Electrophoresis and Blotting

Electrophoresis and Blotting Solutions **150**

Protein Electrophoresis **150**

Power Supplies 153
Protein Standards 157
Mini-Format 1-D Electrophoresis Systems 164
Midi-Format 1-D Electrophoresis Systems 175
Large-Format Vertical Electrophoresis Systems 184
Buffers and Reagents for Protein Electrophoresis 192
Protein Stains 199
2-D Electrophoresis 202
Preparative Electrophoresis 213
Gel Drying Equipment 218

Western Blotting **221**

Transfer Devices 223
Membranes and Filter Papers 232
Blotting Buffers and Reagents 236
Immunodetection Reagents and Kits 237

Nucleic Acid Electrophoresis and Blotting **244**

DNA Electrophoresis Systems 244
Pulsed Field Gel Electrophoresis 253
Buffers and Reagents for Nucleic Acid Electrophoresis 259
DNA Ladders 262
Northern and Southern Blotting 264
Mutation Analysis 264

Experion Automated Electrophoresis System **267**

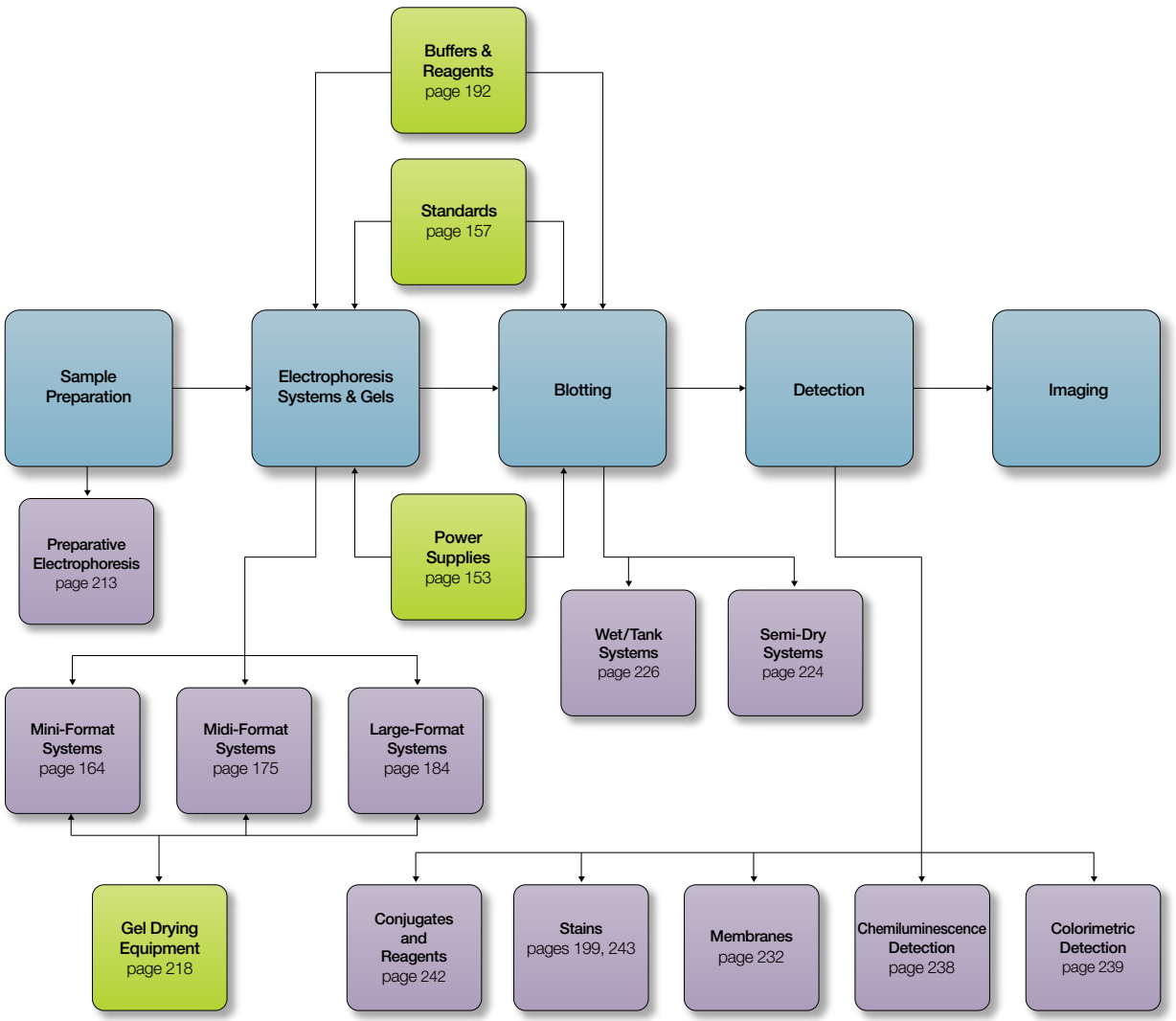
Electrophoresis and Blotting Solutions

Bio-Rad offers a complete solution for all of your electrophoresis and blotting needs, from sample preparation to imaging. Built on over 50 years of pioneering expertise, our innovative products offer reliable, reproducible results for all of your applications.

Protein Electrophoresis

A complete suite of electrophoresis products, from cells and precast gels to buffers and reagents, is available for the separation of proteins.

Learn More About the Technology
Web: bio-rad.com/tech/proteinelectro



Overview of Vertical Gel Electrophoresis Systems

The Mini-PROTEAN®, Criterion™, PROTEAN® II, and PROTEAN® Plus systems all consist of electrophoresis cells and blotting equipment. These systems provide:

- A choice of four size formats with options to meet your specific needs for resolution, capacity, and processing speed
- Cell designs that eliminate current leakage to provide the most reproducible gels and consistent run times
- Dodeca™ cells for high-throughput 2-D separations in mini-, midi-, and large-format gel sizes

Vertical Electrophoresis System Selection Guide

	Mini-PROTEAN System	Criterion System (Midi)	PROTEAN II System (Large)	PROTEAN Plus System (Large)
				
Advantages	Run 1–4 precast or handcast gels in mini format with the Mini-PROTEAN Tetra cell Wing clamp assembly allows easy, fast setup and leak-free operation Minimize reagent cost and waste Fastest turnaround of 2-D data for 2-D-in-a-day capability Run up to 12 mini handcast or precast gels with the Mini-PROTEAN® Dodeca™ cell	Fast setup with drop-in gel and cell design (precast or handcast) Run 1–2 precast Criterion or handcast gels with the Criterion cell Integrated upper buffer chamber ensures leak-free operation Optimal combination of pI separation and fast run times Capability for <1 hr 2-D runs for 2-D-in-a-day results Run up to 12 midi handcast or precast gels with the Criterion Dodeca cell	Large-format gel system offers greater resolution over smaller formats and can be used with handcast gels Versatility to perform 1-D or 2-D gel electrophoresis Can accommodate up to 4 gels and is available in xi or XL format for running a variety of gel sizes Multi-cell is available for running up to 6 gels	Offers maximum resolution in a single gel and the longest range of MW separation Run up to 12 gels with the PROTEAN Plus Dodeca cell
Compatible Gel Formats				
Precast	Mini-PROTEAN precast gels (page 168) Ready Gel® precast gels (page 171)	Criterion, Criterion™ TGX™, and Criterion XT precast gels (page 177)		
Handcast	Mini-PROTEAN empty cassettes (pages 168, 173) Mini-PROTEAN casting plates (page 166)	Criterion empty cassettes (page 182)	PROTEAN II casting plates (page 187)	PROTEAN Plus casting equipment (page 190)
Electrophoresis Cells	Mini-PROTEAN Tetra (page 164) Mini-PROTEAN 3 Dodeca (page 167)	Criterion (page 175) Criterion Dodeca (page 176)	PROTEAN II xi/XL (page 184) PROTEAN II xi/XL multi-cells (pages 186)	PROTEAN Plus Dodeca (page 189)

continues

Vertical Electrophoresis System Selection Guide (cont.)

	Mini-PROTEAN System	Criterion System	PROTEAN II System	PROTEAN Plus System
Gel Dimensions (W x L x thickness)	Mini-PROTEAN precast gels: 8.6 x 7.2 x 0.1 cm Ready Gel precast gels: 8.3 x 6.4 x 0.1 cm	Criterion precast gels: 13.3 x 8.7 x 0.1 cm		
Gel Cassette Dimensions (W x L)	10.0 x 8.0 cm	15.0 x 10.6 cm	20.0 x 18.3 cm	18.5 x 20.5 cm 20.0 x 20.5 cm 25.0 x 20.5 cm
Compatible Transfer Systems				
Wet/tank transfer	Mini Trans-Blot® cell (page 226) Criterion blotter (page 227) Trans-Blot® cell (page 228)	Criterion wire blotter (page 227) Criterion plate blotter (page 227) Trans-Blot cell (page 228) Trans-Blot Plus cell (page 229)	Trans-Blot cell (page 228) Trans-Blot Plus cell (page 229)	Trans-Blot Plus cell (page 229)
Semi-dry transfer	Trans-Blot SD cell (page 225) Trans-Blot Turbo (page 224)	Trans-Blot SD cell (page 225) Trans-Blot Turbo (page 224)	Trans-Blot SD cell (page 225)	

Precast Gels

Bio-Rad offers a broad range of precast gels, including two size formats of polyacrylamide gels, for a number of vertical protein and nucleic acid electrophoresis applications, and one set of agarose gels for horizontal nucleic acid electrophoresis. These gels are part of complete systems of compatible electrophoresis and blotting cells. Refer to the following table to select the appropriate gel type and buffers for your polyacrylamide gel–based applications.

Availability of Precast Gel Types Based on Application

Gel Type	Mini-PROTEAN	Ready Gel	Criterion	Application	Sample Buffer	Running Buffer
TGX	•		•	SDS-PAGE Native PAGE	Laemmli Native	Tris/glycine/SDS Tris/glycine
Tris-HCl		•	•	SDS-PAGE Native PAGE	Laemmli Native	Tris/glycine/SDS Tris/glycine
Stain-Free™	•		•	SDS-PAGE	Laemmli	Tris/glycine/SDS
Bis-Tris			•	SDS-PAGE for small to large proteins	XT	XT MOPS or XT MES
Tris-acetate	•		•	SDS-PAGE for large proteins Native PAGE	XT Native	XT Tricine Tris/glycine
Tris-Tricine	•		•	SDS-PAGE for peptides, small proteins	Tricine	Tris/Tricine/SDS
IEF		•	•	IEF	IEF	Anode and cathode buffer
TBE	•		•	dsDNA separation	Nucleic acid	Tris/boric acid/EDTA
TBE-urea	•	•	•	ssDNA and RNA separation	TBE-urea	Tris/boric acid/EDTA
Zymogram		•	•	Protease detection	Zymogram	Tris/glycine/SDS

In general, single-percentage gels will best separate bands that are close in MW. If your sample contains a broad range of MWs, a gradient gel allows both high- and low-MW bands to be resolved on the same gel. Molecules with a range of sizes can be separated on linear gradient gels because the larger pore sizes allow resolution of larger molecules, while pore sizes that decrease toward the bottom of the gel restrict excessive separations of small molecules.

Power Supplies

Bio-Rad offers a complete line of power supplies that are certified to IEC 1010-1, EN 61010 — the most rigorous international safety standard — to ensure the highest personal and environmental protection.

Power Supply Selection Guide

Technique and Recommended Apparatus	Gel or Tube Size (W x L x Thickness),* Qty	Typical Conditions** (Initial) W	V	mA	Typical Conditions** (Final) W	V	mA	Typical Run Time	PowerPac™ Power Supply
Laemmli (SDS), O'Farrell Second Dimension (SDS)									
PROTEAN® II xi cell	160.0 x 160.0 x 1.5 mm, 2 gels	—	100	35(C)	—	350	35(C)	5 hr	HV or Universal
PROTEAN II XL cell	183.0 x 200.0 x 1.5 mm, 2 gels	—	100	35(C)	—	350	35(C)	5 hr	HV or Universal
Criterion™ cell	133.0 x 87.0 x 1.0 mm, 2 gels	—	200(C)	200	—	200(C)	80	55 min	Basic or HC
Criterion cell	133.0 x 87.0 x 1.0 mm, 2 gels	—	300(C)	224	—	300(C)	164	20–26 min	Basic, HV, or Universal
Mini-PROTEAN® Tetra cell	83.0 x 73.0 x 1.0 mm, 4 gels	—	200(C)	240	—	200(C)	120	35–45 min	Basic or HC
Mini-PROTEAN Tetra cell	83.0 x 73.0 x 1.0 mm, 4 gels	—	300(C)	360	—	300(C)	228	15 min	Basic, HV, or Universal
Mini-PROTEAN Tetra cell	83.0 x 73.0 x 1.0 mm, 4 gels	—	400(C)	456	—	400(C)	416	10 min	HV or Universal
High-Throughput Electrophoresis									
PROTEAN Plus Dodeca™ cell	200.0 x 205.0 x 1.0 mm, 12 gels	—	200(C)	1,000	—	200(C)	350	6 hr	HC or Universal
	250.0 x 205.0 x 1.0 mm, 12 gels	—	200(C)	1,000	—	200(C)	350	6 hr	HC or Universal
	256.0 x 230.0 x 1.0 mm, 12 gels	—	150(C)	1,200	—	150(C)	300	18–20 hr	HC or Universal
PROTEAN II xi/XL multi-cell	160.0 x 200.0 x 1.5 mm, 6 gels	—	150	480(C)	—	500	480(C)	5 hr	Universal
Criterion™ Dodeca™ cell	133.0 x 87.0 x 1.0 mm, 12 gels	—	200(C)	1,000–1,400	—	200(C)	400–500	55 min	HC or Universal
Mini-PROTEAN 3 Dodeca cell	83.0 x 73.0 x 1.0 mm, 12 gels	—	200(C)	600	—	200(C)	360	45 min	HC or Universal
IEF, O'Farrell First Dimension									
PROTEAN II xi cell	150.0 x 1.5 mm tubes, 4 (minimum)	—	800(C)	3.5	—	800(C)	<1	16 hr	HV or Universal
Mini-PROTEAN II tube cell	75.0 x 1.0 mm tubes, 8 (minimum)	—	750(C)	1	—	750(C)	<1	3–4 hr	HV or Universal
Preparative PAGE									
Model 491 prep cell	—	10(C)	300	40	10(C)	400	30	3–8 hr	HV or Universal
Mini prep cell	—	1(C)	200	5	1(C)	300	3	3–8 hr	HV or Universal
Protein Electroelution									
Model 422 electro-eluter	6 samples	—	200	60(C)	—	150	60(C)	3–4 hr	Basic, HV, or Universal
Polyacrylamide Analytical Electrofocusing									
Model 111 mini IEF cell	125.0 x 65.0 x 0.4 mm	—	100(C)	6	—	100(C)	4	15 min	HV or Universal
		—	200(C)	6	—	200(C)	4	15 min	
		—	450(C)	4	—	450(C)	1	1 hr	
DNA Restriction Analysis (Horizontal Mode)									
Sub-Cell® GT cell	150.0 x 200.0 x 5.0 mm	—	80(C)	55	—	80(C)	60	4 hr	Basic or HC
Mini-Sub® cell GT cell	70.0 x 100.0 x 5.0 mm	—	50(C)	25	—	50(C)	30	2 hr	Basic
Wide Mini-Sub cell GT cell	150.0 x 100.0 x 5.0 mm	—	50(C)	35	—	50(C)	40	2 hr	Basic
DNA Sequencing									
Sequi-Gen® GT system	380.0 x 500.0 x 0.4 mm	80(C)	1,850	30	80(C)	1,850	30	2–4 hr	HV
SSCP									
Sequi-Gen GT system	210.0 x 400.0 x 0.4 mm	40(C)	1,800	20	40(C)	1,800	20	2–3 hr	HV
Microsatellite Mapping									
Sequi-Gen GT system	210.0 x 400.0 x 0.4 mm	50(C)	2,100	25	50(C)	2,100	25	2–3 hr	HV
Mutation Detection									
DCode™ system	100.0 x 75.0 x 1.0 mm, 2 gels	—	130(C)	—	—	130(C)	—	2.5 hr	Basic or HV

continues

Power Supply Selection Guide (cont.)

Technique and Recommended Apparatus	Gel or Tube Size (W x L x Thickness)*, Qty	Typical Conditions** (Initial) W	V	mA	Typical Conditions** (Final) W	V	mA	Typical Run Time	PowerPac Power Supply
Western Blotting									
Mini Trans-Blot® cell	83.0 x 73.0 x 0.75 mm, 2 gels	—	100(C)	250	—	100(C)	450	1 hr	HC
Criterion blotter									
Wire electrodes	133.0 x 87.0 x 1.0 mm, 2 gels	—	100(C)	250	—	100(C)	450	1 hr	HC
Plate electrodes	133.0 x 87.0 x 1.0 mm, 2 gels	—	100(C)	650	—	100(C)	1,600	30 min	HC
Trans-Blot® cell									
Wire electrodes	200.0 x 160.0 x 1.5 mm, 1 gel	—	60(C)	210–250	—	60(C)	210–250	5 hr	HC
Plate electrodes	200.0 x 160.0 x 1.5 mm, 1 gel	—	100–150(C)	1,000–1,600	—	100–150(C)	1,000–1,600	1–5 hr	HC
High-intensity transfer	200.0 x 160.0 x 1.5 mm, 1 gel	—	50–100(C)	1,600	—	50–100(C)	1,600	30 min	HC
Trans-Blot Plus cell	265.0 x 280.0 x 1.5 mm, 3 gels	—	100(C)	3,000	—	100(C)	3,000	30 min–1 hr	HC
Semi-Dry Blotting									
Trans-Blot SD cell									
Protein	250.0 x 180.0 x 1.5 mm	—	15(C)	500	—	15(C)	200	15–30 min	HC
DNA/RNA	150.0 x 150.0 x 6.0 mm	—	15	650(C)	—	25	650(C)	10–30 min	HC

* Sizes shown are typical for the corresponding apparatus. For running conditions for additional sizes, see the product instruction manuals.
** (C) = constant; typical conditions are listed as guidelines only and can vary based on sample, buffers, etc.

PowerPac Power Supply Specifications

	PowerPac Basic	PowerPac HC	PowerPac HV	PowerPac Universal
Output range (programmable) Volts Current Power	 10–300 V 4–400 mA 75 W (maximum)	 5–250 V 0.01–3.0 A 1–300 W	 20–5,000 V 0.01–500 mA 1–400 W	 10–500 V 0.01–2.5 A 1–500 W
Type of output (with automatic crossover)	Constant voltage or constant current	Constant voltage, constant current, or constant power	Constant voltage, constant current, constant power, or constant temperature	Constant voltage, constant current, or constant power
Timer	1–999 min	1 min–99 hr, 59 min	1 min–99 hr, 59 min	1 min–99 hr, 59 min
Volt-hour control	—	—	• (99,000 V-hr)	• (99,000 V-hr)
Pause/resume function	•	•	•	•
Display	3-digit LED	16-character x 2-line LCD	128 x 64 pixel, backlit graphics LCD	128 x 64 pixel, backlit graphics LCD
Programmable methods	—	1 method up to 3 steps, no storage capability	Stores 9 methods, each with up to 9 steps	Stores 9 methods, each with up to 9 steps
Real-time clock	—	—	•	•
Automatic recovery after power failure	•	•	•	•
Data transfer/archiving	—	—	•	• (optional)
Temperature control	—	—	Via temperature probe; 30–90°C ± 2°C	—
Microampere readout	—	—	•	—
Safety features	No-load detection; sudden load change detection; overload/ short-circuit detection; overvoltage protection	No-load detection; sudden load change detection; ground leak detection; overload/short-circuit detection; overvoltage protection	No-load detection; sudden load change detection; ground leak detection; arc detection; overload/short-circuit detection; overvoltage protection	No-load detection; sudden load change detection; ground leak detection; overload/short-circuit detection; overvoltage protection
Operating conditions	0–40°C; 0–95% humidity	0–40°C; 0–95% humidity	0–40°C; 0–95% humidity	0–40°C; 0–95% humidity
Stackable	•	•	•	•
Number of output jacks	4 sets in parallel	4 sets in parallel	4 sets in parallel	4 sets in parallel
Regulatory	EN-61010, CE	EN-61010, CE	EN-61010, CE	EN-61010, CE
IQ/OQ protocols	—	—	• (optional)	• (optional)
Input power (actual)	90–120 or 198–264 VAC, 50/60 Hz, autoswitching	90–120 or 198–264 VAC, 50/60 Hz, autoswitching	90–120 or 198–264 VAC, 50/60 Hz, autoswitching	90–120 or 198–264 VAC, 50/60 Hz, autoswitching
Dimensions (W x D x H)	21.0 x 24.5 x 6.5 cm	25.0 x 28.5 x 8.0 cm	27.5 x 34.0 x 10.0 cm	27.5 x 34.0 x 10.0 cm
Weight	1.1 kg (2.4 lb)	2.0 kg (4.4 lb)	2.85 kg (6.3 lb)	2.5 kg (5.5 lb)

PowerPac™ Basic Power Supply

- Recommended for basic applications
- Compact, stackable
- Constant voltage or constant current output

For More Information
Request or download bulletin: 6371

Ordering Information

Catalog #	Description
1645050	**PowerPac Basic Power Supply**, 100–120/220–240 V

See Also

Mini-PROTEAN Tetra cell: page 164.
Criterion cell: page 175.
Sub-Cell systems: page 244.

PowerPac™ HC High-Current Power Supply

- Recommended for high-current applications
- Output of 250 V, 3.0 A, 300 W
- 2-line, 16-character LCD for programming
- Constant voltage, constant power, or constant current output

For More Information
Request or download bulletin: 6371

Ordering Information

Catalog #	Description
1645052	**PowerPac HC Power Supply**, 100–120/220–240 V

See Also

Criterion blotter: page 227.
Mini Trans-Blot cell: page 226.
Trans-Blot cell: page 228.
Trans-Blot Plus cell: page 229.
Dodeca cells: pages 167, 175, 189.

PowerPac™ HV High-Voltage Power Supply

- Ideal for IEF and DNA sequencing
- Output of 5,000 V, 500 mA, and 400 W

Optional temperature probe monitors gel temperature between 30–90°C during electrophoresis. The probe attaches to the glass plate and sends temperature data to the power supply, which adjusts the power output to maintain a constant temperature during electrophoresis.

For More Information
Request or download bulletin: 6371

Ordering Information

Catalog #	Description
1645056	**PowerPac HV Power Supply**, 100–120/220–240 V
1645059	**PowerPac HV Power Supply with Temperature Probe**, 100–120/220–240 V
1645097	**PowerPac Data Transfer Software**, version 2.0
1645099	**PowerPac HV IQ/OQ Protocol Binder**
1655058	**PowerPac Temperature Probe**

See Also

Model 491 prep cell and mini prep cell: page 215.

See Also

High-throughput electrophoresis systems: pages 167, 175.

Western blotting: page 221.

Northern and Southern blotting: page 264.

PowerPac™ Universal Power Supply

- For all applications from mini vertical and high-throughput electrophoresis to blotting
- Protocol binder and test box to support IQ/OQ within GLP- and FDA-regulated environments

Wireless run data transfer software organizes, displays, prints, analyzes, exports, and annotates run data from the power supply. Data can be sent directly to a PC with a peripheral IR receiving device.

For More Information
Request or download bulletin: 6371

Ordering Information

Catalog #	Description
1645070	**PowerPac Universal Power Supply**, 100–120/220–240 V
1645097	**PowerPac Data Transfer Software**, version 2.0
1645069	**PowerPac Universal IQ/OQ Protocol Binder and Test Box**

PowerPac™ Adaptor

- Convert non–IEC-certified electrophoresis cells to fit output terminals of PowerPac power supplies
- Available in two sizes that fit most 2 and 4 mm banana plugs
- Compatible with the discontinued PowerPac 200, 300, 1000, and 3000 power supplies

Ordering Information

Catalog #	Description
1645062	**PowerPac Adaptor**, 2 mm
1645064	**PowerPac Adaptor**, 4 mm

Protein Standards

Standards are an integral part of every electrophoresis experiment because they help identify and characterize the molecules separated in a gel. Prestained and unstained MW standards are available for SDS-PAGE, IEF, 2-D PAGE, and western blotting. For migration charts with different types of gels, see pages 169 (Mini-PROTEAN® TGX™ gels), 171 (Ready Gel® gels), and 178–179 (Criterion™ gels).

For More Information
Request or download bulletins: 2414, 2998, and 3118

Protein Standards Selection Guide

	Precision Plus Protein™ Standards						Prestained Natural Standards				Unstained Natural Standards				Specialty Standards		
	WesternC™	Kaleidoscope™	Dual Xtra	Dual Color	All Blue	Unstained	Broad Range	Low Range	High Range	Natural Kaleidoscope	Broad Range	Low Range	High Range	Polypeptide	IEF	2-D	Standard Plugs***
Molecular weight (MW)/pI range, kD	10–250 kD	10–250 kD	2–250 kD	10–250 kD	10–250 kD	10–250 kD	6.9–210 kD	14–97 kD	45–200 kD	7.6–216 kD	6.5–200 kD	14–97 kD	45–200 kD	1.4–26.6 kD	4.45–9.6 pI	17.5–76 kD 4.5–8.5 pI	10–250 kD
Number of proteins	10	10	12	10	10	10	8	6	4	7	9	6	5	6	9	7	10
Electrophoresis																	
SDS-PAGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	–	–	•
Accurate MW estimation	•	•	•	•	•	•	–	–	–	–	•	•	•	•	–	–	•
Multicolored	•	•	•	•	–	–	–	–	–	•	–	–	–	–	–	–	–
Coomassie staining	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fluorescent staining	–	–	–	–	–	•	–	–	–	–	•	•	•	•	–	•	•
2-D electrophoresis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	•	–
IEF	–	–	–	–	–	–	–	–	–	–	–	–	–	–	•	–	–
Plug format for use in gels with no reference well	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	•
Blotting																	
Monitoring transfer efficiency	•	•	•	•	•	–	•	•	•	•	–	–	–	–	–	–	–
Coomassie staining	•	•	•	•	•	•	•	•	•	•	•	•	•	•	–	•	•
Fluorescent staining	–	–	–	–	–	•	–	–	–	–	•	•	•	•	–	•	•
Fluorescent blotting*	•	•	•	•	•	–	–	–	–	–	–	–	–	–	–	–	–
Immunodetection**	•	–	–	–	–	•	–	–	–	–	–	–	–	–	–	–	•
Catalog Numbers																	
Single unit	1610385	1610375	1610377	1610374	1610373	1610363	1610318	1610305	1610309	1610324	1610317	1610304	1610303	1610326	1610310	1610320	1610378
Value pack of 5 units	1610398	1610395	1610397	1610394	1610393	1610396	–	–	–	–	–	–	–	–	–	–	–

* These standards have fluorescent properties and can be used for fluorescent blotting applications. See bulletin 5723 for details on using Precision Plus Protein™ WesternC™ standards for fluorescent multiplexing. Precision Plus Protein Dual Xtra standards (#1610377) are recommended for fluorescent blot analysis of proteins between 5–250 kD.

** Immunodetection via addition of a Precision Protein™ StrepTactin and horseradish peroxidase (HRP) or StrepTactin and alkaline phosphatase (AP) conjugate, which will bind to the internal *Strep*-tags on the proteins.

*** 24 unstained plugs for 2-D gels.

Recombinant Prestained and Unstained Standards

Precision Plus Protein™ standards offer accurate and consistent recombinant protein standards for electrophoresis and western blotting experiments. These protein standards offer a good balance between band sharpness and brightness, accurate MW estimation, reproducible migration patterns, and excellent blotting results.

See Also

Vertical electrophoresis systems: pages 164–191.

Horizontal electrophoresis systems: pages 244–252.

Electrophoresis and blotting buffers: pages 192, 236.

Protein electrophoresis stains: page 199.

Protein blotting stains: page 243.

Gel Doc EZ imaging system: page 283.

ChemiDoc MP imaging system: page 282.

Precision Plus Protein™ Standards

Precision Plus Protein standards contain up to 12 recombinant bands that exhibit reproducible and consistent migration regardless of staining. This family of standards includes six unique options – one unstained, four prestained (All Blue, Dual Color, Dual Xtra, Kaleidoscope™), and one multi-application standard, WesternC™. Features include:

- Reproducible and accurate migration pattern, allowing MW estimation
- Exceptional band sharpness, providing clear confirmation of electrophoretic separation
- *Strep*-tag affinity sequence, allowing detection and MW determination on western blots
- Natural fluorescence properties, allowing fluorescent and multiplex fluorescent detection
- Superior compatibility with TGX Stain-Free™ precast gels (Unstained and All Blue)

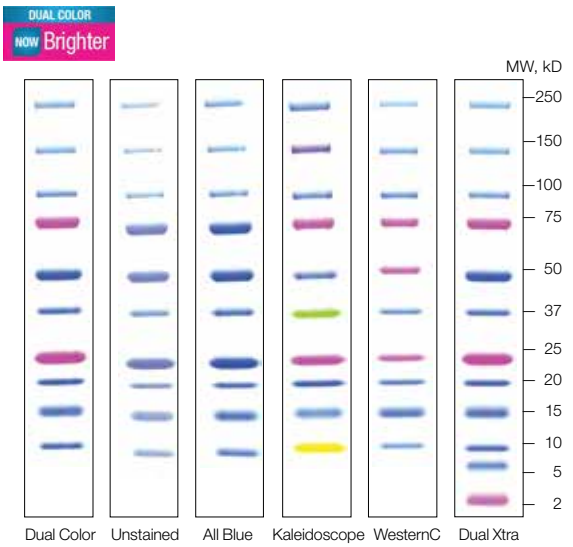
New and Improved Dual Color Standard

- Brighter for easier identification of target proteins
- Stronger band intensity throughout blot development
- Sharper for more accurate molecular weight estimation

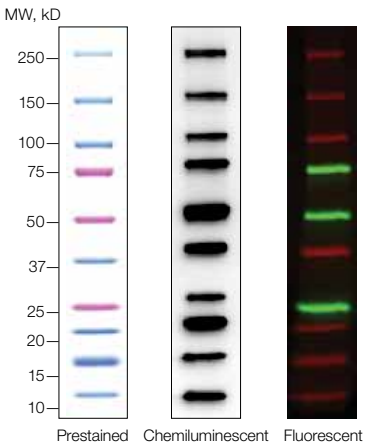
Precision Plus Protein™ WesternC™ Standards

Precision Plus Protein WesternC is a versatile, multi-application protein standard offering colorimetric, chemiluminescent, and fluorescent properties all in one. WesternC contains ten prestained bands from 10–250 kD that provide electrophoretic confirmation on a gel, verification of transfer efficiency on a blot, and detection and MW estimation on fluorescent western blots. Features include:

- Reproducible and accurate migration pattern, allowing MW estimation
- Exceptional band sharpness, providing clear confirmation of electrophoretic separation
- Chemiluminescent detection and MW determination on western blots when probed with StrepTactin conjugates
- Fluorescent and multiplex fluorescent detection when excited with red (~635 nm) or green (~532 nm) channels
- Prestained blue standards, with three pink high-intensity reference bands at 25, 50, and 75 kD
- Ready-to-use formulation



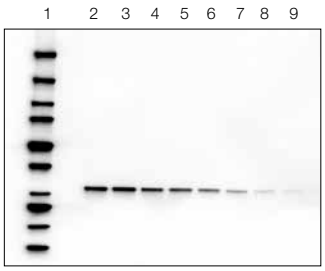
The Precision Plus Protein standards family.



Precision Plus Protein WesternC standard and its multiple applications offer many detection options.

For More Information

Request or download bulletins: 2847, 5561, and 5576; multiplex fluorescence detection — 5685 and 5723



Western blot detection of 27 kD protein and Precision Plus Protein WesternC standards using the Immun-Star™ WesternC™ chemiluminescence detection kit. Maximum sensitivity achievable with the Immun-Star WesternC kit is in the mid-femtogram range. A gel run with 5 µl of Precision Plus Protein WesternC standards (lane 1) and a dilution series of *E. coli* lysate containing an overexpressed 27 kD protein (lanes 2–9) was transferred to a nitrocellulose membrane. The dilutions were: 200, 150, 100, 75, 50, 25, 12, and 6 ng. The blot was probed with a primary antibody specific for the 27 kD protein, then incubated with StrepTactin-horseradish peroxidase (HRP) and a secondary antibody conjugated to HRP. After incubation in the Immun-Star WesternC detection solution for 5 min, the blot was imaged using the ChemiDoc™ XRS system.

For More Information
Web: bio-rad.com/pppstandards

Precision Plus Protein Standard Plugs for 2-D Gels

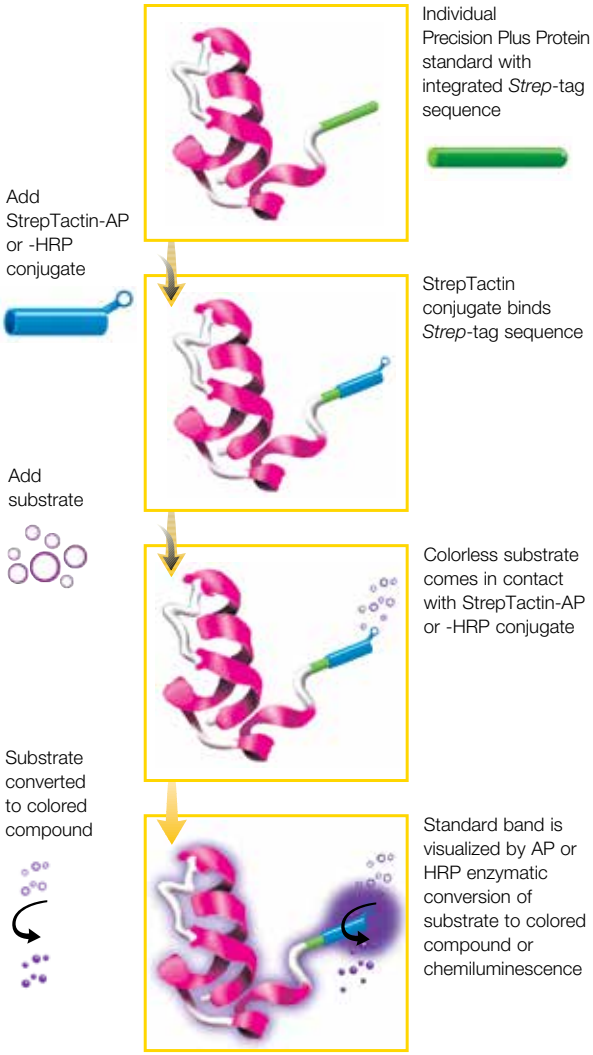
Precision Plus Protein standard plugs allow easy, quick, and clean loading of MW standards on any gel. The plugs are especially useful for vertical 2-D gels with no reference well. Precision Plus Protein unstained standards are cast in 1 mm thick agarose plugs for easy storage, handling, and loading. Load concentrations have been optimized for SYPRO Ruby, Silver Stain Plus™, and Bio-Safe™ Coomassie stains.

Precision Plus Protein standard plugs come in easy-to-use snap-off molds in packs of 24 (one application per plug). Advantages include:

- Unchanging MWs, so band sizes are easy to remember
- A ready-to-use, load-and-go format — just snap, twist, and load the plug onto a gel
- *Strep*-tag amino acid sequence for detection and MW estimation on western blots

Precision Plus Protein Standard Plugs

For More Information
Web: bio-rad.com/standardplugs
Request or download bulletin: 3036



Overview of the StrepTactin detection system.

Precision Plus Protein Standards Specifications

Product	Volume	Number of Applications	Shelf Life
Unstained	1 ml	100	1 year at –20°C
All Blue	500 µl	50	6 months at 4°C or 1 year at –20°C
Dual Color	500 µl	50	6 months at 4°C or 1 year at –20°C
Kaleidoscope	500 µl	50	1 year at –20°C
Dual Xtra	500 µl	50	6 months at 4°C or 1 year at –20°C
WesternC	250 µl	50	1 year at –20°C
WesternC pack*	250 µl standard 125 µl HRP conjugate	50	1 year at –20°C
Unstained plugs	24 plugs	24	1 month at 4°C (once opened)

* WesternC pack comes with WesternC protein standard and StrepTactin-HRP conjugate, needed for colorimetric or chemiluminescent blot detection. StrepTactin-AP conjugate also available (#1610382).

Ordering Information

Catalog #	Description
1610363	**Precision Plus Protein Unstained Standards**, 1,000 µl, 100 applications
1610396	**Precision Plus Protein Unstained Standards Value Pack**, 5 x 1,000 µl, 500 applications
1610373	**Precision Plus Protein All Blue Standards**, 500 µl, 50 applications
1610393	**Precision Plus Protein All Blue Standards Value Pack**, 5 x 500 µl, 250 applications
1610374	**Precision Plus Protein Dual Color Standards**, 500 µl, 50 applications
1610394	**Precision Plus Protein Dual Color Standards Value Pack**, 5 x 500 µl, 250 applications
1610375	**Precision Plus Protein Kaleidoscope Standards**, 500 µl, 50 applications
1610395	**Precision Plus Protein Kaleidescope Standards Value Pack**, 5 x 500 µl, 250 applications
1610385*	**Precision Plus Protein WesternC Pack**, 250 µl WesternC standard, 125 µl HRP conjugate, 50 applications
1610398*	**Precision Plus Protein WesternC Pack**, **Value Pack**, 5 x 250 µl WesternC standard, 5 x 125 µl HRP conjugate, 250 applications
1610376*	**Precision Plus Protein WesternC Standards**, 250 µl, 50 applications
1610399*	**Precision Plus Protein WesternC Standards Value Pack**, 5 x 250 µl, 250 applications
1610377	**Precision Plus Protein Dual Xtra Standards**, 500 µl, 50 applications
1610397	**Precision Plus Protein Dual Xtra Standards Value Pack**, 5 x 500 µl, 250 applications
StrepTactin Conjugates for Precision Plus Protein Standards	
1610380	**Precision Protein StrepTactin-HRP Conjugate**, 300 µl, 150 applications
1610381	**Precision Protein StrepTactin-HRP Conjugate**, 125 µl, 50 applications
1610382	**Precision Protein StrepTactin-AP Conjugate**, 300 µl, 150 applications
Precision Plus Protein Standard Plugs	
1610378	**Precision Plus Protein Standard Plugs**, unstained, 24 applications
Clarity Western ECL Substrate	
1705060	**Clarity Western ECL Substrate**, 200 ml
1705061	**Clarity Western ECL Substrate**, 500 ml

* Note that StrepTactin (-HRP or -AP) conjugate is needed for colorimetric or chemiluminescence blots.

Natural Prestained Standards

Prestained standards for SDS-PAGE and western blotting provide a quick and easy way to monitor protein separation during electrophoresis and to assess transfer efficiency on blots. Each lot of Kaleidoscope and SDS-PAGE prestained standards is individually calibrated for estimating the MW of sample proteins. For optimal results with TGX™ precast gels, Precision Plus Protein standards (see page 158) will provide increased accuracy and consistency.

For More Information
Web: bio-rad.com/naturalstandards

Natural prestained standards are available while supplies last.

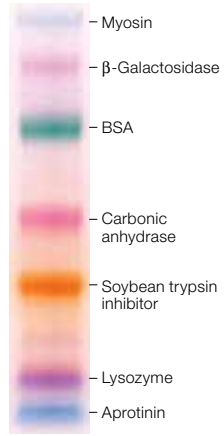
Kaleidoscope™ Standards

Kaleidoscope prestained broad range standards have individually colored proteins to allow instant orientation on SDS-PAGE gels and western blots.

Calibrated MWs of Kaleidoscope Standards

Protein	Color	MW Prestained
Myosin	Blue	216,000
β-Galactosidase	Magenta	132,000
BSA	Green	78,000
Carbonic anhydrase	Violet	45,700
Soybean trypsin inhibitor	Orange	32,500
Lysozyme	Purple	18,400
Aprotinin	Blue	7,600

MWs are of representative lots; actual weights may vary. Lot-specific MWs are included with each vial.



Kaleidoscope Prestained Standards

Ordering Information

Catalog #	Description
1610324	**Kaleidoscope Prestained Standards**, broad range, 500 µl

Standards have a shelf life of 3 years at –20°C; shipped at room temperature.

Prestained SDS-PAGE Standards

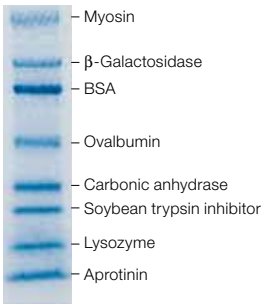
Bio-Rad's original prestained SDS-PAGE standards are available in broad, low, and high ranges.

Calibrated MWs of Prestained SDS-PAGE Standards

Protein	Broad Range	Low Range	High Range
Myosin	209,000	—	204,000
β-Galactosidase	124,000	—	123,000
Phosphorylase b	—	103,000	—
BSA	80,000	77,000	80,000
Ovalbumin	49,100	50,000	48,000
Carbonic anhydrase	34,800	34,300	—
Soybean trypsin inhibitor	28,900	28,800	—
Lysozyme	20,600	20,700	—
Aprotinin	7,100	—	—

MWs are of representative lots; actual weights may vary. Lot-specific MWs are included with each vial.

Use prestained SDS-PAGE standards to assess transfer efficiency on western blots. Broad range prestained SDS-PAGE standards, 5 µl, were run on a 4–20% Ready Gel® precast gel and transferred to nitrocellulose using the Mini Trans-Blot® cell.



Ordering Information

Catalog #	Description
1610318	**Prestained SDS-PAGE Standards**, broad range, 500 µl
1610305	**Prestained SDS-PAGE Standards**, low range, 500 µl
1610309	**Prestained SDS-PAGE Standards**, high range, 500 µl

Standards have a shelf life of 3 years at –20°C; shipped at room temperature.

See Also

Protein electrophoresis stains: page 199.

Protein blotting stains: page 243.

Electrophoresis and blotting buffers: pages 192, 236.

Gel Doc EZ imaging system: page 283.

Natural Unstained Standards

Unstained standards allow accurate MW determination on SDS-PAGE gels. Every batch is tested for proper mobility, providing a reliable control for gel-to-gel variability.

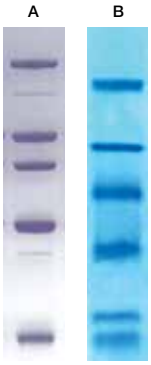
Specifications

	Volume, µl	Applications* (Number of Mini Gels)
SDS-PAGE standards	200	800–1,600
Polypeptide standards	200	800

* Number of applications depends on staining method.

For More Information
Web: bio-rad.com/naturalstandards

Natural unstained standards are available while supplies last.



SDS-PAGE standards provide accurate MW determinations. **A**, high range SDS-PAGE standards stained with Coomassie Brilliant Blue R-250 stain; **B**, polypeptide SDS-PAGE standards stained with Coomassie Brilliant Blue G-250 stain.

Constituent Proteins of Unstained SDS-PAGE Standards

			Ranges Available*			
Protein	Source	MW, kD	Broad	Low	High	Polypeptide
Myosin	Rabbit skeletal muscle	200.0	•		•	
β-Galactosidase	*E. coli*	116.3	•		•	
Phosphorylase b	Rabbit muscle	97.4	•	•	•	
Serum albumin	Bovine	66.2	•	•	•	
Ovalbumin	Hen egg white	45.0	•	•	•	
Carbonic anhydrase	Bovine	31.0	•	•		
Triosephosphate isomerase	Rabbit	26.6				•
Trypsin inhibitor	Soybean	21.5	•	•		
Myoglobin	Equine	17.0				•
α-Lactalbumin	Bovine	14.5				•
Lysozyme	Hen egg white	14.4	•	•		
Aprotinin	Bovine pancreas	6.5	•			•
Insulin B chain, oxidized	Bovine	3.5				•
Bacitracin	*Bacillus licheniformis*	1.4				•

* SDS-PAGE — broad, low, high, and polypeptide.

See Also
Vertical electrophoresis systems: pages 164–191.
Electrophoresis and blotting buffers: pages 192, 236.
Protein electrophoresis stains: page 199.
Protein blotting stains: page 243.

Unstained SDS-PAGE Standards

SDS-PAGE Standards

SDS-PAGE standards are blended to give uniform band intensities when stained with Coomassie Brilliant Blue R-250 or zinc stains. SDS-PAGE standards are available in broad, low, high, and polypeptide MW ranges, allowing calibration in almost any percentage gel.

Polypeptide SDS-PAGE Standards

Polypeptide SDS-PAGE standards are for MW determination of peptides and small proteins resolved on Tricine gels. Consisting of six polypeptides with molecular masses ranging from ~1.4 to ~26.6 kD, polypeptide SDS-PAGE standards stain uniformly with Coomassie Brilliant Blue G-250 stain.

Ordering Information

Catalog #	Description
1610317	**SDS-PAGE Standards**, broad range, 200 µl
1610304	**SDS-PAGE Standards**, low range, 200 µl
1610303	**SDS-PAGE Standards**, high range, 200 µl
1610326	**Polypeptide SDS-PAGE Standards**, 200 µl

Specialty Standards (IEF and 2-D SDS-PAGE)

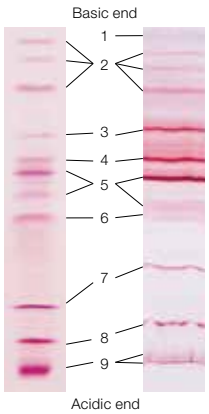
IEF Standards

IEF standards allow dependable and reproducible pI calibration in native polyacrylamide or agarose IEF gels. IEF standards are a mixture of nine native proteins with pIs ranging from 4.45–9.6. To monitor focusing, five of the nine proteins are naturally colored. The standards are provided in a stable aqueous solution and require no reconstitution or dilution prior to use.

Constituent Proteins of IEF Standards*

Protein	Color	pI
1. Cytochrome c	Red	9.6
2. Lentil lectin (3 bands)	—	7.8, 8.0, 8.2
3. Human hemoglobin C	Red	7.5
4. Human hemoglobin A	Red	7.1
5. Equine myoglobin (2 bands)	Brown	6.8, 7.0
6. Human carbonic anhydrase	—	6.5
7. Bovine carbonic anhydrase	—	6.0
8. β-Lactoglobulin B	—	5.1
9. Phycocyanin (3 bands)	Blue	4.45, 4.65, 4.75

* Because the IEF standards are in native form, they cannot be used with reducing or denaturing agents such as urea, β-mercaptoethanol, or dithiothreitol. For calibration of IEF tube gels containing urea, use 2-D SDS-PAGE standards.



IEF standards stained with IEF gel stain. Run on Criterion™ Tris-HCl (**left**) and Ready Gel® IEF gels (**right**).

Ordering Information

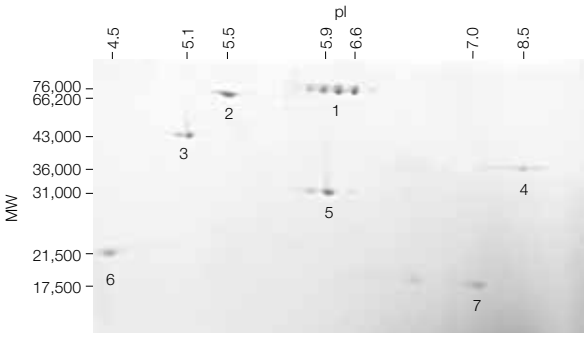
Catalog #	Description
1610310	**IEF Standards**, 250 µl

2-D SDS-PAGE Standards

2-D SDS-PAGE protein standards provide calibrated references for the pI and MW of proteins in 2-D SDS-PAGE applications. These standards consist of seven reduced, denatured proteins that can be visualized with silver or Coomassie Blue stains and require no dilution prior to use.

