Product Catalog

Life Science Research

2018

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Personalized Workflows for Drug Discovery and Development

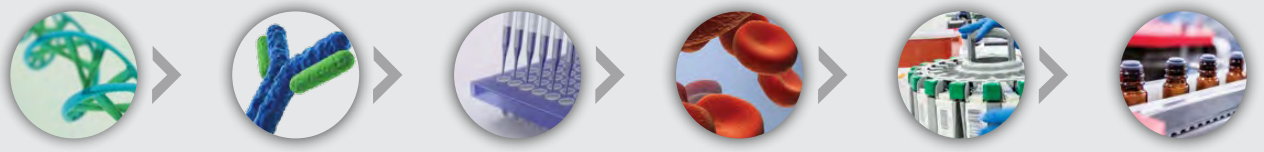
Every drug discovery and development journey is unique. Bio-Rad offers a suite of customizable products and services that ensure efficiency, reproducibility, and reliability at each step of the drug discovery and development process. With more than 60 years of experience as a global leader in life science research and clinical diagnostics, Bio-Rad provides the highest-quality integrated platforms and solutions so that you can focus on your science. Products are manufactured in ISO-certified production facilities and an experienced global support team is available to partner with you to provide technical and regulatory audit support.

More than products: A trusted global partner

Bio-Rad's commitment to your success does not end with your purchase. Our global support and service team is dedicated to limiting downtime and maximizing your productivity.

Bio-Rad workflows — Bio-Rad understands the power of an optimized workflow: systems, reagents, and software that work better together to enhance productivity and promote confidence in your science. Over the next few pages, explore examples of the various workflows Bio-Rad has to offer.

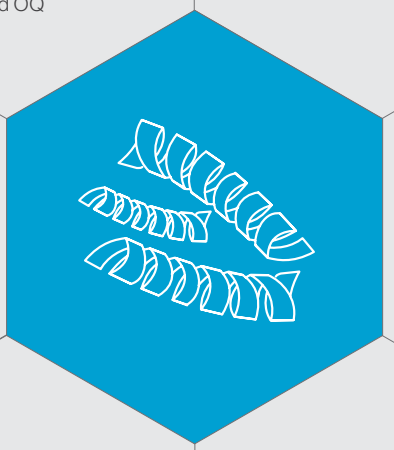
Customizable products and services from discovery to approval and release



Target Discovery | Lead Discovery | Preclinical Research | Clinical Research | Process Development | Manufacturing

RNA/DNA Analysis, p. iv

- Droplet Digital™ PCR
- Quantitative PCR
- Validated primers
- Plastics
- Sample preparation
- CFR, IQ, and OQ



Protein Analysis, p. viii

- Multiplex analysis
- Purification
- Quantitation
- Separation

Cell Analysis, p. xvi

- Counting
- Sorting
- Viability
- Editing
- Transfecting

Gene Expression Analysis Workflow

Sample > Sample preparation > qPCR reagents + qPCR instrumentation or

	Purification of RNA from tissues, cell cultures, or bacterial cells	Choice of reagents and instruments most compatible with your RNA/cDNA assay needs and amplification of cDNA using PCR	
Methods	Nucleic acid sample preparation	One- or two-step reverse transcription quantitative PCR (RT-qPCR)	
Product Solutions	SingleShot™ cell lysis RT-qPCR kits, p. 385	iTaq™ universal probes one-step kit, p. 383	CFX384 Touch™ real-time PCR detection system, p. 367
	Aurum™ total RNA kits, p. 10 PureZOL™ RNA isolation reagent, p. 11	iScript™ reverse transcription supermix for RT-qPCR, pp. 388–389 SsoAdvanced™ supermixes, pp. 377–379, 384 PrimePCR™ plates, p. 374 PrimePCR probe assays, p. 374	C1000 Touch™ thermal cycler, p. 360 CFX96 Touch™ real-time PCR detection system, p. 365 CFX automation system II, p. 368 CFX Maestro™ software, p. 370 PCR plastic consumables, pp. 394–395

Choice of reagents and instruments compatible with your application and amplification of DNA using Droplet Digital™ PCR (ddPCR) and analysis

Droplet Digital PCR

One-step RT-ddPCR advanced kit for probes, p. 351

QX200™ Droplet Digital PCR system, pp. 347–348

QX200™ ddPCR™ EvaGreen® supermix, p. 352

PrimePCR ddPCR assays, p. 354

QX200™ AutoDG™ Droplet Digital PCR system, pp. 347–348

QX ONE™ Droplet Digital PCR system, pp. 346–347

CRISPR Gene-Editing Workflow

Sample → Cell health assessment → Transfection → Expansion of transfected cells

	Cell health assessment	Transfection	Expansion of transfected cells
	Monitoring of cell health and growth. Confirmation of stable growth of cells and their readiness for editing	Delivery of guide RNA and Cas9 to cells	Enrichment of cell population with single-cell sorting and clonal expansion
Methods	Cell growth Cell counting Cell imaging	Transfection	Cell sorting Cell growth
Product Solutions	 ZOE™ fluorescent cell imager, p. 70	 Gene Pulser Xcell™ electroporation systems, pp. 336–337	 S3e™ cell sorter, pp. 32–34
	TC20™ automated cell counter, pp. 28–29 Cell viability assays, pp. 58–60 Nuclear staining dyes, pp. 65–66	TransFectin™ lipid reagent, p. 334 Helios® gene gun system, p. 340 Gene Pulser®/MicroPulser™ electroporation cuvettes, p. 338 Gene Pulser electroporation buffer, pp. 335–336	Cell viability assays, pp. 58–60 Apoptosis antibodies, p. 51 Autophagy antibodies, p. 53 Cell proliferation antibodies, p. 57

Validation → Quantification → Downstream analysis → Assay for disease state

Determination of genotype	Quantification of CRISPR/Cas9-induced indels at off-target sites	Analysis of downstream protein expression
High-fidelity PCR Real-time PCR	Absolute nucleic acid quantification Droplet Digital™ PCR (ddPCR™)	Protein separation Western blotting Chromatography Activity assays Cell-based assays
 CFX96 Touch™ real-time PCR detection system, p. 365	 QX200™ Droplet Digital PCR system, pp. 347–348	 ZE5™ cell analyzer, pp. 40–41
CFX automation system II, p. 368 iProof™ HF master mix, p. 391 C1000 Touch™ thermal cycler, p. 360 Gel boxes and power supplies, pp. 171–172 CFX384 Touch™ real-time PCR detection system, p. 367 SsoAdvanced™ universal probes supermix, p. 378 Precision melt supermix, p. 386 Precision Melt Analysis™ software, p. 372 ReadyAgarose™ precast gels, p. 259 Agarose powders, pp. 264–265, 268	Droplet generation oils, pp. 347–348 ddPCR supermix for residual DNA quantification, p. 351 QX ONE™ Droplet Digital PCR system, pp. 346–347	ChemiDoc™ MP and ChemiDoc imaging systems, p. 287 Trans-Blot® Turbo™ transfer system, p. 231 Stain-free protein gels, pp. 184, 191 Clarity™ western ECL blotting substrate, p. 245 Clarity Max™ western ECL blotting substrate, p. 245 Bio-Plex® multiplex system and tools, p. 296 Bio-Plex assays, pp. 303–320 ZOE fluorescent cell imager, p. 70 S3e cell sorter, pp. 32–34 Protein extraction kits, pp. 3–4 Chromatography resins, p. 74 Antibodies, p. 280 V3 Western Workflow™, p. 228 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.

Protein Purification Workflow

Sample → Sample assessment → Sample preparation → Preliminary sample assessment →

	Analysis of crude protein extract	Lysis, solubilization, clarification, and fractionation of sample	Assessment for quality and quantity
Methods	Protein electrophoresis Image analysis Spectrophotometry and fluorometry Protein assays	Protein sample preparation	Protein electrophoresis Image analysis Spectrophotometry and fluorometry Protein assays 2-D electrophoresis
Product Solutions	 ChemiDoc™ MP and ChemiDoc imaging systems, p. 287	 SureBeads™ magnetic beads, p. 2	 Stain-free protein gels, pp. 184, 191
	Mini-PROTEAN® TGX Stain-Free™ precast gels, p. 184 Criterion™ TGX Stain-Free™ precast gels, p. 191 *RC DC*™ protein assay, p. 22	ReadyPrep™ protein extraction kit (total protein), p. 3 ReadyPrep sequential extraction kit, p. 5 ReadyPrep mini grinders, p. 4 ReadyPrep reagents, pp. 219–221 *RC DC* protein assay, p. 22	ChemiDoc MP and ChemiDoc imaging systems, p. 287 Trans-Blot® Turbo™ transfer system, p. 231 xMark™ microplate absorbance spectrophotometer, pp. 326–327 *RC DC* protein assay, p. 22 2-D electrophoresis, p. 215 Antibodies, p. 280 PrecisionAb™ validated western blotting antibodies, p. 281 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.

Purification → Protein assays → Purified proteins

Purification of a specific protein or protein family of interest from preparative to process and manufacturing scale	Assessment of purified protein(s) for quality and quantity
Chromatography	Protein electrophoresis Protein blotting Image analysis Spectrophotometry and fluorometry Protein assays
 NGC™ chromatography systems, pp. 134–137	 Bio-Plex® multiplex system, p. 296
UNOsphere™ Q resin, pp. 78–79 UNOsphere S resin, pp. 78–79 Bio-Gel® HT and HTP hydroxyapatite, p. 93 CHT™ ceramic hydroxyapatite, pp. 89–90 Nuvia™ cPrime™ resin, pp. 88–89 ENrich™ high-resolution size exclusion columns, p. 116 ENrich Q columns, p. 115 ENrich S columns, p. 115 Nuvia IMAC resin, p. 94 Foresight™ prepacked chromatography plates, columns, and RoboColumn units, pp. 117–118, 163–164	Trans-Blot Turbo transfer system, p. 231 ChemiDoc MP and ChemiDoc imaging systems, p. 287 xMark microplate absorbance spectrophotometer, pp. 326–327 Stain-free protein gels, pp. 184, 191 V3 Western Workflow™, p. 228 2-D electrophoresis, p. 215 PrecisionAb validated western blotting antibodies, p. 281 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.

Biosimilar Development Workflow

Sample → Transfection → Confirmation → Cell line development

	Transfection	Confirmation	Cell line development
	Design of vectors and transfection into desired cell line	Confirmation of presence and number of gene copies	Development and culture of cell lines to express biosimilars. Identification of optimal clones with which to scale up production levels
Methods	Transfection	Reverse transcription quantitative PCR	Cell growth Cell sorting
Product Solutions	 Gene Pulser Xcell™ electroporation systems, pp. 336–337	 CFX96 Touch™ real-time PCR detection system, p. 365	 S3e™ cell sorter, pp. 32–34
	TransFectin™ lipid reagent, p. 334 Helios® gene gun system, p. 340 Gene Pulser®/MicroPulser™ electroporation cuvettes, p. 338 Gene Pulser electroporation buffer, pp. 335–336	CFX automation system II, p. 368 Aurum™ total RNA kits, p. 10 iProof™ high-fidelity DNA polymerase, p. 391 ReadyAgarose™ precast gels, p. 259 Agarose powders, pp. 264–265, 268	ZOE™ fluorescent cell imager, p. 70 TC20™ automated cell counter, pp. 28–29 Cell viability assays, pp. 58–60

Purification → Purity assessment → Sample assessment → Purified protein

Purification of a specific protein or protein family of interest from preparative to process and manufacturing scale	Assessment of impurities	Assessment of purified protein(s) for quality and quantity for downstream assays
Chromatography	Host cell protein detection Host cell DNA detection	Protein electrophoresis Protein blotting Image analysis Spectrophotometry and fluorometry Protein assays
 NGC™ chromatography systems, pp. 134–137	 QX200™ Droplet Digital™ PCR (ddPCR™) system, pp. 347–348	 Bio-Plex® multiplex system, p. 296
UNOsphere™ Q resin, pp. 78–79 UNOsphere S resin, pp. 78–79 Bio-Gel® HT and HTP hydroxyapatite, p. 93 CHT™ ceramic hydroxyapatite, pp. 89–90 Nuvia™ cPrime™ resin, pp. 88–89 Nuvia IMAC resin, p. 94 Nuvia S resin, pp. 78–79 ENrich™ high-resolution size exclusion columns, p. 116 ENrich Q columns, p. 115 ENrich S columns, p. 115	ddPCR CHO residual DNA quantification kit, p. 355 ddPCR *E. coli* residual DNA quantification kit, p. 355 QX ONE™ Droplet Digital PCR system, pp. 346–347 Visit **bio-rad.com/HCPanalysis** to learn about our host cell protein analysis workflow.	ChemiDoc™ MP and ChemiDoc imaging systems, p. 287 Trans-Blot® Turbo™ transfer system, p. 231 Stain-free protein gels, pp. 184, 191 PowerPac™ Universal power supply, p. 174 Bio-Plex Data Pro™ software, p. 302 Bio-Plex assays, pp. 303–320 Mini-PROTEAN® Tetra cell, pp. 180–181 Protein standards, p. 175 2-D electrophoresis, p. 215 Antibodies, p. 280 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.

Biomarker Discovery Workflow

Tissue, cells, etc. → Cell analysis → Sample preparation → Sample assessment

	Cell analysis	Sample preparation	Sample assessment
	Analysis of cells using imaging or flow cytometry to identify cell-based biomarkers or for the preparation of cell populations for downstream investigations	Purification of DNA, RNA, or protein from tissues, cell cultures, or bacterial cells	Assessment of nucleic acid or protein for quality and quantity
Methods	Cell counting Cell sorting Cell imaging Cell analysis	**Protein** Protein sample preparation **Nucleic Acid** Nucleic acid sample preparation	**Protein** Protein electrophoresis Spectrophotometry and fluorometry Protein assays **Nucleic Acid** Nucleic acid electrophoresis Spectrophotometry and fluorometry
Product Solutions	 ZE5™ cell analyzer, pp. 40–41	 SureBeads™ magnetic beads, p. 2	 Mini-PROTEAN® Tetra cell, pp. 180–181
	TC20™ automated cell counter, pp. 28–29 ZOE™ fluorescent cell imager, p. 70 Antibodies, p. 280 S3e™ cell sorter, pp. 32–34 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.	SingleShot™ cell lysis RT-qPCR kits, p. 385 Aurum™ total RNA kits, p. 10 Aurum plasmid mini kit, p. 14 PureZOL™ RNA isolation reagent, p. 11 ReadyPrep™ protein extraction kit (total protein), p. 3 ReadyPrep sequential extraction kit, p. 5 ReadyPrep mini grinders, p. 4 ReadyPrep reagents, pp. 219–221 InstaGene™ matrix (DNA only), p. 14 Quantum Prep® plasmid kits, p. 13	Criterion™ TGX Stain-Free™ precast gels, p. 191 Mini-PROTEAN® TGX Stain-Free™ precast gels, p. 184 PowerPac™ Basic power supply, p. 173 PROTEAN® Plus Dodeca™ cell, p. 202

Profiling and quantitation → Assay development → Validation → Validated biomarker

Profiling and quantitation of expression changes correlating with disease state or system perturbation	Development of assays for biomarker(s) for disease states	Validation of specific biomarker assays
Protein Multiplex suspension array technology Image analysis Gel excision 2-D electrophoresis **Nucleic Acid** Reverse transcription quantitative PCR (RT-qPCR)	**Protein** Protein blotting Multiplex suspension array technology ELISA Spectrophotometry and fluorometry **Nucleic Acid** RT-qPCR	**Protein** Multiplex suspension array technology Protein blotting Immunohistochemistry **Nucleic Acid** RT-qPCR
 CFX384 Touch™ real-time PCR detection system, p. 367	 Bio-Plex multiplex system, p. 296	 ZOE fluorescent cell imager, p. 70
Bio-Plex® multiplex system, p. 296 Bio-Plex Data Pro™ software, p. 302 CFX automation system II, p. 368 PrimePCR™ primers, assays, and arrays, pp. 373–374 PCR reagents, p. 375 PCR plastic consumables, pp. 394–395 2-D electrophoresis, p. 215 CFX Maestro™ software, p. 370 QX ONE™ Droplet Digital™ PCR system, pp. 346–347	Trans-Blot® Turbo™ transfer system, p. 231 CFX automation system II, p. 368 xMark™ microplate absorbance spectrophotometer, pp. 326–327 PrimePCR primers, assays, and arrays, pp. 373–374 PCR reagents, p. 375 PCR plastic consumables, pp. 394–395	S3e cell sorter, pp. 32–34 CFX384 Touch real-time PCR detection system, p. 367 CFX automation system II, p. 368 PrimePCR primers, assays, and arrays, pp. 373–374 PCR reagents, p. 375 PCR plastic consumables, pp. 394–395 PowerPac Universal power supply, p. 174 Mini-PROTEAN Tetra cell, pp. 180–181 Stain-free protein gels, pp. 184, 191 Antibodies, p. 280 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.

Protein Separation, Analysis, and Quantitation Workflow

Sample → Sample preparation → Protein separation → Protein purification

	Protein purification and fractionation from tissues, cell cultures, or bacterial cells	Separation of proteins by electrophoresis	Purification of proteins by chromatography
Methods	Protein sample preparation	Protein electrophoresis 2-D electrophoresis Isoelectric focusing Preparative electrophoresis	Ion exchange chromatography Hydroxyapatite and affinity chromatography Size exclusion chromatography
Product Solutions	 SureBeads™ magnetic beads, p. 2	 Mini-PROTEAN® Tetra Cell, pp. 180–181	 NGC™ chromatography systems, pp. 134–137
	ReadyPrep™ protein extraction kit (total protein), p. 3 ReadyPrep sequential extraction kit, p. 5 Model 491 prep cell, pp. 225–226	Stain-free protein gels, pp. 184, 191 PROTEAN® II XL cells, pp. 197–198 PowerPac™ power supplies, pp. 171–172 2-D electrophoresis, p. 215	GS-900™ calibrated densitometer, p. 291 Nuvia™ S resin, pp. 78–79 CHT™ ceramic hydroxyapatite, pp. 89–90 Bio-Gel® P polyacrylamide resin, p. 107 Nuvia™ cPrime™ resin, pp. 88–89 Nuvia IMAC resin, p. 94 ENrich™ high-resolution size exclusion columns, p. 116 ENrich Q columns, p. 115 ENrich S columns, p. 115

Protein confirmation → Profiling and quantitation → Downstream functional assays

Confirmation of protein identity	Protein profiling, characterization, and quantitation
Western blotting ELISA Protein electrophoresis	Protein quantification Protein characterization
 Trans-Blot® Turbo™ transfer system, p. 231	 Bio-Plex® multiplex system, p. 296
ChemiDoc™ MP and ChemiDoc imaging systems, p. 287 Image Lab™ software, p. 292 Stain-free protein gels, pp. 184, 191 PrecisionAb™ validated western blotting antibodies, p. 281 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.	ChemiDoc MP and ChemiDoc imaging systems, p. 287 Bio-Plex Data Pro™ software, p. 302 Bio-Plex assays, pp. 303–320 Antibodies, p.280 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.

Stem Cell Research Workflow

Stem cells → Isolation → Differentiation → Transfection

	Isolation	Differentiation	Transfection
	Isolation and separation of individual stem cell populations and their derivatives. Confirmation that cells retain their functionality and potential for differentiation. If creating induced pluripotent stem cells, transfection prior to differentiation	Control and activation of stem cell differentiation to desired lineage, yielding functionally active differentiated cells	Introduction of nucleic acid to cells to control stemness and/or protein expression
Methods	Cell culturing Cell sorting Cell imaging and analysis	RNA interference (RNAi) Growth factors Immunocytochemistry Cell counting	Electroporation Lipid-mediated transfection Biolistic particle delivery RNAi
Product Solutions	 S3e™ cell sorter, pp. 32–34	 TC20™ automated cell counter, pp. 28–29	 Gene Pulser Xcell™ electroporation systems, pp. 336–337
	ZOE™ fluorescent cell imager, p. 70 Antibodies, p. 280 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies	10x phosphate buffered saline, p. 243 Gelatin, EIA grade, p. 243 IEP/IEF agaroses, p. 209 Xcluda™ aerosol barrier pipet tips, p. 414 Seque/Pro™ capillary pipet tips, p. 415	Gene Pulser® electroporation buffer, pp. 335–336 TransFectin™ lipid reagent, p. 334 siLentFect™ lipid reagent for RNAi, p. 333 Helios® gene gun system, p. 340 PDS-1000/He™ and Hepta™ systems, pp. 341–342

Isolation → Nucleic acid analysis → Protein analysis → Isolated and analyzed stem cells

Isolation	Nucleic acid analysis	Protein analysis	Isolated and analyzed stem cells
Isolation and separation of individual stem cell populations and their derivatives	Identification of molecular profiles characteristic of cell state, type, and/or disease. Understanding mechanisms that regulate self renewal, differentiation, cell cycle control, and other biological processes. Addressing misidentification and cross-contamination	Identification of proteomic profiles characteristic of cell state, type, and/or disease. Understanding mechanisms that regulate self renewal, differentiation, cell cycle control, and other biological processes. Addressing misidentification and cross-contamination	
Cell culturing Cell sorting Cell imaging and analysis	Sample preparation High-fidelity PCR Nucleic acid electrophoresis Reverse transcription quantitative PCR (RT-qPCR) Droplet Digital™ PCR (ddPCR™)	Sample preparation Blotting Multiplex suspension array Separation 1-D electrophoresis 2-D electrophoresis	
 ZOE™ fluorescent cell imager, p. 70	 CFX96 Touch™ and CFX384 Touch™ real-time PCR detection systems, pp. 365, 367	 Bio-Plex® multiplex system, p. 296	
S3e cell sorter, pp. 32–34 Antibodies, p. 280 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies	QX200™ Droplet Digital PCR system, pp. 347–348 QX ONE™ Droplet Digital PCR system, pp. 346–347 1000-series thermal cyclers, p. 359 CFX automation system II, p. 368 PrimePCR™ primers, assays, and arrays, pp. 373–374 SingleShot™ cell lysis RT-qPCR kits, p. 385 ddPCR multiplex mutation screening kits, p. 356 ddPCR *SMN1* copy number determination kit, p. 357 ddPCR *SMN2* copy number determination kit, p. 357 PCR plastic consumables, pp. 394–395 Aurum™ total RNA kits, p. 10 PureZOL™ RNA isolation reagent, p. 11	ChemiDoc™ MP and ChemiDoc imaging systems, p. 287 Bio-Plex Data Pro™ software, p. 302 Bio-Plex assays, pp. 303–320 Trans-Blot® Turbo™ transfer system, p. 231 Stain-free protein gels, pp. 184, 191 Mini-PROTEAN® Tetra cell, pp. 180–181 2-D electrophoresis, p. 215 PrecisionAb™ validated western blotting antibodies, p. 281 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.	

Immunotherapy Analysis Workflow

Sample → Cell screening → Cell sorting → Low-abundance biomarker analysis

	Cell screening	Cell sorting	Low-abundance biomarker analysis
	Analysis of up to 25 parameters simultaneously for identification of rare cell populations	Sorting of populations for downstream cell analysis	Identification of low-abundance biomolecules and circulating tumor cell DNA
Methods	Cell analysis Cell sorting Cell counting	Cell sorting	Droplet Digital™ PCR
Product Solutions	 ZE5™ cell analyzer, pp. 40–41	 S3e cell sorter, pp. 32–34	 QX200™ Droplet Digital PCR system, pp. 347–348 QX200™ AutoDG™ Droplet Digital PCR system, pp. 347–348
	Antibodies, p. 180 TC20™ automated cell counter, pp. 28–29 Counting slides, p. 29 S3e™ cell sorter, pp. 32–34 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.	Antibodies, p. 180 Visit **bio-rad.com/antibodies** to browse our range of application-specific antibodies.	PrimePCR™ primers, assays, and arrays, pp. 373–374 QX ONE™ Droplet Digital PCR system, pp. 346–347

Nucleic acid analysis → Protein analysis → Purified protein

Rapid screening of large gene panels for the identification of biomarkers	Rapid screening of multiple protein markers for inflammation	
Real-time PCR	Multiplex immunoassays	
 CFX Maestro™ software, p. 370	 Bio-Plex® multiplex system p. 296	
PrimePCR primers, assays, and arrays, pp. 373–374 CFX384 Touch™ real-time PCR detection system, p. 367 CFX automation system II, p. 368	Bio-Plex Pro™ human inflammation assays, pp. 303–304 Bio-Plex Pro cytokine, chemokine, and growth factor assays, pp. 304–311 Bio-Plex Pro human inflammation panel 1, 37-plex, p. 303	

New Products

Flow Cytometry

Accessory Reagents

Fixation Buffer

The fixation buffer is a paraformaldehyde-based fixative that is suitable for use with most cell types. Paraformaldehyde-containing fixation buffer is essential for intracellular staining prior to permeabilization. **Page 63.**

Intracellular Permeabilization/Wash Buffer

This permeabilization and wash buffer is for intracellular staining. Access to intracellular targets, such as cytokines and cytoplasmic proteins, requires permeabilization of the cell membrane after fixation. This buffer has minimal effect on cell morphology. The buffer is supplied as a 10x solution for dilution in water. It can also be used as a wash buffer during intracellular staining to help minimize background staining. **Page 63.**

Protein Transport Inhibitors

Protein transport inhibitors can be used to enhance intracellular cytokine staining. As cytokines and chemokines are usually secreted, use of these inhibitors traps the proteins within the cell, leading to a buildup of cytokines in the Golgi apparatus and endoplasmic reticulum. The choice of and culture conditions for these inhibitors may need to be optimized depending on the species and cytokines being stained. Monensin acts by interfering with the Na^+/H^+ transport in Golgi apparatus transmembranes. Brefeldin A acts by redistributing proteins from the Golgi apparatus to the endoplasmic reticulum. **Page 63.**

Staining Buffer

Bio-Rad's staining buffer contains bovine calf serum. It has been optimized for staining both live and fixed cells with antibodies. It is suitable for use with both conjugated and unconjugated antibodies and can be used as an antibody dilution media and a wash buffer. The addition of bovine calf serum reduces background staining of target cells. The staining buffer also contains sodium azide to minimize receptor capping. **Page 63.**

Additional Laser Configurations for the S3e™ Cell Sorter

The S3e is the first truly walk-away automated cell sorter available to researchers. It is a compact cell sorter that utilizes established jet-in-air technology in which cells are analyzed directly in the stream before being sorted. Samples can be sorted at high speeds while sensitivity and purity are maintained. Previous configurations included one or two lasers with 4 detectors plus forward and side scatter. The S3e cell sorter now offers additional laser configurations, with a three-laser system that includes a 405 nm 100 mW laser. **Page 32.**

Lynx Conjugation Kits

Lynx Rapid Conjugation Kit® and Lynx Rapid Plus conjugation kits make direct labeling of antibodies, proteins, and peptides quick and easy. They are suitable for use in flow cytometry, ELISA, western blotting, immunohistochemistry, and immunofluorescence applications. **Page 46.**

Chromatography: Laboratory and Process Separations

NGC™ Fraction Collector
The NGC fraction collector paired with the NGC chromatography system has the capability to produce purified biomolecules for discovery and small-scale batch production on one hardware and software platform. **Page 147.**

Process Resins
Coming Soon Nuvia™ HP-Q Resin
Nuvia HP-Q is a strong anion exchange resin designed for high-throughput purification of large biomolecules, such as IgA, IgM, fibrinogen, factor VIII, von Willebrand factor, and polyethylene glycol (PEG)–modified proteins. **Page 78.**

Nuvia IMAC Uncharged Resin
Nuvia IMAC is available in two forms: uncharged and charged with Ni^{2+}. The uncharged form can be charged with the metal ion of your choice for even greater purification flexibility.
Page 94.

