	6.0 mm
320103	Comb 3.0 mm	10	72 µl	6.0 mm
320161	Comb 1.0 mm	16	12 µl	3.0 mm
320162	Comb 2.0 mm	16	24 µl	3.0 mm
320163	Comb 3.0 mm	16	36 µl	3.0 mm
320181	Comb 1.0 mm	18	14 µl	3.5 mm
compatible with multichannel pipettes				
320121	Prep Comb 1.0 mm 1 sample/2 markers		360 µl/2 x 12 µl	90.0/3 mm
320122	Prep Comb 2.0 mm 1 sample/2 markers		720 µl/2 x 24 µl	90.0/3 mm
321050	U.V. transparent tray 10 x 8 cm (w x l) Supplied with 2 removable casting gates			
320700	Set of power leads			
340500	Separate gel Casting base with adjustable feet and bubble			

* for a 5 mm thickness gel

PACK A - Cat. No. 3110PA



INCLUDES: MINIGEL 2 + PS 304
 ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS



MIDIGEL 2

APPLICATION: Accomodates standard gels for both analytical and preparative studies of nucleic acid. Designed for separations of DNA and RNA restriction fragments in agarose gel as well as PCR® screening and RFLP.

- Maximum number of samples: 72 with 4 combs.
- Gel tray 10 x 14 cm has 4 spaces for combs insertion.
- Gel tray 10 x 8 cm has 2 spaces for combs insertion.
- Combs 10, 16 and 18 teeth compatible with multichannel pipettes.
- Preparative combs also available.
- 4 adjustable feet and bubble level.
- Red strips for wells vizualisation.



ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS

TECHNICAL SPECIFICATIONS

Buffer Volume	800 ml
Unit dimensions (w x l x h)	28 x 16 x 9 cm

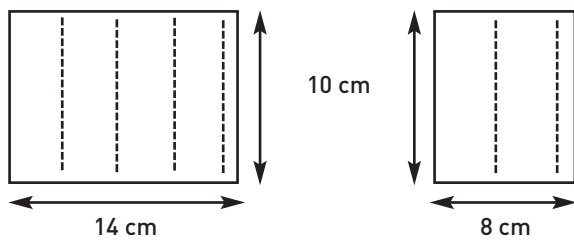
ORDERING INFORMATION

321000	MIDIGEL 2. Includes: Removable U.V. transparent gel tray 10 x 14 cm (w x l), 2 removable casting gates, 2.0 mm thickness 16 teeth comb, sample volume 24 µl*, safety lid, set of power leads, buffer circulation accessories, user's manual			
3210PF	PACK F. Includes: MIDIGEL 2 Fully equipped as above Cat. No 321000 + Power supply PS 304			
	Thickness	Teeth	Sample volume*	Well width
320101	Comb 1.0 mm	10	24 µl	6.0 mm
320102	Comb 2.0 mm	10	48 µl	6.0 mm
320103	Comb 3.0 mm	10	72 µl	6.0 mm
320161	Comb 1.0 mm	16	12 µl	3.0 mm
320162	Comb 2.0 mm	16	24 µl	3.0 mm
320163	Comb 3.0 mm	16	36 µl	3.0 mm
320181	Comb 1.0 mm	18	14 µl	3.5 mm
compatible with multichannel pipettes				
320121	Prep Comb 1.0 mm	1 sample/2 markers	360 µl/2 x 12 µl	90.0/3 mm
320221	Prep Comb 1.0 mm	2 samples/2 markers	160 µl/2 x 12 µl	40.0/3 mm
320122	Prep Comb 2.0 mm	1 sample/2 markers	720 µl/2 x 24 µl	90.0/3 mm
321100	U.V. transparent tray 10 x 14 cm (w x l) Supplied with 2 removable casting gates			
321050	U.V. transparent tray 10 x 8 cm (w x l) Supplied with 2 removable casting gates			
320700	Set of power leads			
340500	Separate gel Casting base with adjustable feet and bubble			

* for a 5 mm thickness gel

TANKS FOR NUCLEIC ACIDS

NUMBER OF COMBS AND GEL DIMENSIONS



Gel tray - Cat. No. 321100
4 comb slots

Gel tray - Cat. No. 321050
2 comb slots



Delrin Combs

SUGGESTED POWER SUPPLIES (Page 6)

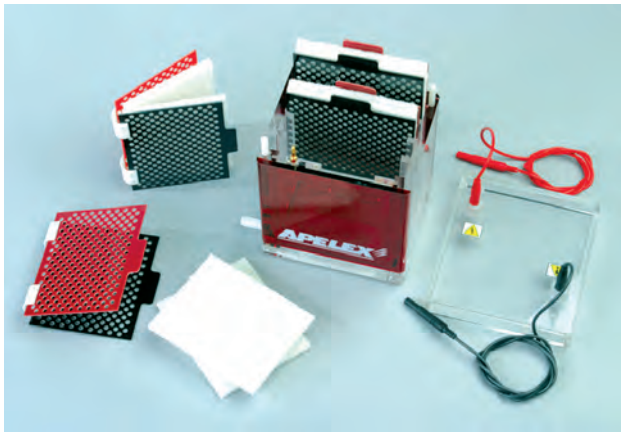


PS 304 - Cat. No. 160500



PS 305 - Cat. No. 170000

SUGGESTED BLOTTING TANKS (Pages 44-45)



Mini Transblotter - Cat. No. 430000



Slim blotter - Cat. No. 504001

PACK F - Cat. No. 3210PF



INCLUDES: MIDIGEL 2 + PS 304
ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS



Page 6

MIDIGEL XL

APPLICATION: Accommodates standard gels for both analytical and preparative studies of nucleic acid. Designed for separations of DNA and RNA restriction fragments in agarose gel as well as PCR® screening and RFLP.

- Short and long length separation according the selected Gel Tray.
- Gel tray 15 x 20 cm has 8 spaces for comb insertion.
- Gel tray 15 x 17 cm has 6 spaces for combs insertion.
- Gel tray 15 x 12 cm has 4 spaces for combs insertion.
- Gel tray 15 x 7 cm has 2 spaces for combs insertion.
- Conventional, compatible with multichannel pipettes and preparative combs.
- 4 adjustable feet and bubble level.
- Red strips for wells visualisation.
- Ports for buffer circulation.



ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS

TECHNICAL SPECIFICATIONS

Buffer Volume	1 200 ml
Unit dimensions (w x l x h)	30 x 20 x 8 cm

ORDERING INFORMATION

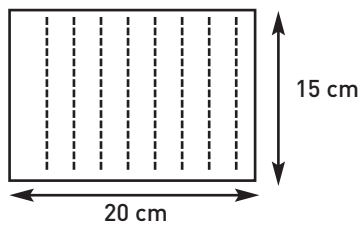
370000	MIDIGEL XL. Includes: Removable U.V. transparent gel tray 15 x 17 cm (w x l), 2 removable casting gates, 2.0 mm thickness 27 teeth comb, sample volume 32 µl*, safety lid, set of power leads, buffer circulation accessories, user's manual
3700PB	PACK B. Includes: MIDIGEL XL Fully equipped as above Cat. No. 370000 + Power supply PS 304
371000	MIDIGEL XL. Fully equipped with 6 combs Cat. No. 371601 for running 96 samples on a 15 x 17 cm gel. Includes: removable U.V. transparent gel tray 15 x 17 cm (w x l), equipped by 2 removable casting gates, U.V. transparent gel tray 15 x 12 cm (w x l), equipped by 2 removable casting gates, 6 x 1.0 mm thickness 16 teeth comb, compatible with multichannel pipettes, sample volume 24 µl*, safety lid, set of power leads, buffer circulation accessories, user's manual
371696	PACK 96S. Includes: MIDIGEL XL Fully equipped as above Cat. No. 371000 + Power supply PS 304

	Thickness	Teeth	Sample volume*	Well width
371601	Comb 1.0 mm**	16	24 µl	6.0 mm
371602	Comb 2.0 mm**	16	48 µl	6.0 mm
371603	Comb 3.0 mm**	16	72 µl	6.0 mm
372701	Comb 1.0 mm	27	16 µl	4.0 mm
372702	Comb 2.0 mm	27	32 µl	4.0 mm
372703	Comb 3.0 mm	27	48 µl	4.0 mm
373201	Comb 1.0 mm**	32	14 µl	3.5 mm
37P111	Prep Comb 1.0 mm 1 sample/1 marker		140 µl/24 µl	138/5 mm
37P112	Prep Comb 2.0 mm 1 sample/1 marker		280 µl/48 µl	138/5 mm
37P113	Prep Comb 3.0 mm 1 sample/1 marker		420 µl/72 µl	138/5 mm
371520	U.V. transparent tray 15 x 20 cm (w x l) Supplied with 2 removable casting gates			
371517	U.V. transparent tray 15 x 17 cm (w x l) Supplied with 2 removable casting gates			
371512	U.V. transparent tray 15 x 12 cm (w x l) Supplied with 2 removable casting gates			
371507	U.V. transparent tray 15 x 7 cm (w x l) Supplied with 2 removable casting gates			
320700	Set of power leads			
340500	Separate gel Casting base with adjustable feet and bubble			

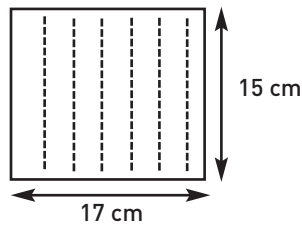
* for a 5 mm thickness gel - **compatible with multichannel pipettes

TANKS FOR NUCLEIC ACIDS

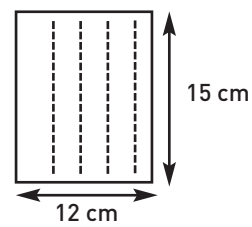
NUMBER OF COMBS AND GEL DIMENSIONS



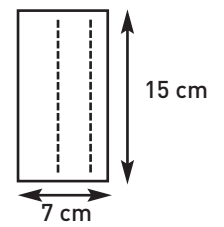
Gel tray - Cat. No. 371520
8 comb slots



Gel tray - Cat. No. 371517
6 comb slots



Gel tray - Cat. No. 371512
4 comb slots



Gel tray - Cat. No. 371507
2 comb slots

SUGGESTED POWER SUPPLIES (Page 6)

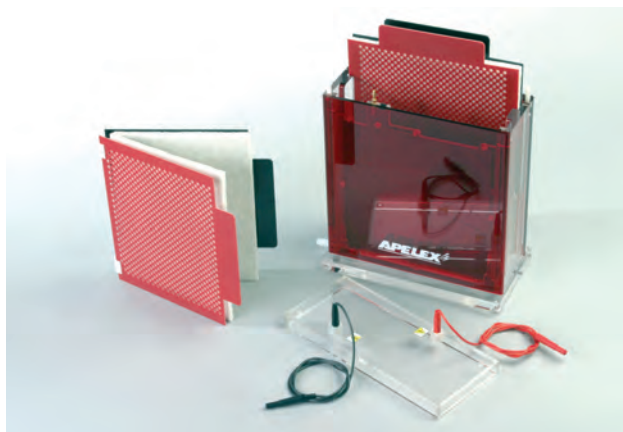


PS 304 - Cat. No. 160500



PS 305 - Cat. No. 170000

SUGGESTED BLOTTING TANKS (Pages 44-45)



Mini transblotter - Cat. No. 440000



Slim blotter - Cat. No. 504017

PACK 96S - Cat. No. 371696



INCLUDES: MIDIGEL XL for 96 samples - Cat. No. 371000
+ PS 304



Page 6

MAXIGEL ECO 2

APPLICATION: DNA/RNA analysis and quick screening of all samples from 3 x 96 position PCR® thermal cycler on one gel, restriction fragments screening.

- Long length separation, 12 cm or 24 cm according to the selected Gel Tray.
- Maximum number of samples 352 using 8 combs Cat. No. 334421 or Cat. No. 334422 compatible with multichannel pipettes.
- Gel tray 20 x 24 cm has 8 spaces for comb insertion.
- Gel tray 20 x 12 cm has 2 spaces for combs insertion.
- Combs 10, 20, 30 teeth and preparative models.
- Double combs 44 / 21 teeth compatible with multichannel pipettes.
- 4 adjustable feet and bubble level.
- Red strips for wells visualisation.
- Ports for buffer circulation.



ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS

TECHNICAL SPECIFICATIONS

Buffer Volume	1 800 ml
Unit dimensions (w x l x h)	28 x 37 x 9 cm

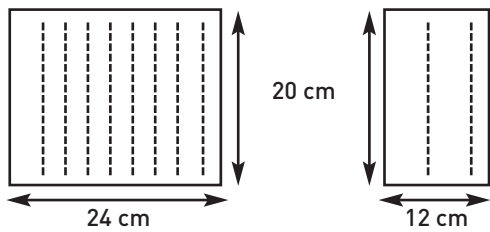
ORDERING INFORMATION

341000	MAXIGEL ECO 2. Includes: Removable U.V. transparent gel tray 20 x 24 cm (w x l), 2 removable casting gates, 1.0 mm thickness double sided comb, 44/21 teeth, sample volume 14/24 µl* (Cat. No. 334421) Compatible with multichannel pipettes, safety lid, set of power leads, buffer circulation accessories, user's manual			
3410PC	PACK C. Includes: MAXIGEL ECO 2 Fully equipped as above Cat. No. 341000 + Power supply PS 305			
	Thickness	Teeth	Sample volume*	Well width
330101	Comb 1.0 mm	10	64 µl	16.0 mm
330102	Comb 2.0 mm	10	128 µl	16.0 mm
330103	Comb 3.0 mm	10	192 µl	16.0 mm
330201	Comb 1.0 mm	20	26 µl	6.5 mm
330202	Comb 2.0 mm	20	52 µl	6.5 mm
330203	Comb 3.0 mm	20	78 µl	6.5 mm
330301	Comb 1.0 mm	30	16 µl	4.0 mm
330302	Comb 2.0 mm	30	32 µl	4.0 mm
330303	Comb 3.0 mm	30	48 µl	4.0 mm
334421	Double Sided Comb 1.0 mm**	44/21	14/24 µl	3.5/6 mm
334422	Double Sided Comb 2.0 mm**	44/21	28/48 µl	3.5/6 mm
330412	Prep Comb 1.0 mm 1 sample/2 markers		360 µl/2 x 12 µl	90.0/3 mm
330414	Prep Comb 1.0 mm 2 samples/2 markers		160 µl/2 x 12 µl	40.0/3 mm
331100	U.V. transparent tray 20 x 24 cm (w x l) Supplied with 2 removable casting gates			
331050	U.V. transparent tray 20 x 12 cm (w x l) Supplied with 2 removable casting gates			
320700	Set of power leads			
340500	Separate gel Casting base with adjustable feet and bubble			

* for a 5 mm thickness gel - **compatible with multichannel pipettes

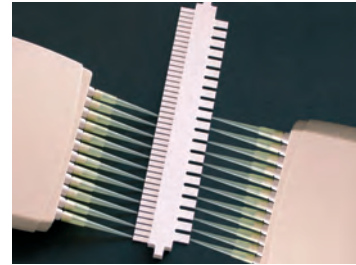
TANKS FOR NUCLEIC ACIDS

NUMBER OF COMBS AND GEL DIMENSIONS



Gel tray - Cat. No. 331100
8 comb slots

Gel tray - Cat. No. 331050
2 comb slots



Double Combs - Cat. No. 334421 and Cat. No. 334422.
Both side are compatible with multichannel pipettes
21 and 44 teeth

SUGGESTED POWER SUPPLIES (Page 6)

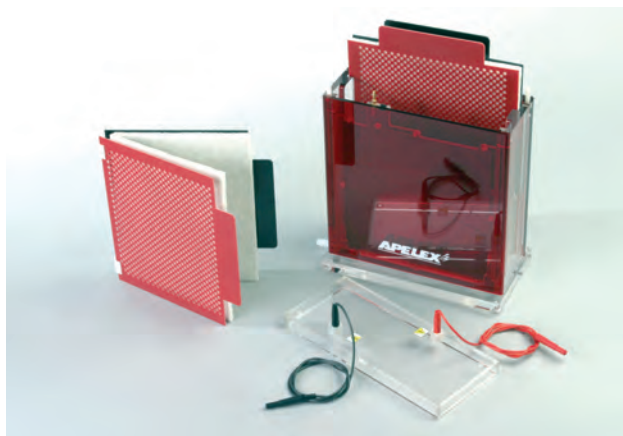


PS 304 Power Supply - Cat. No. 160500



PS 305 Power Supply - Cat. No. 170000

SUGGESTED BLOTTING TANKS (Pages 44-45)



Mini transblotter - Cat. No. 440000



Slim blotter - Cat. No. 504021

PACK C - Cat. No. 3410PC



INCLUDES: MAXIGEL ECO 2 + PS 305
ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS



MAXIGEL THERMO 2

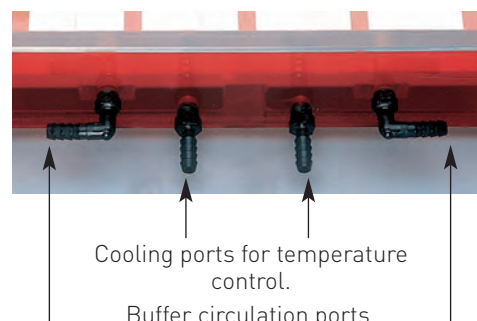
APPLICATION: Designed for high resolution electrophoresis including DNA analysis and PCR® screening and long length separation of 24 cm. DNA/RNA analysis and quick screening of all samples from 3 x 96 position PCR® thermal cycler on one gel.

- Maximum number of samples 352 using 8 combs compatible with multichannel pipettes.
- Gel tray 20 x 24 cm has 8 spaces for combs insertion.
- Gel tray 20 x 12 cm has 2 spaces for combs insertion.
- Combs 10, 20, 30 wells and preparative models.
- Double combs 44 / 21 teeth compatible with multichannel pipettes.
- 4 adjustable feet and bubble level.
- Ports for buffer circulation and cooling for temperature control.



ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS

Equipped with cooling built-in channel for buffer temperature control that can be maintained by circulating water through the base.



TECHNICAL SPECIFICATIONS

Buffer Volume	1 800 ml
Unit dimensions (w x l x h)	28 x 37 x 9 cm

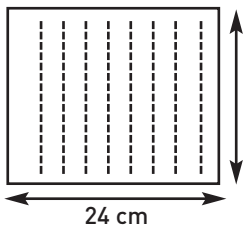
ORDERING INFORMATION

331000	MAXIGEL THERMO 2. Includes: Removable U.V. transparent gel tray 20 x 24 cm (w x l), 2 removable casting gates, 1.0 mm thickness double sided comb, 44/21 teeth, sample volume 14/24 µl* [Cat. No. 334421] Compatible with multichannel pipettes, safety lid, set of power leads, buffer and cooler circulation accessories, user's manual			
3310PG	PACK G. Includes: MAXIGEL THERMO 2 Fully equipped as above Cat. No. 331000 + Power supply PS 305			
	Thickness	Teeth	Sample volume*	Well width
330101	Comb 1.0 mm	10	64 µl	16.0 mm
330102	Comb 2.0 mm	10	128 µl	16.0 mm
330103	Comb 3.0 mm	10	192 µl	16.0 mm
330201	Comb 1.0 mm	20	26 µl	6.5 mm
330202	Comb 2.0 mm	20	52 µl	6.5 mm
330203	Comb 3.0 mm	20	78 µl	6.5 mm
330301	Comb 1.0 mm	30	16 µl	4.0 mm
330302	Comb 2.0 mm	30	32 µl	4.0 mm
330303	Comb 3.0 mm	30	48 µl	4.0 mm
334421	Double Sided Comb 1.0 mm**	44/21	14/24 µl	3.5/6 mm
334422	Double Sided Comb 2.0 mm**	44/21	28/48 µl	3.5/6 mm
330412	Prep Comb 1.0 mm 1 sample/2 markers		360 µl/2 x 12 µl	90.0/3 mm
330414	Prep Comb 1.0 mm 2 samples/2 markers		160 µl/2 x 12 µl	40.0/3 mm
331100	U.V. transparent tray 20 x 24 cm (w x l) Supplied with 2 removable casting gates			
331050	U.V. transparent tray 20 x 12 cm (w x l) Supplied with 2 removable casting gates			
320700	Set of power leads			
340500	Separate gel Casting base with adjustable feet and bubble			
115612	Cooler F12ED working temp. range -20 +100°C Pump rate 15L/min. 0.35 bar			

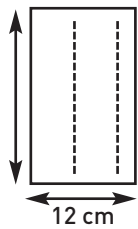
* for a 5 mm thickness gel - **compatible with multichannel pipettes

TANKS FOR NUCLEIC ACIDS

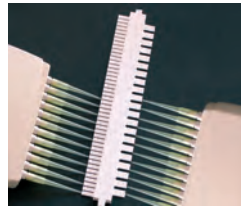
NUMBER OF COMBS AND GEL DIMENSIONS



Gel tray - Cat. No. 331100
8 comb slots



Gel tray - Cat. No. 331050
2 comb slots



Double Combs - Cat. No. 334421 and
Cat. No. 334422. Both side are compatible with
multichannel pipettes 21 and 44 teeth



Cooler F12-ED

SUGGESTED POWER SUPPLIES (Page 6)

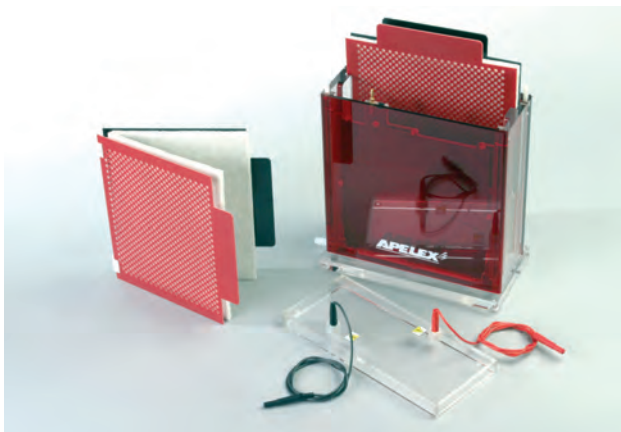


PS 304 - Cat. No. 160500



PS 305 - Cat. No. 170000

SUGGESTED BLOTTING TANKS (Pages 44-45)



Mini transblotter - Cat. No. 440000



Slim blotter - Cat. No. 504021

PACK G - Cat. No. 3310PG



INCLUDES: MAXIGEL THERMO 2 + PS 305
ONE FREE GEL TRAY WHEN ORDERING 2 ADDITIONAL COMBS



Page 6

TANKS FOR NUCLEIC ACIDS

MAXIGEL XL

Cat. No. 812325

UP TO 500 SAMPLES!