Constituent Proteins of 2-D SDS-PAGE Standards

Protein	pI	MW, kD
1. Hen egg white conalbumin	6.0, 6.3, 6.6	76
2. Bovine serum albumin (BSA)	5.4, 5.5, 5.6	66
3. Bovine muscle actin	5.0, 5.1	43
4. Rabbit muscle GAPDH	8.3, 8.5	36
5. Bovine carbonic anhydrase	5.9, 6.0	31
6. Soybean trypsin inhibitor	4.5	21.5
7. Equine myoglobin	7.0	17.5



Migration pattern of 2-D SDS-PAGE standards. First dimension separation was performed with 7 cm ReadyStrip™ IPG strips. Second dimension separation was achieved with the Mini-PROTEAN® II cell.

Ordering Information

Catalog #	Description
1610320	**2-D SDS-PAGE Standards**, 500 µl

Mini-Format 1-D Electrophoresis Systems

The Mini-PROTEAN® system includes the four-gel Mini-PROTEAN Tetra cell and the high-throughput, 12-gel Mini-PROTEAN® 3 Dodeca™ cell. The systems are compatible with mini handcast or precast gels.

See Also

PowerPac Basic and PowerPac HC power supplies: page 155.

Premixed buffers and buffer reagents: page 192.

Mini-PROTEAN precast gels: page 168.

Mini-PROTEAN® Tetra Cell

The Mini-PROTEAN Tetra cell is ideal for vertical mini gel electrophoresis. This electrophoresis cell accommodates 1–4 precast or handcast gels. Easy to assemble, the Mini-PROTEAN Tetra cell has a patented sealing mechanism* that prevents assembly errors. The Mini-PROTEAN Tetra cell offers the following advantages:

Loading and Running

- Patented sample loading guides** prevent skipped or repeated loading lanes
- Cell runs up to four gels (10.0 x 8.3 cm) using two running modules

Modular Cells for Many Applications

- Interchangeable modules convert a Mini-PROTEAN Tetra cell into a Mini Trans-Blot® electrophoresis transfer cell for western blotting

Gel Casting

- Ground glass plates with permanently bonded spacers and improved casting gaskets guarantee perfect alignment and leakproof casting
- Casting frames*** with simple cam closure provide precision alignment on any flat surface
- Side-by-side casting stand*** allows access to both gels simultaneously, and the spring-loaded lever creates a tight seal against the silicon rubber gasket
- Plastic combs*** do not inhibit polymerization and have built-in ridges to eliminate air contact during gel casting for uniform gel polymerization
- Glass plates and combs are labeled with thickness and number of wells for instant identification
- Thick glass spacer plates reduce breakage

Configuring Your Own Electrophoresis Cell

You can choose one of the preset configurations such as #1658000 (10-well, 0.75 mm) or #1658001 (10-well, 1.0 mm). To configure your own electrophoresis cell, order the Mini-PROTEAN Tetra cell (#1658004) and select a casting module from the ordering information (see page 166).

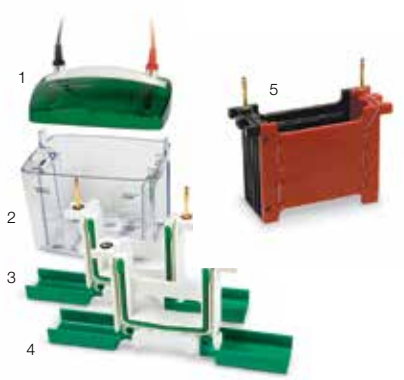
For More Information
Web: bio-rad.com/tetra
Request or download bulletin: 5535

Mini-PROTEAN Tetra cell components:

1. Lid and tank.
2. Combs.
3. Ready Gel® precast gels.
4. Mini-PROTEAN® TGX™ precast gels.
5. Gel releasers.
6. Spacer plates.
7. Short plates.
8. Sample loading guides.
9. Casting frame.
10. Casting stand.

Mini Trans-Blot electrophoresis transfer cell components:

1. Lid.
2. Tank.
3. Electrode assembly.
4. Companion running module.
5. Mini Trans-Blot module.



*U.S. patents 6,436,262, **5,656,145, and ***6,162,342.

Maximum Sample Volume per Well for Mini-PROTEAN Tetra Combs

Number or Type of Wells	Well Width, mm	Comb Thickness		
		0.75 mm	1.0 mm	1.5 mm
5	12.70	70 µl	105 µl	160 µl
9	5.08	33 µl	44 µl	66 µl
10	5.08	33 µl	44 µl	66 µl
15	3.35	20 µl	26 µl	40 µl
IPG	6.20	—	420 µl	730 µl
Prep/2-D				
Reference well	3.10	13 µl	17 µl	30 µl
Sample well	67.44	310 µl	400 µl	680 µl

Specifications

Number of gels	1–4	Total buffer volume for 2 gels	700 ml
Precast gels	Mini-PROTEAN and Ready Gel	Total buffer volume for 4 gels	1,000 ml
Handcast gels	Cast using Mini-PROTEAN spacer plates	Typical run times for SDS-PAGE	35–45 min (at 200 V constant)
Cassette size (W x L)	Precast: 10.0 x 8.3 cm	Recommended power supply	See Power Supplies Selection Guide, p. 153
Glass plate size (W x L)	Short plate: 10.1 x 7.3 cm Spacer plate: 10.1 x 8.2 cm	Dimensions (W x L x H)	12.0 x 16.0 x 18.0 cm
		Weight	1 kg (2.2 lb)

Ordering Information

Catalog #	Description
1658000FC	**Mini-PROTEAN Tetra Cell**, 10-well, 0.75 mm thickness; 4-gel system includes 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), 2 casting stands, 4 casting frames, sample loading guide, electrode assembly, companion running module, tank, lid with power cables, mini cell buffer dam
1658001FC	**Mini-PROTEAN Tetra Cell**, 10-well, 1.0 mm thickness; 4-gel system includes 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), 2 casting stands, 4 casting frames, sample loading guide, electrode assembly, companion running module, tank, lid with power cables, mini cell buffer dam
1658002FC*	**Mini-PROTEAN Tetra Cell**, 10-well, 0.75 mm thickness; 2-gel system includes 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), casting stand, 2 casting frames, sample loading guide, electrode assembly, tank, lid with power cables, mini cell buffer dam
1658003FC*	**Mini-PROTEAN Tetra Cell**, 10-well, 1.0 mm thickness; 2-gel system includes 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), casting stand, 2 casting frames, sample loading guide, electrode assembly, tank, lid with power cables, mini cell buffer dam
1658004	**Mini-PROTEAN Tetra Cell for Mini Precast Gels**, 4-gel system includes electrode assembly, companion running module, tank, lid with power cables, mini cell buffer dam
1658005*	**Mini-PROTEAN Tetra Cell for Mini Precast Gels**, 2-gel system includes electrode assembly, tank, lid with power cables, mini cell buffer dam
1658006FC	**Mini-PROTEAN Tetra Cell**, 10-well, 1.5 mm thickness; 4-gel system includes 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), 2 casting stands, 4 casting frames, sample loading guide, electrode assembly, companion running module, tank, lid with power cables, mini cell buffer dam
1658007FC*	**Mini-PROTEAN Tetra Cell**, 10-well, 1.5 mm thickness; 2-gel system includes 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), casting stand, 2 casting frames, sample loading guide, electrode assembly, tank, lid with power cables, mini cell buffer dam
Mini-PROTEAN Tetra Systems	
1658025FC	**Mini-PROTEAN Tetra Cell and PowerPac Basic Power Supply**, includes #1658001 and #1645050
1658026FC	**Mini-PROTEAN Tetra Cell and PowerPac Universal Power Supply**, includes #1658001 and #1645070
1658027FC	**Mini-PROTEAN Tetra Cell and PowerPac HC Power Supply**, includes #1658001 and #1645052
1658028FC	**Mini-PROTEAN Tetra Cell and PowerPac HV Power Supply**, includes #1658001 and #1645056
1658029FC	**Mini-PROTEAN Tetra Cell and Mini Trans-Blot Module**, includes #1658001 and #1703935
1658030	**Mini-PROTEAN Tetra Cell for Mini Precast Gels and Mini Trans-Blot Module**, includes #1658004 and #1703935
1658033FC	**Mini-PROTEAN Tetra Cell, Mini Trans-Blot Module, and PowerPac Basic Power Supply**, includes #1658001, #1703935, and #1645050
1658034FC	**Mini-PROTEAN Tetra Cell for Mini Precast Gels, Mini Trans-Blot Module, and PowerPac Basic Power Supply**, includes #1658004, #1703935, and #1645050
1658035FC	**Mini-PROTEAN Tetra Cell, Mini Trans-Blot Module, and PowerPac HC Power Supply**, includes #1658001, #1703935, and #1645052
1658036	**Mini-PROTEAN Tetra Cell for Mini Precast Gels, Mini Trans-Blot Module, and PowerPac HC Power Supply**, includes #1658004, #1703935, and #1645052

continues

The catalog numbers above with an “FC” suffix come with a 10% TGX Stain-Free™ FastCast™ kit (1610182). To place an order without a FastCast kit, remove the "FC" suffix from the catalog number.

Ordering Information

Description	0.75 mm	1.0 mm	1.5 mm
Casting Modules**			
5-Well	1658008	1658013	1658019
9-Well	1658009	1658014	1658020
10-Well	1658010	1658015	1658021
15-Well	1658011	1658016	1658022
Prep/2-D Well	1658012	1658017	1658023
IPG Well	—	1658018	1658024
Mini-PROTEAN Combs (5) for Hand Casting with Glass Plates			
5-Well	1653352	1653357	1653363
9-Well	1653353	1653358	1653364
10-Well	1653354	1653359	1653365
15-Well	1653355	1653360	1653366
Prep/2-D + 1 Reference Well	1653356	1653361	1653367
IPG Well	—	1653362	1653368

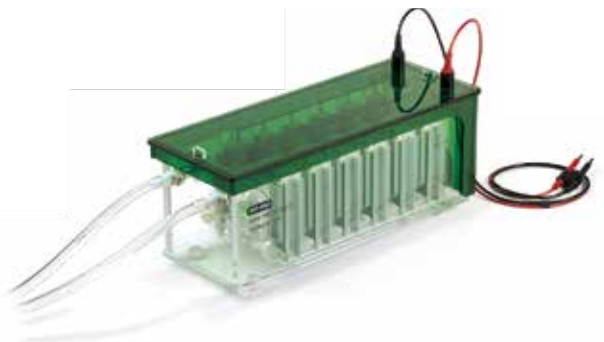
Catalog #	Description
Handcast Gel Accessories and Replacement Parts	
1658051	**Mini-PROTEAN Tetra Cell Casting Stand**, 2 core, includes clamps for use with the Mini-PROTEAN Tetra cell casting modules
1658052	**Mini-PROTEAN Tetra Cell Casting Stand**, 1 core, includes clamps for use with the Mini-PROTEAN Tetra cell casting modules
1653303	**Mini-PROTEAN Casting Stand with Gaskets**
1653304	**Mini-PROTEAN Casting Frame**
1653305	**Mini-PROTEAN Casting Stand Gaskets**, replacement, 2
1653308	**Short Plates**, 5
1653149	**Replacement Gaskets**, for electrophoresis clamping frame, green, 2
1653310	**Spacer Plates with 0.75 mm Integrated Spacers**, 5
1653311	**Spacer Plates with 1.0 mm Integrated Spacers**, 5
1653312	**Spacer Plates with 1.5 mm Integrated Spacers**, 5
Other Replacement Parts and Accessories	
1658037	**Mini-PROTEAN Tetra Electrode Assembly**
1658038	**Mini-PROTEAN Tetra Companion Running Module**
1658039	**Buffer Tank**, replacement
1658040	**Buffer Tank and Lid**, replacement
1658041	**Cell Lid with Power Cables**
1653201	**Sample Loading Guide**, 9-well (red)
1653146	**Sample Loading Guide**, 10-well (yellow)
1653203	**Sample Loading Guide**, 12-well (green)
1653132	**Sample Loading Guide**, 15-well (blue)
1653130	**Mini Cell Buffer Dams**, 2 (compatible with Mini-PROTEAN Tetra cell, Mini-PROTEAN 3 Dodeca cell, and the discontinued Mini-PROTEAN 3 cell)
1653320	**Gel Releasers**, 5

* The 2-gel systems do not include the companion running module.
** Each casting module includes 2 casting stands, 4 casting frames, 5 combs, 1 set of glass plates (5 short plates and 5 spacer plates), and the appropriate sample loading guide.

Mini-PROTEAN® 3 Dodeca™ Cell

The Mini-PROTEAN 3 Dodeca cell runs up to 12 mini gels under identical conditions in just 35 minutes. Eliminate gel-to-gel variation by hand casting gels 12 at a time using the Mini-PROTEAN 3 multi-casting chamber (see page 174) and Model 485 gradient former (see page 174). Alternatively, use precast gels. Features of the Mini-PROTEAN 3 Dodeca cell include:

- Built-in cooling coil to prevent overheating
- Stirbar capability helps maintain uniform buffer tank temperatures for run reproducibility
- Easy assembly facilitated by a patented* electrophoresis clamping frame
- Convenient buffer draining via the built-in quick-connect drain port



For More Information
Web: bio-rad.com/dodeca
Request or download bulletin: 2571

See Also

PowerPac HC power supply: page 155.
Mini-PROTEAN precast gels: page 168.
AnyGel stands: page 173.

Specifications

Number of gels	1–12
Precast gels	Mini-PROTEAN and Ready Gel®
Handcast gels	Cast using Mini-PROTEAN 3 spacer plates and the Mini-PROTEAN 3 multi-casting chamber
Cassette size (W x L)	10.0 x 8.3 cm
Gel thickness	0.5, 0.75, 1.0, or 1.5 mm (precast gels are available only in 1.0 mm)
Total buffer volume	3.4–4.4 L
Typical running conditions	200 V constant, 600 mA, 120 W maximum
Cooling	Built-in cooling coil attaches easily to external refrigerated circulator (circulator must be purchased separately; recommended flow rate 10–15 L/min, recommended cooling capacity ≥250 W at 20°C)
Recommended power supply	PowerPac™ HC
Dimensions (W x L x H)	16.2 x 41.5 x 15.0 cm
Weight	5 kg (11 lb)

* U.S. patent 6,436,262.

Ordering Information

Catalog #	Description
1654100	**Mini-PROTEAN 3 Dodeca Cell**, includes electrophoresis tank with built-in cooling coil, lid with power cables, 6 electrophoresis clamping frames, 2 buffer dams, drain line, 2 gel releasers
1654101	**Mini-PROTEAN 3 Dodeca Cell with Multi-Casting Chamber**, same as #1654100 with multi-casting chamber, 15 separation sheets, 8 acrylic blocks, tapered luer connector, stopcock valve
1655132	**Mini-PROTEAN 3 Dodeca Cell and 6-Row AnyGel Stand**, includes #1654100 and #1655131
Replacement Parts and Accessories	
1654102	**Replacement Electrophoresis Clamping Frame**
1653149	**Replacement Gaskets**, for electrophoresis clamping frame, green, 2
1654103	**Lower Electrode Assembly with Platinum Wire**
1654104	**Replacement Drain Line**
1654105	**Replacement Cooling Coil**, includes connector tubing
1652948	**Replacement Power Cables**, for lid
1653320	**Gel Releasers**, 5
1653130	**Mini Cell Buffer Dams**, 2 (compatible with Mini-PROTEAN Tetra cell, Mini-PROTEAN 3 Dodeca cell, and the discontinued Mini-PROTEAN 3 cell)
1655131	**AnyGel Stand**, 6-row, holds 6 PROTEAN gels, 12 Criterion gels, or 18 Ready Gel mini gels

Mini-PROTEAN® Precast Gels

Mini-PROTEAN® TGX™ Precast Gels

Long shelf life Mini-PROTEAN TGX precast gels accelerate electrophoresis and blotting while delivering superior performance. TGX gels maintain cooler temperatures at high voltages, allowing run times as short as 15 minutes. The gels are designed to provide Laemmli-like separation patterns using the standard Tris/glycine/SDS running buffer system. Mini-PROTEAN gels are compatible with the Mini-PROTEAN Tetra (1–4 gels) and Dodeca (1–12 gels) cells. These gels can also be used in the earlier Mini-PROTEAN 3 cell model. Gel opening lever (4560000) sold separely.

Mini-PROTEAN TGX gels provide:

- Run times as short as 15 min
- Transfer times as short as 3 min with the Trans Blot® Turbo™ transfer system
- 12-month shelf life
- Laemmli format
- Inexpensive buffer system, low running costs
- Bottom-open cassette design for simple gel handling and blotting

For More Information
Web: bio-rad.com/tgx
Request or download bulletins: 5535 and 5871

Mini-PROTEAN® TGX Stain-Free™ Precast Gels

Mini-PROTEAN TGX Stain-Free precast gels combine TGX formulation with a proprietary compound that facilitates protein visualization in less than 5 minutes using Bio-Rad's stain-free enabled imaging systems (see page 282).

Mini-PROTEAN TGX Stain-Free precast gels eliminate the need for staining, reducing the time to results and improving the ease of downstream processing. In addition to the 12-month shelf life, Laemmli buffer system, and fast run times of the TGX formulation, the Mini-PROTEAN TGX Stain-Free gels provide:

- Complete protein separation, gel imaging, and data analysis in 20 min
- Sensitivity comparable to that of Coomassie stain
- Better reproducibility and quantitation compared to staining procedures
- Capability of using the same gel for chromatography, western blotting, standard staining methods, and mass spectrometry analysis

For More Information
Web: bio-rad.com/ministainfree

Empty Cassettes for Hand Casting

Single-use empty Mini-PROTEAN cassettes are available to hand cast gels. For added convenience, cast your gels using AnyGel™ stands or the Mini-PROTEAN casting stand.

Mini-PROTEAN Gels

Mini-PROTEAN Tris-Tricine Precast Gels

- Designed for separation of peptides and small proteins with MWs <10,000

Mini-PROTEAN TBE and TBE-Urea Precast Gels

- Ideal for the separation of DNA and RNA
- TBE gels are suitable for electrophoresis of nucleic acids from 50–2,000 bp
- TBE-urea gels are best suited for the separation of ssDNA and ssRNA between 60–200 bp

For More Information
Web: bio-rad.com/mpgels

Gel Cassette Specifications

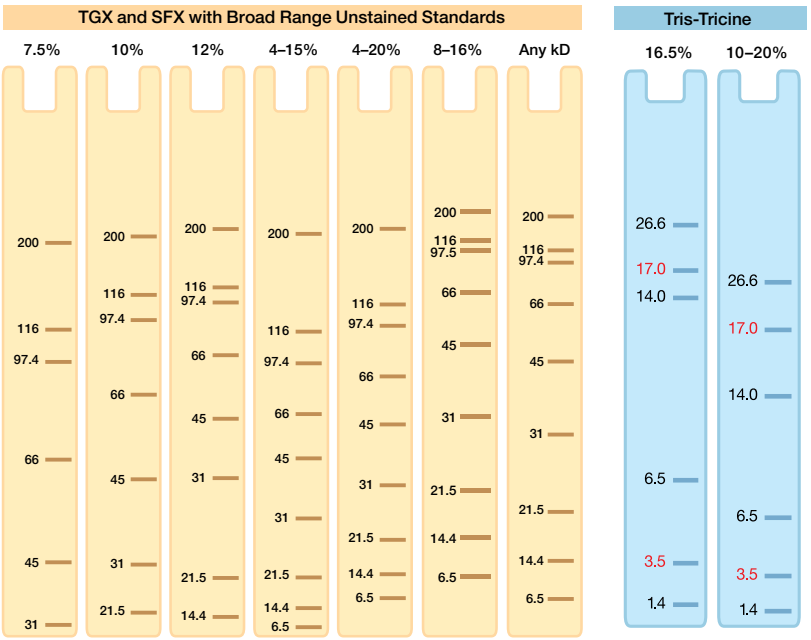
Gel dimensions (W x L x thickness)	86.0 x 72.0 x 1.0 mm
Gel cassette dimensions (W x L x thickness)	101.0 x 89.0 x 4.6 mm
Cassette material	Styrene copolymer
Comb material	Polycarbonate
Gel storage conditions	Store flat at 4°C; do not freeze

Mini-PROTEAN Precast Gel Selection Guide

	TGX, TGX Stain-Free	Tris-Tricine	TBE, TBE-Urea
Shelf Life at Recommended Temperature*	12 months	8–12 weeks	8–12 weeks
Recommended Buffers			
Sample (dilute 1:1 with sample)	Laemmli	Tricine	Nucleic acid, TBE-urea
Running	Tris/glycine/SDS	Tris/Tricine/SDS	Tris/boric acid/EDTA (TBE)

* From date of manufacture.

Mini-PROTEAN Precast Gel Migration Charts



Ordering Information

Description	8+1-Well* 30 µl	10-Well 30 µl	10-Well 50 µl	12-Well 20 µl	15-Well 15 µl	IPG Well† 7 cm IPG Strip
Mini-PROTEAN TGX Precast Gels**						
7.5% Resolving Gel	4561029	4561023	4561024	4561025	4561026	4561021
10% Resolving Gel	4561039	4561033	4561034	4561035	4561036	4561031
12% Resolving Gel	4561049	4561043	4561044	4561045	4561046	4561041
4–15% Resolving Gel	4561089	4561083	4561084	4561085	4561086	4561081
4–20% Resolving Gel	4561099	4561093	4561094	4561095	4561096	4561091
8–16% Resolving Gel	4561109	4561103	4561104	4561105	4561106	4561101
Any kD Resolving Gel	4569039	4569033	4569034	4569035	4569036	4569031
Mini-PROTEAN TGX Stain-Free Precast Gels**						
7.5% Resolving Gel	4568029	4568023	4568024	4568025	4568026	4568021
10% Resolving Gel	4568039	4568033	4568034	4568035	4568036	4568031
12% Resolving Gel	4568049	4568043	4568044	4568045	4568046	4568041
4–15% Resolving Gel	4568089	4568083	4568084	4568085	4568086	4568081
4–20% Resolving Gel	4568099	4568093	4568094	4568095	4568096	4568091
8–16% Resolving Gel	4568109	4568103	4568104	4568105	4568106	4568101
Any kD Resolving Gel	4568129	4568123	4568124	4568125	4568126	4568121
Empty Cassettes and Combs						
Mini-PROTEAN Empty Cassette***	—	4560003	—	4560005	4560006	4560001
Combs (for Mini-PROTEAN empty cassettes)	—	4560013	—	4560015	4560016	4560011

* Multichannel pipet compatible.

** Mini-PROTEAN TGX and TGX Stain-Free gels are available in 10-packs (catalog numbers listed) or 2-packs (add an "S" to the end of the catalog number listed).

*** Includes 50 empty cassettes. Combs sold separately in 50 pack.

† IPG well only, no reference well. If a protein standard is needed on gel, order Precision Plus Protein Standard plugs, #1610378.

Catalog #	Description
4560000	**Mini-PROTEAN Precast Gel Opening Lever**
Premixed Buffers for Mini-PROTEAN TGX Gels*	
1610737	**2x Laemmli Sample Buffer**, 30 ml
1610747	**4x Laemmli Sample Buffer**, 10 ml
1610738	**2x Native Sample Buffer**, 30 ml
1610732	**10x Tris/Glycine/SDS**, 1 L
1610734	**10x Tris/Glycine**, 1 L

* For 5 L volume of the running buffers, see page 193.

Applications Guide

1658100 **Mini-PROTEAN Gel Instruction Manual and Application Guide**, online

Description	10-Well 30 µl	10-Well 50 µl	12-Well* 20 µl	15-Well 15 µl	IPG Well** 7 cm IPG Strip
Mini-PROTEAN Precast Gels (2 per package)					
5% TBE	4565013	4565014*	4565015*	4565016	—
10% TBE	4565033	4565034*	4565035	4565036	—
15% TBE	4565053*	4565054	4565055*	4565056	—
4–20% TBE	4565093*	4565094*	4565095*	4565096*	—
10% TBE-Urea	4566033*	—	—	4566036*	—
15% TBE-Urea	4566053*	—	4566055*	4566056*	—
16.5% Tris-Tricine	4563063	4563064	4563065*	4563066	—
10–20% Tris-Tricine	4563113	4563114	4563115*	4563116*	—

* Please allow up to 2 weeks for delivery.

** IPG well only, no reference well. If a protein standard is needed on gel, order Precision Plus Protein standard plugs, #1610378.

Ready Gel® Precast Gels

Proteins and nucleic acids can be separated by Ready Gel precast gels using the Mini-PROTEAN® Tetra electrophoresis cell (1–4 gels; page 164) or, for high-throughput applications, the Mini-PROTEAN® 3 Dodeca™ cell (1–12 gels; page 167). Ready Gel precast gels are available in six buffer formulations for a variety of applications. Refer to the Bio-Rad website for migration charts.

For More Information
Web: bio-rad.com/readygel
Download bulletin: Ready Gel Application Guide (LIT188)

See Also

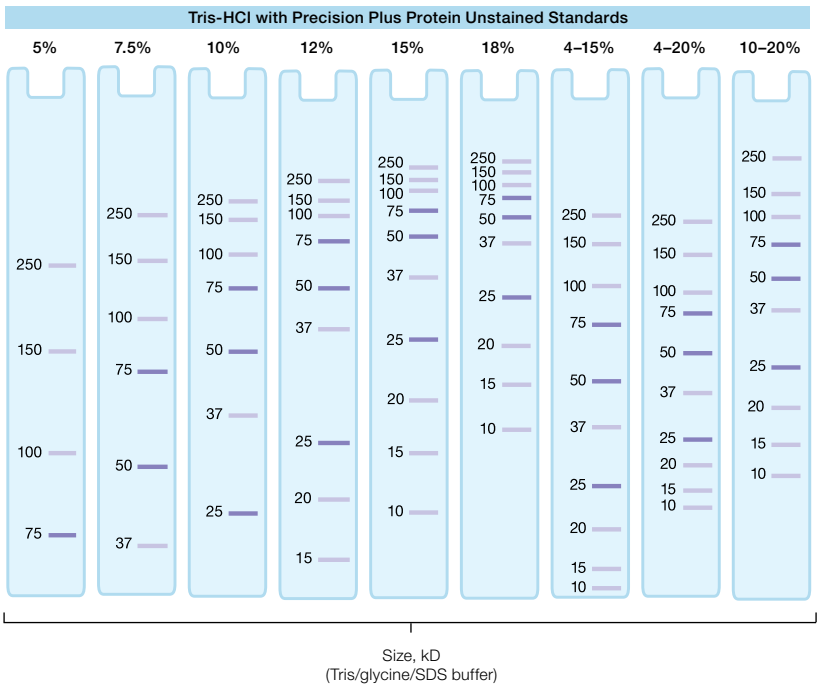
ReadyStrip IPG strips: page 205.
Standards: page 157.
Electrophoresis stains: page 199.
Mini Trans-Blot cell: page 226.
Blot detection: page 237.
PowerPac Basic and PowerPac HC power supplies: page 155.
Imaging systems: page 280.
Premixed buffers: page 192.

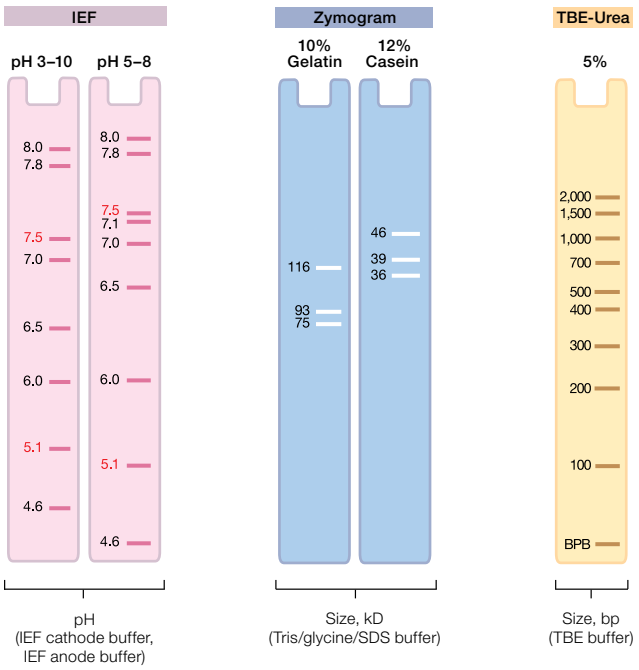
Specifications

Gel dimensions (W x L x thickness)	8.3 x 6.4 x 0.1 cm
Cassette dimensions (W x L x thickness)	10.0 x 8.0 x 0.4 cm
Gel storage conditions	Store flat at 4°C; do not freeze
Gel shelf life*	8–12 weeks for Tris-HCl, Tris-Tricine, zymogram, TBE, TBE-urea; ~26 weeks for IEF

* From date of manufacture.

Ready Gel Migration Charts





Ordering Information

Description	10-Well 30 µl	15-Well 15 µl	10-Well 50 µl
Ready Gel Tris-HCl Gels			
5% Resolving Gel	—	—	1611213
7.5% Resolving Gel	—	—	1611154
10% Resolving Gel	—	—	1611155
12% Resolving Gel	—	—	1611156
15% Resolving Gel	1611103	—	1611157
18% Resolving Gel	—	—	1611219
4–15% Linear Gradient	—	1611122	1611158
4–20% Linear Gradient	1611105	1611123	1611159
10–20% Linear Gradient	—	1611124	1611160
Ready Gel IEF Gels			
pH 5–8	1611112	—	—
Ready Gel Zymogram Gels			
10% Zymogram Gel with Gelatin	—	—	1611167
12% Zymogram Gel with Casein	—	—	1611168*
Ready Gel TBE-Urea Gels			
5% TBE-Urea Gel	1611115*	—	—

* Please allow up to 2 weeks for delivery.

continues

Ordering Information

Catalog #	Description
Premixed Buffers for Tris-HCl Gels	
1610737	**2x Laemmli Sample Buffer**, 30 ml
1610747	**4x Laemmli Sample Buffer**, 10 ml
1610738	**2x Native Sample Buffer**, 30 ml
1610732	**10x Tris/Glycine/SDS**, 1 L
1610734	**10x Tris/Glycine**, 1 L
1610772	**10x Tris/Glycine/SDS**, 5 L cube
1610771	**10x Tris/Glycine**, 5 L cube
Premixed Buffers for Tris-Tricine Gels for Peptides	
1610739	**2x Tricine Sample Buffer**, 30 ml
1610744	**10x Tris/Tricine/SDS**, 1 L
Premixed Buffers for IEF Gels	
1610763	**IEF Sample Buffer**, 30 ml
1610761	**10x IEF Anode Buffer**, 250 ml
1610762	**10x IEF Cathode Buffer**, 250 ml
Premixed Buffers for Zymogram Gels	
1610764	**Zymogram Sample Buffer**, 30 ml
1610765	**10x Zymogram Renaturation Buffer**, 125 ml
1610766	**10x Zymogram Development Buffer**, 125 ml
Premixed Buffers for TBE and TBE-Urea Gels	
1610767	**5x Nucleic Acid Sample Loading Buffer**, 10 ml
1610768	**2x TBE-Urea Sample Buffer**, 30 ml
1610770	**10x Tris/Boric Acid/EDTA (TBE)**, 5 L cube
Accessories	
1610992	**Ready Gel Key Knife**, free upon request with Ready Gel purchase

Mini-PROTEAN® Hand Casting Accessories

Empty Cassettes

Single-use empty Mini-PROTEAN cassettes are available for hand casting a mini gel.

AnyGel™ Stands

AnyGel stands are convenient for storing glass plates of any size gel. They are available as single row or six-row stands.

Features of the six-row stand:

- Perfect for high-volume, 2-D proteomics studies — accommodates up to 6 PROTEAN®, 12 Criterion™, or 18 Mini-PROTEAN mini gels
- Facilitates loading IPG strips on both large format gels and Criterion gel sizes using a front clamp that slants the gel to an ideal angle (can also be used to load tube gels)
- A stair-step design and clear clamps so gels are clearly visible while casting and loading

The single-row AnyGel stand is ideal for processing a few gels at a time. It accommodates one PROTEAN gel, two Criterion gels, or three Mini-PROTEAN mini gels.

AnyGel Six-Row Stand

AnyGel Single-Row Stand with Mini-PROTEAN Cassettes

See Also

Acrylamide gel-casting reagents: page 195.

Buffers: page 193.

Mini-PROTEAN 3 Multi-Casting Chamber

Use the Mini-PROTEAN 3 multi-casting chamber to cast up to 12 gels of 0.75, 1.0, or 1.5 mm thickness simultaneously. Acrylic blocks act as space fillers when fewer than 12 gels are cast. You can cast gradient gels through a bottom filling port with the Model 485 gradient former (see below) to ensure reproducibility. Gels cast in the multi-casting chamber can be run on any of the Mini-PROTEAN electrophoresis systems including the Mini-PROTEAN Tetra cell and the Mini-PROTEAN 3 Dodeca cell.

Mini-PROTEAN 3 Multi-Casting Chamber

Model 485 Gradient Former

The Model 485 gradient former allows you to pour linear, concave, or convex exponential acrylamide gradients for PAGE. Its 40–175 ml capacity is designed to pour up to 12 gradient gels in the Mini-PROTEAN 3 multi-casting chamber. The optional exponential piston is required to form concave or convex exponential acrylamide gradients.

For More Information
Web: bio-rad.com/mphandcast

Model 485 Gradient Former

Ordering Information

Catalog #	Description
Mini-PROTEAN Empty Cassettes and Combs	
4560003	**Mini-PROTEAN Empty Cassettes**, 10-well, 50
4560005	**Mini-PROTEAN Empty Cassettes**, 12-well, 50
4560006	**Mini-PROTEAN Empty Cassettes**, 15-well, 50
4560001	**Mini-PROTEAN Empty Cassettes**, IPG-well, 7 cm IPG strip, 50
4560013	**Mini-PROTEAN Combs**, 10-well, 50
4560015	**Mini-PROTEAN Combs**, 12-well, 50
4560016	**Mini-PROTEAN Combs**, 15-well, 50
4560011*	**Mini-PROTEAN Combs**, IPG, 50
AnyGel Stands and Accessories	
1654131	**AnyGel Stand**, single-row, holds 1 PROTEAN gel, 2 Criterion gels, or 3 Mini-PROTEAN or Ready Gel mini gels
1655131	**AnyGel Stand**, 6-row, holds 6 PROTEAN gels, 12 Criterion gels, or 18 Mini-PROTEAN or Ready Gel mini gels
1654132	**Replacement Clamps**, 2
AnyGel Stands and Electrophoresis Cells	
1655134	**PROTEAN Plus Dodeca Cell (100/120 V) and Two 6-Row AnyGel Stands**, includes #1654150 and two #1655131
1655135	**PROTEAN Plus Dodeca Cell (220/240 V) and Two 6-Row AnyGel Stands**, includes #1654151 and two #1655131
1655133	**Criterion Dodeca Cell and 6-Row AnyGel Stand**, includes #1654130 and #1655131
1656020	**Criterion Cell and Single-Row AnyGel Stand**, includes #1656001 and #1654131
Mini-PROTEAN 3 Multi-Casting Chambers	
1654110**	**Mini-PROTEAN 3 Multi-Casting Chamber**, includes 15 separation sheets, 8 acrylic blocks, tapered luer connector, stopcock valve (order glass plates and combs separately)
1654111**	**Mini-PROTEAN 3 Multi-Casting Chamber**, 0.75 mm, includes 15 sets of glass plates
1654112**	**Mini-PROTEAN 3 Multi-Casting Chamber**, 1.0 mm, includes 15 sets of glass plates
1654113**	**Mini-PROTEAN 3 Multi-Casting Chamber**, 1.5 mm, includes 15 sets of glass plates
1654116**	**Mini-PROTEAN 3 Multi-Casting Chamber**, 0.5 mm, includes 15 sets of glass plates
Mini-PROTEAN 3 Multi-Casting Chamber Accessories	
1654114	**Acrylic Blocks**, 6.0 mm, 8
1654115	**Separation Sheets**, 15
1653320	**Gel Releasers**, 5
1652913	**Replacement Gaskets**, for Mini-PROTEAN 3 multi-casting chamber, includes 3' of tubing

continues

Ordering Information

Catalog #	Description
Combs, *** and Glass Plates for 2-D Electrophoresis**	
1653308	**Short Plates**, 5
1653310	**Spacer Plates with 0.75 mm Integrated Spacers**, 5
1653311	**Spacer Plates with 1.0 mm Integrated Spacers**, 5
1653312	**Spacer Plates with 1.5 mm Integrated Spacers**, 5
1653362	**Mini-PROTEAN Comb**, IPG well, 1.0 mm
1653368	**Mini-PROTEAN Comb**, IPG well, 1.5 mm
1653356	**Mini-PROTEAN Comb**, prep/2-D well, 0.75 mm
1653361	**Mini-PROTEAN Comb**, prep/2-D well, 1.0 mm
1653367	**Mini-PROTEAN Comb**, prep/2-D well, 1.5 mm
Model 485 Gradient Former	
1654120	**Model 485 Gradient Former**, 40–175 ml, includes body with valve stem and tubing connection kit
1654122	**Model 485 Gradient Former and Mini-PROTEAN 3 Multi-Casting Chamber**, ncludes #1654120 and #1654110
Model 485 Gradient Former Accessories	
1652006	**Exponential Piston**, for Model 385 and Model 485 gradient formers
1652007	**Gradient Pouring Needles**, 2
1652008	**Tubing Connection Kit**, includes stopcock, luer taper coupling, tubing (1/8" ID, 3'), Y-connector

* Catalog #4560011 is an IPG well only, no reference well. If a protein standard is needed on gel, order Precision Plus Protein standard plugs #1610378.

** Order combs separately (see combs for use with glass plates on page 166) in the Mini-PROTEAN Tetra cell section.

***For multi-well comb configurations, refer to page 166.

Midi-Format 1-D Electrophoresis Systems

The Criterion™ and the Criterion™ Dodeca™ electrophoresis cells accommodate precast or handcast Criterion gels that are wider and longer than traditional mini gels for increased throughput and separation.

Criterion™ Cell and Criterion™ Dodeca™ Cell

Criterion Cell

The Criterion electrophoresis cell is dedicated to running one or two midi gels* (13.3 x 8.7 cm), which are wider and longer than traditional mini gels (8.6 x 7.2 cm). With a single Criterion gel, you can run up to 26 samples in less than 1 hour or accommodate 11 cm ReadyStrip™ IPG strips for 2-D applications.

- Compact size that requires only 1 L of running buffer
- Built-in wedge on the lid to open gel cassettes in a single step
- Locator slots built into the tank walls to easily and quickly slide cassettes into position

For More Information
Web: bio-rad.com/criterioncell
Request or download bulletin: 2710

* U.S. patent 6,093,301.

See Also

Criterion precast gels and empty cassettes: page 177.
Criterion blotter: page 227.
PowerPac Basic and PowerPac HC power supplies: page 155.
Dodeca stainers: page 182.
AnyGel stands: page 182.

See Also

PowerPac Basic and PowerPac HC power supplies: page 155.

Criterion precast gels and accessories: page 177.

Trans-Blot Plus cell: page 229.

Dodeca stainers: page 182.

Imaging systems: page 280.

Imaging software: page 292.

Criterion Dodeca Cell

The Criterion Dodeca cell has the capacity to run up to 12 handcast or Criterion precast gels* simultaneously. Criterion gels accommodate 11 cm ReadyStrip IPG strips.

- Locator slots to slide cassettes into place without alignment hassles or bulky clamps
- Built-in cooling coil to prevent overheating and ensure the highest resolution
- Stirbar capability to maintain uniform buffer tank temperatures for reproducible runs
- A cassette opener built into the cell for easy gel access
- Convenient buffer draining via the built-in quick-connect drain port

For More Information
Web: bio-rad.com/criteriondodeca
Request or download bulletin: 2622

* U.S. patent 6,093,301.

Specifications	Criterion Cell	Criterion Dodeca Cell
Number of gels	1–2	1–12
Precast gels	Criterion precast gels	Criterion precast gels
Handcast gels	Gels prepared in Criterion empty cassettes	Gels prepared in Criterion empty cassettes
Gel size (W x L)	13.3 x 8.7 cm	13.3 x 8.7 cm
Gel thickness	1.0 mm	1.0 mm
Total buffer volume	1 L	6 L
Typical running conditions	200 V constant	200 V constant; 1 A maximum; 200 W maximum
Recommended power supply	PowerPac™ Basic or PowerPac HC	PowerPac HC or PowerPac Universal
Dimensions (W x L x H)	14.4 x 22.3 x 19.5 cm	18.8 x 49.0 x 19.2 cm
Weight	0.86 kg (1.9 lb)	4.8 kg (11 lb)

Ordering Information

Catalog #	Description
Criterion Cell and Systems	
1656001	**Criterion Cell**, includes electrophoresis buffer tank, lid with power cables, 3 sample loading guides (12+2 well, 18-well, 26-well)
1656019	**Criterion Cell and PowerPac Basic Power Supply**, 100–120/220–240 V, includes #1656001 and #1645050
1656020	**Criterion Cell and Single-Row AnyGel Stand**, includes #1656001 and #1654131
Criterion Cell and Blotter Systems	
1656024	**Criterion Cell/Plate Blotter System**, includes #1656001 and #1704070
1656025	**Criterion Cell/Wire Blotter System**, includes #1656001 and #1704071
Replacement Parts	
1656002	**Criterion Replacement Electrophoresis Buffer Tank**, with lower electrodes
1656003	**Criterion Replacement Lid**, with upper electrodes
1656004	**Criterion Replacement Upper Electrode**, includes prestrung platinum wire
1656005	**Criterion Replacement Lower Electrode**, includes prestrung platinum wire
1652948	**Replacement Power Cables**, for lid
1654131	**AnyGel Stand**, single-row, holds 1 PROTEAN gel, 2 Criterion gels, or 3 Mini-PROTEAN or Ready Gel mini gels
Criterion Dodeca Cell	
1654130	**Criterion Dodeca Cell**, includes electrophoresis buffer tank with built-in cooling coil, lid with power cables
1654138	**Criterion Dodeca Cell and PowerPac HC Power Supply**, includes #1654130 and #1645052
1654139	**Criterion Dodeca Cell and PowerPac Universal Power Supply**, includes #1654130 and #1645070
1655133	**Criterion Dodeca Cell and 6-Row AnyGel Stand**, includes #1654130 and #1655131
Replacement Parts	
1654104	**Replacement Drain Line**
1654135	**Lower Electrode with Platinum Wire**
1654136	**Replacement Cooling Coil**, includes connector tubing
1654137	**Replacement Lid**
1652948	**Replacement Power Cables**, for lid

Criterion™ Precast Gels

Criterion precast gels include a broad selection of midi polyacrylamide gels in single-use cassettes. This gel size provides reproducible, high-resolution results with fast setup, loading, and run times. The gels are wider and longer than traditional mini gels for high-throughput electrophoresis. Criterion gels are packaged and sold in individual units: 1–2 gels can be run in the Criterion cell (page 175) and 1–12 gels can be run in the high-throughput Criterion Dodeca cell (page 176).

- Fast run times and 12-month shelf life for Criterion™ TGX™ gels
- Room temperature storage and 12-month shelf life for Criterion XT Bis-Tris gels
- Formats that run up to 26 samples on a single gel without reducing sample volume or sacrificing speed
- A patented* cassette design including an integral upper buffer chamber that never leaks and requires no tools to open
- Sample wells that are outlined and numbered for easy loading
- Multichannel pipet–compatible combs

Criterion TGX Precast Gels

These precast gels use the Laemmli buffer system and have a 12-month shelf life. And they maintain cooler temperatures at elevated voltages, allowing for reduced run times.

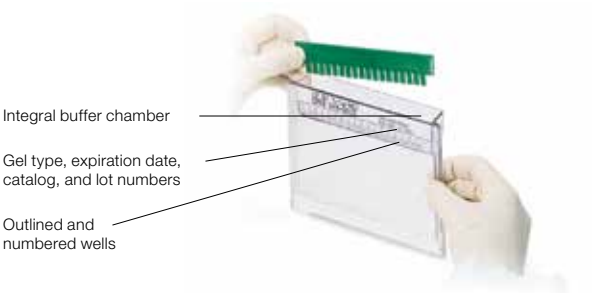
- Run times as short as 20 min
- Transfer times as short as 7 min with the Trans-Blot® Turbo™ system
- 12-month shelf life
- Laemmli format, no special buffers required
- Integrated upper buffer chamber

Criterion TGX Precast Gel Specifications

Gel dimensions (W x L)	13.3 x 8.7 cm; 1.0 mm thick
Cassette dimensions (W x L)	15.0 x 10.6 cm; 5.3 mm thick
Cassette material	Styrene copolymer
Comb material	Polycarbonate
Gel storage conditions	Store flat at 4°C; do not freeze
Shelf life at recommended temperature*	12 months
Recommended sample buffer (dilute 1:1 with sample)	Laemmli sample buffer: 62.5 mM Tris-HCl, pH 6.8, 2% SDS, 25% glycerol, 0.01% bromophenol blue
Recommended running buffer (Tris/glycine/SDS)	25 mM Tris, 192 mM glycine, 0.1% SDS, pH 8.3
Run times	42–50 min at 200 V 20–26 min at 300 V

* From date of manufacture.

* U.S. patent 6,093,301.



Available Chemistries

IEF	pH 3–10, 5–8
Stain-Free	10%, 4–20%, 8–16% Tris-HCl
TBE	5%, 10%, 15%, 4–20%
TBE-urea	5%, 10%, 15%
TGX	7.5%, 10%, 12%, 18% resolving 4–15%, 4–20%, 8–16%, 10–20% linear gradient Any kD™
TGX Stain-Free™	7.5%, 10%, 12%, 18%, 4–15%, 4–20% 8–16%, 10–20% linear gradient Any kD
Tris-acetate	7%, 3–8% resolving
Tris-HCl	5%, 7.5%, 10%, 12.5%, 15%, 18% resolving 4–15%, 4–20%, 8–16%, 10–20%, 10.5–14% linear gradient
Tris-Tricine	16.5%, 10–20%
XT (Bis-Tris)	10%, 12%, 4–12% resolving
Zymogram	10% with gelatin, 12.5% with casein

See Also

Premixed buffers: page 192.
ReadyStrip IPG strips: page 205.
Criterion blotter: page 227.
PowerPac power supplies: page 155.
Dodeca stainers: page 182.
Criterion staining trays: page 182.
Standards: page 157.
Electrophoresis stains: page 199.

Criterion™ TGX Stain-Free™ Precast Gels

Criterion TGX Stain-Free precast gels combine TGX formulation with a proprietary compound that facilitates protein visualization in less than 5 minutes using Bio-Rad's stain-free enabled imaging systems (see page 280).

Criterion TGX Stain-Free precast gels eliminate the need for staining. In addition to the 12-month shelf life, Laemmli buffer system, and fast run times of the TGX formulation, the Criterion TGX Stain-Free gels provide:

- Complete protein separation, gel imaging, and data analysis in 25 min
- Comparable sensitivity to Coomassie stain
- Better reproducibility and quantitation compared to staining procedures
- Use of the same gel for chromatography, western blotting, standard staining methods, and mass spectrometry analysis

For More Information
Web: bio-rad.com/midistainfree
Request or download bulletin: 5974

Extended Shelf-Life Criterion XT Gels for SDS-PAGE and Native PAGE

Criterion XT gels are formulated at near-neutral pH to ensure longer shelf life (12 months for Bis-Tris gels, 8 months for Tris-acetate gels) and improved protein stability. Criterion XT gels are run using optimized sample and running buffers — without the need for antioxidant addition — for sharp bands and minimal preparation time. Like traditional Laemmli systems, Criterion XT gels use discontinuous buffer that forms moving boundaries to stack and then separate proteins.