Antibodies

Fluorescent Antibodies for Western Blotting
hFAB™ Rhodamine Housekeeping Protein Primary Antibodies
These housekeeping primary antibodies are human Fab fragments labeled with rhodamine. They enable easier fluorescent multiplex detection of common housekeeping proteins (actin, tubulin, and GAPDH). **Page 283.**

StarBright™ Blue Secondary Antibodies
StarBright Blue 700 and StarBright Blue 520 fluorescent secondary antibodies are highly sensitive, allowing the detection of low-abundance proteins within seconds of exposure time with minimal background. These antibodies are ideal for multiplex western blotting. **Page 282.**

DNA Amplification/PCR

CFX Maestro™ Software

CFX Maestro software is an easy tool for visualizing your real-time PCR data and performing statistically powered analysis. **Page 370.**

CFX Maestro Software, Security Edition

With CFX Maestro software, Security Edition, you can boost your real-time PCR standard operating protocols with electronic signatures, file-specific password protection, and audit trails. **Page 371.**

ddPCR™ Multiplex Supermix

The ddPCR multiplex supermix is a 4x supermix specifically designed and optimized for multiplexing using the QX ONE™ Droplet Digital™ PCR (ddPCR) system. **Page 350.**

iScript™ Explore One-Step RT and PreAmp Kit

The iScript Explore kit includes a highly sensitive reagent to generate preamplified cDNA directly from RNA in a single step. This kit is well suited for detecting many targets from a limited sample or for reliable detection of targets expressed at low levels. The reagent's patented* Sso7d fusion protein provides unbiased target-specific preamplification of up to 100 targets. The kit also integrates an effective genomic DNA removal step, which helps ensure only the transcripts of interest are detected by quantitative qPCR. **Page 390.**

PrimePCR™ Long Noncoding RNA Assays and Array Plates

PrimePCR gene expression assays now include some for human long noncoding RNA (lncRNA) targets. The expansion of the PrimePCR product offering now includes 20 predesigned array plates, custom lncRNA arrays, and individual assay formats for both SYBR®- and probe-based assays. **Page 374**.

QX ONE Droplet Digital PCR System

The QX ONE Droplet Digital PCR system expands upon the most proven digital PCR technology for unmatched precision and sensitivity in absolute quantification with advanced multiplex capabilities, high throughput, and fully integrated operation. The QX ONE ddPCR system takes care of droplet generation, thermal cycling, and reading so that you don't have to. **Page 346.**

ZDC Multiplex RT-PCR Assay

The ZDC multiplex RT-PCR assay is a one-step reverse transcription PCR (RT-PCR) assay for the simultaneous detection of Zika (ZIKV), dengue (DENV 1–4), and chikungunya (CHIKV) viral RNAs by real-time PCR. The assay includes all the controls needed for reliable results, thus providing researchers with a robust tool to identify ZIKV, DENV, and CHIKV nucleic acids in RNA extracted from a wide range of sample types. **Page 387.**

* U.S. patents 6,627,424; 7,541,170; and 7,560,260.

Bio-Rad Explorer™ Educational Products

Giant Panda Problem Kit for AP Biology
In recent decades, the giant panda population has been severely threatened. This hands-on laboratory kit allows your students to take on the role of conservation biologist as they assess panda fertility using the power of an enzyme-linked immunosorbent assay (ELISA). **Page 428.**

Sample Preparation

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Protein Sample Preparation

Magnetic Beads and Racks for Immunoprecipitation

See Also
Antibodies: page 280.
Western blotting: page 228.
Chemiluminescence detection: page 245.

SureBeads™ Magnetic Beads System

SureBeads are designed for bioseparation techniques like immunoprecipitation (IP), co-immunoprecipitation (co-IP), and protein pull-down assays. SureBeads are superparamagnetic beads with surface activated hydrophilic polymers and chemically conjugated Protein A or Protein G that specifically bind to the Fc region of immunoglobulins. Proprietary chemistry enables high IgG binding and low nonspecific binding from a variety of biological samples.

Product features include:

- **Faster IP** — no centrifugation
- **Easier IP** — ergonomically designed magnetic rack magnetizes beads in seconds, making washes easy and preventing loss of beads during pipetting
- **Less antibody needed** — patented* surface chemistry enables proper antibody orientation for optimal antigen binding
- **More concentrated sample elution** — small elution volumes allow recovery of more concentrated sample
- **Reproducible** — consistent IgG binding capacity ensures accurate, reproducible results
- **Low cost to go magnetic** — priced similarly to leading agarose beads, and the 16-tube magnetic rack is included in the IP starter kit with two 3 ml vials of beads

* U.S. patent 20100105879A1.

For More Information
Web: bio-rad.com/immunoprecipitation
Request or download bulletin: 6560

Try TidyBlot™ western blot detection reagent to avoid interference from IgG heavy or light chains when detecting about 25 or 50 kD immunoprecipitated protein in western blots.

TidyBlot™

Ordering Information

Catalog #	Description
1614011	**SureBeads Protein A Magnetic Beads**, 1 x 1 ml vial conjugated magnetic immunoprecipitation beads (10 mg beads/ml suspension)
1614013	**SureBeads Protein A Magnetic Beads**, 1 x 3 ml vial conjugated magnetic immunoprecipitation beads (10 mg beads/ml suspension)
1614021	**SureBeads Protein G Magnetic Beads**, 1 x 1 ml vial conjugated magnetic immunoprecipitation beads (10 mg beads/ml suspension)
1614023	**SureBeads Protein G Magnetic Beads**, 1 x 3 ml vial conjugated magnetic immunoprecipitation beads (10 mg beads/ml suspension)
1614916	**16-Tube SureBeads Magnetic Rack**, with separable magnets
1614833	**SureBeads Starter Kit Protein A and G**, 1 x 3 ml vial Protein A– and 1 x 3 ml vial Protein G–conjugated magnetic immunoprecipitation beads (10 mg beads/ml suspension), 16-tube magnetic rack

Protein Extraction

Protein extraction tools such as cell lysis and extraction kits, as well as mini grinders, are available for extracting proteins from cultured cells and tissues.

ReadyPrep™ Protein Extraction Kit

The ReadyPrep protein extraction kit (total protein) provides a simple, rapid, and reproducible method for preparation of total cellular protein extracts from a wide variety of biological samples. Use of this kit generates protein samples that can be applied directly to a variety of methods, including IEF and 2-D gel electrophoresis.

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

Ordering Information

Catalog #	Description
1632086	**ReadyPrep Protein Extraction Kit (Total Protein)**, 20 preps

Kits for Cell Lysis

See Also
Protein assay kits: page 20.

Cell Lysis Kits

These kits offer a gentle nondetergent solution to cell disruption and generate total protein samples that are ready to be applied to SDS-PAGE, isoelectric focusing, 2-D gel electrophoresis, and liquid chromatography–mass spectrometry (LC-MS). The kits are based on a chaotropic protein solubilization buffer (PSB), which contains nondetergent sulfobetaine 201 (NDSB 201) along with urea, thiourea, and CHAPS for particularly effective solubilization (Vuillard et al. 1995). Cell lysis and extraction protocols are tailored for mammalian, plant, yeast, or bacterial samples.

Bio-Plex® Cell Lysis Kit

This cell lysis kit is used to prepare cell lysates for western blot analysis. Its protein extraction procedure yields western blotting results similar to those generated by routine cell lysis and protein extraction protocols.

For More Information
Web: bio-rad.com/proteinextraction and /bioplexcelllysis
Download bulletins: 3033, 3034, and 5517

See Also
Protein assay kits: page 20.

ReadyPrep™ Mini Grinders

For grinding small biological samples for high recovery of proteins (and nucleic acids), each mini grinder includes a 1.5 ml grinding tube containing a grinding resin and a matching pestle. The grinding resin is a neutral abrasive material made of high tensile strength microparticles that do not bind to proteins or nucleic acids. ReadyPrep mini grinders are disposable and are nuclease- and protease-free. They are a component of the MicroRotofor™ lysis kit (mammal) and are also sold separately as a pack of 20. The mini grinder tubes fit conveniently in most benchtop centrifuges.

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

Ordering Information

Catalog #	Description
1632141	**Mammalian Cell Lysis Kit**, 15 preps, includes 50 ml protein solubilization buffer (PSB), ReadyPrep mini grinders (2 packs of 10 each)
1632142	**Plant Cell Lysis Kit**, 10 preps, includes 50 ml protein solubilization buffer (PSB), ReadyPrep 2-D cleanup kit (50 reaction size)
1632143	**Yeast Cell Lysis Kit**, 15 preps, includes 50 ml protein solubilization buffer (PSB), 15 ml yeast suspension buffer, 2 x 0.5 ml lyticase (1.5 U/µl)
1632144	**Bacterial Cell Lysis Kit**, 15 preps, includes 50 ml protein solubilization buffer (PSB), 25 ml bacteria suspension buffer, 1 ml lysozyme (1,500 U/µl)
Cell Lysis Kit Components	
1632145	**Protein Solubilization Buffer (PSB)**, makes 50 ml of solution
1632146	**ReadyPrep Mini Grinders**, includes 20 mini grinders, sufficient for twenty 100 mg extractions
Bio-Plex Cell Lysis Kits	
171304011	**Bio-Plex Cell Lysis Kit**, 1 x 96-well, includes cell lysis and wash buffers, factor 1 and factor 2
171304012	**Bio-Plex Cell Lysis Kit**, 10 x 96-well, includes cell lysis and wash buffers, factor 1 and factor 2

Protein Sample Cleanup

General-purpose cleanup kits and columns are available for the removal of salts and other contaminants.

Protein Sample Cleanup Kit Selection Guide

Kit Type and Catalog Number	Applications	Procedure	Preparation Time	Number of Preps
Salt Removal				
ReadyPrep 2-D cleanup kits (#1632130, #1632140)	Cleanup of protein samples for 1-D and 2-D applications Reduction of streaking on 2-D gels Concentration of dilute samples	TCA-like precipitation to remove salts, detergents, lipids, phenolic compounds	<1 hr	50
Micro Bio-Spin™ P-6 columns (see pages 16–17)	Removal of salts and other contaminants	Size exclusion chromatography	5 min	25, 100
Removal of Other Contaminants				
ReadyPrep 2-D cleanup kits (#1632130, #1632140)	Reduction of streaking on 2-D gels Concentration of dilute samples	TCA-like precipitation to remove salts, detergents, lipids, phenolic compounds	<1 hr	50
Reduction and Alkylation				
ReadyPrep reduction-alkylation kit (#1632090)	Reduction of streaking on 2-D gels Improved resolution of basic proteins	Reduction, then alkylation of sample to remove disulfide bonds and prevent their re-formation	<2 hr	100

For More Information
Web: bio-rad.com/proteincleanup
Download bulletins: 2934 and 2961

Ordering Information

Catalog #	Description
ReadyPrep Kits	
1632130	**ReadyPrep 2-D Cleanup Kit**, 50 preps
1632140	**ReadyPrep 2-D Cleanup Kit**, 5 preps
1632105	**ReadyPrep 2-D Starter Kit**, includes protein sample and reagents sufficient to rehydrate, focus, and transfer to second-dimension gels; six 17 cm, ten 11 cm, or sixteen 7 cm ReadyStrip IPG strips (ReadyStrip IPG strips,* precast SDS-PAGE gels, and gel stains not included in kit)
1632090	**ReadyPrep Reduction-Alkylation Kit**, 100 preps
ReadyPrep Kit Components and Related Products	
1632091	**ReadyPrep Proteomics Grade Water**, 500 ml
1632083	**ReadyPrep 2-D Rehydration/Sample Buffer 1**, 10 ml, 7 M urea, 2 M thiourea, 1% ASB-14, 40 mM Tris, 0.001% bromophenol blue
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
Reducing and Alkylating Agents	
1610611	**Dithiothreitol (DTT)**, 5 g
1632101	**Tributylphosphine (TBP)**, 200 mM, 0.6 ml
1632109	**Iodoacetamide**, 30 g

* See the prepacked Bio-Spin and Micro Bio-Spin gel filtration columns on pages 16–17.

See Also

Bio-Spin gel filtration columns: pages 16–17.

Micro Bio-Spin gel filtration columns: pages 16–17.

Protein Fractionation

Fractionation kits reduce sample complexity, helping to identify low-abundance proteins. Fractionation kits can be subdivided into three groups that fractionate based on differential solubility, cellular location of the proteins of interest, and protein charge.

Fractionation by Solubility

Fractionation Using Differential Protein Solubility

The ReadyPrep sequential extraction kit and the ReadyPrep protein extraction kit (soluble/insoluble) both reduce sample complexity using differential solubilization. The two kits can be used independently, or the rehydration/sample buffer from the soluble/insoluble kit can be used with the sequential extraction kit to create a fourth fraction for even better resolution.

- **ReadyPrep sequential extraction kit** — enables the isolation of 3 different fractions of increasing solubility. These fractions are isolated sequentially, allowing the visualization of proteins that might not otherwise be seen. Increasing solubilization strength is provided through the use of stronger detergents for each subsequent fraction
- **ReadyPrep protein extraction kit (soluble/insoluble)** — uses a single fractionation step

ReadyPrep Kit Components and Related Products

Individual ReadyPrep kit components and related products such as reducing agents are also available.

For More Information
Web: bio-rad.com/proteinfractionation
Download bulletins: 2934 and 2961

Ordering Information

Catalog #	Description
ReadyPrep Kits	
1632100	**ReadyPrep Sequential Extraction Kit**, 15 preps
1632085	**ReadyPrep Protein Extraction Kit (Soluble/Insoluble)**, 20 preps
ReadyPrep Kit Components and Related Products	
1632103	**ReadyPrep Sequential Extraction Kit Reagent 2**, 10 ml, 8 M urea, 4% CHAPS, 40 mM Tris base, 0.2% Bio-Lyte 3/10 ampholyte
1632104	**ReadyPrep Sequential Extraction Kit Reagent 3**, 10 ml, 5 M urea, 2 M thiourea, 2% CHAPS, 2% SB 3–10, 40 mM Tris base, 0.2% Bio-Lyte 3/10 ampholyte
1632083	**ReadyPrep 2-D Rehydration/Sample Buffer 1**

Fractionation by Cellular Location

Fractionation by Cellular Location

ReadyPrep™ protein extraction kits facilitate fractionation of proteins from different cellular locations such as the membrane, nucleus, or cytoplasm.

- **ReadyPrep protein extraction kit (cytoplasmic/nuclear)** — prepares fractions enriched in cytoplasmic or nuclear proteins from eukaryotic samples
- **ReadyPrep protein extraction kit (membrane I)** — offers a quick and effective protocol for isolating most membrane proteins. It does not require ultracentrifugation or preparation of density gradients
- **ReadyPrep protein extraction kit (membrane II)** — offers a protocol for isolating more complex membrane proteins
- **ReadyPrep protein extraction kit (signal)** — for isolating proteins involved in intracellular membrane trafficking and signaling pathways. These include GPI-anchored proteins, caveolin and associated proteins, acylated tyrosine kinases, and G proteins

For More Information
Web: bio-rad.com/proteinfractionation
Download bulletins: 2934 and 2961

Ordering Information

Catalog #	Description
ReadyPrep Kits	
1632089	**ReadyPrep Protein Extraction Kit (Cytoplasmic/Nuclear)**, 50 preps
1632088	**ReadyPrep Protein Extraction Kit (Membrane I)**, 50 preps
1632084	**ReadyPrep Protein Extraction Kit (Membrane II)**, 10 preps
1632087	**ReadyPrep Protein Extraction Kit (Signal)**, 50 preps
Related Products	
1632083	**ReadyPrep 2-D Rehydration/Sample Buffer 1**
1632085	**ReadyPrep Protein Extraction Kit (Soluble/Insoluble)**, 20 preps

Protein Depletion

Complex samples often require depletion of high-abundance proteins to allow the detection of the low-abundance ones. Bio-Rad offers two different methodologies for protein depletion — the ProteoMiner™ protein enrichment system (which utilizes hexapeptide libraries) and Aurum™ serum and Affi-Gel® Blue products (which utilize resins).

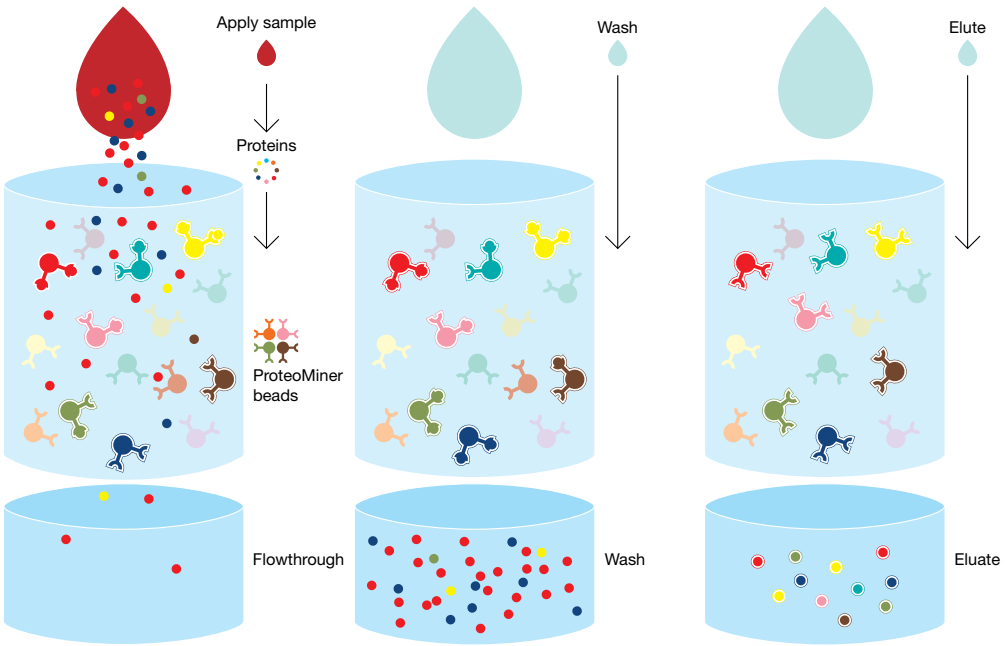
ProteoMiner™ Protein Enrichment System

The ProteoMiner protein enrichment system is a novel sample preparation tool for reducing the dynamic range of protein concentrations in complex biological samples. The ProteoMiner system:

- Enriches and concentrates low-abundance proteins that cannot be detected through traditional methods
- Works with a variety of sample types (serum, plasma, urine, bile, cell lysates, tissues, and platelets) and is not limited by the species' origin
- Utilizes a combinatorial library of hexapeptides rather than immunodepletion, minimizing dependence on available antibodies and preventing the codepletion of low-abundance proteins

ProteoMiner Protein Enrichment Kits — these kits can be used with a variety of biological samples and are compatible with all major downstream proteomics applications. Small- and large-capacity kits are available for processing two or ten samples.

ProteoMiner Sequential Elution Kits — these kits utilize multiple elution reagents to sequentially elute proteins based on different properties.



ProteoMiner technology is based on the interaction of complex protein samples with a large, highly diverse library of hexapeptides bound to chromatographic supports. In theory, each unique hexapeptide binds to a unique protein sequence. Because the bead capacity limits binding capacity, high-abundance proteins quickly saturate their ligands (red and yellow beads) and excess protein is washed out during the procedure. In contrast, low-abundance proteins are concentrated on their specific ligands (pink and teal beads), thereby decreasing the dynamic range of proteins in the sample. When analyzed in downstream applications, the number of low-abundance proteins detected is dramatically increased.

ProteoMiner Small- and Large-Capacity Kits
ProteoMiner kits for protein enrichment are now offered in formats optimized for varying starting amounts of sample protein.

- **Small-capacity kits** — optimized for use with limited sample material (minimum 10 mg of protein is recommended)
- **Large-capacity kits** — optimized for use with samples in which at least 50 mg of protein is available

For More Information
Web: bio-rad.com/proteominer
Download bulletins: 5632, 5635, and 5841

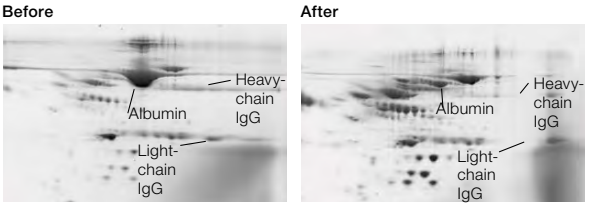
Ordering Information

Catalog #	Description
1633006	**ProteoMiner Protein Enrichment Small-Capacity Kit**, 10 preps, for processing 10 mg of total protein, includes 10 spin columns, wash buffer, elution reagents, collection tubes
1633007	**ProteoMiner Protein Enrichment Large-Capacity Kit**, 10 preps, for processing 50 mg of total protein, includes 10 spin columns, wash buffer, elution reagents, collection tubes
1633008	**ProteoMiner Protein Enrichment Introductory Small-Capacity Kit**, 2 preps, for processing 10 mg of total protein, includes 2 spin columns, wash buffer, elution reagents, collection tubes
1633009	**ProteoMiner Protein Enrichment Introductory Large-Capacity Kit**, 2 preps, for processing 50 mg of total protein, includes 2 spin columns, wash buffer, elution reagents, collection tubes
ProteoMiner Sequential Elution Kits	
1633010	**ProteoMiner Sequential Elution Small-Capacity Kit**, 10 preps, for processing 10 mg of total protein, includes 10 spin columns, wash buffer, 4 sequential elution reagents, collection tubes
1633011	**ProteoMiner Sequential Elution Large-Capacity Kit**, 10 preps, for processing 50 mg of total protein, includes 10 spin columns, wash buffer, 4 sequential elution reagents, collection tubes
ProteoMiner Kit Accessories	
1633003	**ProteoMiner Sequential Elution Reagents**, 10 preps, includes reagents only (columns not included), to be used with #1633006 or #1633007

Aurum™ Kits and Columns

The Aurum™ Affi-Gel® Blue and Aurum serum kits and columns use affinity chromatography to reduce albumin and IgG, which improves analysis of lower abundance proteins. These products utilize a quick and easy spin-column format and provide eluted proteins ready for analysis.

For More Information
Web: bio-rad.com/proteindepletion
Download bulletin: 2823



Removal of albumin and IgG from serum using the Aurum serum protein mini kit. Total protein (1.32 mg) was purified on an Aurum serum protein mini column. **Left**, untreated serum; **right**, serum treated with the Aurum kit.

Ordering Information

Catalog #	Description
7326701	**Aurum Serum Protein Mini Kit**, 10 pack, includes columns and buffers
7326708	**Aurum Affi-Gel Blue Mini Columns**, 25 pack

Nucleic Acid Sample Preparation

RNA Isolation

Bio-Rad offers a broad range of sample preparation products for RNA isolation. Scalable and high-throughput products are available.

RNA Isolation Product Selection Guide

	Aurum™ Total RNA Kits			PureZOL™ RNA Isolation Reagent
	Mini Kit	**Fatty and Fibrous Tissue Kit**	**96 Kit**	
Format	Mini column filtration (vacuum or spin)	Mini column filtration (vacuum or spin)	96-well plate filtration (vacuum or spin)	Single solution organic extraction
Maximum starting material amounts				
Cultured cells	2×10^6	1×10^7	1×10^6	1×10^7
Bacterial cells	2.4×10^9	2.4×10^9	8×10^8	2.4×10^9
Yeast cells	3×10^7	3×10^7	2×10^7	3×10^7
Hard animal tissue	20 mg	100 mg	—	100 mg
Soft to moderately hard animal tissue	40 mg	100 mg	—	100 mg
Plant tissue	40 mg	100 mg	—	100 mg
Isolation method	Silica membrane	Lysis with PureZOL reagent, purification on silica membrane	Silica membrane	Organic extraction
Number of preps	50	50	192 (2 x 96-well plate)	50 or 100 (1 ml/prep)
Number of washes	3	3	3	—
DNase I included*	Yes	Yes	Yes	No
DNase I digest time	15 min (animal tissue, 25 min)	15 min	10 min	—
Total preparation time**	<50–80 min (with DNase I digest)	<50–80 min (with DNase I digest)	<60 min (with DNase I digest)	<60 min
Binding capacity	>100 µg	>100 µg	>40 µg	—
Maximum elution volume	80 µl (2 x 40 µl elutions)	2 x 40 µl	80 µl	30–100 µl
Yield***	20–30 µg/2 x 10^6 NIH 3T3 cells 20–40 µg/2 x 10^6 HeLa cells 15–20 µg/40 mg brain 30–55 µg/20 mg thymus 15–30 µg/40 mg spleen 8–15 µg/40 mg liver 15–20 µg/40 mg kidney 8–15 µg/40 mg lung 15–30 µg/40 mg potato 20–30 µg/3 x 10^7 *S. cerevisiae* cells 35–55 µg/2.4 x 10^9 *E. coli* cells 35–55 µg/2.4 x 10^9 *B. cereus* cells	140–150 µg/1 x 10^7 293H cells 90–100 µg/100 mg brain 50–60 µg/100 mg breast 80–90 µg/100 mg heart 60–70 µg/100 mg skin 50–60 µg/100 mg cartilage 20–30 µg/2.4 x 10^9 *E. coli* cells 60–65 µg/3 x 10^7 *S. cerevisiae* cells 90–100 µg/100 mg potato 5–10 µg/100 mg *Arabidopsis* 10–15 µg/50 mg *A. niger*	10 µg/1 x 10^6 NIH 3T3 cells 17 µg/1 x 10^6 HeLa cells 11 µg/2 x 10^7 *S. cerevisiae* cells 5 µg/8 x 10^8 *E. coli* cells 5 µg/8 x 10^8 *B. cereus* cells	1.37 µg/1 x 10^5 293H cells 1.15 µg/mg brain 1.37 µg/mg fat 1.2 µg/mg heart 0.66 µg/mg cartilage 1.2 µg/mg skin 1.0 µg/mg potato 0.1 µg/mg *Arabidopsis* 0.38 µg/mg *A. niger* 0.63 µg/2.4 x 10^7 *E. coli* cells 0.31 µg/3 x 10^5 *S. cerevisiae* cells
Purity	A_{260}/A_{280} of 1.9–2.1	A_{260}/A_{280} of 1.9–2.1	A_{260}/A_{280} of 1.9–2.1	A_{260}/A_{280} of 1.9–2.1

* Removal not required.
** Total preparation time will vary depending on the tissue or cell type and on which format is used (vacuum or spin).
*** Yields will vary depending on the developmental stage, tissue type or cell line, and growth conditions used.

See Also

PCR reagents: page 375.
Real-time PCR systems: page 363.
Experion automated electrophoresis system: page 271.
DNA amplification/PCR: page 345.

See Also
PureZOL reagent: page 11.
Lipid transfection reagents: page 333.
DNA amplification/PCR: page 345.

Aurum™ Total RNA Kits

Aurum total RNA kits are designed and formulated to assist in the isolation of highly pure and intact RNA from a variety of starting materials. Isolated RNA is compatible with downstream applications including real-time qPCR, northern blotting, microarray analysis, and cDNA library construction.

- Isolate high yields of RNA from a wide range of sample types in less than 60 min
- DNase treatment ensures genomic DNA removal
- Produce ready-to-use RNA suitable for the most demanding downstream applications

Aurum total RNA kits offer streamlined processing using a choice of vacuum- or spin-mediated protocols. If vacuum-mediated purification is preferred, the protocol may be performed with a vacuum manifold.*

For More Information
Web: bio-rad.com/rna-isolation
Download bulletins: 2919, 2920, and 5282

Aurum Total RNA Fatty and Fibrous Tissue Kit

Aurum Total RNA Mini Kit

The Aurum total RNA mini kit produces DNA-free total RNA from a wide range of starting materials, including cultured cells, bacteria, and yeast, as well as animal and plant tissues. The kit utilizes a stringent reagent composed of guanidine isothiocyanate and β-mercaptoethanol for efficient sample lysis and quick RNase inactivation, followed by purification on silica membrane in a spin-column format using a spin- or vacuum-mediated protocol. The kit can also be used for RNA cleanup and desalting.

Aurum Total RNA Fatty and Fibrous Tissue Kit

The Aurum total RNA fatty and fibrous tissue kit isolates total RNA from samples that are difficult to disrupt. The kit is effective for purifications involving fatty and fibrous tissues or samples, such as fungi, that are rich in RNases. The kit utilizes PureZOL™ RNA reagent, a potent phenol-based reagent, which effectively lyses tissues and cells. The kit includes spin columns that can be processed using a choice of vacuum- or spin-mediated protocols.

Aurum Total RNA 96 Kit

The Aurum total RNA 96 kit reproducibly isolates DNA-free total RNA from cultured cells, bacteria, and yeast in less than 60 minutes in a 96-well format for high-throughput total RNA isolation. The total RNA binding plate is designed for use on the Aurum vacuum manifold.*

Consumables and Accessories

The reagents and plasticware used in the Aurum RNA kits are available as refill orders. These products can be ordered separately from the Aurum total RNA kits.

* The Aurum vacuum manifold is no longer available. Please contact Bio-Rad Technical Support for information on alternative products.