Designed for: Gel tray 23 x 25 cm

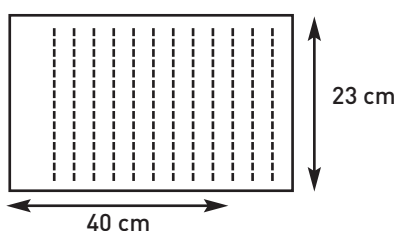
Cat. No. 8102325

TECHNICAL SPECIFICATIONS

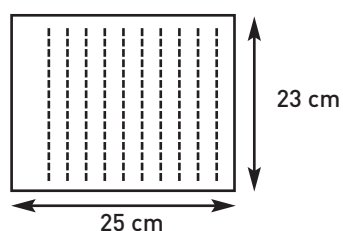
Buffer Volume	3 000 ml
Unit dimensions (w x l x h)	32 x 37,5 x 10,5 cm



NUMBER OF COMBS AND GEL DIMENSIONS



Gel tray - Cat. No. 8112340
12 comb slots
for MAXIGEL XXL only



Gel tray - Cat. No. 8102325
10 comb slots
for MAXIGEL XL and XXL



Gel Casting base - Cat. No. 340600,
designed for:
- Gel tray 23 x 25 cm - Cat. No. 8102325
- Gel tray 23 x 40 cm - Cat. No. 8112340

MAXIGEL XXL

Cat. No. 812340

UP TO 600 SAMPLES!

With Gel tray 23 x 40 cm - Cat. No. 8112340

Also designed for:

Gel tray 23 x 25 cm - Cat. No. 8102325

TECHNICAL SPECIFICATIONS

Buffer Volume	4 500 ml
Unit dimensions (w x l x h)	32 x 53 x 10,5 cm

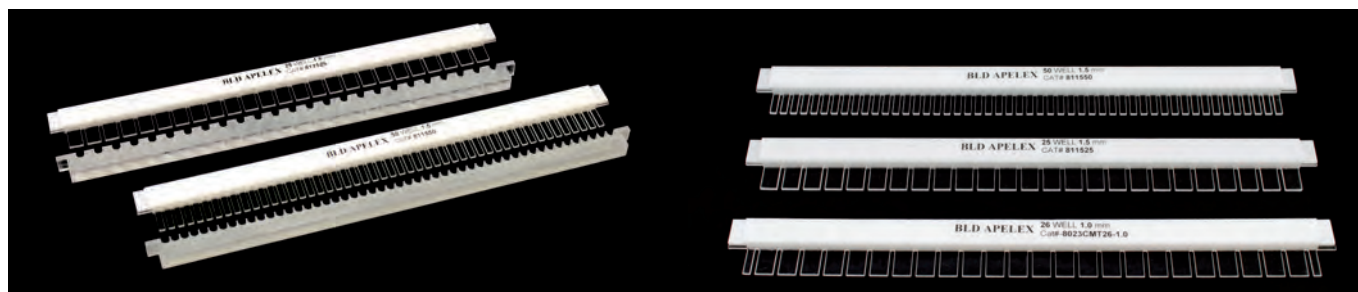


PACK H - Cat. No. 8100PH

INCLUDES: MAXIGEL XXL + PS 608



TANKS FOR NUCLEIC ACIDS



Sample loading guides

Multichannel compatible combs

APPLICATION: Designed for high resolution electrophoresis including DNA analysis, PCR® screening and long length separation of 25 cm with MAXIGEL XL and 40 cm with MAXIGEL XXL. DNA/RNA analysis and quick screening of samples from five or six 96 position PCR® thermal cycler using 25 cm length gel tray or 40 cm length gel tray.

ORDERING INFORMATION

812325	MAXIGEL XL. Includes:			
8102325	Removable U.V. transparent gel tray 23 x 25 cm (w x l) for up to 10 combs			
810125	2 x Combs 25 teeth thickness 1 mm, compatible with multichannel pipettes			
810150	2 x Combs 50 teeth thickness 1 mm, compatible with multichannel pipettes			
340600	Gel Casting base with adjustable feet and bubble designed to hold gel tray 23 x 40 cm and 23 x 25 cm			
810270	Safety lid with attached power leads			
810280	Accessories for buffer circulation			
812340	MAXIGEL XXL. Includes:			
8112340	Removable U.V. transparent gel tray 23 x 40 cm (w x l) for up to 12 combs			
810125	2 x Combs 25 teeth thickness 1 mm, compatible with multichannel pipettes			
810150	2 x Combs 50 teeth thickness 1 mm, compatible with multichannel pipettes			
340600	Gel Casting base with adjustable feet and bubble designed to hold gel tray 23 x 40 cm and 23 x 25 cm			
811270	Safety lid with attached power leads			
810280	Accessories for buffer circulation			
8100PH	PACK H. Includes: Power Supply PS 608 + MAXIGEL XXL equipped as follow:			
8112340	Removable U.V. transparent gel tray 23 x 40 cm (w x l) for up to 12 combs			
8102325	Removable U.V. transparent gel tray 23 x 25 cm (w x l) for up to 10 combs			
8101242	8 x Combs 26 teeth 1 mm (24 + 2 markers), compatible with multichannel pipettes			
8125SLG	Sample Loading guide for 26 wells Comb			
340600	Gel Casting base with adjustable feet and bubble designed to hold gel tray 23 x 40 cm and 23 x 25 cm			
173000	Power Supply PS 608			
	Thickness	Teeth	Sample volume*	Well width
810125	Comb 1.0 mm	25	16 µl	7.2 mm
810150	Comb 1.0 mm	50	7 µl	3.0 mm
8101242	Comb 1.0 mm	26 (24 + 2 markers)	16/7 µl	7.2/3.0 mm
811525	Comb 1.5 mm	25	24 µl	7.2 mm
811550	Comb 1.5 mm	50	10 µl	3.0 mm
8115242	Comb 1.5 mm	26 (24 + 2 markers)	24/10 µl	7.2/3.0 mm
812025	Comb 2 mm	25	32 µl	7.2 mm
812050	Comb 2 mm	50	14 µl	3.0 mm
8120242	Comb 2 mm	26 (24 + 2 markers)	32/14 µl	7.2/3.0 mm
8125SLG	Sample Loading guide for 26 teeth Comb and 25 teeth Comb			
8150SLG	Sample Loading guide for 50 teeth Comb			
8102325	U.V. transparent Gel Tray 23 x 25 cm (w x l) Designed for 10 combs			
8112340	U.V. transparent Gel Tray 23 x 40 cm (w x l) Designed for 12 combs			
340600	Gel Casting base with adjustable feet and bubble designed to hold gel tray 23 x 40 cm and 23 x 25 cm (Page 15)			

* for a 5 mm thickness gel

NUCLEIC ACIDS SEQUENCING

APELEX DNA sequencing unit is designed with cabinet style doors and a safety lid to provide easy access for sample loading without compromising safety. All components are shielded and the unit cannot operate until the doors are closed and the safety lid is in place. A combination of rubber mounted, precision machined aluminium heat transfer plates, float glass plates and clamps, ensure excellent heat distribution and straight sample migration through the gel. A drainage port in the upper buffer tank facilitates emptying of the running buffer. An optional fan kit provides adjustable thermostatic control of the gel and enables gels to be run at higher speeds. With the fan kit a 33 x 41 cm, 0.35 mm 6% gel can be run at 55°C within 1 hour 45 minutes (including the pre-run).

POWER CONNECTION
Gold plated terminals resist corrosion. Recessed connectors, integral with the safety lid isolate power when lid is removed.

ELECTRODES
Of pure platinum, the electrodes are both protected and user-replaceable.

POWER LEADS
All leads are double insulated and connectors have CE standard 2mm fixed shrouds to prevent finger contact.

TWO GEL SIZES
20 x 50 cm and 33 x 41 cm.

BUFFER SEALS
Easily replaced - double format in silicone dovetail for leak-free sealing and easy cleaning.

DRAINAGE TAP
Allows easy and safe emptying of upper buffer tank.

HEAT SINK PLATE
A heavy duty aluminium back plate helps disperse heat evenly and results in gels free from 'smiling' and lane distortion.

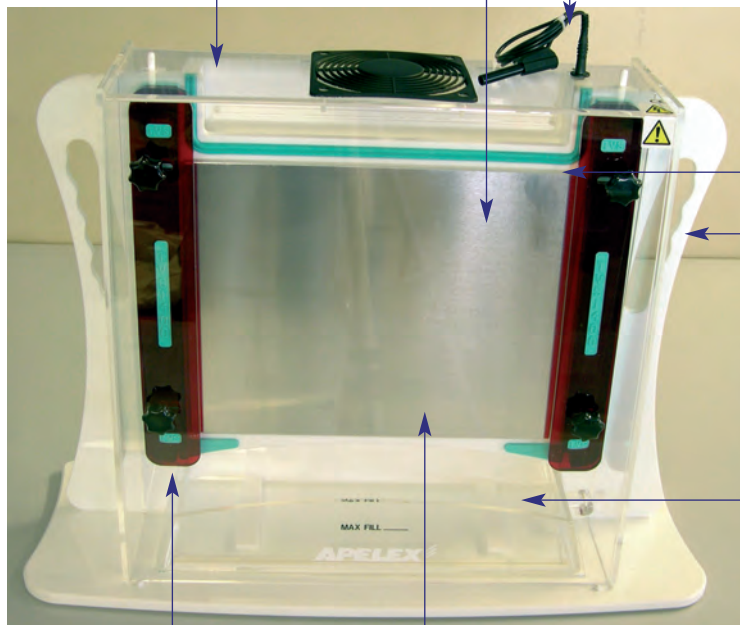
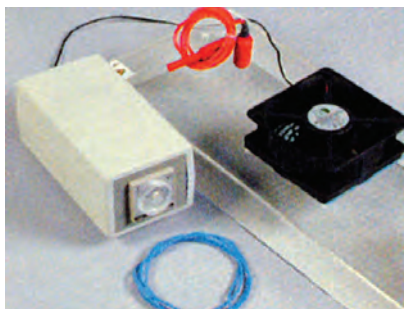


PLATE CLAMPS
Screw clamps for easy plate assembly.

GEL THICKNESS
Float glass plates ensure uniform gel thickness and straight sample migration.

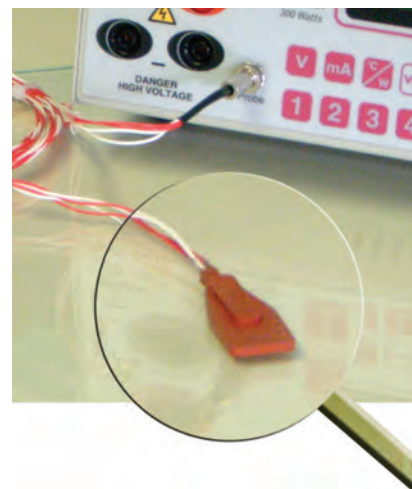
COMBS
An extensive range of combs of various thicknesses are available including a series of shark's tooth models.

Cat. No. 703341 - Option 2
Thermostatic fan kit allows gels to be run at higher speeds



Gel dimensions (W x L)	33 x 41 cm
Max. sample capacity	96 (shark teeth)
Max. buffer volume, upper	700 ml
Lower	700 ml
Combs available:	
Number of samples	40, 48, 60, 80, 96
Thicknesses	0.25 mm et 0.35 mm
Tank dimensions (W x L x H)	17.5 x 51.5 x 48 cm

Cat. No. 119020 - Option 1
Surface probe for temperature control with the Power Supply PS 9009TX (Page 10)



ORDERING INFORMATION

703341	DNA Sequencing Gel Unit, 33 x 41 cm with Integral Aluminium Heat Sink Plate Includes: 2 x Notched Glass Plate, 2 x Plain Glass Plate, 1 x Set of 0.35 mm Melinex Spacers, 1 of 0.35 mm Melinex 48 Sample Shark's Tooth Comb
3341-NG	Notched Glass Plate, 33 x 41 cm (W x L), pk/2
3341-PG	Plain Glass Plate, 33 x 41 cm (W x L), pk/2
41-SM0.25	0.25 mm Spacer Set, 2 x 41 cm (W x L)
41-SM0.35	0.35 mm Spacer Set, 2 x 41 cm (W x L)
703350	Thermostatic bloc and Fan kit for sequencing unit
119020	Temperature probe (suitable for Power supplies PS 9009TX and PS 1006P)

NUCLEIC ACIDS SEQUENCING

SUGGESTED POWER SUPPLIES



Programmable PS 9009TX - Cat. No. 119030
(Page 10)



PS 3003 - Cat. No. 178000
(Page 12)

COMBS FOR SEQUENCING UNITS					
SPECIFICATIONS & ORDERING INFORMATION					
Reference	Thickness (mm)	No of samples	Tooth width (mm)	Max Spacing (mm)	Sample vol. (µl)
33 cm Wide Combs suitable for: DNA Sequencing, 703341					
33-25-40	0.25	40	4	3	5
33-25-60MC	0.25	60	2	2.5	2.5
33-25-80	0.25	80	2.5	1.1	2.5
33-35-40	0.35	40	4	3	7
33-35-60MC	0.35	60	2	2.5	3.5
33-35-80	0.35	80	2.5	1.1	4
33 cm Wide Shark's Tooth Combs suitable for: DNA Sequencing, 703341					
33-25-48-ST	0.25	48	0.25	5.6	7
33-25-60MC-ST	0.25	60	0.25	4.5	5
33-25-96-ST	0.25	96	0.25	2.8	3
33-35-48-ST	0.35	48	0.25	5.6	7
33-35-60MC-ST	0.35	60	0.25	4.5	7
33-35-96-ST	0.35	96	0.25	2.8	5

VACUUM & HEATED GEL DRYERS

Two sizes of vacuum, heated, gel dryer:
45 x 34 cm and 50 x 40 cm.

The units have two timers, one for the temperature and one for the vacuum pump. The drying temperature can be set between ambient and 90°C and regulated to ±2°C, and the drying time set up to 5 hours in 1 minute steps. The vacuum pump can also be timed to automatically switch off, any time up to 5 hours in 1 minute steps.



TECHNICAL SPECIFICATIONS

GEL DRYERS		
Unit dimensions (H x W x D)	# 704534 # 705040	11 x 57 x 40 cm 12 x 63 x 48 cm
Weight		14 Kgs
VACUUM PUMP		
Unit dimensions	# 705050	32 x 18 x 22 cm
Maximum Vacuum		-440 mbar
Maximum Airflow		70 litres/min
Noise Level		45 dBa at 1 metre
Weight		7 Kgs

ORDERING INFORMATION

704534	45 x 34 cm Slab Gel Dryer System Includes: Stainless steel screen, Mylar sheet, Porous polyethylene sheet, clear silicone rubber overlay sheet
705040	50 x 40 cm Slab Gel Dryer System Includes: Stainless steel screen, Mylar sheet, Porous polyethylene sheet, clear silicone rubber overlay sheet
705050	Vacuum Pump

TANKS FOR PROTEINS

POLYACRYLAMIDE VERTICAL GELS

Our VERTIGEL electrophoresis units are manufactured to a high specification and design to combine versatility with safety. The robust gel tanks are easy to use and are offering many gel sizes standard gels.

All VERTIGEL gel units are supplied with float glass plates to ensure that the gels are of uniform thickness, providing an even sample migration and minimum lane distortion.

Gel can be cast in the inner running frame.

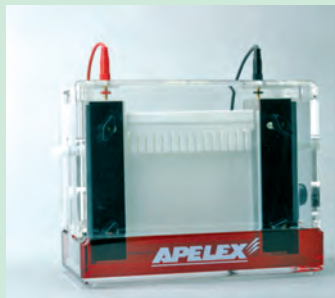
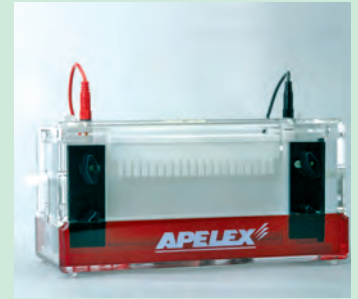
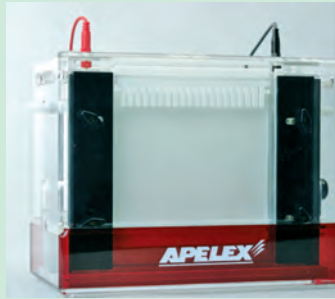
The MINI-VERTIGEL 2 is designed in order to be compatible with our pre-cast gels and with most pre-cast gels 10 x 10 cm.

Cooling is a built-in equipment but not necessary for all applications.

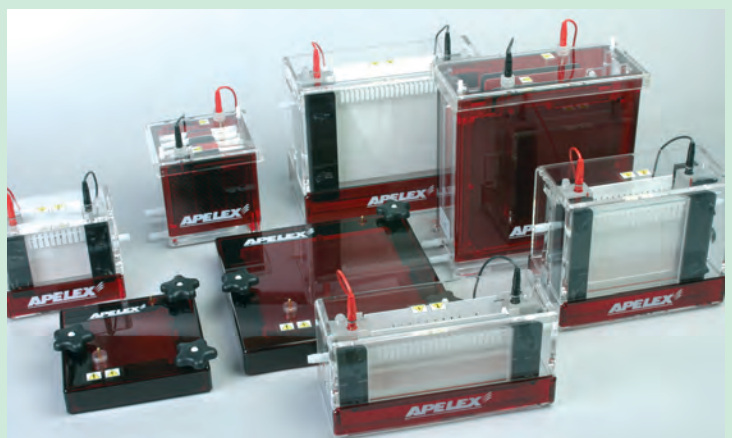
All VERTIGEL models have a gel casting system using the slab gel running module and a leak-free separate casting base equipped by two silicone seals and two clamping cams.

This system allows two gels to be cast at a time directly in the gel running module.

Then, after gel polymerisation, the running module is removed from the casting base and directly placed in the outer buffer tank.