Criterion XT Bis-Tris gels are formulated by using a Bis-Tris buffer system (pH 6.4) for separation of proteins by MW. By selecting from two running buffers (MOPS or MES) you can expand the separation capability of a single Bis-Tris gel type.

For More Information
Web: bio-rad.com/criteriongels

Criterion Stain Free™ Precast Gels

Criterion Stain Free gels have Tris-HCl formulation for PAGE applications and a proprietary compound that facilitates protein visualization using a stain-free enabled imager (Gel Doc™ EZ or ChemiDoc™ MP imaging system). The stain-free technology allows direct visualization, analysis, and documentation of protein samples in PAGE gels without staining, destaining, and gel drying procedures.

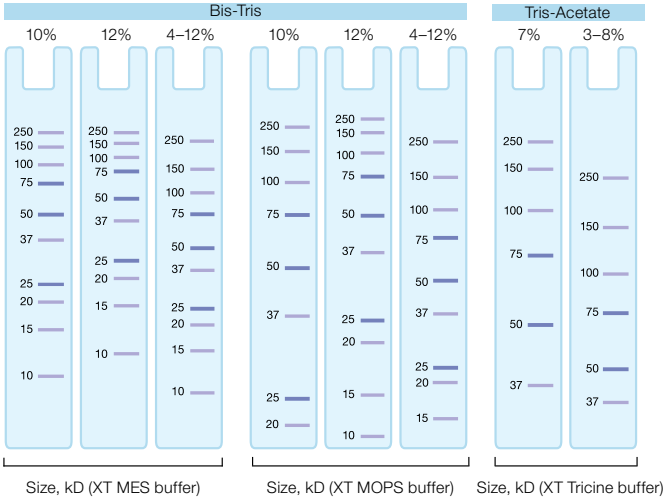
For More Information
Web: bio-rad.com/criterionstainfree

Specifications

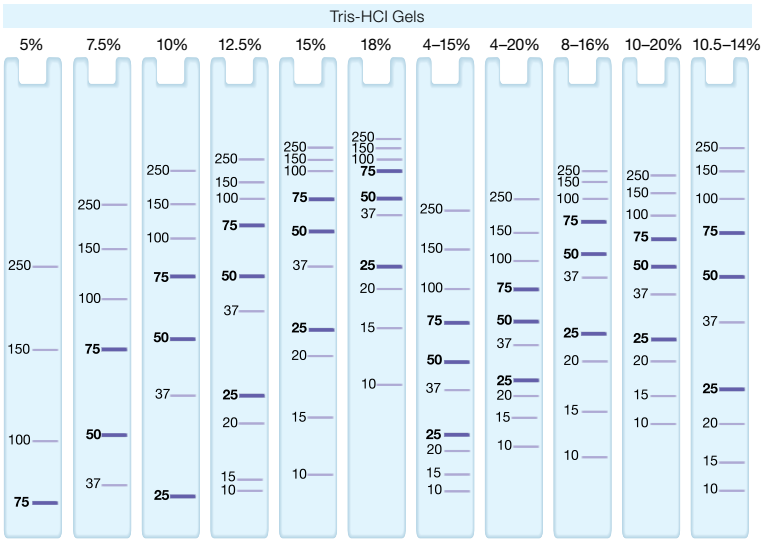
Gel dimensions	13.3 x 8.7 cm (W x L); 1.0 mm thick
Cassette dimensions	15.0 x 10.6 cm (W x L); 5.3 mm thick
Cassette material	Styrene copolymer
Comb material	Polycarbonate
Storage tray material	PET
Gel storage conditions	Store flat; do not freeze Room temperature for Bis-Tris gels 4°C for all other gel types
Gel shelf life*	12 months for TGX and Bis-Tris gels 8 months for Tris-acetate gels 12 weeks for Tris-HCl, Tris-Tricine, zymogram, TBE, TBE-urea gels 26 weeks for IEF gels
Buffer volume	Upper, 60 ml; lower, 400 ml

* From date of manufacture.

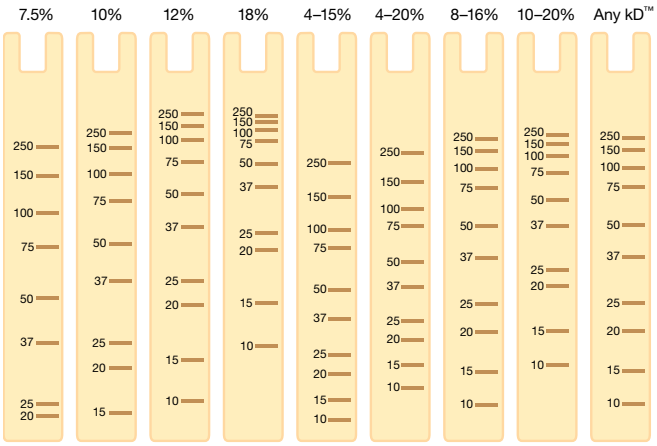
Criterion XT Migration Charts
(with Precision Plus Protein™ Unstained Standards)



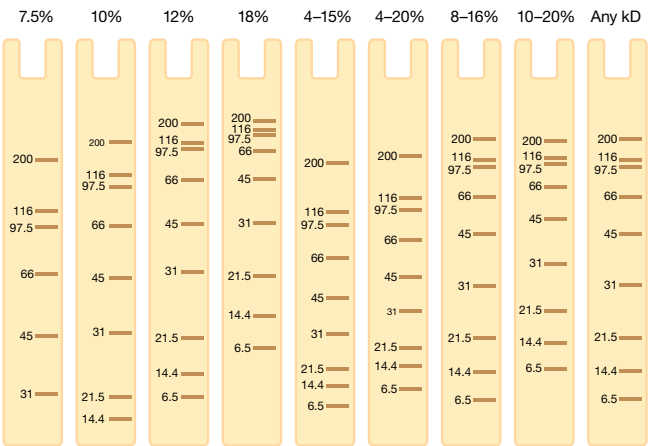
Criterion Migration Charts (with Precision Plus Protein Unstained Standards)

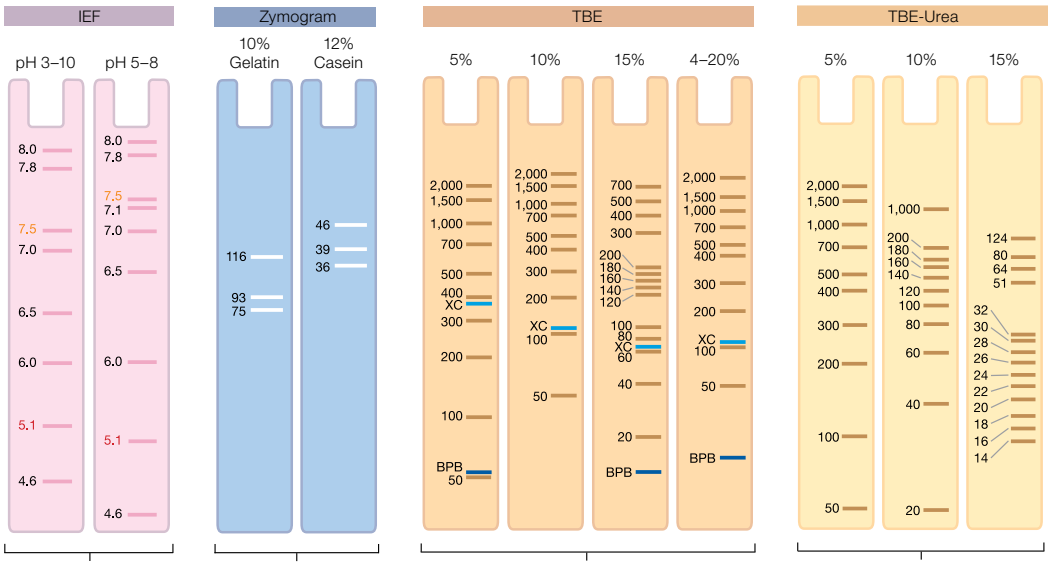


Criterion™ TGX™ and TGX Stain-Free Migration Charts (with Precision Plus Protein Unstained Standards)



Criterion TGX and TGX Stain-Free Migration Charts (with Broad Range Unstained Protein Standards)





Ordering Information

Description	12+2-Well*, ** 45 µl	18-Well 50 µl	26-Well* 15 µl	Prep+2-Well** 800 µl	IPG+1-Well** 11 cm IPG Strip
Criterion TGX Precast Gels					
7.5% Resolving Gel	5671023	5671024	5671025	—	—
10% Resolving Gel	5671033	5671034	5671035	—	—
12% Resolving Gel	5671043	5671044	5671045	—	—
18% Resolving Gel	5671073	5671074	5671075	5671072	5671071
4–15% Linear Gradient	5671083	5671084	5671085	5671082	5671081
4–20% Linear Gradient	5671093	5671094	5671095	5671092	5671091
8–16% Linear Gradient	5671103	5671104	5671105	5671102	5671101
10–20% Linear Gradient	5671113	5671114	5671115	5671112	5671111
Any kD Gel	5671123	5671124	5671125	5671122	5671121
Criterion TGX Stain-Free Precast Gels					
7.5% Gel	5678023	5678024	5678025	—	—
10% Gel	5678033	5678034	5678035	—	—
12% Gel	5678043	5678044	5678045	—	—
18% Gel	5678073	5678074	5678075	5678072	5678071
4–15% Gel	5678083	5678084	5678085	5678082	5678081
4–20% Gel	5678093	5678094	5678095	5678092	5678091
8–16% Linear Gradient	5678103	5678104	5678105	5678102	5678101
10–20% Linear Gradient	5678113	5678114	5678115	5678112	5678111
Any kD Gel	5678123	5678124	5678125	5678122	5678121
Criterion XT Bis-Tris Gels* **					
10% Resolving Gel	3450111	3450112	3450113	—	3450115
12% Resolving Gel	3450117	3450118	3450119	3450120†	3450121
4–12% Resolving Gel	3450123	3450124	3450125	3450126†	3450127

continues

Ordering Information

Description	12+2-Well*, ** 45 µl	18-Well 50 µl	26-Well* 15 µl	Prep+2-Well** 800 µl	IPG+1-Well** 11 cm IPG Strip
Criterion XT Tris-Acetate Gels					
7% Resolving Gel	3450135	3450136†	3450137†	—	—
3–8% Resolving Gel	3450129	3450130	3450131	—	3450133†
Criterion Tris-HCl Gels					
5% Resolving Gel	3450001	3450002	3450003†	—	—
7.5% Resolving Gel	3450005	3450006	3450007	3450008	—
10% Resolving Gel	3450009	3450010	3450011	3450012†	3450101
12.5% Resolving Gel	3450014	3450015	3450016	3450017†	3450102
15% Resolving Gel	3450019	3450020	3450021	3450022†	—
18% Resolving Gel	3450023	3450024	3450025	3450026†	—
4–15% Linear Gradient	3450027	3450028	3450029	3450030†	3450103
4–20% Linear Gradient	3450032	3450033	3450034	3450035	3450104
8–16% Linear Gradient	3450037	3450038	3450039	3450040†	3450105
10–20% Linear Gradient	3450042	3450043	3450044	3450045†	3450107
10.5–14% Linear Gradient	3459949	3459950	3459951	—	3450106
Criterion Stain Free Gels					
10% Tris-HCl Gel	3451012	3451018	—	—	—
4–20% Tris-HCl Gel	3450412	3450418	3450426	—	—
8–16% Tris-HCl Gel	3458162	—	3458166	—	3458161
Criterion Tris-Tricine Gels					
16.5% Tris-Tricine	3450063	3450064	3450065†	3450066†	—
10–20% Tris-Tricine	3450067	3450068	3450069	—	—
Criterion IEF Gels					
pH 3–10	3450071†	3450072†	3450073†	—	—
pH 5–8	—	3450076†	—	—	—
Criterion Zymogram Gels					
10% Zymogram Gel with Gelatin	3450079†	3450080†	3450081†	—	—
12.5% Zymogram Gel with Casein	3450082†	3450083†	3450084†	—	—
Criterion TBE Gels					
5% TBE Gel	3450047	3450048	3450049	—	—
10% TBE Gel	3450051	3450052	3450053	—	—
15% TBE Gel	3450055†	3450056	3450057	—	—
4–20% TBE Gel	3450059†	3450060†	3450061†	—	—
Criterion TBE-Urea Gels					
5% TBE-Urea Gel	—	3450086†	—	—	—
10% TBE-Urea Gel	3450088†	3450089†	3450090†	—	—
15% TBE-Urea Gel	3450091	3450092	3450093†	—	—
Criterion Empty Cassettes					
1.0 mm thick, 10 sets	3459901	3459902	3459903	3459904	3459906
Loading Guides					
Criterion Sample Loading Guide††	1656006	1656007	1656008	—	—

continues

See Also
Premixed running buffers: page 192.

Ordering Information

Catalog #	Description
Criterion XT Buffers and Reagents	
1610788***	**XT MOPS Running Buffer**, 20x, 500 ml
1610789***	**XT MES Running Buffer**, 20x, 500 ml
1610790	**XT Tricine Running Buffer**, 20x, 500 ml
1610791	**XT Sample Buffer**, 4x, 10 ml
1610792	**XT Reducing Agent**, 20x, 1 ml
1610793***	**XT MOPS Buffer Kit**, includes 500 ml of 20x XT MOPS running buffer, 10 ml of 4x XT sample buffer, 1 ml of 20x XT reducing agent
1610796***	**XT MES Buffer Kit**, includes 500 ml of 20x XT MES running buffer, 10 ml of 4x XT sample buffer, 1 ml of 20x XT reducing agent
1610797	**XT Tricine Buffer Kit**, includes 500 ml of 20x XT Tricine running buffer, 10 ml of 4x XT sample buffer, 1 ml of 20x XT reducing agent
Application Guide	
4110001	**Criterion Precast Gel Application Guide**, available online

* Multichannel pipet compatible. ** Includes reference well(s), 15 µl. *** Purchase of this product is accompanied by a limited license under U.S. patents 6,143,154; 6,096,182; 6,059,948; 5,578,180; 5,922,185; 6,162,338; and 6,783,651 and corresponding foreign patents.

† Please allow up to 2 weeks for delivery. †† U.S. patent 5,656,145.

Criterion™ Accessories

Empty Cassettes

Single-use empty Criterion cassettes are available for hand casting gels. For added convenience, cast your gels using AnyGel™ stands.

For More Information
Request or download bulletins: 2710, 2911, and 2912

AnyGel Stands

AnyGel stands are convenient for storing glass plates of any size gel. They are available as single-row or six-row stands. See the Mini-PROTEAN® precast gel section, page 168.

Criterion Staining Trays

Criterion staining/blotting trays are plastic trays specifically designed for staining one or two Criterion gels or performing western blot detection. Tray dimensions are optimized for Criterion gel staining and for blot detection. These dimensions provide a working volume of up to 500 ml.

Dodeca™ High-Throughput Stainers

Dodeca stainers are high-throughput gel staining devices available in two sizes: the small size accommodates up to 24 Criterion gels while the large size can accommodate up to 12 large-format gels. The stainers eliminate risk of gel breakage from excessive handling. Features of the stainers include:

- A patented* shaking rack designed to hold the staining trays at an angle to allow air bubbles to escape, ensure uniform gel staining, and protect gels from breaking
- Compatibility with Bio-Safe™ Coomassie, Coomassie, Oriole™, SYPRO Ruby, Flamingo™, and silver stains

* U.S. patent 6,843,593.

Dodeca stainer components:

1. Shaker motor.
2. Lid with shaker control unit and integrated reagent access door.
3. Tray attachments.
4. Stack of staining trays (including white development tray).
5. Shaking rack designed with built-in handles for easy placement into the solution tank.
6. Gel clip.
7. Solution tank with incorporated drain ports.

- A white development tray that allows easy monitoring of the final development step during the staining process
- A reagent access door integrated into the lid to add staining solutions without disturbing the gels
- Boxes for convenient storage of gels (optional)

Stainer Compatibility with Different Gel Sizes

	Gel Size (W x L)	Gel Format
Large Dodeca stainer	25.6 x 23.0 cm	PROTEAN® Plus precast
	25.0 x 20.5 cm	PROTEAN Plus handcast (requires one attachment per tray)
Small Dodeca stainer	20.0 x 20.5 cm	PROTEAN Plus handcast
	18.5 x 20.0 cm	PROTEAN II XL handcast
	18.3 x 19.3 cm	PROTEAN II XL precast
	16.0 x 20.0 cm	PROTEAN II xi handcast
	16.0 x 16.0 cm	PROTEAN II xi handcast and precast
	13.3 x 8.7 cm	Criterion (up to 24 gels, requires one attachment per tray)

Specifications

Number of gels	1–12 large format gels in the large Dodeca stainer; 1–24 Criterion gels in the small Dodeca stainer (minimum of 4 gels recommended for silver staining)
Shaker device	Built-in shaker motor
Maximum staining solution volume	10 L for the large Dodeca stainer, 7 L for the small Dodeca stainer
Compatible stains	Bio-Safe™ colloidal Coomassie Brilliant Blue G-250 stain, Coomassie Brilliant Blue R-250 stain, SYPRO Ruby protein gel stain, Oriole and Flamingo fluorescent gel stains, Dodeca silver stain kit
Dimensions (W x L x H)	41.3 x 46.2 x 38.9 cm for both the large and small Dodeca stainers
Weight (empty)	9.1 kg (20 lb) for the large Dodeca stainer 7.5 kg (17 lb) for the small Dodeca stainer

Ordering Information

Catalog #	Description
AnyGel Stands and Accessories	
1654131	**AnyGel Stand**, single-row, holds 1 PROTEAN gel, 2 Criterion gels, or 3 Mini-PROTEAN or Ready Gel mini gels
1655131	**AnyGel Stand**, 6-row, holds 6 PROTEAN gels, 12 Criterion gels, or 18 Mini-PROTEAN or Ready Gel mini gels
1654132	**Replacement Clamps**, 2
Criterion Staining Trays	
3459921	**Criterion Staining/Blotting Trays**, with lids, 2
3459920	**Criterion Staining/Blotting Trays**, with lids, 12
Dodeca Stainers, Accessories, and Replacement Parts	
1653400	**Dodeca Stainer**, large, 100–240 V, includes 13 trays (12 clear, 1 white), 12 tray attachments, shaking rack, solution tank, lid with shaker motor, shaker control unit, gel clip
1653401	**Dodeca Stainer**, small, 100–240 V, includes 13 trays (12 clear, 1 white), 12 Criterion tray attachments, shaking rack, solution tank, lid with shaker motor, shaker control unit, gel clip
1653403	**Dodeca Stainer and Dodeca Silver Stain Kit**, large, 100–240 V, includes large Dodeca stainer (#1653400), Dodeca silver stain kit for the large tank (#1610480)
1653404	**Dodeca Stainer and Dodeca Silver Stain Kit**, small, 100–240 V, includes small Dodeca stainer (#1653401), Dodeca silver stain kit for the small tank (#1610481)
1653405	**Dodeca Stainer and Bio-Safe Coomassie Stain Kit**, large, 100–240 V, includes large Dodeca stainer (#1653400) and staining solution for a large tank, sufficient for up to 12 large format gels
1653406	**Dodeca Stainer and Bio-Safe Coomassie Stain Kit**, small, 100–240 V, includes small Dodeca stainer (#1653401) and staining solution for a small tank, sufficient for up to 12 large format gels
1653407	**Dodeca Stainer and SYPRO Ruby Protein Gel Stain Kit**, large, 100–240 V, includes large Dodeca stainer (#1653400) and SYPRO staining solution for a large tank, sufficient for up to 12 large format gels
1653408	**Dodeca Stainer and SYPRO Ruby Protein Gel Stain Kit**, small, 100–240 V, includes small Dodeca stainer (#1653401) and SYPRO staining solution for a small tank, sufficient for up to 12 large format gels
1653429	**Storage Box**, large, holds up to 4 gels on large staining trays
1653430	**Storage Box**, small, holds up to 4 gels on small staining trays
1653416	**Dodeca Stainer Tray**, small, replacement, 2
1653420	**Dodeca Stainer White Development Tray**, small
1653422	**Dodeca Stainer Shaking Rack**, small, replacement
1653423	**Dodeca Stainer Solution Tank**, large, replacement
1653424	**Dodeca Stainer Solution Tank**, small, replacement
1653425	**Dodeca Stainer Lid with Shaker Motor**, 100–240 V, replacement, fits both tank sizes
1653426	**Dodeca Stainer Lid without Shaker Motor**, replacement, fits both tank sizes
1653428	**Dodeca Stainer Shaker Control Unit**, replacement
1610480	**Dodeca Silver Stain Kit**, large, for use with large Dodeca stainer (#1653400), for 12 large gels
1610481	**Dodeca Silver Stain Kit**, small, for use with small Dodeca stainer (#1653401), for 12 large or 24 midi gels

Large-Format Vertical Electrophoresis Systems

See Also

PowerPac Universal and PowerPac HV power supplies: page 155.

PROTEAN i12 IEF cell: page 202.

Protein stains: page 199.

Buffers and reagents for protein electrophoresis: page 192.

Gel clip: page 190.

Dodeca stainers: page 182.

PROTEAN® II xi and XL Cells

Large format cells for protein and nucleic acid electrophoresis applications.

1-D Separations

For the first dimension of separation, choose the PROTEAN II xi cell, available in two sizes (16 x 20 or 20 x 20 cm). Up to four* gels can be run at once using the optional notched inner plate and additional spacers. High-resolution vertical agarose electrophoresis of nucleic acids can be done with the optional frosted glass plates. Conversion screws are available to convert the standard 25 mm well depth to 10 mm.

2-D Separations

For the second dimension of 2-D electrophoresis, choose the PROTEAN II XL cell. This cell is designed to run up to two* (18.3 x 20 cm) gels at once with 17 and 18 cm ReadyStrip™ IPG strips. Key features include:

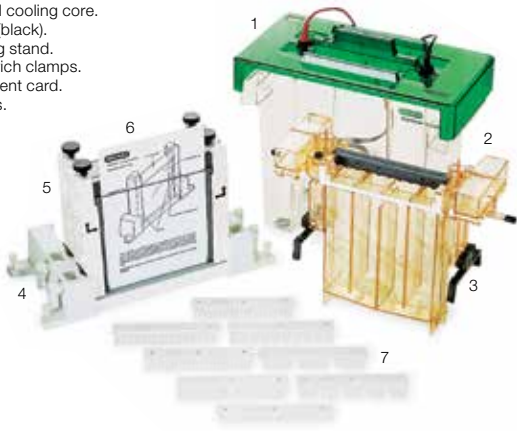
- **Leak proof** — innovative clamps exert uniform pressure along the length of the plates to prevent leaking without the use of grease or agarose plugs
- **Sharp bands and spots** — central cooling core can provide smile-free patterns with as little as 1.5 L of buffer
- **Multiple ways to customize** — choose different combs, spacers, clamps, and glass plates to tailor the system to your needs

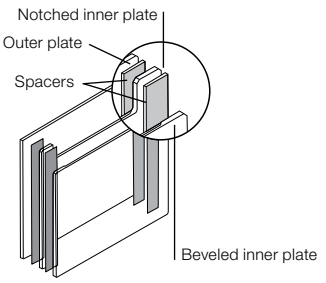
For More Information
Web: bio-rad.com/largeelectro
Request or download bulletin: 1760

PROTEAN II Conversion Kits for 2-D Applications

Conversion kits allow you to expand the capabilities of the PROTEAN II xi cell. Choose the PROTEAN II xi cell IPG conversion kit for running 17 and 18 cm ReadyStrip IPG strips. Three options are available to accommodate different gel thicknesses. The PROTEAN II xi cell 2-D conversion kit can modify the cell to function as a system for running IEF tube gels.

PROTEAN II xi system components:
1. Tank and lid.
2. Central cooling core.
3. Latch (black).
4. Casting stand.
5. Sandwich clamps.
6. Alignment card.
7. Combs.





Optional notched inner plate and additional spacers allow up to four gels to be run in the PROTEAN II xi cell.

* For higher throughput, the PROTEAN II multi-cell provides six-gel capacity.

Specifications

	PROTEAN II xi (16 cm)	PROTEAN II xi (20 cm)	PROTEAN II XL (20 cm)
Number of gels	1–4	1–4	2
Gel size (W x L)	16 x 16 cm (handcast)	16 x 20 cm (handcast)	18.3 x 20 cm (handcast)
Glass plate size (W x L)			
Inner plate	20 x 16 cm	20 x 20 cm	20 x 20 cm
Outer plate	20 x 18.3 cm	20 x 22.3 cm	20 x 22.3 cm
Spacer length	18.3 cm	22.3 cm	22.3 cm
Typical upper buffer volume	350 ml	350 ml	350 ml
Typical lower buffer volume	1.8 L	1.2 L	1.2 L
Typical run times for SDS-PAGE*			
Without cooling	4 hr	5 hr	5 hr
With cooling	2.5 hr	3.5 hr	3.5 hr
Recommended power supply	PowerPac™ HV or PowerPac Universal	PowerPac HV or PowerPac Universal	PowerPac HV or PowerPac Universal

* For voltage and current settings for electrophoresis applications, see page 153.

Ordering Information

Catalog #	Description
PROTEAN II xi Cells, for 16 x 16 cm* Gels	
1651801	**PROTEAN II xi Cell**, without spacers and combs**
1651802	**PROTEAN II xi Cell**, 1.5 mm spacers (4), 15-well combs (2)
1651803	**PROTEAN II xi Cell**, 1.0 mm spacers (4), 15-well combs (2)
1651804	**PROTEAN II xi Cell**, 0.75 mm spacers (4), 15-well combs (2)
PROTEAN II xi Cells, for 16 x 20 cm Gels	
1651811	**PROTEAN II xi Cell**, without spacers and combs**
1651812	**PROTEAN II xi Cell**, 1.5 mm spacers (4), 15-well combs (2)
1651813	**PROTEAN II xi Cell**, 1.0 mm spacers (4), 15-well combs (2)
1651814	**PROTEAN II xi Cell**, 0.75 mm spacers (4), 15-well combs (2)
PROTEAN II XL Cells, for 18.3 x 20 cm Gels*, Compatible with ReadyStrip IPG Strips	
1653188	**PROTEAN II XL Cell**, wide-format, 1.0 mm, spacers (4), IPG 2-D combs (2)
1653189	**PROTEAN II XL Cell**, wide-format, 1.5 mm, spacers (4), IPG 2-D combs (2)
1653190	**PROTEAN II XL Cell**, wide-format, 2.0 mm, spacers (4), IPG 2-D combs (2)
PROTEAN II IPG Conversion Kits, for 2-D (to Convert xi to XL)***	
1651815	**PROTEAN II xi Cell 2-D Conversion Kit**, converts PROTEAN II xi cell into a tube gel IEF 2-D system, 2 tube gel adaptors, 24 glass tubes (1.5 mm diameter, 180 mm length), gaskets, grommets, stoppers
1653183	**PROTEAN II xi Cell IPG Conversion Kit**, 1.0 mm spacers
1653186	**PROTEAN II xi Cell IPG Conversion Kit**, 1.5 mm spacers
1653184	**PROTEAN II xi Cell IPG Conversion Kit**, 2.0 mm spacers
1651834	**PROTEAN II xi Basic Unit with Casting Stand**, includes central cooling core, lower buffer chamber, lid with cables, leveling bubble; combine with an IPG conversion kit for a complete 18.3 cm wide format system

* All cells include central cooling core with gaskets, lower buffer chamber, lid with cables, 2 sets of glass plates, sandwich clamps (4), upper buffer dam, casting stand with gaskets, leveling bubble, instructions, and alignment card.

** Select spacers and combs from page 186–187.

*** All PROTEAN II xi cell IPG conversion kits include 2 sets of IPG clamps, 2 sets of 20 x 20 cm glass plates, IPG spacers (4), IPG 2-D combs (2), IPG central cooling core gaskets (2), casting stand gaskets (2), and alignment card.

See Also

PowerPac Universal power supply: page 156.

Premixed buffers and buffer reagents: page 192.

Dodeca stainers: page 182.

PROTEAN® II xi and XL Multi-Cells

The PROTEAN xi and XL multi-cells, which can run up to six gels at once, offer efficient cooling with a combination of two cooling coils and three cooling cores.* Effective cooling enables high-power runs for rapid separation with minimal protein diffusion for sharper bands and spots.

* Requires a refrigerated circulating bath and operation at 4°C for optimal results.

PROTEAN® II xi and XL Accessories

Accessories and replacement parts are available for the PROTEAN II xi and XL systems. There are a wide variety of glass plates, spacers, and combs to choose from. Components can be purchased separately for a truly customized system. Replacement parts are also available to keep your system up and running.

For More Information
Web: bio-rad.com/largeelectro
Request or download bulletin: 1760

PROTEAN II xi and XL (IPG) component comparison:
1. The 4 mm xi and 13 mm XL clamp notches.
2. The 181 mm xi and 198 mm XL central cooling core gaskets.
3. The 153 mm xi and 184 mm XL combs.
4. The 19 mm xi and 8 mm XL spacers.

Maximum Sample Volume per Well for PROTEAN II xi and XL Combs*

		Comb Thickness				
Number or Type of Wells	**Well Width**	**0.5 mm**	**0.75 mm**	**1.0 mm**	**1.5 mm**	**3.0 mm**
25	3.5 mm	—	60 µl	80 µl	120 µl	—
20	5.0 mm	54 µl	82 µl	110 µl	164 µl	328 µl
15	6.5 mm	74 µl	110 µl	147 µl	221 µl	442 µl
10	1.0 cm	114 µl	172 µl	229 µl	343 µl	687 µl
5	2.3 cm	—	—	522 µl	783 µl	1.57 ml
3	4.0 cm	—	—	—	1.37 ml	—
Blank	14.5 cm	—	2.44 ml	3.26 ml	4.88 ml	9.76 ml
2-D (IPG well)						
Reference well	3.5 mm	—	—	28 µl	42 µl	84 µl
Sample well	17.8–17.9 cm	—	—	—	—	—

* At standard 25 mm well depth.

Ordering Information

Catalog #	Description
PROTEAN II xi Accessories for Running Gels	
1651901	**PROTEAN II xi Sandwich Clamps**, 16 cm set (1 left, 1 right)
1651902	**PROTEAN II xi Sandwich Clamps**, 20 cm set (1 left, 1 right)
1651913	**PROTEAN II xi Replacement Gaskets**, for central cooling core, 2
PROTEAN II XL Accessories for Running Gels	
1651835	**PROTEAN II XL Sandwich Clamps**, IPG set (1 left, 1 right)
1653182	**PROTEAN II XL Replacement Gaskets**, for central cooling core, 2
PROTEAN II xi and XL Accessories for Running Gels	
1651806	**Central Cooling Core**, includes 2 gaskets
1651807	**Buffer Tank**
1651808	**Cell Lid**, with power cables
1651909	**Upper Buffer Dam**
1005430	**PROTEAN II Latch Assembly Kit**, for central cooling core
900768018	**Replacement Platinum Wire**, cathode, 18"
900768024	**Replacement Platinum Wire**, anode, 24"
PROTEAN II xi and XL Casting Apparatus	
1651911	**Slab Gel Casting Stand**, with gaskets
1651912	**Replacement Gaskets**, for casting stand, 2
PROTEAN II xi Glass Plates*	
1651821	**Inner Plates**, for 16 x 16 cm gels, 16 x 20 cm, 2, for PROTEAN II xi cell only
1651822	**Outer Plates**, for 16 x 16 cm gels, 18.3 x 20 cm, 2, for PROTEAN II xi cell only
PROTEAN II xi Specialty Glass Plates	
1651825**	**Frosted Inner Plates**, for agarose gels, 16 x 20 cm, 2, for PROTEAN II xi cell only
1651826**	**Frosted Inner Plates**, for agarose gels, 20 x 20 cm, 2, for PROTEAN II xi cell only
1651832	**Notched Inner Plate**, for double-up procedures, 16 x 16 cm gel, 16 cm bevel length, for PROTEAN II xi cell only
1651833	**Notched Inner Plate**, for double-up procedures, 16 x 20 cm gel, 16 cm bevel length, for PROTEAN II xi cell only
PROTEAN II xi and XL Glass Plates, for 16 x 20 or 18.3 x 20 cm gels*	
1651823	**Inner Plates**, 20 x 20 cm, 2
1651824	**Outer Plates**, 22.3 x 20 cm, 2

Spacer Width	0.5 mm	0.75 mm	1.0 mm	1.5 mm	3.0 mm
PROTEAN II xi Spacers (Set of 4)					
16 cm gels	1651841	1651842	1651843	1651844	1651845
20 cm gels	1651846	1651847	1651848	1651849	1651850
PROTEAN II xi Combs**					
Blank	—	1651891	1651892	1651893	1651894
2-D IPG	—	—	1651897	1651898	1651899
3-Well	—	—	—	1651888	—
5-Well	—	—	1651882	1651883	1651884
10-Well	1651875	1651876	1651877	1651878	1651879
15-Well	1651870	1651871	1651872	1651873	1651874
20-Well	1651865	1651866	1651867	1651868	1651869
25-Well	—	1651861	1651862	1651863	—

Spacer Width	1.0 mm	1.5 mm	2.0 mm
PROTEAN II XL Combs, IPG Strip Format			
2-D IPG (with reference well)	1651838	1653187	1651839

Catalog #	Description
PROTEAN II XL Spacers, IPG Strip Format (Set of 4)	
1651836	**20 cm Spacers**, 1.0 mm
1653181	**20 cm Spacers**, 1.5 mm
1651837	**20 cm Spacers**, 2.0 mm

* One gel sandwich consists of 1 outer plate, 1 inner plate, and 2 spacers.

** Each comb is 15.2 cm long. All combs except the 2-D combs produce sample wells that are 25 mm deep. The well depth of the 2-D comb is 8 mm. The well depth of all standard combs can be converted from 25 mm to 10 mm with comb conversion screws (#1651859).

continues

Ordering Information

Catalog #	Description
PROTEAN II xi Multi-Cell*	
1651951	**PROTEAN II xi Multi-Cell**, includes 3 central cooling cores with gaskets, buffer tank, lid with power cables, 1 upper buffer dam, PROTEAN II xi multi-casting chamber with accessories, leveling bubble
1651956	**PROTEAN II xi Multi-Cell 2-D Conversion Kit**, for proper cooling, includes 2 cooling coils and manifold (required for 2-D electrophoresis applications)
PROTEAN II XL Multi-Cell, Wide Format, Compatible with ReadyStrip IPG Strips*,**	
1653176	**PROTEAN II XL Multi-Cell**, wide format, 1.0 mm
1653177	**PROTEAN II XL Multi-Cell**, wide format, 1.5 mm
1653178	**PROTEAN II XL Multi-Cell**, wide format, 2.0 mm

* The PROTEAN i12 IEF system is required for first-dimension IEF with the PROTEAN II xi or XL multi-cell; see page 202.

** Includes catalog #1651951, #1651956, and 3 PROTEAN II xi cell IPG conversion kits of desired thickness. Order appropriate spacers, plates, clamps, combs, and accessories for your application (pages 185–187).

See Also
Acrylamide gel-casting reagents: page 195.
Buffers: page 193.

PROTEAN® II Multi-Gel Casting Chamber

- Up to twelve 1.5 mm thick gels can be cast simultaneously
- Top filling for uniform single percentage gels
- Bottom filling for reproducible gradient gels using the Model 495 gradient former (see page 190)
- Accommodation of 16 or 20 cm gels
- Acrylic blocks can be used as space fillers when fewer than 10 gels are cast, and reusable separation sheets offer easy separation of gel sandwiches after casting

Ordering Information

Catalog #	Description
1652025	**PROTEAN II xi Multi-Gel Casting Chamber**, includes casting chamber, sealing plate, silicone gasket, 15 separation sheets, 4 acrylic blocks, 10 xi alignment cards, tapered luer connector, leveling bubble
1652024	**PROTEAN II XL Multi-Gel Casting Chamber**, includes casting chamber, sealing plate, silicone gasket, 15 separation sheets, 4 acrylic blocks, 10 XL alignment cards, tapered luer connector, leveling bubble
Accessories	
1651957	**Acrylic Blocks**, 4
1651958	**Separation Sheets**, 15
1652026	**Sealing Gaskets**, 3
1652029	**PROTEAN II xi Alignment Cards**, 2
1651840	**PROTEAN II XL Alignment Cards**, 2

PROTEAN® Plus Dodeca™ Cell

The PROTEAN Plus Dodeca cell* accommodates up to 12 large slab gels, matching the capacity of 1-D runs in the PROTEAN IEF system for high-throughput 2-D applications. Features include:

- Capacity to run 1–12 gels
- Ceramic cooling core, buffer recirculation pump**, and refrigerated circulator that provide efficient cooling — temperature of buffer surrounding gels varies by ≤1°C
- Plate electrodes** that create an optimally uniform electrical field to give straight horizontal run results
- Differential plate heights that facilitate easy IPG strip or tube gel loading; the AnyGel™ stand (page 190) can be used to stabilize and position gels while loading

For More Information
Request or download bulletin: 2621
Web bio-rad.com/proteandodeca

* Designed to run IPG and tube gel samples; not recommended for 1-D applications.
** U.S. patent 6,451,193.

See Also

PowerPac HC and PowerPac Universal power supplies: page 155.
Dodeca stainers: page 182.
Gel clip: page 190.

Ordering Information

Catalog #	Description
PROTEAN Plus Dodeca Cells and Systems	
1654150	**PROTEAN Plus Dodeca Cell**, 100/120 V, includes electrophoresis buffer tank with built-in ceramic cooling core, lid, buffer recirculation pump with tubing, 2 gel releasers
1654140	**PROTEAN Plus Dodeca Cell (100/120 V) and PowerPac HC Power Supply**, includes #1654150 and #1645052
1654142	**PROTEAN Plus Dodeca Cell (100/120 V) and PowerPac Universal Power Supply**, includes #1654150 and #1645070
1654144	**PROTEAN Plus Dodeca Cell (100/120 V), Trans-Blot Plus Cell, and PowerPac Universal Power Supply**, includes #1654150, #1703990, and #1645070
1655134	**PROTEAN Plus Dodeca Cell (100/120 V) and Two 6-Row AnyGel Stands**, includes #1654150 and two #1655131
1654151	**PROTEAN Plus Dodeca Cell**, 220/240 V, includes electrophoresis buffer tank with built-in ceramic cooling core, lid, buffer recirculation pump with tubing, 2 gel releasers
1654141	**PROTEAN Plus Dodeca Cell (220/240 V) and PowerPac HC Power Supply**, includes #1654151 and #1645052
1654143	**PROTEAN Plus Dodeca Cell (220/240 V) and PowerPac Universal Power Supply**, includes #1654151and #1645070
1654145	**PROTEAN Plus Dodeca Cell (220/240 V), Trans-Blot Plus Cell, and PowerPac Universal Power Supply**, includes #1654151, #1703990, and #1645070
1655135	**PROTEAN Plus Dodeca Cell (220/240 V) and Two 6-Row AnyGel Stands**, includes #1654151 and two #1655131
Accessories and Replacement Parts	
1654158	**Recirculation Pump**, 100/120 V
1654159	**Recirculation Pump**, 220/240 V
1654153	**Replacement Tubing Kit**, for tank with stopcock drain port installed at base of tank
1654152	**Replacement Old Tubing Kit**, for tank without stopcock drain port installed at base of tank
1654154	**Replacement Gasket Assembly**
1654155	**Replacement Electrode Card**, anode
1654156	**Replacement Electrode Card**, cathode
1654157	**Replacement Lid**
1654166	**Manifold Tubing**, required for precast gels and PROTEAN II plates, 11 pieces
1654167	**Buffer Exhaust Tubing**
1653320	**Gel Releasers**, 5
1652948	**Replacement Power Cables**, for lid

See Also
Acrylamide gel-casting reagents: page 195.
Buffers: page 193.

Large-Format Electrophoresis Accessories

PROTEAN® Plus Combs and Hinged Spacer Plates

PROTEAN Plus hinged spacer plates are two glass plates joined together by a silicone hinge with integrated spacers bonded onto the long plate to guarantee perfect alignment during casting and eliminate potential current leaks. The differential plate heights facilitate easy IPG strip or tube gel loading. The hinged spacer plate sizes are the same for both gel sizes (20 and 25 cm wide). Combs are available for both 20 and 25 cm wide gel sizes and 1.0, 1.5, or 2.0 mm thick gels.


Hinged Spacer Plates

PROTEAN Plus Multi-Casting Chamber

Use the PROTEAN Plus multi-casting chamber to cast up to 12 gels of 1.0, 1.5, or 2.0 mm thickness simultaneously. The chamber accommodates the PROTEAN Plus hinged spacer plates for both 20 and 25 cm wide gel sizes. Acrylic blocks act as space fillers when fewer than 12 gels are cast, and a leveling bubble ensures level interfaces. Gradient gels are cast through a bottom port using the Model 495 gradient former (below).


PROTEAN Plus Multi-Casting Chamber

Dodeca™ High-Throughput Stainers

Dodeca stainers are available in two sizes: the small size accommodates up to 24 Criterion™ gels while the large size can accommodate up to 12 large-format gels. The stainers ensure consistent results and eliminate gel breakage from excessive handling.


Large Dodeca Stainer

Model 495 Gradient Former

This gradient former allows you to pour linear or convex exponential acrylamide gradients. Its 100–1,500 ml capacity is designed to pour up to 12 gradient slab gels in the PROTEAN Plus multi-casting chamber. The optional exponential piston is required to form convex exponential acrylamide gradients.

PROTEAN® II xi Plate Washer/Holder

The PROTEAN II xi plate washer/holder takes the tedium out of washing glass plates while greatly reducing the potential for plate damage. Each rack holds up to eight PROTEAN II xi plates or 18 Mini-PROTEAN® II plates. The plate washing tank is ideal for soaking plates and for long-term dust-free storage. Hooks suspend the rack above the washing tank for complete plate drainage.


PROTEAN II xi Plate Washer/Holder

AnyGel™ Stands

AnyGel stands provide stabilization and access to virtually any size gel. The clamping mechanism secures gel cassettes vertically without excessive pressure.

Gel Clip

The gel clip facilitates the handling of large-format gels and eliminates gel breakage by minimizing direct hands-on gel manipulation. The gel clip gently but securely clamps along one edge of a gel, distributing the weight evenly so that the gel can be easily lifted without tearing.


Using the gel clip to clamp onto a gel (PROTEAN Plus precast gel shown).

Ordering Information

Catalog #	Description
PROTEAN Plus Combs	
1654176	**2-D Comb with 1 Reference Well**, 20 cm, 1.0 mm
1654177	**2-D Comb with 1 Reference Well**, 20 cm, 1.5 mm
1654178	**2-D Comb with 1 Reference Well**, 20 cm, 2.0 mm
1654179	**2-D Comb with 1 Reference Well**, 25 cm, 1.0 mm
1654180	**2-D Comb with 1 Reference Well**, 25 cm, 1.5 mm
1654181	**2-D Comb with 1 Reference Well**, 25 cm, 2.0 mm
PROTEAN Plus Hinged Spacer Plates	
1654170	**Hinged Spacer Plates**, for 20 x 20.5 cm gels, 1.0 mm, 1 set
1654171	**Hinged Spacer Plates**, for 20 x 20.5 cm gels, 1.5 mm, 1 set
1654172	**Hinged Spacer Plates**, for 20 x 20.5 cm gels, 2.0 mm, 1 set
1654173	**Hinged Spacer Plates**, for 25 x 20.5 cm gels, 1.0 mm, 1 set
1654174	**Hinged Spacer Plates**, for 25 x 20.5 cm gels, 1.5 mm, 1 set
1654175	**Hinged Spacer Plates**, for 25 x 20.5 cm gels, 2.0 mm, 1 set
PROTEAN Plus Multi-Casting Chamber	
1654160	**PROTEAN Plus Multi-Casting Chamber**, includes casting chamber, sealing plate, silicone gasket, tapered luer connector, leveling bubble, 15 separation sheets, 8 acrylic blocks (order glass hinged spacer plates and combs separately)
Accessories for PROTEAN Plus Multi-Casting Chamber	
1654165	**Separation Sheets**, for PROTEAN Plus multi-casting chamber, 15
1654161	**Acrylic Block**, 1.5 mm
1654162	**Acrylic Block**, 3 mm
1654163	**Acrylic Block**, 6 mm
1654164	**Acrylic Block**, 12 mm
1653320	**Gel Releasers**, 5
Gel Clip	
1653414	**Gel Clip**, holds any gel size
Model 495 Gradient Former	
1654121	**Model 495 Gradient Former**, 100–1,500 ml, includes body with valve stem and tubing connection kit
1654123	**Model 495 Gradient Former and PROTEAN Plus Multi-Casting Chamber**, includes #1654121 and #1654160
Accessories for Model 495 Gradient Former	
1652005	**Exponential Piston**, for Model 395 and Model 495 gradient formers
1652008	**Tubing Connection Kit**, includes stopcock, luer taper coupling, tubing (1/8" ID, 3'), Y-connector
PROTEAN II xi Plate Washer/Holder	
1651991*	**PROTEAN II xi Plate Washer System**, includes 2 plate holders, washing tank, lid, 1 bottle of Bio-Rad cleaning concentrate
1651992*	**PROTEAN II xi Plate Holder**
1610722	**Bio-Rad Cleaning Concentrate**, 50x, 1 kg

* Not compatible with Mini-PROTEAN 3 short plates and spacer plates or with PROTEAN Plus hinged spacer plates.

Buffers and Reagents for Protein Electrophoresis

See Also
ReadyPrep 2-D sample preparation kits: page 3.
ReadyStrip IPG strips: page 205.

Premixed Sample Loading Buffers

The concentrated formulas of these buffers allow them to be used with both liquid and lyophilized samples. All premixed sample buffers are tested to ensure quality and consistency.

For More Information
Web: bio-rad.com/proteinreagents

Premixed Sample Loading Buffer Selection Guide

Buffer	Formulation	Applications
Laemmli sample buffer (2x)	62.5 mM Tris-HCl, pH 6.8, 2% SDS, 20% glycerol (w/v), 0.01% bromophenol blue (BPB)	SDS-PAGE
Laemmli sample buffer (4x)	250 mM Tris-HCl, pH 6.8, 4% LDS, 40% glycerol (v/v), 0.02% bromophenol blue (BPB)	SDS-PAGE
Native sample buffer	62.5 mM Tris-HCl, pH 6.8, 40% glycerol (w/v), 0.01% BPB	Native PAGE
Tricine sample buffer	200 mM Tris-HCl, pH 6.8, 2% SDS, 40% glycerol (w/v), 0.04% Coomassie Brilliant Blue G-250	Peptide and small protein SDS-PAGE
IEF sample buffer	50% glycerol (v/v)	IEF
Zymogram sample buffer	62.5 mM Tris-HCl, pH 6.8, 4% SDS, 25% glycerol (w/v), 0.01% BPB	Protease analysis

Ordering Information

Catalog #	Description
Premixed Protein Sample Loading Buffers	
1610737	**2x Laemmli Sample Buffer**, 30 ml
1610747	**4x Laemmli Sample Buffer**, 10 ml
1610738	**Native Sample Buffer**, 30 ml
1610739	**Tricine Sample Buffer**, 30 ml
1610763	**IEF Sample Buffer**, 30 ml
1610764	**Zymogram Sample Buffer**, 30 ml
1610791	**XT Sample Buffer**, 4x, 10 ml

Premixed Running Buffers

Premixed running buffers can be used with handcast or precast gels. Simply dilute with distilled deionized water. For running buffers designed especially for extended shelf life Criterion™ XT precast gels, see page 180.