Ordering Information

Catalog #	Description
7326820	**Aurum Total RNA Mini Kit**, 50 preps, includes 50 RNA binding columns, 50 capless collection tubes (2.0 ml), 100 capped sample tubes (2.0 ml), 50 capped sample tubes (1.5 ml), 1 vial lyophilized DNase I, RNase-free reagents
7326830	**Aurum Total RNA Fatty and Fibrous Tissue Kit**, 50 preps, includes #7326870, 50 ml PureZOL RNA isolation reagent
7326870*	**Aurum Total RNA Fatty and Fibrous Tissue Module**, 50 preps, includes 50 RNA binding columns, 50 capless collection tubes (2.0 ml), 100 capped sample tubes (2.0 ml), 50 capped sample tubes (1.5 ml), 1 vial lyophilized DNase I, RNase-free reagents, and plasticware
7326800	**Aurum Total RNA 96 Kit**, 2 x 96-well preps, includes 2 grow blocks, sealing tape, 2 RNA binding plates, 2 collection microplates, 2 vials lyophilized DNase I, RNase-free reagents
Aurum Consumables and Accessories	
7326828	**DNase I**, RNase-free, lyophilized, 1 vial
7326802	**Aurum Total RNA Lysis Solution**, RNase-free, 85 ml
7326803	**Aurum Total RNA Wash High-Stringency Solution**, RNase-free, 150 ml
7326804	**Aurum Total RNA Wash Low-Stringency Solution**, 60 ml
7326826	**Aurum RNA Binding Mini Columns**, 50

* Does not include PureZOL RNA isolation reagent (see catalog #7326880 or #7326890 to order separately).

PureZOL™ RNA Isolation Reagent

See Also
Aurum total RNA kits: page 10.

The PureZOL RNA isolation reagent protocol is an improvement over the rapid, widely used, and proven method of RNA isolation developed by Chomczynski and Sacchi (1987). PureZOL RNA isolation reagent is a potent monophasic combination of phenol and the chaotropic agent guanidine isothiocyanate, which effectively lyses cells and tissues, deproteinates RNA, and inactivates endogenous nucleases in a single step. DNA and protein are efficiently removed from the RNA following phase separation.

The ready-to-use PureZOL RNA isolation reagent is a versatile and efficient means of isolating high yields of RNA from a variety of sources including cultured cells, animal and plant tissue, yeast, virus, and bacteria samples. The single-solution format permits recovery of RNA from small quantities of tissues or cells, making it ideally suited for gene expression analysis or whenever sample quantities are limited. Total RNA isolated using PureZOL RNA isolation reagent is free of

DNA and protein and can be used for northern blot analysis, in vitro translation, poly(A)+ selection, RNase protection assays, RT-PCR, and molecular cloning. Since no spin columns are used in the protocol, the protocol is scalable to accommodate a wide range of sample sizes.

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

Ordering Information

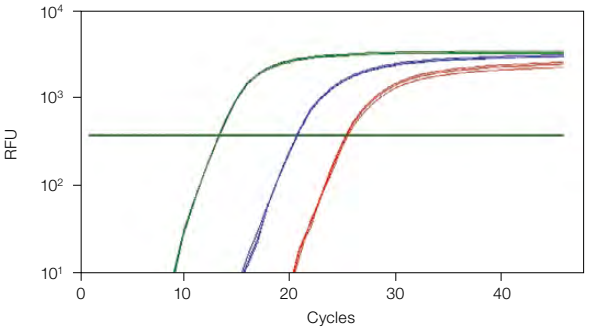
Catalog #	Description
7326880	**PureZOL RNA Isolation Reagent**, 50 ml
7326890	**PureZOL RNA Isolation Reagent**, 100 ml

iScript™ RT-qPCR Sample Preparation Reagent

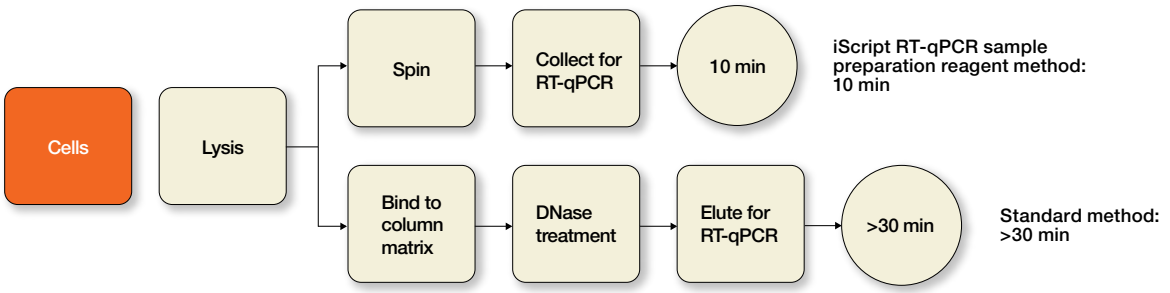
iScript RT-qPCR sample preparation reagent enables efficient cell lysis and RNA stabilization for sensitive quantitative gene expression analysis without RNA purification. This unique reagent accelerates and streamlines RT-qPCR analysis of cultured cells by eliminating the need to purify RNA. Reverse transcription and real-time PCR (qPCR) can be performed directly from cell lysates. This reagent is ideal for rapid, high-throughput gene expression analysis such as validation of siRNA-mediated gene knockdown.

- Rapid protocol (5–10 min) efficiently stabilizes RNA
- Sensitive detection of high-, medium-, and low-copy number gene targets directly from cell lysates
- Reagent enables multiplex qPCR detection of up to 4 targets from as few as 10 cells

For More Information
Web: bio-rad.com/iscript-sampleprep
Request or download bulletin: 5736



iScript RT-qPCR sample preparation reagent provides rapid yet sensitive gene expression results for high-, medium-, and low-copy number gene targets. HeLa cells were treated with iScript RT-qPCR sample preparation reagent at 125 cells/µl and the expression levels of three different genes were assessed. 18S rRNA (—), β-tubulin (—), and CMYC (—) expression levels were determined by performing reverse transcription (iScript cDNA synthesis kit) and qPCR (iQ™ SYBR® Green supermix) directly from cell lysate preparations. RFU, relative fluorescence units.



Ordering Information

Catalog #	Description
1708898	**iScript RT-qPCR Sample Preparation Reagent**, 100 reactions, 10 ml, contains RNase inhibitors and RNA stabilizers
1708899	**iScript RT-qPCR Sample Preparation Reagent**, 500 reactions, 5 x 10 ml, contains RNase inhibitors and RNA stabilizers

DNA Isolation

DNA Isolation Kit Selection Guide

Kit	DNA Yield	Preparation Time	Bacterial Culture Volume	Purification Format	Binding Matrix	Growth Media
Quantum Prep® plasmid miniprep	≤40 µg	<15 min	1–10 ml	Spin	Diatomaceous earth	Enriched or standard
Quantum Prep plasmid midiprep	≤400 µg	45 min	20–40 ml	Spin	Diatomaceous earth	Enriched or standard
Aurum™ plasmid mini	≤20 µg	<10 min	1–5 ml	Vacuum and spin	Silica membrane	Standard

Quantum Prep® Plasmid Kits

Quantum Prep Plasmid Miniprep Kit

The Quantum Prep miniprep kit offers high quality and yield in an easy spin-based procedure that takes less than 15 minutes from cell culture to purified plasmid. Plasmid DNA is recovered in water or TE for immediate use in all downstream molecular biology applications.

Quantum Prep Plasmid Midiprep Kit

The Quantum Prep plasmid midiprep kit uses a simple spin-column procedure that significantly reduces the time required to generate the large quantities of plasmid DNA needed to support applications such as transfection, subcloning, and other enzymatic manipulations.

For More Information
Web: bio-rad.com/quantum-prep
Download bulletin: 2325

Quantum Prep Plasmid Miniprep Kit

Quantum Prep Plasmid Midiprep Kit

Ordering Information

Catalog #	Description
7326100	**Quantum Prep Plasmid Miniprep Kit**, 100 preps, includes 25 ml cell resuspension solution, 25 ml cell lysis solution, 25 ml neutralization solution, 20 ml Quantum Prep matrix, 63 ml wash solution, 100 spin columns
7326120	**Quantum Prep Plasmid Midiprep Kit**, 20 preps, includes 110 ml cell resuspension solution, 110 ml cell lysis solution, 110 ml neutralization solution, 20 ml Quantum Prep matrix, 125 ml wash solution, 20 midi spin columns

See Also
Lipid transfection reagents: page 333.
DNA amplification/PCR: page 345.

Aurum™ Plasmid Mini Kit

The easy-to-use Aurum plasmid mini kit improves the efficiency and throughput of plasmid purifications with a simple bind-wash-elute protocol using silica membranes, all in less than 10 minutes. Spin- and vacuum-mediated protocols are available. The purified plasmid DNA can be immediately used in any downstream molecular biology application.

The Aurum plasmid mini kit delivers high yields of reproducible plasmid DNA preparations for:

- Automated fluorescence-based sequencing
- Restriction digestion
- Ligation and transformation
- Transfection
- PCR

For More Information
Web: bio-rad.com/aurum-plasmid
Download bulletin: 2664

Ordering Information

Catalog #	Description
7326400	**Aurum Plasmid Mini Kit**, 100 preps, includes plasmid-binding mini columns, 100 capless collection tubes, reagents, protocol overview

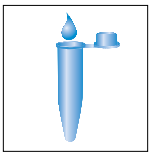
See Also
Molecular biology and biotechnology grade resins: page 87.

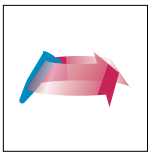
InstaGene™ Matrix

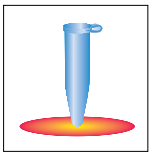
InstaGene matrix is designed for rapid isolation of small amounts of genomic DNA of sufficient purity for PCR in less than an hour. The specially formulated 6% w/v Chelex® resin adsorbs cell lysis products that interfere with PCR, leaving genomic DNA template in the supernatant where it is immediately available for PCR reactions.

For More Information
Web: bio-rad.com/instagene-matrix
Download bulletin: 2074

InstaGene Protocol


Add bacterial colony to water.


Spin and remove supernatant.


Add InstaGene matrix and incubate at 56°C for 30 min. Vortex and incubate at 100°C for 8 min.

Spin; use supernatant for PCR.

Ordering Information

Catalog #	Description
7326030	**InstaGene Matrix**, 20 ml, sufficient for 100 extractions

Chelex® 100 Molecular Biology Grade Resin

Nuclease and ligase inhibitor-free, this pipettable, small-scale resin is certified not to inhibit PCR and ensures complete removal of PCR inhibitors and metal ions.

For More Information
Web: bio-rad.com/dna-isolation
Download bulletin: 2074

Ordering Information

Catalog #	Description
1421253	**Chelex 100 Resin**, molecular biology grade, 50 g, sodium, 200–400 dry mesh, 75–150 µm wet bead

See Also
Molecular biology and biotechnology grade resins: page 87.

DNA Cleanup

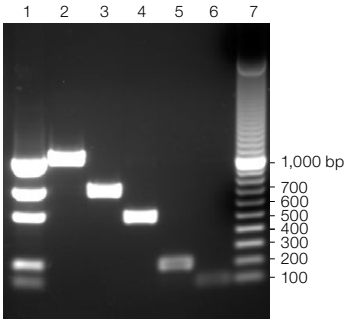
Bio-Rad offers a variety of sample preparation and cleanup columns; many are also suitable for DNA fragment purification.

Freeze 'N Squeeze™ DNA Gel Extraction Spin Columns

Freeze 'N Squeeze spin columns offer a filtration-based purification method, which provides a quick and effective alternative to chemical extraction and electroelution methods. The Freeze 'N Squeeze method uses centrifugation to draw 50–23,000 bp DNA out of agarose gel slices that have been quickly frozen and thawed. Features include:

- No solutions to prepare — save time and avoid using toxic chaotropic materials
- DNA immediately available for PCR, subcloning, ligations, and sequencing reactions
- Less than 1 min of hands-on time

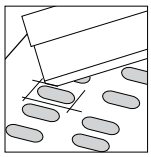
For More Information
Web: bio-rad.com/freeze-n-squeeze

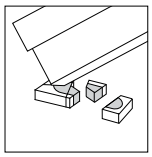


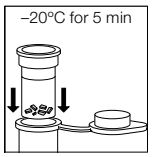
Recovery of DNA fragments using Freeze 'N Squeeze spin columns. Extracted fragments were rerun on a ReadyAgarose™ 1% TAE gel. Lane 1, precision molecular mass ruler; lane 7, EZ Load™ 100 bp PCR molecular ruler.

See Also
ReadyAgarose precast gel system: page 259.
DNA ladders: page 269.

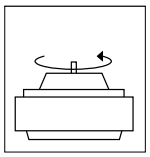
Freeze 'N Squeeze Method

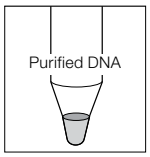

Cut out gel slice.


Chop into pieces.



Transfer to spin column and freeze for 5 min.


Spin for 3 min.



Recover purified DNA.

Ordering Information

Catalog #	Description
7326165	**Freeze 'N Squeeze DNA Gel Extraction Spin Columns**, 25 columns
7326166	**Freeze 'N Squeeze DNA Gel Extraction Spin Columns**, 100 columns

Prepacked Spin Columns

Prepacked size exclusion spin columns allow easy cleanup and purification of DNA and proteins from lower MW contaminants. Bio-Spin®, Micro Bio-Spin™, and PCR Kleen™ columns clean up DNA or protein samples quickly and easily using size exclusion chromatography.

These columns are available in multiple sizes and offer multiple MW exclusion limits to accommodate a variety of needs. Use the chart below to choose the column that best meets your needs.

Prepacked Spin Column Selection Guide

	Bio-Spin P-6	Micro Bio-Spin P-6	Bio-Spin P-30	Micro Bio-Spin P-30	PCR Kleen
Packed support	Special grade Bio-Gel® P-6 gel	Special grade Bio-Gel P-6 gel	Special grade Bio-Gel P-30 gel	Special grade Bio-Gel P-30 gel	Special grade size exclusion gel
Equilibration buffer	10 mM Tris, pH 7.4, or SSC buffer*	10 mM Tris, pH 7.4, or SSC buffer*	10 mM Tris, pH 7.4, or SSC buffer*	10 mM Tris, pH 7.4, or SSC buffer*	10 mM Tris, 1 mM EDTA, pH 7.0
Applications					
Desalting of oligonucleotides >20 bases	•	•	—	—	—
Labeling reactions: removal of unincorporated nucleotides >20 bases or bp from DNA	—	—	•	•	—
Removal of primers and primer-dimers from PCR products >200 bp	—	—	—	—	•
Buffer exchange (restriction fragments, PCR products, enzyme reactions, sequencing templates)	•	•	—	•	—
DNA sequencing reaction mixture cleanup**	—	—	•	•	—
Riboprobe cleanup***	—	—	—	•	—
Desalting of antibody, enzyme, and protein solutions	•	•	—	•	—
Purification of proteins of molecular weight >6,000	•	•	—	—	—
Purification of proteins of molecular weight >40,000	—	—	•	•	—
Bed volume	1.1 ml	0.7 ml	1.1 ml	0.7 ml	0.6 ml
Retention and recovery	90% recovery of 20 bases or bp, 99% retention of salts	90% recovery of 20 bases or bp, 99% retention of salts	95% recovery of 22 bases or bp, 98% retention of ddNTPs	95% recovery of 22 bases or bp, 98% retention of ddNTPs	85% recovery of ≥700 bp, 95% retention of primers and primer-dimers
Molecular weight exclusion limit, globular proteins	6,000	6,000	40,000	40,000	8,000,000
Sample volume	50–100 µl	10–75 µl	50–100 µl	10–75 µl	25–100 µl
Centrifuge type	Swinging bucket	Microcentrifuge	Swinging bucket	Microcentrifuge	Microcentrifuge
Autoclavability	Yes	Yes	Yes	Yes	Yes

* 150 mM NaCl, 17.5 mM sodium citrate, pH 7.0.
** In Tris buffer.
*** In RNase-free Tris buffer.

Prepacked Bio-Spin and Micro Bio-Spin Columns

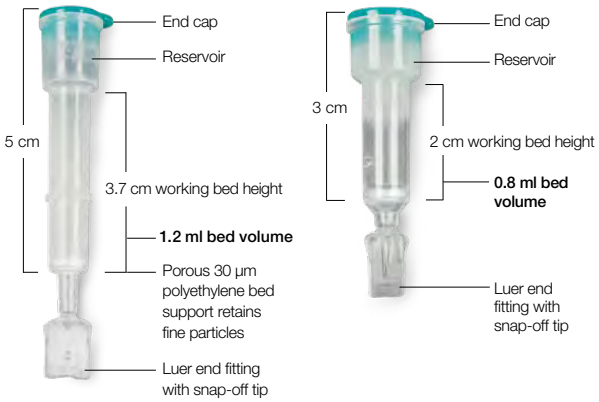
Bio-Spin and Micro Bio-Spin columns clean up and remove salts, nucleotides, dye terminators, and small molecules from DNA, RNA, and protein samples in 10 minutes. Filled with specially sized Bio-Gel P gels, these columns are shipped fully hydrated in Tris or SSC buffer. They yield 95% recovery of DNA >22 bp and allow sample loads of 10–100 µl. For safe riboprobe preparation use RNase-free Micro Bio-Spin P-30 Tris spin columns.

For More Information
Web: bio-rad.com/dna-cleanup and /protein-cleanup

PCR Kleen Spin Columns

PCR Kleen columns are prepacked spin columns for purifying PCR products and other DNA molecules >200 bp directly from reaction mixtures. A simple 4-minute spin effectively removes salts, nucleotides, enzymes, primers, and primer-dimers. Purified DNA fragments are immediately available for secondary PCR, subcloning, restriction digests, ligations, sequencing, and other enzymatic manipulations.

For More Information
Web: bio-rad.com/dna-cleanup
Download bulletin: 2311



Prepacked Bio-Spin and Micro Bio-Spin Columns

PCR Kleen Spin Columns

See Also

Empty columns: page 127.
Bio-Gel P resin: page 107.
Bio-Spin, Micro Bio-Spin, and Mini Bio-Spin empty columns: page 127.

Ordering Information

Catalog #	Description
Micro Bio-Spin Columns with Bio-Gel P-6 in Tris Buffer	
7326221	**Micro Bio-Spin P-6 Columns**, includes 25 columns in Tris buffer, 50 collection tubes
7326222	**Micro Bio-Spin P-6 Columns**, includes 100 columns in Tris buffer, 200 collection tubes
Micro Bio-Spin Columns with Bio-Gel P-30 in Tris Buffer	
7326223	**Micro Bio-Spin P-30 Columns**, includes 25 columns in Tris buffer, 50 collection tubes
7326224	**Micro Bio-Spin P-30 Columns**, includes 100 columns in Tris buffer, 200 collection tubes
7326250	**Micro Bio-Spin P-30 Columns**, includes 25 columns in Tris buffer, 50 collection tubes, RNase-free
7326251	**Micro Bio-Spin P-30 Columns**, includes 100 columns in Tris buffer, 200 collection tubes, RNase-free
Micro Bio-Spin Columns with Bio-Gel P-6 in SSC Buffer	
7326200	**Micro Bio-Spin P-6 Columns**, includes 25 columns in SSC buffer, 50 collection tubes
7326201	**Micro Bio-Spin P-6 Columns**, includes 100 columns in SSC buffer, 200 collection tubes
Micro Bio-Spin Columns with Bio-Gel P-30 in SSC Buffer	
7326202	**Micro Bio-Spin P-30 Columns**, includes 25 columns in SSC buffer, 50 collection tubes
7326203	**Micro Bio-Spin P-30 Columns**, includes 100 columns in SSC buffer, 200 collection tubes
Bio-Spin Columns with Bio-Gel P-6 in Tris Buffer	
7326227	**Bio-Spin P-6 Columns**, includes 25 columns in Tris buffer, 50 collection tubes
7326228	**Bio-Spin P-6 Columns**, includes 100 columns in Tris buffer, 200 collection tubes
Bio-Spin Columns with Bio-Gel P-30 in Tris Buffer	
7326231	**Bio-Spin P-30 Columns**, includes 25 columns in Tris buffer, 50 collection tubes
7326232	**Bio-Spin P-30 Columns**, includes 100 columns in Tris buffer, 200 collection tubes
Bio-Spin Columns with Bio-Gel P-6 in SSC Buffer	
7326002	**Bio-Spin P-6 Columns**, includes 25 columns in SSC buffer, 50 collection tubes
Bio-Spin Columns with Bio-Gel P-30 in SSC Buffer	
7326006	**Bio-Spin P-30 Columns**, includes 25 columns in SSC buffer, 50 collection tubes
PCR Kleen Spin Columns	
7326300	**PCR Kleen Spin Columns**, 25

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Sample Quantitation

Protein Assay Kits 20

Cuvettes 23

Protein Assay Kits

See Also

Microplate readers: page 326.

Cuvettes: pages 23–24.

Determining the concentration of protein samples is critical for many experiments, and most protein samples can be quantitated by a colorimetric assay. In a typical protein assay, a chemical reagent is added to a protein sample solution, producing a color change that is measured with a spectrophotometer or microplate reader and compared to a standard curve of known protein concentrations. Bio-Rad offers four protein assays, each with a unique set of advantages. All assays can be easily automated for large numbers of samples.

Bio-Rad offers four protein assays:

- **Quick Start™ Bradford protein assay** — the single-step method for determining protein concentration in solution
- **Bio-Rad protein assay** — for quantitating most proteins and polypeptides with MWs >3,000
- ***DC*™ protein assay** — for use with samples containing detergent
- ***RC DC*™ protein assay** — for complex sample solutions containing reducing agents and detergents

For More Information
Web: bio-rad.com/proteinassays
Download bulletins: 1069, 6835, 6836, 6837, 6838, and 6852

Protein Assay Selection Guide*

	Quick Start Bradford	Bio-Rad	*DC*	*RC DC*
Application	Single-step method	Quantitates most proteins	For samples with detergent	For complex samples with reductants and detergents
Method adapted from	Bradford (1976)	Bradford (1976)	Lowry et al. (1951)	Lowry et al. (1951)
Standard-concentration assay Sample volume Linear range	 100 µl 0.125–1.5 mg/ml	 100 µl 0.125–1.5 mg/ml	 100 µl 0.125–1.5 mg/ml	 100 µl 0.2–1.5 mg/ml
Low-concentration assay Sample volume Linear range	 1 ml 1.25–25 µg/ml	 800 µl 1.25–25 µg/ml	 200 µl 5–250 µg/ml	 200 µl 5–250 µg/ml
Microplate assay sample volume	5 µl	10 µl	5 µl	**
Minimum incubation time	5 min	5 min	15 min	15 min
Assay wavelength	595 nm	595 nm	650–750 nm	650–750 nm

* Standard-concentration assay is designed for smaller sample volumes of higher protein concentration, while the low-concentration assay is designed for larger sample volumes of lower protein concentration.

** To adapt the *RC DC* assay to a microplate format, follow the micro test tube (microfuge tube) assay protocol in the *RC DC* protein assay instruction manual up to the centrifugation step where the supernatant is discarded. The pellet can then be transferred to the microplate, and the microplate assay protocol in the *DC* protein assay instruction manual can be followed.

Quick Start™ Bradford Protein Assay

The Quick Start Bradford protein assay is a streamlined, accurate procedure for determining the concentration of protein in solution. Ready-to-use dye reagent and prediluted protein standards allow one-step determination of protein concentration.

Quick Start Bradford kits offer either bovine serum albumin or bovine γ-globulin standard sets. Each kit contains two aliquots each of seven concentrations (0.125, 0.25, 0.5, 0.75, 1.0, 1.5, and 2.0 mg/ml) conveniently packaged in screwcap vials, eliminating ampoules and ensuring protein stability for one year when stored at 4°C. Standards are also available in five 2 mg/ml aliquots for creating your own dilutions.

The 1x dye reagent can be used for performing 1 and 5 ml standard assays, microplate assays, or microassays.

For More Information
Web: bio-rad.com/quickstart
Download bulletins: 1069, 2969, 6835, and 6852

Ordering Information

Catalog #	Description
5000201	**Quick Start Bradford Protein Assay Kit 1**, includes 1x dye reagent (1 L), bovine serum albumin standard (5 x 2 mg/ml); sufficient for 200 standard assays or 4,000 microplate assays
5000202	**Quick Start Bradford Protein Assay Kit 2**, includes 1x dye reagent (1 L), bovine serum albumin standard set (2 sets of 7 concentration standards, 0.125–2.0 mg/ml, 2 ml)
5000203	**Quick Start Bradford Protein Assay Kit 3**, includes 1x dye reagent (1 L), bovine γ-globulin standard (5 x 2 mg/ml)
5000204	**Quick Start Bradford Protein Assay Kit 4**, includes 1x dye reagent (1 L), bovine γ-globulin standard set (2 sets of 7 concentration standards, 0.125–2.0 mg/ml, 2 ml)
Reagents	
5000205	**Quick Start Bradford 1x Dye Reagent**, 1 L
Accessories	
5000206	**Quick Start Bovine Serum Albumin Standard**, 5 x 2 ml vials of 2 mg/ml
5000207	**Quick Start Bovine Serum Albumin Standard Set**, 2 sets of 7 concentration standards, 0.125–2.0 mg/ml
5000208	**Quick Start Bovine γ-Globulin Standard**, 5 x 2 ml vials of 2 mg/ml
5000209	**Quick Start Bovine γ-Globulin Standard Set**, 2 sets of 7 concentration standards, 0.125–2.0 mg/ml

Bio-Rad Protein Assay

The Bio-Rad protein assay is a simple colorimetric assay for determining total protein concentration. It is easy to adapt the assay from the standard-concentration range to a low-concentration microassay or for use in 96-well microplates for rapid determinations.

The Bio-Rad protein assay is based on the Bradford dye-binding procedure (Bradford 1976), which measures the color change of Coomassie Brilliant Blue G-250 dye when it binds to protein (primarily to basic and aromatic amino acid residues). The assay quantitates most proteins and polypeptides with MWs >3,000. Some detergents and basic buffers interfere with the assay.

For More Information
Web: bio-rad.com/BRprotein
Download bulletins: 1069, 1123, 6836, and 6852

Ordering Information

Catalog #	Description
5000001	**Bio-Rad Protein Assay Kit I**, includes 450 ml dye reagent concentrate, bovine γ-globulin standard; sufficient for 440 standard assays or 2,200 microplate assays
5000002	**Bio-Rad Protein Assay Kit II**, includes 450 ml dye reagent concentrate, bovine serum albumin standard; sufficient for 440 standard assays or 2,200 microplate assays
Reagents	
5000006	**Bio-Rad Protein Assay Dye Reagent Concentrate**, 450 ml
Accessories	
5000005	**Protein Standard I**, bovine γ-globulin, reconstituted volume 20 ml
5000007	**Protein Standard II**, bovine serum albumin, reconstituted volume 20 ml

DC™ Protein Assay

The *DC* (detergent compatible) protein assay is a colorimetric assay for protein determination of samples that contain detergents. The reaction is similar to the well-documented Lowry assay (Lowry et al. 1951), but has been modified to save time. The *DC* protein assay requires only a single 15 minute incubation, and the absorbance readings are stable for at least 2 hours.

For More Information
Web: bio-rad.com/DCprotein
Download bulletins: 1069, 1731, 1770, 1909, 6837, and 6852

Ordering Information

Catalog #	Description
5000111	***DC* Protein Assay Kit I**, includes 250 ml alkaline copper tartrate solution, 2 L dilute Folin reagent, 5 ml surfactant solution, bovine γ-globulin standard; sufficient for 450 standard assays
5000112	***DC* Protein Assay Kit II**, includes 250 ml alkaline copper tartrate solution, 2 L dilute Folin reagent, 5 ml surfactant solution, bovine serum albumin standard; sufficient for 450 standard assays
Reagents	
5000113	**Protein Assay Reagent A**, 250 ml, alkaline copper tartrate solution
5000114	**Protein Assay Reagent B**, 1 L, dilute Folin reagent
5000115	**Protein Assay Reagent S**, 5 ml, surfactant solution
5000116	***DC* Protein Assay Reagents Package**, includes 250 ml alkaline copper tartrate solution, 2 L dilute Folin reagent, 5 ml surfactant solution; sufficient for 450 standard assays
Accessories	
5000005	**Protein Standard I**, bovine γ-globulin, lyophilized (reconstituted volume 20 ml)
5000007	**Protein Standard II**, bovine serum albumin, lyophilized (reconstituted volume 20 ml)

See Also
Protein sample preparation: page 2.
Cuvettes: pages 23–24.

RC DC™ Protein Assay

The *RC DC* (reducing agent and detergent compatible) protein assay is a colorimetric assay for protein determination in the presence of reducing agents and detergents. The *RC DC* protein assay, based on the Lowry protocol (Lowry et al. 1951), includes the features of the original *DC* protein assay. Its compatibility with a broader range of reagents allows simplified protein quantitation directly in complex sample solutions.