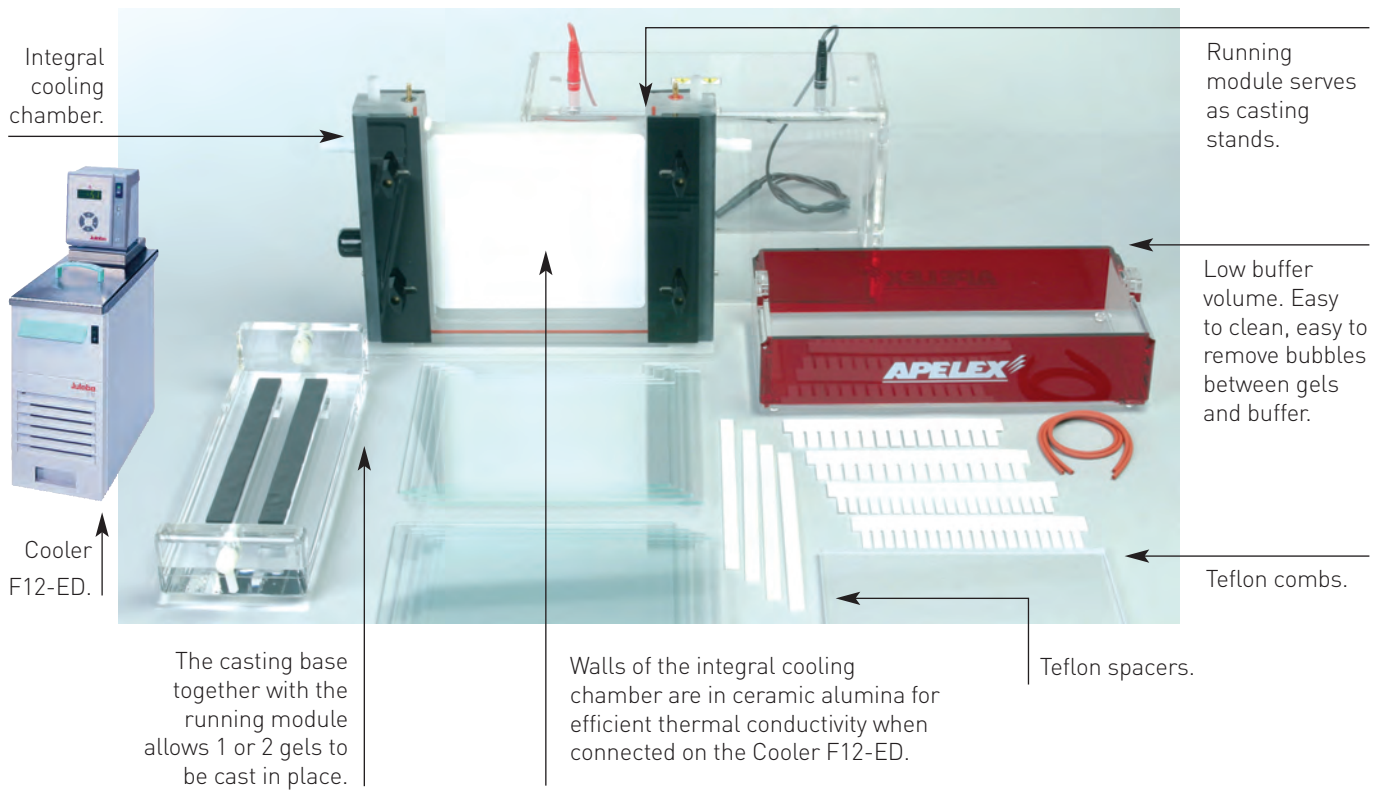


- Easy to use clamping system.
- Safety lid with integral power leads.
- Long life pure platinum electrodes are both protected and user replaceable.
- Gold plated terminals for corrosion resistance.
- Leak-free buffer seals.
- Float glass plates ensure uniform gel thickness and straight sample migration.
- Supplied with casting base.
- Complemented with a full range of combs and spacers.

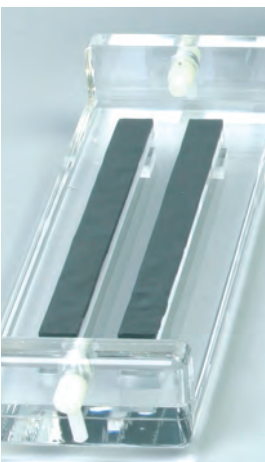
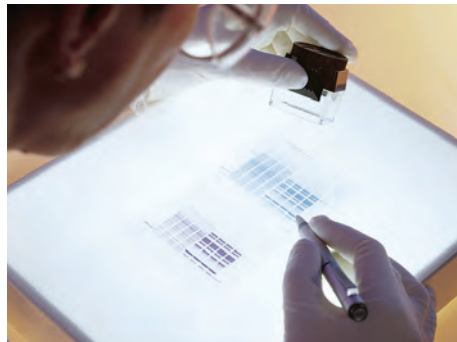


TANKS FOR PROTEINS

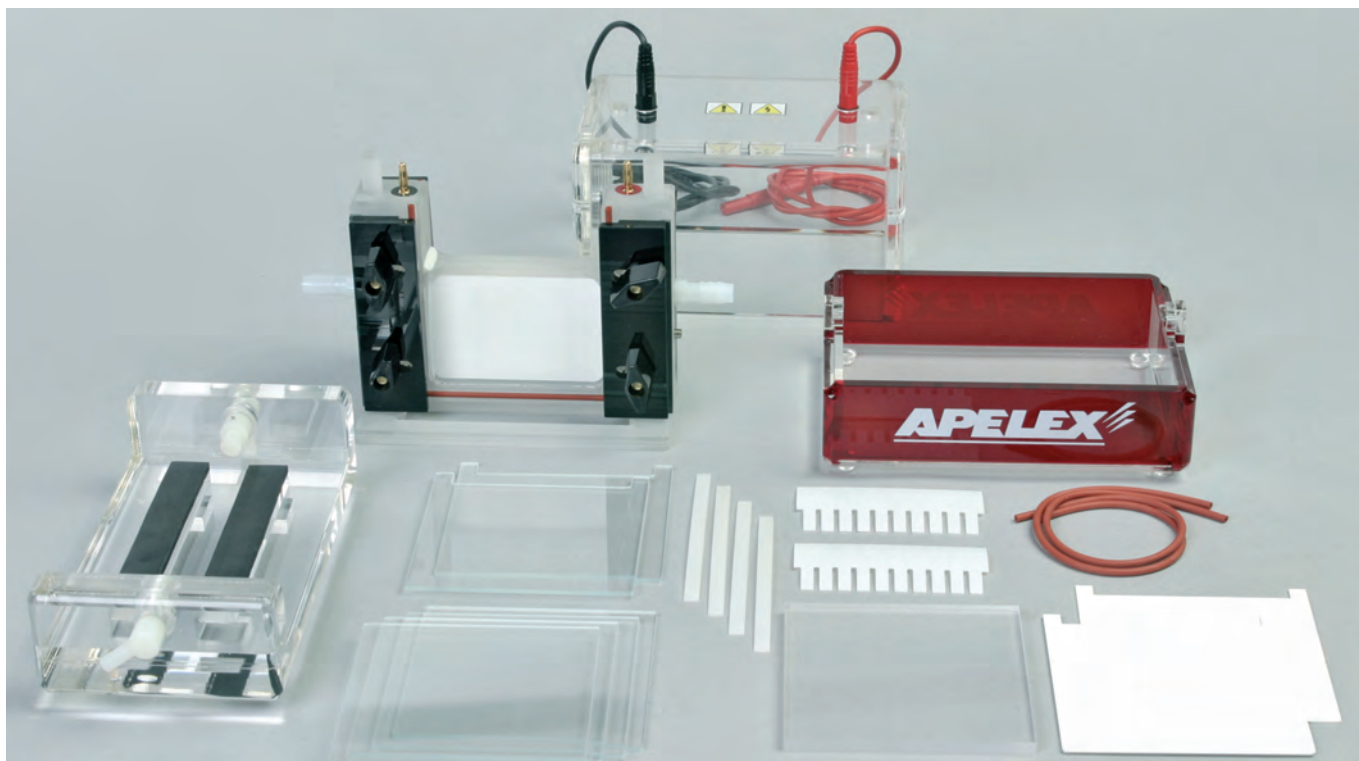
THE BEST FEATURES OF THE TWIN VERTIGEL SYSTEMS



THE TWIN AND COOLED VERTIGEL TANKS ARE SUPPLIED FULLY EQUIPPED READY FOR CASTING AND RUNNING 2 GELS



MINI-VERTIGEL 2



DESCRIPTION

400000 **MINI-VERTIGEL 2** Comes fully equipped for casting and running 2 gels. Also designed for running pre-cast gels 10 x 10 cm. Includes: Main buffer tank with safety lid and attached connecting leads, 1 upper twin running module equipped by water cooled integral cooling chamber, 2 x notched glass plate, 4 x plain glass plate, 2 sets of 0.8 mm thick spacers, 2 x 0.8 mm 10 wells Teflon combs maximum sample volume 99 μ l, 2 notched alumina plates, 1 blind plate, 2 replacement gaskets. Gel casting base including 2 silicone seals, 2 cams, 2 x replacement silicone seals, instruction manual.

400800 **MINI-VERTIGEL 2 PC**
Designed for 2 x pre-cast gels 10 x 10 cm (Pages 50-55). Supplied with Running Module. No other accessories for Casting Gels.

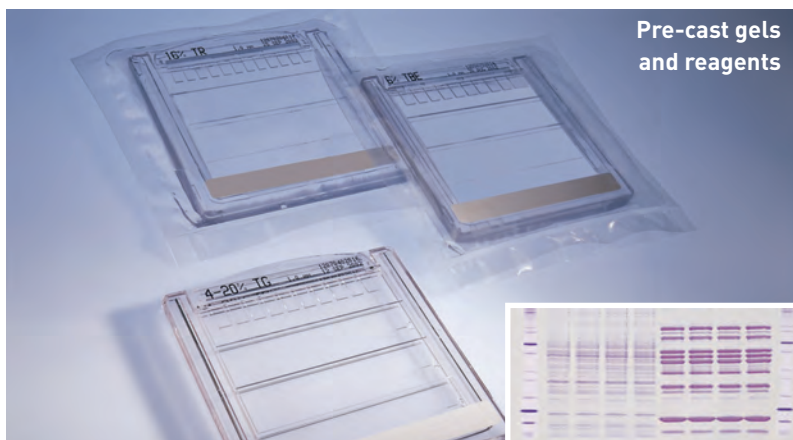
Range of combs and accessories on page 40

Active gel sizes 9 x 8.5 cm (W x H)

- Glass plate sizes 10 cm W x 8-10 cm L
- Acrylamide capacity 6-15 ml
- Current constant 15-30 mA/gel
- Maximum voltage 300 Volt
- Run time 30-60 minutes

TECHNICAL SPECIFICATIONS

Total Buffer Volume	300 - 400 ml
Maximum number of samples	2 x 15
Unit dimensions (H x W x D)	14 x 17 x 12 cm



Pre-cast gels and reagents



MINI-VERTIGEL 2 PC: Cat. No. 400800

Designed for precast gels 10 x 10 cm only (Pages 50-55)

TANKS FOR PROTEINS

SUGGESTED POWER SUPPLIES (Page 6)

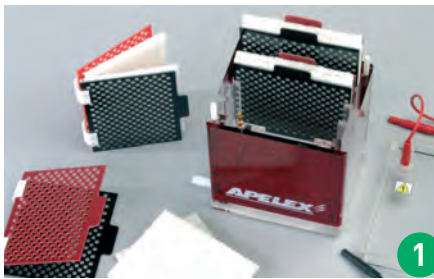


PS 304 - Cat. No. 160500



PS 305 - Cat. No. 170000

SUGGESTED BLOTTING TANKS (Pages 44-46)



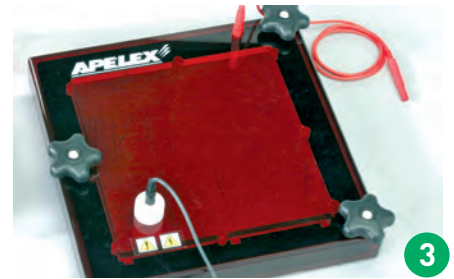
1

1. Mini Transblotter - Cat. No. 430000



2

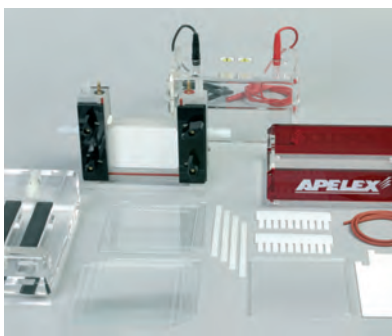
2. Slim Blotter - Cat. No. 504001



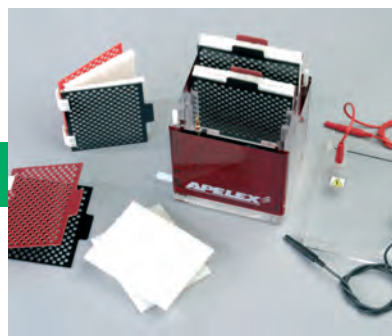
3

3. Mini Semi Dry Blotter - Cat. No. 450000

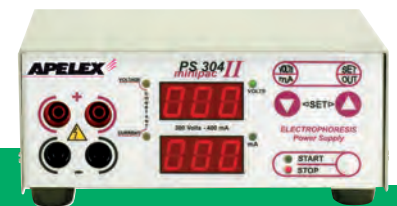
PACK 1 (See more packs page 48)



+



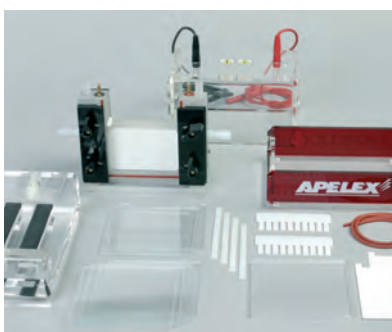
+



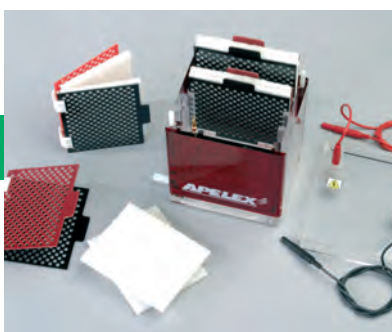
4000P1 / Pack 1 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- MINI TRANSBLOTTER - Cat. No. 430000
- PS 304 - Cat. No. 160500

PACK 2 (See more packs page 48)



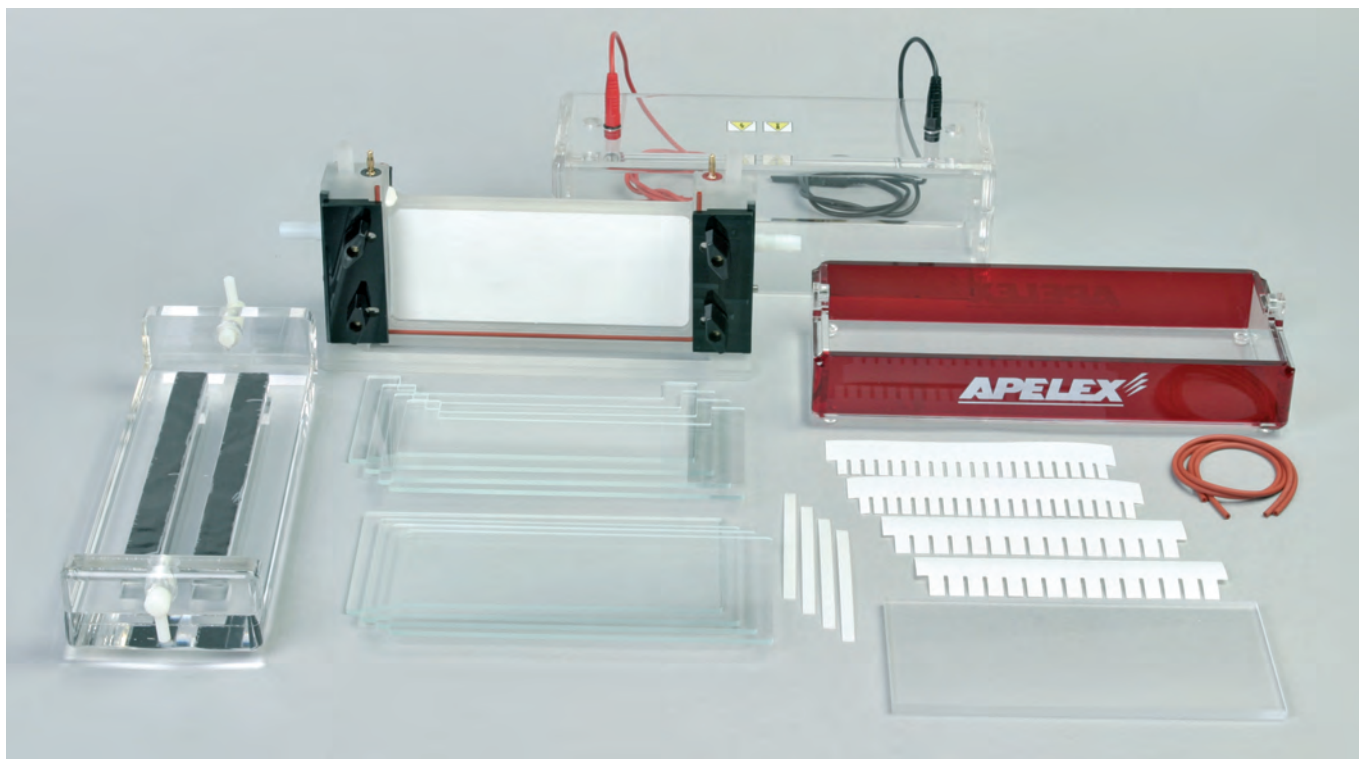
+



4000P2 / Pack 2 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- MINI TRANSBLOTTER - Cat. No. 430000

MINI-WIDE VERTIGEL 2



RUN UP TO 50 SAMPLES

DESCRIPTION

410000 **MINI-WIDE VERTIGEL 2** comes fully equipped for casting and running 2 gels.
Includes: Main buffer tank with safety lid and attached connecting leads, 1 upper twin running module equipped by water cooled integral cooling chamber, 4 x notched glass plate, 4 x plain glass plate, 2 x 0.8 mm 20 wells Teflon combs maximum sample volume 97 μ l, 1 blind plate, 2 x 0.8 mm 15 wells Teflon combs maximum sample volume 144 μ l, 2 sets of 0.8 mm thick spacers, 2 replacement gaskets.
 Gel casting base including 2 silicone seals, 2 cams, 2 x replacement silicone seals, instruction manual.