Electrophoresis Running Buffer Selection Guide

Buffer	1x Formulation	Applications
Protein Electrophoresis		
10x Tris/glycine/SDS	25 mM Tris, 192 mM glycine, 0.1% SDS, pH 8.3	General SDS-PAGE
10x Tris/glycine	25 mM Tris, 192 mM glycine, pH 8.3	Native PAGE
10x Tris/Tricine/SDS	100 mM Tris, 100 mM tricine, 0.1% SDS, pH 8.3	Peptide SDS-PAGE
10x IEF anode buffer	7 mM phosphoric acid	Analytical isoelectric focusing
10x IEF cathode buffer	20 mM lysine, 20 mM arginine	Analytical isoelectric focusing
10x zymogram renaturation buffer	2.5% Triton X-100	Protease analysis; renatures enzymes after electrophoresis
10x zymogram development buffer	50 mM Tris-HCl, pH 7.5, 200 mM NaCl, 5 mM $CaCl_2$, 0.02% Brij 35	Protease analysis; activates enzymes after electrophoresis
Nucleic Acid Electrophoresis		
10x TBE	89 mM Tris, 89 mM boric acid, 2 mM EDTA, pH 8.3	Nucleic acid electrophoresis/sequencing; polyacrylamide or agarose gels
10x TBE extended range	130 mM Tris, 45 mM boric acid, 2.5 mM EDTA	Nucleic acid electrophoresis/sequencing; polyacrylamide or agarose gels; extends the buffer capacity for longer DNA sequencing runs
50x TAE	40 mM Tris, 20 mM acetic acid, 1 mM EDTA, pH 8.0	Nucleic acid electrophoresis; polyacrylamide or agarose gels

Ordering Information

Catalog #	Description	Catalog #	Description
Premixed Protein Running Buffers		**Premixed Nucleic Acid Running Buffers**	
1610732	**10x Tris/Glycine/SDS**, 1 L	1610733	**10x Tris/Boric Acid/EDTA (TBE)**, 1 L
1610772	**10x Tris/Glycine/SDS**, 5 L cube	1610770	**10x Tris/Boric Acid/EDTA (TBE)**, 5 L cube
1610734	**10x Tris/Glycine**, 1 L	1610741	**10x Tris/Boric Acid/EDTA (TBE)**, extended range, 1 L
1610771	**10x Tris/Glycine**, 5 L cube	1610743	**50x Tris/Acetic Acid/EDTA (TAE)**, 1 L
1610744	**10x Tris/Tricine/SDS**, 1 L		
1610761	**10x IEF Anode Buffer**, 250 ml		
1610762	**10x IEF Cathode Buffer**, 250 ml		
1610765	**10x Zymogram Renaturation Buffer**, 125 ml		
1610766	**10x Zymogram Development Buffer**, 125 ml		

See Also

Criterion XT buffers and reagents: page 182.

Premixed Gel-Casting Buffers

Tris-HCl buffers are available to prepare the stacking and resolving portions of native or SDS-PAGE gels using discontinuous buffer systems according to Laemmli (1970) or Ornstein and Davis (1959). Use the 0.5 M Tris-HCl, pH 6.8, buffer for stacking gels and the 1.5 M Tris-HCl, pH 8.8, buffer for resolving gels.

Ordering Information

Catalog #	Description
1610798	**Resolving Gel Buffer**, 1.5 M Tris-HCl, pH 8.8, 1 L
1610799	**Stacking Gel Buffer**, 0.5 M Tris-HCl, pH 6.8, 1 L

See Also

ReadyStrip IPG strips: page 205.
Vertical electrophoresis systems: pages 164–191.
Horizontal electrophoresis systems: pages 244–252.

TGX Stain-Free™ Solutions

See Also
Mini-PROTEAN TGX precast gels: page 168.
Mini-PROTEAN TGX Stain-Free precast gels: page 168.

TGX™ Handcast Acrylamide Solutions

TGX Stain-Free™ FastCast™ Acrylamide Solutions
TGX Stain-Free FastCast acrylamide solutions are ready-to-use solutions for hand casting polyacrylamide gels for SDS-PAGE or PAGE. Stain-free technology eliminates extra steps by confirming electrophoresis results and transfer performance before western blotting, conserving precious samples, and reducing waste. Each kit comes with two resolver and stacker solutions, which are each mixed 1:1 with the appropriate amount of TEMED and APS.

TGX™ FastCast™ Acrylamide Solutions
TGX FastCast acrylamide solutions are ready-to-use solutions for hand casting polyacrylamide gels for SDS-PAGE or PAGE. Each kit comes with two resolver and stacker solutions, which are each mixed 1:1 with the appropriate amount of TEMED and APS.

Advantages of the TGX and TGX Stain-Free FastCast acrylamide kits:

- **Faster casting times** — ability to pour stacker immediately after resolver
- **Long shelf life gels** — gels can be used up to 1 month after casting when stored at 4°C
- **Fast run times** — run times in as little as 20 min

- **Fast blotting times** — efficient protein transfers in as little as 3 min using the Trans-Blot® Turbo™ transfer system
- **Stain-free technology** — for fast imaging or for better, more reliable total protein normalization in western blotting (using Stain-Free FastCast kits and Bio-Rad stain-free enabled imagers)

For More Information
Web: bio-rad.com/tgxfastcast
bio-rad.com/tgxstainfreefastcast

Approximate Number of Gels per Kit

	Mini Gels (~9 x 7 cm)				Midi Gels (~13 x 9 cm)
	1.0 mm MiniPROTEAN® Cassettes	0.75 mm Glass Plates	1.0 mm Glass Plates	1.5 mm Glass Plates	1.0 mm Criterion® Cassettes
Starter Kit	11 gels	19 gels	13 gels	9 gels	6 gels
11 gels	55 gels	95 gels	65 gels	45 gels	30 gels

Ordering Information

Catalog #	Description
1610170	**TGX FastCast Acrylamide Starter Kit**, 7.5%
1610171	**TGX FastCast Acrylamide Kit**, 7.5%
1610172	**TGX FastCast Acrylamide Starter Kit**, 10%
1610173	**TGX FastCast Acrylamide Kit**, 10%
1610174	**TGX FastCast Acrylamide Starter Kit**, 12%
1610175	**TGX FastCast Acrylamide Kit**, 12%
1610180	**TGX Stain-Free FastCast Acrylamide Starter Kit**, 7.5%
1610181	**TGX Stain-Free FastCast Acrylamide Kit**, 7.5%
1610182	**TGX Stain-Free FastCast Acrylamide Starter Kit**, 10%
1610183	**TGX Stain-Free FastCast Acrylamide Kit**, 10%
1610184	**TGX Stain-Free FastCast Acrylamide Starter Kit**, 12%
1610185	**TGX Stain-Free FastCast Acrylamide Kit**, 12%

Gel-Casting Reagents

Acrylamide

- **Acrylamide powders** — acrylamide and bis-acrylamide powders allow adjustment of concentration and acrylamide/bis ratio
- **Premixed acrylamide/bis powders** — premeasured amounts allow stock solutions from 30–50% to be prepared directly in the bottle by adding the indicated amount of water
- **Acrylamide solutions** — ready to use and available in two concentrations (30% and 40%) and in three acrylamide/bis ratios (19:1, 29:1, and 37.5:1)

Pore Size Determination: %T and %C

Polyacrylamide gels are described in terms of two parameters that determine pore size: total monomer concentration (%T) and weight percentage of cross-linker (%C).

$$\%T = \frac{\text{grams acrylamide + grams cross-linker}}{\text{total volume, ml}} \times 100\%$$

$$\%C = \frac{\text{grams cross-linker}}{\text{grams acrylamide + grams cross-linker}} \times 100\%$$

By varying these two parameters, the pore size of the gel can be optimized to give the best separation and resolution for the molecule of interest. For help in determining the best %T and %C for your application, refer to the Precast Gels sections on pages 168 and 177. Examples of migration patterns of proteins on gels of different compositions can be found on page 169 (Mini-PROTEAN® TGX™ precast gels) and 178 (Criterion™ precast gels), or contact Bio-Rad Technical Support.

Acrylamide/Cross-Linker Ratio by Application

Ratio	%C	Common Applications
19:1	5	DNA sequencing
29:1	3.3	Protein separation
37.5:1	2.6	Protein separation

For More Information
Web: bio-rad.com/acrylamide
Request or download bulletins: 1156 and 1866

Ordering Information

Description		
Acrylamide Solutions*	**500 ml**	**2 x 500 ml**
30% acrylamide/bis, 19:1	1610154	1610155
30% acrylamide/bis, 29:1	1610156	1610157
30% acrylamide/bis, 37.5:1	1610158	1610159
40% acrylamide/bis, 19:1	1610144	1610145
40% acrylamide/bis, 29:1	1610146	1610147
40% acrylamide/bis, 37.5:1	1610148	1610149
40% acrylamide	1610140	1610141
2% bis solution	1610142	1610143

Catalog #	Description
Acrylamide Powder	
1610100	**Acrylamide**, 99.9%, 100 g
1610101	**Acrylamide**, 99.9%, 500 g
1610107	**Acrylamide**, 99.9%, 1 kg
1610103	**Acrylamide**, 99.9%, 2 kg
1610108	**Acrylamide**, 99.9%, 5 kg

Premixed Acrylamide/Bis Powders	30 g	150 g
Acrylamide/bis, 19:1	1610120	1610123
Acrylamide/bis, 29:1	1610121	1610124
Acrylamide/bis, 37.5:1	1610122	1610125

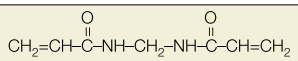
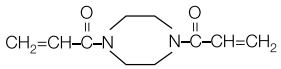
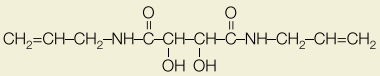
Catalog #	Description
1615100	**SDS-PAGE Reagent Starter Kit**, includes 100 g acrylamide, 5 g bis, 5 ml TEMED, 10 g ammonium persulfate
1632091	**ReadyPrep Proteomics Grade Water**, 500 ml

* Store acrylamide solutions at 4°C. All other reagents should be stored at room temperature, dry, and away from direct sunlight.

Cross-Linkers and Catalysts

Bio-Rad offers standard and alternative cross-linkers for a variety of applications.

Cross-Linker Application Guide

	Formal Name	Chemical Structure	Applications
Bis	N,N'-methylene-bis-acrylamide		General cross-linker in PAGE
PDA	Piperazine diacrylamide		Reduction of silver stain background in SDS-PAGE and 2-D gels, increased resolution, higher gel strength
DATD	N,N'-diallyl-tartardiamide		Increased pore size of IEF gels where molecular sieving is a problem. Used in scintillation counting. 1,2-diol structure is soluble in periodic acid

Ordering Information

Catalog #	Description
Crosslinkers	
1610200	**Bis Crosslinker**, 5 g
1610201	**Bis Crosslinker**, 50 g
1610142	**2% Bis Solution**, 500 ml
1610143	**2% Bis Solution**, 2 x 500 ml
1610202	**PDA Crosslinker**, 10 g
1610620	**DATD Crosslinker**, 25 g
Catalysts	
1610800	**TEMED***, 5 ml (hazardous shipping charges may apply)
1610801	**TEMED**, 50 ml
1610700	**Ammonium Persulfate (APS)***, 10 g
1610501	**Riboflavin-5'-Phosphate***, 10 g

* For longer shelf life, store desiccated at room temperature.

IEP/IEF Agaroses

Standard low –m_r agarose — with high strength, clarity, and low –m_r value, this agarose is recommended for all standard immunoelectrophoresis applications.

Zero –m_r agarose — this agarose is specific for IEF. It has no detectable electroendosmosis and is recommended for IEF of very high MW proteins or complexes that are subject to varying degrees of molecular sieving in polyacrylamide gels. Agarose IEF and post-run processing can be completed more quickly than polyacrylamide gel IEF.

For More Information
Web: bio-rad.com/IEP/IEFAgaroses

Ordering Information

Catalog #	Description
1620100	**Standard Low –m_r Agarose**, 100 g
1620102	**Standard Low –m_r Agarose**, 500 g
1620022	**Zero –m_r Agarose**, 10 g

All reagents should be stored at room temperature, dry, and away from direct sunlight.

Accessory Reagents

Tracking Dyes

Bio-Rad offers two tracking dyes to monitor electrophoresis runs:

- Bromophenol blue for monitoring protein electrophoresis
- Xylene cyanole (FF) for monitoring nucleic acid electrophoresis

Ordering Information

Catalog #	Description
1610404	**Bromophenol Blue**, 10 g
1610423	**Xylene Cyanole FF**, 25 g

All dyes and stains should be stored at room temperature, dry, and away from direct sunlight.

Detergents

SDS is available in a powder form or as 10% and 20% solutions. They are prepared with 18 MΩ water and have no detectable DNase or RNase activity. Also available are Tween 20 for blotting solutions and Triton X-100 and CHAPS for membrane protein solubilization. For simple, accurate pipetting, a solution of 10% Tween 20 is available.

Ordering Information

Catalog #	Description
1610301	**SDS (Sodium Dodecyl Sulfate)**, 100 g
1610302	**SDS (Sodium Dodecyl Sulfate)**, 1 kg
1610416	**SDS Solution**, 10% (w/v), 250 ml
1610418	**SDS Solution**, 20% (w/v), 1 L
1706531	**Tween 20**, EIA grade, 100 ml
1610407	**Triton X-100 Detergent**, 500 ml
1610460	**CHAPS***, 1 g
1610781	**10% Tween 20**, for easy pipetting, 1 L

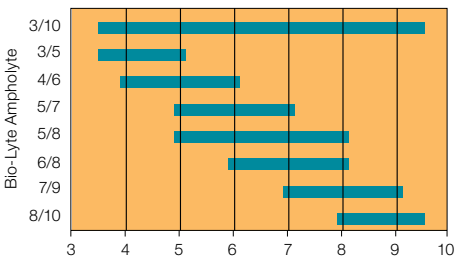
* Store desiccated at 4°C. All other reagents should be stored at room temperature, dry, and away from direct sunlight.

See Also
ReadyPrep 2-D sample preparation kits: page 3.

See Also
ReadyStrip IPG strips: page 205.
PROTEAN i12 IEF system: page 202.

Bio-Lyte® Ampholytes

Bio-Lyte carrier ampholytes, supplied as aqueous solutions, are blended to give a complete range of isoelectric points for linear pH gradients. Bio-Lyte 3/10, 3/5, and 8/10 ampholytes extend from approximately pH 3.5–9.5 units on the acidic and basic ends. All other ranges are within 0.1–0.2 pH units of their specified range. Bio-Lyte ampholytes are also used as IPG buffers. For ready-to-use ampholytes, see ReadyStrip™ IEF buffers (page 206).



pH range of each Bio-Lyte ampholyte.

Ordering Information

Catalog #	Description	Catalog #	Description
1631112	**Bio-Lyte 3/10 Ampholyte**, 40%, 10 ml	1631192	**Bio-Lyte Ampholyte**, 40%, 10 ml
1631113	**Bio-Lyte 3/10 Ampholyte**, 40%, 25 ml	1631193	**Bio-Lyte 5/8 Ampholyte**, 40%, 25 ml
1631132	**Bio-Lyte 3/5 Ampholyte**, 20%, 10 ml	1631162	**Bio-Lyte 6/8 Ampholyte**, 40%, 10 ml
1631142	**Bio-Lyte 4/6 Ampholyte**, 40%, 10 ml	1631163	**Bio-Lyte 6/8 Ampholyte**, 40%, 25 ml
1631143	**Bio-Lyte 4/6 Ampholyte**, 40%, 25 ml	1631172	**Bio-Lyte 7/9 Ampholyte**, 40%, 10 ml
1631152	**Bio-Lyte 5/7 Ampholyte**, 40%, 10 ml	1631182	**Bio-Lyte 8/10 Ampholyte**, 20%, 10 ml
1631153	**Bio-Lyte 5/7 Ampholyte**, 40%, 25 ml		

Cleaning Concentrate

Bio-Rad's cleaning concentrate is a moderately alkaline detergent that cleans by solubilization and emulsification. It is ideal for cleaning glass plates and other laboratory equipment and is harmless to skin and clothing.

Ordering Information

Catalog #	Description
1610722	**Bio-Rad Cleaning Concentrate**, 50x, 1 kg

See Also
Gel drying systems: page 218.

Gel Drying Solution

Bio-Rad's gel drying solution is a pretreatment for polyacrylamide gels that helps prevent gels from cracking during air or vacuum drying. Just 10 minutes of equilibration in the solution before drying prevents excessive gel swelling and cracking.

Ordering Information

Catalog #	Description
1610752	**Gel Drying Solution**, 1 L

Protein Stains

Bio-Rad offers visible and fluorescent gel stains to accommodate your needs for sensitivity, linearity, and mass spectrometry compatibility.

Gel Stain Selection Guide

Stain	Staining per Band	Time	Comments
Coomassie Stains			
QC Colloidal Coomassie	3.0 ng	1–20 hr	Colloidal endpoint stain; nonhazardous formulation
Bio-Safe™ Coomassie G-250	8.0–28.0 ng	1–2.5 hr	Nonhazardous staining in aqueous solution; premixed; mass spectrometry compatible
Coomassie Brilliant Blue R-250	36.0–47.0 ng	2.5 hr	Simple and consistent; mass spectrometry compatible
Silver Stains			
Silver Stain Plus™ kit (Gottlieb and Chavko 1987)	0.6–1.2 ng	1.5 hr	Simple and robust; mass spectrometry compatible
Silver stain (Merril et al. 1981)	0.6–1.2 ng	2 hr	Stains glycoproteins, lipoproteins, lipopolysaccharides, nucleic acids
Fluorescent Stains			
Oriole™ fluorescent gel stain	0.5–1.0 ng	1.5 hr	Rapid fluorescent gel stain; no destaining; mass spectrometry compatible; compatible only with UV excitation
Flamingo™ fluorescent gel stain	0.25–0.5 ng	5 hr	High sensitivity; broad dynamic range; no destaining; simple; mass spectrometry compatible; excellent for LED and laser-based scanners
SYPRO Ruby protein gel stain	1.0–10.0 ng	3 hr	Fluorescent protein stain; simple, robust protocol; broad dynamic range; mass spectrometry compatible
Nucleic Acid Stains			
Ethidium bromide	50.0 ng	1 hr	Classic fluorescent DNA stain

Coomassie Stains

QC Colloidal Coomassie Stain

The QC colloidal Coomassie stain provides sensitivity down to ~3 ng BSA, low background endpoint staining, and the level of reproducibility needed to meet regulatory standards. Additionally, it is formulated to be ready to use and environmentally friendly. Features include:

- Low background, high sensitivity, superior reproducibility
- Environmentally friendly formulation — no addition of methanol or acetic acid required; eliminates the need for hazardous waste disposal
- Flexible staining and destaining times — from 1 hr to overnight
- No alcohol addition or dilution steps necessary when staining polyacrylamide gels
- One-part, ready-to-use colloidal Coomassie stain

For More Information
Web: bio-rad.com/coomassie
Request or download bulletin: 6385

Coomassie Brilliant Blue R-250 Staining and Destaining Solutions

Coomassie Brilliant Blue R-250 staining solution is the fastest and easiest way to stain Criterion™ or other polyacrylamide protein gels using Coomassie stain. Coomassie R-250 staining and destaining solutions are ready to use.

QC Colloidal Coomassie Stain

Bio-Safe Coomassie Stain

Bio-Safe™ Coomassie Stain

Bio-Safe Coomassie Brilliant Blue G-250 stain is a premixed, ready-to-use, nonhazardous solution that does not require the use of methanol and acetic acid for destaining. Bio-Safe Coomassie stain produces blue bands on a clear background and is fast, simple, sensitive, and convenient. Advantages include:

- Staining in aqueous solution — no special handling or fume hood requirements
- Visibility of bands while gel is in the stain
- No solvent waste problems or disposal costs

For More Information
Web: bio-rad.com/coomassie
Request or download bulletin: 2423

See Also

Precast polyacrylamide gels: pages 168, 177.

Imaging systems: page 280.

Ordering Information

Catalog #	Description
QC Colloidal Coomassie Stain	
1610803	**QC Colloidal Coomassie Stain**, 1 L
Bio-Safe Coomassie Stain	
1610786	**Bio-Safe Coomassie Stain**, 1 L
1610787	**Bio-Safe Coomassie Stain**, 5 L
Coomassie Brilliant Blue R-250 Staining and Destaining Solutions	
1610435	**Coomassie Brilliant Blue R-250 Staining Solutions Kit**, includes 1 L Coomassie Brilliant Blue R-250 staining solution, 2 x 1 L Coomassie Brilliant Blue R-250 destaining solution
1610436	**Coomassie Brilliant Blue R-250 Staining Solution**, 1 L
1610437	**Coomassie Brilliant Blue R-250 Staining Solution**, 4 x 1 L
1610438	**Coomassie Brilliant Blue R-250 Destaining Solution**, 1 L
1610439	**Coomassie Brilliant Blue R-250 Destaining Solution**, 4 x 1 L
Coomassie Stain Powders	
1610400	**Coomassie Brilliant Blue R-250**, 10 g
1610406	**Coomassie Brilliant Blue G-250**, 10 g

Silver Stains

Silver Stain Plus™ Kit

Silver Stain Plus kit provides the most sensitive and easiest to use silver stain. It is derived from the method developed by Gottlieb and Chavko (1987) for detection of native and denatured eukaryotic DNA in agarose gels. The chemistry has been modified so that it is ideal for both proteins and nucleic acids in polyacrylamide and agarose gels.

The Silver Stain Plus kit:

- Detects nanogram quantities of protein and DNA
- Eliminates background by preventing silver precipitation in the gel matrix
- Does not require destaining
- Stains 13 full-size gels or 40 mini gels

Bio-Rad Silver Stain Kit

Bio-Rad's original silver stain kit, derived from the method of Merril et al. (1981), is ideal for staining polysaccharides and highly glycosylated proteins that are difficult to stain with the Silver Stain Plus kit. This kit will stain 24 full-size gels or 48 mini gels in 2 hours. The lowest sensitivity is 0.25–0.5 ng.

For More Information
Web: bio-rad.com/silverstain
Request or download bulletin: 1089

Specifications

	Silver Stain Plus	Silver Stain
Time	1.5 hr	2 hr
Number of Gels	40 mini gels	48 mini gels
Shelf Life	1 yr	1 yr
Storage	4°C	Ambient
Lowest Sensitivity	0.6–1.2 ng	0.6–1.2 ng

Ordering Information

Catalog #	Description
Silver Stain Plus Kit	
1610449	**Silver Stain Plus Kit**, includes fixative enhancer concentrate, silver complex solution, reduction moderator solution, image development reagent, development accelerator reagent, stains 13 full size or 40 mini gels
1610448	**Development Accelerator Reagent**, 50 g
1610461	**Fixative Enhancer Concentrate***, 1 L
1610462	**Silver Complex Solution***, 100 ml
1610463	**Reduction Moderator Solution***, 100 ml
1610464	**Image Development Reagent***, 100 ml

* Hazardous shipping charges may apply.

Ordering Information

Catalog #	Description
Bio-Rad Silver Stain Kit*,**	
1610443	**Silver Stain Kit**, includes oxidizer concentrate, silver reagent concentrate, silver stain developer, stains 20 full-size or 48 mini gels
1610450	**Silver Stain Developer**, 115 g
1610447	**Silver Stain Developer**, 4 x 115 g
1610444	**Oxidizer Concentrate**, 480 ml
1610445	**Silver Reagent Concentrate**, 480 ml

* Hazardous shipping charges may apply.

** The Bio-Rad silver stain kit and components should be stored at 4°C.

Fluorescent Stains

Oriole™ Fluorescent Gel Stain

Oriole stain is a an easy-to-use, fast, and sensitive fluorescent protein gel stain.

- One-step protocol, no fixing or destaining required, full sensitivity achieved in 90 min
- Full compatibility with downstream proteolysis and mass spectrometric analysis
- Nanogram sensitivity and low background
- Compatible with UV excitation imagers such as the Gel Doc™ EZ and ChemiDoc™ MP imaging systems

Flamingo™ Fluorescent Gel Stain

This easy-to-use, economical gel stain is for use with the ChemiDoc MP system and a variety of fluorescence imaging systems.

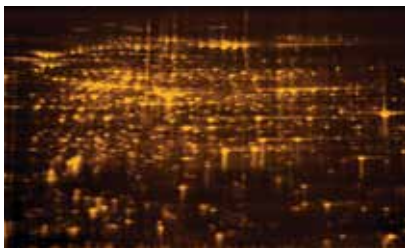
- Two-step protocol that can be completed in as little as 5 hr
- Compatible with mass spectrometry
- Wide dynamic range and highly linear response (3 orders of magnitude)
- Less than 1 ng protein can be detected

SYPRO Ruby Protein Gel Stain

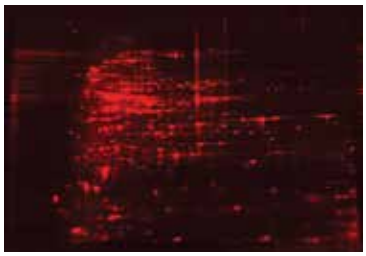
SYPRO Ruby protein gel stain is compatible with mass spectrometry and Edman-based sequencing applications.

- Detection of glycoproteins, lipoproteins, and metalloproteins
- No detection of extraneous nucleic acids in the sample
- Suitable for IEF gels

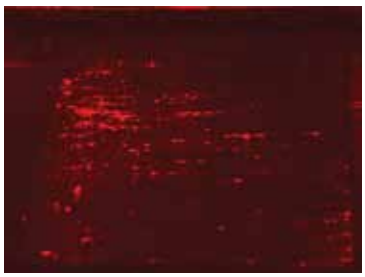
For More Information
Web: bio-rad.com/fluorescentstain
Request or download bulletins: Flamingo - 5346, 5705, 5754
Download bulletins: Oriole - 5900, 5921, 5991



2-D gel stained with Oriole stain. *E. coli* protein (40 µg) was run on an 11 cm pH 5–8 ReadyStrip™ IPG strip for the first dimension and a Tris-HCl 8–16% Criterion™ gel for the second dimension.



Flamingo fluorescent gel stain. *E. coli* protein sample (10 µg).



SYPRO Ruby protein gel stain. *E. coli* protein sample (10 µg).

See Also

Imaging systems: page 280.
Precast polyacrylamide gels: pages 168, 177.
2-D electrophoresis: pages 151, 202.

Ordering Information

Catalog #	Description
Oriole Fluorescent Gel Stain	
1610495	**Oriole Fluorescent Gel Stain**, 1x solution, 200 ml
1610496	**Oriole Fluorescent Gel Stain**, 1x solution, 1 L
1610497	**Oriole Fluorescent Gel Stain**, 1x solution, 5 L
Flamingo Fluorescent Gel Stain	
1610490	**Flamingo Fluorescent Gel Stain**, 10x solution, 20 ml
1610491	**Flamingo Fluorescent Gel Stain**, 10x solution, 100 ml
1610492	**Flamingo Fluorescent Gel Stain**, 10x solution, 500 ml
SYPRO Ruby Protein Gel Stain	
1703126	**SYPRO Ruby Protein Gel Stain**, 1x solution, 200 ml
1703125	**SYPRO Ruby Protein Gel Stain**, 1x solution, 1 L
1703138	**SYPRO Ruby Protein Gel Stain**, 1x solution, 5 L

2-D Electrophoresis

IEF is primarily used as the first dimension of separation in 2-D analysis; 2-D electrophoresis is used to separate complex protein samples based on pI and MW. IEF separations can be performed using two techniques: either with an IPG strip with ampholytes covalently bound to the gel or with carrier ampholytes that move through the gel to generate a pH gradient. Bio-Rad offers products for both techniques. Bio-Rad's first-dimension products are compatible with second-dimension SDS-PAGE systems in mini, midi, and large formats. For more information, see page 151.
For preparative IEF products see page 213.

Learn More about the Technology
Web: bio-rad.com/tech/2delectro

For More Information
Web: bio-rad.com/2dworkflow

See Also
ReadyStrip IPG strips: page 205.
Protein sample preparation products: page 2.
Vertical electrophoresis systems: pages 164–191.

PROTEAN® i12™ IEF System

The PROTEAN i12 IEF system offers individual lane control — a novel feature that allows multiple lanes to be run simultaneously, each with a different sample, pH gradient, and protocol, resulting in time savings and improved reliability. The flexible system works with ReadyStrip™ IPG strips to provide many separation range options. The PROTEAN i12 IEF system provides a unique solution for first-dimension separations with the following features:

Individual Lane Control

- Optimize experiments in fewer runs
- Run multiple experiments at once
- Obtain better quality data with less experimental risk — one irregular sample cannot compromise the entire run

PROTEAN i12 IEF system touch screen user interface.

Touch Screen User Interface

- Easily run programs and edit and create protocols

Flexible Electrode and Tray Design

- Run IPG strips gel-side down or gel-side up or load sample with cups, all within the same tray
- Durable polycarbonate trays supply sufficient heat transfer for accurate and reproducible pI determination

PROTEAN i12 IEF system components:

1. PROTEAN i12 IEF cell.
2. Focusing trays with strip retainers.
3. Cleaning brushes.
4. Pair of electrodes.
5. ReadyStrip IPG Strips.
6. Leveling bubble.
7. Forceps.
8. Styluses.
9. USB flash drives.
10. Electrode wicks.
11. Rehydration trays.
12. ReadyPrep™ 2-D starter kit, rehydration/sample buffer.
13. Cleaning concentrate.
14. Mineral oil.

Web Application

- Export focusing data via USB port to an Excel spreadsheet or upload to the PROTEAN i12 Reporter (**i12reporter.com**), a free Web-based application that easily graphs data, compares lanes, and creates reports

For More Information
Web: bio-rad.com/proteani12
Request or download bulletins: 2651, 6097, 6138, 6139, and 6140

PROTEAN i12 IEF System Specifications

Input power	100–240 VAC, 50/60 Hz	Available focusing tray lengths	7, 11, 13, 17, 18, 24 cm
Voltage per lane	0, 50–10,000 V, 1 V increments	Focusing tray capacity	1–12 IPG strips per tray
Current per lane	0–100 µA, 1 µA intervals	Dimensions (W x D x H)	46 x 34.5 x 18.5 cm
Power per lane	0–1 W	Weight	8.6 kg (19 lbs)
Peltier platform temperature	10–25°C	Display	QVGA resolution (320 x 240) touch screen or mouse control

PROTEAN i12 IEF System Accessories

Accessories for the PROTEAN i12 system can also be purchased individually. Six sizes of focusing and rehydration/equilibration trays are available as well as replacement electrodes, cleaning supplies, and other system-related items.

Cup loading is an option for improving your 2-D results, especially for proteins with extreme pIs. The PROTEAN i12 sample cup holder can be used with all of the PROTEAN i12 focusing trays. It effortlessly clips onto the tray and forms a secure seal that prevents leaking but won't damage the IPG strip. The disposable sample cups prevent sample contamination.

For More Information
Web: bio-rad.com/proteani12
Request or download bulletins: 2651, 6097, 6138, 6139, and 6140

Ordering Information

Catalog #	Description
1646000	**PROTEAN i12 IEF System**, includes basic unit, 90–240 VAC positive and negative electrode assemblies, 7, 11, and 17 cm focusing trays, 1 pack each of 7, 11, and 17 cm rehydration/equilibration trays, 2 pairs of forceps, 2 packs of electrode wicks for gel-side down and gel-side up applications, mineral oil, 2 cleaning brushes, cleaning concentrate, 2 USB flash drives, 3 styluses, pH 3–10 ReadyStrip IPG strips (7, 11, and 17 cm lengths), rehydration/sample buffer, leveling bubble, and instruction manual. All 13, 18, and 24 cm trays and cup loading accessories can be purchased separately
1646001	**PROTEAN i12 IEF Cell**, includes PROTEAN i12 IEF cell, 90–240 VAC basic unit, positive and negative electrode assemblies, and 3 styluses. Focusing trays and other accessories sold separately
PROTEAN i12 IEF System Accessories	
1646107	**i12 7 cm Focusing Tray**, includes 2 IPG strip retainers
1646111	**i12 11 cm Focusing Tray**, includes 2 IPG strip retainers
1646113	**i12 13 cm Focusing Tray**, includes 2 IPG strip retainers
1646117	**i12 17 cm Focusing Tray**, includes 2 IPG strip retainers
1646118	**i12 18 cm Focusing Tray**, includes 2 IPG strip retainers
1646124	**i12 24 cm Focusing Tray**, includes 2 IPG strip retainers
1654035	**i12 7 cm Rehydration/Equilibration Tray**, includes lids, 25
1654025	**i12 11 cm Rehydration/Equilibration Tray**, includes lids, 25
1646313	**i12 13 cm Rehydration/Equilibration Tray**, includes lids, 25
1654015	**i12 17 cm Rehydration/Equilibration Tray**, includes lids, 25
1654041	**i12 18 cm Rehydration/Equilibration Tray**, includes lids, 25
1654043	**i12 24 cm Rehydration/Equilibration Tray**, includes lids, 25
1646040	**IPG Strip Retainers**, 2
1646020	**i12 Sample Cup Holder**, includes 25 sample cups
1646021	**i12 Sample Cups**, 25
1646030	**Gel-Side Up Electrode Wicks**, 100

continues

Ordering Information

Catalog #	Description
PROTEAN i12 IEF System Accessories (cont.)	
1646031	**Gel-Side Down Electrode Wicks**, 500
1646012	**Negative Electrode Assembly**
1646011	**Positive Electrode Assembly**
1646010	**Electrode Assembly Pair**, includes 1 positive and 1 negative electrode assembly
1654072	**Cleaning Brushes**, 2
1610722	**Cleaning Concentrate**, 1 L
1646060	**USB Flash Drive**, 2
1646050	**Stylus**, 3
1632129	**Mineral Oil**, 500 ml
1654070	**Forceps**, 1

PROTEAN® IEF Accessories

Accessories for the discontinued PROTEAN IEF cell (#1654000 and #1654001) are still available and include focusing trays, electrode wicks, cup loading accessories, and thermal printers. Rehydration/equilibration trays, cleaning supplies, forceps, and reagents are interchangeable with the PROTEAN i12 IEF system (see pages 203–204 for part numbers).

Thermal Printer for the PROTEAN IEF System

Focusing Trays

- Focusing trays hold 1–12 ReadyStrip™ IPG strips for flexibility and streamlined handling
- Platinum electrode is physically embedded into the running tray to ensure the integrity of each well and sample
- Durable polycarbonate trays ensure sufficient heat transfer for accurate and reproducible pI determination
- Numbered channels aid in strip identification and sample tracking

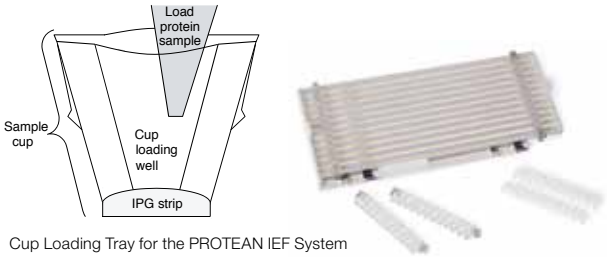
Focusing Tray for the PROTEAN IEF System

Tray Specifications

	IPG Strip Length				
	7 cm	**11 cm**	**17 cm**	**18 cm**	**24 cm**
Focusing Trays					
Electrode distance	6.5 cm	10.2 cm	16.2 cm	17.1 cm	22.7 cm
Total strip length accommodated	8.2 cm	12.1 cm	18.1 cm	20.1 cm	25.3 cm
ReadyStrip IPG strip length	7.9 cm	11.8 cm	17.8 cm	19.0 cm	24.7 cm
Rehydration/Equilibration Trays					
Total strip length accommodated	8.0 cm	12.7 cm	18.6 cm	20.4 cm	25.3 cm
Maximum volume	6.8 ml	9.6 ml	14.2 ml	16.0 ml	19.0 ml

Cup Loading Tray for the PROTEAN IEF System

Cup loading expands the versatility and range of applications for first-dimension IEF using the PROTEAN IEF cell. This loading method can improve focusing results, especially for proteins with pIs in the extreme pH ranges. Load up to 150 µl of sample with easy-to-use disposable sample cups. Moveable electrodes provide the flexibility to run IPG strips from 7 to 24 cm in length.



Cup Loading Tray for the PROTEAN IEF System

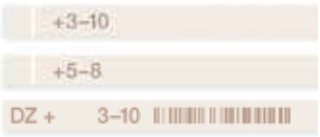
Ordering Information

Catalog #	Description
Trays	
1654030	**7 cm Focusing Tray with Lid**
1654020	**11 cm Focusing Tray with Lid**
1654010	**17 cm Focusing Tray with Lid**
1654040	**18 cm Focusing Tray with Lid**
1654042	**24 cm Focusing Tray with Lid**
Cup Loading Tray*	
1654050	**Cup Loading Tray**, includes 1 tray base, 1 pair movable electrodes, 1 pack each of large and small replacement cups
1654055	**Cup Loading Tray with Forceps**
Accessories	
1654071	**Electrode Wicks**, precut, 500
1654080	**Thermal Printer**, 100 V, includes cable and power adaptor
1702412	**Thermal Printer Paper**, 10 rolls
1654051	**Large Replacement Cups**, 150 µl, 120
1654052	**Small Replacement Cups**, 100 µl, 120
1654053	**Replacement Movable Electrodes**, 1 pair
1654054	**Replacement Cup Loading Tray Base**

* The cup loading tray is not intended or designed for active or passive rehydration of IPG strips. Use the appropriate rehydration/equilibration tray that matches your IPG strip's length.

ReadyStrip™ IPG Strips

ReadyStrip IPG strips are available in five different strip lengths and in a wide selection of pH gradients, with 1, 3, or 7 pH units per strip. Shorter strips are useful for method development, while longer strips provide the best separation possible with higher protein loads. ReadyStrip IPG strips are thoroughly tested for quality and performance to deliver 2-D gel-to-gel reproducibility.



ReadyStrip IPG strips are preprinted to indicate anode end (+) and pH range; in addition, a barcode is printed on the 24 cm strip.

Design Features

- Stringent gel length tolerances of ±2 mm
- Anode and pH range clearly printed on each strip, with barcoding on 24 cm strips
- Consistent backing lengths for self-centering on 2-D gels

Gradient Selection

- Standard broad range pH gradients for maximum separation on a single gel
- Narrow range gradients for greater resolution (more cm of gel per pH unit)
- Comprehensive offering that increases resolving power in the first dimension with overlapping pH ranges

Relative Focusing Power

The 7 cm pH 3–10 strip is arbitrarily assigned a baseline focusing power of 1.0 in order to calculate the relative focusing power of the other strips.

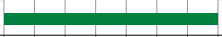
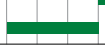
- **Strips with the same pH range but different lengths** — calculate the ratio of the strip lengths. Compared to a 7 cm strip, an 11 cm strip has a relative focusing power of 11/7 cm = 1.6
- **Strips with the same length but different pH range** — calculate the ratio of the pH ranges. Compared to a pH 3–10 strip (7 pH units), a pH 5–8 strip (3 pH units) has a relative focusing power of 7/3 = 2.3

For More Information
Web: bio-rad.com/readystripIPG
Request or download bulletin: 2442

See Also

PROTEAN i12 IEF system: page 202.
ReadyPrep 2-D starter kit: page 207.

Relative Focusing Power of IPG Strips

Strip Range*	pH 3 4 5 6 7 8 9 10	Relative Focusing Power 7 cm	11 cm	17 cm	18 cm	24 cm	ReadyStrip IEF Buffer 3–10	7–10
Broad Range								
3–10		1x	1.6x	2.4x	2.6x	3.4x	•	
3–10 nonlinear (NL)		1x	1.6x	2.4x	2.6x	3.4x	•	
Narrow Range								
3–6		2.3x	3.7x	5.7x	6.0x	8.0x	•	
5–8		2.3x	3.7x	5.7x	6.0x	8.0x	•	
7–10		2.3x	3.7x	5.7x	6.0x	8.0x		•
4–7		2.3x	3.7x	5.7x	6.0x	8.0x	•	

* Strips are designed with sufficient overlap to allow spot matching while limiting the extent of redundant data.

Ordering Information

pH Range	7 cm	11 cm	17 cm	18 cm	24 cm
ReadyStrip IPG Strips, 12 per Package					
pH 3–10	1632000	1632014	1632007	1632032	1632042
pH 3–10 NL*	1632002	1632016	1632009	1632033	1632043
pH 3–6	1632003	1632017	1632010	1632035	1632045
pH 4–7	1632001	1632015	1632008	1632034	1632044
pH 5–8	1632004	1632018	1632011	1632036	1632046
pH 7–10	1632005	1632019	1632012	1632037	1632047

ReadyStrip IEF Buffers and Accessories**

1632094 **Bio-Lyte 3/10 Ampholyte**, 100x, 1 ml
1632093 **ReadyStrip 100x 7–10 Buffer**, includes only ampholytes, 1 ml
1632099 **ReadyStrip Instruction Manual**, free upon request with ReadyStrip purchases

* NL, nonlinear gradient.

** Dilute ReadyStrip buffers to 1x in each sample to obtain a final concentration of 0.2% ampholyte.

ReadyPrep™ Reagents for First-Dimension IEF

ReadyPrep reagents ensure success with first- and second-dimension separations. The 2-D starter kit is the ideal tool for learning to use the PROTEAN i12 IEF system and for perfecting technique. Premixed buffers and individual reagents are available for each step of the 2-D process. For preparation of protein samples for 2-D electrophoresis, see page 3.

ReadyPrep™ 2-D Starter Kit

The ReadyPrep 2-D starter kit is intended for first-time users of the PROTEAN i12 IEF cell and ReadyStrip IPG strips. The kit contains tested premixed reagents required for first and second dimension separations, a reference manual with technical tips, and a known protein sample. The ReadyPrep 2-D starter kit includes all reagents needed to:

- Prepare an *E. coli* protein sample
- Rehydrate IPG strips with sample
- Equilibrate IPG strips for SDS-PAGE
- Overlay IPG strips with agarose on SDS-PAGE gels

This kit contains enough material to complete either six 17 cm IPG strips, ten 11 cm strips, or sixteen 7 cm IPG strips.

For More Information
Web: bio-rad.com/readyprep2d

2-D Starter Kit Contents

	Vials/Kit
E. coli protein sample, 2.7 mg	1
ReadyPrep 2-D starter kit rehydration/sample buffer, 10 ml	1
ReadyPrep equilibration buffer I, 20 ml	2
ReadyPrep equilibration buffer II, 20 ml	2
30% glycerol solution, 70 ml	1
ReadyPrep overlay agarose, 50 ml	1
Iodoacetamide, 0.5 g	2
Nanopure water, 15 ml	1

Ordering Information

Catalog #	Description
1632105	**ReadyPrep 2-D Starter Kit**, includes *E. coli* protein sample and reagents sufficient to rehydrate, focus, and transfer to second-dimension gels, ReadyStrip IPG strips, precast SDS-PAGE gels, and gel stains not included
1632110	***E. coli* Protein Sample**, lyophilized, 2.7 mg

See Also

ReadyStrip IPG strips and IEF buffers: pages 205–206.
PROTEAN i12 IEF system: page 202.
Criterion system: page 175.

See Also
Protein sample preparation products: page 2.
ReadyPrep reduction-alkylation kit: page 4.

2-D Premixed Buffers and Individual Reagents

Streamline 2-D experiments and reduce variables with Bio-Rad's convenient premixed buffers and protein sample, tested for consistent 2-D performance with IPG strips:

- **ReadyPrep™ 2-D starter kit rehydration/sample buffer** — a standard formulation appropriate for many protein samples
- **ReadyPrep 2-D starter kit equilibration buffer I** — premixed with DTT for the first equilibration step in the DTT/iodoacetamide alkylation method
- **ReadyPrep 2-D starter kit equilibration buffer II** — add iodoacetamide and use for the second equilibration step in the DTT/iodoacetamide alkylation method; this buffer can also be used for single-step alkylation by adding TBP and acrylamide
- ***E. coli* protein sample** — this complex protein sample is performance tested to give a consistent pattern when used with ReadyPrep 2-D starter kit rehydration/sample buffer; use this sample as a control to validate your 2-D system and protocol before running more difficult experimental samples

Reducing and Alkylating Agents

Either DTT or TBP can be used for IEF and during equilibration prior to SDS-PAGE. Alkylation with iodoacetamide is the standard method to prevent reoxidation during second-dimension SDS-PAGE. Reduction and alkylation can also occur at the sample preparation stage. See the ReadyPrep reduction-alkylation kit, page 4.

Overlay Agaroses

Bromophenol blue tracking dye is incorporated into this solution to allow monitoring of electrophoresis runs. Use ReadyPrep overlay agarose, a low melting point agarose, to secure IPG strips in place for most applications. For second-dimension runs in the PROTEAN® Plus cell, in which the IPG strip is oriented perpendicular to the laboratory bench, firmer PROTEAN Plus overlay agarose is recommended to secure the IPG strip.

Individual Reagents and Detergent

Urea and Tris as well as CHAPS detergent are available.

For More Information
Web: bio-rad.com/2dreagents

Ordering Information

Catalog #	Description
1632106	**ReadyPrep 2-D Starter Kit Rehydration/Sample Buffer**, 10 ml, 8 M urea, 2% CHAPS, 50 mM DTT, 0.2% Bio-Lyte 3/10 ampholyte, 0.001% bromophenol blue
1632107	**ReadyPrep 2-D Starter Kit Equilibration Buffer I**, with DTT, 10 ml, 375 mM Tris-HCl, pH 8.8, 6 M urea, 2% SDS, 2% DTT
1632108	**ReadyPrep 2-D Starter Kit Equilibration Buffer II**, without DTT or iodoacetamide, 20 ml, 375 mM Tris-HCl, pH 8.8, 6 M urea, 2% SDS
1632091	**ReadyPrep Proteomics Grade Water**, 500 ml
1610610	**Dithiothreitol (DTT)**, 1 g
1610611	**Dithiothreitol (DTT)**, 5 g
1632101	**Tributylphosphine (TBP)**, 200 mM, 0.6 ml
1632109	**Iodoacetamide**, 30 g
1610731	**Urea**, 1 kg
1610719	**Tris**, 1 kg
Control Sample	
1632110	***E. coli* Protein Sample**, lyophilized, 2.7 mg
Overlay Agaroses	
1632111	**ReadyPrep Proteomics Grade Overlay Agarose**, 50 ml, 0.5% low melting point agarose in 1x Tris/glycine/SDS and 0.003% bromophenol blue
1632092	**PROTEAN Plus Proteomics Grade Overlay Agarose**, 125 ml, 0.75% agarose in 1x Tris/glycine/SDS and 0.003% bromophenol blue
Detergent for IEF	
1610460	**CHAPS**, 1 g

Tube Gel IEF 2-D Systems

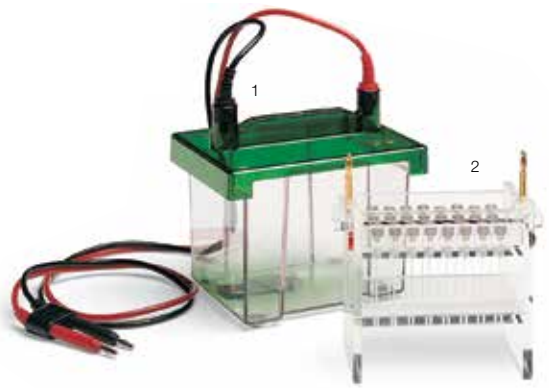
Bio-Rad offers several options for first-dimension tube gel separations using ampholytes.