For More Information
Web: bio-rad.com/RCDCprotein
Download bulletins: 1069, 2610, 6838, and 6852

Ordering Information

Catalog #	Description
5000121	***RC DC* Protein Assay Kit I**, includes *RC* reagents package, *DC* protein assay reagents package, bovine γ-globulin standard; sufficient for 450 standard assays
5000122	***RC DC* Protein Assay Kit II**, includes *RC* reagents package, *DC* protein assay reagents package, bovine serum albumin standard; sufficient for 450 standard assays
Reagents	
5000113	**Protein Assay Reagent A**, 250 ml, alkaline copper tartrate solution
5000114	**Protein Assay Reagent B**, 1 L, dilute Folin reagent
5000115	**Protein Assay Reagent S**, 5 ml, surfactant solution
5000116	***DC* Protein Assay Reagents Package**, includes 250 ml alkaline copper tartrate solution, 2 L dilute Folin reagent, 5 ml surfactant solution; sufficient for 450 standard assays
5000120	***RC DC* Protein Assay Reagents Package**, includes *RC* reagents package and *DC* protein assay reagents package; sufficient for 450 standard assays
5000119	***RC* Reagents Package**, includes *RC* reagent I (250 ml) and *RC* reagent II (250 ml); sufficient for 500 standard assays
5000117	***RC* Reagent I**, 250 ml
5000118	***RC* Reagent II**, 250 ml
Accessories	
5000005	**Protein Standard I**, bovine γ-globulin, lyophilized (reconstituted volume 20 ml)
5000007	**Protein Standard II**, bovine serum albumin, lyophilized (reconstituted volume 20 ml)

Cuvettes

Bio-Rad offers quartz and plastic cuvettes in a range of working volumes.

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

See Also
Protein assay kits: page 20.

Standard and Semimicrovolume Cuvettes

Polystyrene cuvettes are ideal for use with protein assays (pages 20–22). They adsorb less Coomassie Blue dye than glass or quartz cuvettes. Assays can be mixed directly in the standard 3.5 ml cuvettes, and the volume of reagents can be reduced, yielding more assays per kit. Semimicrovolume 1.5 ml cuvettes are ideal for precise quantitation of small-volume samples. Both standard and semimicrovolume cuvettes are sized to fit most spectrophotometers. Bio-Rad cuvettes offer smooth optical surfaces for consistent and accurate readings.

Bio-Rad also offers other cuvettes for specialized applications, including quartz and disposable cuvettes.

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

Cuvette Racks

Ordering Information

Catalog #	Description
Disposable Polystyrene Cuvettes	
2239950	**Standard Disposable Polystyrene Cuvettes**, 3.5 ml, 100
2239955	**Semimicrovolume Disposable Polystyrene Cuvettes**, 1.5 ml, 100
Quartz Cuvettes	
1702502	**Standard Cuvette**, 1–3.5 ml, 10 mm path length, quartz
1702503	**Semimicrovolume Cuvette**, 0.5–1.4 ml, 10 mm path length, quartz
1702504	**Microvolume Cuvette**, 200–700 µl, 10 mm path length, quartz
1702505	**Submicrovolume Cuvette**, 80–100 µl, 10 mm path length, quartz
VersaFluor Disposable Cuvettes and Cuvette Racks	
1702415	**Standard Cuvettes**, 12.5 x 12.5 mm (outside dimensions), 4-sided, optically clear polystyrene, 3.5 ml, 100
1702416	**Microcuvettes**, 3.0 x 3.0 mm (outside dimensions), 4-sided, optically clear polystyrene, 150–350 µl, 100
1660485	**Cuvette Racks**, hold 12 cuvettes each, set of 5

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Cell Counting

Automated Cell Counting System 28

Automated Cell Counting System

TC20™ Automated Cell Counter

With its innovative auto-focus and sophisticated cell counting algorithm, the TC20 automated cell counter eliminates subjectivity while delivering reliable counts of mammalian cells in 30 seconds.

- **Compatible with a broad range of cell sizes and types** — counts cell lines, primary cells (from tissue or blood), and stem cells
- **Innovative auto-focus technology** — removes the variation associated with manual focusing and leads to precise cell counts in 30 sec
- **Cell size gates** — user selects a population of interest in complex samples, such as primary cells, or lets the cell counting algorithm do all the work
- **Cell viability** — analyzes cells accurately using multifocal plane analysis
- **Easy to archive and analyze** — stores up to 100 counts in the onboard memory for access any time, or use the optional TC20 data analyzer software on your PC to further analyze exported cell images

Upon insertion of a counting slide, the TC20 provides a total cell count with or without staining and assesses cell viability via trypan blue exclusion. To determine if a cell is viable, the TC20 counter analyzes each cell on images acquired from multiple focal planes during the focusing step. Auto-focus and multifocal plane analysis reduce counting bias associated with manual focusing.

Accuracy is comparable to results obtained with a hemocytometer. The TC20 counter can count cells with a 6–50 µm cell diameter and within a broad concentration range of 5×10^4–1×10^7 cells/ml, which eliminates the need to dilute cells, thus reducing the errors associated with sample dilutions prior to counting.

For complex samples composed of multiple cell populations, such as primary cells, the position of cell size gates can be adjusted to define the population of interest.

Results from 100 previous counts are stored in the TC20 cell counter and can be exported via the USB port. Images of cells can be further analyzed on a computer using the TC20 data analyzer software.

For More Information
Web: bio-rad.com/TC20
Request or download bulletins: 6282 and 6283

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

TC20 Automated Cell Counter, Counting Slides, and Trypan Blue

Ordering Information

Catalog #	Description
TC20 Automated Cell Counter	
1450102	**TC20 Automated Cell Counter**, 120–240 V, includes instrument, power supply, USB flash drive, 30 dual-chamber counting slides (60 counts), 1.5 ml trypan blue
1450103	**TC20 Automated Cell Counter with Thermal Label Printer**, 120–240 V, includes instrument, power supply, USB flash drive, USB cable, thermal label printer, 1 roll of 500 labels, 30 dual-chamber counting slides (60 counts), 1.5 ml trypan blue
Kits and Reagents*	
1450003	**Counting Kit**, includes 30 dual-chamber counting slides (60 counts), 1.5 ml trypan blue
1450013	**Trypan Blue**, 0.4% in 0.81% sodium chloride and 0.06% potassium phosphate dibasic solution, sterile filtered, sufficient for 150 counts (10 µl/count), 1 x 1.5 ml
1450021	**Trypan Blue**, 0.4% in 0.81% sodium chloride and 0.06% potassium phosphate dibasic solution, sterile filtered, sufficient for 750 counts (10 µl/count), 5 x 1.5 ml
1450022	**Trypan Blue**, 0.4% in 0.81% sodium chloride and 0.06% potassium phosphate dibasic solution, sterile filtered, sufficient for 1,500 counts (10 µl/count), 10 x 1.5 ml
1450015	**Counting Slides**, 150 dual-chamber counting slides (300 counts)
1450016	**Counting Slides**, 300 dual-chamber counting slides (600 counts)
1450017	**Counting Slides**, 600 dual-chamber counting slides (1,200 counts)
1450018	**Counting Slides**, 900 dual-chamber counting slides (1,800 counts)
1450019	**Counting Slides**, 1,200 dual-chamber counting slides (2,400 counts)
1450020	**Counting Slides**, 2,400 dual-chamber counting slides (4,800 counts)
1450014	**System Test Kit**, includes verification slide, instructions
Accessories*	
1450005	**Thermal Label Printer**, 120–240 V, includes thermal label printer, USB cable, 1 roll of 500 labels
1450007	**Thermal Printer Labels**, 1 roll of 500 labels, for thermal label printer

* Compatible with TC20 and TC10 automated cell counters.

Flow Cytometry

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Cell Sorting

Cell sorting provides a method, typically using fluorescence, to sort or isolate a homogenous population of cells from a heterogeneous mixture of cells based on intracellular and/or extracellular properties. Expressed fluorescent proteins, such as green fluorescent protein (GFP), or fluorophores conjugated to antibodies bind to markers of interest, which allows for a starting population to be sorted to greater than 99% purity. While cell sorting is commonly used in fields such as immunology, cancer biology, and stem cell biology, it is quickly becoming a useful tool in broader research studies from microbiology to neuroscience. Cell sorting can also be used as an upstream tool for proteomic or genomic experiments to achieve more specific results by reducing background noise or false positives.

Instruments

See Also

S3e Biosafety System Class I: page 35.

Cell sorting consumables: page 36.

Cell biology reagents: page 44.

Cell counting: page 27.

S3e™ Cell Sorter

The S3e cell sorter is the first truly walk-away automated cell sorter available to scientists. The S3e is a compact cell sorter equipped with one, two, or three lasers and up to four fluorescence detectors plus forward and side scatter detection. The cell sorter utilizes established jet-in-air technology in which cells are analyzed directly within the stream before being sorted. Samples can be sorted at high speeds while sensitivity and purity are maintained.

With its unique feature set and technical ease of use, the automated S3e cell sorter allows you to perform one to four color sorts in less than 30 minutes in your laboratory and greatly enhances your experimental success.

- Utilizes stream-in-air fluid dynamics for a more gentle high-speed sort
- Features Lossless Cell Sorting mode for maximum recovery of target cell populations from your precious samples
- Has simplified instrument setup and the intuitive software ensures user success, regardless of experience level
- Features a compact design (W x D x H: 70 x 65 x 65 cm) that includes onboard fluidics and temperature control systems
- Provides sort status email and text notifications, which allow the user to multitask during a sort

For More Information
Web: bio-rad.com/cellsorter
Download bulletin: #10032007
Request or download bulletins: 6614 and 6697

S3e Cell Sorter System

Features		
Performance	Droplet frequency	37–43 kHz
	Sorting type	True jet-in-air for high-performance sorting
	Sorting rate	No hardware limitations for sort rate, limited only by droplet frequency and application
	Sorting purity	>99% pure
	Sensitivity	<125 MESF for FITC and PE
	Temperature control	Sample and collection temperature control from 4–37°C using Peltier solid-state system
Lasers/Optics	One-laser system	Primary: 488 nm 100 mW
	Two-laser system	Primary: 488 nm 100 mW Secondary: 405 nm 100 mW,* 561 nm 100 mW, or 640 nm 100 mW
	Three-laser system**	Primary: 405 nm 100 mW or 488 nm 100 mW Secondary: 561 nm 100 mW or 640 nm 100 mW Tertiary: 561 nm 100 mW or 640 nm 100 mW
	Detectors	Forward scatter (FSC) with photomultiplier tube (PMT) Side scatter (SSC) with PMT 2 fluorescence detectors with PMT (one laser) 4 fluorescence detectors with PMT (two lasers)
	Filters (488 laser)	Long pass: 495DLP, 560DLP, 540LP Band pass: 488/6, 525/30
	Filters (488/561 lasers)	Long pass: 495DLP, 560DLP, 593DLP, 655LP Band pass: 488/6, 525/30, 615/25, 586/25
	Filters (488/640 lasers)	Long pass: 495DLP, 560DLP, 640DLP, 700LP Band pass: 488/6, 526/48, 593/40, 670/30, 700LP
	Filters (405/488/561 lasers)	Long pass: 470DSP, 495DLP, 560LP, 593LP, 600LP Band pass: 447/60, 488/6, 525/30, 586/25
	Filters (405/488/640 lasers)	Long pass: 475DSP, 495DLP, 560DLP, 640LP, 650LP Band pass: 447/60, 488/6, 526/48, 593/40
	Filters (488/561/640 lasers)	Long pass: 495DLP, 560DLP, 593DLP, 640DLP, 655LP Band pass: 488/6, 525/30, 586/25, 615/25
Fluidics	Nozzle	100 µm fixed
	Pressure	30 psi fixed
	Sheath	Onboard dilution of 8x sheath fluid or direct use of 1x sheath fluid
	Minimum sample loading	200 µl
Sorting	Directions	Two way
	Mode	Single, purity, enrichment
	Collection	Up to 5 x 5 ml sample tubes each direction Up to 5 x 1.5 ml tubes each direction Microscope slides 8-well strip each direction
Physical Specifications	Dimensions (W x D x H)	70 x 65 x 65 cm (instrument only)
	Weight	90 kg (instrument only)

* New laser configuration.
** New laser configurations. Note that 405/561/640 nm option is not available.

See Also

ProLine rainbow beads: page 36.

ProFlow sort grade 8x sheath fluid: page 37.

S3e fluidic container: page 38.

Ordering Information

Catalog #	Description
S3e Cell Sorter	
1451005	**S3e Cell Sorter (488 nm)**, 488 nm 100 mW laser, includes 2 fluorescence detectors with filters, AutoGimbal system, ProSort software
1451006	**S3e Cell Sorter (488/561 nm)**, 488 and 561 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
1451008	**S3e Cell Sorter (488/640 nm)**, 488 and 640 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
Inquire*	**S3e Cell Sorter (405/488/561 nm)**, 405, 488, and 561 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
Inquire*	**S3e Cell Sorter (405/488/640 nm)**, 405, 488, and 640 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
Inquire*	**S3e Cell Sorter (488/561/640 nm)**, 488, 561, and 640 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
1451078	**S3e Biosafety System Class I**
1451029	**S3e Cell Sorter (488 nm) with S3e Biosafety System Class I**
1451030	**S3e Cell Sorter (488/561 nm) with S3e Biosafety System Class I**
1451032	**S3e Cell Sorter (488/640 nm) with S3e Biosafety System Class I**
17003806*	**S3e Cell Sorter (405/488/561 nm) with S3e Biosafety System Class I**
17003807*	**S3e Cell Sorter (405/488/640 nm) with S3e Biosafety System Class I**
17003808*	**S3e Cell Sorter (488/561/640 nm) with S3e Biosafety System Class I**
S3e Cell Sorter Laser Upgrade Package	
12007053	**405 nm Laser Upgrade for S3e Cell Sorter (488/561 nm)**
12007054	**640 nm Laser Upgrade for S3e Cell Sorter (488/561 nm)**
12007055	**405 nm Laser Upgrade for S3e Cell Sorter (488/640 nm)**
12007056	**561 nm Laser Upgrade for S3e Cell Sorter (488/640 nm)**
Accessories	
1441001	**S3e Sheath Cap Assembly**, white
1441002	**S3e DI Water Cap Assembly**, blue
1441003	**S3e Waste Cap Assembly**, red
1441005	**S3e Filter Block A**, empty with 2 dichroic filter holders
1441006	**S3e Filter Block B**, empty with 2 dichroic filter holders
1441007	**S3e Individual Filter Holder**, black, empty
1441008	**Neutral Density Filter**, optical density 1.0
1441009	**S3e Nozzle Tip**, 100 µm
1441010	**S3e Nozzle O-Ring with Alignment Disk**, pkg of 2
1441011	**S3e Collection Adaptor Set**
1441012	**Hex Driver**, 2 mm
1441013	**S3e Individual Dichroic Filter Holder**, empty
1451076	**S3e Power Conditioner**, international
1451077	**S3e Power Conditioner**, U.S.
1451065	**S3e Cell Sorter Accessory Kit**, includes 100 µm nozzle tip, 2 nozzle O-rings, 2 nozzle alignment disks, 1 ml syringe, 2 neutral density filters (1.0), 2 mm hex driver, spanner wrench
1451086	**ProLine Universal Calibration Beads**, includes 3 x 5 ml bottles of ready-to-use beads for alignment verification and drop delay determination on the S3e cell sorter
1451082	**ProFlow Sort Grade 8x Sheath Fluid**, includes 5 x 4 L ready-to-use, sterile, preservative-free phosphate buffered saline (PBS) solutions in gamma-irradiated S3e fluidic containers
1451083	**ProFlow Sort Grade Water**, includes 5 x 4 L sterile, endotoxin-free water in gamma-irradiated S3e fluidic containers
1451084	**S3e Fluidic Container**, 3 x 4 L gamma-irradiated sterile containers for use on the S3 or S3e cell sorter
1451085	**ProLine Rainbow Beads**, includes a 5 ml bottle containing a mixture of beads dyed with 8 different fluorescence intensities for excitation at wavelengths between 365–650 nm

* New laser configuration.

S3e™ Biosafety System Class I

The S3e Biosafety System Class I is an aerosol containment hood custom designed for the S3™ or S3e cell sorter, which provides users and the environment protection from aerosols created during the cell sorting process. It is an affordable alternative to traditional large and expensive biosafety hoods commonly offered for cell sorters.

The S3e Biosafety System Class I sits directly on the benchtop and contains the compact S3 or S3e™ cell sorter. Its easy-to-open, magnetically attached vinyl walls provide ready access to all sides of the cell sorter during operation, cleaning and maintenance, or service.

Fully integrated with and monitored by the S3 or S3e cell sorter's ProSort™ software, users have real-time information about HEPA filter life and the temperature of the system inside. Fan speed is determined based on the cell sorter operation mode — sorting or idle. The HEPA filter provides protection at 99.997% for 0.3 µm particles. The system is able to perform a 100% air exchange six to eight times per minute around the S3 or S3e cell sorter.

The system adheres to the biosafety requirements of the International Society for Advancement of Cytometry (ISAC) for aerosol containment.

Product features include:

- **Compact and affordable** — small footprint for an economical alternative to large and expensive traditional biosafety hoods

- **Software controlled** — full integration with ProSort software for fan speed regulation and temperature monitoring in real time
- **Fully accessible** — easily opened vinyl walls are magnetically attached, allowing access to all 4 sides of the cell sorter for cleaning and maintenance
- **Quiet and energy efficient** — generates low vibration and sound pressure levels; specialized fans and low backpressure from the HEPA filter reduce energy consumption

For More Information
Web: bio-rad.com/S3eBiosafetyMore
Request or download bulletins: 6404 and 6503

Ordering Information

Catalog #	Description
1451005	**S3e Cell Sorter (488 nm)**, 488 nm 100 mW laser, includes 2 fluorescence detectors with filters, AutoGimbal system, ProSort software
1451006	**S3e Cell Sorter (488/561 nm)**, 488 and 561 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
1451008	**S3e Cell Sorter (488/640 nm)**, 488 and 640 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
Inquire*	**S3e Cell Sorter (405/488/561 nm)**, 405, 488, and 561 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
Inquire*	**S3e Cell Sorter (405/488/640 nm)**, 405, 488, and 640 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
Inquire*	**S3e Cell Sorter (488/561/640 nm)**, 488, 561, and 640 nm 100 mW lasers, includes 4 fluorescence detectors with filters, AutoGimbal system, ProSort software
1451078	**S3e Biosafety System Class I**
1451029	**S3e Cell Sorter (488 nm) with S3e Biosafety System Class I**
1451030	**S3e Cell Sorter (488/561 nm) with S3e Biosafety System Class I**
1451032	**S3e Cell Sorter (488/640 nm) with S3e Biosafety System Class I**
17003806*	**S3e Cell Sorter (405/488/561 nm) with S3e Biosafety System Class I**
17003807*	**S3e Cell Sorter (405/488/640 nm) with S3e Biosafety System Class I**
17003808*	**S3e Cell Sorter (488/561/640 nm) with S3e Biosafety System Class I**
1451076	**S3e Power Conditioner**, international
1451077	**S3e Power Conditioner**, U.S.

* New laser configuration.

Consumables

ProLine™ Universal Calibration Beads

ProLine universal calibration beads are designed to verify the alignment performance and determine the drop delay on any S3™ or S3e™ cell sorter. Each bottle contains a single population of ready-to-use fluorescent beads for a total of 30 quality control (QC) tests.

Product features include:

- Ready-to-use fluorescent beads do not require dilution
- Alignment and drop delay can be performed with 1 reagent in less than 7 min
- Pass/fail performance result with ProSort™ software
- Trending QC information in ProSort software for tracking the performance of your S3 or S3e cell sorter

For More Information
Web: bio-rad.com/prolineuniversal
Download bulletin: #10041517
Request or download bulletin: 6614

Ordering Information

Catalog #	Description
1451086	**ProLine Universal Calibration Beads**, 15 ml (3 x 5 ml)

See Also
ProFlow sort grade 8x sheath fluid: page 37.
ProFlow sort grade water: page 38.
S3e fluidic container: page 38.

ProLine™ Rainbow Beads

ProLine rainbow beads are designed for instrument performance monitoring on a flow cytometer system. Each bottle contains 3.0–3.4 µm beads dyed with eight different fluorescent intensities for excitation by lasers between 365 and 650 nm.

- Easily check the sensitivity and linearity of your flow cytometer with one set of beads
- Track fluorescent fluctuations with validated bead lots to ensure accurate baselines
- Use with either the S3e™ cell sorter or the ZE5™ cell analyzer

For More Information
Web: bio-rad.com/prolinerainbowbeads
Download bulletin: #10033040

Ordering Information

Catalog #	Description
1451085	**ProLine Rainbow Beads**, includes a 5 ml bottle containing a mixture of beads dyed with 8 different fluorescent intensities for excitation at wavelengths 365–650 nm

ProFlow™ Sort Grade 8x Sheath Fluid

ProFlow sort grade 8x sheath fluid is a ready-to-use, sterile, endotoxin- and preservative-free phosphate buffered saline solution. Each lot is tested for cytotoxicity and particulates and is bottled in gamma-irradiated containers to ensure sterility. Up to 5 weeks of run time is available per case when it is used on the S3™ or S3e™ cell sorter. The S3 or S3e cell sorter employs its internal fluidics system to automatically dilute ProFlow sort grade 8x sheath fluid and creates 32 L of 1x sheath solution from each container, generating 160 L per case.

Product features include:

- **No manual dilution required** — the S3 and S3e cell sorters' unique internal fluidics chamber automatically generates a 1x solution, ensuring accurate dilution and minimizing potential contamination
- **Easy container swapping** — prepackaged, sterile S3e fluidic container bypasses the need to fill a new container during a sort, minimizing the risk of contamination
- **Minimum storage requirements** — one 20 L case creates 160 L of 1x sheath solution, freeing your storage space for other purposes

For More Information
Web: bio-rad.com/sheath
Download bulletin: #10030825
Request or download bulletin: 6614

Ordering Information

Catalog #	Description
1451082	**ProFlow Sort Grade 8x Sheath Fluid**, 20 L (5 x 4 L)

See Also

ProLine universal calibration beads: page 36.

ProLine rainbow beads: page 36.

ProFlow sort grade water: page 38.

S3e fluidic container: page 38.

See Also
ProLine universal calibration beads: page 36.
ProLine rainbow beads: page 36.
ProFlow sort grade 8x sheath fluid: page 37.

ProFlow™ Sort Grade Water

This sterile, endotoxin-free solution is ideal for flow cytometry instrumentation. ProFlow sort grade water is designed to provide the best sort results when combined with preservative-free ProFlow sort grade 8x sheath fluid on any S3™ or S3e™ cell sorter. It may also be used on the ZE5™ cell analyzer. Each lot is prepared by reverse osmosis, passed through fine carbon, deionized through two resin beds, serially filtered twice through 0.1 µm positively charged membranes, and poured into gamma-irradiated S3e fluidic containers.

For More Information
Web: bio-rad.com/proflowsortgradewater
Download bulletin: #10032248

Ordering Information

Catalog #	Description
1451083	**ProFlow Sort Grade Water**, includes 5 x 4 L sterile, endotoxin-free water in gamma-irradiated S3e fluidic containers

S3e™ Fluidic Container

S3e fluidic containers are specifically designed for use on the S3™ or S3e cell sorter. Easily store your solutions in the S3e fluidic containers for quick container swaps during a run. Each 4 L container is gamma irradiated to ensure sterility.

For More Information
Web: bio-rad.com/s3emore
Request or download bulletin: 6614

Ordering Information

Catalog #	Description
1451084	**S3e Fluidic Container**, 3 x 4 L gamma-irradiated sterile containers for use on the S3 or S3e cell sorter

Reagents

Kits and Reagents for Cell Sorting

See Also
Cell biology reagents: page 44.

Bio-Rad offers a variety of easy-to-use kits and reagents suitable for use with the S3e™ cell sorter.

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter Configuration
Antibody Labeling Kits					
1351011	**ReadiLink 405/454**	403	454	405	405 laser (447/60)
1351002	**ReadiLink 492/516**	492	516	488	488 laser FL1 (526/48) 488 laser FL1 (525/30)
1351003	**ReadiLink 555/570**	555	570	561	561 laser FL2 (586/25)
1351004	**ReadiLink 594/610**	594	610	561	561 laser FL3 (615/25)
1351005	**ReadiLink 633/655**	633	655	640	640 laser FL3 (670/30)
1351006	**ReadiLink 647/674**	647	674	640	640 laser FL3 (670/30)
1351007	**ReadiLink 680/701**	680	701	640	640 laser FL4 (700/LP)
1351008	**ReadiLink 700/713**	700	713	640	640 laser FL4 (700/LP)
Cell Proliferation					
1351202	**CytoTrack Blue 403/454**	403	454	405	405 laser (447/60)
1351203	**CytoTrack Green 511/525**	511	525	488	488 laser FL1 (525/30) 488 laser FL1 (526/48)
1351204	**CytoTrack Yellow 542/556**	542	556	532	488 laser FL2 (593/40)
1351205	**CytoTrack Red 628/643**	628	643	633 or 640	640 laser FL3 (640/30)
1351201	**CFDA-SE Cell Proliferation Assay**	492	517	488	488 laser FL1 (525/30) 488 laser FL1 (525/30)
Cell Viability					
1351112	**VivaFix 410/450**	410	450	405	405 laser (447/60)
1351113	**VivaFix 408/512**	408	512	405	405 laser (495 DLP, 525/30, 526/48)
1351114	**VivaFix 398/550**	398	550	405	405 laser (495 DLP)
1351115	**VivaFix 498/521**	498	521	488	488 laser FL1 (525/30)
1351116	**VivaFix 547/573**	547	573	561	561 laser FL2 (586/25)
1351117	**VivaFix 583/603**	583	603	561	561 laser FL3 (615/25)
1351118	**VivaFix 649/660**	649	660	640	640 laser FL3 (670/30)
1351101	**Propidium Iodide**	538	617	561 or 488	488 laser FL3 (615/25) 488 laser FL2 (540/LP) 488 laser FL2 (593/40) 561 laser FL3 (615/25)
1351102	**7-AAD**	548	648	561 or 488	488 laser FL4 (655/LP) 488 laser FL2 (540/LP) 488 laser FL3 (670/30) 561 laser FL4 (655/LP)

Cell Analysis

See Also
Cell biology reagents: page 44.

Cell analysis via flow cytometry examines the physical and chemical characteristics of particles in a fluid as it passes through at least one laser. Cell components are usually fluorescently labeled and then excited by the laser to emit light at varying wavelengths. Flow cytometry allows fast analysis at the single-cell level. Typical parameters include cell volume (forward scatter), morphological complexity (side scatter), pigments, DNA content, protein expression, cell surface and intracellular antigens, cytokines, apoptosis, cell viability, cell monitoring, and fluorescent proteins. Life science disciplines that utilize flow cytometry include immunology, cell biology, cancer research, plant biology, microbiology, pathology, marine biology, and medicine.

Instruments

ZE5™ Cell Analyzer

The ZE5™ cell analyzer is an innovative flow cytometer with flexible configurations designed to meet a broad range of experimental complexities and throughput needs. With up to 30 detectors (27 colors), the ZE5 cell analyzer is a truly expandable flow cytometer. The fully integrated sample loader, with the ability to handle tubes or plates without changing instrument hardware, enables true walk-away functionality. Features such as the stat tube station, the fluid and reagent hot swap capability, and the automated startup and QC allow for continuous operation and maximize instrument running time for any busy core lab. The ZE5 was created by gathering input from some of the leading flow cytometer users across the world and was designed to address the gaps in currently available systems.