Range of combs and accessories on page 41

Active gel sizes 19 x 8.5 cm (W x H)

- Glass plate sizes 20 cm W x 8-10 cm L
- Acrylamide capacity 15-30 ml
- Current constant 15-45 mA/gel
- Maximum voltage 300 Volt
- Run time 30-90 minutes

TECHNICAL SPECIFICATIONS

Total Buffer Volume	600 - 800 ml
Maximum number of samples	2 x 25
Unit dimensions (H x W x D)	15 x 28 x 13 cm

TANKS FOR PROTEINS

SUGGESTED POWER SUPPLIES (Page 6)

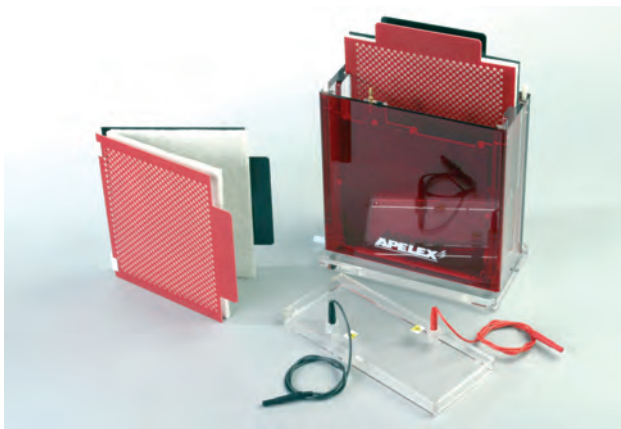


PS 304 - Cat. No. 160500



PS 305 - Cat. No. 170000

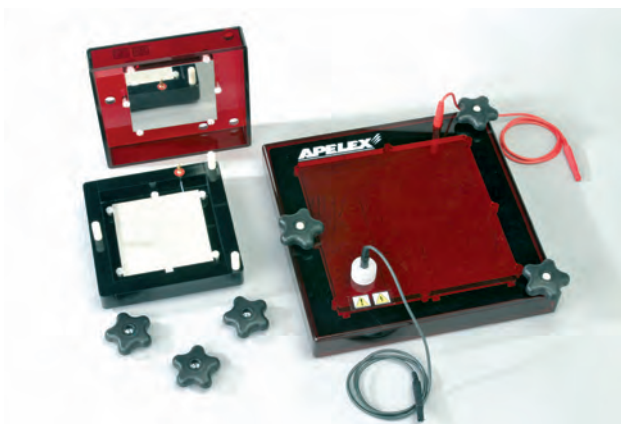
SUGGESTED BLOTTING TANKS (Pages 44-46)



Large Transblotter - Cat. No. 440000

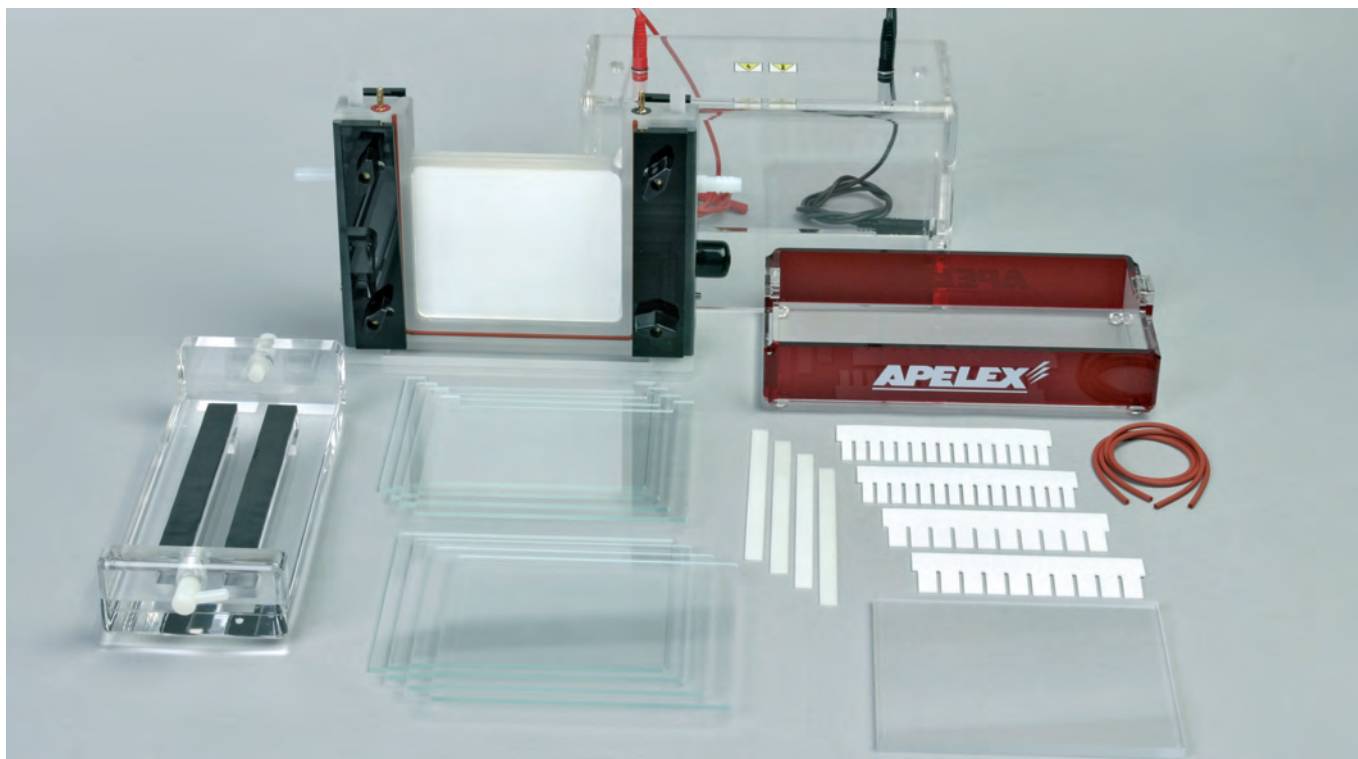


Slim Blotter - Cat. No. 504015



Large Semi Dry Blotter - Cat. No. 460000

MIDI-VERTIGEL 2



IDEAL FOR RAPID SEPARATION

DESCRIPTION

480000 **MIDI-VERTIGEL 2** comes fully equipped for casting and running 2 gels.

Includes: Main buffer tank with safety lid and attached connecting leads, 1 upper twin running module equipped by water cooled integral cooling chamber, 4 x notched glass plate, 4 x plain glass plate, 2 sets of 1.5 mm thick Teflon spacers, 2 x 1.5 mm 15 wells Teflon combs maximum sample volume 201 μ l, 2 x 1.5 mm 20 wells Teflon combs maximum sample volume 129 μ l, 1 blind plate, 2 replacement gaskets.

Gel casting base including 2 silicone seals, 2 cams, 2 x replacement silicone seals, instruction manual.

Range of combs and accessories on page 40

Active gel sizes 15 x 12.5 cm (W x H)

- Glass plate sizes 16 cm W x 14-16 cm L
- Acrylamide capacity 13.5-26.9 ml
- Current constant 15-50 mA/gel
- Maximum voltage 500 Volt
- Run time 60-120 minutes

TECHNICAL SPECIFICATIONS

Total Buffer Volume	600 - 700 ml
Maximum number of samples	48
Unit dimensions (H x W x D)	24 x 21 x 14 cm

TANKS FOR PROTEINS

SUGGESTED POWER SUPPLIES (Pages 6-8)

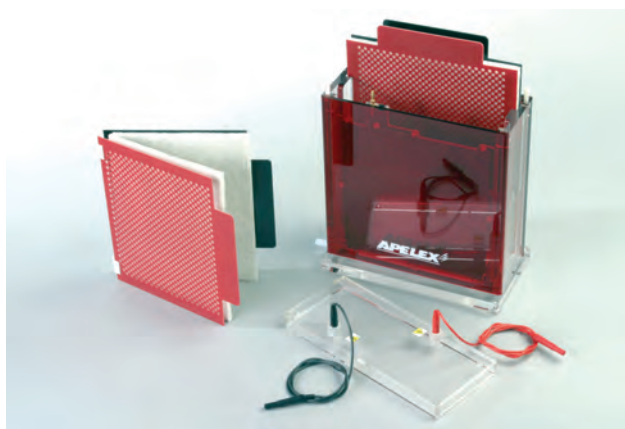


PS 503 - Cat. No. 1720000



PS 608 - Cat. No. 173000

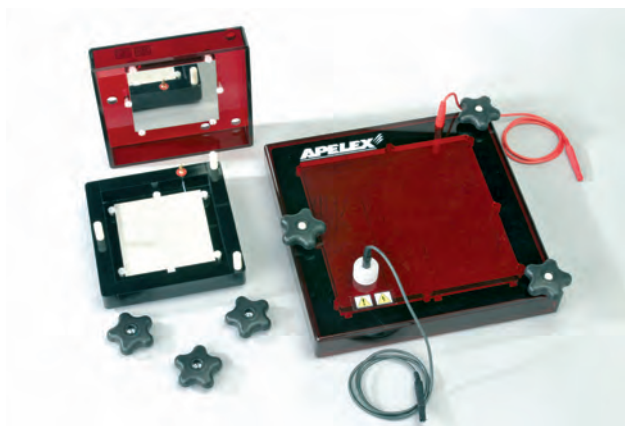
SUGGESTED BLOTTING TANKS (Pages 44-46)



Large Transblotter - Cat. No. 440000

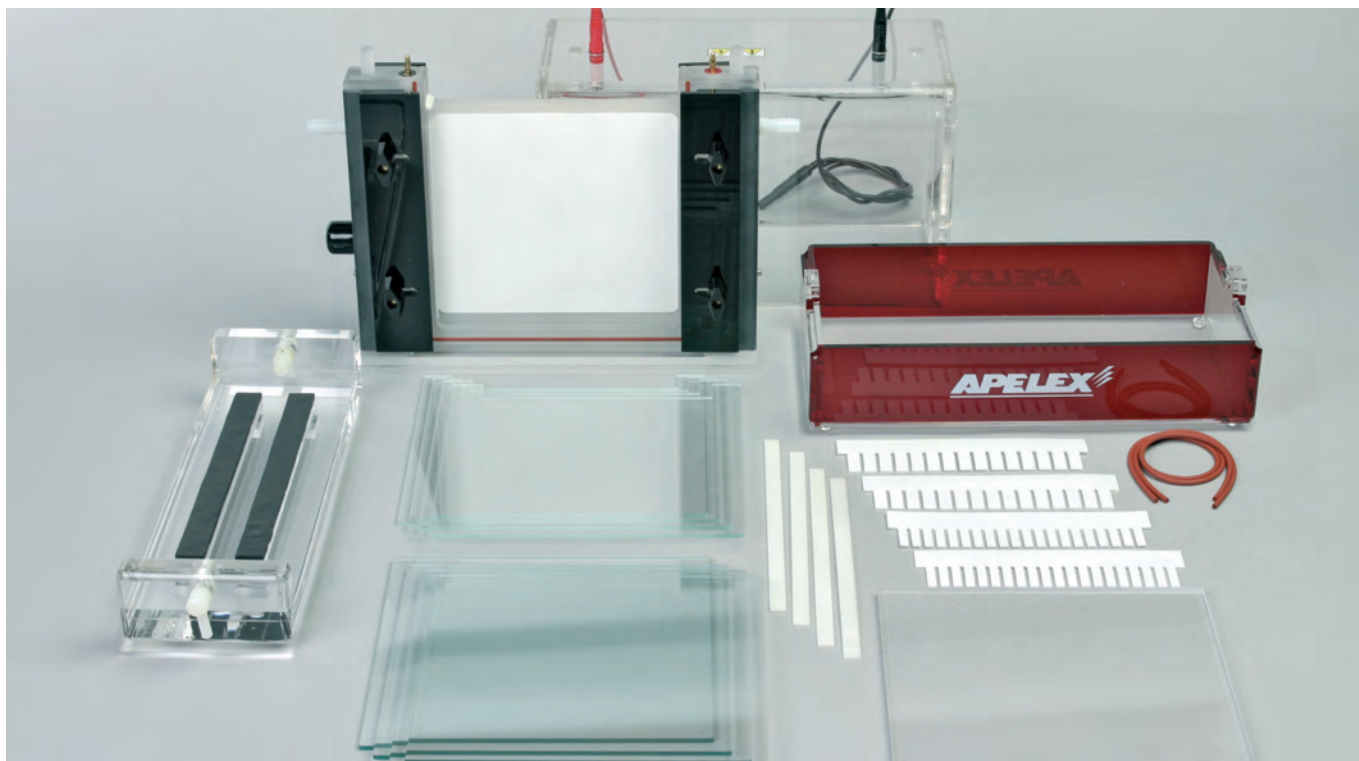


Slim Blotter - Cat. No. 504015



Large Semi Dry Blotter - Cat. No. 460000

H-VERTIGEL 2



DESIGNED FOR LONG LENGTH SEPARATION UP TO 1000 VOLTS
WITH THE COOLER F12-ED

DESCRIPTION

420000 H-VERTIGEL 2 comes fully equipped for casting and running 2 gels.
Includes: Main buffer tank with safety lid and attached connecting leads, 1 upper twin running module equipped by water cooled integral cooling chamber, 4 x notched glass plate, 4 x plain glass plate, 2 sets of 1.5 mm thick Teflon spacers, 2 x 20 wells Teflon combs maximum sample volume 182 µl, 2 x 15 wells Teflon combs maximum sample volume 271 µl, 1 blind plate, 2 replacement gaskets.
 Gel casting base including 2 silicone seals, 2 cams, 2 x replacement silicone seals, instruction manual.

Range of combs and accessories on page 41

Active gel sizes 19 x 17.5 cm (W x H)

- Glass plate sizes 20 cm W x 18-20 cm L
- Acrylamide capacity 24-49 ml
- Current constant 15-75 mA/gel
- Maximum voltage 1000 Volt
- Run time 30-180 minutes

TECHNICAL SPECIFICATIONS

Total Buffer Volume	1 300 ml
Maximum number of samples	50
Unit dimensions (H x W x D)	30 x 24 x 16 cm

TANKS FOR PROTEINS

SUGGESTED POWER SUPPLIES (Pages 6-8)

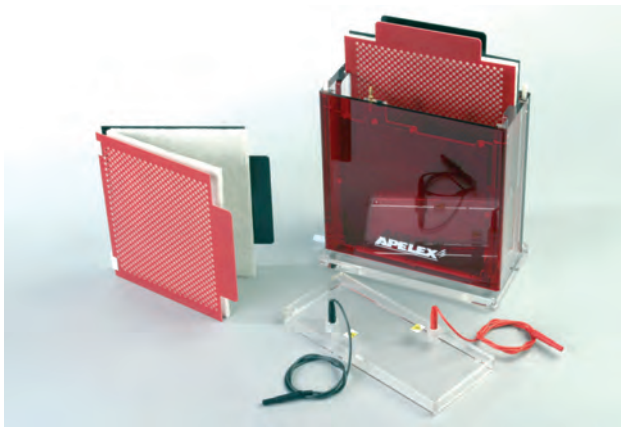


PS 503 - Cat. No. 172000



PS 608 - Cat. No. 173000

SUGGESTED BLOTTING TANKS (Pages 44-46)



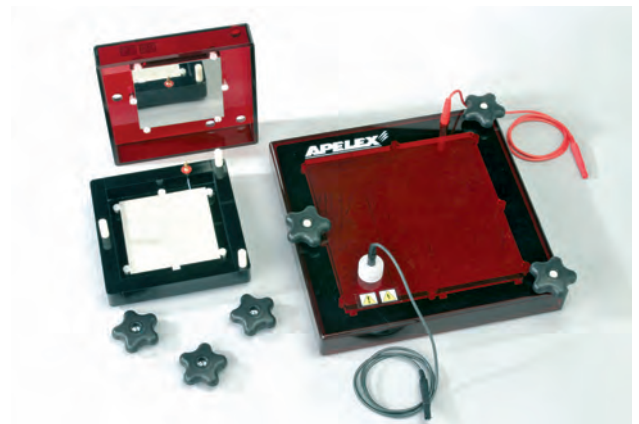
Large Transblotter - Cat. No. 440000
Suggested with Power Supply PS 608
or PS 202 for Fast Blotting



Slim Blotter - Cat. No. 504020



Cooler F12-ED



Large Semi Dry Blotter - Cat. No. 460000

VERTIGEL 2

ORDERING INFORMATION	
400000	MINI-VERTIGEL 2 fully equipped for 2 x 0,8 mm gel 10 x 10 cm and casting base Includes: 2 notched glass plates, 4 plain glass plates, 2 alumina plates, 1 blind plate, 2 x 10 wells 0,8 mm combs, 4 spacers 0,8 mm, 2 replacement gasket, internal running module, with internal cooling chamber, safety lid with power cords, gel casting base, user's manual
400615	6 teeth comb 1,5 mm - Well volume 266 µl - Teeth wide 11 mm
400815	8 teeth comb 1,5 mm - Well volume 42 µl - Teeth wide 7,7 mm
400915	9 teeth comb 1,5 mm multichannel pipette - Well volume 138 µl - Teeth wide 138 mm
401015	10 teeth comb 1,5 mm - Well volume 134 µl - Teeth wide 5,7 mm
401215	12 teeth comb 1,5 mm - Well volume 103 µl - Teeth wide 4,3 mm
40SP15	Set of 2 x 1,5 mm spacers
400608	6 teeth comb 0,8 mm - Well volume 142 µl - Teeth wide 11 mm
400808	8 teeth comb 0,8 mm - Well volume 99 µl - Teeth wide 7,7 mm
400908	9 teeth comb 0,8 mm multichannel pipette compatible - Well volume 41 µl - Teeth wide 138 mm
401008	10 teeth comb 0,8 mm - Well volume 73 µl - Teeth wide 5,7 mm
401208	12 teeth comb 0,8 mm - Well volume 55 µl - Teeth wide 4,3 mm
40SP08	Set of 2 x 0,8 mm spacers
401010	Plain glass plate 10 x 10 cm (1 piece)
401016	Notched glass plate 10 x 10 cm (1 piece)
401020	Notched alumina plate 10 x 10 cm (1 piece)
401025	Blocking plate for running one gel (Blind plate)
400010	Water cooled removable Running module (already included in the package Cat. No. 400000)
400012	Replacement clamps for running module Cat. No. 400010 (x 2)
401035	Replacement gasket for running module Cat. No. 400010 (x 2)
400020	Gel casting base (already included in the package Cat. No. 400000)
400021	Replacement gasket for casting base (x 2)
401030	Gel casting base + running module
480000	MIDI-VERTIGEL 2 fully equipped for 2 x 1,5 mm gel 16 x 14 cm (W x H) + casting base Includes: 4 notched glass plates, 4 plain glass plates, 1 blind plate, 2 x 15 wells 1,5 mm combs, 2 x 20 wells 1,5 mm combs, 4 spacers 1,5 mm, 2 replacement gasket, internal running module, with internal cooling chamber, safety lid with power cords, gel casting base, user's manual
481015	10 teeth comb 1,5 mm - Well volume 346 µl - Teeth wide 10,4 mm
481515	15 teeth comb 1,5 mm - Well volume 201 µl - Teeth wide 6,1 mm
482015	20 teeth comb 1,5 mm - Well volume 129 µl - Teeth wide 3,9 mm
482415	24 teeth comb 1,5 mm - Well volume 96 µl - Teeth wide 2,9 mm
4815PREP	Prep comb 2 teeth 1,5 mm - Well volume 1700 µl - Teeth wide 120/5 mm
48SP15	Set of 2 x 1,5 mm spacers
481008	10 teeth comb 0,8 mm - Well volume 183 µl - Teeth wide 10,4 mm
481508	15 teeth comb 0,8 mm - Well volume 107 µl - Teeth wide 6,1 mm
482008	20 teeth comb 0,8 mm - Well volume 69 µl - Teeth wide 3,9 mm
482408	24 teeth comb 0,8 mm - Well volume 51 µl - Teeth wide 2,9 mm
48SP08	Set of 2 x 0,8 mm spacers
481614	Plain glass plate 16 x 14 cm (W x H) 1 piece
481615	Notched glass plate 16 x 14 cm (W x H) 1 piece
481025	Blocking plate for running one gel (Blind plate)
480010	Water cooled removable Running module (already included in the package Cat. No. 480000)
480012	Replacement clamps for running module Cat. No. 480010 (x 2)
481035	Replacement gasket for running module Cat. No. 480010 (x 2)
480020	Gel casting base (already included in the package Cat. No. 480000)
480021	Replacement gasket for casting base Cat. No. 480020 (x 2)
481030	Gel casting base + running module

TANKS FOR PROTEINS

VERTIGEL 2

ORDERING INFORMATION

410000	MINI-WIDE VERTIGEL 2 fully equipped for 2 x 0,8 mm gel 20 x 10 cm (W x H) + gel casting base Includes: 4 notched glass plates, 4 plain glass plates, 1 blind plate, 2 x 15 wells 0,8 mm combs, 2 x 20 wells 0,8 mm combs, 4 spacers 0,8 mm, 2 replacement gasket, internal running module, with internal cooling chamber, safety lid with power cords, gel casting base, user's manual
411015	10 teeth comb 1,5 mm - Well volume 449 µl - Teeth width 13 mm
411515	15 teeth comb 1,5 mm - Well volume 271 µl - Teeth width 8 mm
412015	20 teeth comb 1,5 mm - Well volume 182 µl - Teeth width 5,5 mm
412515	25 teeth comb 1,5 mm - Well volume 129 µl - Teeth width 4 mm
411815	18 teeth comb 1,5 mm - MC pipette compatible - Well volume 156 µl - Teeth width 6,5 mm
413615	36 teeth comb 1,5 mm - MC pipette compatible - Well volume 64 µl - Teeth width 2,7 mm
41SP15	Set of 2 x 1,5 mm spacers
411008	10 teeth comb 0,8 mm - Well volume 239 µl - Teeth width 13 mm
411508	15 teeth comb 0,8 mm - Well volume 144 µl - Teeth width 8 mm
412008	20 teeth comb 0,8 mm - Well volume 97 µl - Teeth width 5,5 mm
412508	25 teeth comb 0,8 mm - Well volume 69 µl - Teeth width 4 mm
411808	18 teeth comb 0,8 mm - MC pipette compatible - Well volume 78 µl - Teeth width 6,5 mm
413608	36 teeth comb 0,8 mm - MC pipette compatible - Well volume 34 µl - Teeth width 2,7 mm
41SP08	Set of 2 x 0,8 mm spacers
412010	Plain glass plate 20 x 10 cm (W x H) 1 piece
412012	Notched glass plate 20 x 10 cm (W x H) 1 piece
410010	Water cooled removable Running module (already included in the package Cat. No. 410000)
410012	Replacement clamps for running module Cat. No. 410010 (x 2)
411035	Replacement gasket for running module Cat. No. 410010 (x 2)
410020	Gel casting base (already included in the package Cat. No. 410000)
410021	Replacement gasket for casting base Cat. No. 410020 (x 2)
411030	Gel casting base + running module
420000	H-VERTIGEL 2 fully equipped for 2 x 1,5 mm gel 20 x 20 cm + gel casting base Includes: 2 notched glass plates, 4 plain glass plates, 1 blind plate, 2 x 15 wells 1,5 mm combs, 2 x 20 wells 1,5 mm combs, 4 spacers 1,5 mm, 2 replacement gasket, internal running module, with internal cooling chamber, safety lid with power cords, gel casting base, user's manual
421015	10 teeth comb 1,5 mm - Well volume 449 µl - Teeth wide 13 mm
421515	15 teeth comb 1,5 mm - Well volume 271 µl - Teeth wide 8 mm
422015	20 teeth comb 1,5 mm - Well volume 182 µl - Teeth wide 5,5 mm
422515	25 teeth comb 1,5 mm - Well volume 129 µl - Teeth wide 4 mm
4215PREP	Prep comb 2 teeth 1,5 mm - Well volume 4230 µl/135 µl - Teeth wide 151/5 mm
42SP15	Set of 2 x 1,5 mm spacers
421008	10 teeth comb 0,8 mm - Well volume 239 µl - Teeth wide 13 mm
421508	15 teeth comb 0,8 mm - Well volume 144 µl - Teeth wide 8 mm
422008	20 teeth comb 0,8 mm - Well volume 97 µl - Teeth wide 5,5 mm
422508	25 teeth comb 0,8 mm - Well volume 69 µl - Teeth wide 4 mm
42SP08	Set of 2 x 0,8 mm spacers
422020	Plain glass plate 20 x 20 cm (1 piece)
422022	Notched glass plate 20 x 20 cm (1 piece)
420010	Water cooled removable Running module (already included in the package Cat. No. 420000)
420012	Replacement clamps for running module Cat. No. 420010 (x 2)
421035	Replacement gasket for running module Cat. No. 420010 (x 2)
420020	Gel casting base (already included in the package Cat. No. 420000)
420021	Replacement gasket for casting base Cat. No. 420020 (x 2)
421030	Gel casting base + running module



92000 MA•GEL•IN UNIVERSAL CAST-YOUR-OWN SYSTEM

The NEW Ma•GEL•In is truly a versatile protein system designed to accommodate today's researcher. This system will allow you to cast your own gels using the 10 cm x 10 cm glass plates and easy-to-use casting system, or if you prefer to use 8 cm x 10 cm precast gels, the Ma•GEL•In will accommodate those as well. This versatility comes from the specially designed (patent pending) gel capture system that allows plates in a 10 cm x 10 cm format or cast-your-own glass plates in a 10 cm x 10 cm format.