Mini-PROTEAN® 2-D Electrophoresis Cell

The Mini-PROTEAN tube cell module transforms the Mini-PROTEAN 3 cell into a miniature 2-D electrophoresis cell. The Mini-PROTEAN 2-D electrophoresis cell runs both tube gel IEF and vertical electrophoresis applications. First-dimension IEF typically takes 3.5 hours, and second-dimension SDS-PAGE takes 45 minutes. The entire 2-D procedure, including silver staining, can be completed in less than a day.

- Up to 16 tube gels can be cast in the glass tubes, then attached to molded sample reservoirs for the IEF run
- Following first-dimension IEF, the gels are easily removed using the mini 2-D tube gel ejector and are ready to slide between the plates of the slab gel for the second-dimension run
- The cell is IEC 1010 safety certified

For More Information
Web: bio-rad.com/tubegelIEF



Mini-PROTEAN 2-D electrophoresis cell components:
1. Buffer tank and lid with cables.
2. Tube cell module.

Ordering Information

Catalog #	Description
1652960	**Mini-PROTEAN 2-D Cell**, includes tube adaptor, 16 sample reservoirs and stoppers, 50 sample reservoir/capillary tube connectors, 200 capillary tubes with casting tube, tube gel ejector, Mini-PROTEAN II slab cell with electrode assembly and gaskets, lower buffer chamber, lid with cables, 10 sets of glass plates, 2 clamp assemblies, two 2-D combs with 1 standard well, four 1.0 mm thick spacers, casting stand with gaskets, leveling bubble
1652961	**Mini-PROTEAN Tube Cell**, includes tube adaptor, 16 sample reservoirs and stoppers, 50 sample reservoir/capillary tube connectors, 200 capillary tubes with casting tube, lower buffer chamber, lid with cables, tube gel ejector
1652965*	**Mini-PROTEAN Tube Cell Module**, same as #1652961, without lower buffer chamber and lid
Accessories	
1652966	**Capillary Tubes with Casting Tube**, 200
1652967	**Mini 2-D Tube Gel Ejector**
1652968	**Mini-PROTEAN Tube Gel Sample Reservoirs**, 8
1652969	**Mini-PROTEAN Tube Module Stoppers**, 8
1652970	**Mini-PROTEAN Tube Module Tube Connectors**, 50
1645056**	**PowerPac HV Power Supply**, 100–120/220–240 V

* The Mini-PROTEAN tube cell module may be used with the tank and lid of the Mini Trans-Blot cells of older Mini-PROTEAN II or Mini-PROTEAN 3 systems; the tube cell module is not compatible with the Mini-PROTEAN Tetra system. The Mini-PROTEAN tube cell (for casting tube gels and performing first-dimension IEF) and the tube cell module (for casting tube gels) are also available separately.

** Recommended for use with the Mini-PROTEAN 2-D electrophoresis cell.

See Also

AnyGel stands: page 173.
PowerPac HV and PowerPac Universal power supplies: page 155.
Acrylamide gel-casting reagents: page 195.

See Also

PowerPac HV and PowerPac Universal power supplies: page 155.

Acrylamide gel-casting reagents: page 195.

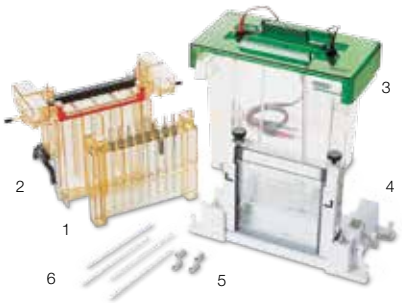
PROTEAN II second-dimension systems: page 184.

PROTEAN® II xi 2-D Tube Gel Cell

The PROTEAN II xi 2-D cell provides all the components required for 2-D electrophoresis using polyacrylamide tube gels. The PROTEAN II xi 2-D cell:

- Runs both tube gels for first-dimension IEF and slab gels for second-dimension SDS-PAGE in the same cell
- Can focus up to 16 first-dimension IEF tube gels in a single run using the tube gel adaptors
- Can run up to four* 16 x 16 cm or 16 x 20 cm slab gels (use the 20 cm length for greater resolution)
- Makes it easy to position tube gels on the slab gel without an agarose overlay due to the beveled plates and the accessibility of the slab gel surface

For More Information
Web: bio-rad.com/tubegelIEF



PROTEAN II xi 2-D cell components:
1. Tube gel central cooling core.
2. Electrophoresis central cooling core with gaskets.
3. Buffer tank and lid with cables.
4. Slab gel casting stand, glass plates, and sandwich clamps.
5. Grommets and stoppers.
6. Glass tubes.

* For higher throughput, the PROTEAN II xi multi-cell provides six-gel capacity for second-dimension runs.

Ordering Information

Catalog #	Description
PROTEAN II xi 2-D Tube Gel Cell*	
1651931	**PROTEAN II xi 2-D Cell**, 1.0 mm, 16 cm
1651932	**PROTEAN II xi 2-D Cell**, 1.5 mm, 16 cm
1651933	**PROTEAN II xi 2-D Cell**, 1.0 mm, 20 cm
1651934	**PROTEAN II xi 2-D Cell**, 1.5 mm, 20 cm
Accessories and Replacement Parts	
1651940	**Tube Gel Adaptor**, with gasket, grommets (4–8 mm OD tubes), stoppers
1651943	**Tube Gel Loading Needles**, 18 cm, 22 gauge, blunt tip, luer hub (for casting monomer in small-diameter tubes), 2
1651944	**Tube Gel Extrusion Needles**, 9 cm, 26 gauge, beveled tip, luer hub (for removing gels from tubes), 2
1651947	**Replacement Gaskets**, for tube gel adaptor, 2
1651859	**PROTEAN II Comb Conversion Screws****, includes 10 comb conversion screws, 10 standard comb screws
1651827	**Beveled Inner Glass Plates**, for 2-D tube gel procedures, 16 cm bevel length, 16 x 20 cm, 2, for PROTEAN II xi 2-D cells only
1651828	**Beveled Inner Glass Plates**, for 2-D tube gel procedures, 16 cm bevel length, 20 x 20 cm, 2, for PROTEAN II xi 2-D cells only

* Each PROTEAN II xi 2-D cell includes a central cooling core with gaskets, lower buffer chamber, lid with cables, 2 sets of glass plates (with beveled inner plates), 4 sandwich clamps, twenty-four 180 mm long glass tubes (tube diameter = spacer thickness), 2 tube gel adaptors, 16 grommets, 16 stoppers, two 2-D combs, 4 spacers, upper buffer dam, casting stand with gaskets, leveling bubble, and instructions. Sandwich clamps are sized to fit the gel length appropriate for the cell (16 cm or 20 cm). 1.0 mm and 1.5 mm indicate the thickness of spacers and combs included with the cell.

** For use with agarose gels. Comb conversion screws convert two PROTEAN II xi combs with standard 25 mm well depth to combs with a 10 mm well depth. Double-up stacking gels (4 gels/run) cannot be cast simultaneously when comb conversion screws are used.

Model 175 Tube Gel Accessories

Glass Tubes for IEF

Bio-Rad's hand-cut and polished borosilicate glass tubes may be used for any tube gel electrophoresis application.

Model 225 Tube Gel Casting Stand

The Model 225 tube gel casting stand aids casting of 4–8 mm OD tube gels and features leveling legs and stainless steel fingers to hold 24 tubes.

Grommet and Stopper Sets

Grommets and stoppers are available in two sizes; they work with both the Model 175 tube cell and the tube gel adaptors for the PROTEAN® II xi cells.

For More Information
Web: bio-rad.com/model175

Glass Tubes

Model 225 Tube Gel Casting Stand

See Also

PowerPac HV and PowerPac Universal power supplies: page 155.
PROTEAN II xi multi-cell: page 186.
Bio-Lyte ampholytes: page 198.
Acrylamide gel-casting reagents: page 195.

Ordering Information

Catalog #	Description
Glass Tubes	
1653136	**1.0 mm ID Glass Tubes**, 6.0 mm OD, 180 mm length, 24
1653137	**1.5 mm ID Glass Tubes**, 7.5 mm OD, 150 mm length, 24
1653138	**1.5 mm ID Glass Tubes**, 7.5 mm OD, 180 mm length, 24
1653155	**2.4 mm ID Glass Tubes**, 4.0 mm OD, 160 mm length, 24
1653150	**3.4 mm ID Glass Tubes**, 5.0 mm OD, 125 mm length, 24
1653122	**5.0 mm ID Glass Tubes**, 7.0 mm OD, 125 mm length, 24
Model 225 Tube Gel Casting Stand	
1652020	**Model 225 Tube Gel Casting Stand**
Grommet and Stopper Sets*	
1651984	**Grommets and Stoppers**, for 4–5 mm OD tubes, 12 each
1651985	**Grommets and Stoppers**, for 6–7.5 mm OD tubes, 12 each

* Grommet and stopper sets work with both Model 175 and Model 225 tube gels and the tube gel adaptors for the PROTEAN II xi cells.

Mini-Format Analytical IEF

See Also

PowerPac HV and PowerPac Universal power supplies: page 155.

IEF standards: page 163.

Bio-Lyte ampholytes: page 198.

Acrylamide gel-casting reagents: page 195.

Agarose: page 196.

Model 111 Mini IEF Cell

This compact cell performs analytical IEF, including isoenzyme separation, forensic applications, and clinical determinations. Use it to screen large numbers of samples or for quickly running a few samples to determine the pI of a protein of interest. It requires only a 500 V power supply. Please note that this unit does not use IPG strips. Features include:

- Unique inverted format — condensation cannot disrupt electrophoresis results
- No external cooling required
- Bufferless operation — no wicks required
- Casting tray suitable for both agarose and polyacrylamide gels
- Easy-to-clean, removable graphite electrodes
- Small footprint of 21 x 11.5 x 4.2 cm

For More Information
Web: bio-rad.com/model111
Request or download bulletin: M1702975

Ordering Information

Catalog #	Description
1702975	**Model 111 Mini IEF Cell**, includes chamber and lid, graphite electrodes, casting tray, 5 glass plates, 50 sheets of gel support film for polyacrylamide, 5 sample templates
Accessories	
1702980	**Graphite Electrodes**, 2
1702981	**Mini Casting Tray**
1702982	**Glass Plates**, 12.5 cm x 6.5 cm x 1.5 mm, 5
1702983	**Gel Support Film for Polyacrylamide**, 12.5 x 6.5 cm, 50 sheets
1702984	**Gel Support Film for Agarose**, 12.5 x 6.5 cm, 50 sheets
1702985	**Sample Templates**, 5

Preparative Electrophoresis

Preparative electrophoresis devices fractionate and purify nanogram to gram quantities of proteins or nucleic acids via liquid phase IEF electrophoresis or continuous electroelution from gels. These devices separate and purify molecules according to their molecular mass (using SDS-PAGE or agarose gel electrophoresis), pI (using liquid-phase IEF), or a combination of both molecular mass and pI (using native PAGE or preparative 2-D electrophoresis). These devices include:

See Also

Protein sample preparation kits: page 2.

- **Model 491 prep cell and mini prep cell** — perform high-resolution separations of proteins and nucleic acids by continuous-elution gel electrophoresis (PAGE)
- **Model 422 electro-eluter** — elutes macromolecules from gel slices

Preparative Electrophoresis Product Selection Guide

Product	Page	Method of Purification	Molecules Purified	Run Time	Bulletin
Model 491 prep cell	215	SDS-PAGE or native PAGE	Protein (1–500 mg) DNA (50–300 µg) RNA (≤1 mg)	4–10 hr	1964
Mini prep cell	215	SDS-PAGE or native PAGE	Protein (0.5–1,000 µg) DNA (≤10 µg) RNA (≤20 µg)	4–10 hr	1964
Model 422 electro-eluter	217	Electroelution from excised gel pieces	Protein (gel load limits) DNA (≤3 mm thick gels)	3–5 hr	—

See Also

PowerPac HV power supply: page 155.

Protein sample preparation kits: page 2.

Rotofor® Cell, Mini Rotofor Cell Accessories, and MicroRotofor™

Ordering Information

Catalog #	Description
Accessories and Replacement Parts for Rotofor Cell and Mini Rotofor Cell	
1702910	**Rotofor Starter Kit**, includes 10 ml Bio-Lyte ampholytes (pH 3–10), 60 ml syringe, colored protein sample, 2 vent buttons, one each of the ion exchange membranes, hydrated
1702991	**Mini Membrane Cores,** for 18 ml focusing chamber, 2
1702952	**Membrane Cores**, for 60 ml focusing chamber, 2
1702953	**Repair Kit**, includes O-ring kit, 4 ion exchange gaskets, 4 port cover screws, 4 electrolyte chamber screws, 2 gray port gaskets
1702954	**Cooling Finger O-Ring Kit**, with 4 O-rings
1702956	**Ion Exchange Membranes**, 5 pair
1702957	**Vent Buttons**, 8
1702958	**Cooling Finger**
1702960	**Sealing Tape**, 1 roll, 1 in x 36 yards
1702964	**Harvest Tubing**
1702965	**Harvest Box Lid**
1702966	**Harvesting Needle Array**
Rotofor Adaptor Kits	
1702990	**Adaptor Kit**, to convert Rotofor cell to mini Rotofor cell, includes mini focusing chamber, mini membrane core, 18 ml
1702959	**Adaptor Kit**, to convert mini Rotofor cell to Rotofor cell, includes focusing chamber, membrane core, 60 ml
Accessories and Replacement Parts for MicroRotofor Cell	
1702804	**MicroRotofor Starter Kit**, includes Bio-Lyte ampholytes, control protein sample, focusing chamber, ion exchange membranes, harvesting tray, syringes
1702810	**MicroRotofor Harvesting Trays**, 3
1702820	**MicroRotofor Sealing Film**, 10 sheets
1702960	**Sealing Tape**, 1 roll, 1 in x 36 yards
1702821	**MicroRotofor Focusing Chambers**, 3
1702822	**MicroRotofor Cathode Assembly**
1702829	**MicroRotofor Anode Assembly**
1702833	**MicroRotofor Ion Exchange Membrane Assemblies**
1702835	**MicroRotofor Cleaning Brush**
1702836	**MicroRotofor Syringes**, 3 and 10 ml, 3 each
1702851	**MicroRotofor Needle Assembly**
1702852	**MicroRotofor Vacuum Block O-Ring**
1702826	**MicroRotofor Electrode Assembly O-Ring/Gasket Kit**, electrolyte buffer chamber O-ring and gaskets

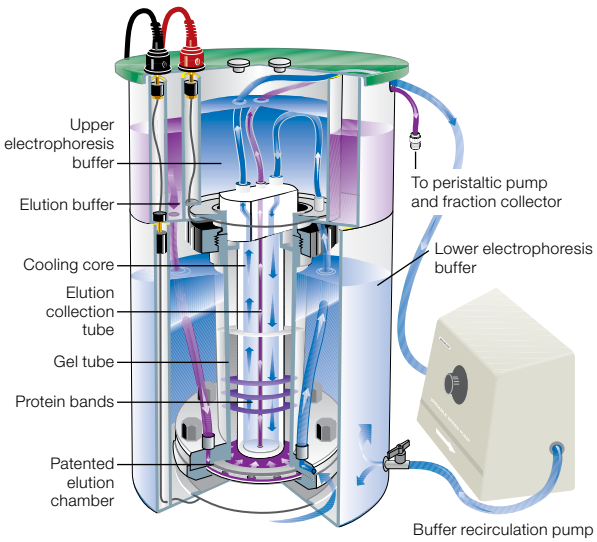
Preparative PAGE Cells

Model 491 Prep Cell and Mini Prep Cell

The Model 491 prep cell and mini prep cells separate biomolecules (protein or nucleic acids) by continuous-elution electrophoresis. Samples are electrophoresed through a cylindrical gel matrix, where they are separated into ring-shaped bands. As individual bands migrate off the bottom of the gel, they are collected in discrete liquid fractions. The Model 491 prep cell and the mini prep cell allow resolution of proteins differing in MW by as little as 2%. With these prep cell systems, you can:

- Purify nanogram to milligram quantities of target protein
- Separate proteins that differ in MW by as little as 1 kDa by using SDS-PAGE
- Separate proteins by mass and charge with pI differences as little as 0.1 pH units by using native PAGE
- Separate large proteins or DNA fragments (up to 18 kb) by using agarose gel electrophoresis

For More Information
Web: bio-rad.com/prepPAGE
Request or download bulletins: 1964, 3153, and 3161



Continuous-elution electrophoresis in the Model 491 prep cell. Samples are electrophoresed through the cylindrical gel matrix where they are separated into ring-shaped bands. Individual bands migrate off the bottom of the gel and are collected in discrete liquid fractions available for assay and characterization.

See Also
PowerPac Universal and PowerPac HV power supplies: page 155.

Specifications

	Model 491 Prep Cell	Mini Prep Cell
Sample capacity (mass/volume)	1–500 mg/0.5–15 ml	0.5–1.0 mg/50–500 µl
Gel tube dimensions	28 and 37 mm ID, 14 cm length	7 mm ID, 13 cm length
Cooling	Glazed alumina-ceramic tube	Not necessary
Electrical limits	500 V, 40 mA, 20 W (PowerPac™ HV or PowerPac Universal recommended)	500 V, 10 mA, 5 W (PowerPac HV or PowerPac Universal recommended)
Elution buffer flow rate	1 ml/min	0.1 ml/min
Auxiliary equipment required	Fraction collector, power supply, peristaltic pump	Fraction collector, power supply

Ordering Information

Catalog #	Description
Model 491 Prep Cells	
1702926	**Model 491 Prep Cell**, 100/120 V, includes buffer recirculation pump, prep cell starter kit with protein standard
1702927	**Model 491 Prep Cell**, 220/240 V
1702928	**Model 491 Prep Cell without Buffer Recirculation Pump**
Replacement Parts and Accessories for the Model 491 Prep Cell	
1702944	**Prep Cell Casting Stand**
1702929	**Buffer Recirculation Pump**, 100/120 V
1702930	**Buffer Recirculation Pump**, 220/240 V
1702932	**Small Gel Tube Assembly**, 28 mm ID
1702933	**Large Gel Tube Assembly**, 37 mm ID
1702934	**Cooling Finger Assembly**, includes feedline connectors
1702935	**Buffer Circulation Tubing Kit**, includes stopcock with tubing and connectors, 3 elution buffer circulation lines and connectors, and electrophoresis/cooling buffer circulation lines and connectors
1702936	**O-Ring Kits**, 2
1702937	**Dialysis Membranes**, precut, 5
1702938	**Frit Kit**, includes support frit and elution frit
1702939	**Sample Application/Overlay Buffer Kit**, includes sample loading guide, syringe with tubing
1702940	**Thumbscrews**, 4
1702969	**Lid with Power Cables**
1615101	**Prep Cell Starter Kit**
1610323	**Prep Cell Starter Kit Protein Standard**, 1 ml
1702941	**Elution Manifold Base**
Mini Prep Cells	
1702915	**Mini Prep Cell with Reagent Starter Kit**
1702908	**Mini Prep Cell without Reagent Starter Kit**
Replacement Parts and Accessories for the Mini Prep Cell	
1702909	**Gel Tubes**, 2
1702913	**Sample Application/Purge Kit**
1702947	**Peristaltic Pump Adaptor Kit**, for 0.8 mm tubing
1702948	**Elution Frit Kit**, with 5 dialysis membranes, MW cutoff 3,500
1702911	**Elution Frit Kit**, with 5 dialysis membranes, MW cutoff 6,000
1702912	**Harvest Ring Assembly**, includes elution collection tubing
1702917	**Mini Prep Cell Elution Chamber Top**
1702918	**Mini Prep Cell Casting Stand**
1702916	**Elution Manifold Base**
8007533	**Lid with Cables**, for mini prep cell

Preparative Electroelution Cells

Whole Gel Eluter and Mini Whole Gel Eluter Accessories

Ordering Information

Catalog #	Description
Whole Gel Eluter Accessories	
1651270	**Whole Gel Eluter Template**
1651275	**Cellophane**, 25 precut sheets
1651277	**Sealing Tabs**, 50
1651280	**Lower Chamber Filter Paper**, 21 x 21 cm, 75 precut sheets
1651281	**Upper Chamber Filter Paper**, 21 x 21 cm, 50 precut sheets
1702940	**Thumbscrews**, 4
Mini Whole Gel Eluter Accessories	
1651276	**Cellophane**, 25 precut sheets
1651278	**Sealing Tabs**, 50
1651282	**Lower Chamber Filter Paper**, 9 x 10 cm, 50 precut sheets
1651283	**Upper Chamber Filter Paper**, 5 x 6 cm, 50 precut sheets

Model 422 Electro-Eluter

The Model 422 electro-eluter is an electroelution cell for preparative recovery of biomolecules from agarose and acrylamide gels. Easy to assemble, the electro-eluter has six vertical glass tubes connecting the upper and lower buffer chambers. A frit at the bottom of each tube retains the gel slice but permits macromolecules to migrate through when current is applied. When the macromolecules have passed through the frit, they are collected (in the membrane cap) for further analysis or testing.

Depending on the buffer system, the Model 422 electro-eluter can be used for protein elution or dialysis. In all cases, setup is quick and easy and the sample is collected in 400–600 µl. The Model 422 electro-eluter can be used for one to six samples without increasing the run time (3–5 hours) or decreasing sample yield.

For More Information
Web: bio-rad.com/electroelution

Specifications

Elution capacity	1–6 samples
Collection volume	400–600 µl
Buffer volume	700 ml
Glass tube dimensions	1 cm (ID) x 6 cm (long)
Recommended power supply	PowerPac™ Universal
Dimensions (W x D x H)	12 x 16 x 18 cm
Weight	1.1 kg (2.4 lb)

Ordering Information

Catalog #	Description
1652976	**Model 422 Electro-Eluter**, includes electro-eluter module, membrane caps (MW cutoff 12,000–15,000), glass tubes, frits, silicone adaptors, grommets and stoppers, buffer tank, lid with power cables
1652977*	**Model 422 Electro-Eluter Module**, without buffer tank and lid
Accessories	
1652985	**Membrane Caps**, clear, MW cutoff 12,000–15,000, 12
1652986	**Membrane Caps**, green, MW cutoff 3,500, 12
1652987	**Frits**, 12
1652978	**Glass Tubes**, 6
1652981	**Silicone Adaptors**, 6
1651988	**Grommets and Stoppers**, 8

* Module can be used with the discontinued Mini-PROTEAN® 3 cell. If you do not own a Mini-PROTEAN 3 cell, order Model 422 electro-eluter #1652976.

Gel Drying Equipment

Bio-Rad offers flexible gel drying systems that will accommodate multiple gel types and allow optimization of drying conditions.

For More Information
Web: bio-rad.com/geldrying

See Also
Precast gels: pages 168, 177.
Acrylamide: page 195.
Premixed buffers: page 192.

Model 583 and HydroTech™ Gel Drying Systems

The Model 583 gel dryer accommodates sequencing gels or multiple standard size gels. With variable temperature control and three preprogrammed cycles, drying conditions can be optimized to prevent gel cracking. The HydroTech vacuum pump is a unique, environmentally friendly vacuum pump. The gel dryer and vacuum pump can be purchased individually or together as an economical system.

Model 583 Gel Dryer

The Model 583 gel dryer has a drying surface large enough to fit up to 16 mini gels, 9 Criterion™ gels, 2 large-format gels, or 1 sequencing gel. The floating heating element heats gels from the top while a vacuum is pulled through the bottom porous gel support, distributing the vacuum evenly so gels dry without cracking. The transparent sealing gasket allows monitoring of gels during the drying cycle.

HydroTech Vacuum Pump

The HydroTech vacuum pump uses ordinary tap water, not vacuum pump oil, eliminating messy oil changes and hazardous waste. A vapor trap is not needed because the pump traps gel-drying liquids and vapors in the 4 L water reservoir.

The self-contained HydroTech pump applies vacuum by pumping pressurized water through dual Venturi injectors. The vacuum strength is temperature dependent; by circulating the water through a cooling unit, the pump maintains a strong, constant vacuum.

For More Information
Request or download bulletin: 1992

Double-Up Gel Dryer Rack

The double-up gel dryer rack accommodates two gel dryers up to 60 x 50 cm. The bottom shelf is on interlocking glides that allow full extension and easy access to the gel dryer's surface. When a dryer is placed on the stationary top shelf, it stabilizes the unit and helps prevent tilting of the rack when the bottom shelf is fully extended. The rack is plumbed for vacuum, made of sturdy sheet metal, and arrives assembled. The rack can be ordered separately, or as a system including two Model 583 gel dryers and a HydroTech vacuum pump.

For More Information
Request or download bulletin: 2210

HydroTech Vacuum Pump

Model 583 Gel Dryer and Double-Up Gel Dryer Rack

Model 583 Gel Drying Supports

Available supports for use with the Model 583 gel dryer include filter paper backing for stained gels, cellophane membrane backing for transmission densitometry, filter paper for fragile sequencing gels, and porous gel supports to ensure evenly distributed vacuum pressure.

Gel drying solution for polyacrylamide gels and drying supports for discontinued products are also available.

For More Information
Request or download bulletin: 2210

Ordering Information

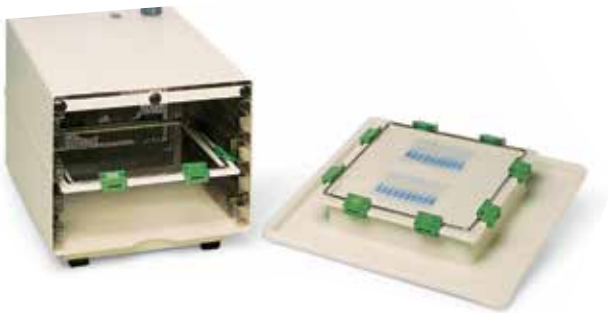
Catalog #	Description
1651789	**HydroTech Gel Drying System**, 100/120 V, includes #1651745 and #1651781
1651790	**HydroTech Gel Drying System**, 220/240 V, includes #1651746 and #1651782
1651745	**Model 583 Gel Dryer***, 100/120 V, includes porous gel support, transparent sealing gasket, filter paper backing, cellophane membrane backing, sequencing gel filter paper
1651746	**Model 583 Gel Dryer***, 220/240 V, includes all items in #1651745
HydroTech Vacuum Pumps	
1651781	**HydroTech Vacuum Pump***, 100/120 V, includes pump, quick disconnect fittings for 1/4 and 3/8" ID vacuum tubing, vacuum tubing, drain tubing
1651782	**HydroTech Vacuum Pump***, 220/240 V, includes all items in #1651781
HydroTech Vacuum Pump Accessories	
1651783	**Quick Disconnect Fitting**, fits 1/4" ID tubing
1651784	**Quick Disconnect Fitting**, fits 3/8" ID tubing
1651785	**Vacuum Tubing**, 2 m, includes quick disconnect fitting, hose clamps, 2-way stopcock
1651786	**Drain Tubing**, 2 m, includes quick disconnect fitting, hose clamp
9100509	**2-Way Stopcock**
1651787	**3-Way Stopcock**
1651788	**HydroTech Vacuum Gauge**
1651791	**Anti-Foam Agent**, 100 ml
Double-Up Gel Drying Rack and Systems	
1651796	**Double-Up Gel Dryer Rack**
1651797	**Double-Up Gel Dryer System**, 100/120 V, includes 2 Model 583 gel dryers (#1651745), HydroTech vacuum pump (#1651781), double-up gel dryer rack (#1651796)
1651798	**Double-Up Gel Dryer System**, 220/240 V, includes 2 Model 583 gel dryers (#1651746), HydroTech vacuum pump (#1651782), double-up gel dryer rack (#1651796)
Model 583 Drying Supports	
1650962	**Filter Paper Backing**, for stained gels, 35 x 45 cm, 25 sheets
1650963	**Cellophane Membrane Backing**, clear membrane for transmission densitometry or overhead projection, 35 x 45 cm, 50 sheets
1650959	**Sequencing Gel Filter Paper**, for fragile sequencing gels, 35 x 45 cm, 25 sheets
1651747	**Model 583 Gel Dryer Porous Gel Support***, 35 x 45 cm
1651748	**Model 583 Transparent Sealing Gasket***, 41 x 51 cm
Drying Supports for Discontinued Products	
1650922	**Cellophane Membrane Backing**, 18 x 34 cm, for Model 224, 443, and 543 slab gel dryers, 50 sheets
1650921	**Thick Blot Paper**, 18 x 34 cm, for Model 224, 443, and 543 slab gel dryers, 25 sheets
Gel Drying Solution	
1610752	**Gel Drying Solution**, 1 L

* Model 583 Gel Dryer and HydroTech Vacuum Pump are not available for sale in European Union countries.

GelAir™ Drying System

The GelAir drying system is perfect for drying polyacrylamide and agarose gels. Dried between two sheets of cellophane, the gels come out completely clear with a glossy finish, ideal for densitometry, photodocumentation, autoradiography, overheads, and long-term storage.

The heated drying chamber works like a convection oven to dry mini gels in 45 minutes or 20.0 x 20.0 cm gels in 60 minutes, rivaling the speed of conventional gel dryers that require a vacuum pump. Drying times may vary depending on the percentage and thickness of the gel. The dryer holds up to four drying frames at once.



For More Information
Web: bio-rad.com/geldrying
Request or download bulletin: 1965

Specifications

GelAir Dryer	
Timer control	0–3 hr, fully adjustable
Function modes	Fan only; fan and heat; off
Dryer capacity	4 shelves, each accommodating 1 drying frame
Dimensions (W x D x H)	27.0 x 43.0 x 30.0 cm
Weight	8 kg (18 lb)

GelAir Drying Frames	
Inner dimensions	20.0 x 20.0 cm
Drying frame	Molded polycarbonate bottom frame, stainless-steel top frame
Clamps	Molded polysulfone, 8 clamps per drying frame
Gel capacity (per frame)	4 mini (8.0 x 7.0 cm) gels, 2 Criterion™ (13.3 x 8.7 cm) gels, 1 large (20.0 x 20.0 cm) gel

Ordering Information

Catalog #	Description
1651771	**GelAir Drying System***, 115 V, 60 Hz, includes #1651777, 2 drying frames, 16 clamps, assembly table, 50 precut sheets of cellophane support, gel drying solution
1651772	**GelAir Drying System***, 230 V, 50 Hz, includes #1651778, 2 drying frames, 16 clamps, assembly table, 50 precut sheets of cellophane support, gel drying solution
1651777	**GelAir Dryer**, 115 V, 60 Hz, gel drying oven only
1651778	**GelAir Dryer**, 230 V, 50 Hz, gel drying oven only
Accessories	
1651775	**GelAir Drying Frames**, includes plastic drying frame, metal square frame, 16 clamps
1651776	**GelAir Assembly Table**
9207965	**GelAir Plastic Drying Frame**, for GelAir assembly table, does not include metal square frame
1651779	**GelAir Cellophane Support**, 50 precut sheets
1651780	**GelAir Drying Frame Clamps**, 8
1610752	**Gel Drying Solution**, 1 L

* GelAir Drying System is not available for sale in European Union countries.

Western Blotting

Bio-Rad's western blotting products include the V3 Western Workflow™, systems for protein transfers, blotting membranes, filter paper, premixed blotting buffers, reagents, protein standards, and detection kits.

Learn More about the Technology
Web: bio-rad.com/tech/westernblotting

V3 Western Workflow™ Protocol

Bio-Rad's V3 Western Workflow — consisting of TGX Stain-Free™ precast gels, the Trans-Blot® Turbo™ system, and the ChemiDoc™ Touch imaging system — incorporates traditional blotting techniques with innovative technology. The five-step streamlined protocol allows quick confirmation of gels and blot transfer quality prior to western blotting and provides total protein blot normalization for rapid and robust quantitation.

Five Steps

1. **Separate proteins** — Mini-PROTEAN® TGX Stain-Free™ precast gels and Criterion™ TGX Stain-Free™ precast gels offer fast, superior protein separation. TGX Stain-Free precast gels feature proprietary in-gel chemistry, enabling high-quality protein separation in as little as 15 minutes (pages 168, 178).
2. **Visualize proteins** — protein separation is visualized and confirmed, using stain-free technology, after 1 minute activation on the ChemiDoc Touch imaging system. Stain-free technology is a sensitive, time-saving alternative to traditional Coomassie staining (page 282).
3. **Transfer proteins** — Trans-Blot Turbo system, a rapid protein transfer apparatus, reduces transfer protocols to as little as 3 minutes across a broad MW range (page 224).
4. **Verify protein transfer** — ChemiDoc Touch imaging system paired with stain-free technology enables instant verification of protein transfer (page 281).
5. **Validate and quantitate** — ChemiDoc Touch imaging system and Image Lab™ software validate western blotting data via total protein normalization as an alternative to using housekeeping proteins. By normalizing to total protein, stripping and reprobing is no longer necessary.

Separate Proteins
Rapidly separate proteins with TGX Stain-Free precast gels

Visualize Separation
Immediately visualize separation using stain-free technology and the ChemiDoc Touch imager

Transfer Proteins
Use the Trans-Blot Turbo system for rapid and efficient protein transfer

Verify Transfer
Verify high-quality transfer by instantly imaging proteins on the membrane

Validate Western Blot
Perform multiplex imaging and validate results by total protein normalization on the ChemiDoc Touch imager

Ordering Information

Catalog #	Description
1708381	**ChemiDoc Touch V3 Western Workflow for Mini Gels**, includes ChemiDoc Touch imager with Image Lab software, UV/stain-free sample tray, 50 Mini-PROTEAN TGX Any kD Stain-Free precast gels, SDS-PAGE accessories, Mini-PROTEAN Tetra cell, Trans-Blot Turbo starter kit, 50 PVDF transfer packs for mini gels
1708382	**ChemiDoc Touch V3 Western Workflow for Midi Gels**, includes ChemiDoc Touch imager with Image Lab software, UV/stain-free sample tray, 50 4–20% Criterion TGX Stain-Free precast gels, SDS-PAGE accessories, Criterion cell, Trans-Blot Turbo starter kit, 50 PVDF transfer packs for midi gels

Bio-Rad V3 Western Workflow vs. Traditional Western Workflow

Bio-Rad V3 Western Workflow

Total time: **6 hr**

		Time	Data
1	**Electrophoresis** TGX Stain-Free™ gel Criterion™ cell ChemiDoc™ Touch system	20–30 min	**Pre-transfer gel** stain-free image to check sample integrity and separation quality
2	**Transfer** Trans-Blot® Turbo™ system ChemiDoc Touch system	3–10 min	**Post-transfer gel** stain-free image to measure transfer efficiency
3	**Antibody Incubation** Clarity™ western ECL substrate	~5 hr	Stain-free **blot** image as loading control
4	**Imaging and Analysis** ChemiDoc Touch system (no need to strip and reprobe)	10–15 min	Target proteins (chemiluminescence) or Target proteins (fluorescence)

Traditional Western Workflow

Total time: **16 hr**

		Time	Data
1	**Gel Preparation**	>1 hr gel prep	—
2	**Electrophoresis**	~1 hr gel run	—
3	**Transfer**	1–3 hr	—
4	**Antibody Incubation**	~5 hr	—
5	**Imaging and Analysis**	>30 min	Target proteins
6	**Strip and Reprobe**	(Often need reprobing for actin/tubulin as loading control) ~5 hr	Loading control

For More Information
Web: bio-rad.com/V3

Transfer Devices

Overview of Blot Transfer Systems

- **Rapid transfer systems** — Trans-Blot® Turbo™ system (page 224) for rapid transfer of proteins, suitable for high molecular weight and low molecular weight proteins
- **Semi-dry transfer systems** — Trans-Blot® SD for rapid, high-intensity transfers, best suited for mid-range proteins, 10–100 kD or >200 kD (page 225)
- **Tank transfer systems** — ideal for most routine protein work, tank transfer systems provide efficient and quantitative protein transfers over a broad MW range and are available with either plate or wire electrodes (page 226)
- **Microfiltration (dot blotting) and screening systems** — used to determine working conditions for a new blotting assay or in situations where protein separation is not required; suitable for both protein and nucleic acid blotting (page 230)

Blotting Selection Guide

	Mini Trans-Blot®	Criterion™ Blotter	Trans-Blot®	Trans-Blot® Plus	Trans-Blot SD	Trans-Blot Turbo
Blotting area	10.0 x 7.5 cm	15.0 x 9.4 cm	16.0 x 20.0 cm	28.0 x 26.5 cm	24.0 x 16.0 cm	15.0 x 11.0 cm
Gel capacity	2 Mini-PROTEAN® gels	4 Mini-PROTEAN or 2 Criterion gels	3 PROTEAN® II xi, 6 Criterion, or 12 Mini-PROTEAN gels	Three 26.5 x 28 cm gels or 12 Criterion gels	2 PROTEAN II gel sandwiches, stacked and separated by dialysis membrane; 4 Mini-PROTEAN gels side by side; 3 Criterion gels side by side	2 midi gels (13.5 x 8.5 cm), 4 mini gels (7.0 x 8.5 cm) or similar
Number of gel holders	2	2	3	3	—	—
Buffer requirement	1.2 L	1.3 L	3–4 L	10–12 L	200 ml	N/A
Electrode distance	4.0 cm	4.3 cm	2 positions: 4.0 and 8.0 cm	3 positions: 4.0, 7.0, and 10.0 cm	Determined by thickness of the gel and membrane sandwich and filter paper stack	~8 mm depending on gel thickness
Electrode dimensions	—	—	—	—	25.0 x 18.0 cm	16.0 x 12.0 cm
Electrode materials	Platinum wire	Platinum-coated titanium anode with stainless-steel cathode plates or platinum wire	Platinum-coated titanium anode with stainless-steel cathode plates or platinum wire	Platinum-coated titanium anode and stainless-steel cathode plates	Platinum-coated titanium anode and stainless-steel cathode plates	Platinum-coated titanium anode and stainless-steel cathode plates
Transfer time						
Wire electrodes	Standard: 16 hr High-intensity: 1 hr	Standard: 60 min to overnight	Standard: 5 hr Overnight: 16 hr High-intensity: 30 min–4 hr	—	—	—
Plate electrodes		Standard: 30 min to overnight	Standard: 1–5 hr Overnight: 16 hr High-intensity: 30 min–1 hr	Standard: 16 hr High-intensity: 15 min–1 hr	~30 min	3–10 min
Cooling	Blue cooling unit	Sealed ice block or optional Criterion blotter cooling unit	Super cooling coil	Super cooling coil	—	—
Overall dimensions (W x L x H)	12.0 x 16.0 x 18.0 cm	21.8 x 11.8 x 15.0 cm	18.0 x 9.5 x 24.0 cm	30.0 x 17.3 x 39.4 cm	37.0 x 24.0 x 11.0 cm	26.0 x 21.0 x 20.0 cm

Semi-Dry and Rapid Blotting Systems

Trans-Blot® Turbo™ Transfer System

The Trans-Blot Turbo transfer system represents the next generation of protein transfer. The Trans-Blot Turbo integrates speed, reproducible performance, and ease of use into a complete system, providing results faster than any other method currently available.

The Trans-Blot Turbo blotting system combines traditional blotting techniques with modern filter paper and buffers, allowing rapid transfer of proteins with minimal preparation time. By providing the entire system in a ready-to-use format, researchers can obtain their results faster and easier with reproducibility that is difficult to achieve by traditional tank and semi-dry blotting methods.

Rapid, High-Throughput Transfer

- Transfers standard mini or midi gels in as little as 3 min
- Efficient transfer of high- and low-MW proteins
- Can transfer 1–4 mini or 1–2 midi gels in a single run
- No cooling period required between runs
- Specialized protocol for Mini-PROTEAN® TGX™ gel transfer in 3 min
- No need to pre-equilibrate gels prior to transfer

Ready-to-Use Transfer Packs

- Ready-to-use transfer packs eliminate the need for buffer and membrane preparation
- Transfer packs available with nitrocellulose and PVDF
- Proprietary buffer included in each transfer pack

Ready-to-Assemble (RTA) Transfer Kits

- Kits provide enough consumables for 40 blots
- Consists of pre-cut membranes, pre-cut filter pads, and specially formulated transfer buffer
- Kits available with nitrocellulose, PVDF, and low-fluorescence PVDF

Flexible Design

- Option to either use rapid preset protocols or customize transfer conditions
- Accommodates traditional semi-dry consumables
- Compatible with various gel types and percentages
- Ability to customize and store protocols within the instrument
- Integrated power supply means no external power supply is needed

Environmentally Friendly

- Environmentally safe consumables eliminate disposal cost
- Single-use consumables reduce waste

For More Information
Web: bio-rad.com/turbo
Request or download bulletin: 6039

Ordering Information

Catalog #	Description
1704150	**Trans-Blot Turbo Transfer System**, includes 2 cassettes, roller
1704151	**Trans-Blot Turbo Cassette**, 1 cassette
1704152	**Trans-Blot Turbo Base**, base instrument, no cassettes included

Description	Mini (7 x 8.5 cm)	Midi (8.5 x 13.5 cm)
Trans-Blot Turbo Transfer Pack, PVDF, pkg of 10	1704156	1704157
Trans-Blot Turbo Transfer Pack, Nitrocellulose, pkg of 10	1704158	1704159
Trans-Blot Turbo RTA Transfer Kit, Nitrocellulose, for 40 blots	1704270	1704271
Trans-Blot Turbo RTA Transfer Kit, PVDF, for 40 blots	1704272	1704273
Trans-Blot Turbo RTA Transfer Kit, LF PVDF, for 40 blots	1704274	1704275

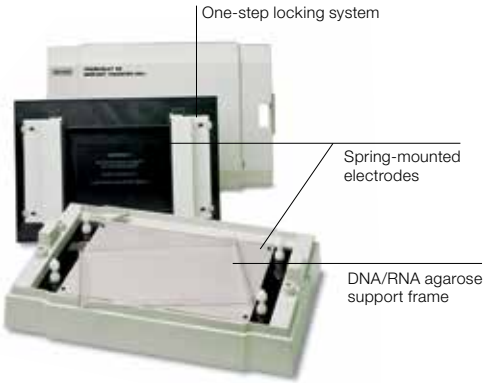
Trans-Blot® SD Semi-Dry Transfer Cell

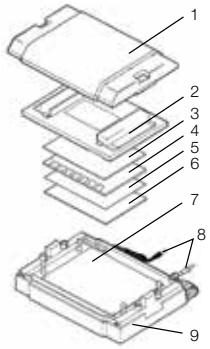
The Trans-Blot SD semi-dry transfer cell allows fast and efficient blotting without buffer tank or gel cassettes. Features include:

- Transfers in as little as 15–60 min
- Minimal buffer requirements
- Capacity to transfer multiple gel sizes
- Single-step locking system for simple setup
- Platinum-coated titanium anode and stainless-steel cathode plate electrodes that provide consistent and reliable transfers, durability, and years of use
- Safety cover to break the electrical current when lifted, preventing electrical shock

In addition to western blotting, the Trans-Blot SD cell can also transfer DNA and RNA using the unique agarose gel semi-dry blotting support frame. The frame protects fragile agarose gels from compression by the electrodes. Southern and northern blot transfers can be run in 10–35 minutes.

For More Information
Web: bio-rad.com/transblotsd
Request or download bulletin: 2895





Expanded view of the Trans-Blot SD cell assembly:
1. Safety lid.
2. Cathode assembly with latches.
3. Filter paper.
4. Gel.
5. Membrane.
6. Filter paper.
7. Spring-loaded anode platform mounted on four guideposts.
8. Power cables.
9. Base.

See Also
PowerPac HC power supply: page 155.
Blotting buffers: page 236.

Specifications

Maximum gel size (W x L)	24 x 16 cm
Buffer requirement	200 ml
Gel capacity	4 Mini-PROTEAN® precast gels, 4 Ready Gel® precast gels, 4 Mini-PROTEAN handcast gels, 3 Criterion™ gels, or 1–3 PROTEAN® II gel sandwiches*
Recommended power supply	PowerPac™ HC
Dimensions (W x L x H)	37 x 24 x 11 cm
Weight	3.6 kg (7.9 lb)

* Dialysis membrane between each gel sandwich.

Ordering Information

Catalog #	Description
1703940*	**Trans-Blot SD Semi-Dry Electrophoretic Transfer Cell**, includes transfer cell, agarose gel support frame, extra thick blot paper (7 x 8.4 cm, 60 sheets; 8 x 13.5 cm, 60 sheets; 14 x 16 cm, 30 sheets; 18 x 18.5 cm, 30 sheets)
1703848	**Trans-Blot SD Cell and PowerPac HC Power Supply**, 100–120/220–240 V, includes #1703940 and #16-5052
1703849	**Trans-Blot SD Cell and PowerPac Universal Power Supply**, 100–120/220–240 V, includes #1703940 and #1645070
Accessories	
1703947	**Cathode Plate**, stainless-steel upper electrode
1703942	**Anode Plate**, platinum-coated lower electrode
1704019	**Trans-Blot SD Agarose Gel Support Frame**, includes extra thick blot paper (15 x 20 cm, 30 sheets)
1703957	**Trans-Blot SD DNA/RNA Blotting Kit**, includes SD agarose gel support frame, extra thick blot paper (15 x 20 cm, 30 sheets), 1 L 10x TBE buffer

* The Trans-Blot SD semi-dry transfer cell requires the use of a microprocessor-controlled power supply.

Wet/Tank Blotting Systems

See Also
PowerPac Basic and HC power supplies: page 155.
Ready Gel precast gels: page 171.
Blotting membranes: page 232.
Blot detection reagents: page 236.
Buffers: page 236.

Mini Trans-Blot® Cell

This cell provides high-quality blotting of mini gels. A component of the Mini-PROTEAN® Tetra system, the Mini Trans-Blot cell accommodates two gel holder cassettes for electrophoretic transfer of mini-format gels.

- Ability to transfer two 10 x 7.5 cm gels in just 1 hr; low-intensity overnight transfers are also possible
- Placement of wire electrodes 4 cm apart for strong electrical fields and efficient protein transfer
- Color-coded cassettes and electrodes to ensure proper orientation of the gel during transfer
- Blue cooling unit, contained within the Mini Trans-Blot cell, absorbs heat generated during rapid transfers
- Availability as either a complete stand-alone apparatus or a module compatible with the Mini-PROTEAN Tetra cell

Mini Trans-Blot cell components:
1. Buffer tank and lid.
2. Blue cooling unit.
3. Foam pads.
4. Gel holder cassette.
5. Electrophoresis blotting module.