Features include:

- Flexible loading options
- Best-in-class and scalable optics
- Integrated and easy-to-use fluidics
- Innovative electronics providing highest quality data

Specifications

System	Fluorescence sensitivity	<100 MESF for FITC, PE, APC
	Scatter sensitivity	<0.3 µm FSC resolution with small particle detection module
	Loader	Integrated sample loader with agitation and temperature control. Up to 384-well plates; 40-tube rack for 5 ml 12 x 75 mm tube loading. Stat tube position for single tube loading
Optics	Excitation	Up to five spatially separated lasers per instrument. Standard options include: 355 nm, 50 mW 405 nm, 100 mW 561 nm, 50 mW 488 nm, 100 mW 640 nm, 100 mW
	Detection	Up to 30 detectors including FSC and SSC; optional second FSC detector
	Cuvette	Fused silica with 145 x 265 µm channel
Electronics	Speed	>100,000 events per second with all parameters enabled
	Data processing	Simultaneous measured peak, area, and width for every channel. 24-bit data for peak and area. 17-bit data for width with high-resolution linear interpolation at the half height.
Fluidics	Sample flow rates	0.0025–2.5 µl/sec
	Bulk fluids	4 x 4 L bulk fluid tanks on board for sheath and waste. On board additive concentrate and cleaner.
Installation	Power	95–240 VAC, 50–60 Hz, <500 W
	Dimensions (W x D x H)	29 x 27 x 26 in.; 74 x 69 x 66 cm
	Weight	<240 lb; <110 kg
	Temperature and humidity	18–25°C; 20–60% RH
	Air and vacuum supply	Included, on-board
Software	Operating system	Windows 7 Pro
	FCS format	FCS 3.1
	QC	Automated quality control with on-board calibration beads
	Workstation	Intel Core i7-7700 Quad Core; 3.3 GHz
Regulatory	CE, CLass I (1) laser product Research use only	

For More Information
Web: bio-rad.com/ZE5cellanalyzer
Request or download bulletin: 6814

Ordering Information

Catalog #	Description
ZE5 Cell Analyzer	
17002033	**ZE5 Cell Analyzer**, 3 laser 17 color (405/488/640)
17002034	**ZE5 Cell Analyzer**, 3 laser 17 color (488/561/640)
17002032	**ZE5 Cell Analyzer**, 4 laser 24 color (405/488/561/640)
17002031	**ZE5 Cell Analyzer**, 5 laser 27 color (355/405/488/561/640)

continues

Ordering Information

Catalog #	Description
Accessories	
12004403	**ZE-Series QC Beads**, 5 ml, pack of 3
1451085	**ProLine Rainbow Beads**, includes a 5 ml bottle containing a mixture of beads dyed with 8 different fluorescent intensities for excitation at wavelengths between 365–650 nm
12004271	**ZE5 Additive**, 4 x 300 ml
12004404	**ZE5 Additive Bottle with Tubing**, white, includes 450 ml bottle, cap/tubing assembly with filter and quick connector
12004272	**Cytometer Cleaner**, 1 L
12004395	**ZE5 Cleaner Bottle with Tubing**, blue, includes 450 ml bottle, cap/tubing assembly with filter and quick connector
12004444	**ZE5 Cleaner/Additive Bottle**, includes 450 ml bottle
1451083	**ProFlow Sort Grade Water**, includes 5 x 4 L sterile, endotoxin-free water in gamma-irradiated fluidic containers
12004397	**ZE5 DI Water Container with Tubing**, includes 4 L container, cap/tubing assembly with filters and quick connectors
12004396	**ZE5 Waste Container with Tubing**, includes 4 L container, cap/tubing assembly with filters and quick connectors
12004418	**ZE5 DI Water Container**, 4 L, pkg of 2
12004402	**ZE5 Waste Container**, 4 L, pkg of 2
12004274	**5 ml Tubes**, 12 x 75 mm with cap, sterile polypropylene, pack of 25
12004445	**ZE5 Tube Rack**, 5 ml size, 40 spots
12004446	**ZE5 Tube Rack**, 1.5 ml size, 24 spots

Reagents

Kits and Reagents for Cell Analysis

Bio-Rad offers a variety of easy-to-use kits and reagents suitable for use with the ZE5™ cell analyzer.

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	ZE5 Cell Analyzer Configuration
Antibody Labeling Kits					
1351011	**ReadiLink 405/454**	403	454	405	405 laser 460/22
1351002	**ReadiLink 492/516**	492	516	488	488 laser 525/35
1351003	**ReadiLink 555/570**	555	570	561	561 laser 577/15
1351004	**ReadiLink 594/610**	594	610	561	561 laser 615/24
1351005	**ReadiLink 633/655**	633	655	640	640 laser 670/30
1351006	**ReadiLink 647/674**	647	674	640	640 laser 670/30
1351007	**ReadiLink 680/701**	680	701	640	640 laser 720/60
1351008	**ReadiLink 700/713**	700	713	640	640 laser 720/60
Cell Proliferation					
1351202	**CytoTrack Blue 403/454**	403	454	405	405 laser 460/22
1351203	**CytoTrack Green 511/525**	511	525	488	488 laser 525/35
1351204	**CytoTrack Yellow 542/556**	542	556	532	561 laser 577/15
1351205	**CytoTrack Red 628/643**	628	643	633 or 640	640 laser 670/30
1351201	**CFDA-SE Cell Proliferation Assay**	492	517	488	488 laser 525/30
Cell Viability					
1351111	**VivaFix 353/442**	353	442	355	355 laser 447/60
1351112	**VivaFix 410/450**	410	450	405	405 laser 460/22
1351113	**VivaFix 408/512**	408	512	405	405 laser 525/50
1351114	**VivaFix 398/550**	398	550	405	405 laser 525/50
1351115	**VivaFix 498/521**	498	521	488	488 laser 525/35
1351116	**VivaFix 547/573**	547	573	561	561 laser 577/15
1351117	**VivaFix 583/603**	583	603	561	561 laser 615/24
1351118	**VivaFix 649/660**	649	660	640	640 laser 670/30
1351101	**Propidium Iodide**	538	617	355, 488, or 561	355 laser 670/30 488 laser 593/52 561 laser 615/24
1351102	**7-AAD**	548	648	488 or 561	488 laser 692/80 561 laser 640/20
Nuclear Dyes					
1351303	**DAPI**	359	461	355 or 405	355 laser 447/60 or 405 laser 460/22
1351304	**Hoechst 33342**	350	461	355	355 laser 447/60 or 670/30

Cell Biology Reagents

In addition to cell biology reagents on **bio-rad.com**, Bio-Rad now offers a dedicated antibody website — **bio-rad-antibodies.com** — specifically designed to meet the unique needs of researchers who use antibodies. This website showcases the range of our more than 10,000 antibodies and related reagents suitable for flow cytometry, immunohistochemistry, immunofluorescence, western blotting, immunoprecipitation, and ELISA. The antibody range also includes the highly validated PrecisionAb™ antibodies for western blotting and covers key research areas such as immunology, cancer, veterinary research, and cell biology.

Antibody Labeling Kits

See Also
Cell sorting consumables: page 36.
Cell counting: page 27.

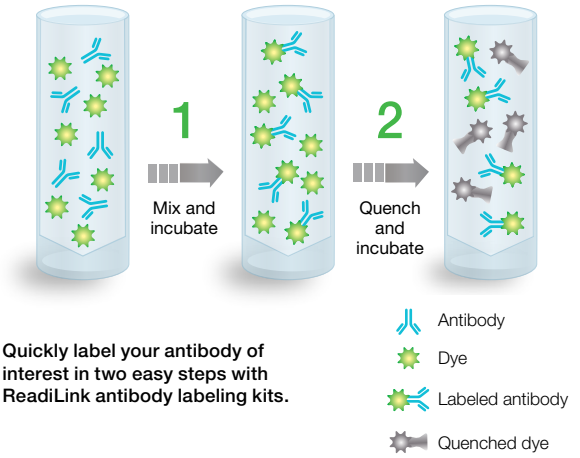
ReadiLink Antibody Labeling Kits

The following products are available on **bio-rad.com**.

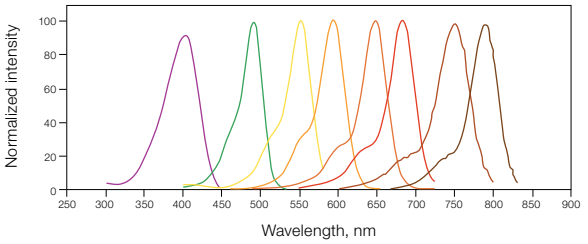
ReadiLink antibody labeling kits offer easy fluorescence conjugation in microscale volumes. Each kit provides all the essential components to perform two 50 µg conjugation reactions with primary antibodies. Available in a variety of excitation and emission wavelength combinations, the ReadiLink kits can be used to rapidly conjugate any antibody of interest for use in multicolor flow cytometry experiments.

- Efficient two-step microgram antibody labeling
- Stable carboxamide bond with fluorescent dye
- Quench buffer eliminates background fluorescence

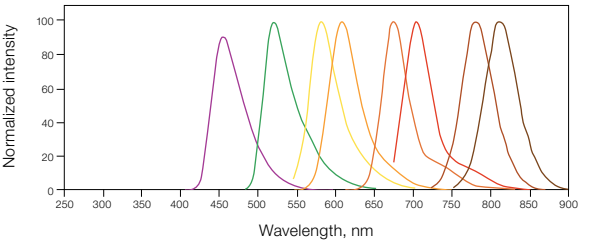
For More Information
Web: bio-rad.com/readilink1
Download bulletin: #10033055
Request or download bulletin: 6523



Quickly label your antibody of interest in two easy steps with ReadiLink antibody labeling kits.



Excitation wavelength spectrum. ReadiLink dyes 405/454 (–); 492/516 (–); 555/570 (–); 594/610 (–); 647/674 (–); 680/701 (–); 750/780 (–); 790/811 (–).



Emission wavelength spectrum. ReadiLink dyes 405/454 (–); 492/516 (–); 555/570 (–); 594/610 (–); 647/674 (–); 680/701 (–); 750/780 (–); 790/811 (–).

Ordering Information

Catalog #	Description	Fluorophore Equivalent	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351011	**ReadiLink 405/454**	Pacific Blue	403	454	405	•	•	
1351002	**ReadiLink 492/516**	FITC Alexa Fluor 488 DyLight 488	492	516	488	•	•	•
1351003	**ReadiLink 555/570**	Cy3 Alexa Fluor 555 DyLight 550	555	570	561	•	•	•
1351004	**ReadiLink 594/610**	Texas Red Alexa Fluor 594 DyLight 594	594	610	561	•	•	•
1351005	**ReadiLink 633/655**	Cy5 Alexa Fluor 633 DyLight 633	633	655	640	•	•	
1351006	**ReadiLink 647/674**	Cy5 Alexa Fluor 647 DyLight 650	647	674	640	•	•	
1351007	**ReadiLink 680/701**	Cy5.5 IRDye 700 Alexa Fluor 680 DyLight 680	680	701	640	•	•	
1351008	**ReadiLink 700/713**	Alexa Fluor 700	700	713	640	•	•	
1351009	**ReadiLink 750/780**	Alexa Fluor 750 DyLight 755	750	780	640		•	
1351010	**ReadiLink 790/811**	IRDye 800 Alexa Fluor 790 DyLight 800	790	811				

Each ReadiLink kit includes 2 vials of labeling dye, reaction buffer, and dye quench for labeling 2 x 50 µg of antibodies.

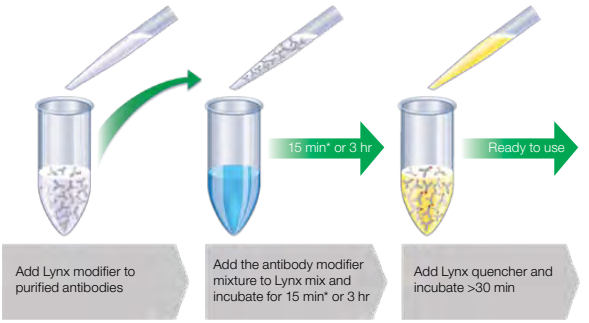
New Lynx Conjugation Kits

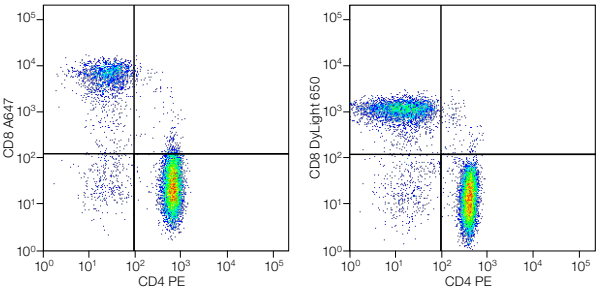
The following products are available on **bio-rad-antibodies.com**.

Lynx Rapid Conjugation Kit® and Lynx Rapid Plus conjugation kits are available in a wide range of options, including common fluorophores, enzymes, and biotin/streptavidin conjugations. These kits are suitable for use in flow cytometry, enzyme-linked immunosorbent assay (ELISA), western blotting, immunohistochemistry, and immunofluorescence applications. Identical protocols for small-scale and large-scale conjugations allow conjugation of up to milligram quantities of antibody. Conjugate your antibodies in three easy steps with only 30 seconds hands-on time and no purification required.

- **Fast** — 1-step labeling procedure; requires 30 sec hands-on time, with an incubation time of either 15 min with the LYNX Rapid Plus kits or 3 hr with the LYNX Rapid kits to finish the conjugation
- **Simple** — can be used in the presence of up to 0.1% sodium azide and 0.5% bovine serum albumin
- **Instantly ready to use** — no additional columns or dialysis are required after the conjugation process is finished; the stable, high-quality labeled antibodies are ready to use
- **100% recovery** — no postconjugation cleanup required, which enables 100% yields of labeled antibodies. Lynx kits save time and eliminate batch-to-batch variation and loss of antibodies compared to traditional labeling methods
- **Easy scale-up** — same procedure is used for labeling small and large quantities of antibodies; users can initially conjugate micrograms of antibody for trial, then scale up to milligram quantities

For More Information
Web: bio-rad-antibodies.com/lynxkits





Comparison of Lynx kits with directly conjugated antibodies. Purified CD4 and CD8 T cells were labeled with Lynx Rapid RPE antibody conjugation kit (catalog #LNK021RPE) and Lynx Rapid Plus DyLight 650 antibody conjugation kit (#LNK241D650), respectively, and used to stain human peripheral blood. Alternatively, directly labeled antibodies were used. The staining shown is lymphocytes gated on the CD3 positive population. CD4 and CD8 positive T cells can be identified in both plots. Data acquired on the ZE5™ cell analyzer. PE, phycoerythrin.

* Lynx Rapid Plus kits only.

Ordering Information

Catalog #	Description
Lynx Rapid Conjugation Kits	
LNK061F	**Lynx Rapid Fluorescein Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK062F	**Lynx Rapid Fluorescein Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK063F	**Lynx Rapid Fluorescein Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody
LNK021RPE	**Lynx Rapid RPE Antibody Conjugation Kit**, 1 conjugation for 60 µg antibody
LNK022RPE	**Lynx Rapid RPE Antibody Conjugation Kit**, 3 conjugations for 60 µg antibody
LNK023RPE	**Lynx Rapid RPE Antibody Conjugation Kit**, 1 conjugation for 600 µg antibody
LNK024RPE	**Lynx Rapid RPE Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK171PETR	**Lynx Rapid RPE–Texas Red Antibody Conjugation Kit**, 1 conjugation for 100 µg antibody
LNK172PETR	**Lynx Rapid RPE–Texas Red Antibody Conjugation Kit**, 3 conjugations for 100 µg antibody
LNK173PETR	**Lynx Rapid RPE–Texas Red Antibody Conjugation Kit**, 1 conjugation for 1 mg antibody
LNK174PETR	**Lynx Rapid RPE–Texas Red Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK031APC	**Lynx Rapid APC Antibody Conjugation Kit**, 1 conjugation for 150 µg antibody
LNK032APC	**Lynx Rapid APC Antibody Conjugation Kit**, 3 conjugations for 150 µg antibody
LNK033APC	**Lynx Rapid APC Antibody Conjugation Kit**, 1 conjugation for 1.5 mg antibody
LNK034APC	**Lynx Rapid APC Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK081C	**Lynx Rapid RPE-Cy5 Antibody Conjugation Kit**, 1 conjugation for 60 µg antibody
LNK082C	**Lynx Rapid RPE-Cy5 Antibody Conjugation Kit**, 3 conjugations for 60 µg antibody
LNK083C	**Lynx Rapid RPE-Cy5 Antibody Conjugation Kit**, 1 conjugation for 600 µg antibody
LNK084C	**Lynx Rapid RPE-Cy5 Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK071PERCP	**Lynx Rapid PerCP Antibody Conjugation Kit**, 1 conjugation for 100 µg antibody
LNK072PERCP	**Lynx Rapid PerCP Antibody Conjugation Kit**, 3 conjugations for 100 µg antibody
LNK073PERCP	**Lynx Rapid PerCP Antibody Conjugation Kit**, 1 conjugation for 1 mg antibody
LNK074PERCP	**Lynx Rapid PerCP Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK121APCCY5.5	**Lynx Rapid APC-Cy5.5 Antibody Conjugation Kit**, 1 conjugation for 150 µg antibody
LNK141PERCPCY5.5	**Lynx Rapid PerCP-Cy5.5 Antibody Conjugation Kit**, 1 conjugation for 100 µg antibody
LNK142PERCPCY5.5	**Lynx Rapid PerCP-Cy5.5 Antibody Conjugation Kit**, 3 conjugations for 100 µg antibody
LNK143PERCPCY5.5	**Lynx Rapid PerCP-Cy5.5 Antibody Conjugation Kit**, 1 conjugation for 1 mg antibody
LNK144PERCPCY5.5	**Lynx Rapid PerCP-Cy5.5 Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK092PECY5.5	**Lynx Rapid RPE-Cy5.5 Antibody Conjugation Kit**, 3 conjugations for 60 µg antibody
LNK093PECY5.5	**Lynx Rapid RPE-Cy5.5 Antibody Conjugation Kit**, 1 conjugation for 600 µg antibody
LNK094PECY5.5	**Lynx Rapid RPE-Cy5.5 Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK131APCCY7	**Lynx Rapid APC-Cy7 Antibody Conjugation Kit**, 1 conjugation for 150 µg antibody
LNK132APCCY7	**Lynx Rapid APC-Cy7 Antibody Conjugation Kit**, 3 conjugations for 150 µg antibody
LNK133APCCY7	**Lynx Rapid APC-Cy7 Antibody Conjugation Kit**, 1 conjugation for 1.5 mg antibody
LNK134APCCY7	**Lynx Rapid APC-Cy7 Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
LNK111PECY7	**Lynx Rapid RPE-Cy7 Antibody Conjugation Kit**, 1 conjugation for 60 µg antibody
LNK112PECY7	**Lynx Rapid RPE-Cy7 Antibody Conjugation Kit**, 3 conjugations for 60 µg antibody
LNK113PECY7	**Lynx Rapid RPE-Cy7 Antibody Conjugation Kit**, 1 conjugation for 600 µg antibody
LNK114PECY7	**Lynx Rapid RPE-Cy7 Antibody Conjugation Kit**, 3 conjugations for 10 µg antibody
Lynx Rapid Plus Conjugation Kits	
LNK221D488	**Lynx Rapid Plus DyLight 488 Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK222D488	**Lynx Rapid Plus DyLight 488 Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK223D488	**Lynx Rapid Plus DyLight 488 Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody
LNK201CY3	**Lynx Rapid Plus Cy3 Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK202CY3	**Lynx Rapid Plus Cy3 Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK203CY3	**Lynx Rapid Plus Cy3 Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody
LNK251RHO	**Lynx Rapid Plus Rhodamine Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK252RHO	**Lynx Rapid Plus Rhodamine Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK253RHO	**Lynx Rapid Plus Rhodamine Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody
LNK231D550	**Lynx Rapid Plus DyLight 550 Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK232D550	**Lynx Rapid Plus DyLight 550 Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK233D550	**Lynx Rapid Plus DyLight 550 Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody
LNK211CY5	**Lynx Rapid Plus Cy5 Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK212CY5	**Lynx Rapid Plus Cy5 Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK213CY5	**Lynx Rapid Plus Cy5 Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody
LNK241D650	**Lynx Rapid Plus DyLight 650 Antibody Conjugation Kit**, 3 conjugations for 200 µg antibody
LNK242D650	**Lynx Rapid Plus DyLight 650 Antibody Conjugation Kit**, 1 conjugation for 2 mg antibody
LNK243D650	**Lynx Rapid Plus DyLight 650 Antibody Conjugation Kit**, 3 conjugations for 20 µg antibody

Apoptosis Reagents

Apoptosis, one of the main forms of programmed cell death, is carried out in very distinct stages characterized by specific morphologies. Antibodies against common apoptosis markers allow determination of cellular apoptosis levels. Activation of the caspase cascade initiates this process through either the intrinsic or extrinsic apoptosis pathway.

Annexin V Kits

The following products are available on **bio-rad-antibodies.com**.

Early apoptotic cells can be detected with the help of annexin V, a protein encoded by the *ANXA5* gene, which acts as an anticoagulant. Annexin V, like other members of the annexin protein family, binds to specific membrane proteins. During the early stages of apoptosis, the plasma membrane is rearranged, resulting in changes to the cell membrane's phospholipid asymmetry. One of the effects of these rearrangements is the display of phosphatidylserine (PS) at the outer plasma membrane. In healthy, quiescent cells, PS is exclusively located on the inner membrane and therefore the exposure of PS is an indication of early apoptosis (Fadeel and Xue, 2009). Annexin V has a high binding affinity for PS in the presence of Ca^{2+} and is therefore a commonly used tool for detecting apoptotic cells.

- Applicable for multicolor flow cytometry experiments; available as conjugates, including biotin, FITC, PE, and APC
- Includes the viability dye propidium iodide for distinction between apoptotic/secondary necrotic and apoptotic cells
- Labeled annexin V, included in the kits, has been conjugated such that the native phospholipid binding properties of annexin V remain unaltered

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

Ordering Information

Catalog #	Description
ANNEX20B	**Annexin V:Biotin Assay Kit,** 1 x 0.1 ml annexin V:Biotin, 1 x 1.6 ml propidium iodide, 1 x 50 ml vial binding buffer for 20 tests
ANNEX100B	**Annexin V:Biotin Assay Kit**, 1 x 0.5 ml annexin V:Biotin, 1 x 1.6 ml propidium iodide, 1 x 50 ml vial binding buffer for 100 tests
ANNEX300B	**Annexin V:Biotin Assay Kit**, 1 x 1.5 ml annexin V:Biotin, 2 x 1.6 ml propidium iodide, 1 x 50 ml vial binding buffer for 300 tests
ANNEX20F	**Annexin V:FITC Assay Kit**, 1 x 0.1 ml annexin V:FITC, 1 x 1.6 ml propidium iodide, 1 x 50 ml vial binding buffer for 20 tests
ANNEX100F	**Annexin V:FITC Assay Kit**, 1 x 0.5 ml annexin V:FITC, 1 x 1.6 ml propidium iodide, 1 x 50 ml vial binding buffer for 100 tests
ANNEX300F	**Annexin V:FITC Assay Kit**, 1 x 1.5 ml annexin V:FITC, 2 x 1.6 ml propidium iodide, 1 x 50 ml vial binding buffer for 300 tests
ANNEX50PE	**Annexin V:PE Assay Kit**, 50 tests annexin V:PE, 7-AAD viability staining solution, 10x binding buffer
ANNEX200PE	**Annexin V:PE Assay Kit**, 200 tests annexin V:PE, 7-AAD viability staining solution, 10x binding buffer
ANNEX50APC	**Annexin V:APC Assay Kit**, 50 tests annexin V:APC, propidium iodide staining solution, 10x binding buffer
ANNEX200APC	**Annexin V:APC Assay Kit**, 200 tests annexin V:APC, propidium iodide staining solution, 10x binding buffer

Caspase Kits

The following products are available on **bio-rad-antibodies.com**.

Active caspases in apoptotic cells can be analyzed using FLICA kits, which offer:

- Unique cell-permeable and non-cytotoxic FLICA reagent
- Quick and easy method suitable for flow cytometry, fluorescence microscopy, or a plate reader
- Choice of 4 fluorophores, from green to far red

FLICA caspase apoptosis detection kits allow analysis of active caspases in whole, living cells. The unique cell-permeable and non-cytotoxic reagent, called fluorochrome inhibitor of caspases (FLICA), contains a caspase inhibitor sequence (such as VAD) linked to a green (carboxyfluorescein, FAM) or red (sulforhodamine, SR) fluorescent probe. As FLICA binds only to the active caspase, there is no interference from pro-caspases or inactive forms of the enzyme. The remaining fluorescent signal gives a direct measure of the amount of active caspase in the whole living cell. Cellular analysis may be performed with a fluorescence microscope, plate reader, or flow cytometer.

FLICA caspase kits are suitable for cells in suspension and adherent cells, thin tissue sections, and thin frozen sections (but not fixed or paraffin-embedded tissues) from many species, including mammals, insects, and yeast. Various cell types, including HeLa, primary neurons, macrophages, and lymphocytes, have been successfully studied with these kits.

FAM FLICA fluoresces green and the SR FLICA fluoresces red. The latter is useful for studying caspase activity in GFP-transfected cell lines and for dual-color experiments with other green reagents. For general apoptosis detection, poly caspase kits (caspase 1, 3, 4, 5, 6, 7, 8, 9) are recommended, as they will react with all active caspases. Alternatively, individual caspase activity may be studied with the single caspase FLICA kits. The Magic Red reagent contains a caspase inhibitor sequence $(DEVD)_2$ linked to a red (cresyl violet) fluorescent probe.

The FLICA 660 caspase kits use a target sequence sandwiched between a far red fluorescent 660 dye and a fluoromethylketone to make a quick and flexible method to analyze active caspases.

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

Ordering Information

Catalog #	Description
ICT097	**FAM FLICA Caspase-1 Kit**, 25 tests
ICT098	**FAM FLICA Caspase-1 Kit**, 100 tests
ICT9122*	**FLICA 660 Caspase-1 Kit**, 25–50 tests
ICT918	**FAM FLICA Caspase-2 Kit**, 25 tests
ICT919	**FAM FLICA Caspase-2 Kit**, 100 tests
ICT093	**FAM FLICA Caspase-3/7 Kit**, 25 tests
ICT094	**FAM FLICA Caspase-3/7 Kit**, 100 tests
ICT935	**Magic Red Caspase-3/7 Kit**, 25 tests
ICT936	**Magic Red Caspase-3/7 Kit**, 100 tests
ICT9125*	**FLICA 660 Caspase-3/7 Kit**, 25–50 tests
ICT095	**FAM FLICA Caspase-6 Kit**, 25 tests
ICT096	**FAM FLICA Caspase-6 Kit**, 100 tests
ICT099	**FAM FLICA Caspase-8 Kit**, 25 tests
ICT910	**FAM FLICA Caspase-8 Kit**, 100 tests
ICT912	**FAM FLICA Caspase-9 Kit**, 25 tests
ICT913	**FAM FLICA Caspase-9 Kit**, 100 tests
ICT960	**SR FLICA Caspase-9 Kit**, 25 tests
ICT961	**SR FLICA Caspase-9 Kit**, 100 tests
ICT923	**FAM FLICA Caspase-10 Kit**, 100 tests
ICT091	**FAM FLICA Poly Caspase Kit**, 25 tests
ICT092	**FAM FLICA Poly Caspase Kit**, 100 tests
ICT916	**SR FLICA Poly Caspase Kit**, 25 tests
ICT917	**SR FLICA Poly Caspase Kit**, 100 tests
ICT9120*	**FLICA 660 Poly Caspase Kit**, 25–50 tests

* New product.

Mitochondrial Membrane Potential Kits

The following products are available on **bio-rad-antibodies.com**.

An early indication of apoptosis involves a collapse in the electrochemical gradient across the mitochondrial membrane. This is mediated by the opening of permeability transition (PT) pores and is known as the mitochondrial PT event. It is measured by the change in the mitochondrial membrane potential. Loss of mitochondrial membrane potential can be detected by three fluorescent cationic dyes: 5,5',6,6'-tetrachloro-1,1',3,3'-tetraethylbenzimidazolocarbocyanine iodide (JC-1), tetramethylrhodamine ethyl ester (TMRE), and tetramethylrhodamine methyl ester (TMRM).

These dyes are lipophilic and have a delocalized positive charge, which enables them to enter cells and negatively charged healthy mitochondria. In nonapoptotic mitochondria, the dyes aggregate and will fluoresce bright orange/red. As apoptosis occurs and the mitochondrial membrane potential collapses, the dyes disperse throughout the cell and the fluorescence either diminishes (MitoPT TMRE and TMRM kits) or changes color (MitoPT JC-1 kit). This allows an easy distinction between apoptotic and nonapoptotic fluorescent cells, which can be read with a flow cytometer, fluorescence microscope, or a fluorescence plate reader using black microtiter plates.

- Quick and easy staining method clearly differentiates nonapoptotic and apoptotic cells
- MitoPT TMRE and TMRM kits are ideal for single-cell multiparametric analyses
- Suitable for flow cytometry, fluorescence microscopy, or a plate reader

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

Ordering Information

Catalog #	Description
ICT946	**Mitochondrial Membrane Potential: MitoPT TMRE Kit**, 500 tests
ICT948	**Mitochondrial Membrane Potential: MitoPT TMRM Kit**, 500 tests
ICT943	**Mitochondrial Permeability Transition: MitoPT JC-1 Kit**, 100 tests
ICT944	**Mitochondrial Permeability Transition: MitoPT JC-1 Kit**, 400 tests

Real-Time Apoptosis Fluorescent Microscopy Kit

The following products are available on **bio-rad-antibodies.com**.