Casting your own gels: The #920000 comes with three sets of glass plates and a 2-place casting system for casting your own gels. The 2-place casting system #921000 has a very small footprint (10 cm x 15 cm), utilizing minimal space on the counter. The glass plates are held together using neoprene spacers.

Once assembled, the glass sandwich is placed in the casting system, and the lid is mounted to the top of the casting system. The gel can now be

cast through the opening in the lid. Once the gel has polymerized, the glass sandwiches can be removed from the casting system, placed in the gel capture unit, and set into the buffer tank. Quick and simple!

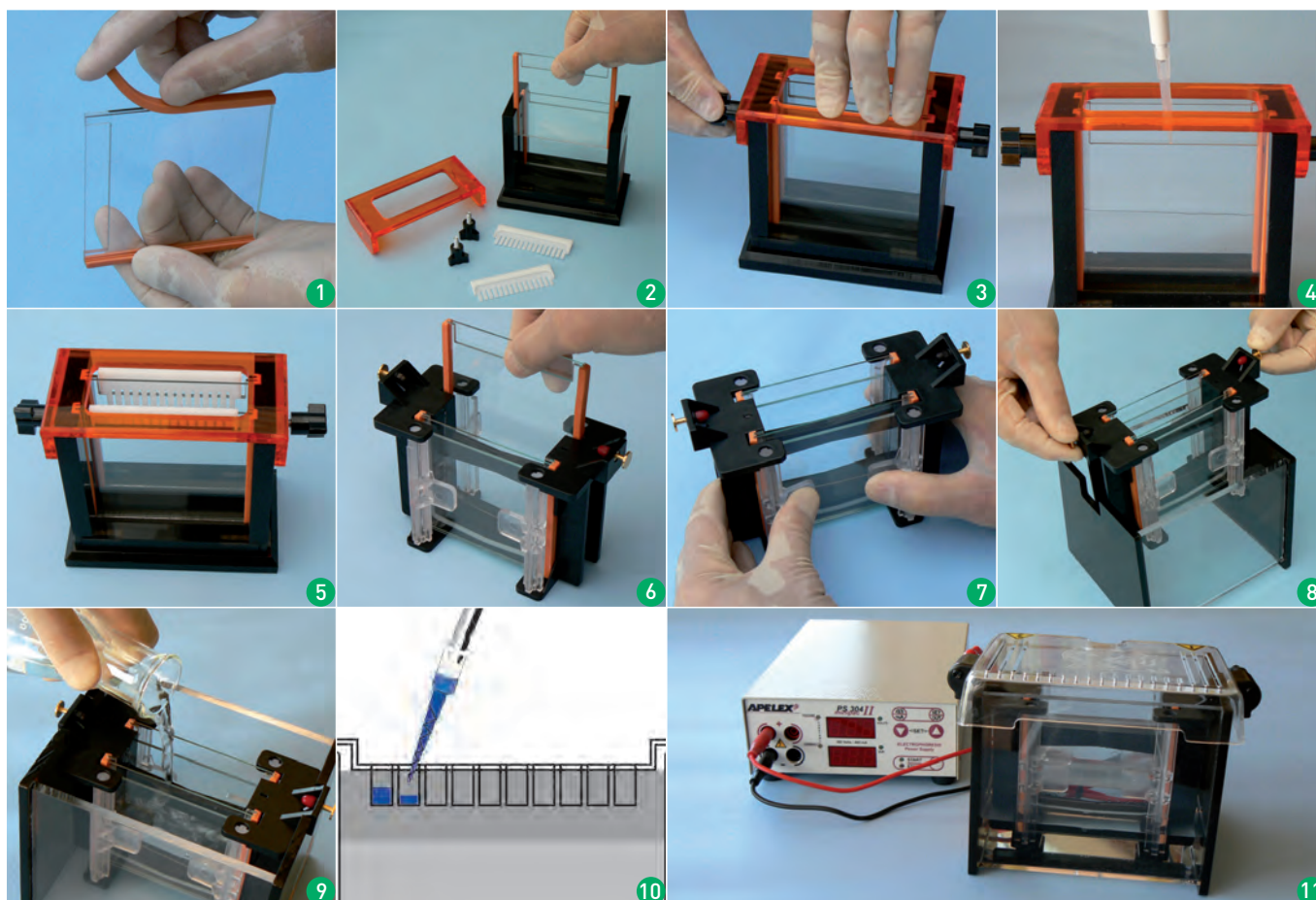
Pre-Cast gels: Using the same gel capture unit, 8 cm x 10 cm precast polyacrylamide gels can be inserted, locked in place, and set into the buffer tank. The Ma•GEL•In will accommodate various brands of pre-cast gel. The #920000 is an all-inclusive, easy-to-use, protein electrophoresis system designed for years of continuous use.

"Discover what Ma•GEL•In can do for you!"

The tank holds a minimum of 350 ml of buffer. For longer runs, the tank can be filled to a maximum of 850 ml. A stir bar can be placed in the tank to recirculate the buffer to keep the ionic concentration constant.

The tank includes a patented vented lid to further reduce heat buildup during the gel run.

TANKS FOR PROTEINS



SET UP

- 1 • Create glass plate sandwich with spacers and glass slides.
- 2 • Place glass sandwich into casting system-notched plates to inside.
- 3 • Secure lid by pressing down and inserting locking knobs.
- 4 • Add gel through opening in lid.
- 5 • Carefully remove combs.
- 6 • Insert gel plates in gel capture device per instructions.
- 7 • Turn cams inward to secure gel plates.
- 8 • Place gel capture device in tank-note keyed inserts.
- 9 • Pour appropriate amount of buffer.
- 10 • Load the samples in the wells.
- 11 • Initiate desired program.

TECHNICAL SPECIFICATIONS - CONSTRUCTION

• Inner gel support	Molded ABS
• Clamp assemblies	Molded polycarbonate
• Buffer chamber	3/8" acrylic
• Gaskets	Extruded silicone
• Shipping weight	2.2 Kg
• Overall size	17 cm (L) x 17 cm (W) x 18 cm (H)
• Gel size	8 cm (L) x 10 cm (W) or 10 cm (L) x 10 cm (W)

The 92000 comes with a patented vented lid.
Patent Cat. No. 5779,869

ORDERING INFORMATION

92000 **Ma•GEL•In Universal Protein Cast-Your-Own System.**
Includes: Center support, buffer tank, vented lid, casting system, three inner and three outer glass plates, two sets of 0.8 mm side spacers, two 0.8 mm x 15 tooth combs, power cords, and manual

	Description	Well Width	Sample Volume Per mm Gel
92030	0.8 mm x 10 tooth	5.86 mm	28.13 µl
92031	0.8 mm x 12 tooth	4.22 mm	20.26 µl
92032	0.8 mm x 15 tooth	3.38 mm	16.22 µl
92033	0.8 mm x 1 sample	70 mm	336 µl

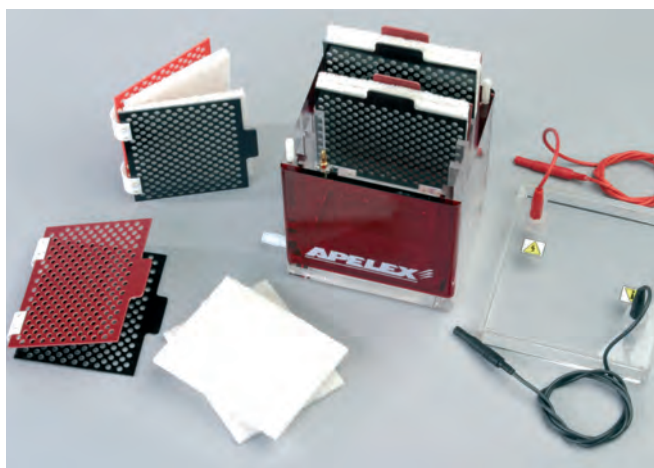
SUGGESTED POWER SUPPLY

PS 304 - 300 Volts - 400 mA - Cat. No. 160500 (Page 6)

ORDERING INFORMATION

Description
50500 Replacement Power Cords
92010 Inner Glass Plate, Set of 5 (Notched)
92020 Outer Glass Plate, Set of 5
92025 0.8 Spacer Set (2 Spacers)
92040 Replacement Tank
92050 Replacement Gel Capture Device
92060 Replacement Lid
92070 Replacement Gaskets, casting System, 2 Each
92071 Replacement Thumb Screws, 2 Each
92072 Replacement Tank Connector Kit
92100 Protein Casting System, 2 Place
92200 Protein Casting System, 8 Place
92500 Western Transfer Module

MINI GEL TRANSBLOTTER FOR UP TO 4 GELS 10 x 10 cm



ORDERING INFORMATION

430000 Electro-blotting unit for up to four 10 x 10 cm gels
Includes: 4 compression cassettes, 8 x fibre packs

ACCESSORIES for unit Cat. No. 430000

431010 Compression cassette

431PAD Fibre pads 10 x 10 cm, PK/4

TECHNICAL SPECIFICATIONS

Buffer Volume	1300 ml
Unit dimensions (H x W x D)	15 x 13 x 15 cm
Transfer Area	9 cm W x 9 cm L
Run Time	4 hours - Overnight

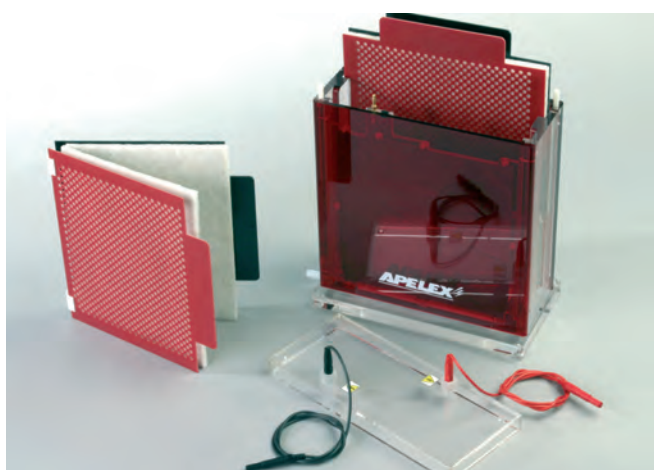
- Water cooled base with stirring bar which can be placed in the unit under the compression cassette. Then unit is placed on a stable magnetic stirrer.
- An open square grid design for the cassettes provides a maximum area for the transfer and is strong enough to maintain a firm contact between the gel and the transfer membrane.
- Replaceable platinum electrodes.
- Safety lid provides complete protection to the user.
- Western Blot.
- Southern Blot.
- Northern Blot.

SUGGESTED POWER SUPPLY (Page 6)



PS 305 Cat. No. 170000

LARGE GEL TRANSBLOTTER FOR UP TO 2 GELS 20 x 20 cm



ORDERING INFORMATION

440000 Electro-blotting unit for up to two 20 x 20 cm gels
Includes: 2 compression cassettes, 4 x fibre packs

ACCESSORIES for unit Cat. No. 440000

441010 Compression cassette 20 x 20 cm with pads

440PAD Fibre pads 20 x 20 cm, PK/4

SUGGESTED POWER SUPPLY (Page 8)



PS 202 Cat. No. 176000 or PS 608 Cat. No. 173000

TECHNICAL SPECIFICATIONS

Buffer Volume	3000 ml
Unit dimensions (H x W x D)	25 x 23 x 10 cm
Transfer Area	19 cm W x 19 cm L
Run Time	4 hours - Overnight

TANKS FOR *BLOTTING*

THE SLIM FAMILY FOR FAST BLOTTING!

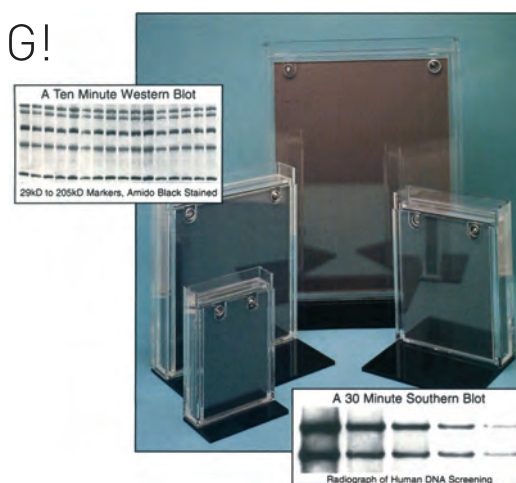
Designed for all blottings:

PROTEINS: WESTERN with standard alloy anode and cathode.

DNA: SOUTHERN with platinized Titanium anode.

RNA: NORTHERN with platinized Titanium anode.

- Western Blots of 0,75 or 0,8 mm thick gels are cleared of proteins up to 170kD in size in 40 minutes at 24 Volts.
- Western Blots of 1mm thick gels in 30 minutes at 24 Volts.



THE BEST SPECIFICATIONS OF THE SLIM BLOTTERS

- LOW BUFFER VOLUME.
- No maintenance on the platinized Titanium electrodes.
- Standard alloy electrodes should be wiped occasionally.
- Just a few minutes for loading.
- High surface area assures a high field at the gel.
- 5 models with alloy electrodes for WESTERN Blot.
- 5 models with platinized Titanium anode for SOUTHERN and NORTHERN blotting.
- No bubble surrounding the electrodes.

ORDERING INFORMATION

504001	10 x 15 cm unit with alloy anode for Western Blots Buffer 350 ml
504015	15 x 20 cm unit with alloy anode for Western Blots Buffer 800 ml
504020	20 x 24 cm unit with alloy anode for Western Blots Buffer 1400 ml
504040	25 x 34 cm unit with alloy anode for Western Blots Buffer 2500 ml
504002	10 x 15 cm unit with Platinized Titanium anode for Southern and Western Blots Buffer 350 ml
504017	15 x 20 cm unit with Platinized Titanium anode for Southern and Western Blots Buffer 800 ml
504021	20 x 24 cm unit with Platinized Titanium anode for Southern and Western Blots Buffer 1400 ml
504041	25 x 34 cm unit with Platinized Titanium anode for Southern and Western Blots Buffer 2500 ml
504005	10 x 15 cm Platinized Titanium anode for nucleic acid blots
504010	15 x 20 cm Platinized Titanium anode for nucleic acid blots
504027	20 x 24 cm Platinized Titanium anode for nucleic acid blots
504044	25 x 34 cm Platinized Titanium anode for nucleic acid blots



Loading Position

SUGGESTED POWER SUPPLIES

PS 305 - 300 Volts - 500 mA - Cat. No. 170000

PS 304 - 300 Volts - 400 mA - Cat. No. 160500



Blotting Position

SEMI-DRY BLOTTING

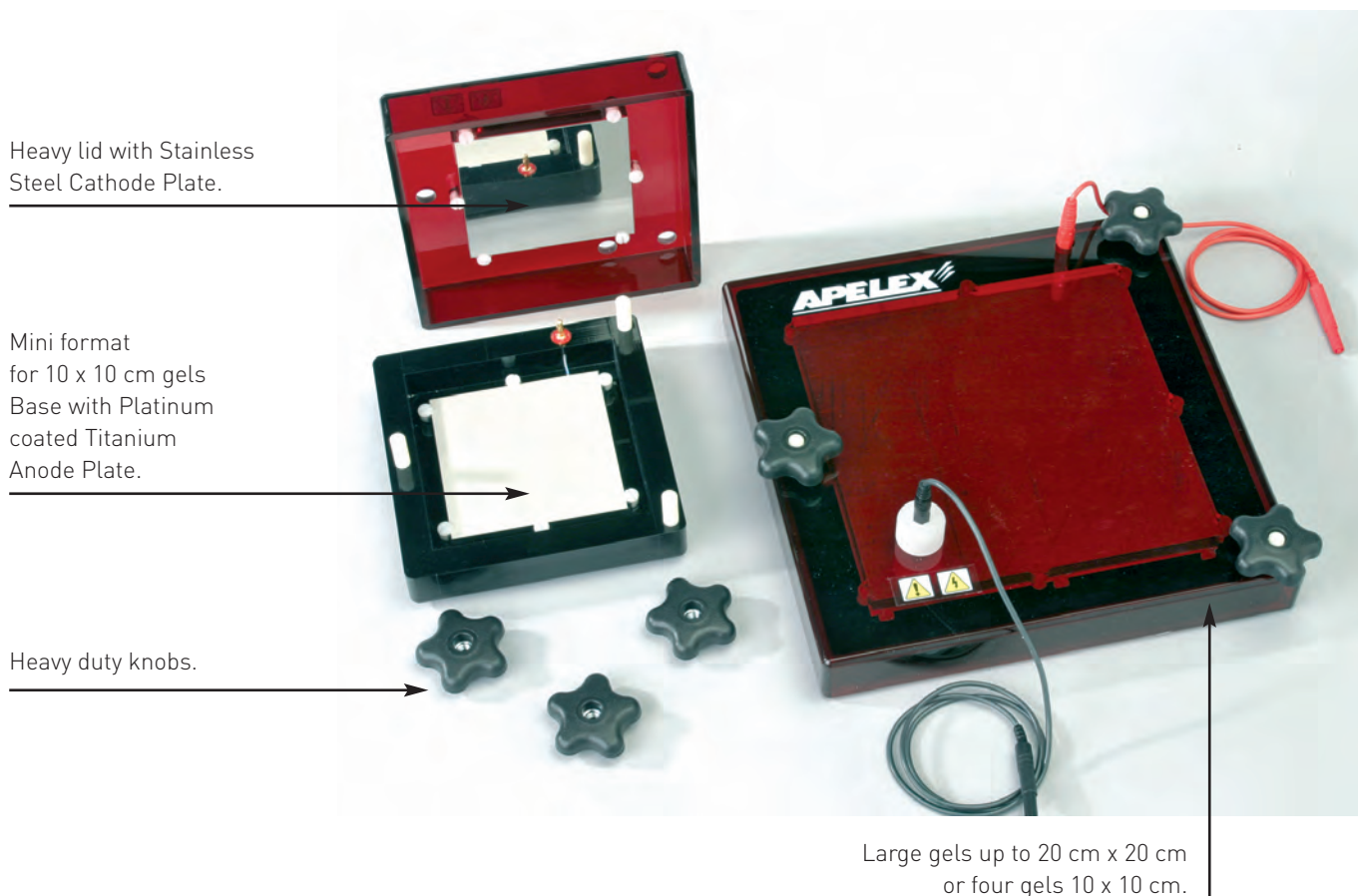
ORDERING INFORMATION	
450000	Mini Semi-Dry Blotter for gel up to 11 x 11 cm
460000	Large Semi-Dry Blotter for gel up to 20 x 20 cm

Mini and Large Semi-Dry Blotters 2 sizes: 11 x 11 cm & 20 x 20 cm

- Very high conductivity with corrosion free electrodes.
- Cathode in stainless steel, anode in platinum plated titanium for long life.
- Up to 3 mA/cm² of gel provides a very fast transfer.
- Strong side clamp system provides an uniform pressure between the gel and the transfer membrane.