For More Information
Request or download bulletin: 2033

Specifications

Maximum gel size (W x L)	10 x 7.5 cm
Buffer requirement	1.2 L
Gel capacity	2 Mini-PROTEAN handcast gels, 2 Mini-PROTEAN precast gels, or 2 Ready Gel® precast gels
Recommended power supply	PowerPac™ HC (PowerPac Basic is a suitable alternative)
Dimensions (W x L x H)	12 x 16 x 18 cm

Ordering Information

Catalog #	Description
1703930	**Mini Trans-Blot Electrophoretic Transfer Cell**, includes 2 gel holder cassettes, 4 foam pads, modular electrode assembly, blue cooling unit, lower buffer tank, lid with cables
1703935*	**Mini Trans-Blot Module**, without lower buffer tank and lid
1703989	**Mini Trans-Blot Cell and PowerPac Basic Power Supply**, includes #1703930 and #1645050
1703836	**Mini Trans-Blot Cell and PowerPac HC Power Supply**, includes #1703930 and #1645052
1658029	**Mini-PROTEAN Tetra Cell and Mini Trans-Blot Module**, includes 10-well, 1.0 mm, 4-gel system (#1658001) and blotting module (#1703935) without lower buffer tank and lid, gel casting accessories
1658033	**Mini-PROTEAN Tetra Cell, Mini Trans-Blot Module, and PowerPac Basic Power Supply**, includes #1658001, #1703935, and #1645050
1658034	**Mini-PROTEAN Tetra Cell for Mini Precast Gels, Mini Trans-Blot Module, and PowerPac Basic Power Supply**, includes #1658004, #1703935, and #1645050
1658036	**Mini-PROTEAN Tetra Cell for Mini Precast Gels, Mini Trans-Blot Module, and PowerPac HC Power Supply**, includes #1658004, #1703935, and #1645052
1658035	**Mini-PROTEAN Tetra Cell, Mini Trans-Blot Module, and PowerPac HC Power Supply**, includes #1658001, #1703935, and #1645052
Accessories	
1703931	**Mini Gel Holder Cassette**
1703932	**Thick Blot Paper**, 7.5 x 10 cm, for Mini Trans-Blot cassette, 50 sheets
1703933	**Foam Pads**, 8 x 11 cm, 4
1703812	**Mini Trans-Blot Central Core**
1703919	**Blue Cooling Unit**, for Mini-PROTEAN Tetra tanks
1703934	**Bio-Ice Cooling Unit**, for Mini-PROTEAN 3 tanks
1651279	**Roller**, 3.5" wide

* Also fits in the Mini-PROTEAN 3 electrophoresis cell.

Criterion™ Blotter

- Efficient transfers in 30 min to 1 hr for most proteins; overnight transfer at lower voltages is also an option
- Plate electrodes, for faster and more efficient transfers, or wire electrodes
- Included assembly tray and roller
- Sealed ice block provides sufficient cooling for most applications
- Optional cooling coil — available for applications that require precise temperature control
- Cassettes with handles for easy removal from the tank

For More Information
Request or download bulletin: 2558

Criterion blotter components:
1. Tank and lid.
2. Assembly tray with gel holder cassette, roller, foam pads, and blotting filter paper.
3. Wire electrodes.
4. Plate electrodes.
5. Sealed ice block.
6. Optional cooling coil.

Specifications

Maximum gel size (W x L)	15 x 9.4 cm
Buffer requirement	1.3 L
Gel capacity	4 Mini-PROTEAN® precast gels, 4 Ready Gel® precast gels, 4 mini handcast gels, or 2 Criterion precast gels
Electrode choices	Platinum-coated titanium anode and stainless-steel cathode plate electrodes*, or economical platinum wire electrodes
Recommended power supply	PowerPac™ HC
Dimensions (W x L x H)	21.8 x 11.8 x 15 cm

* Plate electrodes create a high-strength electrical field with higher current densities than other electrodes, producing faster and more efficient transfers.

Ordering Information

Catalog #	Description
1704070	**Criterion Blotter with Plate Electrodes**, includes cell assembled with plate electrodes, lid with cables, 2 Criterion gel holder cassettes, 1 pack precut blot absorbent filter paper, 4 foam pads, gel/blot assembly tray, roller, sealed ice block
1704071	**Criterion Blotter with Wire Electrodes**, includes cell assembled with wire electrodes, lid with cables, 2 Criterion gel holder cassettes, 1 pack precut blot absorbent filter paper, 4 foam pads, gel/blot assembly tray, roller, sealed ice block
1656024	**Criterion Cell/Plate Blotter System**, includes #1656001 and #1704070
1656025	**Criterion Cell/Wire Blotter System**, includes #1656001 and #1704071
1703872	**Criterion Blotter with Plate Electrodes and PowerPac HC Power Supply**, includes #1704070 and #1645052
1703874	**Criterion Blotter with Wire Electrodes and PowerPac HC Power Supply**, includes#1704071 and #1645052
Accessories	
1704076	**Optional Criterion Blotter Cooling Coil**
1704077	**Criterion Blotter Buffer Tank**
1704079	**Criterion Blotter Lid**
1704080	**Criterion Blotter Gel Holder Cassette**
1704081	**Criterion Blotter Platinum Anode Plate Electrode**
1704082	**Criterion Blotter Stainless-Steel Cathode Plate Electrode**
1704083	**Criterion Blotter Wire Electrode Card**, anode
1704084	**Criterion Blotter Wire Electrode Card**, cathode
1704085	**Thick Blot Paper**, 9.5 x 15.2 cm, for Criterion blotter, 50 sheets
1704086	**Foam Pads**, 9.5 x 15.2 cm, 4
1704087	**Sealed Ice Blocks**, for Criterion blotter, 2
1704089	**Criterion Gel/Blot Assembly Tray**
1651279	**Roller**, 3.5" wide

See Also

PowerPac Basic and PowerPac HC power supplies: page 155.
Criterion precast gels: page 177.
Blotting membranes: page 232.
Blot detection reagents: page 236.
Buffers: page 236.

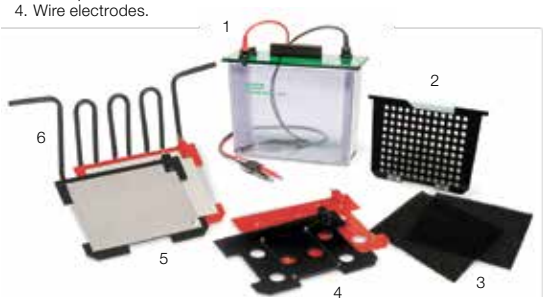
See Also
PowerPac HC power supply: page 155.
Precast gels: pages 168, 177.
Blotting membranes: page 232.
Blot detection reagents: page 236.
Buffers: page 236.

Trans-Blot® Cell

Features of the Trans-Blot transfer cell include:

- Ability to transfer up to 12 mini or 6 midi gels at the same time
- Plate electrodes, for faster and more efficient transfers, or wire electrodes
- Temperature regulation with the super cooling coil and a water recirculator
- A hinged gel holder cassette clamping system that eliminates slipping and ensures tight contact between the membrane and the gel
- Color-coded cassettes to ensure proper orientation in the cell

Trans-Blot cell components:
1. Buffer tank and lid with cables.
2. Gel holder cassette.
3. Foam pads.
4. Wire electrodes.
5. Plate electrodes.
6. Super cooling coil.



Specifications

Maximum gel size (W x L)	16 x 20 cm
Buffer requirement	3–4 L
Gel capacity	12 Mini-PROTEAN® precast gels, 12 Ready Gel® precast gels, 12 mini handcast gels, 6 Criterion™ precast gels, or 3 PROTEAN® II xi handcast gels
Electrode choices	Durable platinum-coated titanium anode and stainless-steel cathode plate electrodes*, or economical platinum wire electrodes
Recommended power supply	PowerPac™ HC
Dimensions (W x L x H)	18 x 9.5 x 24 cm

* Plate electrodes create a high-strength electrical field with higher current densities than other electrodes, producing faster and more efficient transfers.

Ordering Information

Catalog #	Description
1703939*	**Trans-Blot Cell with Plate Electrodes and Super Cooling Coil**, includes 2 gel holder cassettes, buffer tank, lid with power cables, 4 foam pads, 1 pack precut blot absorbent filter paper (15 x 20 cm)
1703853*	**Trans-Blot Cell with Plate Electrodes, Super Cooling Coil, and PowerPac HC Power Supply**, includes #1703939, #1703912, and #1645052
1703946	**Trans-Blot Cell with Plate Electrodes**, includes 2 gel holder cassettes, buffer tank, lid with power cables, 4 foam pads, 1 pack precut blot absorbent filter paper (15 x 20 cm)
1703850	**Trans-Blot Cell with Plate Electrodes and PowerPac HC Power Supply**, includes #1703946 and #1645052
1703910	**Trans-Blot Cell with Wire Electrodes**, includes 2 gel holder cassettes, buffer tank, lid with power cables, 4 foam pads, 1 pack precut blot absorbent filter paper (15 x 20 cm)
1703825	**Trans-Blot Cell with Wire Electrodes and PowerPac HC Power Supply**, includes #1703910 and #1645052
Accessories	
1703914	**Foam Pads**, 15.5 x 20.5 cm, 6
1703956	**Thick Blot Paper**, 15 x 20 cm, for Trans-Blot cassette, 25 sheets
1703960	**Extra Thick Blot Paper**, 15 x 20 cm, 30 sheets
1703943	**Trans-Blot Platinum Anode Plate Electrode**
1703944	**Trans-Blot Stainless-Steel Cathode Plate Electrode**
1703945	**Trans-Blot Plate Electrode Pair**, platinum anode and stainless-steel cathode
1703920	**Trans-Blot Standard Wire Electrode Card**, cathode
1703921	**Trans-Blot Standard Wire Electrode Card**, anode
1703912	**Super Cooling Coil**, required for all high-intensity transfers
1703913	**Gel Holder Cassette**, includes 2 foam pads
1703922	**Trans-Blot Cell Buffer Tank**
1703923	**Trans-Blot Cell Lid with Power Cables**

* Trans-Blot cells require the super cooling coil for high-intensity transfers; the super cooling coil is also recommended for all applications using plate electrodes.

Trans-Blot® Plus Cell

The Trans-Blot Plus cell provides transfers of proteins from large format gels in as little as 15–30 minutes.

- Durable plate electrodes (platinum coated and stainless steel) that provide a strong and uniform electrical field
- Rigid gel holder cassettes that ensure uniform contact along the entire gel and membrane surface
- A hinged cassette design that prevents slipping and facilitates cassette assembly
- Color-coded cassettes and electrode plates to ensure proper orientation in the cell
- Temperature regulation with the super cooling coil and refrigerated water recirculator
- An optional assembly tray that is ideal for gel sandwich and cassette assembly

For More Information
Request or download bulletin: 2866

Trans-Blot Plus cell components:
1. Buffer tank and lid with cables.
2. Gel holder cassettes.
3. Foam pads.
4. Plate electrodes.
5. Super cooling coil.

See Also
PowerPac HC power supply: page 155.
Precast gels: pages 168, 177.
Blotting membranes: page 232.
Blot detection reagents: page 236.
Gel clip: page 190.
Buffers: page 236.

Specifications

Maximum gel size (W x L)	26.5 x 28 cm
Buffer requirement	10–12 L
Gel capacity	27 Mini-PROTEAN® precast gels, 27 Mini-PROTEAN handcast gels, 27 Ready Gel® precast gels, 12 Criterion™ gels, or 3 PROTEAN® II XL gels
Recommended power supply	PowerPac™ HC
Dimensions (W x L x H)	30 x 17.3 x 39.4 cm

Ordering Information

Catalog #	Description
1703990*	**Trans-Blot Plus Cell with Plate Electrodes and Super Cooling Coil**, includes 3 gel holder cassettes, buffer tank, lid with power cables, 6 foam pads, 1 pack blot absorbent filter paper (26.5 x 28 cm, 30 sheets), roller, stirbar
1703991	**Trans-Blot Plus Cell and PowerPac HC Power Supply**, 100–120/220–240 V, includes #1703990 and #1645052
1703992	**Trans-Blot Plus Cell and PowerPac Universal Power Supply**, 100–120/220–240 V, includes #1703990 and #1645070
1654144	**PROTEAN Plus Dodeca Cell (100/120 V), Trans-Blot Plus Cell, and PowerPac Universal Power Supply**, includes #1654150, #1703990, and #1645070
1654145	**PROTEAN Plus Dodeca Cell (220/240 V), Trans-Blot Plus Cell, and PowerPac Universal Power Supply**, includes #1654151, #1703990, and #1645070

Accessories

1703995	**Foam Pads**, 27 x 28.5 cm, 2
1703997	**Stirbar**
1703998	**Trans-Blot Plus Roller**, 6 in wide
1704990	**Trans-Blot Plus Super Cooling Coil**
1704991	**Trans-Blot Plus Platinum Anode Plate Electrode**
1704992	**Trans-Blot Plus Stainless-Steel Cathode Plate Electrode**

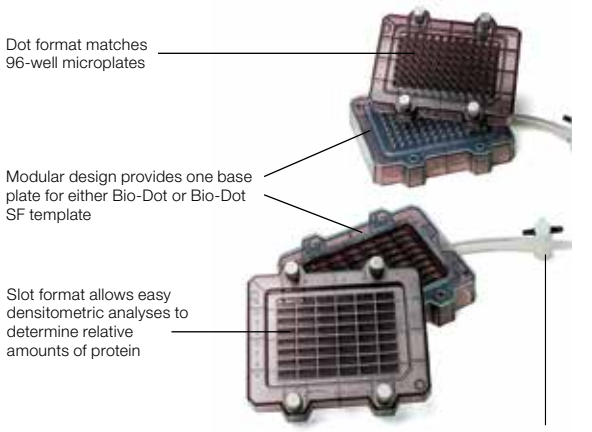
* Trans-Blot cells require the super cooling coil for high-intensity transfers; the super cooling coil is also recommended for all applications using plate electrodes.

Microfiltration and Screening Systems

Bio-Dot® and Bio-Dot SF Microfiltration Apparatus

The 96-well Bio-Dot and 48-well Bio-Dot SF (slot format) microfiltration units provide easy, reproducible methods for binding proteins or nucleic acids in solution onto membranes. The Bio-Dot SF apparatus focuses sample to a thin line instead of a circle, making quantitation by densitometry more reproducible. Each is available as a complete, independent unit or as a modular template without the manifold base. Features include:

- Resistance to 100% ethanol, strong acid, and NaOH
- Autoclavability
- Sealing gasket to eliminate lateral leakage
- Easy sample application with microplate-based spacing
- Flow valve (three-way) for adjustable vacuum



Specifications

	Bio-Dot Apparatus	Bio-Dot SF Apparatus
Format	Dot blot	Slot blot
Samples	96-well, 8 x 12 format	48-well, 6 x 8 format
Sample volume	50–600 µl	50–500 µl
Well size	3 mm diameter	7 x 0.75 mm
Quantitation with densitometer	Yes, but Bio-Dot SF unit recommended	Yes
Overnight incubations	Yes	No
Membrane size (W x L)	12 x 9 cm	12 x 9 cm
Dimensions (W x H x D)	9 x 6.5 x 12"	9.5 x 7 x 12"
Weight	1.1 kg (2.5 lb)	1.2 kg (2.6 lb)

Ordering Information

Catalog #	Description
1703938	**Bio-Dot Microfiltration System**, includes Bio-Dot apparatus (#1706545) and Bio-Dot SF module (#1706543) templates, vacuum manifold base, gasket support plates, gasket
1706545	**Bio-Dot Apparatus**, includes Bio-Dot sample template, vacuum manifold base, gasket support plate, gasket
1706547	**Bio-Dot Module**, without vacuum manifold base, for conversion of Bio-Dot SF to Bio-Dot apparatus
1706542	**Bio-Dot SF Apparatus**, includes Bio-Dot SF sample template, vacuum manifold base, gasket support plate, gasket, filter paper
1706543	**Bio-Dot SF Module**, without vacuum manifold base, for conversion of Bio-Dot to Bio-Dot SF apparatus
Accessories	
1706546	**Bio-Dot Gaskets**, 3
1706544	**Bio-Dot SF Gaskets**, 2
1620161	**Bio-Dot/Bio-Dot SF Filter Paper**, 11.3 x 7.7 cm, 60 sheets

Mini-PROTEAN® II Multiscreen Apparatus

Advantages of the Mini-PROTEAN II multiscreen apparatus include:

- Quick and efficient screening or filtering of up to 40 different antibodies or sera without cutting a western blot into individual strips
- Compatibility with all common western blotting procedures
- Precise side-by-side comparison of results
- Economical use of antibody samples — requires only 600 µl per channel
- Separate, detachable sample templates that accommodate one or two 8 x 7 cm blots
- Clamps that secure the blot to form 40 leakproof channels
- Molded gasket that eliminates cross-contamination between samples
- Easy operation and assembly

Specifications

Membrane size (W x L)	8 x 7 cm
Channel dimensions	2.5 mm x 5.2 cm x 5 mm
Dimensions (W x L x H)	27 x 11 x 6 cm

Ordering Information

Catalog #	Description
1704017	**Mini-PROTEAN II Multiscreen Apparatus**, includes 2 sample templates, 2 gaskets, base plate
1704018	**Multiscreen Gaskets**, 2

Mini Incubation Trays

Trays allow screening of antigens that have been blotted onto membranes. An entire immunological screening process can be carried out in a single tray.

- Each tray has eight 10.5 cm x 5 mm channels to accommodate strips cut from the blotted membrane. Channels align with an eight-channel pipet
- Minimal reagent volumes needed (400 µl/channel)
- Numbered channels for sample identification
- Unique ribs in the tray lid and the design of the sample channels ensure that no cross-contamination occurs

Ordering Information

Catalog #	Description
1703902	**Mini Incubation Trays**, 20
1703903	**Mini Incubation Trays**, 100

Membranes and Filter Papers

Bio-Rad offers a comprehensive line of blotting membranes including different grades of nitrocellulose, PVDF, and Zeta-Probe® nylon membranes. Use the selection guide below to choose the membrane appropriate for your application.

For More Information
Web: bio-rad.com/blottingmembranes

Blotting Membrane and Filter Paper Selection Guide

Membrane	Pore Size	Binding Capacity, µg/cm²	Compatible Detection Methods	Notes
Nitrocellulose	0.45 µm 0.2 µm	80–100	Colorimetric, chemiluminescence, chemifluorescence, radioactive	General-purpose protein blotting membrane
Supported nitrocellulose	0.45 µm 0.2 µm	80–100	Colorimetric, chemiluminescence, chemifluorescence, radioactive	Pure nitrocellulose cast on an inert synthetic support; increased strength for easier handling and for reprobing
Immun-Blot® PVDF	0.2 µm	150–160	Colorimetric, chemiluminescence, radioactive	High mechanical strength and chemical stability; recommended for western blotting
Immun-Blot LF PVDF	0.45 µm	155–300	Colorimetric, chemiluminescence, chemifluorescence, fluorescence	High mechanical strength and chemical stability; low autofluorescence; recommended for western blotting using fluorescence detection
Sequi-Blot™ PVDF	0.2 µm	170–200	Colorimetric, radioactive	High mechanical strength and chemical stability; recommended for protein sequencing

Blotting Apparatus	Precut Membrane Sizes	Precut Filter Paper Sizes	Membrane/Filter Paper Sandwiches
Mini Trans-Blot® cell	7 x 8.5 cm	7.5 x 10.5 cm	7 x 8.5 cm
Criterion™ blotter	8.5 x 13.5 cm	9.5 x 15.2 cm	8.5 x 13.5 cm
Trans-Blot® cell	13.5 x 16.5 cm	15 x 20 cm	—
Trans-Blot Plus cell	25 x 28 cm 26.5 x 28 cm	— —	— —
Trans-Blot® Turbo™	7 x 8.5 cm 8.5 x 13.5 cm	7.5 x 10.5 cm 9.5 x 15.2 cm	7 x 8.5 cm 8.5 x 13.5 cm (see page 233)
Trans-Blot SD cell	7 x 8.5 cm 11.5 x 16 cm 15 x 15 cm 15 x 9.2 cm 20 x 20 cm	7 x 8.5 cm 8 x 13.5 cm 14 x 16 cm 18 x 18.5 cm —	7 x 8.5 cm 8.5 x 13.5 cm — — —
Mini-PROTEAN® II multiscreen apparatus	7 x 8.5 cm 7 x 8.5 cm	7 x 8.5 cm —	7 x 8.5 cm —
Bio-Dot® apparatus	9 x 12 cm	11.3 x 7.7 cm	—
Bio-Dot SF apparatus	9 x 12 cm	11.3 x 7.7 cm	—
Vacuum blotter	—	—	—

See Also
Filter paper: page 235.

Nitrocellulose Membranes

Nitrocellulose

Nitrocellulose with the 0.45 µm pore size is recommended for most analytical blotting including protein, ssDNA, and RNA transfers. For transfer of low MW proteins (<15 kD) or nucleic acids, the 0.2 µm nitrocellulose membrane prevents sample loss due to transfer through the membrane.

Supported Nitrocellulose

Made of 100% pure nitrocellulose cast on an inert synthetic support, this nitrocellulose is a solid support for nucleic acid and protein applications and can withstand the rigors of multiple reprobing and autoclaving (121°C).

Ordering Information

Catalog #	Description	Recommended Uses
Nitrocellulose Membranes (0.2 µm)		
1620112	**Nitrocellulose Membrane**, 0.2 µm, 30 cm x 3.5 m, 1 roll	Transfer of low MW proteins or nucleic acids (has smaller pore size)
1620212	**Nitrocellulose/Filter Paper Sandwiches**, 0.2 µm, 7 x 8.4 cm, 20 pack	
1620213	**Nitrocellulose/Filter Paper Sandwiches**, 0.2 µm, 7 x 8.4 cm, 50 pack	
1620232	**Nitrocellulose/Filter Paper Sandwiches**, 0.2 µm, 8.5 x 13.5 cm, 20 pack	
1620233	**Nitrocellulose/Filter Paper Sandwiches**, 0.2 µm, 8.5 x 13.5 cm, 50 pack	
1620146	**Nitrocellulose Membranes**, 0.2 µm, 7 x 8.4 cm, 10 sheets	
1620168	**Nitrocellulose Membranes**, 0.2 µm, 8.5 x 13.5 cm, 10 sheets	
1620147	**Nitrocellulose Membranes**, 0.2 µm, 13.5 x 16.5 cm, 10 sheets	
1620150	**Nitrocellulose Membranes**, 0.2 µm, 20 x 20 cm, 5 sheets	
1620252	**Nitrocellulose Membranes**, 0.2 µm, 26.5 x 28 cm, 10 sheets	
Nitrocellulose Membranes (0.45 µm)		
1620115	**Nitrocellulose Membrane**, 0.45 µm, 30 cm x 3.5 m, 1 roll	Transfer of low MW antigens, immunoglobulins, glycoprotein receptor proteins, histones and nonhistones, etc.; capillary Southern blotting of ssDNA and RNA <500 bp (use Zeta-Probe membranes for blotting ssDNA and RNA of all sizes)
1620214	**Nitrocellulose/Filter Paper Sandwiches**, 0.45 µm, 7 x 8.4 cm, 20 pack	
1620215	**Nitrocellulose/Filter Paper Sandwiches**, 0.45 µm, 7 x 8.4 cm, 50 pack	
1620234	**Nitrocellulose/Filter Paper Sandwiches**, 0.45 µm, 8.5 x 13.5 cm, 20 pack	
1620235	**Nitrocellulose/Filter Paper Sandwiches**, 0.45 µm, 8.5 x 13.5 cm, 50 pack	
1620145	**Nitrocellulose Membranes**, 0.45 µm, 7 x 8.4 cm, 10 sheets	
1620167	**Nitrocellulose Membranes**, 0.45 µm, 8.5 x 13.5 cm, 10 sheets	
1620117	**Nitrocellulose Membranes**, 0.45 µm, 9 x 12 cm, 10 sheets	
1620148	**Nitrocellulose Membranes**, 0.45 µm, 11.5 x 16 cm, 10 sheets	
1620114	**Nitrocellulose Membranes**, 0.45 µm, 15 x 9.2 cm, 10 sheets	
1620116	**Nitrocellulose Membranes**, 0.45 µm, 15 x 15 cm, 10 sheets	
1620113	**Nitrocellulose Membranes**, 0.45 µm, 20 x 20 cm, 5 sheets	
1620251	**Nitrocellulose Membranes**, 0.45 µm, 26.5 x 28 cm, 10 sheets	
Supported Nitrocellulose Membranes (0.2 µm)		
1620097	**Supported Nitrocellulose Membrane**, 0.2 µm, 30 cm x 3 m, 1 roll	Protein and nucleic acid blotting
1620095	**Supported Nitrocellulose Membranes**, 0.2 µm, 7 x 8.4 cm, 10 sheets	
1620071	**Supported Nitrocellulose Membranes**, 0.2 µm, 8.5 x 13.5 cm, 10 sheets	
Supported Nitrocellulose Membranes (0.45 µm)		
1620094	**Supported Nitrocellulose Membrane**, 0.45 µm, 30 cm x 3 m, 1 roll	Protein and nucleic acid blotting
1620090	**Supported Nitrocellulose Membranes**, 0.45 µm, 7 x 8.4 cm, 10 sheets	
1620070	**Supported Nitrocellulose Membranes**, 0.45 µm, 8.5 x 13.5 cm, 10 sheets	

PVDF Membranes

The chemically resistant PVDF membrane has very high protein binding capacity and resistance to tearing and cracking, even after repeated stripping and reprobing. All Bio-Rad PVDF membranes have a 0.2 µm pore size.

Immun-Blot® PVDF for Western Blotting

This membrane is ideal for chemiluminescent and colorimetric western blots because it retains target protein very strongly but reduces nonspecific protein binding that can obscure high-sensitivity detection. Binding capacity is 150–160 µg/cm^2.

Sequi-Blot™ PVDF for Protein Sequencing

This membrane gives outstanding performance in protein sequencing, even for low-abundance samples. Sequi-Blot PVDF retains all transferred protein and has a binding capacity of 170–200 µg/cm^2.

Immun-Blot Low Fluorescence PVDF Membrane

Optimized for fluorescence applications, the low fluorescence property of the membrane enhances image quality and improves sensitivity of all fluorescence detection protocols. It is ideal for multiplex, fluorescence western blotting, and chemifluorescence applications. The membrane is also compatible with other detection methods such as chemiluminescence and colorimetric detection. This membrane is highly recommended for the V3 Western Workflow™.

For More Information
Web: bio-rad.com/v3
Request or download bulletins: 2212 and 6116

Ordering Information

Catalog #	Description
Immun-Blot PVDF Membranes	
1620177	**Immun-Blot PVDF Membrane**, 26 cm x 3.3 m, 1 roll
1620218	**Immun-Blot PVDF/Filter Paper Sandwiches**, 7 x 8.4 cm, 20 pack
1620219	**Immun-Blot PVDF/Filter Paper Sandwiches**, 7 x 8.4 cm, 50 pack
1620238	**Immun-Blot PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 20 pack
1620239	**Immun-Blot PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 50 pack
1620174	**Immun-Blot PVDF Membranes**, 7 x 8.4 cm, 10 sheets
1620175	**Immun-Blot PVDF Membranes**, 10 x 15 cm, 10 sheets
1620176	**Immun-Blot PVDF Membranes**, 20 x 20 cm, 10 sheets
1620255	**Immun-Blot PVDF Membranes**, 25 x 28 cm, 10 sheets
Sequi-Blot PVDF Membranes	
1620184	**Sequi-Blot PVDF Membrane**, 26 cm x 3.3 m, 1 roll
1620237	**Sequi-Blot PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 50 pack
1620186	**Sequi-Blot PVDF Membranes**, 7 x 8.4 cm, 10 sheets
1620180	**Sequi-Blot PVDF Membranes**, 10 x 15 cm, 10 sheets
1620181	**Sequi-Blot PVDF Membranes**, 15 x 15 cm, 10 sheets
1620182	**Sequi-Blot PVDF Membranes**, 20 x 20 cm, 10 sheets
Immun-Blot Low-Fluorescence PVDF Membranes	
1620260	**Low Fluorescence PVDF/Filter Paper Sandwiches**, 7 x 8.5 cm, 10 pack
1620261	**Low Fluorescence PVDF/Filter Paper Sandwiches**, 7 x 8.5 cm, 20 pack
1620262	**Low Fluorescence PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 10 pack
1620263	**Low Fluorescence PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 20 pack
1620264	**Low Fluorescence PVDF Roll**, 28 x 3.8 m, 1 roll

Zeta-Probe® Nylon Membranes

Zeta-Probe Membranes

Zeta-Probe membranes bind nucleic acids independently of buffer pH, so they can be used in traditional Southern blots, rapid alkaline Southern and northern blotting techniques, and electrophoretic transfer of nucleic acids from agarose and polyacrylamide gels. Zeta-Probe membranes can be hybridized and stripped as many as 20 times for DNA (Li et al. 1987) and six times for RNA (Gatti et al. 1984). Oligonucleotides as short as six bases will bind to the membrane and oligonucleotides ≥20 bases long will be retained after repeated hybridization and washing.

Zeta-Probe GT Membranes

Zeta-Probe GT (genomic DNA-tested) membranes meet all performance specifications of Zeta-Probe membranes, and each lot is also functionally tested to ensure that 3 pg of single-copy factor VIII human DNA can be detected in 5 µg total genomic DNA.

For More Information
Request or download bulletin: 2096

C/P Lift® Membranes

C/P Lift membranes yield strong, sharp signals and very low background from positive colonies or plaques in confluent lawns. The membranes complement the screening of genomic and cDNA libraries using either DNA or RNA probes. The membranes wet easily and can be used directly out of the box with no pretreatment.

Ordering Information

Description	Zeta-Probe	Zeta-Probe GT
Zeta-Probe and Zeta-Probe GT Membranes		
30 cm x 3.3 m, 1 roll	1620159	1620196
20 cm x 3.3 m, 1 roll	1620165	1620197
7 x 10 cm, 15 sheets	1620206	1620208
9 x 12 cm, 15 sheets	1620153	1620190

continues

Ordering Information

Description	Zeta-Probe	Zeta-Probe GT
Zeta-Probe and Zeta-Probe GT Membranes (cont.)		
10 x 15 cm, 15 sheets	1620154	1620191
15 x 15 cm, 15 sheets	1620155	1620192
15 x 20 cm, 15 sheets	1620156	1620193
20 x 20 cm, 15 sheets	1620157	1620194
20 x 25 cm, 3 sheets	1620158	1620195

Catalog #	Description
C/P Lift Membranes	
1620162	**C/P Lift Membrane Disks**, 85 mm, 50
1703202	**Supported Nitrocellulose Membrane Disks**, 82.5 mm, 50

Filter Paper

Bio-Rad offers a range of filter papers for blotting applications, including filter paper precut to fit standard gel sizes.

Ordering Information

Catalog #	Description	Recommended Uses
Blot Absorbent Filter Paper (Extra Thick)		
1703965	**Extra Thick Blot Paper**, 7.5 x 10 cm, for Ready Gel or Mini-PROTEAN Tetra gels, 60 sheets	All blotting applications using the Trans-Blot SD cell or Trans-Blot cell (precut to gel dimensions from well to bottom of gel)
1703966	**Extra Thick Blot Paper**, 7 x 8.4 cm, for Ready Gel or Mini-PROTEAN Tetra gels, 60 sheets	
1703967	**Extra Thick Blot Paper**, 8 x 13.5 cm, for Criterion precast gels, 60 sheets	
1703968	**Extra Thick Blot Paper**, 14 x 16 cm, for PROTEAN II xi gels, 30 sheets	
1703969	**Extra Thick Blot Paper**, 19 x 18.5 cm, for PROTEAN II XL gels, 30 sheets	
1703958	**Extra Thick Blot Paper**, 10 x 15 cm, 30 sheets	
1703959	**Extra Thick Blot Paper**, 15 x 15 cm, 30 sheets	
1703960	**Extra Thick Blot Paper**, 15 x 20 cm, 30 sheets	
Blot Absorbent Filter Paper (Thick)		
1703932	**Thick Blot Paper**, 7.5 x 10 cm, for Mini Trans-Blot cassette, 50 sheets	All blotting applications requiring thick, high wet strength filter paper
1704085	**Thick Blot Paper**, 9.5 x 15.2 cm, for Criterion blotter, 50 sheets	
1703955	**Thick Blot Paper**, 14 x 16 cm, for PROTEAN II xi gels, 25 sheets	
1703956	**Thick Blot Paper**, 15 x 20 cm, for Trans-Blot cassette, 25 sheet	
1650921	**Thick Blot Paper**, 18 x 34 cm, for Model 224, 443, and 543 slab gel dryers, 25 sheets	
1620161	**Bio-Dot/Bio-Dot SF Filter Paper**, 7.7 x 11.3 cm, 60 sheets	
1650962	**Filter Paper Backing**, 35 x 45 cm, for stained gels, 25 sheets	
Blot Absorbent Filter Paper (Thin)		
1620118	**Thin Blot Paper**, 33 cm x 3 m, 1 roll	All blotting applications requiring thin, high wet strength filter paper

Blotting Stains and Tracking Dyes

Bio-Rad offers a selection of stains for blotting applications; see page 243. Tracking dyes can be found on page 259.

Blotting Buffers and Reagents

Premixed Blotting Buffers and Buffer Reagents

Two transfer buffers are available: 10x Tris/glycine and 10x Tris/CAPS. Premixed blocking buffers, available as 1x PBS with casein and 1x TBS with casein, take the time and effort out of solubilizing casein. Bio-Rad offers a complete line of reagents for preparation of buffers to your own specifications.

Blotting Buffer Selection Guide

	1x Formulation	Applications
Transfer Buffers*		
10x Tris/glycine	25 mM Tris, 192 mM glycine, pH 8.3	Western blotting
10x Tris/CAPS	Anode buffer: 60 mM Tris, 40 mM CAPS, 15% methanol, pH 9.6 Cathode buffer: 60 mM Tris, 40 mM CAPS, 0.1% (w/v) SDS, pH 9.6	A discontinuous buffer system that increases transfer efficiency in semi-dry applications
Processing Buffers		
10x PBS	10 mM sodium phosphate, 150 mM NaCl, pH 7.4	Western blotting wash solution
10x TBS	20 mM Tris, 500 mM NaCl, pH 7.4	Western blotting wash solution
1x PBS with 1% casein	10 mM sodium phosphate, 150 mM NaCl, 1% (w/v) casein, pH 7.4	Western blotting blocking buffer (casein blockers recommended for all applications, including those with biotin-avidin complexes)
1x TBS with 1% casein	20 mM Tris, 500 mM NaCl, 1% (w/v) casein, pH 7.4	Western blotting blocking buffer (casein blockers recommended for all applications, including those with biotin-avidin complexes)

* These buffers can be used for all gel types and formulations.

Ordering Information

Catalog #	Description	Catalog #	Description
Blot Transfer and Processing Buffers		**Detergents and Blocking Buffers**	
1610734	**10x Tris/Glycine**, 1 L	1706537	**Gelatin, EIA grade**, 200 g
1610771	**10x Tris/Glycine**, 5 L cube	1706404	**Blotting-Grade Blocker, nonfat dry milk**, 300 g
1610778	**10x Tris/CAPS**, 1L		
1610780	**10x Phosphate Buffered Saline**, 1 L	1706531	**Tween 20**, EIA grade, 100 ml
1706435	**10x Tris Buffered Saline**, 1 L	1610781	**10% (w/v) Tween 20**, for easy pipetting, 1 L
		1610418	**SDS Solution**, 20% (w/v), 1 L
		1610783	**1x Phosphate Buffered Saline with 1% Casein***, 1 L
		1610782	**1x Tris Buffered Saline with 1% Casein***, 1 L
Reagents			
1610610	**Dithiothreitol (DTT)****, 1 g	1610710	**2-Mercaptoethanol**, 25 ml
1610611	**Dithiothreitol (DTT)****, 5 g	1632101	**Tributylphosphine (TBP)**, 200 mM, 0.6 ml
1610729	**EDTA**, 500 g		
1706537	**Gelatin**, EIA grade, 200 g	1610713	**Tricine**, 500 g
1610717	**Glycine**, 250 g	1610716	**Tris**, 500 g
1610718	**Glycine**, 1 kg	1610719	**Tris**, 1 kg
		1610730	**Urea**, 250 g

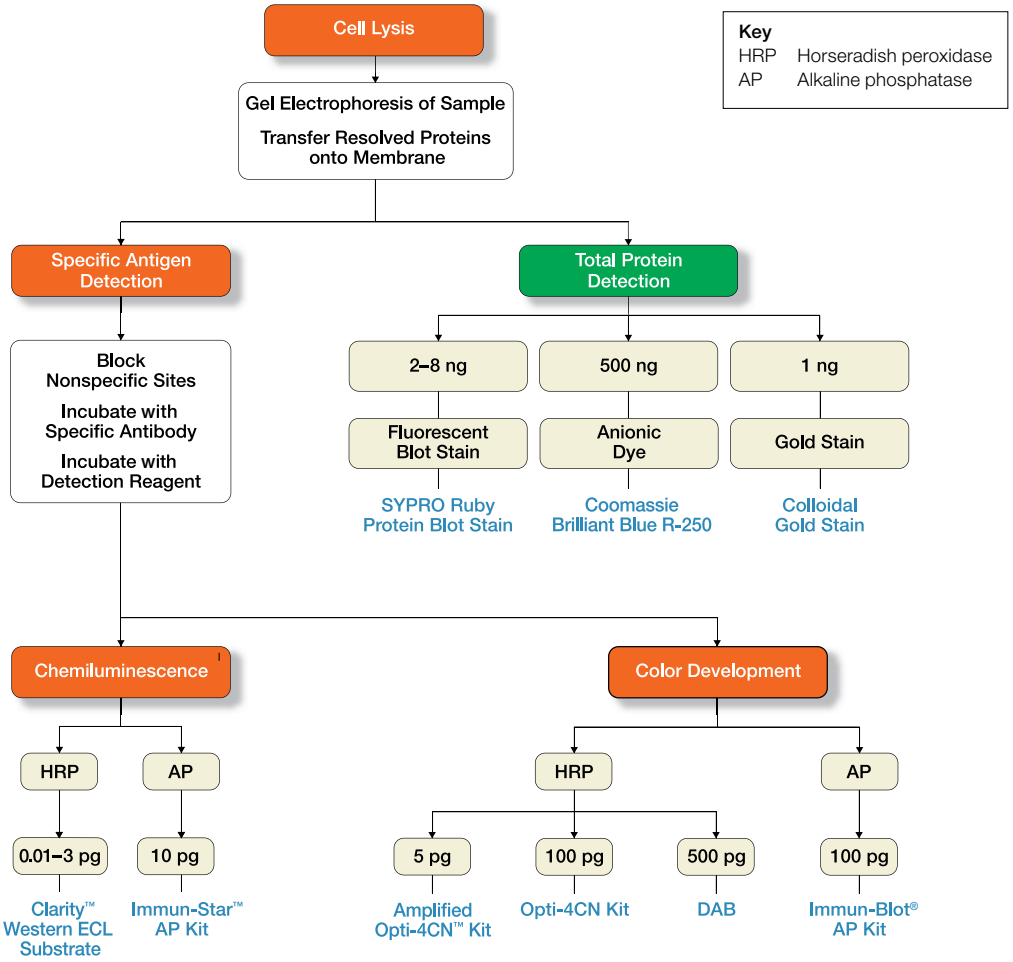
* Store at 2–8°C.

** Store desiccated at 2–8°C; store other reagents at room temperature, dry, and away from direct sunlight. Hazardous shipping charges may apply.

Immunodetection Reagents and Kits

The most common blot detection techniques use antibodies to either probe for specific antigens in a complex protein sample or stain all proteins bound to a membrane. The chart indicates the maximum sensitivity achievable with each detection system.

For more information on methods, equipment, and reagents used in protein blotting, request the Protein Blotting Guide (bulletin 2895).



Blot detection reagent selection guide.

Chemiluminescence Detection

Chemiluminescent western blot detection offers highly sensitive detection of proteins bound to blotting membranes. Most specific antigen detection methods are based on HRP (horseradish peroxidase) or AP (alkaline phosphatase) secondary antibody conjugates. The signal can be captured with film or dedicated imaging equipment (see page 280).

Chemiluminescence-Based Kit Selection Guide

	Clarity™ Western ECL	Immun-Star™ AP
Lower detection limit	Mid femtogram	10 pg
Signal duration	24 hr	24 hr
Primary detection method	Digital imager and film	Film
Suggested anitbody dilution	Primary: 1:1,000–1/50,000; Secondary: 1:50,000–1/250,000	Primary: 1:1,000–1/6,000; Secondary: 1:3,000
Recommended membrane	Nitrocellulose, PVDF, or LF PVDF	Nitrocellulose, PVDF, or LF PVDF

Clarity™ Western ECL Substrate

Clarity Western ECL substrate is compatible with any HRP-conjugate secondary detection reagent and ideal for both digital and film-based imaging. The Clarity substrate provides excellent sensitivity with an extremely long signal duration that allows re-imaging without loss of signal. Features include:

- Low background levels, yielding very clear images
- Bright, long signal
- Shelf life of 12 months at room temperature

For More Information
Web: bio-rad.com/clarity
Request or download bulletin: 6305

Ordering Information

Catalog #	Description
1705060	**Clarity Western ECL Substrate**, 200 ml size contains Clarity western peroxide reagent, 100 ml, and Clarity western luminol/enhancer reagent, 100 ml
1705061	**Clarity Western ECL Substrate**, 500 ml size contains Clarity western peroxide reagent, 250 ml, and Clarity western luminol/enhancer reagent, 250 ml

Immun-Star™ AP Chemiluminescence Kits

These kits combine Bio-Rad's blotting reagents and CDP-*Star* chemiluminescence technology. Exposure times on film are typically between 30 seconds and 5 minutes, depending on sample amount and antibody specificity. Immun-Star AP kit features include:

- The ability to reactivate a blot, even weeks later, with the addition of fresh chemiluminescent substrate
- Detection of as little as 10 pg of protein
- Stable light signal duration of 24 hr
- Ability to strip and reprobe

Choose from two kits based on goat anti-mouse or goat anti-rabbit conjugates.

For More Information
Web: bio-rad.com/blotdetection
Request or download bulletin: 2050

Ordering Information

Catalog #	Description	Substrate	Enhancer*	Antibody
Immun-Star AP Kits** **and Components**				
1705010	**GAM-AP Detection Kit**	•	•	•
1705011	**GAR-AP Detection Kit**	•	•	•
1705018	**AP Substrate**, 125 ml	•		
1705012	**AP Substrate Pack**	•	•	

* The enhancer is used on nitrocellulose blots but is not optimized for PVDF blots. Additional testing is recommended to determine appropriate conditions for PVDF blots.

** GAM, goat anti-mouse; GAR, goat anti-rabbit.

Colorimetric Detection

Enzymes such as HRP or AP convert several substrates to a colored precipitate. As the precipitate accumulates on the blot, a colored signal develops. The reaction can be monitored and stopped when the desired signal over background is observed. Colorimetric detection is easier to perform than film-based chemiluminescence detection; however, the method's single end-point result does not allow multiple exposures of chemiluminescent methods. Colorimetric detection is typically considered a medium-sensitivity method compared to radioactive or chemiluminescence detection. However, Bio-Rad offers amplified colorimetric systems that provide high sensitivity comparable to or exceeding that of chemiluminescent detection.

For More Information
Web: bio-rad.com/blotdetection

Colorimetric HRP Detection

Bio-Rad offers three types of kits based on the detection reagent 4-chloro-1-naphthol (4CN) for colorimetric HRP detection; individual reagents are also available, including 3,3'-diaminobenzidine (DAB), an alternative reagent.

For More Information
Request or download bulletin: 2260

Opti-4CN™ Substrate and Detection Kits

Detection sensitivity using 4CN is about 500 pg of antigen, with the benefit of very low background. The Opti-4CN kit improves detection sensitivity over that of 4CN, to 100 pg, with no additional steps required.

Amplified Opti-4CN Substrate and Detection Kits

Amplified Opti-4CN detection kits are based on proprietary HRP-activated amplification reagents from Bio-Rad. These kits allow colorimetric detection to 5 pg, which is comparable to chemiluminescence detection sensitivity. No additional materials or special equipment are required.

Immun-Blot® HRP Assay Kits

Immun-Blot HRP assay kits provide the reagents required to perform standard HRP/4CN colorimetric detection on western blots with the added convenience of premixed buffers and enzyme substrates. All kit components are individually tested for quality control in blotting applications.

Premixed and Individual HRP Colorimetric Substrates

Premixed enzyme substrate kits are convenient and reliable and reduce exposure to hazardous reagents used in the color development of western blots.

Ordering Information

Catalog #	Description
Opti-4CN Kits*	
1708235	**Opti-4CN Substrate Kit**
1708236	**Opti-4CN Goat Anti-Rabbit Detection Kit**
1708237	**Opti-4CN Goat Anti-Mouse Detection Kit**
Amplified Opti-4CN Kits*	
1708238	**Amplified Opti-4CN Substrate Kit**
1708240	**Amplified Opti-4CN Goat Anti-Mouse Detection Kit**
1708239	**Amplified Opti-4CN Goat Anti-Rabbit Detection Kit**
Immun-Blot HRP Assay Kits, with 4CN**	
1706463	**Goat Anti-Rabbit IgG (H + L)-HRP Assay Kit**
1706464	**Goat Anti-Mouse IgG (H + L)-HRP Assay Kit**
1706465	**Goat Anti-Human IgG (H + L)-HRP Assay Kit**
Premixed Substrate Reagents	
1706431	**HRP Conjugate Substrate Kit**, contains premixed 4CN, hydrogen peroxide solutions, color development buffer; makes 1 L color development solution
Individual Blotting Substrates	
1706534	**HRP Color Development Reagent**, 4CN, 5 g
1706535	**HRP Color Development Reagent**, DAB, 5 g

* Each kit contains enough reagent for 2,500 cm^2 of membrane or approximately 50 mini blots.

** Kits contain 0.5 ml of specific HRP blotting-grade conjugate; each kit provides reagents (blotting-grade TBS buffer, Tween 20 detergent, gelatin blocking reagent, and 4CN substrate solution) for 200 assays on a 0.6–0.8 x 9.2 cm nitrocellulose strip using a total volume of 5.0 ml.

Colorimetric AP Detection

Immun-Blot® AP Assay Kits

A common substrate for colorimetric detection on western blots based on AP-conjugated secondary antibodies is 5-bromo-4-chloro-3-indolyl phosphate/nitroblue tetrazolium (BCIP/NBT). Immun-Blot AP assay kits provide the essential reagents to perform colorimetric detection (of up to 100 pg of protein) based on AP and BCIP/NBT with the added convenience of premixed buffers and enzyme substrates. All kit components are individually tested for quality control in blotting applications.

Premixed AP Colorimetric Substrates

Premixed enzyme substrate kits provide convenience and reliability and reduce exposure to hazardous reagents.

For More Information
Web: bio-rad.com/blotdetection
Request or download bulletins: 1600 and 2032

Ordering Information

Catalog #	Description
Opti-4CN Kits*	
1706460	**Goat Anti-Rabbit IgG (H + L)-AP Assay Kit**
1706461	**Goat Anti-Mouse IgG (H + L)-AP Assay Kit**
1706462	**Goat Anti-Human IgG (H + L)-AP Assay Kit**
Premixed Substrate Reagents	
1706432	**AP Conjugate Substrate Kit**, contains premixed BCIP and NBT solutions and color development buffer; makes 1 L color development solution

* Kits contain 0.5 ml of specific AP blotting-grade conjugate; each kit provides reagents (blotting grade TBS buffer, Tween 20 detergent, gelatin blocking reagent, and BCIP and NBT substrate solution) for 200 assays on a 0.6–0.8 x 9.2 cm nitrocellulose strip using a total volume of 5.0 ml.

Western Blot Conjugates and Reagents

Blotting-Grade Conjugates and Reagents

Protein A and Protein G Conjugates

Proteins A and G are bacterial cell surface proteins that bind to the Fc region of IgG molecules. Each reagent has different IgG binding capabilities, depending on the species of origin of the immunoglobulin.

Blotting-Grade Reagents

Detergents and blocking reagents for western blotting are available individually.

Primary Antibodies

For our selection of primary antibodies for western blotting and other applications, see page 276.

For More Information
Web: bio-rad.com/blotdetection

Binding Specificities of Protein A and Protein G Conjugates

Immunoglobulin	Protein A	Protein G	Immunoglobulin	Protein A	Protein G
Human IgG_1	•	•	Mouse IgG_{2b}	•	•
Human IgG_2	•	•	Mouse IgG_3	•	•
Human IgG_3	—	•	Rat IgG_1	◦	◦
Human IgG_4	•	•	Rat IgG_{2a}	—	•
Mouse IgG_1	°/—	◦	Rat IgG_{2b}	—	◦
Mouse IgG_{2a}	•	•	Rat IgG_{2c}	•	•

• Strong binding. ° Weak binding. — No binding.