Compatible with conventional fluorescence microscopes and the ZOE™ fluorescent cell imager, IANBD (excitation maximum 488 nm, emission maximum 530 nm) can be easily detected by FITC filter sets.

- Ideal for performing time-lapse live cell imaging experiments
- Visualize apoptosis events in real time
- Perfect for comparing mutant and wild type strains
- Observe transient and reversible apoptotic events
- No washing steps or special buffers required — just add the pSIVA probe and start imaging
- Differentiate apoptotic from necrotic/dead cells
- The kit includes the propidium iodide viability dye

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

Ordering Information

Catalog #	Description
APO004	**pSIVA Real-Time Apoptosis Fluorescent Microscopy Kit**, 1 kit

Apoptosis Antibodies

Visit **bio-rad.com/apoptosis** for a full list of our apoptosis products.

Ordering Information

Catalog #	Description	Clone	Species Reactivity	Applications	Host	Formats
MCA2712	**Annexin V**	VAA-33	Human	E, FC	Mouse	Pur., Biot., FITC
AHP963	**Caspase-1**	Polyclonal	Human	IHC-P,* WB	Rabbit	Pur.
AHP1423	**Caspase-2**	Polyclonal	Human, mouse	IHC-P,* WB	Rabbit	Pur.
AHP2717**	**Caspase-3**	Polyclonal	Human, mouse, rat	IHC-P, WB	Rabbit	Pur.
AHP964	**Caspase-4**	Polyclonal	Human, mouse	IHC-P,* WB	Rabbit	Pur.
AHP965	**Caspase-5**	Polyclonal	Human	WB	Rabbit	Pur.
AHP1788	**Caspase-7**	Polyclonal	Human, mouse, rat	IHC-P,* WB	Rabbit	Pur.
AHP966	**Caspase-7**	Polyclonal	Human, mouse, rat	IHC-P,* WB	Rabbit	Pur.
MCA2739	**Caspase-8**	4-1-20	Human	E, WB	Mouse	Pur.
AHP967	**Caspase-8**	Polyclonal	Human, mouse, rat	WB	Rabbit	Pur.
AHP492	**Caspase-9**	Polyclonal	Human, mouse, rat	WB	Rabbit	Pur.
AHP491	**Caspase-9**	Polyclonal	Human, mouse, rat	E, WB	Rabbit	Pur.
AHP2284	**Caspase-10**	Polyclonal	Human, mouse, rat	WB	Rabbit	Pur.
AHP625	**Caspase-12**	Polyclonal	Human, mouse, rat	IHC-P,* WB	Rabbit	Pur.
AHP626	**Caspase-12**	Polyclonal	Human, mouse, rat	IHC-P,* WB	Rabbit	Pur.
AHP582	**Caspase-13**	Polyclonal	Human, mouse, rat	WB	Rabbit	Pur.
AHP1175	**Caspase-14**	Polyclonal	Human, mouse, rat	WB	Rabbit	Pur.
AHP2286	**Caspase-3 Active**	Polyclonal	Human, mouse, rat	IHC-P, WB	Rabbit	Pur.
AHP2287	**Caspase-7 Active**	Polyclonal	Human, mouse, rat	IHC-P, IP, WB	Rabbit	Pur.
AHP2288	**Caspase-9 Active**	Polyclonal	Human	IP, WB	Rabbit	Pur.
MCA2740	**Cytochrome c**	2G8	Human	E, FC*	Mouse	Pur.
VMA00017	**Bcl-2 PrecisionAb**	–	Human	WB	Mouse	Pur.
MCA1550	**Bcl-2**	100	Human	FC,* IHC-F, IHC-P,* IP, WB	Mouse	Pur.
0300-0020	**Bcl-2**	Polyclonal	Human	E	Rabbit	Pur.
0300-0016	**Bcl-2**	Polyclonal	Human	E	Rabbit	Pur.
AHP1057	**Bcl-2**	Polyclonal	Human, mouse, rat	E, WB	Goat	Pur.
MCA1539	**CD95**	LOB 3/17	Human	FC, IP	Mouse	Pur., FITC, RPE
AHP2306	**CD95**	Polyclonal	Human, mouse, rat	IHC-P, WB	Rabbit	Pur.
MCA2409	**CD178**	14C2	Human	E, FC, IP	Mouse	Pur., A488, A647, RPE
MCA2896	**CD178**	MFL4	Mouse, rat	FC, FN	Hamster	Pur., A488, A647, FITC, EL, RPE
MCA2408GA	**CD178**	10F2	Human	E, FC, FN, IP	Mouse	Pur., EL
MCA2118	**Granzyme B**	GB7	Human	IHC-P,* WB	Mouse	Pur.
MCA2119B	**Granzyme B**	GB10	Human	E	Mouse	Biot.
MCA2120	**Granzyme B**	GB11	Human	E, FC,* IHC-F, IF/ICC , IP	Mouse	Pur.

Applications: E, ELISA; FC, flow cytometry; FN, functional assays; IF/ICC, immunofluorescence/immunocytochemistry; IHC-F, immunohistology-frozen; IHC-P, immunohistology-paraffin; IP, immunoprecipitation; WB, western blotting.
Formats: Axxx, Alexa Fluor; Biot., biotin; EL, low endotoxin; FITC, fluorescein isothiocyanate; Pur., purified; RPE, R-phycoerythrin.
* Requires special treatment. Refer to product datasheet.
** New product.

Autophagy Reagents

Autophagy is the orderly degradation and recycling of cytoplasmic components via the lysosome. It is thought to be a repair and survival response during stress and infection and has been linked closely to apoptosis. Autophagy can be studied using antibodies or analysis of active cathepsins. During autophagy, cathepsins hydrolyze and degrade cytoplasmic proteins, bulk cytoplasm, and dysfunctional organelles for recycling. Increased levels of cathepsin activity have been linked with conditions such as cancer, arthritis, and Alzheimer's disease, indicating that cathepsin proteins may be a potential target for novel therapies.

Cathepsin Detection Kits

The following products are available on **bio-rad-antibodies.com**.

Magic Red cathepsin detection kits allow analysis of active cathepsins in whole, living cells. The substrate-based cresyl violet fluorophore probe is nonfluorescent when bound through amide links to two target peptides. Active cathepsins cleave the target peptide at an amide link, which causes the mono cresyl violet fluorophore to emit red fluorescence (>610 nm) when excited at 540–590 nm. Uncleaved target peptides have excitation and emission wavelengths of 592 and 628 nm, respectively, resulting in minimal cellular autofluorescence. Cathepsin activity can be determined by the accumulation of red fluorescent cresyl violet fluorophore substrate hydrolysis within organelles. Cellular analysis may be performed with a fluorescence microscope or plate reader.

The photostable substrates for cathepsin B (z-arginine-arginine)$_2$, cathepsin K (z-leucine-arginine)$_2$, and cathepsin L (z-phenylalanine-arginine)$_2$ easily cross the plasma membrane and intracellular organelle membranes of living cells. The kits also contain Hoechst stains for labeling nuclei and acridine orange for lysosome and organelle identification.

The cathepsin Magic Red kits are suitable for cells in suspension, adherent cells, and thin frozen tissue sections (but not fixed or paraffin-embedded cells) from many species including mammalian, insect, and yeast. Various cell types, including Jurkat, HL-60, THP-1, fibroblasts, UMUC-3, MCF-7, and U937 cells, have also been successfully studied with these kits.

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

Ordering Information

Catalog #	Description
ICT937	**Magic Red Cathepsin B Kit**, 25 tests
ICT938	**Magic Red Cathepsin B Kit**, 100 tests
ICT939	**Magic Red Cathepsin K Kit**, 25 tests
ICT941	**Magic Red Cathepsin L Kit**, 25 tests
ICT942	**Magic Red Cathepsin L Kit**, 100 tests

Autophagy Antibodies

Visit **bio-rad.com/apoptosis** for a full list of our autophagy products.

Ordering Information

Catalog #	Description	Clone	Species Reactivity	Applications	Host	Formats
AHP1009	**Beclin-1**	Polyclonal	Human, mouse, rat	FC, IHC-P,* WB	Rabbit	Pur.
AHP2167	**MAP1LC3A/B (N-Terminal)**	Polyclonal	Human	IF/ICC, WB	Rabbit	Pur.
AHP2448**	**CD107a (LAMP-1)**	Polyclonal	Mouse, rat	IF/ICC, IHC-P, WB	Rabbit	Pur.
MCA2881Z	**CD107a (LAMP-1)**	B-T47	Mouse	FC, IHC-P	Mouse	Pres. Fr.
MCA4707T	**CD107a (LAMP-1)**	1D4B	Mouse	FC, IHC-F, IF/ICC, IP	Rat	Pur.
MCA2315GA	**CD107a (LAMP-1)**	4E9/11	Pig	FC,* IHC-F, IF/ICC, IHC-P,* IP, WB	Mouse	Pur., A647, FITC
AHP2324	**CD107b (LAMP-2)**	Polyclonal	Human, mouse, rat	WB	Rabbit	Pur.
AHP2325	**CD107b (LAMP-2)**	Polyclonal	Human, mouse, rat	E, IF/ICC, WB	Rabbit	Pur.
AHP1634	**CD107b (LAMP-2)**	Polyclonal	Human, mouse, rat	IHC-F, WB	Rabbit	Pur.
MCA2293	**CD107b (LAMP-2)**	M3/84	Mouse	FC,* IHC-F, IHC-P, IP, WB	Mouse	Pur.
MCA2558GA	**CD107b (LAMP-2)**	AC17	Dog, human	FC,* IF/ICC, IP, WB	Mouse	Pur., A647, FITC, RPE

Applications: E, ELISA; FC, flow cytometry; IF/ICC, immunofluorescence/immunocytochemistry; IHC-F, immunohistology-frozen; IHC-P, immunohistology-paraffin; IP, immunoprecipitation; WB, western blotting.
Formats: Axxx, Alexa Fluor; FITC, fluorescein isothiocyanate; Pres. Fr., preservative free; Pur., purified; RPE, R-phycoerythrin.
* Requires special treatment. Refer to product datasheet.
** New product.

Cell Proliferation Assays

An increase or decrease in cell growth and division can be a key result in cytotoxicity and apoptosis assays and can be used to determine the effect of experimental treatments on cellular replication. We offer a broad range of antibodies, kits, and dyes to monitor proliferation. Proliferation can be measured through dye incorporation into live cells, by quantifying key proliferation markers, or by assessing incorporation of the thymidine analog BrdU into DNA.

Cell Proliferation Assay Reagents

The following products are available on **bio-rad-antibodies.com**.

alamarBlue is a cell proliferation assay that provides a rapid, sensitive, and economical way to quantitatively measure cell proliferation and cytotoxicity in various human and animal cell lines. It can also be used to study mycobacteria, bacteria, and fungi. It is a preferred alternative reagent to similar cell proliferation assays, including MTT, XTT, 3H thymidine, and neutral red.

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

- **Simple** — water soluble, just add and measure the formula in cell cultures
- **Flexible** — colorimetric and fluorometric detection for both suspension and adherent cell lines
- **Nontoxic** — alamarBlue does not kill cells and is safe to the user and the environment
- **Reliable** — highly referenced for cytotoxicity and viability assays
- **High sensitivity** — detects as few as 50 cells
- **Stable** — proprietary buffering agents ensure alamarBlue is suitable for time-course studies
- **Economical** — lack of cell lysis allows cells to be cultured for subsequent assays

Ordering Information

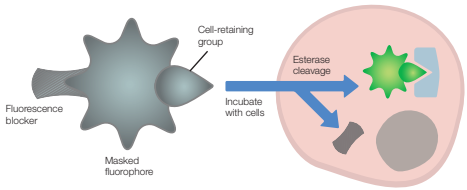
Catalog #	Description
BUF012A	**alamarBlue Reagent**, 25 ml
BUF012B	**alamarBlue Reagent**, 100 ml

CytoTrack™ Cell Proliferation Assay

The following products are available on **bio-rad.com**.

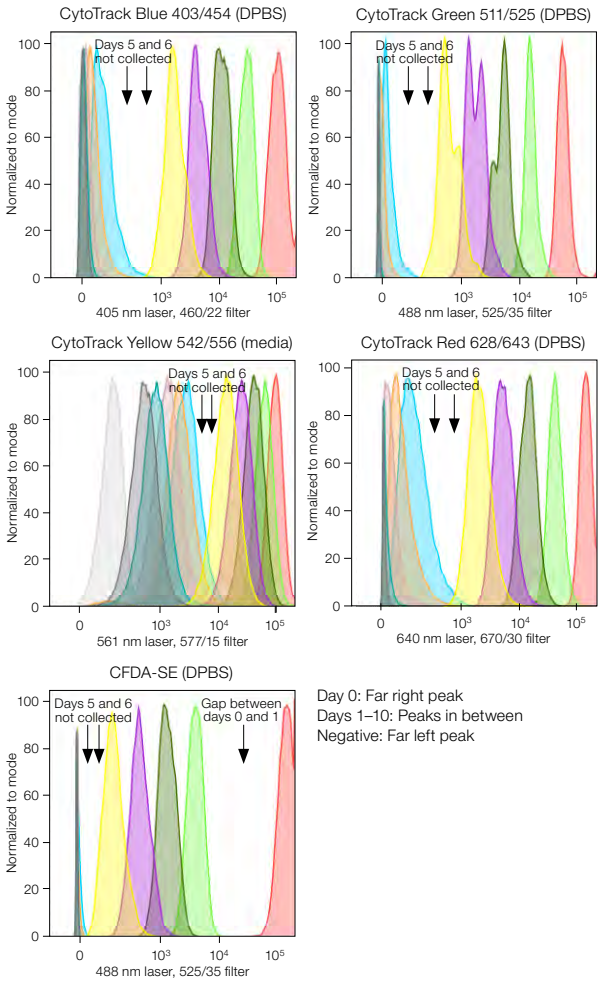
CytoTrack cell proliferation assays efficiently stain live cells for excellent resolution of up to 10 generations in a population of dividing cells. Using a proprietary chemistry, the CytoTrack dye reacts with intracellular proteins and is effectively retained in the cell without efflux. As cell division occurs, the dye is successively halved and the different generations can be determined based on the decrease in fluorescence intensity.

- Dyes are directly added to cell culture media or buffer
- Compatible with intracellular analysis using standard formaldehyde-containing fixatives and saponin-based permeabilization buffers
- Easily combine CytoTrack dyes with fluorescent proteins or antibody-labeled fluorophores for multicolor cell analysis



The nonfluorescent dye is cleared upon cell entry with the cell-retaining group and then covalently binds to intracellular protein, allowing it to remain in the cell during division.

For More Information
Web: bio-rad.com/cytotrack
Download bulletin: #10033110
Request or download bulletin: 6524



CytoTrack and CFDA-SE performance on the ZE5™ cell analyzer. 1x CytoTrack solution in either cell culture media or buffer was added to 1 x 10^6 Jurkat cells/ml. Cells were incubated in the dark at room temperature for 15 min, then washed and resuspended with cell culture media or buffer. Half were run on the ZE5 cell analyzer (day 0) and the other half left to grow. Each day, half the sample was removed to run on the ZE5 cell analyzer and the cell culture was replenished. DPBS, Dulbecco's phosphate buffered saline.

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351202	**CytoTrack Blue 403/454**	403	454	405	•	•	
1351203	**CytoTrack Green 511/525**	511	525	488	•	•	
1351204	**CytoTrack Yellow 542/556**	542	556	532	•	•	
1351205	**CytoTrack Red 628/643**	628	643	633 or 640	•	•	

Each kit includes 4 vials of dye and 1 vial DMSO for 200 cell proliferation tests.

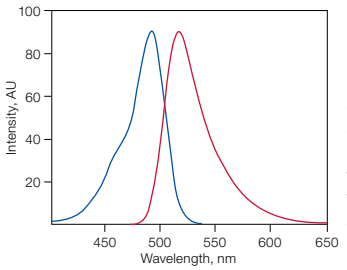
CFDA-SE Cell Proliferation Assay

The following products are available on **bio-rad.com**.

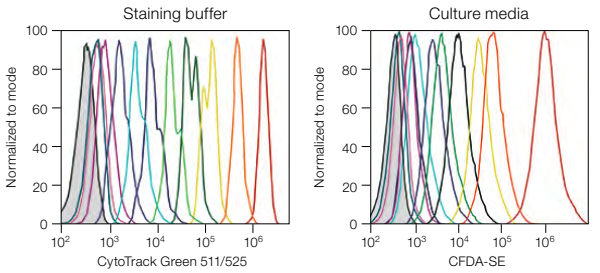
CFDA-SE cell proliferation assay provides carboxyfluorescein diacetate succinimidyl ester (CFDA-SE) in a convenient and easy-to-use format. CFDA-SE is a cell-permeable dye that fluoresces after the acetate groups are cleaved by intracellular esterases, creating carboxyfluorescein succinimidyl ester (CFSE). As the succinimidyl ester group reacts with primary amines of intracellular proteins, CFSE is retained in the cell and is successively halved during cell divisions.

- Visualize up to 8 cell divisions
- Minimize contamination and reduce dilution steps with small vial size

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



CFDA-SE excitation/ emission is 492/517 nm in 0.1 M NaOH. Excitation wavelength (—); emission wavelength (—). AU, absorbance unit.



CytoTrack™ resolves up to ten cell divisions compared to eight for CFDA-SE.

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351201	**CFDA-SE Cell Proliferation Assay**	492	517	488	•	•	

Includes 5 x 100 µg vials 5(6)-carboxyfluorescein diacetate succinimidyl ester, CFDA-SE.

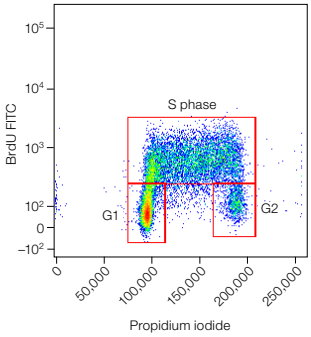
Cell Proliferation Detection Antibodies

Visit **bio-rad.com/cellproliferationassay** for a full list of our cell proliferation products.

The thymidine analog 5'-bromo-2'-deoxyuridine (BrdU) is a popular reagent in various scientific disciplines ranging from cancer to neuroscience research. The chemical is frequently added to samples, such as mammalian cell lines, and subsequently incorporated into newly synthesized DNA during replication.

To measure cell proliferation, the incorporated BrdU is detected with anti-BrdU antibodies, such as the mouse anti-BrdU antibody, clone Bu20a. However, to ensure that the antibody is able to bind to BrdU, DNA treatment prior to antibody staining is required (Liboska et al. 2012). In the literature, endonucleases, such as deoxyribonuclease I (DNase I), and acids, such as hydrochloric acid, are frequently used to cleave or denature the DNA to make incorporated BrdU accessible (Liboska et al. 2012).

Our mouse anti-BrdU antibody, clone Bu20a (catalog #MCA2483), has been tested in flow cytometry and immunocytochemistry. The product has been referenced in 12 publications. It is available in three different sizes (0.2 mg, 0.1 mg, and 20 µg) and is conjugated to FITC. In addition to flow cytometry and immunocytochemistry, the Bu20a clone is recommended for immunohistochemistry.



Staining profile of anti-BrdU antibody. BrdU-labeled human lymphoma cells were stained with mouse anti-BrdU antibody, clone BU20a, at a 1/100 dilution overnight at 4°C. A secondary antibody, FITC-conjugated goat anti-mouse IgG (H/L) (#STAR117F) was used at a 1/50 dilution. Total DNA staining was performed with ReadiDrop™ propidium iodide (#1351101). FITC, fluorescein isothiocyanate.

Detection of BrdU is commonly performed in combination with total DNA staining. When performing cell cycle analysis, propidium iodide tends to be the DNA stain of choice.

Ki67, proliferating cell nuclear antigen (PCNA), and minichromosome maintenance protein 2 (MCM2) are key proteins for regulating cellular growth and proliferation.

Ordering Information

Catalog #	Description	Clone	Species Reactivity	Applications	Host	Formats
MCA2483	**BrdU**	Bu20a	–	FC,* IF/ICC, IHC-F, IHC-P*	Mouse	Pur., FITC
HCA117	**Ki67**	2815	Human	E, IHC-P*	HuCAL	Pur.
HCA053	**Ki67**	2531	Bovine, dog, human	E, IHC-F, IHC-P,* WB	HuCAL	Pur.
HCA006	**Ki67**	AbD2531 (Fab)	Bovine, dog, human	E, IF/ICC, IHC-F, IHC-P,* WB	HuCAL	Pur.
VMA00259	**MCM2 PrecisionAb Antibody**	OT13B6	Human, mouse, rat	WB	Mouse	Pur.
MCA1859	**MCM2**	CRCT2.1	Human	IHC-P,* WB	Mouse	Pur.
VMA00018	**PCNA PrecisionAb**	–	Human, mouse, rat	WB	Mouse	Pur.
MCA1558	**PCNA**	PC10	Broad	FC,* IHC-F, IHC-P, IP, WB	Mouse	Pur., FITC, HRP
AHP1419	**PCNA Polyclonal**	–	Bovine, dog, human, mouse, rat	E, IHC-P, WB	Rabbit	Pur.

Applications: E, ELISA; FC, flow cytometry; IF/ICC, immunofluorescence/immunocytochemistry; IHC-F, immunohistology-frozen; IHC-P, immunohistology-paraffin; IP, immunoprecipitation; WB, western blotting.
Formats: FITC, fluorescein isothiocyanate; HRP, horseradish peroxidase; Pur., purified.
* Requires special treatment. Refer to product datasheet.

Cell Viability Assays

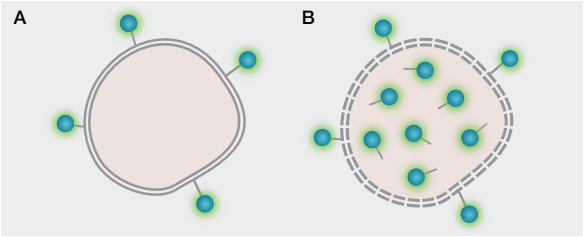
VivaFix™ Cell Viability Assay

The following products are available on **bio-rad.com**.

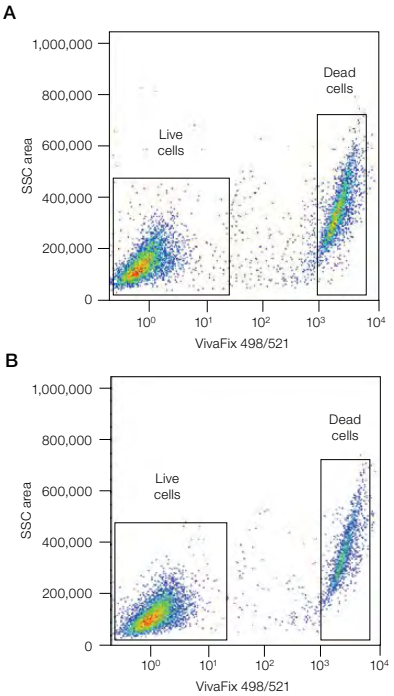
VivaFix cell viability assays provide a sensitive method for determining the viability of live or fixed mammalian cells by flow cytometry, cell sorting, and microscopy.

Using proprietary dyes that covalently bind to primary amines, VivaFix cell viability assays provide at least a 100-fold difference in fluorescence intensity between live and dead cells. The brightness of VivaFix dyes is preserved upon treatment with fixative agents.

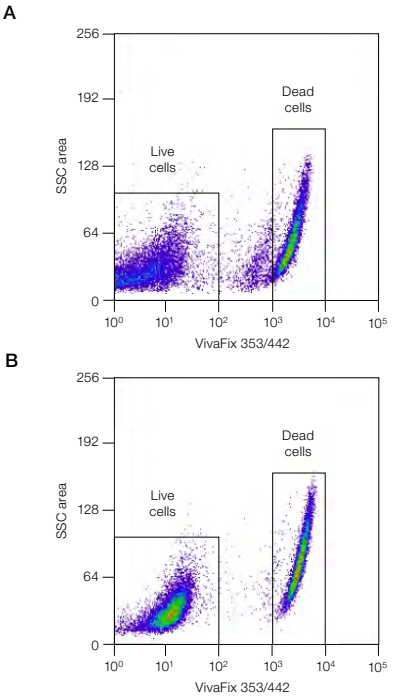
- 100-fold discrimination between dead and live cells
- Compatible with fixed and unfixed cells
- 8 different excitation/emission wavelength combinations



VivaFix cell viability assay chemistry. A, VivaFix dyes bind to the cell surface primary amines of viable cells; **B**, in dead cells, where the plasma membrane is compromised, VivaFix dyes are able to permeate the cell and also react with intracellular primary amines. As a result, a greater number of fluorophores is associated with dead cells and at least a 100-fold difference in fluorescence intensity is measured between the live and the dead cells, thereby allowing an easier discrimination between the two populations.



Assessment of cell viability using VivaFix and the S3e™ cell sorter. Jurkat cells were stained with the VivaFix 498/521 dye, fixed with 3.7% formaldehyde (**A**) or not fixed (**B**), and analyzed with the S3e cell sorter. SSC, side scatter.



Assessment of cell viability using VivaFix and the ZE5™ cell analyzer. Jurkat cells were heat shocked at 65°C for 5 min, then washed and suspended at 2 x 10^6 cells/ml in phosphate buffered saline. Cells were incubated with VivaFix 353/442 at 37°C for 30 min in the dark. **A**, half of the cells fixed in 1% paraformaldehyde; **B**, half of the cells not fixed. Identical gates for all samples were used during analysis on the ZE5 cell analyzer. SSC, side scatter.

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

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351111	**VivaFix 353/442**	353	442	355		•	•
1351112	**VivaFix 410/450**	410	450	405	•	•	
1351113	**VivaFix 408/512**	408	512	405	•	•	
1351114	**VivaFix 398/550**	398	550	405	•	•	
1351115	**VivaFix 498/521**	498	521	488	•	•	•
1351116	**VivaFix 547/573**	547	573	561	•	•	•
1351117	**VivaFix 583/603**	583	603	561	•	•	•
1351118	**VivaFix 649/660**	649	660	640	•	•	

Each VivaFix assay includes 4 x 50 test vials and 250 µl of DMSO.

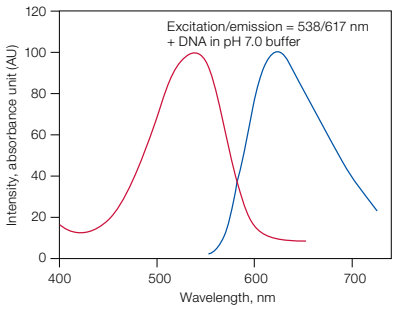
ReadiDrop™ Cell Viability Assays

The following products are available on **bio-rad.com**.

Designed for ease of use in cell sorting and flow cytometry applications, ReadiDrop cell viability assays remove the traditional manual weighing, pipetting, and dilution steps required with commonly available cell viability dyes. Simply add one or two drops to assess the health of your cells.

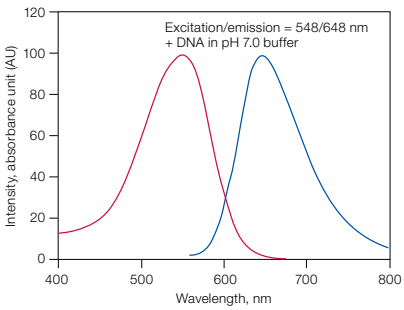
ReadiDrop Propidium Iodide

- Cell impermeant nucleic acid–binding dye that binds to double-stranded DNA/RNA
- Ready-to-use formulation in PBS without preservatives
- Stable at room temperature

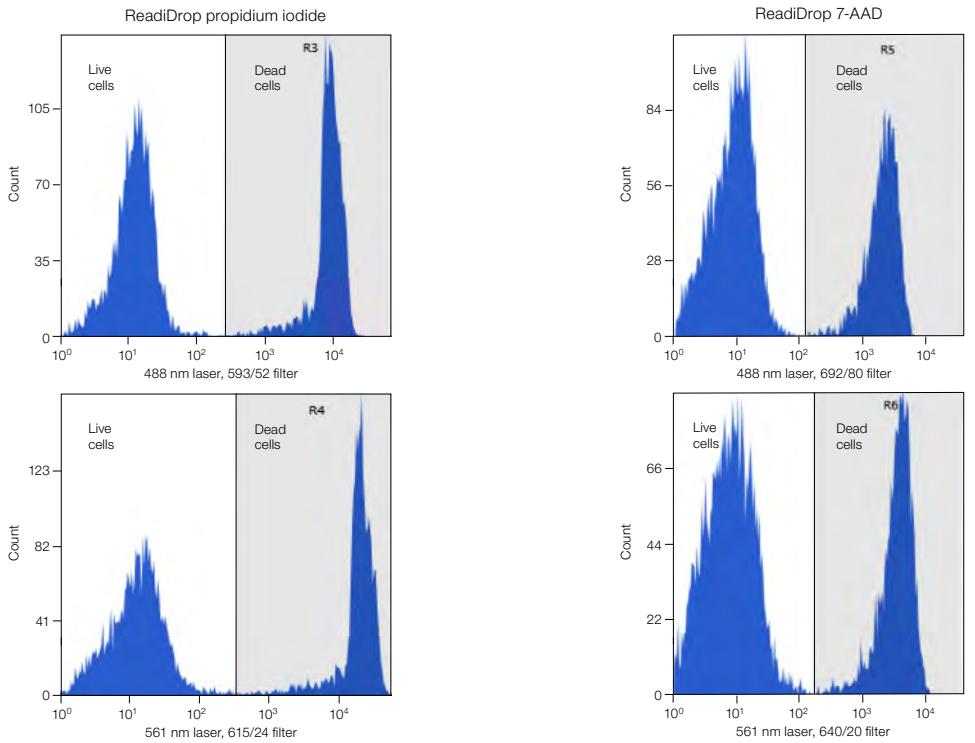


ReadiDrop 7-AAD

- Cell impermeant DNA binding dye with a high affinity for GC-rich regions of double-stranded DNA
- Ideal for cell sorting and flow cytometry
- Stable at room temperature



Excitation and emission curves for propidium iodide and 7-AAD.