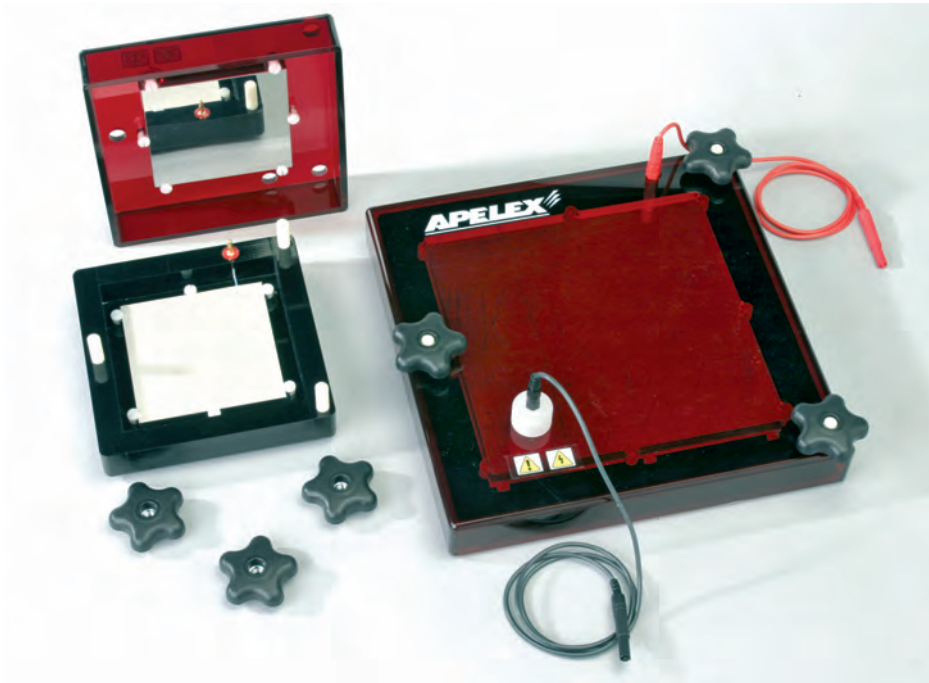
RUNNING CONDITIONS		
	Protein	DNA/RNA
Membrane	Nitrocellulose 0.45µm or 0.2µm PVDF 0.45µm or 0.2µm	Nylon
Transfer Buffer	Towbin Buffer, 3 Buffer System, Bjerrum Schafer-Nielsen	0.5X - 1XTBE, NAQ
Power Setting	Constant current 0.8-3mA/cm ² gel surface area 10-14 Volts maximum	Constant current 0.5-3mA/cm ² gel surface area 10-14 Volts max.
Running Time	30 minutes to 2 hours Needs to be experimentally determined (large molecules need longer transfer time)	30 minutes to 2 hours generally in the lower

Ideal for proteins less than 150 kd - Fast WESTERN BLOT
Mini Gels in 15 minutes! - Designed for extensive use



TANKS FOR *BLOTTING*

WHAT TANK FOR BLOTTING?



Solution 1: **Semi-Dry BLOTTING**

- Recommended for **BLOTTING OF PROTEINS AND NUCLEIC ACIDS**.
- Ideal for transferring all Protein, overall less than 150 kd.
- No significant volume of buffer to prepare.



Solution 2: **LIQUID BLOTTING** GEL TRANSBLOTTERS - MINI AND LARGE

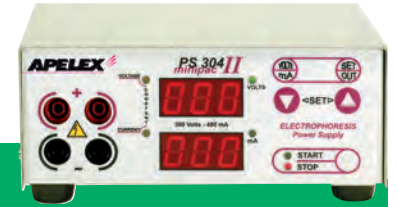
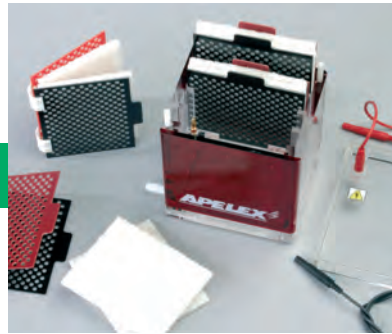
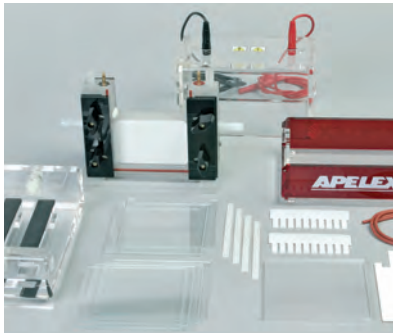
- Separate cassettes give flexible gel capacity.
- Designed for **NORTHERN, SOUTHERN AND WESTERN BLOTTING**.



Solution 3: **LIQUID BLOTTING** SLIM BLOTTERS

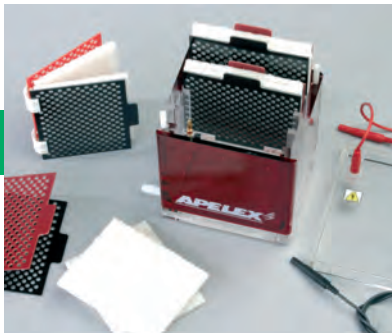
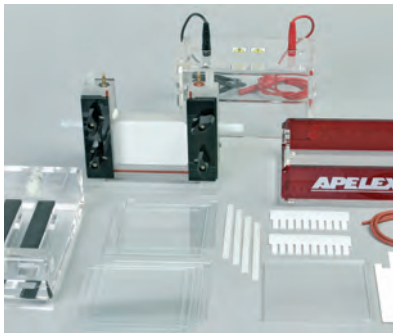
- Low buffer volume.
- Very fast transfer.
- Low voltage.
- 5 tank sizes for Western Blotting.
- 5 tank sizes equipped by platinized Titanium anode for **NORTHERN, SOUTHERN AND WESTERN BLOTTING**.

PACKS FOR PROTEINS



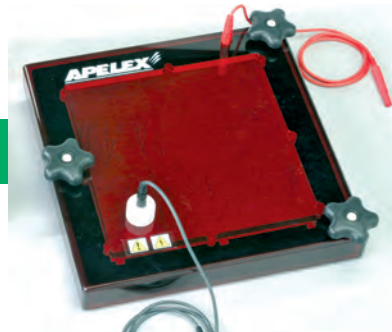
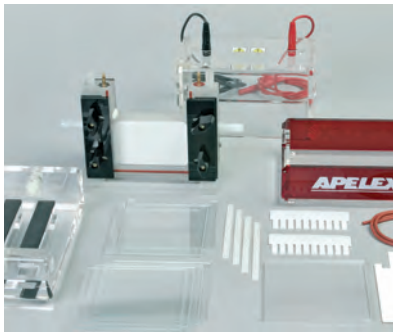
4000P1 / Pack 1 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- MINI TRANSBLOTTER - Cat. No. 430000
- PS 304 - Cat. No. 160500



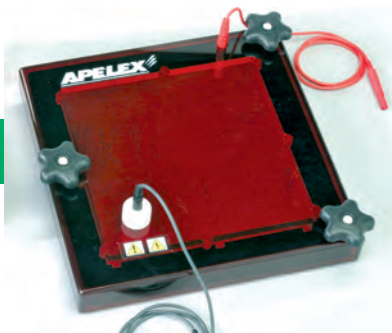
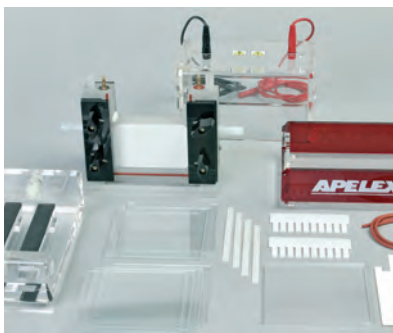
4000P2 / Pack 2 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- MINI TRANSBLOTTER - Cat. No. 430000



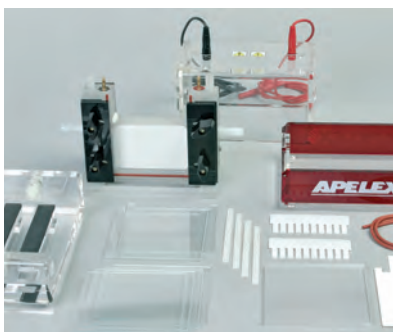
4000P3 / Pack 3 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- SEMI DRY BLOTTER - Cat. No. 450000
- PS 305 - Cat. No. 170000



4000P4 / Pack 4 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- SEMI DRY BLOTTER - Cat. No. 450000



4000P5 / Pack 5 includes

- MINI-VERTIGEL 2 - Cat. No. 400000
- SLIM BLOTTER - Cat. No. 504001
- PS 304 - Cat. No. 160500

PRE-MIXED GELS & SOLUTIONS

POLYACRYLAMIDE GEL APPLICATIONS				
Recommended applications for each formulation are shown in RED				
Acrylamide: MBA Ratio	Gel %	Native DNA/RNA (bp)	Denatured DNA/RNA (bp)	Protein (kd)
19:1	4	400-1500	70-500	100-200
"	6	60-600	40-400	40-150
"	8	40-500	20-200	20-100
"	10	30-300	15-150	15-70
"	12	20-150	10-100	8-60
29:1	5	200-2000	70-800	>150
"	6	80-800	50-500	50-200
"	8	60-400	30-300	30-125
"	10	50-300	20-200	20-100
"	12	40-200	15-125	10-70
"	20	<40	<40	<30
37.5:1	6	.	.	60-200
"	8	.	.	50-150
"	10	.	.	25-100
"	12	.	.	15-80



GEL MATRICES

ORDERING INFORMATION

PROTEIN SEPARATION		
EC 890-200	ProtoGel 37,5:1	200 ml
EC 890-450	ProtoGel 37,5:1	450 ml
EC 890-1000	ProtoGel 37,5:1	1000 ml
30% Stabilized 37.5:1 Premixed solution of acrylamid/bisacrylamide Ideal for the separation of proteins and polypeptides.		
EC 852-450	AccuGel 29:1	450 ml
EC 852-1000	AccuGel 29:1	1 Liter
Ready-to-use monomer Premixed 40% Acrylamide/Bisacrylamide solution for the preparation of electrophoresis gels for Protein separation.		
EC 755	ProtoPrep II Kit	450 ml
EC 757	ProtoPrep II buffer	200 ml
EC 756	ProtoPrep II concentrate	200 ml
EC 758	ProtoPrep II dissolution reagent	50 ml
Meltable acrylamide matrix for the electrophoretic separation and purification and recovery of proteins. After the gel is run, proteins from 2 to 200kD can be located excised and recovered from the matrix by melting the gel section in three volumes of dissolution reagent. The ProtoPrep II will melt only once and remains liquefied.		
EC 810-1000	AcrylaGel	1 Liter
AcrylaGel is a 30% stabilized, ready-to-use acrylamide solution.		
EC 820-1000	Bis-AcrylaGel	1 Liter
Bis-AcrylaGel is a ready-to-use, 2% solution of methylene bisacrylamide. Also designed for DNA & RNA separation.		
EC 852-1000	AccuGel 29:1	1 Liter
Ready-to-use monomer Premixed 40% Acrylamide/Bisacrylamide solution for the preparation of electrophoresis gels for Protein separation.		

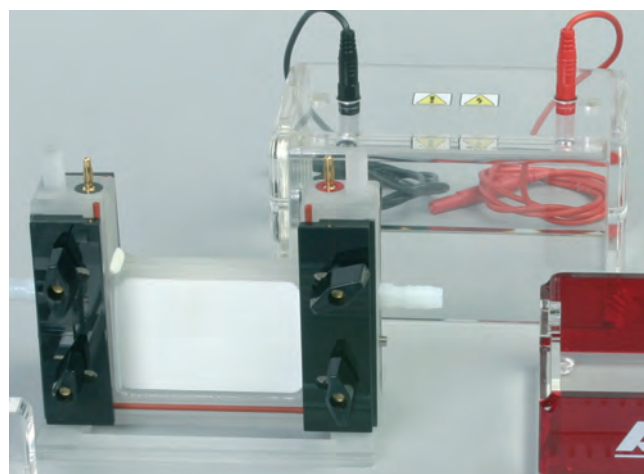
DNA and RNA SEPARATION

EC 834-450	SequaGel-4	450 ml
EC 832-450	SequaGel-4.25	450 ml
EC 837-450	SequaGel-4.75	450 ml
EC 836-450	SequaGel-6	450 ml
EC 838-450	SequaGel-8	450 ml
EC 841-90	SequaGel Complete Buffer	90 ml
Consist of one bottle of SequaGel monomere solution and SequaGel complete Buffer solution. Simply mix 4 parts of bottle one with 1 part of bottle two to formulate 19:1 denaturing DNA gels of constant percentage.		
EC 833*	SequaGel Sequencing System	1 Kit
EC 840-450	SequaGel Diluant	450 ml
EC 830-450	SequaGel Concentrate	450 ml
EC 835	SequaGel Buffer	100 ml
*Three bottle system to cast 19:1 sequencing gels from 4% up to 20% quickly and conveniently.		
EC 847	SequaGel MD Heteroduplex	1 Kit
EC 846	SequaGel MD SSCP	1 Kit
EC 845	SequaGel MD Monomer Solution	200 ml
For the detection of minor mutational differences in SSCP analysis and Heteroduplex analysis.		
EC 842-450	SequaGel XR	450 ml
EC 843-100	SequaGel XR Concentrate	100 ml
National Diagnostics' proprietary extended read matrix.		
EC 850-1000	AccuGel 19:1	1 Liter
Ready-to-use monomer solutions for the preparation of electrophoresis gels for DNA or RNA.		
EC 810-000	AcrylaGel	1 Liter
AcrylaGel is a 30% stabilized, ready-to-use acrylamide solution.		
EC 820-1000	Bis-AcrylaGel	1 Liter
Bis-AcrylaGel is a ready-to-use, 2% solution of methylene bisacrylamide. Also designed for Protein separation.		

APELEX ANAMED PRECAST GELS

The following gels are manufactured in a 10 cm x 10 cm one-way use plastic-cassette and fit into the **APELEX** Mini-Vertigel 2 tank (see page 30) and most of the commercial available electrophoresis minicells, such as Novex Serva, Hoefer, e.g. The gels are available in packs of ten per gel type - no single-gels!

APELEX anamed precast gel (PAG) are manufactured to be "native" gels. Therefore they fit perfectly for to use in native or SDS-Electrophoresis! All Laemmli-gels have a 4 % stacking gel!



APELEX ANAMED precast gel:

A reliable standard directly from the refrigerator. Our specialists have several years of first-hand experience in the development and production of precast gels. We submit our products to a strict quality control with a certificate of analysis (GLP).

Mini Vertigel 2 PC: Cat. No. 400800

Designed for precast gels 10 x 10 cm. Supplied with Running Module. No other accessories for Casting Gels.

See page 40 the detail of additional accessories as combs, spacers, glass plates and further items.

VarioGel® ORDERING INFORMATION

PART-N°	PRODUCT-SPECIFICATION	UNIT
VarioGel® – the cleaver Solution for your Protein- or DNA-Electrophoresis		
IDEAL IN PERFORMANCE FOR NARROW MOLECULAR WEIGHT RANGES		
VG 09110	9 % VarioGel®, 1 mm, 10 wells	10 pieces
VG 09112	9 % VarioGel®, 1 mm, 12 wells	10 pieces
VG 09115	9 % VarioGel®, 1 mm, 15 wells	10 pieces
IDEAL IN PERFORMANCE FOR BROAD MOLECULAR WEIGHT RANGES		
VG 41210	4 – 12 % VarioGel®, 1 mm, 10 wells	10 pieces
VG 41212	4 – 12 % VarioGel®, 1 mm, 12 wells	10 pieces
VG 41215	4 – 12 % VarioGel®, 1 mm, 15 wells	10 pieces
BUFFER SOLUTIONS FOR ELEKTROPHORESIS WITH VARIOGEL®		
VM 05509	MOPS/Tris/SDS-Running buffer for VarioGel® (20 x Concentrate)	500 ml
VM 10509	MOPS/Tris/SDS-Running buffer for VarioGel® (20 x Concentrate)	1000 ml
VM 50509	MOPS/Tris/SDS-Running buffer for VarioGel® (20 x Concentrate)	5000 ml
VT 05508	Tricin/Tris/SDS-Running buffer for VarioGel® (20 x Concentrate)	500 ml
VT 10508	Tricin/Tris/SDS-Running buffer for VarioGel® (20 x Concentrate)	1000 ml
VT 50508	Tricin/Tris/SDS-Running buffer for VarioGel® (20 x Concentrate)	5000 ml
VP 02510	Tris/HCl/SDS-Samplebuffer for VarioGel® (2 x Concentrate)	20 ml
VP 05510	Tris/HCl/SDS-Samplebuffer for VarioGel® (2 x Concentrate)	50 ml
TB 01075	TBE- Samplebuffer for DNS-Samples (5 x Concentrate), extra heavy	10 ml
BUFFER SOLUTIONS FOR BLOTTING THE ANAMED PRECAST GELS		
TG 05005	Transfer buffer for VarioGel®/ProGel/ProGel-P (25 x Concentrate)	500 ml
TG 10005	Transfer buffer for VarioGel®/ProGel/ProGel-P (25 x Concentrate)	1000 ml

NEW PRECAST GELS FAMILY: THE VARIOGEL®

Two variations: 9 % and 4-12 % VarioGel® for precise Protein - or DNA separation.

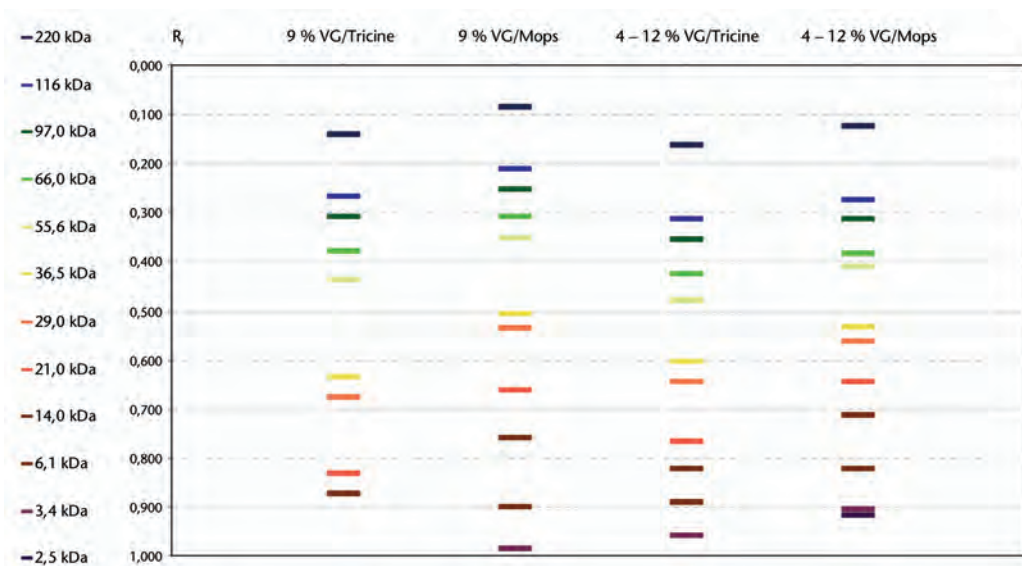
VarioGel® is a pH-neutral Polyacrylamide-Precast-Gel designed for the vertical SDS-Electrophoresis in format of 10 cm x 10 cm gels.

VarioGel® is clearly designed for being an alternative product to other available “long-shelf-life – gels”.

VarioGel® doesn't need an antioxidant added to the run-buffer-solution to prevent reoxidation of the samples during run-time of the electrophoresis, it's already in the buffer solution.

VarioGel® is not intended to substitute by all means the performance of a pH-alkaline Tris/Glycine or Tricine gel. We know by fact certain applications which run much better in terms of separation in weak alkaline buffer medias.