Conjugate Specifications*

Products	Volume, ml	Recommended Dilution	Products	Volume, ml	Recommended Dilution
Immun-Star™ GAR	2	1:10,000	Goat anti-rabbit IgG-AP	1	1:3,000
Immun-Star GAM	2	1:10,000	Goat anti-mouse IgG-AP	1	1:3,000
Avidin-HRP	2	1:1,000–1:3,000	Goat anti-human IgG-AP	1	1:3,000
Goat anti-rabbit (H + L)	2	1:3,000	Avidin-AP	1	1:1,000–1:3,000
Goat anti-mouse (H + L)	2	1:3,000	Biotinylated-AP	1	1:3,000
Goat anti-human (H + L)	2	1:3,000	Biotinylated-GAR (H + L), human IgG adsorbed	1	1:3,000
Protein A-HRP	1	1:3,000			
Protein G-HRP	1	1:3,000			

* Shelf life of conjugates is one year when stored at 4°C.

Ordering Information

Catalog #	Description	Catalog #	Description
Blotting-Grade Conjugates, HRP			
1705046	**Immun-Star Goat Anti-Rabbit (GAR)-HRP**, lyophilized	1706522	**Protein A-HRP**, 1 ml
		1706425	**Protein G-HRP**, 1 ml
1705047	**Immun-Star Goat Anti-Mouse (GAM)-HRP**, lyophilized	1706528	**Avidin-HRP**, 2 ml
1706515	**Goat Anti-Rabbit IgG (H + L)-HRP**, 2 ml		
1706516	**Goat Anti-Mouse IgG (H + L)-HRP**, 2 ml		
1721050	**Goat Anti-Human IgG (H + L)-HRP**, 2 ml		
Blotting-Grade Conjugates, AP			
1706518	**Goat Anti-Rabbit IgG-AP**, 1 ml	1706521	**Goat Anti-Human IgG-AP**, 1 ml
1706520	**Goat Anti-Mouse IgG-AP**, 1 ml	1706403	**Biotinylated AP**, 1 ml
Detergents and Blocking Reagents			
1706537	**Gelatin**, EIA grade, 200 g	1610418	**SDS Solution**, 20% (w/v), 1 L
1706404	**Blotting-Grade Blocker**, nonfat dry milk, 300 g	1610783	**1x Phosphate Buffered Saline with 1% Casein**,* 1 L
1706531	**Tween 20**, EIA grade, 100 ml	1610782	**1x Tris Buffered Saline with 1% Casein**,* 1 L
1610781	**10% Tween 20**, for easy pipetting, 1 L		

* Store at 2–8°C.

Total Protein Blot Detection

Bio-Rad offers three stain options for total protein detection. For electrophoresis stains, see page 199.

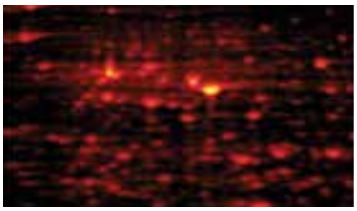
Total Protein Stains

Comparison of Total Protein Staining Methods

Stain	Sensitivity	Staining Time	Advantages	Disadvantages
SYPRO Ruby protein blot stain	2–8 ng	<1 hr	Mass spectrometry compatible	UV fluorescence detection system required
Coomassie Brilliant Blue R-250	100–1,000 ng	~1 hr	Inexpensive, rapid stain	Low sensitivity, shrinks nitrocellulose membranes
Colloidal gold total protein stain	1 ng	~2 hr	Very sensitive, rapid stain	High background with nylon membranes

SYPRO Ruby Protein Blot Stain

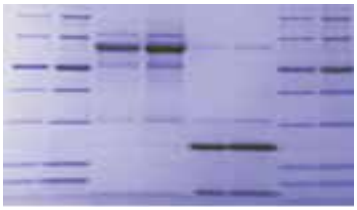
SYPRO Ruby protein blot stain provides highly sensitive detection of proteins on PVDF or nitrocellulose membranes. After staining, target proteins can be detected by colorimetric or chemiluminescence immunostaining or analyzed by microsequencing or mass spectrometry with no interference from the stain.



SYPRO Ruby protein gel stain.

Coomassie Brilliant Blue R-250 Dye

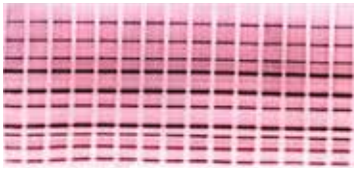
Coomassie Brilliant Blue R-250 is an anionic dye used for staining gels and membranes (PVDF and nitrocellulose). It is a rapid and inexpensive stain that can detect nanogram levels of protein. Since this dye can interfere with antibody binding sites, subsequent detection of proteins by immunostaining is not recommended.



Coomassie Brilliant Blue stain.

Colloidal Gold Total Protein Stain

Colloidal gold total protein stain is a stabilized gold stain optimized for rapid and sensitive identification of proteins bound to nitrocellulose membranes (Rohringer and Holden 1985). Protein bands stain dark red following incubation of the membrane with colloidal gold solution. The stained membrane yields a permanent record of the protein pattern for exact comparison to immunostained results. Colloidal gold total protein stain is provided ready to use.



Colloidal gold total protein stain.

For More Information
Web: bio-rad.com/totalprotein

Ordering Information

Catalog #	Description
1703127	**SYPRO Ruby Protein Blot Stain**, 200 ml
1610400	**Coomassie Brilliant Blue R-250**, 10 g
1706527	**Colloidal Gold Total Protein Stain**, 500 ml

Nucleic Acid Electrophoresis and Blotting

Bio-Rad offers a wide range of nucleic acid electrophoresis and blotting tools for life science research — from molecular ladders to mutation detection systems. Different system formats and sizes are available to accommodate a variety of application needs.

Learn More about the Technology
Web: bio-rad.com/tech/DNAelectro

DNA Electrophoresis Systems

See Also

Certified agaroses: page 261.
PowerPac Basic power supply: page 155.
DNA ladders: page 262.
Premixed electrophoresis buffers: page 260.
Nucleic acid reagents: page 259.
Gel documentation systems: page 280.
ReadyAgarose precast gels: page 252.

Bio-Rad offers a complete line of easy-to-use horizontal agarose gel electrophoresis systems, varying in length and width, for both low- and high-throughput applications. Submerged horizontal electrophoresis cells include two models that can run precast or handcast gels:

- Mini-Sub® cell GT cell
- Wide Mini-Sub cell GT cell

Three models that can run handcast gels only:

- Sub-Cell® GT cell
- Sub-Cell Model 96 cell
- Sub-Cell Model 192 cell

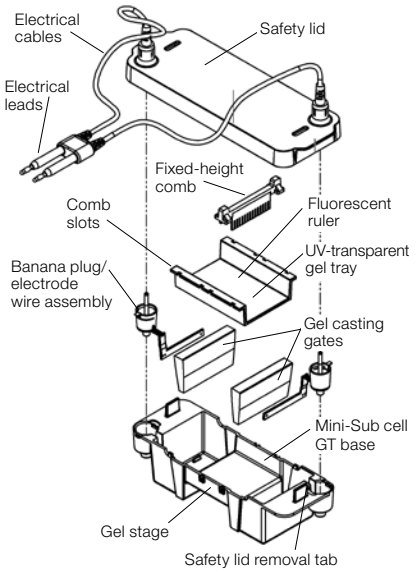
And two models configured to run ReadyAgarose™ precast gels:

- Mini ReadySub-Cell™ GT cell
- Wide mini ReadySub-Cell GT cell

Key features of the Sub-Cell family of cells include:

- UV-transparent gel trays with an integrated fluorescent ruler
- Multiple options for hand casting gels of different sizes
- Combs to fit virtually every need
- Clear plastic construction for easy sample visualization
- Buffer recirculation ports for applications that require high voltages or extended runs
- Easy-to-replace electrode cassettes
- IEC 1010 (EN 61010) electrical safety certification

For More Information
Web: bio-rad.com/DNAelectro
Request or download bulletin: 2660



Components of the Mini-Sub cell GT cell.

Sub-Cell Family Selection Guide

	Mini-Sub Cell GT*	Wide Mini-Sub Cell GT**	Sub-Cell GT	Sub-Cell Model 96	Sub-Cell Model 192
Cell size (W x L x H)	9.2 x 25.5 x 5.6 cm	17.8 x 25.5 x 6.8 cm	18 x 40.5 x 9.4 cm	29 x 30 x 9 cm	29 x 40 x 9 cm
Gel tray sizes (outside dimensions, W x L)	7 x 7 cm 7 x 10 cm	15 x 7 cm 15 x 10 cm	15 x 10 cm 15 x 15 cm 15 x 20 cm 15 x 25 cm	25 x 10 cm 25 x 15 cm	25 x 10 cm 25 x 15 cm 25 x 20 cm 25 x 25 cm
ReadyAgarose gels accommodated	Yes (mini format 8-, 12-, 2 x 8-well)	Yes (wide mini and 96 Plus formats)	No	No	No
Sample throughput	8–30***	10–60***	1–120†	24–96***	24–192†
Base buffer volume	~270 ml	~650 ml	~1 L	~2 L	~3 L
Buffer recirculation	No	No	No	Yes	Yes
Bromophenol blue migration	~4.5 cm/hr (at 75 V)	~4.5 cm/hr (at 75 V)	~3.0 cm/hr (at 75 V)	~6.2 cm/hr (at 200 V)	~5.2 cm/hr (at 200 V)

* The mini ReadySub-Cell™ GT cell is a Mini-Sub cell GT cell dedicated to running ReadyAgarose precast gels, gel size 7 x 10 cm; sample throughput is 8-, 12-, or 2 x 8-well. This cell does not include casting gates, tray, or combs.

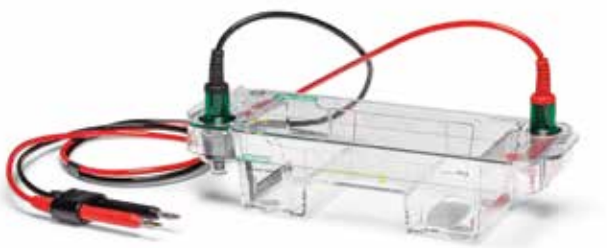
** The wide mini ReadySub-Cell GT cell is a wide Mini-Sub cell GT cell dedicated to running ReadyAgarose precast gels, gel size 15 x 10 cm; sample throughput is 20-, 32-, 2 x 32-, or 4 x 26-well. This cell does not include casting gates, tray, or combs.

*** Sample throughput value assumes 1–2 combs per gel.

† Sample throughput value assumes 1–4 combs per gel.

Mini-Sub® Cell GT Cells

The redesigned Mini-Sub cell GT cell offers updated features that make electrophoresis even easier. A Mini-Sub cell GT cell can resolve up to 30 samples. Its short, narrow format allows 7 and 10 cm runs with speed, simplicity, and economy. Bio-Rad's mini cells resolve EcoRI or HindIII digests of lambda phage DNA in only 1.5 hours at 60 V. Small DNA fragments can be separated in as little as 15 minutes at 150 V. All mini cells accommodate ReadyAgarose™ precast gels and include a buffer tank, safety lid with cables, and leveling bubble.



The mini ReadySub-Cell™ GT cell (#1704487 and #1640303) is identical to the Mini-Sub cell GT cell, except it is dedicated to running mini ReadyAgarose precast gels. This cell does not include casting gates, tray, or combs. Kits are available to upgrade the ReadySub-Cell GT cell for handcasting capability.

For More Information
Web: bio-rad.com/DNAelectro

Ordering Information

Catalog #	Casting Gates	Gel Caster	UVTP Tray, cm 7 x 7*	UVTP Tray, cm 7 x 10	Combs 8-Well	Combs 15-Well	PowerPac™ Basic Power Supply (#16-5050)
Mini-Sub Cell GT Systems**							
1704406	•		•		•	•	
1704466				•	•	•	
1704486	•	•	•		•	•	
1704467		•		•	•	•	
1640300		•		•	•	•	•
1704487							
1640303							•

Catalog #	Description
Mini-Sub Cell GT Accessories	
1704491	**Mini Handcasting Kit**, includes 7 x 7 cm tray, casting gates, 15-well 1.5 mm fixed-height comb, 8-well 1.5 mm fixed-height comb
1704422	**Mini-Gel Caster**, for Mini-Sub and wide Mini-Sub cell GT systems
1704436*	**Sub-Cell GT UV-Transparent Mini-Gel Tray**, 7 x 7 cm (trays have 2 slots for fixed-height combs)
1704435	**Sub-Cell GT UV-Transparent Mini-Gel Tray**, 7 x 10 cm (trays have 2 slots for fixed-height combs)
1704330**	**Original UV-Transparent Mini-Gel Tray**, 7 x 10 cm
1704434	**Mini-Sub Cell GT Casting Gates**, 2
1704362	**Mini-Sub Cell GT Anode (Red) Quick Snap Electrode Assembly**
1704363	**Mini-Sub Cell GT Cathode (Black) Quick Snap Electrode Assembly**
1704331	**Mini-Comb Holder**, for Mini-Sub cell adjustable-height combs

Catalog #	# of Wells	Height†	Thickness, mm	Width of Well, mm	Length of Teeth, mm	Volume, µl (in 5 mm deep gel)
Combs for Mini-Sub Cell GT Systems						
1704464	15	Fixed	0.75	2.6	10.2	9.7
1704465***	15	Fixed	1.5	2.6	10.2	19.4
1704332	15	Adjustable	1.0	2.6	10.2	13.0
1704462	8	Fixed	0.75	5.5	11.0	20.8
1704463***	8	Fixed	1.5	5.5	11.0	41.6
1704333	8	Adjustable	1.0	5.5	10.2	27.7
1704461	2 preparative 2 reference	Fixed	1.5	20.0 4.0	10.2	152.4 30.0
1704460	1 preparative 2 reference	Fixed	1.5	43.4 3.0	10.2	325.7 22.5
1704342	1 preparative 2 reference	Adjustable	3.0	43.4 3.0	10.2	651.4 45.0

* Allows casting gels in the cell using casting gates; 7 x 10 cm gels can be cast with a gel caster.

** Mini-Sub cell systems purchased before 1996 (Mini-Sub DNA cell) require casting tray #1704330. This tray is not compatible with the Mini-Sub cell GT system.

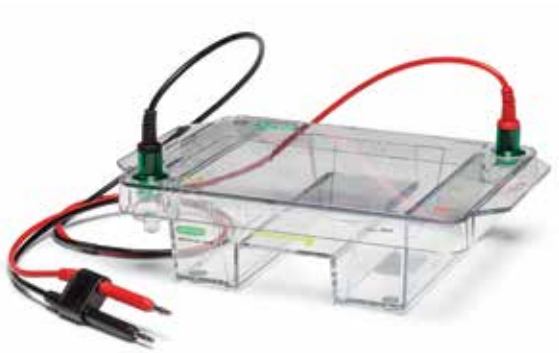
*** Combs included in systems.

† Fixed-height combs must be used with Mini-Sub cell GT system gel trays. Adjustable-height combs require comb holder, #1704331.

Wide Mini-Sub® Cell GT Cells

The redesigned wide Mini-Sub cell GT cell offers updated features that make electrophoresis even easier for multiple samples and rapid screening applications. This popular system has a wide platform that can separate 30 samples per comb. The wide Mini-Sub cell GT cell is the same width as the Sub-Cell® GT cell, so the comb holders, combs, and 15 x 10 cm gel trays are interchangeable with the larger Sub-Cell GT units. All wide mini cells accommodate ReadyAgarose™ precast gels and include a buffer tank, safety lid with cables, and leveling bubble.

The wide mini ReadySub-Cell™ GT cell (#1704489 and #1640304) is identical to the wide Mini-Sub cell GT cell, except it is dedicated to running ReadyAgarose precast gels. This cell does not include casting gates, tray, or combs. Kits are available to upgrade the wide mini ReadySub-Cell GT cell for handcasting capability.



For More Information
Web: bio-rad.com/DNAelectro

Ordering Information

Catalog #	Casting Gates	Gel Caster	UVTP Tray, cm 15 x 7*	UVTP Tray, cm 15 x 10	Combs 15-Well	Combs 20-Well	PowerPac™ Basic Power Supply (#1645050)
Wide Mini-Sub Cell GT Systems**							
1704405	•		•		•	•	
1704468				•	•	•	
1704485	•	•	•		•	•	
1704469		•		•	•	•	
1640301		•		•	•	•	•
1704489							
1640304							•

Catalog #	Description
Wide Mini-Sub Cell GT Accessories	
1704497	**Wide Mini Handcasting Kit**, includes 15 x 7 cm tray, casting gates, 15-well 1.5 mm fixed-height comb, 20-well 1.5 mm fixed-height comb
1704422	**Mini-Gel Caster**, for Mini-Sub and wide Mini-Sub cell GT systems
1704426	**Sub-Cell GT UV-Transparent Wide Mini-Gel Tray**, 15 x 7 cm (trays have 2 slots for fixed-height combs)
1704416**,***	**Sub-Cell GT UV-Transparent Gel Tray**, 15 x 10 cm (trays have 2 slots for fixed-height combs)
1704425	**Wide Mini-Sub Cell GT Casting Gates**, 2
1704372	**Wide Mini-Sub Cell GT Anode (Red) Quick Snap Electrode Assembly**
1704373	**Wide Mini-Sub Cell GT Cathode (Black) Quick Snap Electrode Assembly**
1704320	**Comb Holder**, for Sub-Cell and wide Mini-Sub cell adjustable-height combs
1704331	**Mini-Comb Holder**, for Mini-Sub cell adjustable-height combs

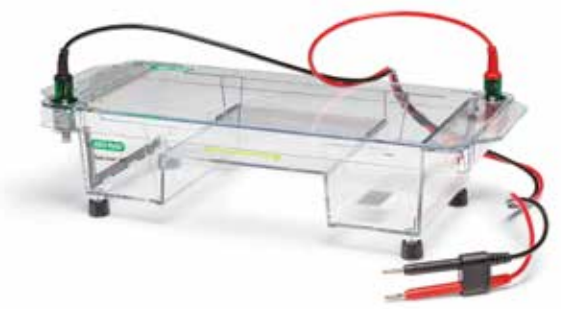
* Allows casting gels in the cell using casting gates; 15 x 10 cm gels can be cast with a gel caster.

** Tray is compatible with the Sub-Cell DNA system.

*** 15 x 10 cm gel tray can be used for both wide Mini-Sub cell GT and Sub-Cell GT cells.

Sub-Cell® GT Cell

The redesigned Sub-Cell GT cell is the most versatile horizontal electrophoresis cell in the Sub-Cell family, offering the greatest choice of gel lengths, combs, and separation modes that make it ideal for Southern and northern blotting protocols. Up to 30 samples can be resolved over a distance of 25 cm. Using four rows of combs, the cell can run up to 120 samples. All Sub-Cell GT cells include a buffer tank, safety lid with cables, leveling bubble, and combs (15- and 20-well). System configurations that include additional accessories are also available.



For More Information
Web: bio-rad.com/DNAelectro

Ordering Information

Catalog #	Casting Gates	Gel Caster	UVTP Tray, cm 15 x 10	15 x 15*	15 x 20	15 x 25	Combs 15-Well	20-Well	PowerPac™ Basic Power Supply (#1645050)
Sub Cell GT Systems**									
1704401			•				•	•	
1704402	•			•			•	•	
1704403					•		•	•	
1704404						•	•	•	
1704481		•	•				•	•	
1704482	•	•		•			•	•	
1704483		•			•		•	•	
1704484		•				•	•	•	
1640302	•	•		•			•	•	•

Catalog #	Description
Sub-Cell GT Accessories	
1704412	**Gel Caster**, full size
1704416**	**Sub-Cell GT UV-Transparent Gel Tray**, 15 x 10 cm (trays have 2 slots for fixed-height combs)
1704417*	**Sub-Cell GT UV-Transparent Gel Tray**, 15 x 15 cm
1704418	**Sub-Cell GT UV-Transparent Gel Tray**, 15 x 20 cm
1704419	**Sub-Cell GT UV-Transparent Gel Tray**, 15 x 25 cm
1704415	**Sub-Cell GT Casting Gates**, 2
1704392	**Sub-Cell GT Anode (Red) Quick Snap Electrode Assembly**
1704393	**Sub-Cell GT Cathode (Black) Quick Snap Electrode Assembly**
1704320	**Comb Holder**, for Sub-Cell and wide Mini-Sub cell adjustable-height combs

* Allows casting gels in the cell using casting gates. Other gel sizes can be cast with a gel caster.
** 15 x 10 cm gel tray can be used for both Sub-Cell GT and wide Mini-Sub cell GT cells.

Combs for Wide Mini-Sub® Cell and Sub-Cell® GT Cells

Ordering Information

Catalog #	# of Wells	Height	Thickness, mm	Width of Well, mm	Length of Teeth, mm	Volume, µl (in 5 mm deep gel)
Combs for Wide Mini Sub-Cell and Sub-Cell GT Systems*						
1704449	30	Fixed	1.5	2.7	14.0	20.2
1704344	30	Adjustable	1.5	2.7	19.1	20.2
1704447	20	Fixed	0.75	4.8	14.0	18.2
1704448**	20	Fixed	1.5	4.8	14.0	36.3
1704321	20	Adjustable	0.75	4.8	19.1	18.2
1704322	20	Adjustable	1.5	4.8	19.1	36.4
1704445	15	Fixed	0.75	5.5	14.0	20.7
1704446**	15	Fixed	1.5	5.5	14.0	41.4
1704323	15	Adjustable	0.75	5.5	19.1	20.7
1704324	15	Adjustable	1.5	5.5	19.1	41.4
1704443	10	Fixed	0.75	9.9	14.0	37.0
1704444	10	Fixed	1.5	9.9	14.0	74.0
1704325	10	Adjustable	0.75	9.9	19.1	37.0
1704326	10	Adjustable	1.5	9.9	19.1	74.0
Preparative Combs for Sub-Cell GT Systems*						
1704442	4 preparative 2 reference	Fixed	1.5	26.4	14.0	200.0
1704441	2 preparative 2 reference	Adjustable	1.5	50.3	14.0	377.0
1704440	1 preparative 2 reference	Fixed	1.5	106.4	14.0	800.0
1704328	1 preparative 2 reference	Adjustable	3.0	106.4	14.0	1,596.0
Multichannel Pipet–Compatible Combs for Wide Mini Sub-Cell and Sub-Cell GT Systems*						
1704456	26	Fixed	0.75	2.9	14.0	10.9
1704457	26	Fixed	1.5	2.9	14.0	21.8
1704454	18	Fixed	0.75	2.9	14.0	11.2
1704455	18	Fixed	1.5	2.9	14.0	22.5
1704452	14	Fixed	0.75	5.8	14.0	22.5
1704453	14	Fixed	1.5	5.8	14.0	45.0
1704450	10	Fixed	0.75	5.8	14.0	22.5
1704451	10	Fixed	1.5	5.8	14.0	45.0

* Fixed-height combs must be used with GT gel trays. Adjustable-height combs require comb holder, #1704320.
** Combs included in systems.

Sub-Cell® Model 96 Cell

This electrophoresis cell is ideal for medium- to high-throughput analyses because it accommodates two 51-well combs that are also multichannel pipet compatible. The shorter gel lengths (10 and 15 cm) and 26-well comb also allow the Sub-Cell Model 96 cell to be used for routine applications. This model also contains buffer recirculation ports for applications that require high voltages or extended runs. All Sub-Cell Model 96 systems include a buffer tank, safety lid with cables, leveling bubble, and combs (26- and 51-well). System configurations that include additional accessories are also available.

For More Information
Web: bio-rad.com/DNAelectro

Ordering Information

Catalog #	Casting Gates	Gel Caster	UVTP Tray, cm 25 x 10*	UVTP Tray, cm 25 x 15	Combs 26-Well	Combs 51-Well	PowerPac™ Basic Power Supply (#1645050)
Sub-Cell Model 96 Systems							
1704502	•		•		•	•	
1704503				•	•	•	
1704500	•	•	•		•	•	
1704501		•		•	•	•	
1640305	•	•	•		•	•	•

Catalog #	Description
Sub-Cell Model 96 Accessories	
1704514	**Model 96 Gel Caster**
1704521*	**Model 96/192 UV-Transparent Gel Tray**, 25 x 10 cm
1704522	**Model 96/192 UV-Transparent Gel Tray**, 25 x 15 cm
1704520	**Model 96/192 Gel Casting Gates**, 2
1704518	**Model 96/192 Anode (Red) Electrode Assembly**
1704519	**Model 96/192 Cathode (Black) Electrode Assembly**
1704537	**Model 96/192 Buffer Recirculation Kit**, includes 2 recirculation port fittings, 6' Tygon tubing, 4 tubing clips
1704525	**Sub-Cell Models 96 and 192 Comb Holder**

Catalog #	# of Wells	Height†	Thickness, mm	Width of Well, mm	Length of Teeth, mm	Volume, µl (in 5 mm deep gel)
Adjustable-Height Combs for Sub-Cell Model 96 Systems**						
1704528***	51	—	0.75	3.0	15.0	11.2
1704529***, †	51	—	1.5	3.0	15.0	22.5
1704526***	26	—	0.75	6.0	15.0	22.5
1704527***, †	26	—	1.5	6.0	15.0	45.0
1704530	2 or 4 preparative 2 reference	—	075	46.0 or 97.0 6.0	15.0	172.5 or 364.0 22.5
1704531	2 or 4 preparative 2 reference	—	1.5	46.0 or 97.0 6.0	15.0	345.0 or 727.5 45.0

* Allows casting gels in the cell using casting gates; 25 x 15 cm gels can be cast with a gel caster.

** Combs for Sub-Cell Model 96 cells can be used with Sub-Cell Model 192 cells and vice versa. Adjustable-height combs require comb holder, #1704525. Each system includes one comb holder.

*** Multichannel pipet compatible.

† Combs included in systems.

Sub-Cell® Model 192 Cell

The Sub-Cell Model 192 electrophoresis cell has higher throughput capabilities and is compatible with multichannel pipets. It can run gels up to 25 cm long and allows four or more 51-well combs to be used, accommodating more than two microplates of samples. The longer gels and buffer recirculation ports of the Model 192 make this cell ideal for RFLP, Southern and northern blotting, and separation of cosmid DNA restriction digests. All Sub-Cell Model 192 cells include a buffer tank, safety lid with cables, leveling bubble, and combs (26- and 51-well). System configurations that include additional accessories are also available.

For More Information
Web: bio-rad.com/DNAelectro

Ordering Information

Catalog #	Casting Gates	Gel Caster	UVTP Tray, cm: 25 x 10	25 x 15*	25 x 20	25 x 25	Combs: 26-Well	51-Well	PowerPac™ Basic Power Supply (#1645050)
Sub-Cell Model 192 Systems									
1704508			•				•	•	
1704509	•			•			•	•	
1704510					•		•	•	
1704511						•	•	•	
1704504		•	•				•	•	
1704505	•	•		•			•	•	
1704506		•			•		•	•	
1704507		•				•	•	•	
1640306	•	•		•			•	•	•

Catalog #	Description
Sub-Cell Model 192 Accessories	
1704517	**Model 192 Gel Caster**
1704521	**Model 96/192 UV-Transparent Gel Tray**, 25 x 10 cm
1704522*	**Model 96/192 UV-Transparent Gel Tray**, 25 x 15 cm
1704523	**Model 192 UV-Transparent Gel Tray**, 25 x 20 cm
1704524	**Model 192 UV-Transparent Gel Tray**, 25 x 25 cm
1704520	**Model 96/192 Gel Casting Gates**, 2
1704518	**Model 96/192 Anode (Red) Electrode Assembly**
1704519	**Model 96/192 Cathode (Black) Electrode Assembly**
1704537	**Model 96/192 Buffer Recirculation Kit**, includes 2 recirculation port fittings, 6' Tygon tubing, 4 tubing clips

Catalog #	# of Wells	Height†	Thickness, mm	Width of Well, mm	Length of Teeth, mm	Volume, µl (in 5 mm deep gel)
Adjustable-Height Combs for Sub-Cell Model 192 Systems**						
1704528***	51	—	0.75	3.0	15.0	11.2
1704529***, †	51	—	1.5	3.0	15.0	22.5
1704526***	26	—	0.75	6.0	15.0	22.5
1704527***, †	26	—	1.5	6.0	15.0	45.0
1704530	2 or 4 preparative 2 reference	—	0.75	46.0 or 97.0 6.0	15.0	172.5 or 364.0 22.5
1704531	2 or 4 preparative 2 reference	—	1.5	46.0 or 97.0 6.0		345.0 or 727.5 45.0

* Allows casting gels in the cell using casting gates; other gel sizes can be cast with a gel caster.

** Combs for Sub-Cell Model 192 cells can be used with Sub-Cell Model 96 cells and vice versa. Adjustable-height combs require comb holder, #1704525. Each system includes one comb holder.

*** Multichannel pipet compatible.

† Combs included in systems.

See Also
Certified agaroses: page 261.
Nucleic acid reagents: page 259.
PowerPac Basic and PowerPac HC power supplies: page 155.
Premixed electrophoresis buffers: page 260.

ReadyAgarose™ Precast Gel System

ReadyAgarose precast gels are prepared in gel trays designed to fit securely in Mini-Sub® cell GT and wide Mini-Sub cell GT cells (page 245). They come in a choice of 27 gel types, including ReadyAgarose 96 Plus gels, which resolve DNA fragments from 20–10,000 bp. Gels are individually packaged and cast in their own running tray with Bio-Rad's Certified™ line of agaroses. Gel types to choose from include:

- Mini, wide, and 96-sample formats
- 1% and 3% agarose
- TBE or TAE buffer
- With or without ethidium bromide
- Multichannel pipet–compatible wells
- Compatible with Mini-Sub and wide Mini-Sub cell GT cells

ReadyAgarose 96 Plus Products — Ideal for High-Throughput Applications

ReadyAgarose 96 Plus products include:

- ReadyAgarose 96 Plus precast gels
- Wide mini ReadySub-Cell™ GT cell
- ReadyAgarose 96 Plus wizard for data analysis with Quantity One® Basic software

ReadyAgarose 96 Plus gels are 4- and 12-channel multichannel pipet compatible. The ReadyAgarose 96 Plus wizard of Quantity One software rearranges the lanes from samples run on the gel and displays them in the original 96-well microplate format, simplifying sample tracking for analysis.

For More Information
Web: bio-rad.com/agarosegel; to download ReadyAgarose 96 Plus wizard, go to bio-rad.com/software
Request or download bulletins: 2647 and 2980

Ordering Information

Description	8-Well	2 x 8-Well	2 x 8-Well
Mini ReadyAgarose Gels, TBE			
1.0% plus ethidium bromide	1613004	1613010	—
3.0% plus ethidium bromide	1613006	1613012	—
Mini ReadyAgarose Gels, TAE			
1.0%	1613015	—	1613057
1.0% plus ethidium bromide	1613016	1613022	—
3.0%	1613017	—	—
3.0% plus ethidium bromide	1613018	1613024	—
	20-Well	**32-Well**	**2 x 32-Well**
Wide Mini ReadyAgarose Gels, TBE			
1.0% plus ethidium bromide	1613028	1613034	1613038
3.0% plus ethidium bromide	1613030	1613036	1613040
Wide Mini ReadyAgarose Gels, TAE			
1.0% plus ethidium bromide	1613044	1613050	1613054
3.0% plus ethidium bromide	1613046	1613052	1613056
ReadyAgarose 96 Plus Gels, TBE, 4 x 26-Well (96 Plus)			
1.0% plus ethidium bromide	1613060		
3.0% plus ethidium bromide	1613062		
ReadyAgarose 96 Plus Gels, TAE, 4 x 26-Well (96 Plus)			
1.0% plus ethidium bromide	1613063		
3.0% plus ethidium bromide	1613065		

Catalog #	Description
ReadySub-Cell GT Cells for ReadyAgarose Gels	
1704487	**Mini ReadySub-Cell GT Cell**, includes buffer tank, lid and electrodes, leveling bubble; accommodates 8- and 12-well mini ReadyAgarose gels
1704489	**Wide Mini ReadySub-Cell GT Cell**, includes buffer tank, lid and electrodes, leveling bubble; accommodates 20-, 32-, and 2 x 32-wide mini ReadyAgarose gels
1640303	**Mini ReadySub-Cell GT Cell and PowerPac Basic Power Supply**
1640304	**Wide Mini ReadySub-Cell GT Cell and PowerPac Basic Power Supply**
Application Guide	
1613000	**ReadyAgarose Instruction Manual**, free upon request with ReadyAgarose gel purchase

Pulsed Field Gel Electrophoresis

Pulsed field gel electrophoresis (PFGE) resolves large DNA molecules by alternating the electrical field between spatially distinct pairs of electrodes, causing DNA molecules as large as several megabases to reorient and move at different speeds through the pores in an agarose gel. Bio-Rad offers three clamped homogenous electrical field (CHEF) systems that incorporate different PFGE technologies for optimal resolution in various size ranges (see CHEF Systems Selection Guide below).

Learn More about the Technology
Web: bio-rad.com/tech/pfge

Agaroses, Reagents, and Standards for PFGE

Bio-Rad offers a comprehensive line of agaroses (page 261), standards, and markers (page 257), buffers (page 260), and other reagents to make PFGE simple and convenient. See page 257 for genomic DNA plug preparation kits.

For More Information
Web: bio-rad.com/PFGE

CHEF Systems Selection Guide

Feature	CHEF Mapper® XA	CHEF-DR® III	CHEF-DR II
Fragment size	100 bp–10 Mb	100 bp–10 Mb	5 kb–6 Mb
Optimal separation size range	100 bp–10 Mb	100 bp–6 Mb	100 kb–2 Mb
Auto-algorithm and interactive algorithm	•	—	—
Program storage	20 complex programs	Last program run	—
Programming blocks of run conditions	8 blocks	3 blocks	2 blocks
Battery-operated backup RAM	•	•	—
Pulse angle	0–360°	90–120° in 1° increments	Fixed angle of 120°
Asymmetrical angles	•	—	—
Nonlinear switch-time ramping (expands linear range of fragment separation to 50–700 kb)	•	—	—
Multistate separation	•	—	—
Secondary pulses (voltage interrupts)	•	—	—
FIGE and asymmetric FIGE (resolution of fragments in the 100 bp–250 kb range)	•	—	—
Resolution	All size ranges	DNA fragments >2 Mb	DNA fragments <2 Mb
Recommended use	Ideal for all PFGE applications Most accurate results Most reproducible results Fastest runs	Better suited for more advanced separations than CHEF-DR II system	Suitable for routine separations with the same organism

CHEF Mapper® XA System

The CHEF Mapper XA system is ideal for any PFGE application. Features include:

Automation
- Built-in auto-algorithm and interactive algorithm

Customization
- Store up to 99 simple programs or 20 complex programs with up to 8 blocks of programming each

Application Versatility
- Ability to choose any pulse angle from 0–360°
- Optimal resolution of both megabase- and kilobase-sized DNA fragments
- Resolution of very large DNA molecules with secondary pulses that release DNA caught in the gel matrix

- Rapid resolution of small fragments in the 100 bp–250 kb range with FIGE and AFIGE technologies
- Expanded linear range of fragment separation to 50–700 kb
- Enhanced resolution in selected fragment size ranges

For More Information
Web: bio-rad.com/chefXA
Request or download bulletin: 1906

Ordering Information

Catalog #	Description
CHEF Mapper XA System*	
1703670	**CHEF Mapper XA System**, 120 V, includes power module, embedded auto-algorithm for protocol optimization, interactive algorithm program disk, electrophoresis cell, cooling module, variable-speed pump, Tygon tubing (12'), 14 x 13 cm (W x L) casting stand, 15-well 1.5 mm comb and comb holder, screened cap, disposable plug molds, leveling bubble, cables, *S. cerevisiae* DNA size standards, two 0.5 A FB fuses, 5 g pulsed field Certified agarose, 5 g Certified megabase agarose, for North America
1703671	**CHEF Mapper XA System**, 100 V, for Japan
1703672	**CHEF Mapper XA System**, 220 V, for Asia Pacific/Europe
1703673	**CHEF Mapper XA System**, 240 V, for Asia Pacific/Europe

* All accessories are compatible with CHEF Mapper, CHEF-DR II, and CHEF-DR III systems. Accessories can be found on page 256. A comprehensive listing of replacement parts can be found at **bio-rad.com**.

CHEF-DR® III Variable Angle System

The CHEF-DR III variable angle system combines PACE and CHEF technologies in an easy-to-use instrument that yields high-resolution separations.

Automation

- Recalls last used conditions and uses them as the default protocol
- Recalls current run conditions and run progress if interrupted by power failure and resumes the run without intervention

Customization

- Customize desired conditions using examples provided in the instruction manual for a variety of size separation ranges

Application Versatility

- Ability to program the electrophoresis angle from 90–120° for separations of DNA molecules ranging from 100 bp–10 Mb
- Selection of optimal voltage gradient, switch time, and angle for specific DNA size ranges
- Ability to program up to 3 consecutively executing blocks of run conditions

For More Information
Web: bio-rad.com/chef3

Ordering Information

Catalog #	Description
CHEF-DR III Variable Angle System*	
1703700	**CHEF-DR III Variable Angle System**, 120 V, includes power module, electrophoresis cell, cooling module variable-speed pump, 14 x 13 cm casting stand with frame and platform, comb holder, 15-well 1.5 mm thick comb, screened cap, disposable plug molds, 12' Tygon tubing, 2 plugs *S. cerevisiae* DNA size standards, two 0.5 A FB fuses, 5 g pulsed field Certified agarose, 5 g Certified megabase agarose, for North America
1703702	**CHEF-DR III Variable Angle System**, 220/240 V, for Asia Pacific/Europe
1703703	**CHEF-DR III Variable Angle System**, 100 V, for Japan

* All accessories are compatible with CHEF Mapper, CHEF-DR II, and CHEF-DR III systems. Accessories can be found on page 256. A comprehensive listing of replacement parts can be found at **bio-rad.com**.

CHEF-DR® II Chiller System

The CHEF-DR II chiller system resolves DNA fragments in the 5 kb–6 Mb range and is the most cost-effective PFGE instrument. It is simple to program and lets you enhance resolution by executing two blocks of running conditions successively.

Customization

You can program run conditions into the CHEF-DR II system. The instrument manual provides examples of run conditions for a variety of size separation ranges for easy startup.

Application Versatility

The CHEF-DR II system uses the most common angle for PFGE, 120°. This unit can be used to separate fragments up to 6 Mb by adjusting the running conditions for low voltage and extended run times; optimal separation range is up to 2 Mb.

For More Information
Web: bio-rad.com/chef2

Ordering Information

Catalog #	Description
CHEF-DR II Chiller System*	
1703725	**CHEF-DR II System**, 120 V, includes electrophoresis cell, drive module, cooling module, control module, variable-speed pump, 14 x 13 cm casting stand with frame and platform, comb holder, 15-well 1.5 mm thick comb, screened cap, disposable plug molds, 12' Tygon tubing, 2 plugs *S. cerevisiae* DNA size standards, 5 g pulsed field Certified agarose, 5 g Certified megabase agarose, for North America
1703727	**CHEF-DR II System**, 220/240 V, for Asia Pacific/Europe
1703728	**CHEF-DR II System**, 100 V, for Japan
Accessories for Chef Mapper, CHEF-DR III, and CHEF-DR II Systems*	
1703654	**Cooling Module**, 120 V, for North America
1703688	**Cooling Module**, 100 V, for Japan
1703655	**Cooling Module**, 220/240 V, for Asia Pacific/Europe
1703644	**Variable-Speed Pump**, 120 V
1703648	**Electrodes**, thick gauge (0.02"), 6
1703711	**Screened Caps**, 5
1703713	**50-Well Disposable Plug Molds**, enough for 250 plugs
1703622	**Reusable Plug Mold**, 10 plug
1703689	**Standard Casting Stand**, includes 14 x 13 cm frame and platform
1703704	**Wide/Long Combination Casting Stand**, includes 21 x 14 cm frame and platform
1703699	**Combination Comb Holder**
1704326	**10-Well Adjustable-Height Comb**, 1.5 mm
1704325	**10-Well Adjustable-Height Comb**, 0.75 mm
1704324	**15-Well Adjustable-Height Comb**, 1.5 mm
1704323	**15-Well Adjustable-Height Comb**, 0.75 mm
1704322	**20-Well Adjustable-Height Comb**, 1.5 mm
1704344	**30-Well Adjustable-Height Comb**, 1.5 mm
1703627	**15-Well Comb**, 21 cm wide, 1.5 mm thick
1703628	**30-Well Comb**, 21 cm wide, 1.5 mm thick
1703645	**45-Well Comb**, 21 cm wide, 1.5 mm thick
1703623	**Preparative Comb**, 14 cm wide, 1.5 mm thick, with 2 outer wells for size standards
1704046	**Leveling Table**, 20 x 30 cm
1703643	**Gel Scoop**

* All accessories are compatible with CHEF Mapper, CHEF-DR III, and CHEF-DR II systems. A comprehensive listing of replacement parts can be found at **bio-rad.com**.

CHEF Genomic DNA Plug Kits

CHEF genomic DNA plug kits provide a convenient means for preparing intact, chromosome-sized DNA for PFGE. Three kits are available for the preparation of bacterial (lysozyme-sensitive) or mammalian genomic DNA and yeast chromosomes (YACs). Each kit contains all the enzymes, reaction buffers, and restriction digest-qualified CleanCut™ agarose necessary to prepare 100 plugs as well as disposable plug molds and screened caps for simplified plug processing. Each kit is thoroughly tested to ensure that prepared genomic DNA can be restriction digested and separated on a CHEF electrophoresis system.

Ordering Information

Catalog #	Description
CHEF Genomic DNA Plug Kits	
1703591	**CHEF Mammalian Genomic DNA Plug Kit**, contains 12 ml cell suspension buffer, 1.3 ml proteinase K, 30 ml proteinase K reaction buffer, 12 ml 2% CleanCut agarose, 60 ml 10x wash buffer, screened cap, 2 disposable plug molds; makes 100 plugs
1703592	**CHEF Bacterial Genomic DNA Plug Kit**, contains 12 ml cell suspension buffer, 1.3 ml proteinase K, 30 ml proteinase K reaction buffer, 12 ml 2% CleanCut agarose, 60 ml 10x wash buffer, 1.6 ml lysozyme (25 mg/ml), 30 ml lysozyme buffer, screened cap, 2 disposable plug molds; makes 100 plugs
1703593	**CHEF Yeast Genomic DNA Plug Kit**, contains 12 ml cell suspension buffer, 1.3 ml proteinase K, 30 ml proteinase K reaction buffer, 12 ml 2% CleanCut agarose, 60 ml 10x wash buffer, 1.6 ml lyticase, 25 ml lyticase buffer, screened cap, 2 disposable plug molds; makes 100 plugs
1703594	**CleanCut Agarose**, 2%, 12 ml

Agaroses and Standards for Pulsed Field Gel Electrophoresis

Bio-Rad offers a comprehensive line of agaroses for use with PFGE as well as CHEF DNA standards and convenient buffers and reagents to simplify your PFGE experiments. See page 261 for agaroses, page 257 for size standards and buffers.

Pulsed Field Standards

Bio-Rad offers standards for applications from FIGE separation of cosmid inserts to the largest chromosomal separations. The higher MW standards are prepared in low-melt agarose blocks that can be cut to fit most well dimensions.

DNA Ladders Selection Guide

Type	Description
Pulsed Field Standards	
CHEF DNA standards	Derived from plasmids and lambda phage
CHEF DNA markers	Chromosomal DNA in low-melt agarose blocks

Pulsed Field Standards Selection Guide

	Range	Contents	Amount	Number of Applications
5 kb ladder	4.9–120 kb	Concatemers of pBR328	20 µg in 200 µl	20–25
8–48 kb ladder	8.3–48.5 kb	Mixed digest of phage	25 µg in 125 µl	125
Lambda ladder	0.05–1 Mb	Concatemers of phage cI857Sam7	5 agarose blocks	25–40
S. cerevisiae	0.225–2.2 Mb	*Saccharomyces cerevisiae* chromosomal DNA	5 agarose blocks	25–40
H. wingei	1–3.1 Mb	*Hansenula wingei* chromosomal DNA	5 agarose blocks	25–40
S. pombe	3.5–5.7 Mb	*Schizosaccharomyces pombe* chromosomal DNA	5 agarose blocks	25–40

See Also

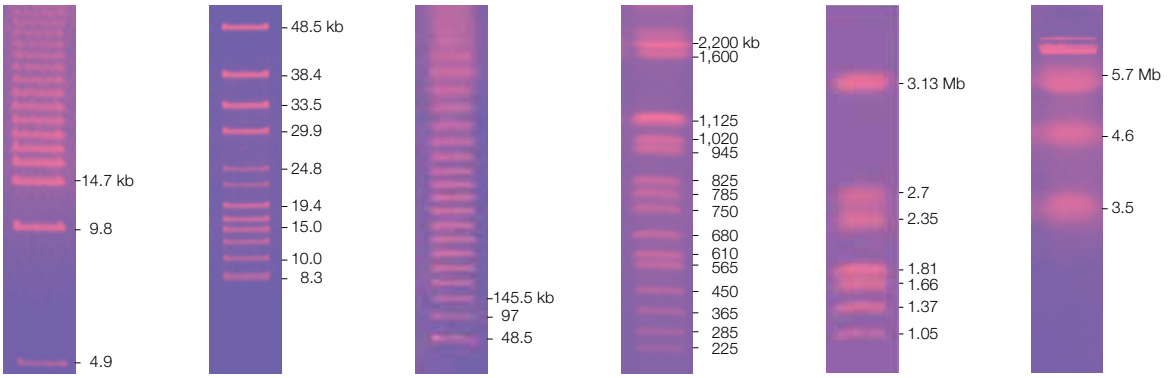
Pulsed field gel electrophoresis systems: page 253.

Imaging systems: page 280.

Bioinformatics software: page 292.

Certified agaroses: page 261.

Pulsed Field Standards



5 kb Ladder | 8–48 kb Ladder | Lambda Ladder | *S. cerevisiae* Chromosomal DNA | *H. wingei* Chromosomal DNA | *S. pombe* Chromosomal DNA

Ordering Information

Catalog #	Description
Agaroses and Standards for Pulsed Field Gel Electrophoresis	
1613108	**Certified Megabase Agarose**, 25 g
1613109	**Certified Megabase Agarose**, 125 g
1613110	**Certified Megabase Agarose**, 500 g
1613100	**Certified Molecular Biology Agarose**, 25 g
1613101	**Certified Molecular Biology Agarose**, 125 g
1613102	**Certified Molecular Biology Agarose**, 500 g
1620137	**Pulsed Field Certified Agarose**, 100 g
1620138	**Pulsed Field Certified Agarose**, 500 g
Premixed Nucleic Acid Electrophoresis Buffers	
1610733	**10x Tris/Boric Acid/EDTA (TBE)**, 1 L
1610770	**10x Tris/Boric Acid/EDTA (TBE)**, 5 L cube
1610743	**50x Tris/Acetic Acid/EDTA (TAE)**, 1 L
1610773	**50x Tris/Acetic Acid/EDTA (TAE)**, 5 L cube
Pulsed Field Standards*	
1703624	**CHEF DNA Size Standard**, 5 kb ladder, 4.9–120 kb, 20–25 lanes
1703707	**CHEF DNA Size Standard**, 8–48 kb, 125 lanes
1703635	**CHEF DNA Size Standard**, lambda ladder, 0.05–1 Mb, 5 agarose blocks, sufficient for 25–40 plugs
Pulsed Field Markers*	
1703605	**CHEF DNA Size Marker**, *S. cerevisiae*, 0.2–2.2 Mb, 5 agarose blocks, sufficient for 25–40 plugs
1703667	**CHEF DNA Size Marker**, *H. wingei*, 1–3.1 Mb, 5 agarose blocks, sufficient for 25–40 plugs
1703633	**CHEF DNA Size Marker**, *S. pombe*, 3.5–5.7 Mb, 5 agarose blocks, sufficient for 25–40 plugs

* CHEF, clamped homogeneous electrical field. For more information, see page 253–257.