Assessment of cell viability using ReadiDrop reagents and the ZE5™ cell analyzer. Jurkat cells were heat shocked at 65°C for 5 min. Cells were washed and resuspended at 2 x 10^6 cells/ml in phosphate buffered saline (PBS). Twenty µl of ReadiDrop propidium iodide or 7-AAD were added to 0.5 ml cells and incubated for 15 min at room temperature in the dark. Cells were washed once in PBS prior to acquisition on the ZE5 cell analyzer.

For More Information
Web: bio-rad.com/readidrop1
Download bulletin: #10049240
Request or download bulletin: 6522

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351101	**Propidium Iodide**	538	617	561 or 488	•	•	
1351102	**7-AAD**	548	648	561 or 488	•	•	

Each assay includes 3 x 3 ml bottles of ready-to-use reagent suspended in PBS for dead cell exclusion in cell sorting and flow cytometry applications.

Flow Cytometry Calibration and Validation Reagents

Standards and Stabilizers

The following products are available on **bio-rad-antibodies.com**.

Flow Cytometry Absolute Count Standard

Flow Cytometry Absolute Count Standard is a suspension of microspheres that are approximately the size of human lymphocytes (7–9 µm) and are presented as a known concentration. They are internally labeled with multiple fluorochromes and the combination of dyes allows the beads to be excited by a common argon laser (488 nm) and emit in the three standard channels of a flow cytometer (FL1, FL2, and FL3).

RPE Reference Standard

RPE reference standard consists of one vial of microspheres that are uniform in both size and fluorescence and are approximately the size of human lymphocytes (7–9 µm). The excitation and emission spectra of the microspheres match those of cell samples labeled with RPE. It is used to provide qualitative data when compared to a sample but can also be used to calibrate the flow cytometer.

Protein Stabilizer

Protein stabilizer stabilizes antibodies and other proteins or biomolecules in solution. It may be used to stabilize ready-to-use prediluted standards and controls used in immunoassays.

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

Ordering Information

Catalog #	Description
FCSC580	**Flow Cytometry Absolute Count Standard**, 1 bottle containing 10 ml of microspheres, 20 tests
FCSC899B	**RPE Reference Standard**, 1 x 5 ml bottle of labeled microbeads for 100 tests
BUF069A	**Protein Stabilizer**, 100 ml of ready-to-use liquid
BUF069B	**Protein Stabilizer**, 1,000 ml of ready-to-use liquid

Calibration Reagents

The following products are available on **bio-rad-antibodies.com**.

Quantum kits are used for the quantitation of fluorescence intensity in molecules of equivalent soluble fluorochrome (MESF) units. When used in conjunction with Simply Cellular microspheres, this kit also allows quantitation of antibody binding capacity (ABC). The fluorescence intensity of each of the populations in the kit has been calibrated against solutions of laser-grade fluorescent dye in units of MESF dye per microsphere. The Certified Blank population is used to measure the fluorescence detection threshold of the instrument.

- Quantitation of fluorescence intensity of samples in terms of MESF
- Determination of instrument fluorescence detection threshold
- Determination of instrument linearity
- Data comparison over time and between multiple instruments

Quantum FITC-5 MESF is composed of five calibrated fluorescent populations in one tube, each with different levels of FITC fluorescence intensity, and one blank population of uniform microspheres that are approximately the size of human lymphocytes (7–9 µm). Quantum R-PE MESF is composed of four calibrated fluorescent populations, with different levels of RPE fluorescence intensity.

Quantum Simply Cellular mouse IgG is composed of four coated populations and one blank population of uniform microspheres that are approximately the size of human lymphocytes (7–9 µm). Each of the four sets is coated with goat anti-mouse IgG (Fc-specific) with different calibrated antibody binding capacities (ABC) for mouse monoclonal antibodies. The blank population has no specific binding capacity for mouse IgG. When the bead populations are labeled in the same manner as the cells to be analyzed, they provide a means for constructing a QuickCal calibration curve (ABC values vs. fluorescence intensity), from which samples may be "read." Cellular antigen expression may thus be quantitated in ABC units.

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

Ordering Information

Catalog #	Description
FCSC555A	**Quantum FITC-5 MESF**, 1 x 1 ml bottle of unlabeled microbeads, 5 x 1 ml bottles of labeled microbeads for 20 tests
FCSC555B	**Quantum FITC-5 MESF**, 1 x 5 ml bottle of unlabeled microbeads, 5 x 5 ml bottles of labeled microbeads for 100 tests
FCSC555C	**Quantum FITC-5 MESF**, 2 x 7 ml bottle of unlabeled microbeads, 10 x 7 ml bottles of labeled microbeads for 280 tests
FCSC555PA	**Quantum FITC-5 MESF (Pre-Mixed)**, 1 x 1 ml bottle of unlabeled microbeads, 5 x 1 ml bottles of labeled microbeads for 20 tests
FCSC555PB	**Quantum FITC-5 MESF (Pre-Mixed)**, 1 x 5 ml bottle of unlabeled microbeads, 5 x 5 ml bottles of labeled microbeads for 100 tests
FCSC827A	**Quantum R-PE MESF Medium Level**, 1 x 1 ml bottle of unlabeled microbeads, 4 x 1 ml bottles of labeled microbeads for 20 tests
FCSC827B	**Quantum R-PE MESF Medium Level**, 1 x 5 ml bottle of unlabeled microbeads, 4 x 5 ml bottles of labeled microbeads for 100 tests
FCSC815A	**Quantum Simply Cellular Mouse IgG**, 1 x 1 ml bottle of unlabeled microbeads, 4 x 1 ml bottles of labeled microbeads for 20 tests
FCSC815B	**Quantum Simply Cellular Mouse IgG**, 1 x 5 ml bottle of unlabeled microbeads, 4 x 5 ml bottles of labeled microbeads for 100 tests
FCSC815C	**Quantum Simply Cellular Mouse IgG**, 2 x 7 ml bottle of unlabeled microbeads, 8 x 7 ml bottles of labeled microbeads for 280 tests

Flow Cytometry General Reagents

Accessory Reagents

The following products are available on **bio-rad-antibodies.com**.

Human Seroblock

Human Fc receptors are expressed on a variety of immune cell types including monocytes, macrophages, B cells, granulocytes, and dendritic cells. Cells that express Fc receptors can produce false positive immunofluorescent staining due to the Fc receptors binding of Ig. Human seroblock is designed to prevent such nonspecific staining without interfering with appropriate target staining. Human seroblock is compatible with use of anti-human antibodies targeting Fc receptors in flow cytometry.

Mouse Seroblock FcR

Mouse seroblock FcR is a rat antibody that recognizes mouse CD16 and CD32 cell surface proteins also known as FcRγIII and FcRγII, respectively. The function of these proteins is to bind IgG molecules via their Fc regions as part of the adaptive immune response. CD16 and/or CD32 are expressed by a wide variety of cells, including monocytes, macrophages, B lymphocytes, granulocytes, NK cells, dendritic cells, and some activated T lymphocytes. The expression of CD16/CD32 antigens can lead to nonspecific binding of test monoclonal antibodies in staining procedures, resulting in high background staining on a wide range of cells. This nonspecific binding may be blocked by pre-incubation of target cells with Mouse seroblock FcR, resulting in clearer staining.

Neutralite Avidin:Cy5 or RPE

Neutralite avidin is a deglycosylated version of egg white avidin that retains its affinity for biotin but has a near-neutral pH that minimizes nonspecific interactions.

Streptavidin:APC or FITC

Streptavidin is designed as a secondary reagent for use in flow cytometry in conjunction with biotinylated primary antibodies. Its conjugates show negligible nonspecific binding to nonbiotinylated macromolecules, and therefore produces very low backgrounds.

Leucoperm™ Reagent

Leucoperm reagents allow intracellular antigen analysis with the same ease as surface antigens. The only prerequisite is the availability of suitable antibody conjugates. Most commercially available monoclonal antibody conjugates can be used with Leucoperm reagents. Some determinants are sensitive, however, to the fixation step involved. This and the optimal fixation time may have to be determined experimentally for each antibody conjugate.

New Staining Buffer

Bio-Rad's staining buffer contains bovine calf serum. It has been optimized for staining both live and fixed cells with antibodies. It is suitable for use with both conjugated and unconjugated antibodies and can be used as an antibody dilution media and a wash buffer. The addition of bovine calf serum reduces background staining of target cells. The staining buffer also contains sodium azide to minimize receptor capping.

New Fixation Buffer

The fixation buffer is a paraformaldehyde-based fixative that is suitable for use with most cell types. Paraformaldehyde-containing fixation buffer is essential for intracellular staining prior to permeabilization.

New Intracellular Permeabilization/Wash Buffer

This permeabilization and wash buffer is for intracellular staining. Access to intracellular targets, such as cytokines and cytoplasmic proteins, requires permeabilization of the cell membrane after fixation. This buffer has minimal effect on cell morphology. The buffer is supplied as a 10x solution for dilution in water. It can also be used as a wash buffer during intracellular staining to help minimize background staining.

New Protein Transport Inhibitors

Protein transport inhibitors can be used to enhance intracellular cytokine staining. As cytokines and chemokines are usually secreted, use of these inhibitors traps the proteins within the cell, leading to a buildup of cytokines in the Golgi apparatus and endoplasmic reticulum. The choice of and culture conditions for these inhibitors may need to be optimized depending on the species and cytokines being stained. Monensin acts by interfering with the Na^+/H^+ transport in Golgi apparatus transmembranes. Brefeldin A acts by redistributing proteins from the Golgi apparatus to the endoplasmic reticulum.

Red Cell Lysing Buffer

The red cell lysing buffer, erythrolyse, is available as a 10x solution that is stable for 1 year at room temperature. It is suitable for the lysing of red blood cells in human, rat, and mouse blood.

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

Ordering Information

Catalog #	Description
BUF070A	**Human Seroblock**, includes a solution of buffer and blocking agents for 50 tests
BUF070B	**Human Seroblock**, includes a solution of buffer and blocking agents for 200 tests
BUF041A	**Mouse Seroblock FcR**, includes 0.1 mg of purified IgG
BUF041B	**Mouse Seroblock FcR**, includes 0.5 mg of purified IgG
720015	**Neutralite Avidin:Cy5**, includes 1 mg of neutralite avidin at 1 mg/ml
720009	**Neutralite Avidin:RPE**, includes 0.5 mg of neutralite avidin at 1 mg/ml
STAR119	**Streptavidin:APC**, includes lyophilized product for 100 tests
STAR2B	**Streptavidin:FITC**, includes 1 mg of streptavidin:FITC at 1 mg/ml
BUF09	**Leucoperm Reagent**, fixation and permeabilization mediums for 50 tests
BUF09B	**Leucoperm Reagent**, fixation and permeabilization mediums for 250 tests
BUF09C	**Leucoperm Reagent**, fixation and permeabilization mediums for 1,000 tests
BUF073*	**Staining Buffer**, 500 ml
BUF071*	**Fixation Buffer**, 100 ml
BUF072*	**Intracellular Permeabilization/Wash Buffer**, 10x solution, 100 ml
BUF074*	**Monensin**, 1000x solution, 1 ml
BUF075*	**Brefeldin A**, 1000x solution, 1 ml
BUF04B	**Red Cell Lysing Buffer**, 10x solution, 100 tests/20 ml
BUF04C	**Red Cell Lysing Buffer**, 10x solution, 500 tests/100 ml
BUF036A	**Phosphate Buffered Saline (PBS)**, 10x, 1 L

* New product.

Nuclear Staining Dyes

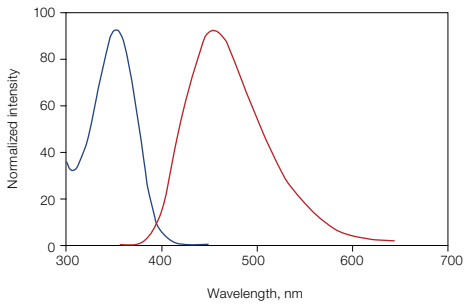
PureBlu™ Hoechst 33342 Nuclear Staining Dye

The following products are available on **bio-rad.com**.

PureBlu Hoechst 33342 nuclear staining dye is a highly pure formulation of Hoechst 33342 fluorescent dye. It is available in a user-friendly format that allows easy preparation of the working solution without any weighing step and with a single dilution after resuspension. PureBlu Hoechst 33342 dye permeates cell membranes and binds double-stranded DNA, which enables identification of nuclei within cells. It has a maximum excitation wavelength of 350 nm in the ultraviolet range and can be optimally detected in the blue channel with a maximum emission wavelength of 461 nm.

Product features include:

- Easy to reconstitute without any weighing step
- Optimal for live cell staining
- Compatible with multicolor experiments



Excitation and emission spectra of PureBlu Hoechst 33342 dye.

For More Information
Web: bio-rad.com/PureBluHoechst33342
Download bulletin: #10043283
Request or download bulletin: 6607

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351304	**PureBlu Hoechst 33342**	350	461	355		•	•

Includes 5 x 56 µg vials of Hoechst 33342 powder.

See Also

ReadiLink antibody labeling kits: pages 44–45.

VivaFix cell viability assay: pages 58–59.

Cell proliferation assays: pages 54–56.

PureBlu™ DAPI Nuclear Staining Dye

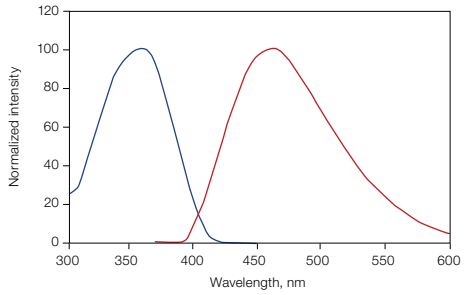
The following products are available on **bio-rad.com**.

PureBlu DAPI nuclear staining dye is a highly pure formulation of 4',6-diamidino-2-phenylindole dihydrochloride (DAPI) fluorescent dye. It is available in a user-friendly format that allows easy preparation of the working solution without any weighing step and with a single dilution after resuspension. PureBlu DAPI dye permeates cell membranes and binds double-stranded DNA, which enables identification of nuclei within cells. It has a maximum excitation wavelength of 359 nm in the ultraviolet range and can be optimally detected in the blue channel with a maximum emission wavelength of 461 nm.

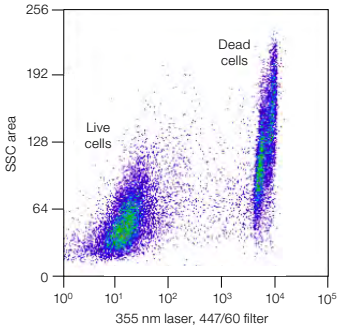
Product features include:

- Easy to reconstitute without any weighing step
- Optimal for fixed cell staining
- Compatible with multicolor experiments

For More Information
Web: bio-rad.com/PureBluDAPI
Download bulletin: #10043282
Request or download bulletin: 6607

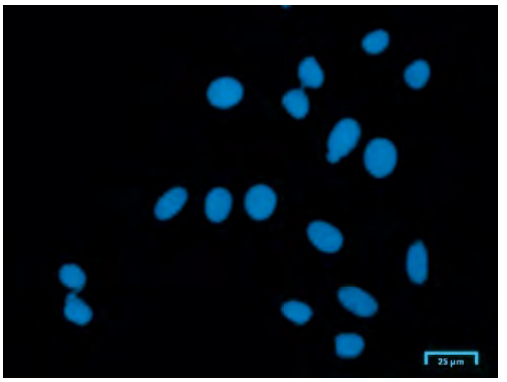


Excitation and emission spectra of PureBlu DAPI dye.

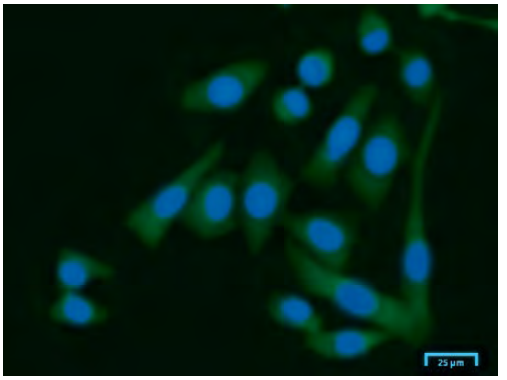


Assessment of cell viability using PureBlu DAPI and the ZE5™ cell analyzer. Jurkat cells were heat shocked at 65°C for 5 min. Cells were washed and resuspended at 2 x 10^6 cells/ml in phosphate buffered saline. Five µl of 100x PureBlu DAPI were added to 0.5 ml cells and incubated for 15 min at room temperature in the dark. Cells were then run on the ZE5 cell analyzer. SSC, side scatter.

A



B



PureBlu dyes are the optimal choice for staining the DNA of eukaryotic cells. HeLa cells were transfected with a green fluorescent protein (GFP)–expressing plasmid DNA, stained, and viewed in a six-well dish using a ZOE™ fluorescent cell imager. **A**, cells counterstained with PureBlu DAPI nuclear staining dye; **B**, merged view of cells stained with PureBlu DAPI and GFP.

Ordering Information

Catalog #	Description	Maximum Excitation, nm	Maximum Emission, nm	Optimal Excitation Laser, nm	S3e Cell Sorter	ZE5 Cell Analyzer	ZOE Cell Imager
1351303	**PureBlu DAPI**	359	461	355		•	•

Includes 5 x 50 µg vials of DAPI powder.

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Cell Imaging

Cell Imaging 70

Cell Imaging

Bio-Rad's suite of tools for fluorescence microscopy and cell imaging includes the ZOE fluorescent cell imager and nuclear dyes.

See Also

PureBlu Hoechst 33342 nuclear staining dye: page 65.

PureBlu DAPI nuclear staining dye: pages 65–66.

ReadiLink antibody labeling kits: pages 44–45.

VivaFix cell viability assays: pages 58–59.

Cell proliferation assays: pages 54–56.

ZOE™ Fluorescent Cell Imager

The ZOE fluorescent cell imager is a complete imaging system that is suitable for routine cell culture and imaging applications. It eliminates the complexities of cell imaging by combining the ease of use of a personal tablet with the power of an inverted microscope. An intuitive Android-based touch-screen interface is used to control brightfield, three fluorescence channels, and the integrated digital camera.

As a fully integrated system with long-life light-emitting diodes (LEDs), the ZOE cell imager is a robust imaging device ready for intensive daily use. There are no time-consuming setup and hardware adjustments to perform (optical and illumination alignment, changing filter sets or objective lenses) or parts with a limited life span that could result in costly maintenance (replacing mercury arc lamps).

The ZOE cell imager uses high-quality hard-coated filter sets that provide high light transmission and long life. Its 20x plan achromatic objective lens is mounted in a proprietary manner, resulting in a wide field of view (0.70 mm^2) that is ~180% greater than that of a traditionally mounted 20x objective lens. When zoomed out it is approximately equivalent to that of a 4x objective. When needed, use the pinch-to-zoom gesture to magnify up to 20x by digital zoom while retaining resolution (1 µm).

Product features include:

- **Simplified cell imaging** — the intuitive touch-screen interface allows users to view cells, capture images, and create multichannel merges
- **Flexible system** — brightfield and three fluorescence channels enable use for routine cell culture applications as well as more sophisticated imaging applications
- **Fluorescence at your bench** — an integrated light shield permits fluorescence imaging in ambient light

ZOE Fluorescent Cell Imager

- **Robust construction** — fully integrated system with long-life LEDs is ready for intensive daily use
- **LED light sources** — thousands of hours of illumination that are instantly ready after power on
- **Large field of view** — the motorized stage and large field of view allow you to see more of your sample, faster
- **Small footprint** — compact size accommodates crowded laboratory benches

For More Information
Web: bio-rad.com/ZOE
Request or download bulletin: 6585

Ordering Information

Catalog #	Description
1450031	**ZOE Fluorescent Cell Imager**, 120–240 V, includes instrument, power supply, USB flash drive

Kits and Reagents for Cell Imaging

Bio-Rad offers a variety of kits and reagents for use with the ZOE fluorescent cell imager.

Ordering Information

Catalog #	Description
Nuclear Staining Dyes	
1351303	**PureBlu DAPI Nuclear Staining Dye**, pkg of 1, includes 5 x 50 µg vials of DAPI powder
1351304	**PureBlu Hoechst 33342 Nuclear Staining Dye**, pkg of 1, includes 5 x 56 µg vials of Hoechst 33342 powder
Antibody Labeling Kits	
1351002	**ReadiLink 492/516 Antibody Labeling Kit**, includes 2 vials of labeling dye, reaction buffer, and dyed quench buffer for labeling 2 x 50 µg of antibodies
1351003	**ReadiLink 555/570 Antibody Labeling Kit**, includes 2 vials of labeling dye, reaction buffer, and dyed quench buffer for labeling 2 x 50 µg of antibodies
1351004	**ReadiLink 594/610 Antibody Labeling Kit**, includes 2 vials of labeling dye, reaction buffer, and dyed quench buffer for labeling 2 x 50 µg of antibodies
Fixable Viability Dyes	
1351111	**VivaFix 353/442 Cell Viability Assay**, pkg of 1, kit includes 4 x 50 assay vials and 250 µl of DMSO, for running 200 assays
1351115	**VivaFix 498/521 Cell Viability Assay**, pkg of 1, kit includes 4 x 50 assay vials and 250 µl of DMSO, for running 200 assays
1351116	**VivaFix 547/573 Cell Viability Assay**, pkg of 1, kit includes 4 x 50 assay vials and 250 µl of DMSO, for running 200 assays
1351117	**VivaFix 583/603 Cell Viability Assay**, pkg of 1, kit includes 4 x 50 assay vials and 250 µl of DMSO, for running 200 assays

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Chromatography: Laboratory and Process Separations

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Chromatography Overview

A Range of Options

Bio-Rad offers a wide selection of chromatography tools for the life scientist involved in analytical, preparative, or process chromatography. We have become known as a quality provider of chromatography resins for reagent cleanup and biomolecule purification, manufacturing flexible and intuitive instrumentation and software and prepacked and empty columns for sample separations.

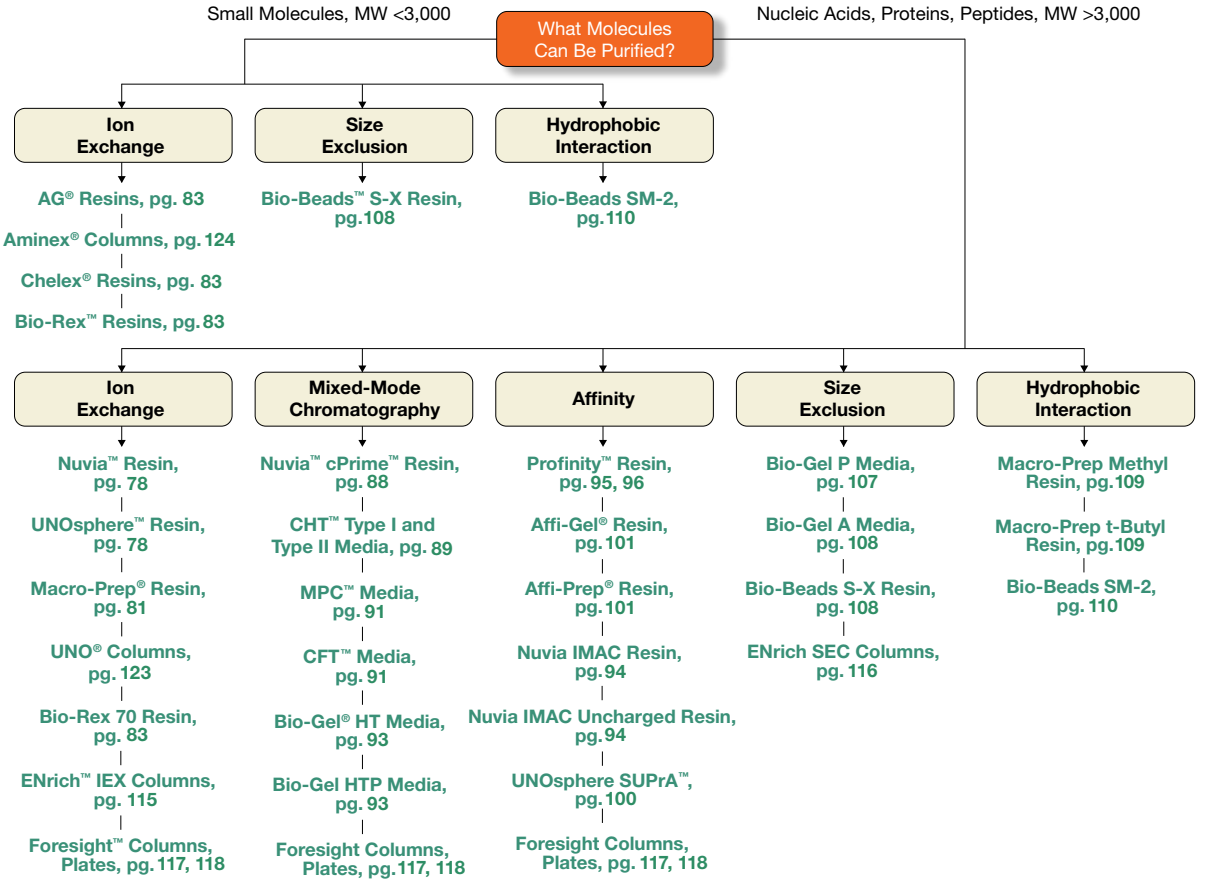
Throughput, capacity, selectivity, resolution, and process economics are among the considerations when selecting any chromatography resin, column, or instrument. We offer products for each phase of purification and manufacture resins for any scale from nanograms to kilograms.

Bio-Rad offers a wide range of lab and process chromatography resins for ion exchange, hydroxyapatite, affinity, size exclusion, and hydrophobic interaction chromatography as well as chromatography standards. For convenient sample preparation products, see page 1. Bio-Rad's process chromatography resins are used worldwide to manufacture registered biotherapeutics and diagnostics. All chromatography resins are manufactured in an ISO 9001 registered manufacturing facility. The manufacturing processes are audited and registered by National Quality Assurance Limited against the provisions of ANSI/ISO/ASQ 9001:2000.

Development, Application, and Validation Support

Bio-Rad provides development and application support for large-scale separations. We also offer regulatory assistance and regulatory support files to help validate the chromatography resins used in your processes. These files contain information essential to validation, including general product information, specification test procedures, identification tests, and biological safety data.

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



Chromatography Media

Bio-Rad offers process-scale developers a selection of media for protein separation using ion exchange, hydroxyapatite and fluoroapatite, affinity, size exclusion (gel filtration), and hydrophobic interaction chromatography. These media offer high binding capacity, base stability, and high flow rates and are available in multi-liter quantities.