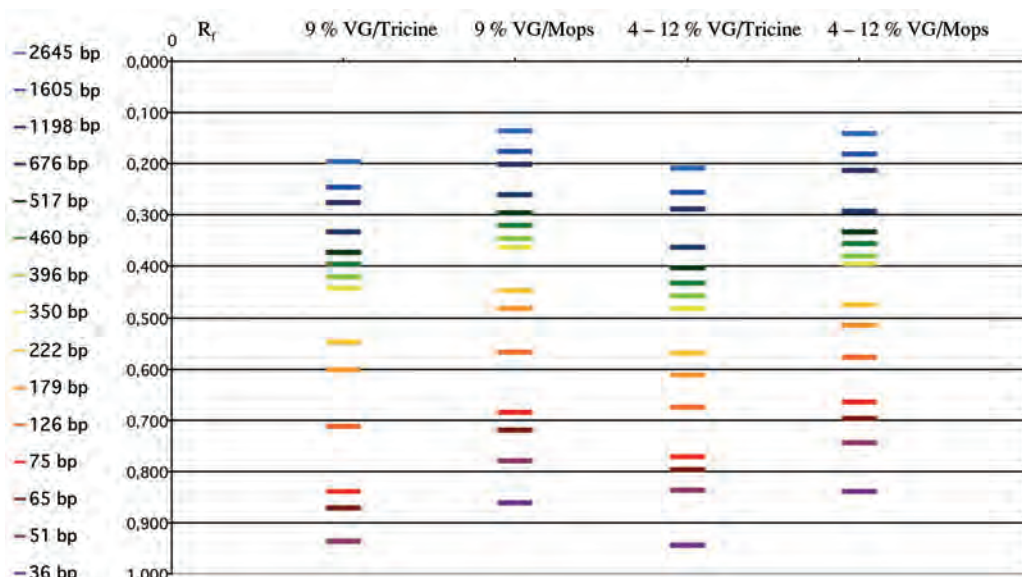
MIGRATION PATTERN OF PROTEMIX ON VARIOGEL® 9% AND 4 - 12%



The best feature of VarioGel®:

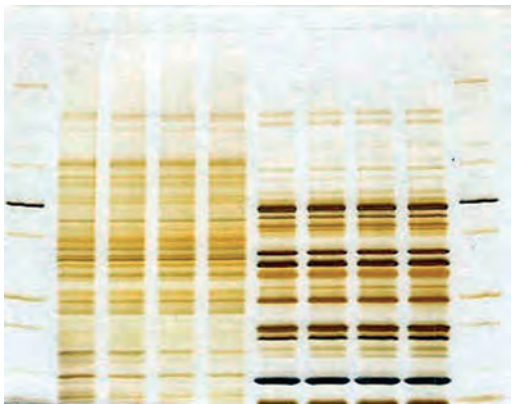
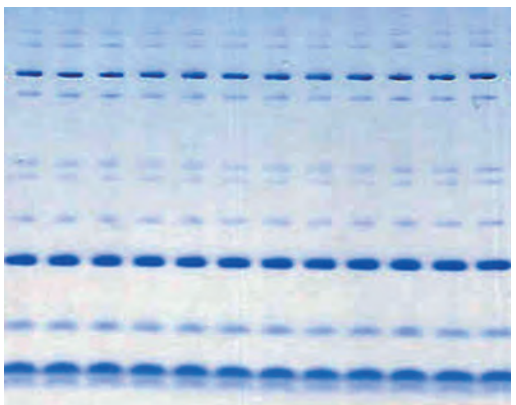
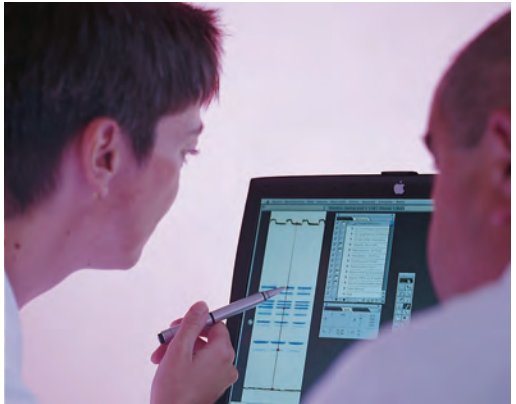
- Possible variations in buffer solutions to be used, for selection of the best resolution in molecular sizes a user wants to look at.
- Shorter runtime, down to 35 minutes instead of 90 minutes.
- No need of refrigerator storage.

MIGRATION PATTERN OF DNA-FRAGMENTS ON VARIOGEL® 9% AND 4 - 12%



- Guaranteed shelf life of at least 6 months after production date.
- Very attractive in price, QC – certificates available on request.
- Saving laboratory costs, providing ease of use and precise results.

PROGEL HOMOGENIOUS TRIS-GLYCINE GELS ("LAEMMLI-GELS") FOR PROTEIN ANALYSIS



	IDEAL PERFORMANCE BETWEEN	100 - 400 kDa
TG 04110	4 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 04112	4 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 04115	4 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 04510	4 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 04512	4 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 04515	4 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	60 - 300 kDa
TG 06110	6 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 06112	6 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 06115	6 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 06510	6 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 06512	6 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 06515	6 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	40 - 250 kDa
TG 08110	8 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 08112	8 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 08115	8 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 08510	8 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 08512	8 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 08515	8 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	30 - 200 kDa
TG 10110	10 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 10112	10 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 10115	10 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 10510	10 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 10512	10 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 10515	10 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	15 - 120 kDa
TG 12110	12 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 12112	12 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 12115	12 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 12510	12 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 12512	12 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 12515	12 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	6 - 80 kDa
TG 14110	14 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 14112	14 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 14115	14 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 14510	14 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 14512	14 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 14515	14 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	5 - 60 kDa
TG 16110	16 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 16112	16 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 16115	16 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 16510	16 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 16512	16 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 16515	16 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	2 - 50 kDa
TG 18110	18 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 18112	18 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 18115	18 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 18510	18 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 18512	18 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 18515	18 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

PROGEL TRIS-GLYCINE GRADIENT-GELS

	IDEAL PERFORMANCE BETWEEN	30 - 300 kDa
TG 41210	4 - 12 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 41212	4 - 12 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 41215	4 - 12 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 41250	4 - 12 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 41252	4 - 12 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 41255	4 - 12 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	10 - 200 kDa
TG 81610	8 - 16 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 81612	8 - 16 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 81615	8 - 16 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 81650	8 - 16 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 81652	8 - 16 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 81655	8 - 16 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	5 - 200 kDa
TG 42010	4 - 20 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 42012	4 - 20 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 42015	4 - 20 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 42050	4 - 20 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 42052	4 - 20 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 42055	4 - 20 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	5 - 100 kDa
TG 12010	10 - 20 % Tris/Gly Gel, 1,0 mm, 10-well	10 pieces in a box
TG 12012	10 - 20 % Tris/Gly Gel, 1,0 mm, 12-well	10 pieces in a box
TG 12015	10 - 20 % Tris/Gly Gel, 1,0 mm, 15-well	10 pieces in a box
TG 12050	10 - 20 % Tris/Gly Gel, 1,5 mm, 10-well	10 pieces in a box
TG 12052	10 - 20 % Tris/Gly Gel, 1,5 mm, 12-well	10 pieces in a box
TG 12055	10 - 20 % Tris/Gly Gel, 1,5 mm, 15-well	10 pieces in a box

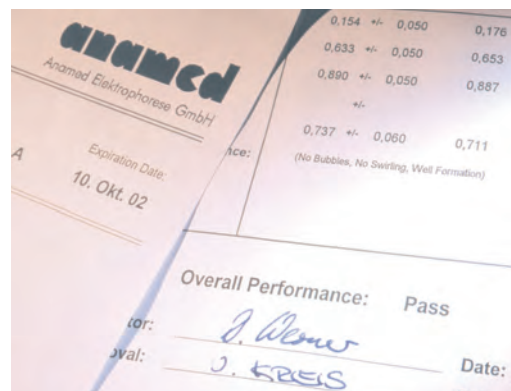


PROGEL-P TRIS-TRICINE-GELS ("SCHAEGGER & VON JAGOW-GELS"), PREFERABLY DESIGNATED FOR PEPTIDE ELECTROPHORESIS

	IDEAL PERFORMANCE BETWEEN	8 - 150 kDa
TR 10110	10 % Tricine Gel, 1,0 mm, 10-well	10 pieces in a box
TR 10112	10 % Tricine Gel, 1,0 mm, 12-well	10 pieces in a box
TR 10115	10 % Tricine Gel, 1,0 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	1 - 40 kDa
TR 16110	16 % Tricine Gel, 1,0 mm, 10-well	10 pieces in a box
TR 16112	16 % Tricine Gel, 1,0 mm, 12-well	10 pieces in a box
TR 16115	16 % Tricine Gel, 1,0 mm, 15-well	10 pieces in a box

	IDEAL PERFORMANCE BETWEEN	2 - 200 kDa
TR 12010	10 - 20% Tricine Gel, 1,0 mm, 10-well	10 pieces in a box
TR 12012	10 - 20% Tricine Gel, 1,0 mm, 12-well	10 pieces in a box
TR 12015	10 - 20% Tricine Gel, 1,0 mm, 15-well	10 pieces in a box



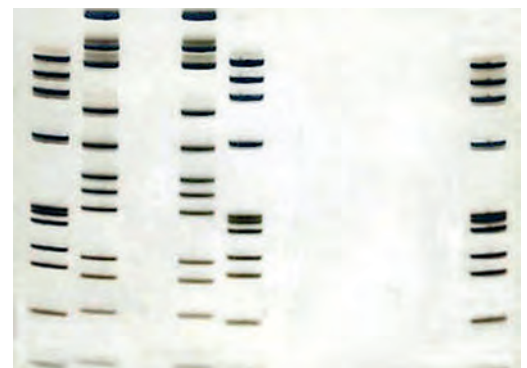
NUCGEL TRIS-BORATE-EDTA (TBE) GELS FOR ELECTROPHORESIS OF DNA

	IDEAL PERFORMANCE BETWEEN	60 - 2500 bp
TB 06110	6 % TBE Gel, 1,0 mm, 10-well	10 pieces in a box
TB 06112	6 % TBE Gel, 1,0 mm, 12-well	10 pieces in a box
TB 06115	6 % TBE Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	40 - 2500 bp
TB 08110	8 % TBE Gel, 1,0 mm, 10-well	10 pieces in a box
TB 08112	8 % TBE Gel, 1,0 mm, 12-well	10 pieces in a box
TB 08115	8 % TBE Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	50 - 1500 bp
TB 10110	10 % TBE Gel, 1,0 mm, 10-well	10 pieces in a box
TB 10112	10 % TBE Gel, 1,0 mm, 12-well	10 pieces in a box
TB 10115	10 % TBE Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	10 - 900 bp
TB 20110	20 % TBE Gel, 1,0 mm, 10-well	10 pieces in a box
TB 20112	20 % TBE Gel, 1,0 mm, 12-well	10 pieces in a box
TB 20115	20 % TBE Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	60 - 2500 bp
TB 41210	4 - 12 % TBE Gel, 1,0 mm, 10-well	10 pieces in a box
TB 41212	4 - 12 % TBE Gel, 1,0 mm, 12-well	10 pieces in a box
TB 41215	4 - 12 % TBE Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	20 - 3000 bp
TB 42010	4 - 20 % TBE Gel, 1,0 mm, 10-well	10 pieces in a box
TB 42012	4 - 20 % TBE Gel, 1,0 mm, 12-well	10 pieces in a box
TB 42015	4 - 20 % TBE Gel, 1,0 mm, 15-well	10 pieces in a box



NUCGEL-S TBE-UREA GELS FOR THE ELECTROPHORESIS OF SINGLE-STRANDED DNA OR RNA

	IDEAL PERFORMANCE BETWEEN	40 - 750 bases
TU 06110	6 % TBU Gel, 1,0 mm, 10-well	10 pieces in a box
TU 06112	6 % TBU Gel, 1,0 mm, 12-well	10 pieces in a box
TU 06115	6 % TBU Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	20 - 500 bases
TU 10110	10 % TBU Gel, 1,0 mm, 10-well	10 pieces in a box
TU 10112	10 % TBU Gel, 1,0 mm, 12-well	10 pieces in a box
TU 10115	10 % TBU Gel, 1,0 mm, 15-well	10 pieces in a box
	IDEAL PERFORMANCE BETWEEN	20 - 300 bases
TU 15110	15 % TBU Gel, 1,0 mm, 10-well	10 pieces in a box
TU 15112	15 % TBU Gel, 1,0 mm, 12-well	10 pieces in a box
TU 15115	15 % TBU Gel, 1,0 mm, 15-well	10 pieces in a box



EMPTY CASSETTES AND COMBS

AN 90100	Empty Cassettes	10 x 10cm	1,0 mm, 25 pieces	1 Pack
AN 90105	Empty Cassettes	10 x 10cm	1,5 mm, 25 pieces	1 Pack
AN 91110	Combs	10 well	1,0 mm, 25 pieces	1 Pack
AN 91112	Combs	12 well	1,0 mm, 25 pieces	1 Pack
AN 91115	Combs	15 well	1,0 mm, 25 pieces	1 Pack

Buffer Concentrates for Electrophoresis - Tris-Glycine - Applications

TG 05001	Tris-Glycine-SDS	Running Buffer (10 x Concentrate)	500 ml
TG 10001	Tris-Glycine-SDS	Running Buffer (10 x Concentrate)	1000 ml
TG 50001	Tris-Glycine-SDS	Running Buffer (10 x Concentrate)	5000 ml
TG 02002	Tris-Glycine-SDS	Sample Buffer (2 x Concentrate)	20 ml
TG 05002	Tris-Glycine-SDS	Sample Buffer (2 x Concentrate)	50 ml
TG 05003	Tris-Glycine-Native	Running Buffer (10 x Concentrate)	500 ml
TG 10003	Tris-Glycine-Native	Running Buffer (10 x Concentrate)	1000 ml
TG 02004	Tris-Glycine-Native	Sample Buffer (2 x Concentrate)	20 ml
TG 05004	Tris-Glycine-Native	Sample Buffer (2 x Concentrate)	50 ml
TG 05005	Transferbuffer for ProGel/ProGel-P	(25 x Concentrate)	500 ml
TG 10005	Transferbuffer for ProGel/ProGel-P	(25 x Concentrate)	1000 ml

TRIS-TRICINE - APPLICATIONS

TR 05006	Tris-Tricine-SDS	Running Buffer (10 x Concentrate)	500 ml
TR 10006	Tris-Tricine-SDS	Running Buffer (10 x Concentrate)	1000 ml
TR 50006	Tris-Tricine-SDS	Running Buffer (10 x Concentrate)	5000 ml
TR 02007	Tris-Tricine-SDS	Sample Buffer (2 x Concentrate)	20 ml
TR 05007	Tris-Tricine-SDS	Sample Buffer (2 x Concentrate)	50 ml
TG 05005	Transfer buffer for ProGel/ProGel-P	(25 x Concentrate)	500 ml
TG 10005	Transfer buffer for ProGel/ProGel-P	(25 x Concentrate)	1000 ml

TRIS-BORATE-EDTA (TBE) - BUFFERSYSTEM FOR NUCLEIC - ACID ELECTROPHORESIS

TB 10060	TBE Running buffer	(5x Concentrate)	1000 ml
TB 50060	TBE Running buffer	(5 x Concentrate)	5000 ml
TB 01070	TBE Sample buffer	(6 x Concentrate)	10 ml
TB 05070	TBE Sample buffer	(6 x Concentrate)	50 ml
TB 01075	TBE Sample buffer	(5 x Concentrate) - extra heavy	10 ml
TU 01080	TBE-Urea Sample Buffer	(2 x Concentrate)	10 ml
TU 02085	TBE-Urea, prep. Sample Buffer	(2 x Concentrate)	20 ml

MARKER AND STANDARDS

MS 10001	ProteMix Proteinstandard	with 12 Components (220 - 2,5 kDa)	1 ml
MS 10005	Blue-Prestained Proteinmarker	with 8 Components (175 - 6,5 kDa)	1 ml

GEL - STAINING AND DESTAINING

GF 10002	AzurGel-K, Colloidal Coomassie Kit		1 Pack
	contents of 2 solutions and an instruction sheet, sufficient for 25 anamed-minigels		
GF 10003	AzurGel-Super, ready-to-use staining solution		1000 ml
	sufficient for approx. 50 anamed-minigels		
GF 10010	ArgentQuick, Silverstaining Kit for detection of traces		1 Pack
	5 solutions, ea. 125 ml, and an instruction sheet, sufficient for 25 anamed-minigels		

GEL-DRYING

AN 10100	AnaFix - Geldrying-Kit I	for 10 x 10 cm Gels	1 Pack
	(2 Drying-frames, 200 Cellophane-sheets and 500 ml AnaRapid)		
AN 10200	AnaFix - Geldrying-Kit II	for 20 x 20 cm Gels	1 Pack
	(1 Drying-frame, 100 Cellophane sheets and 500 ml AnaRapid)		
AN 10110	AnaFix - Drying-frame I	for one piece of a 10 x 10 cm Gel	1 Pack
	(1 Pack. = 2 frames)		
AN 10210	AnaFix - Drying-frame II	for a 20 x 20 cm Gel or 4 anamed-gels	1 Piece
AN 10120	Cellophane-sheets I - precut	for 10 x 10 cm gels	1 Pack
	(1 Pack = 200 pieces)		
AN 10220	Cellophane-sheets II - precut	for 20 x 20 cm gels	1 Pack
	(1 Pack = 100 pieces)		
AR 10050	AnaRapid - Geldrying-solution		500 ml
AR 10100	AnaRapid - Geldrying-solution		1000 ml
AR 10500	AnaRapid - Geldrying-solution		5000 ml

A Matrix Related Problems

Problems with the matrix will manifest as smeared bands and/or loss of resolution. Note that most "total failures" of electrophoresis are not matrix related (see "D" - Buffer related problems)

- 1) **Pore size:** This is determined by the amount of matrix and cross-linker used; suggested ranges are given on the web site. Use of the wrong formulation will result in the region of interest running off of the gel, or failing to enter the gel sufficiently to resolve. Larger pore sizes also allow more diffusion, resulting in broader bands.
- 2) **Polymerization:** Gels which take longer than usual to polymerize will generally give broad and distorted bands due to local variations in gel quality. Polymerization of the gel is a chain reaction, initiated by Ammonium Persulfate (APS) and TEMED. The extension of initiated chains is inhibited by oxygen. APS and TEMED must be fresh for consistent results. APS should "crackle" when dissolving. TEMED should be clear, with no yellow color. Use of old reagents will lead to incomplete polymerization, which is further inhibited by low levels of dissolved oxygen. Degassing will remove O₂ giving better polymerization, but it is not a substitute for fresh reagents. Cold temperatures will also slow polymerization - cast gels at room temperature.
- 3) **Well Formation (sharks-tooth comb):** The bottom of the well must be smooth and flat. Remove the comb after casting slowly, under buffer. Reinsert the comb carefully, so as not to over-penetrate the gel surface. Do not withdraw the comb once inserted - well distortions and leakage will result.
- 4) **Immobilized charges:** Acrylamide is subject to oxidation, producing acrylic acid. The immobilization of acrylic acid in the matrix generates a reverse flow of water (electroendosmosis), and allows the proteins to interact with the matrix, which leads to band broadening. Use only fresh acrylamide solutions, within their shelf life, which have been properly stored.

B Sample Preparation

Degradation of samples leads to smeared or doubled bands. Overloading will cause bands to smear and will alter band positions.

- 1) **Nuclease degradation:** Exonucleases will cause bands to smear down, endonucleases will generate new bands. Keep samples cold, include EDTA where practical.
- 2) **Denaturation:** Insufficient heating may allow retention of residual secondary structure which causes bands to migrate at spurious molecular weights, and may cause doublets.
- 3) **Overloading:** Loading of more than 10 µg/ lane of DNA will cause an upward smearing of the bands.
- 4) **Urea in wells:** The urea in the gel will diffuse into the wells and disrupt sample loading. Flush wells with running buffer just prior to loading.

TroubleShooting Denaturing DNA-PAGE Gels

Symptom	Diagnosis
<ul style="list-style-type: none"> • Smeared bands or distorted band pattern - dyes run normally (gel difficult to load) 	<ul style="list-style-type: none"> • Gel poorly polymerized (A-2), gel overloaded (B-3), nuclease in samples (B-1), salt in samples (D-1), or wells not flushed (B-4)
<ul style="list-style-type: none"> • Smeared bands or distorted band pattern - dye run speed altered or dyes smeared 	<ul style="list-style-type: none"> • Buffer mismatch (D-1,3,4), glycerol in samples (D-5), run parameters not optimal (C-1), or fixed charges on gel (A-4)
<ul style="list-style-type: none"> • "Smiling" - middle lanes run faster than outer lanes 	<ul style="list-style-type: none"> • Gel heating during run - check run parameters (C-1), buffer (D-3,4) and heat exchange system on gel apparatus (C-3)
<ul style="list-style-type: none"> • Wavy bands 	<ul style="list-style-type: none"> • Poor gel polymerization (A-2) or upper edge of gel distorted (A-3)
<ul style="list-style-type: none"> • Double bands 	<ul style="list-style-type: none"> • Samples not fully denatured (B-2), nuclease degradation (B-1), or insufficient pre-run (C-2)
<ul style="list-style-type: none"> • Gel fails to polymerize 	<ul style="list-style-type: none"> • Ammonium Persulfate or TEMED too old (A-2)/ or too much oxygen in the gel solution (A-2)
<ul style="list-style-type: none"> • Dye runs slowly, as a sharp band at the top of the gel 	<ul style="list-style-type: none"> • No buffer in gel (D-2)
<ul style="list-style-type: none"> • Expected bands not seen 	<ul style="list-style-type: none"> • Nuclease digestion of samples (B-1) or wrong pore size used (A-1)

C Run Conditions

The voltage and temperature maintained during the run can have marked effects on the results.