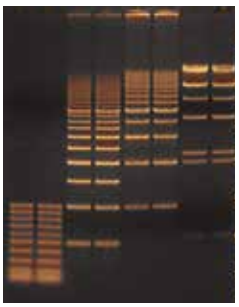
Buffers and Reagents for Nucleic Acid Electrophoresis

Ethidium Bromide Solution

Ethidium bromide is a sensitive fluorescent stain for visualizing DNA or RNA in agarose and polyacrylamide gels. Ethidium bromide is excited with a standard 302 nm UV transilluminator and emits a red-orange signal that can be photographed with Polaroid film or with a CCD-based gel documentation system.

Bio-Rad's premixed ethidium bromide solution eliminates preparation steps and minimizes exposure to hazardous ethidium bromide. Ethidium bromide solution is supplied as a 10 mg/ml solution in 10 ml bottles.

For More Information
Web: bio-rad.com/nastains



DNA stained with ethidium bromide.

Ordering Information

Catalog #	Description
1610433	**Ethidium Bromide Solution**, 10 mg/ml, 10 ml

Tracking Dyes

Bio-Rad offers two tracking dyes to monitor electrophoresis runs:

- Bromophenol blue for monitoring nucleic acid and protein electrophoresis
- Xylene cyanol (FF) for monitoring nucleic acid electrophoresis

Ordering Information

Catalog #	Description
1610404	**Bromophenol Blue**, 10 g
1610423	**Xylene Cyanol FF**, 25 g

UView™ 6x Loading Dye

Eliminate the need for gel staining with this easy-to-use UView 6x loading dye. Because it also acts as an in-gel stain, it saves precious time.

- Loading dye plus in-gel stain
- Saves time
- Nontoxic
- UV detection

For More Information
Web: bio-rad.com/fishbarcoding

Ordering Information

Catalog #	Description
1665111	**UView 6x Loading Dye**, 0.2 ml
1665112	**UView 6x Loading Dye**, 1 ml

Premixed Sample Loading and Running Buffers

Premixed Sample Loading Buffers

The concentrated formulas of these buffers allow them to be used with both liquid and lyophilized samples. All premixed sample buffers are tested to ensure quality and consistency.

Premixed Sample Loading Buffer Selection Guide

Buffer	Formulation	Applications
TBE-urea sample buffer	89 mM Tris-HCl, pH 8.0, 89 mM boric acid, 2 mM EDTA, 7 M urea, 12% ficoll, 0.01% BPB, 0.02% xylene cyanole FF	Denaturing ssDNA, RNA
Nucleic acid sample buffer	50 mM Tris-HCl, pH 8.0, 25% glycerol, 5 mM EDTA, 0.2% BPB, 0.2% xylene cyanole (FF)	Nondenaturing dsDNA, TBE gels

Premixed Running Buffers

Premixed running buffers can be used with handcast or precast gels. Simply dilute with distilled deionized water. Save time and standardize electrophoresis runs with these premixed running buffers.

Premixed Running Buffer Selection Guide

Buffer	1x Formulation	Applications
Nucleic Acid Electrophoresis		
10x TBE	89 mM Tris, 89 mM boric acid, 2 mM EDTA, pH 8.3	Nucleic acid electrophoresis/sequencing; polyacrylamide or agarose gels
10x TBE extended range	130 mM Tris, 45 mM boric acid, 2.5 mM EDTA, pH 8.3	Nucleic acid electrophoresis/sequencing; polyacrylamide or agarose gels; extends the buffer capacity for longer DNA sequencing runs
50x TAE	40 mM Tris, 20 mM acetic acid, 1 mM EDTA, pH 8.0	Nucleic acid electrophoresis; polyacrylamide or agarose gels

Ordering Information

Catalog #	Description
Premixed Nucleic Acid Sample Loading Buffers	
1610767	**5x Nucleic Acid Sample Buffer**, 10 ml
1610768	**1x TBE-Urea Sample Buffer**, 30 ml
Premixed Nucleic Acid Electrophoresis Buffers	
1610773	**50x Tris/Acetic Acid/EDTA (TAE)**, 5 L cube
1610770	**10x Tris/Boric Acid/EDTA (TBE)**, 5 L cube
1610741	**10x Tris/Boric Acid/EDTA (TBE)**, extended range, 1 L bottle
1610743	**50x Tris/Acetic Acid/EDTA (TAE)**, 1 L bottle
1610733	**10x Tris/Acetic Acid/EDTA (TBE)**, 1 L bottle

Certified™ Agaroses

All Certified agarose products are 100% pure and GQT grade, guaranteeing the absence of inhibitors, DNases, and RNases and minimizing background staining. Use the guide below to choose the agarose for your application.

Certified Agarose Selection Guide

Application	Molecular Biology Agarose	PCR Agarose	Low Range Ultra Agarose	Low-Melt Agarose	PCR Low-Melt Agarose	Megabase Agarose	Pulsed Field Agarose
Analytical Separation							
≥1,000 bp	•			•			
≤1,000 bp		•			•		
10–200 bp			•				
1 kb–2 Mb						•	•
1 kb–5 Mb						•	

Certified molecular biology agarose — this general-purpose agarose ensures that DNA recovered from a preparative gel can be manipulated without compromising quality. It has a very low sulfate content that yields a very high gel strength and higher exclusion limit. The high electrophoretic mobility increases resolution and reduces run time, and the gels are easy to handle even at low agarose percentages.

Certified PCR agarose — Certified PCR agarose is recommended for separation of DNA fragments ≤1,000 bp. This high-strength agarose forms gels that are easy to handle even at high gel percentages, minimizing the risk of cracking or breaking. PCR agarose gels at 40°C so it is faster and easier to prepare than GQT products with similar sieving properties that gel at higher temperatures.

Certified low range ultra agarose — this agarose provides superior resolution of small PCR fragments and primers. A 3% gel clearly resolves a 10 bp ladder and a 4% gel approaches the resolution of an 8% polyacrylamide gel.

Certified low-melt agarose — this low melting temperature agarose has a high resolving capacity for DNA fragments ≥1,000 bp. It is recommended for preparative electrophoresis and for in-gel applications such as digestion and ligation. It is also recommended for embedding chromosomes and megabase-sized DNA for pulsed field applications.

Certified PCR low-melt agarose — this agarose yields excellent resolution of fragments ≤1,000 bp in an analytical or preparative format. It is ideal for digestion by agarase and for all in-gel applications.

Certified megabase agarose — this Certified agarose is the superior choice for CHEF and FIGE applications. The gels are easy to handle even at concentrations as low as 0.3%. The separation range is between 1 kb and 5 Mb. Low background staining also provides superior imaging of high MW DNA.

Pulsed field Certified agarose — this agarose enables excellent separation and resolution of large DNA fragments in pulsed field gel applications. The optimal separation range is 1 kb–2 Mb. Running conditions for this agarose are a preset selectable method of the CHEF Mapper® XA system auto-algorithm.

For More Information
Web: bio-rad.com/agarose
Download bulletin: 2755

Ordering Information

Description	5 x 1 ml	1 x 5 ml	5 x 5 ml
Certified Agaroses for Standard Applications			
Certified molecular biology agarose	1613100	1613101	1613102
Certified PCR agarose	1613103	1613104	1613105
Certified low range ultra agarose	1613106	1613107	—
Certified megabase agarose	1613108	1613109	1613110
Certified low-melt agarose	1613111	1613112	—
Certified PCR low-melt agarose	1613113	1613114	1613115

Catalog #	Description
1620137	**Pulsed Field Certified Agarose**, 100 g
1620138	**Pulsed Field Certified Agarose**, 500 g

See Also

DNA gel electrophoresis: page 244.
Overlay agaroses: page 208.
CleanCut agarose: page 257.
CHEF genomic DNA plug kits: page 257.
Buffers: page 260.

DNA Ladders

See Also

Pipet tips: page 405.

Micro test tubes: page 409.

ReadyAgarose precast gels: page 252.

Imaging systems: page 280.

DNA gel electrophoresis systems: page 244.

Bio-Rad offers a broad variety of DNA ladders for conventional DNA gel electrophoresis, including molecular rulers with evenly spaced banding patterns and EZ Load™ rulers premixed with loading buffer.

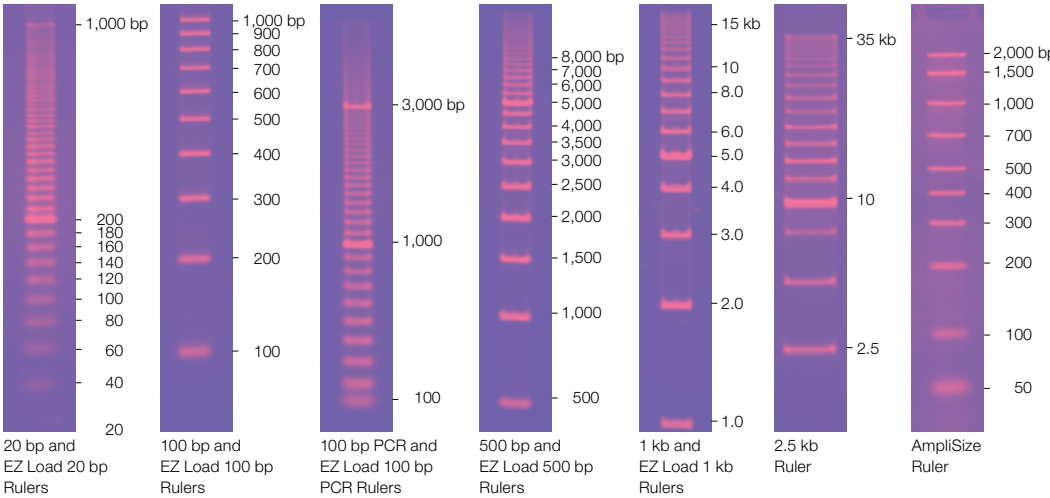
DNA Ladder Selection Guide

Type	Description
Molecular Rulers Standard and EZ Load molecular rulers	DNA ladders of even base pair length increments, available in 5 size ranges
AmpliSize® molecular ruler	Blunt-end DNA of precise length and known sequence
Molecular Mass Rulers Standard and EZ Load molecular mass rulers	Multiple bands of defined mass ranging from 10–100 ng for DNA quantitation

Molecular Rulers Selection Guide

Ruler	Concentration	Range	Number of Bands	Reference Band	Amount	Suggested Gel Type	Number of Applications
20 bp EZ Load 20 bp	0.2 µg/µl 0.1 µg/µl	20–1,000 bp	50 in 20 bp increments	200 bp	50 µg DNA	2.5–4% agarose	100
100 bp EZ Load 100 bp	0.1 µg/µl 0.05 µg/µl	100–1,000 bp	10 in 100 bp increments	None	25 µg DNA	2.5–4% agarose	100
100 bp PCR EZ Load 100 bp PCR	0.2 µg/µl 0.08 µg/µl	100–3,000 bp	30 in 100 bp increments	1,000 bp and 3,000 bp	40 µg DNA	0.8–3% agarose	100
500 bp EZ Load 500 bp	0.2 µg/µl 0.08 µg/µl	500–8,000 bp	16 in 500 bp increments	5,000 bp	40 µg DNA	0.8–1% agarose	100
1 kb EZ Load 1 kb	0.2 µg/µl 0.08 µg/µl	1–15 kb	15 in 1 kb increments	5 kb	40 µg DNA	0.8–1% agarose	100
2.5 kb	0.1 µg/µl	2.5–35 kb	14 in 2.5 kb increments	10 kb	40 µg DNA	0.8% agarose	100
AmpliSize	0.1 µg/µl (10 ng/band/µl)	50–2,000 bp	10	None	25 µg DNA	1.5–3% agarose	50
Precision	0.1 µg/µl	100–1,000 bp	5, from 10–100 ng	None	25 µg DNA	1–3% agarose	100
EZ Load precision	0.05 µg/µl	100–1,000 bp	5, from 10–100 ng	None	25 µg DNA	1–3% agarose	100

Molecular Rulers



20 bp and EZ Load 20 bp Rulers

100 bp and EZ Load 100 bp Rulers

100 bp PCR and EZ Load 100 bp PCR Rulers

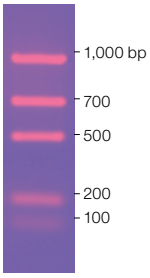
500 bp and EZ Load 500 bp Rulers

1 kb and EZ Load 1 kb Rulers

2.5 kb Ruler

AmpliSize Ruler

Molecular Mass Rulers



Precision, EZ Load Precision Mass Rulers

Molecular Rulers

Molecular rulers are DNA ladders with precisely defined size intervals between bands for simplified estimation of the length of single- and double-stranded DNA separated on agarose gels. Bio-Rad provides three types of molecular rulers for simplified estimation of length.

- **Standard molecular rulers** — DNA ladders of even base pair length increments; ready for dilution
- **EZ Load™ molecular rulers** — similar to standard molecular rulers but prediluted to a concentration appropriate for most electrophoresis runs
- **AmpliSize® molecular rulers** — blunt-end DNA of precise length and known sequence

Ordering Information

Catalog #	Description
20 bp Molecular Rulers	
1708201	**20 bp Molecular Ruler**, 250 µl, 20–1,000 bp, 100 applications
1708351	**EZ Load 20 bp Molecular Ruler**, 500 µl, 20–1,000 bp, includes 1 ml 5x nucleic acid sample buffer, 100 applications
100 bp Molecular Rulers	
1708202	**100 bp Molecular Ruler**, 250 µl, 100–1,000 bp, 100 applications
1708352	**EZ Load 100 bp Molecular Ruler**, 500 µl, 100–1,000 bp, includes 1 ml 5x nucleic acid sample buffer, 100 applications
1708206	**100 bp PCR Molecular Ruler**, 200 µl, 100–3,000 bp, 100 applications
1708353	**EZ Load 100 bp PCR Molecular Ruler**, 500 µl, 100–3,000 bp, includes 1 ml 5x nucleic acid sample buffer, 100 applications
500 bp Molecular Rulers	
1708203	**500 bp Molecular Ruler**, 200 µl, 500–8,000 bp, 100 applications
1708354	**EZ Load 500 bp Molecular Ruler**, 500 µl, 500–8,000 bp, includes 1 ml 5x nucleic acid sample buffer, 100 applications
1 kb Molecular Rulers	
1708204	**1 kb Molecular Ruler**, 200 µl, 1–15 kb, 100 applications
1708355	**EZ Load 1 kb Molecular Ruler**, 500 µl, 1–15 kb, includes 1 ml 5x nucleic acid sample buffer, 100 applications
2.5 kb Molecular Ruler	
1708205	**2.5 kb Molecular Ruler**, 400 µl, 2.5–35 kb, 100 applications
AmpliSize Molecular Ruler	
1708200	**AmpliSize Molecular Ruler**, 250 µl, 50–2,000 bp, 50 applications

Molecular Mass Rulers

Bio-Rad's precision molecular mass rulers are DNA markers that allow accurate DNA quantitation in gels, making them ideal for densitometry or image analysis. These ladders have five bands, which contain 100, 70, 50, 20, and 10 ng of DNA. The EZ Load™ precision molecular mass ruler has been blended with sample loading buffer and is ready to load.

Ordering Information

Catalog #	Description
1708207	**Precision Molecular Mass Ruler**, 250 µl, 100–1,000 bp, 10–100 ng, 100 applications
1708356	**EZ Load Precision Molecular Mass Ruler**, 500 µl, 100–1,000 bp, 10–100 ng, 100 applications

Northern and Southern Blotting

Premixed Blotting Buffers

Bio-Rad offers a complete line of reagents for preparation of buffers for your northern and Southern blot transfers.

Blotting Buffer Selection Guide

	1x Formulation	Applications
Transfer Buffers*		
20x SSC	150 mM NaCl, 15 mM sodium citrate, pH 7.0	Capillary transfer of agarose gels
Processing Buffers		
20x SSC	150 mM NaCl, 15 mM sodium citrate, pH 7.0	Northern and Southern blotting prehybridization and hybridization solutions

* These buffers can be used for all gel types and formulations.

Ordering Information

Catalog #	Description
Blot Transfer and Processing Buffers	
1610774	**20x SSC**, 1 L
1610775	**20x SSC**, 5 L cube

Mutation Analysis

See Also

DNA amplification/PCR: page 349.

PowerPac Basic and PowerPac HV power supplies: page 155.

Acrylamide: page 195.

Premixed buffers: page 260.

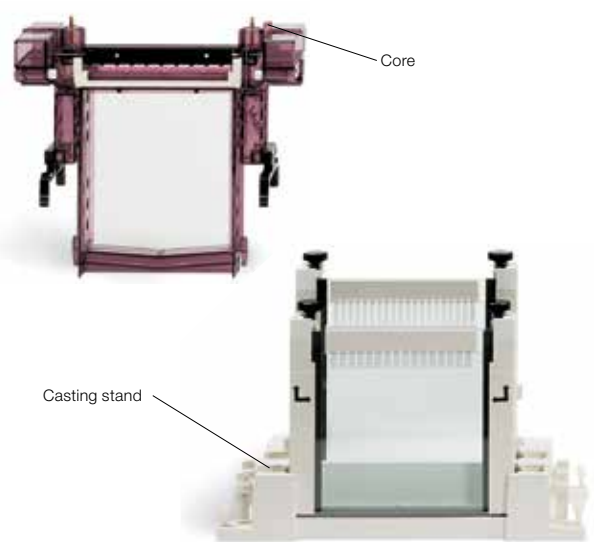
DCode™ Universal Mutation Detection System

The DCode universal mutation detection system enables mutation detection by various electrophoretic techniques. The DCode system can be used to scan single-base changes with any of the following electrophoretic techniques:

- Single-strand conformation polymorphism (SSCP)
- Denaturing gradient gel electrophoresis (DGGE)
- Constant denaturing gel electrophoresis (CDGE)
- Temporal temperature gradient gel electrophoresis (TTGE)

The DCode system meets the demands of all major mutation detection techniques with:

- Ability to run 64 samples in a single gel in as little as 2 hr, with accurate temperature control between 5–70°C
- Modular design to allow customization for current and future laboratory needs
- Specific reagents and controls that are optimized for each electrophoretic technique



Model 475 Gradient Delivery System

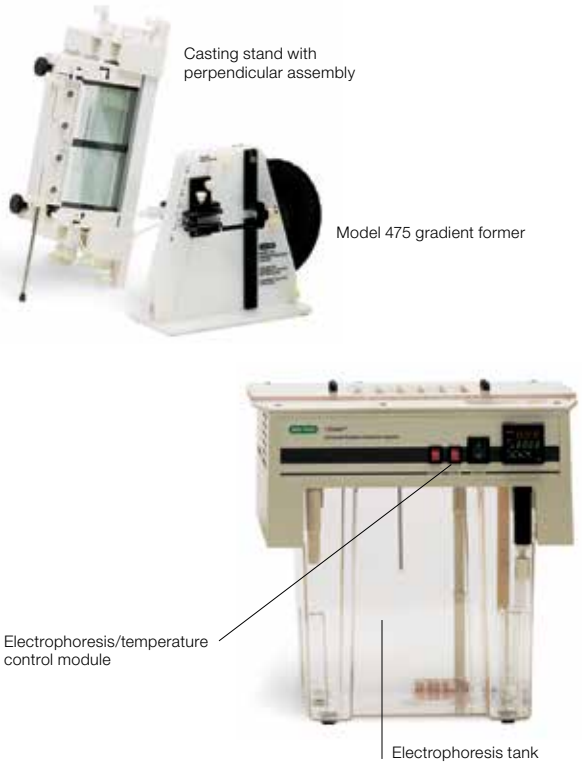
The cam-operated manual gradient former creates linear gradient gels for the DCode system. It mixes and delivers high- and low-density solutions without using a peristaltic pump or magnetic stirrer. The gradients formed are linear and reproducible.

WinMelt™ Software Optimizes Primer Placement

Windows-based WinMelt software predicts the melting profile of any DNA sequence up to 3,200 bp (Lerman and Silverstein 1987). Placement of primers and GC clamps can be optimized by analysis of the placement effect on the DNA melting profile. WinMelt (Windows XP system compatible) software is recommended for all DGGE, CDGE, and TTGE applications.

An interactive CD-ROM describes the principles of DGGE, CDGE, TTGE, and SSCP (training guide, #1709241) and includes videos on setting up and using the DCode system, a WinMelt software tutorial, DCode application notes, instruction manual, and other literature.

For More Information
Web: bio-rad.com/dcode
For more information on the DCode system and accessories, request or download bulletins: 2069 and 2100.
For complete ordering information, request or download bulletin: 2100



Ordering Information

Catalog #	Description
DCode Systems*	
1709080	**DCode System for DGGE**, 120 V, for 16 cm gels with single prep well (1 mm), includes comb gasket, 2 sets of clamps, Model 475 gradient former, all parts required to cast gradient gels
1709081	**DCode System for DGGE**, 220/240 V, for 16 cm gels with single prep well (1 mm)
1709082	**DCode System for DGGE**, 100 V, for 16 cm gels with single prep well (1 mm)
1709088	**DCode System for CDGE**, 100 V, for 16 cm gels with 20 wells (1 mm)
1709091	**DCode System for TTGE**, 100 V, for 16 cm gels with 20 wells (1 mm)
1709105**	**Complete DCode System**, 120 V, PC, for all gel sizes and types described above, includes software, standard and cooling tanks, Model 475 gradient former, sandwich clamps, pressure clamp, comb gasket and holder, fittings required for gradient gels

continues

Ordering Information

Catalog #	Description
Adaptor Kits***	
1709125	**DGGE Kit**, for 16 cm gels with single prep well (1 mm), includes sandwich clamps, pressure clamp, comb gasket and holder, fittings required for gradient gel casting
1709126	**DGGE Kit**, for 10 cm gels with 2 prep wells (1 mm)
1709127	**CDGE/TTGE Kit**, for 16 cm gels with 20 prep wells (1 mm)
1709128	**Complete SSCP Kit**, for 20 cm gels with 20 wells (0.75 mm), includes sandwich clamps, cooling finger adaptor for use with external chiller
Accessories†	
1709240	**WinMelt Software**, PC/Windows
1709241	**Interactive CD-ROM Training Guide**
1709042	**Model 475 Gradient Delivery System**, includes cam-operated manual gradient former, 2 each of 10 and 30 ml syringes, all accessories required to cast gradient gels
Electrophoresis Reagents and DNA Control Reagents	
1709150	**DCode Control Reagent Kit for DGGE/CDGE/TTGE**, includes primers (one GC-clamped) and DNA templates for production of wild-type and mutant DNA
1709151	**DCode Control Reagent Kit for SSCP**, includes primers and DNA templates for production of wild-type and mutant DNA
1709170	**DCode Electrophoresis Reagent Kit for DGGE**, includes 500 ml 40% acrylamide/bis (37.5:1), 2 x 1 L 50x TAE buffer, 225 ml 100% deionized formamide, 10 ml 10 mg/ml ethidium bromide, 10 ml DCode dye solution, 5 ml TEMED, 1 ml 2x gel loading dye, 10 g ammonium persulfate

* Each system includes electrophoresis/temperature control module, sandwich core, kit to cast gels of indicated size and type (2 sets of plates, 2 sets of clamps and spacers, 2 combs), control reagents for indicated application(s).

** For PC, includes WinMelt software.

*** Each kit includes 2 sets of plates, 2 sets of spacers, 2 combs.

† For a complete list of accessories, including combs and spacers, for the DCode system, go to **bio-rad.com/dcode**.

Experion™ Automated Electrophoresis System

The Experion automated electrophoresis system automatically performs all the steps of gel-based electrophoresis, providing a comprehensive platform for the analysis of nucleic acids and proteins.

Learn More about the Technology
Web: bio-rad.com/tech/experion

See Also

Real-time PCR systems: page 361.

BioLogic DuoFlow systems: page 122.

Rapid Analysis of Proteins, RNA, and DNA

The Experion system performs automated sample separation, staining, destaining, imaging, band detection, quantitation, and data analysis in as little as 30 minutes. Results are digitally stored for easy record keeping and reporting. The software interface and functionality are intuitive, and the system's microfluidic technology provides good reproducibility and accuracy for routine analysis.

Reproducible Separation, Sizing, and Quantitation

- Single-step protein sizing from 10–260 kD
- Protein sensitivity down to 2.5 ng/µl
- RNA concentration and integrity (RQI) determination at nanogram and picogram levels
- Single-step sizing and quantitation analysis of DNA fragments
- Simple chip priming — automated method for reproducible, error-free results

Convenient Data Analysis Tools

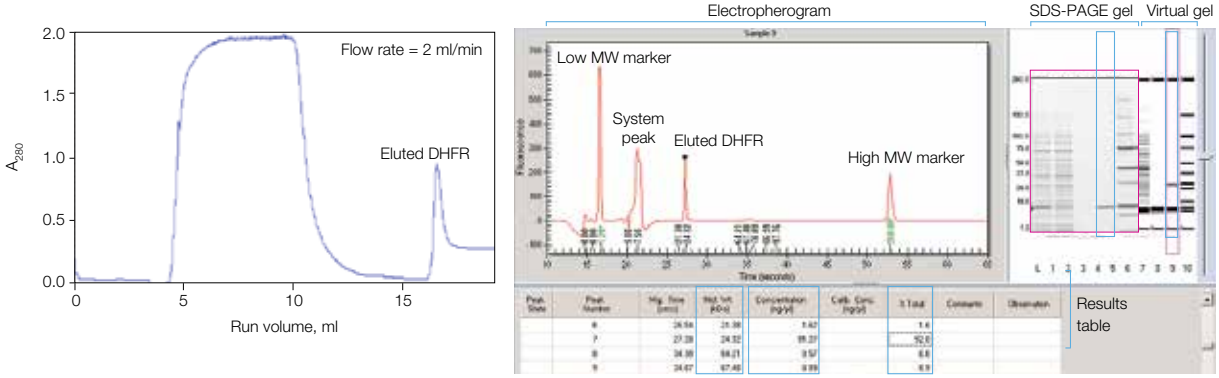
- Automatic sizing and quantitation calculations
- Intuitive navigation of separation and data analysis screens
- Quick comparisons of samples across the chip or from chip to chip
- Digital data storage for easy record keeping and reporting
- Flexible and easy export options and annotation ability for publications, reports, and presentations

A Powerful Complement to Many Applications

The Experion system is the ideal complement to a number of applications including sizing and quantitation of DNA fragments for PCR and restriction digest experiments, RNA integrity assessments prior to real-time PCR, microarray, and next-generation sequencing experiments (for example, using Illumina or Roche sequencers). RNA integrity assessment via RQI has been recommended as part of the MIQE guidelines. Leading scientists have developed these guidelines to increase the quality and reproducibility of quantitative PCR and real-time PCR data. The Experion system also provides quick protein purity analysis and results in digitized formats, which complement protein applications such as laboratory-scale chromatography, crystallography, and process-scale purification.

For More Information
Web: bio-rad.com/experion
Request or download bulletins: 3140, 3169, 3170, 3171, 3174A, and 5520

Note: The Experion automated electrophoresis system will be discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021.



Analysis of chromatographic fractions with the Experion system. Left, chromatogram showing purification of histidine-tagged DHFR using Profinity™ IMAC resin and the BioLogic DuoFlow™ system. **Right**, comparison of analysis of fractions using the Experion system and SDS-PAGE (shown as inset). The Experion system generated an electropherogram and virtual gel image of the separation. Note that the virtual gel image is comparable to the SDS-PAGE gel image. The Experion system also automatically reports the size (MW), relative concentration, and percent of each resolved protein in the total sample in the results table.

Experion™ Priming Station

The Experion automated priming station consistently prepares chips for successful automated electrophoresis with minimal hands-on time. It is used with all Experion chips regardless of whether the application is for protein, RNA, or DNA samples. Preset time and pressure settings ensure optimal priming of the gel matrix into the microchannels of the chip in preparation for sample analysis. This device helps ensure higher quality and more reproducible results than those obtainable with less reliable manual priming methods.

Automated Chip Priming

- Large LCD display clearly shows the preset time and pressure settings
- Integrated timer conveniently counts down the time-sensitive priming step
- Coordinating alignment arrows on the chip and priming station ensure proper chip placement

Experion priming station. The priming station primes the chip by applying pressure and pushing the gel-stain solution into the microchannels of the chip. This automated priming method helps ensure reproducible chip performance.

- Built-in, pressure-activated release mechanism ensures precise priming
- Secure locking mechanism prevents early release while priming

Ordering Information

Catalog #	Description
7007030	**Experion Priming Station**, 100–240 V, includes 2 priming seals
7007031	**Experion Priming Seals**, replacement, provides air seal on top of priming well, 2

Experion™ Vortex Station II

The Experion vortex station II ensures complete mixing of RNA or DNA samples and analysis reagents. The specially designed vortex adaptor prongs securely hold the chip during the 1 minute vortex cycle. Preset speed and time settings provide single-step, precise mixing of samples and reagents.

Experion vortex station II. The vortex station is needed for nucleic acid analysis.

Ordering Information

Catalog #	Description
7007043	**Experion Vortex Station II**, 100–240 V, for preparing Experion RNA/DNA chips

Note: The Experion automated electrophoresis system will be discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021.

Experion™ Software

Experion software adds to the efficiency of the Experion automated electrophoresis system. Results are displayed with peak electropherograms, in a virtual gel view, and as results tables. Additionally, versions 3.0 and above automatically generate a validated RNA quality indicator (RQI) number that correlates with eukaryotic total RNA sample integrity. The RQI complements the electropherogram and reported ribosomal peak area ratio visual assessments.

Key Features

- Real-time display of data acquisition
- Manual integration of peaks
- Automatic sizing, quantitation, and % total calculations
- Statistical evaluations (mean, std deviation, and %CV)
- Multiple protein quantitation method options
- Flexible printing and data export options

Experion Validation Kit (Optional)

The IQ/OQ validation kit includes automated protocols that test the critical functions of the system to verify and validate the system to the specified functionality. Validation should be performed at least biannually, when troubleshooting, and after moving the instrument.

Experion Security Edition Software (Optional)

The optional Security Edition offers tools for compliance with U.S. FDA 21 CFR Part 11 regulations:

- Different levels of access to different software functions
- Audit trail table tracks daily use of the system
- Password protection and auto lock function maintain database and file integrity
- Electronic signatures facilitate record keeping and tracking
- Report generation enables quick viewing and archiving of multiple run parameters, data, audit trail, and electronic signatures

For More Information
Web: bio-rad.com/experionsoftware
Request or download bulletins: 3171 and 5761

Note: The Experion automated electrophoresis system will be discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021.

System Requirements

Operating system	Windows XP (Service Pack 3), Windows Vista (Service Pack 1), WIndows 7 (32 bit)
Processor (CPU)	Pentium 4 (3 GHz processor) PC only
RAM	1 GB
Hard drive space	80 GB
USB 2.0	1 port
Other drives	CD-ROM

Ordering Information

Catalog #	Description
7007050	**Experion Software**, system operation and standard data analysis tools, includes software CD-ROM
7007051	**Experion Validation Kit**, includes 3 test chips, qualification procedures, dongle for PC
7007052	**Experion Software, Security Edition**, standard and 21 CFR Part 11 compliance data analysis tools, includes 3 test chips, qualification procedures, dongle for PC

See Also

Chromatography systems: page 111.

Real-time PCR systems: page 361.

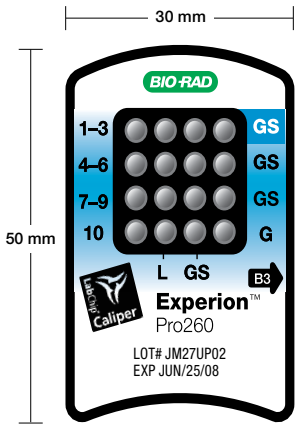
Sample preparation products: page 2.

Experion™ Analysis Kits

Experion analysis kits combine innovative chip design with high-quality reagents to perform reproducible, quantitative, and accurate protein, RNA, or DNA analyses in minutes. Streamlined chip preparation methods and low sample and reagent volume requirements result in rapid experiments with minimal hands-on time.

For More Information
Web: bio-rad.com/experionanalysiskits
Request or download bulletins: 3140, 3169, 3170, 3171, 3174A, 5520, and 5761

Note: The Experion automated electrophoresis system will be discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021.



Experion Pro260 Chip

Experion Pro260 Analysis Kit

The Experion Pro260 analysis kit makes protein separation, sizing, and quantitation fast and easy. The Pro260 kit offers the ability to analyze ten protein samples (10–260 kD) in approximately 30 minutes. Accurate sizing is achieved with the Experion Pro260 ladder, part of the Precision Plus Protein™ family of standards. Refer to the specifications table for more details.

Experion RNA HighSens and RNA StdSens Analysis Kits

For accurate assessment of RNA quality prior to downstream experiments, Experion RNA analysis kits offer rapid single-step quality assessments and the ability to analyze 11 or 12 samples in approximately 30 minutes. Sample concentrations in nanogram or picogram amounts can be analyzed, depending on the kit. Refer to the specifications table for more details. For a fast and objective assessment of total RNA integrity, an RNA quality indicator (RQI) value is automatically generated for eukaryotic samples.

Experion DNA 1K and DNA 12K Analysis Kits

The Experion DNA 1K and DNA 12K analysis kits allow analysis of DNA samples with size ranges between 15–1,500 bp and 50–17,000 bp, respectively. These DNA assays provide high sensitivity and excellent resolution (down to 5 bp) over a broad dynamic range. Consuming only 1 µl of sample for each analysis, the Experion automated system can analyze 11 samples in approximately 30–40 minutes. These assays are recommended for analysis of restriction digests, amplified DNA, microsatellites, and AFLPs.

Specifications

	Pro260 Chip	RNA HighSens Chip	RNA StdSens Chip	DNA 1K Assay	DNA 12K Assay
Number of samples	1–10	1–11	1–12	1–11	1–11
Sample volume	4 µl	1 µl	1 µl	1 µl	1 µl
Linear dynamic range	5–2,000 ng/µl BSA	—	—	—	—
Concentration range	5–2,000 ng/µl	100–5,000 pg/µl	5–500 ng/µl	0.1–50 ng/µl	0.1–50 ng/µl
Separation range	10–260 kD	—	—	15–1,500 bp	50–17,000 bp
Sensitivity	2.5 ng/µl of carbonic anhydrase in 1x PBS	100 pg	5 ng	0.1 ng	0.1 ng

Ordering Information

Catalog #	Description
7007101	**Experion Pro260 Analysis Kit for 10 Chips**, includes 10 Pro260 chips, 1 cleaning chip, 3 x 520 µl Pro260 gel, 45 µl Pro260 stain, 60 µl Pro260 ladder (10–260 kD), 400 µl Pro260 sample buffer, 3 spin filters
7007102	**Experion Pro260 Analysis Kit for 25 Chips**, includes 25 Pro260 chips, 1 cleaning chip, 5 x 520 µl Pro260 gel, 2 x 45 µl Pro260 stain, 2 x 60 µl Pro260 ladder (10–260 kD), 2 x 400 µl Pro260 sample buffer, 5 spin filters
7007103	**Experion RNA StdSens Analysis Kit for 10 Chips**, includes 10 RNA StdSens chips, 2 cleaning chips, 1,250 µl RNA gel, 20 µl RNA StdSens stain, 20 µl RNA ladder, 900 µl RNA StdSens loading buffer, 2 spin filters
7007104	**Experion RNA StdSens Analysis Kit for 25 Chips**, includes 25 RNA StdSens chips, 2 cleaning chips, 2 x 1,250 µl RNA gel, 2 x 20 µl RNA StdSens stain, 2 x 20 µl RNA ladder, 2 x 900 µl RNA StdSens loading buffer, 4 spin filters
7007105	**Experion RNA HighSens Analysis Kit for 10 Chips**, includes 10 RNA HighSens chips, 2 cleaning chips, 1,250 µl RNA gel, 20 µl RNA HighSens stain, 20 µl RNA ladder, 900 µl RNA HighSens loading buffer, 100 µl RNA sensitivity enhancer, 2 spin filters
7007106	**Experion RNA HighSens Analysis Kit for 25 Chips**, includes 25 RNA HighSens chips, 2 cleaning chips, 2 x 1,250 µl RNA gel, 2 x 20 µl RNA HighSens stain, 20 µl RNA ladder, 2 x 900 µl RNA HighSens loading buffer, 2 x 100 µl RNA sensitivity enhancer, 4 spin filters
7007107	**Experion DNA 1K Analysis Kit for 10 Chips**, includes 10 DNA chips, 1 cleaning chip, 3 x 250 µl DNA 1K gel, 40 µl DNA 1K stain, 20 µl DNA 1K ladder, 750 µl DNA 1K loading buffer, 3 spin filters
7007108	**Experion DNA 12K Analysis Kit for 10 Chips**, includes 10 DNA chips, 1 cleaning chip, 650 µl DNA 12K gel, 40 µl DNA 12K stain, 20 µl DNA 12K ladder, 750 µl DNA 12K loading buffer, 3 spin filters
7007307	**Experion DNA 1K Analysis Kit for 30 Chips**, includes 30 DNA chips, 3 cleaning chips, 9 x 250 µl DNA 1K gel, 3 x 40 µl DNA 1K stain, 3 x 20 µl DNA 1K ladder, 3 x 750 µl DNA 1K loading buffer, 9 spin filters
7007308	**Experion DNA 12K Analysis Kit for 30 Chips**, includes 30 DNA chips, 3 cleaning chips, 3 x 650 µl DNA 12K gel, 3 x 40 µl DNA 12K stain, 3 x 20 µl DNA 12K ladder, 3 x 750 µl DNA 12K loading buffer, 9 spin filters

Experion Analysis Kit Accessories

7007151	**Experion Pro260 Chips**, 10, plus 1 cleaning chip
7007152	**Experion Pro260 Reagents and Supplies for 10 Chips**, includes 3 x 520 µl Pro260 gel, 45 µl Pro260 stain, 60 µl Pro260 ladder (10–260 kD), 400 µl Pro260 sample buffer, 3 spin filters
7007153	**Experion RNA StdSens Chips**, 10, plus 2 cleaning chips
7007154	**Experion RNA StdSens Reagents and Supplies for 10 Chips**, includes 1,250 µl RNA gel, 20 µl RNA StdSens stain, 20 µl RNA ladder, 900 µl RNA StdSens loading buffer, 2 spin filters
7007155	**Experion RNA HighSens Chips**, 10, plus 2 cleaning chips
7007156	**Experion RNA HighSens Reagents and Supplies for 10 Chips**, includes 1,250 µl RNA gel, 20 µl RNA HighSens stain, 20 µl RNA ladder, 900 µl RNA HighSens loading buffer, 100 µl RNA sensitivity enhancer, 2 spin filters
7007163	**Experion DNA Chips**, 10, for DNA 1K and 12K analyses, plus 1 cleaning chip
7007164	**Experion DNA 1K Reagents and Supplies for 10 Chips**, includes 3 x 250 µl DNA 1K gel, 40 µl DNA 1K stain, 20 µl DNA 1K ladder, 750 µl DNA 1K loading buffer, 3 spin filters
7007165	**Experion DNA 12K Reagents and Supplies for 10 Chips**, includes 650 µl DNA 12K gel, 40 µl DNA 12K stain, 20 µl DNA 12K ladder, 750 µl DNA 12K loading buffer, 3 spin filters
7007251	**Experion Cleaning Chips**, 10
7007252	**Experion Electrode Cleaner**, 250 ml
7007253	**Experion DEPC-Treated Water**, 100 ml
7007254	**Experion Spin Filters**, 10
7007255	**Experion RNA Ladder**, 20 µl
7007256	**Experion Pro260 Ladder**, 60 µl
7007261	**Experion DNA 1K Ladder**, 20 µl
7007262	**Experion DNA 12K Ladder**, 20 µl
7007112	**Experion Mouse Liver Total RNA Standard**, 500 ng/µl, 20 µl
5000208	**Bovine Gamma Globulin (BGG) Standard**, 2 mg/ml, 2 ml
7007264	**Cleaning Swabs**, lint free, for electrode deep cleaning, 25
7007270	**Experion Pro260 Sample Buffer**, 400 µl, 2 vials
1632091	**ReadyPrep Proteomics Grade Water**, 500 ml
1610710	**2-Mercaptoethanol**, 25 ml
1610610	**Dithiothreitol (DTT)**, 1 g

Note: The Experion automated electrophoresis system will be discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021.

Experion™ Starter Kits

Experion starter kits include all the necessary consumables to illustrate the utility of the Experion system in protein or RNA applications.

The Experion protein starter kit (using the Pro260 chip) provides information on:

- How best to prepare and load a protein chip
- Protein quantitation and sizing using a known standard
- Creating and running a calibration curve
- The concept of scaling for the virtual gel
- Tips and common mistakes

The Experion RNA starter kit (using RNA StdSens chip) provides information on:

- How best to prepare and load an RNA chip
- How to confirm RNA quality and integrity
- The concept of scaling for the virtual gel
- Tips and common mistakes

Each kit contains:

- Experion reagents
- Three Experion chips
- Cleaning chips
- RNase-free tips
- RNase-free tubes
- DEPC-treated water
- DTT (protein kit only)
- Spin filters
- Electrode cleaner
- Cleaning swabs (lint free)
- Control sample
- Detailed instruction manual
- CD-ROM with system introduction and chip loading video

For More Information
Web: bio-rad.com/experionstarterkits
Request or download bulletin: 5732

Note: The Experion automated electrophoresis system will be discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021.

Ordering Information

Catalog #	Description
7007110	**Experion Pro260 Starter Kit**, includes 3 Experion chips, 1 cleaning chip, Experion reagents, spin filters, IgG protein standard, DTT, cleaning swabs (lint free), electrode cleaner, narrow bore polypropylene pipet tips, polypropylene 0.5 ml microcentrifuge tubes, DEPC-treated water (0.2 µm filtered)
7007111	**Experion RNA StdSens Starter Kit**, includes 3 Experion chips, 2 cleaning chips, Experion reagents, spin filters, total RNA standard, cleaning swabs (lint free), electrode cleaner, narrow bore polypropylene pipet tips, RNase- and DNase-free polypropylene 0.5 ml microcentrifuge tubes, DEPC-treated water (0.2 µm filtered)

Subject Index

2-D Premixed Buffers and Individual Reagents, 208
2-D SDS-PAGE Standards, 163
Agaroses and Standards for Pulsed Field Gel Electrophoresis, 257
Bio-Dot® and Bio-Dot SF Microfiltration Apparatus, 230
Bio-Lyte® Ampholytes, 198
Blotting-Grade Conjugates and Reagents, 242
Blotting Stains and Tracking Dyes, 235
Certified™ Agaroses, 261
CHEF-DR® II Chiller System, 256
CHEF-DR® III Variable Angle System, 255
CHEF Genomic DNA Plug Kits, 257
CHEF Mapper® XA System, 254
Clarity™ Western ECL Substrate, 238
Cleaning Concentrate, 198
Colorimetric AP Detection, 241
Colorimetric HRP Detection, 239
Combs for Wide Mini-Sub® Cell and Sub-Cell® GT Cells, 249
Coomassie Stains, 199
Criterion™ Accessories, 182
Criterion™ Blotter, 227
Criterion™ Cell and Criterion™ Dodeca™ Cell, 175
Criterion™ Precast Gels, 177
Cross-Linkers and Catalysts, 196
DCode™ Universal Mutation Detection System, 264
Detergents, 197
Ethidium Bromide Solution, 259
Experion™ Analysis Kits, 270
Experion™ Priming Station, 268
Experion™ Software, 269
Experion™ Starter Kits, 272
Experion™ Vortex Station II, 268
Filter Paper, 235
Fluorescent Stains, 201
GelAir™ Drying System, 220
Gel-Casting Reagents, 195
Gel Drying Solution, 198
IEF Standards, 163
IEP/IEF Agaroses, 196
Immun-Star™ AP Chemiluminescence Kits, 239
Kaleidoscope™ Standards, 161
Large-Format Electrophoresis Accessories, 190
Mini Incubation Trays, 231
Mini-PROTEAN® 2-D Electrophoresis Cell, 209
Mini-PROTEAN® 3 Dodeca™ Cell, 167
Mini-PROTEAN® Hand Casting Accessories, 173
Mini-PROTEAN® II Multiscreen Apparatus, 231
Mini-PROTEAN® Precast Gels, 168
Mini-PROTEAN® Tetra Cell, 164
Mini-Sub® Cell GT Cells, 245
Mini Trans-Blot® Cell, 226
Model 111 Mini IEF Cell, 212
Model 175 Tube Gel Accessories, 211
Model 422 Electro-Eluter, 217
Model 491 Prep Cell and Mini Prep Cell, 215
Model 583 and HydroTech™ Gel Drying Systems, 218
Molecular Mass Rulers, 263
Molecular Rulers, 263
Nitrocellulose Membranes, 232
PowerPac™ Adaptor, 156
PowerPac™ Basic Power Supply, 155
PowerPac™ HC High-Current Power Supply, 155
PowerPac™ HV High-Voltage Power Supply, 155
PowerPac™ Universal Power Supply, 156
Precision Plus Protein™ Standards, 158
Premixed Blotting Buffers, 264
Premixed Blotting Buffers and Buffer Reagents, 236
Premixed Gel-Casting Buffers, 193
Premixed Running Buffers, 192
Premixed Sample Loading and Running Buffers, 260
Premixed Sample Loading Buffers, 192
Prestained SDS-PAGE Standards, 161
PROTEAN® i12™ IEF System, 202
PROTEAN® IEF Accessories, 204
PROTEAN® II Multi-Gel Casting Chamber, 188
PROTEAN® II xi 2-D Tube Gel Cell, 210
PROTEAN® II xi and XL Accessories, 186
PROTEAN® II xi and XL Cells, 184
PROTEAN® II xi and XL Multi-Cells, 186
PROTEAN® Plus Dodeca™ Cell, 189
PVDF Membranes, 233
ReadyAgarose™ Precast Gel System, 252
Ready Gel® Precast Gels, 171
ReadyPrep™ 2-D Starter Kit, 207
ReadyStrip™ IPG Strips, 205
Rotofor® Cell, Mini Rotofor Cell Accessories, and MicroRotofor™, 214
Silver Stains, 200
Sub-Cell® GT Cell, 248
Sub-Cell® Model 96 Cell, 250
Sub-Cell® Model 192 Cell, 251
TGX™ Handcast Acrylamide Solutions, 194
Total Protein Stains, 243
Tracking Dyes, 197, 259
Trans-Blot® Cell, 228
Trans-Blot® Plus Cell, 229
Trans-Blot® SD Semi-Dry Transfer Cell, 225
Trans-Blot® Turbo™ Transfer System, 224
Unstained SDS-PAGE Standards, 162
UView™ 6x Loading Dye, 259
Whole Gel Eluter and Mini Whole Gel Eluter Accessories, 217
Wide Mini-Sub® Cell GT Cells, 247
Zeta-Probe® Nylon Membranes, 234