- 1) **Electrical parameters:** run gels at constant wattage (45-55 watts), to maintain the temperature above 50°C, which keeps the sample denatured. Too low a wattage allows the gel to cool to the point that the samples will begin to renature. Running at too high a voltage causes smearing and/or "smiling".
- 2) **Pre-Run:** Gels must be pre-run for 30 min. to warm the gel to operating temperature. Failure to pre-run gives doublet bands.
- 3) **Heat exchange:** Heat must be conducted away from the gel to avoid thermal gradients in the gel, which cause "smiling" or other pattern distortions.

D Buffer Related Problems

Buffer problems are by far the most common cause of "total failure" of gels. A buffer imbalance will lead to changes in the voltage, current or wattage of the run.

- 1) **Sample contains too much salt:** Salt ions in the sample will migrate as a zone of high conductivity, low resistance and low voltage. The initial migration of the sample bands will be altered, resulting in skewed or broad bands, or aberrant band positions. High salt samples should be dialyzed or otherwise desalted before loading.
- 2) **No buffer in gel:** This creates a high resistance across the gel. With no ions to carry the current, the tracking dye "stacks" in the zone behind the slow moving buffer front.
- 3) **Tank buffer incorrect:** Use of too concentrated or too dilute tank buffer will lead to a salt discontinuity which migrates through the gel, distorting the band pattern with a "wave" effect.
- 4) **Gel buffer incorrect:** The gel provides most of the resistance to current flow - changes in the gel buffer will alter the electrical parameters of the run. Too concentrated a gel buffer will allow more current to flow, leading to more heat generation, with distortions such as smiling. Too dilute a gel buffer will increase resistance to current flow, which may actually sharpen the bands but generally slows the run and reduces resolution.
- 5) **Glycerol containing samples:** Glycerol forms complexes with the borate in TBE buffer, creating a zone of low conductivity which migrates slowly through the gel, creating a "wave" pattern. Use a non-glycerol loading buffer, or run gels in a borate free buffer such as TTE.

A Matrix Related Problems

Problems with the matrix will manifest as smeared bands and/or loss of resolution. Note that most "total failures" of electrophoresis are not matrix related (see "D"- Buffer related problems)

- 1) Pore size: This is determined by the concentration and type of agarose used. Suggested ranges are given on the web site. Low concentration gels should be run in the cold room, they are fragile, and allow more sample diffusion. High concentration gels are friable (crumble easily), and will not allow large DNA molecules to enter the gel.
- 2) Gel preparation: Agarose should be boiled only long enough to dissolve all crystals. Overboiling will weaken the matrix. Cool to 60°C before pouring to avoid damage to the gel mold. Allow the gel to cool gradually after pouring- rapid cooling will "trap" swirling and convection currents in the set gel, which can distort bands which pass through them. NOTE ON ALKALINE GELS: alkaline gel buffers will hydrolyze hot agarose solutions. Boil agarose for alkaline gels in water, cool, and then add alkaline buffer concentrate just before pouring the gel.
- 3) Wells: Use care in removing the comb after casting; check to be sure that the gel is completely cooled. Twisting of the comb on removal will tear the walls of the well, allowing sample to seep into the tear, and generating distorted band shapes. Rapid removal of the comb will create a vacuum which will tear out the bottom of the wells, allowing sample to seep out before it can enter the gel.
- 4) Immobilized charges: Poor grades of agarose can carry sulfate groups which, under electrophoresis, will generate a reverse flow of water (electroendosmosis), and which will also interact with the sample. Both effects lead to band broadening. Use only fresh, high quality Agarose, with an EEO specification of ≤ 0.15 .

B Sample Preparation

Degradation of samples leads to smeared or doubled bands. Overloading will cause bands to smear and will alter band positions.

- 1) Nuclease degradation: Exonucleases will cause bands to smear down, endonucleases will generate new bands. Keep samples cold, include EDTA where practical.
- 2) Overloading: Loading of more than 10 µg/ lane of DNA will cause an upward smearing of the bands.
- 3) Dye overload: In some cases, bands will comigrate with the tracking dye. The dye will absorb the ethidium fluorescence during staining, obscuring the band. Soaking the gel in water or buffer for 1 hour will allow the dye to diffuse enough to see the bands.

TroubleShooting Agarose DNA Gels

Symptom	Diagnosis
• Smeared bands-dyes run normally	• Gel overloaded (B-2), nuclease in samples (B-1)/ or excessive salt in samples (D-1)
• Smeared bands-dye run speed altered or dyes smeared	• Run parameters not optimal (C-1/2), buffer mismatch (D-1,3), or fixed charges on gel (A-4)
• "Smiling"- middle lanes run faster than outer lanes	• Gel heating during run-check run parameters (C-1,2 and buffer (D-3)
• Wavy bands	• Gel cooled too quickly after pouring (A-2) or wells damaged (A-3)
• Double bands	• Nuclease degradation (B-1), gel run too fast (C-1), or buffer mis-match (D-3)
• Gel fails to set up	• Alkaline buffer hydrolyzed matrix (A-2)
• Dye runs slowly, as a sharp band at the top of the gel	• No buffer in gel (D-2)
• Expected bands not seen	• Nuclease digestion of samples (B-1), wrong percentage gel used (A-1), voltage too high (C-1), or dye overload (B-3)

C Run Conditions

The voltage and temperature maintained during the run can have marked effects on the results.

- 1) Electrical parameters: Most gels are meant to be run at 5-15V/ cm. Running at too low a voltage (too slow) allows the bands to diffuse too much before the run is finished. Too high a voltage causes heating which can melt the gel. Increasing the voltage also selectively increases the mobility of larger DNA molecules, compressing the band pattern.
- 2) Temperature: In general, gels should be run as cold as is convenient. This is particularly true for low-melting or low percentage gels, which are fragile at room temperature.

D Buffer Related Problems

Buffer problems are by far the most common cause of "total failure" of gels.

A buffer imbalance will lead to changes in the voltage, current or wattage of the run.

- 1) Sample contains too much salt: Salt ions in the sample will migrate as a zone of high conductivity, low resistance and low voltage. The initial migration of the bands will be altered, resulting in skewed or broad bands, or aberrant band positions. High salt samples should be dialyzed or otherwise desalted before loading.
- 2) No buffer in gel: Failure to add buffer to the gel creates a high resistance across the gel, with no ions to carry the current. The tracking dye "stacks" in the zone just behind the buffer front, and migrates slowly into the gel.
- 3) Gel or Tank buffer incorrect: A mismatch between gel and tank buffers will lead to a salt discontinuity which migrates through the gel, distorting the band pattern with a "wave" effect. This can also cause bands to migrate at an angle to the vertical, causing the bands to look broad when viewed from directly above. In some cases, such bands will appear to be doublets.

A Matrix Related Problems

Problems with the matrix will manifest as smeared bands and/or loss of resolution. Note that most "total failures" of electrophoresis are not matrix related (see "D"- Buffer related problems).

- 1) **Pore size:** This is determined by the amount of matrix and cross-linker used; suggested ranges are given on the web site. Too small of a pore size will prevent proteins of interest from moving far enough into the resolving gel to be resolved. Too large of a pore size will allow smaller proteins to run with the SDS front, creating a large, intense protein band containing many unresolved proteins, running just behind or with the tracking dye.
- 2) **Polymerization:** Polymerization of the gel is a chain reaction, initiated by Ammonium Persulfate (APS) and TEMED. The extension of initiated chains is inhibited by oxygen. APS and TEMED must be fresh for consistent results. APS should "crackle" when dissolving. TEMED should be clear, with no yellow color. Use of old reagents will lead to incomplete polymerization, which is easily inhibited by low levels of dissolved oxygen. Such gels will take longer than usual to polymerize, and will give broad and distorted bands due to local variations in gel quality. Degassing will remove O₂, giving better polymerization, but it is not a substitute for fresh reagents.
- 3) **Stacking gel:** This gel sharpens the protein zone before it enters the resolving gel. A straight sharp interface is critical to good resolution- overlay the resolving gel with water saturated n-butanol for best results.
- 4) **Immobilized charges:** Acrylamide is subject to oxidation, producing acrylic acid. The immobilization of acrylic acid in the matrix generates a flow of water (electroendosmosis), and allows the proteins to interact with the matrix, which leads to band broadening. Use only fresh acrylamide solutions, within their shelf life, which have been properly stored.

B Sample Preparation

Degradation of samples leads to smeared or doubled bands. Overloading will cause bands to smear and will alter band positions.

- 1) **Proteolysis/Oxidation:** Proteases are active in the sample buffer- keep the samples cold prior to denaturing and loading. Add mercaptoethanol or DTT to the sample buffer if oxidation is suspected. Proteolysis can cause spurious bands or a downward smearing.
- 2) **Denaturation:** Insufficient heating may allow retention of residual secondary structure which will cause bands to migrate at spurious molecular weights, and may cause doublets.
- 3) **Overloading:** Loading of more than 40 µg/ lane of protein will cause an upward smearing of the bands.

TroubleShooting Denaturing Protein Gels

Symptom	Diagnosis
• Smeared bands- dyes run normally	• Gel poorly polymerized (A-2), gel overloaded (B-3), protease in samples (B-1)/ or excessive salt in samples (D-1)
• Smeared bands- dye run speed altered or dyes smeared	• Run parameters not optimal (C-1), buffer mismatch (D-1/3,4)/ or fixed charges on gel (A-4)
• "Smiling"- middle lanes run faster than outer lanes	• Gel heating during run - Check run parameters (C-1), buffer (D-3,4) and heat exchange system on gel apparatus (C-2)
• Wavy bands	• Poor interface between stacking and resolving gels (A-3). Poor gel polymerization (A-2)
• Double bands	• Protease degradation or sample oxidation (B-1), or samples not fully denatured (B-2)
• Gel fails to polymerize	• Ammonium Persulfate or TEMED too old (A-2). Too much oxygen in the gel solution (A-2)
• Dye runs slowly, as a sharp band at the top of the gel	• No buffer in gel (D-2)
• Expected bands not seen	• Protease digestion of samples (B-1) or wrong pore size used (A-1)

C Run Conditions

The voltage and temperature maintained during the run can have marked effects on the results.

- 1) **Electrical parameters:** Most gels are meant to be run at 5-20V/cm. Running at too low a voltage (too slow) allows the bands to diffuse too much before the run is finished. Running at too high a voltage causes the bands to smear, and will lead to overheating, which causes "smiling".
- 2) **Temperature:** In general, gels should be run as cold as is convenient. If high voltages are used, a heat exchange system should be used. Overheating of the gel causes changes in the conductivity of the buffer, which leads to unpredictable results, often distortions of the band pattern, or band broadening.

D Buffer Related Problems

Buffer problems are by far the most common cause of "total failure" of gels. A buffer imbalance will lead to changes in the voltage, current or wattage of the run.

- 1) **Sample contains too much salt:** Salt ions in the sample will migrate as a zone of high conductivity, low resistance and low voltage. Until this zone migrates away from the sample, the migration of the protein bands will be altered, resulting in skewed or broad bands, or aberrant band positions. High salt samples should be dialyzed or otherwise desalted before loading.
- 2) **No buffer in gel:** Failure to add buffer to the gel creates a high resistance across the gel, with no ions to carry the current. The tracking dye "stacks" in the zone just behind the buffer front, and migrates slowly into the gel.
- 3) **Tank buffer incorrect:** The Laemmli buffer system uses a buffer discontinuity to "stack" the samples prior to separation; as a result it is more tolerant of minor buffer changes than a continuous system. Use of too concentrated or too dilute tank buffer will lead to a salt discontinuity which migrates through the gel, distorting the band pattern with a "wave" effect.
- 4) **Gel buffer incorrect:** The gel provides most of the resistance to current flow- changes in the gel buffer will alter the electrical parameters of the run. Too concentrated a gel buffer will allow more current to flow, leading to more heat generation, with distortions such as smiling. Too dilute a gel buffer will increase resistance to current flow, which may actually sharpen the bands but generally slows the run and reduces resolution.

USUAL INFORMATION FOR ELECTROPHORESIS

Effective Range of Separation of DNAs and Dye Co-Migration in Native Polyacrylamide Gels				Effective Range of Separation of DNAs and Dye Co-Migration in Denaturing Polyacrylamide Gels			
Gel %	Size Range (bp)	Bromophenol Blue (nucleotides)	Xylene Cyanol (nucleotides)	Gel %	Size Range (bp)	Bromophenol Blue (nucleotides)	Xylene Cyanol (nucleotides)
4	1000-2000	95	450	4	> 250	30	155
6	70-450	60	240	6	60-250	25	110
8	60-400	45	160	8	40-120	20	75
10	50-300	35	120	10	20-60	10	55
12	40-200	20	70	12	10-50	8	45

Range of Separation in Agarose Gels	
Gel %	Size Range (bp)
0.3	5000-60,000
0.6	1000-20,000
0.7	800-10,000
0.9	500-7,000
1.2	400-6000
1.5	200-3000
2.0	100-2000

The sieving characteristics of different types of agarose vary considerably.
A more complete discussion can be found in the web site.

Range of Separation of Proteins in SDS-PAGE	
Gel %	Size Range (kp)
6	60-200
8	40-140
10	20-80
12	15-70
15	10-15

The Genetic Code															
A															
A			G			T			C						
A	G	T	C	A	G	T	C	A	G	T	C	A	G	T	C
Lys	Lys	Asn	Asn	Arg	Arg	Ser	Ser	Ile	Met	Ile	Ile	Thr	Thr	Thr	Thr
G															
A			G			T			C						
A	G	T	C	A	G	T	C	A	G	T	C	A	G	T	C
Lys	Lys	Asn	Asn	Arg	Arg	Ser	Ser	Ile	Met	Ile	Ile	Thr	Thr	Thr	Thr
T															
A			G			T			C						
A	G	T	C	A	G	T	C	A	G	T	C	A	G	T	C
Lys	Lys	Asn	Asn	Arg	Arg	Ser	Ser	Ile	Met	Ile	Ile	Thr	Thr	Thr	Thr
C															
A			G			T			C						
A	G	T	C	A	G	T	C	A	G	T	C	A	G	T	C
Lys	Lys	Asn	Asn	Arg	Arg	Ser	Ser	Ile	Met	Ile	Ile	Thr	Thr	Thr	Thr

DNA Data

Base pairs per turn (B form): 10
1 µg of 1000bp DNA=1.51pmoles
avg MW of a base pair=650

Melting Point Calculations

$T_{m_{DNA:RNA}} = 79.8^\circ C + 18.5 (\log_{10} [Na]) + 0.58 (\%GC) + 11.8 (\%GC)^2 + 0.50 (\% \text{ Formamide}) + (820/L)$
 $T_{m_{DNA:RNA}} = 81.5^\circ C + 16.6 (\log_{10} [Na]) + 0.41 (\%GC) + 11.8 (\%GC)^2 - 0.63 (\% \text{ Formamide}) - (600 / \text{length})$
 Tm decreases by ~ 1° C for every 1% increase in mismatches.
 Tm decreases by ~ 0.5° C for every increase of 1% in formamide.

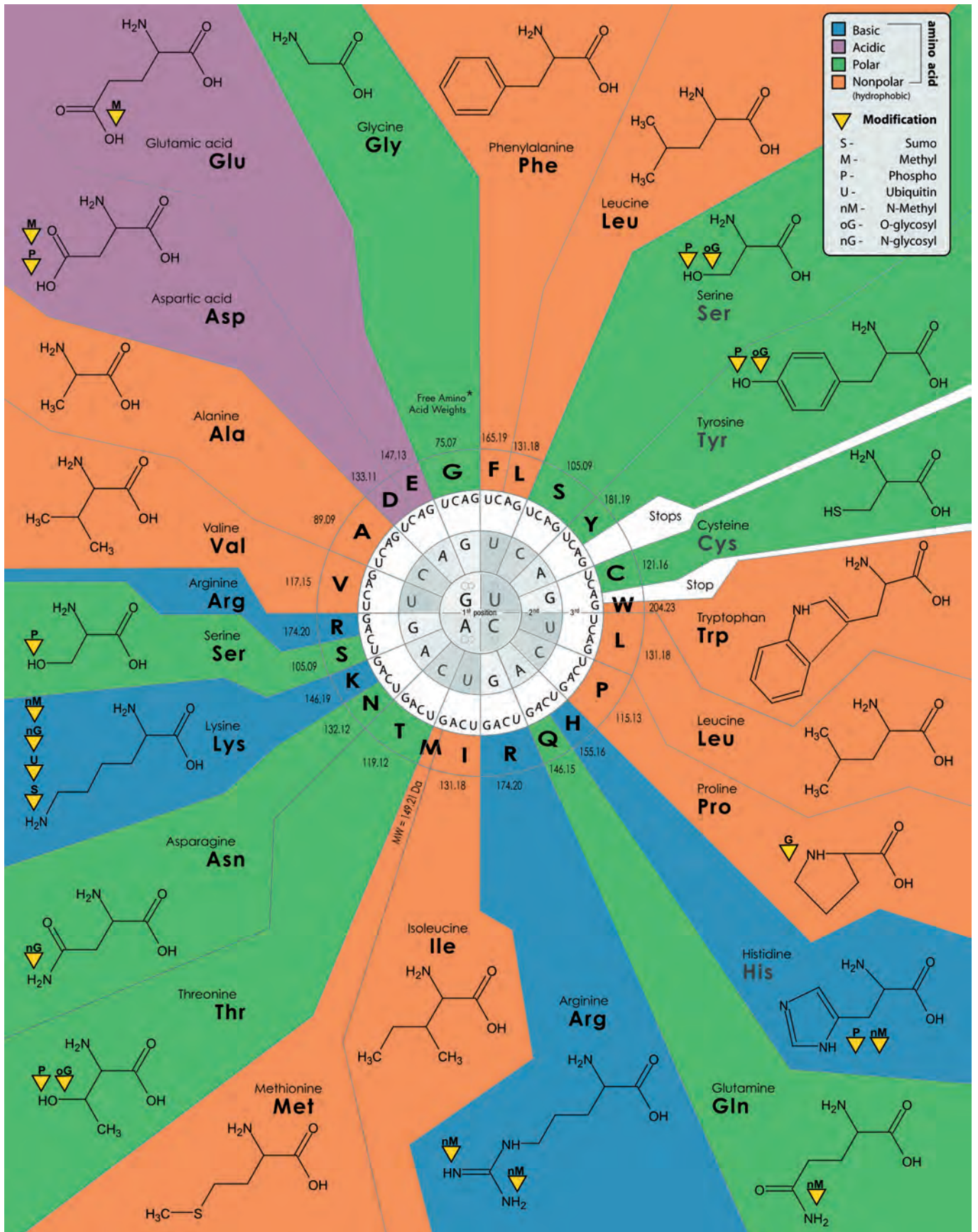
Protein Data

Average MW of an amino acid: 110 daltons grams
SDS bound per gram of protein: 1.2 (average)
A₂₈₀, 1mg/ml solution: 0.4-1.5 (range can be as much as 0.0-2.65)

Ohm's law

V = IR where
V = Voltage
I = Current
R = Resistance
Power = IV = I²R

UV Absorbance of DNA and RNA		
Nucleic Acid	µg/ml to give an A260=1.0	A260/A280 of pure material
ds DNA	50	1.8
ss DNA	37	1.8-1.9
RNA	40	37



**national
diagnostics**

www.nationaldiagnostics.com

How to Use This Chart:

This chart will enable you to identify an amino acid from a single codon. Begin in the center with the first nucleotide of the codon and work your way out. For example, to translate CAU, use the first position nucleotide (C) to identify the correct quadrant of the center circle. Next, find the second position nucleotide in the first ring surrounding the center (A), which is at five o'clock. Finally, locate the third nucleotide (U) in the second ring from the center (five o'clock). Follow the segment outward to the next ring, where you will find the single-letter code for the amino acid (H). By following the color-coded section outward, you will find structural information and related post-translational modifications.



FOR MORE INFORMATION

E-mail: apelex@apelex.fr

Web site: www.apelex.fr

APELEX

Z.I. des Malines - 22 B, rue des Malines
91090 Lisses - FRANCE

Phone: 33 (0) 1 69 91 05 24 - Fax: 33 (0) 1 69 91 36 93

N° SIRET: 412 699 597 00016 - TVA: FR 18 412 699 597