For More Information
Request or download bulletin: 6713

Chromatography Media Selection Guide

		Suitability**				
Media	**Packing Format***	**Analytical Scale**	**Pilot/ Preparative Scale**	**Process Scale**	**Application**	**Page**
Anion Exchange						
AG® 1	B, GC	++++	++++	++++	Strong exchanger. Separation of low MW peptides, nucleotides, inorganic ions using different cross-linkages; high selectivity for anions such as chloride; gravity or low-pressure use	83
AG MP-1M	B, GC	++++	++	+	Strong exchanger. Macroporous, equivalent to AG 1 for MW >1,000,000; gravity or low-pressure use	83
Bio-Rex™ 5 and AG 4-X4	B, GC	++++	++		Weak exchanger. Used to remove organic acids from sugars; adsorption of mineral acids; gravity or low-pressure use	83
UNO® Q	MPC	++++			Strong exchanger. High-resolution biomolecule separation at high flow rates; pH stability 2–12	123
Macro-Prep® High Q	B, C	+++	++++	+++	Strong exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	81
Macro-Prep 25 Q	B	++++	++++	+	Strong exchanger. Similar to Macro-Prep High Q but 25 µm particle size allows higher-resolution separation; unique surface chemistry allows contaminant removal; pH stability 1–10	81
Macro-Prep DEAE	B, C	+++	++++	+++	Weak exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	81
UNOsphere™ Q	B, C, F	++++	++++	++++	Strong exchanger. High-productivity, high-capacity biomolecule separation; pH stability 1–14	78
Aminex®	HPLC	++++			High-pressure separation of carbohydrates, sugars, and small organic molecules; delivers industry-standard performance (U.S. Pharmacopeia)	124
Nuvia™ Q	B, F	++++	++++	++++	Strong exchanger. Similar to UNOsphere Q but surface modification allows extremely high capacity biomolecule separation; pH stability 1–14	78
Nuvia HP-Q ***	B, F	++++	++++	++++	Strong anion exchange resin specifically designed for the high-throughput purification of large biomolecules	78
Cation Exchange						
AG 50W	B, GC	++++	++++	++++	Strong exchanger. Lower cross-linkages useful for peptide and nucleotide separation; higher cross-linkages useful for small peptide and metals separation and removal of cations; gravity or low-pressure use	83
AG MP-50	B, GC	++++	++	+	Strong exchanger. Macroporous equivalent to AG 50W for MW >1,000,000; gravity or low-pressure use	83
Bio-Rex 70	B	++++	++	++	Weak exchanger. High capacity for high MW (>1,000,000) solutes; can be used for purification and fractionation of peptides, proteins, enzymes, and other cationic molecules. Amenable to large-scale purification	83

continues

* B, bottle; C, cartridge (1 or 5 ml); F, Foresight™ prepacked plates and columns; GC, gravity column; HPLC, high-pressure column; MPC, medium-pressure column; SC, spin column. ** +, low suitability; ++, moderate suitability; +++, suitable; ++++, high suitability. *** Coming soon.

Chromatography Media Selection Guide

Media	Packing Format*	Suitability** Analytical Scale	Pilot/ Preparative Scale	Process Scale	Application	Page
Chelex® 100	B, GC	++++	++++	++++	Weak exchanger. Chelating resin removes metals and is suitable for PCR applications; can also be used for ultrapurification of buffers and ionic reagents; gravity or low-pressure use. Available in molecular biology and biotechnology grades	83
UNO® S	MPC	++++			Strong exchanger. High-resolution biomolecule separation at high flow rates; pH stability 2–12	123
Macro-Prep 25 S	B	++++	++++	+	Strong exchanger. Similar to Macro-Prep High S, but 25 µm particle size allows higher-resolution separation; unique surface chemistry allows contaminant removal; pH stability 1–10	81
Macro-Prep High S	B, C	+++	++++	+++	Strong exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	81
Macro-Prep CM	B	+++	++++	+++	Weak exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	81
UNOsphere S	B, C, F	++++	++++	++++	Strong exchanger. High-capacity biomolecule separation; pH stability 1–14	78
Nuvia S	B, C, F	++++	++++	++++	Strong exchanger. Similar to UNOsphere S but surface modification allows extremely high capacity biomolecule separation; pH stability 1–14	78
Nuvia HR-S	B, C, F	++++	++++	++++	Strong exchanger. Has smaller particle size for high resolution	78
Specialty Ion Exchange						
AG 11 A8	B	++++	++	++	Ion retardation — contains cation and anion exchange sites that weakly interact with mobile ions; can be used for desalting of nonionic molecules with water elution, such as removal of SDS from protein and adsorption of mineral acids	83
AG 501-X8	B	++++	+++	+++	Mixed bed, consists of equivalent amounts of AG 1-X8 and AG 50W-X8. May be used to deionize impure water, urea, formamide, and acrylamide to provide extremely pure reagents	83
Bio-Rex MSZ 501	B	++++	++	++	Mixed bed, consists of equivalent amounts of Bio-Rex MSZ 1 and Bio-Rex MSZ 50 resin. Monosized ion exchange; desalting of water and nonelectrolytes. Ideal for large-scale industrial applications	83
Size Exclusion (Gel Filtration						
Bio-Gel® P	B, C, SC,	++++	++++		Separation of molecules by size; desalting and buffer exchange; several particle size ranges available with MW exclusion limits ranging from 100–100,000 D; pH stability 2–10	107
Bio-Beads™ S-X	B	++++	++++	++	Fractionation of low MW organic polymers and other hydrophobic substances in nonpolar solvents from 400–14,000 D	108
Affinity						
UNOsphere SUPrA™	B, C, F	++++	++++	++++	Antibody purification; Fc-fusion purification from large volumes of feed/cell culture; development and commercial-scale mAb purification process applications	100
Affi-Gel® Protein A	B, C, GC	++++	++++		IgG purification from ascites, serum, and culture fluid; low-pressure resin	101
Affi-Prep® Protein A	B, C	++++	++++	++	IgG purification from ascites, serum, and culture fluid; pressure-stable resin	101
Affi-Gel Blue	B, C, SC	++++	++++		Albumin removal and enzyme purification; Cibacron Blue F3GA dye covalently attached; purification of proteins with dinucleotide fold	102

continues

Chromatography Media Selection Guide

Media	Packing Format*	Suitability** Analytical Scale	Pilot/ Preparative Scale	Process Scale	Application	Page
DEAE Affi-Gel Blue	B, C, GC	++++	++++		Albumin and protease removal for IgG purification; Cibacron Blue F3GA dye covalently attached to DEAE Bio-Gel A	102
CM Affi-Gel Blue	B	++++	++++		Albumin and protease removal for IgG purification; Cibacron Blue F3GA dye covalently attached to CM Bio-Gel A	103
Affi-Gel heparin	B	++++	++++		Purification of coagulation factors, plasma proteins, and enzymes including nucleases, lipases, and proteases; binding specific to a variety of enzymes and other proteins	105
Nuvia IMAC	B, C	++	++++	++++	Purification of recombinant histidine-tagged proteins; can be charged with other transition metals	94
Nuvia IMAC, uncharged	B, C	++	++++	++	Purification of recombinant histidine-tagged proteins; can be charged with other transition metals	94
Profinity™ IMAC	B, C	++++	++++	++	Histidine-tagged protein purification	95
Profinity GST	C	++++	++++	++	GST-tagged protein purification	96
Profinity eXact™	B, C, SC	++++	++++	++	One-step affinity tag purification and on-column cleavage	97
Affi-Prep polymyxin	B	++++	++++	++++	Removal of endotoxins; pressure-stable resin capable of sanitization procedures with NaOH	104
Affi-Gel boronate	B	++++	++		Affinity for low MW molecules containing *cis* hydroxyl (cis-diol) groups; separation of AMP from cyclic AMP	104
Profinity epoxide	B	++++	++++	++++	Affinity coupling; coupling of nucleophiles such as hydroxy (–OH), amino (–NH_2), or thiol (–SH) groups; based on UNOsphere base matrix for superb pressure flow characteristics	96
Affi-Gel 10	B	++++	++++		Affinity coupling; immobilization of ligands with –NH_2 groups, coupling of proteins with pI 6.5–11; low-pressure resin	105
Affi-Gel 15	B	++++	++++		Affinity coupling; immobilization of ligands with –NH_2 groups, coupling of proteins with pI <6.5; low-pressure resin	105
Affi-Gel Hz	B	++++	++++		Affinity coupling; immobilization of IgG molecules via their Fc region	106
Affi-Gel 102	B	++++	++++		Affinity coupling of ligands with –COOH groups via EDAC coupling chemistry	106
Mixed-Mode						
Nuvia™ cPrime™	B, F	++++	++++	++++	Recombinant protein purification. Uses hydrophobic and weak cation exchange modes	88
CHT™ Type I	B, C, MPC, F	++++	++++	++++	Antibody purification (higher capacity than Type II); virus purification/removal; DNA purification/removal; aggregate and endotoxin removal	89
CHT Type II	B, C, F	++++	++++	++++	Antibody purification; removal of albumin from feedstream; vaccine/VLP purification	89
MPC™ Type I	B, F	++++	++++	++++	Antibody purification; virus purification/removal; DNA purification/removal; aggregate and endotoxin removal; exhibits greater stability during pH excursions inherent in buffer exchanges	91
CFT™ Type II	B	++++	++++	++++	Similar properties to CHT but exhibits greater stability in the lower pH range (5.5)	91
Bio-Gel HT	B	++++	+++		Purification of proteins, nucleic acids, and other biomolecules; crystalline hydroxyapatite not as mechanically stable as CHT (ceramic hydroxyapatite)	93
Bio-Gel HTP	B	++++	+++		Similar to Bio-Gel HT but in powder form	93
DNA grade Bio-Gel HTP	B	++++	+++		Similar to Bio-Gel HTP with smaller particle size; selectivity for double-stranded DNA; of single- and double-stranded DNA separation	93

continues

Chromatography Media Selection Guide

Media	Packing Format*	Suitability** Analytical Scale	Pilot/ Preparative Scale	Process Scale	Application	Page
Hydrophobic Interaction						
Macro-Prep methyl	B	++++	++++	++++	Separation of proteins based on relative hydrophobicity; pH stability 1–10	109
Macro-Prep t-butyl	B	++++	++++	++++	Separation of proteins based on relative hydrophobicity; pH stability 1–10	109
Bio-Beads SM-2	B	++++	++++	++++	Useful for the adsorption of nonpolar substances or surface active agents from aqueous solutions	110

* B, bottle; C, cartridge (1 or 5 ml); F, Foresight prepacked plates and columns; GC, gravity column; HPLC, high-pressure column; MPC, medium-pressure column; SC, spin column. ** +, low suitability; ++, moderate suitability; +++, suitable; ++++, high suitability. *** Coming soon.

Ion Exchange Chromatography

See Also

Chromatography systems: page 134.

Prepacked columns: pages 114–115.

Ion exchange chromatography standards: page 112.

Sample preparation products: page 1.

Resin sampler packs: page 110.

Bio-Scale Mini cartridges: page 119.

UNOsphere™ and Nuvia™ Ion Exchange Media

Bio-Rad's ion exchange resins are scalable and fast. They are designed to meet the needs of the biopharmaceutical industry for capture, intermediate, and polishing stages of purification. UNOsphere and Nuvia resins are bioprocess compatible and may also be used at laboratory scales for high-performance applications. Benefits include:

- Efficient capture from crude feedstreams
- Optimization to operate under 2 bar at 1,200 cm/hr
- Large-pore design results in ultra-high binding capacities at fast linear velocities
- Fully supported for regulatory information

UNOsphere Q and S Resins

UNOsphere Q and S resins are strong anion and cation exchange resins, respectively, and may be used at any stage of the purification process.

For More Information
Web: bio-rad.com/unosphere
Request or download bulletins: UNOsphere Q resin — 2724 and 2729 (download only); UNOsphere S resin — 2669 and 2678

Nuvia Q, S, and HR-S Resins

Nuvia ion exchange resins are a family of next-generation ion exchange products built on an industry-proven proprietary base matrix technology. Nuvia resins provide very high capture and exceptional flow properties designed to meet current and future process needs. Nuvia Q and S are flexible alternatives that may be used as capture and/or polishing solutions. Nuvia HR-S is a high-resolution cation exchanger designed for intermediate and final polish applications.

- Use less resin to purify a given amount of product
- Reduce cycle time and increase productivity by operating at higher flow rates
- Reduce cost and space requirements by decreasing buffer consumption
- Reduce capital and operating expenses by using smaller columns
- Chemical stability for repetitive clean-in-place cycles
- Flexibility for capture or polish steps
- Fully supported for regulatory submission

Coming Soon Nuvia HP-Q Resin

Nuvia HP-Q is a strong anion exchange resin specifically designed for the high-throughput purification of large biomolecules. The large pores, optimized with surface extenders, together with the rigid base beads provide fast mass transfer kinetics at high flow rates for large biomolecule purification.

- Optimized surface extender/ligand density allows high dynamic binding capacity
- Favorable pressure flow characteristics at scale
- Base stability for excellent process economics

For More Information
Web: bio-rad.com/nuvia
Request or download bulletins:
5984, 5987, 6128, 6129, 6241, and 6448

Properties of UNOsphere and Nuvia

Property	UNOsphere Q	UNOsphere S	Nuvia Q	Nuvia S	Nuvia HR-S	Nuvia HP-Q
Type of ion exchanger	Strong anion	Strong cation	Strong anion	Strong cation	Strong cation	Strong anion
Functional group	$-N^+(CH_3)_3$	$-SO_3^-$	$-N(CH_3)_3^+$	$-SO_3^-$	$-SO_3^-$	$-N(CH_3)_3^+$
Total ionic capacity	75–163 µeq/ml	269 ± 50 µeq/ml	100–170 µeq/ml	90–150 µeq/ml	100–180 µeq/ml	48–88 µeq/ml
Particle size	120 ± 15 µm	80 ± 10 µm	85 ± 15 µm	85 ± 15 µm	50 ± 10 µm	47 ± 5 µm
Dynamic binding capacity*,**						
At 150 cm/hr	180 mg BSA/ml	60 mg IgG/ml	—	—	—	≥28 mg thyroglobulin/ml
At 300 cm/hr	—	—	>170 mg/ml	>110 mg/ml	≥70 mg/ml	—
At 600 cm/hr	125 mg BSA/ml	30 mg IgG/ml	—	—	—	—
Recommended linear flow rate range	50–300 cm/hr	50–300 cm/hr	50–600 cm/hr	50–600 cm/hr	50–200 cm/hr	50–150 cm/hr
pH stability (accelerated, 60°C)	1–14	1–14	2–14 short term	2–14 short term	2–14 short term	2–14 short term
	—	—	4–12 long term	4–13 long term	4–13 long term	4–12 long term
Sanitization	0.5–1.0 N NaOH	0.5–1.0 N NaOH	0.5–1.0 N NaOH	0.5–1.0 N NaOH	0.5–1.0 N NaOH	0.5–1.0 N NaOH

* 10% breakthrough capacity determined with a 5.0 mg/ml human IgG and 5.0 mg/ml BSA in a 1.1 x 20 cm column.
** Nuvia HP-Q 10% breakthrough capacity determined with 1 mg/ml thyroglobulin in a 0.7 x 5.5 cm column.

Ordering Information

Catalog #	Description	
1560311	**Nuvia S Media**, 25 ml	Ultra high capacity strong cation process media
1560313	**Nuvia S Media**, 100 ml	
156-0315	**Nuvia S Media**, 500 ml	
156-0317	**Nuvia S Media**, 10 L	
1560511	**Nuvia HR-S Media**, 25 ml	High-resolution strong cation process media
1560513	**Nuvia HR-S Media**, 100 ml	
156-0515	**Nuvia HR-S Media**, 500 ml	
156-0517	**Nuvia HR-S Media**, 10 L	
1560411	**Nuvia Q Media**, 25 ml	Ultra high capacity strong anion process media
1560413	**Nuvia Q Media**, 100 ml	
156-0415	**Nuvia Q Media**, 500 m l	
156-0417	**Nuvia Q Media**, 10 L	
12006693*	**Nuvia HP-Q Media**, 25 ml	High-performance strong anion process media
12006691*	**Nuvia HP-Q Media**, 100 ml	
12006660*	**Nuvia HP-Q Media**, 500 ml	
12006659*	**Nuvia HP-Q Media**, 5 L	
12007023*	**Nuvia HP-Q Media**, 10 L	
1560101	**UNOsphere Q Media**, 25 ml	High-capacity strong anion media
1560103	**UNOsphere Q Media**, 100 ml	
156-0105	**UNOsphere Q Media**, 500 ml	
156-0107	**UNOsphere Q Media**, 10 L	
1560111	**UNOsphere S Media**, 25 ml	High-capacity strong cation media
1560113	**UNOsphere S Media**, 100 ml	
156-0115	**UNOsphere S Media**, 500 ml	
156-0117	**UNOsphere S Media**, 10 L	

Description	1 x 1 ml	5 x 1 ml	1 x 5 ml	5 x 5 ml
Prepacked Bio-Scale Mini Cartridges				
Nuvia S Media	7324420	7324421	7324422	7324423
UNOsphere Q Media	—	7324100	7324102	7324104
UNOsphere S Media	—	7324110	7324112	7324114

continues

Ordering Information

Catalog #	Description
Foresight Prepacked Plates and Columns	
Foresight Plates**	
732-4714	**Foresight UNOsphere Q**, 20 µl
732-4710	**Foresight UNOsphere S**, 20 µl
732-4703	**Foresight Nuvia Q**, 20 µl
732-4701	**Foresight Nuvia S**, 20 µl
732-4707	**Foresight Nuvia HR-S**, 20 µl
12006908*	**Foresight Nuvia HP-Q**, 20 µl

Foresight Columns	**1 ml**	**5 ml**
Foresight UNOsphere Q	732-4732	732-4752
Foresight UNOsphere S	732-4730	732-4750
Foresight Nuvia Q	732-4721	732-4741
Foresight Nuvia S	732-4720	732-4740
Foresight Nuvia HR-S	732-4723	732-4743
Foresight Nuvia HP-Q	12007020*	12007021*

Foresight RoboColumn Units***	**200 µl**	**600 µl**
Foresight UNOsphere Q	732-4819	732-4820
Foresight UNOsphere S	732-4813	732-4814
Foresight Nuvia Q	732-4804	732-4805
Foresight Nuvia S	732-4801	732-4802
Foresight Nuvia HR-S	732-4831	732-4832
Foresight Nuvia HP-Q	12007013*	12007014*

Catalog #	Description
Adaptor Fittings for Bio-Scale Mini Cartridges	
7320111	**Luer to M6 Adaptor Fittings Kit**, includes luer to M6 fittings to connect 1 cartridge to an FPLC system
7320112	**Luer to 10-32 Adaptor Fittings Kit**, includes luer to 10-32 fittings to connect 1 cartridge to an HPLC or NGC system
7320113	**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems
7885010	**Luer to 10-32 Adaptor Fittings Kit**, includes female slip luer to female 10-32 fitting to connect male end of luer column to NGC system

* Coming soon.
** Package size: 2 x 96-well plates.
*** Package size: 1 row of 8 columns.

Macro-Prep® Ion Exchange Media

See Also

Ion exchange chromatography standards: page 112.

Macro-Prep ion exchange resins are designed to provide high resolution and high capacity for preparative separations. The rigid methacrylate beads exhibit little shrinkage or swelling, making them suitable for both low- and medium-pressure chromatography. The macroporous resin allows both small and large molecules to access exchange sites located throughout the chromatography bed. The physical structure of the resin permits high flow rates at low backpressure. Depending on the resin, pH conditions, and samples, the products can display mixed-mode behavior.

Benefits include:

- High capacity for biomolecules
- High resolution of complex biological mixtures
- Rigid methacrylate polymer matrix that allows high flow rates at modest pressures

Macro-Prep High Q, High Q-3HT, DEAE, High S, and CM Resins

For maximum flexibility, the product offerings include Macro-Prep High Q strong anion exchange resin, Macro-Prep DEAE weak anion exchange resin, Macro-Prep High S strong cation exchange resin, and Macro-Prep CM weak cation exchange resin.

For More Information

Web: bio-rad.com/macroprep

Request or download bulletins: Macro-Prep DEAE resin — 1942 (download only); High S and High Q resins — 5643 and 5644 (download only)

Macro-Prep Resins

Bio-Scale™ Mini Macro-Prep Cartridges

Macro-Prep 25 Q and S Resins

Macro-Prep 25 Q strong anion exchange resin and Macro-Prep 25 S strong cation exchange resin offer high-resolution separations at high flow rates with medium pressures. Both resins possess the same rigid, macroporous, and hydrophilic properties of 50 µm Macro-Prep High Q and High S resins, but in a 25 µm bead that offers higher resolution.

For More Information

Web: bio-rad.com/macroprepSandQ

Download bulletin: 2292

Properties of Macro-Prep

Property	High Q	High Q-3HT	DEAE	High S	CM	25 Q*	25 S
Type of resin	Strong anion	Strong anion	Weak anion	Strong anion	Weak anion	Strong anion	Strong anion
Functional ligand	$-N^+(CH_3)_3$	$-N^+(C_2H_5)_2$	$-N^+(C_2H_5)_2$	$-SO_3^-$	$-COO^-$	$-N^+(CH_3)_3$	$-SO_3^-$
Ionic capacity	400 ± 75 µeq/ml	400 ± 75 µeq/ml	175 ± 75 µeq/ml	160 ± 40 µeq/ml	210 ± 40 µeq/ml	220 ± 40 µeq/ml	110 ± 30 µeq/ml
Typical binding capacity	37 mg BSA/ml	>37 mg BSA/ml	≥30 mg BSA/ml	≥49 mg hIgG/ml	≥25 mg hemoglobin/ml	>30 mg BSA/ml	>40 IgG/ml
Counter ion	Cl^-	Cl^-	Cl^-	Na^+	Na^+	Cl^-	Na^+
Nominal particle size	50 µm	50 µm	50 µm	50 µm	50 µm	25 µm	25 µm
Nominal pore size	1,000 Å	1,220 Å–1,280 Å	1,000 Å	1,000 Å	1,000 Å	725 Å	725 Å
Recommended linear flow rate range	—	—	—	—	—	50–300 cm/hr	50–300 cm/hr
Maximum recommended linear flow rate	300 cm/hr	300 cm/hr	300 cm/hr	300 cm/hr	300 cm/hr	300 cm/hr	300 cm/hr
Chemical stability							
1% SDS, 24 hr	•	•	•	•	•	•	•
6 M guanidine-HCl, 24 hr	•	•	•	•	•	•	•
Volume changes							
pH 4–10	<1%	<1%	<1%	<3%	<1%	<1%	<1%
0.1–1.0 M NaCl	<5%	<5%	<5%	<9%	<4%	<5%	<5%
pH stability	1–10**	1–10**	1–10**	1–10**	1–12**	1–10**	1–10**
Storage conditions	20% ethanol	20% ethanol	20% ethanol	20% ethanol	20% ethanol	20% ethanol	20% ethanol

* Do not autoclave the OH^- form.

** The use of basic reagents greater than pH 10 should be evaluated for each application.

Ordering Information

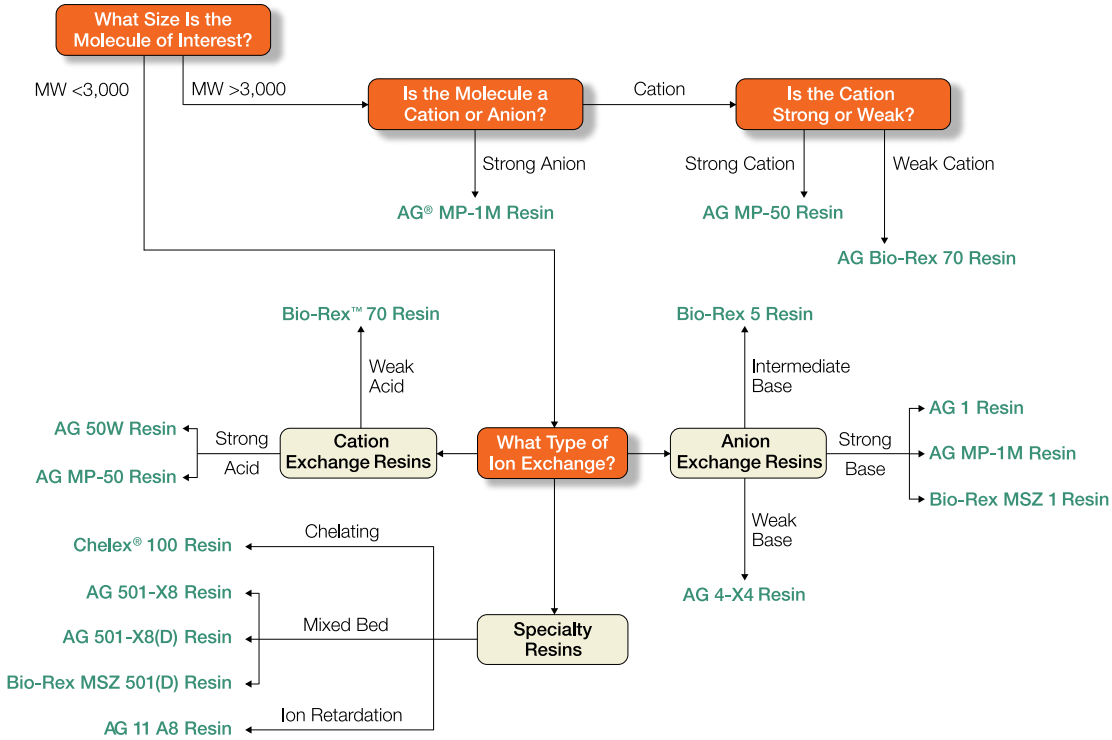
Catalog #	Description	
Macro-Prep High Q Media		
1580040	**Macro-Prep High Q Media**, 25 ml	High-capacity strong anion exchange media; very high flow rates and resolution
1560040	**Macro-Prep High Q Media**, 100 ml	
156-0041	**Macro-Prep High Q Media**, 500 ml	
156-0042	**Macro-Prep High Q Media**, 5 L	
156-0043	**Macro-Prep High Q Media**, 10 L	
Macro-Prep High Q-3HT Media		
1560040-3HT	**Macro-Prep High Q-3HT Media**, 100 ml	High-capacity strong anion exchange media; very high flow rates and resolution
1560041-3HT	**Macro-Prep High Q-3HT Media**, 500 ml	
1560042-3HT	**Macro-Prep High Q-3HT Media**, 5 L	
1560043-3HT	**Macro-Prep High Q-3HT Media**, 10 L	
Macro-Prep DEAE Media		
1580020	**Macro-Prep DEAE Media**, 25 ml	High-capacity weak anion exchange media; very high flow rates and resolution
1560020	**Macro-Prep DEAE Media**, 100 ml	
156-0021	**Macro-Prep DEAE Media**, 500 ml	
156-0022	**Macro-Prep DEAE Media**, 5 L	
156-0023	**Macro-Prep DEAE Media**, 10 L	
Macro-Prep High S Media		
1580030	**Macro-Prep High S Media**, 25 ml	High-capacity strong cation exchange media; very high flow rates and resolution
1560030	**Macro-Prep High S Media**, 100 ml	
156-0031	**Macro-Prep High S Media**, 500 ml	
156-0032	**Macro-Prep High S Media**, 5 L	
156-0033	**Macro-Prep High S Media**, 10 L	
Macro-Prep CM Media		
1580070	**Macro-Prep CM Media**, 25 ml	High-capacity weak cation exchange media; high flow rates and resolution
1560070	**Macro-Prep CM Media**, 100 ml	
156-0071	**Macro-Prep CM Media**, 500 ml	
156-0073	**Macro-Prep CM Media**, 10 L	
Macro-Prep 25 Q Media		
1530021	**Macro-Prep 25 Q Media**, 50 ml	Strong anion exchange media; 25 µm bead that offers higher resolution
1530022	**Macro-Prep 25 Q Media**, 200 ml	
153-0023	**Macro-Prep 25 Q Media**, 1 L	
153-0024	**Macro-Prep 25 Q Media**, 5 L	
Macro-Prep 25 S Media		
1530031	**Macro-Prep 25 S Media**, 50 ml	Strong cation exchange media; 25 µm bead that offers higher resolution
1530032	**Macro-Prep 25 S Media**, 200 ml	
153-0033	**Macro-Prep 25 S Media**, 1 L	
153-0034	**Macro-Prep 25 S Media**, 5 L	

Description	5 x 1 ml	1 x 5 ml	5 x 5 ml
Prepacked Bio-Scale Mini Cartridges			
Macro-Prep High Q Media	7324120	7324122	7324124
Macro-Prep High S Media	7324130	7324132	7324134
Macro-Prep DEAE Media	7324140	7324142	7324144

Catalog #	Description
Adaptor Fittings for Bio-Scale Mini Cartridges	
7320111	**Luer to M6 Adaptor Fittings Kit**, includes luer to M6 fittings to connect 1 cartridge to an FPLC system
7320112	**Luer to 10-32 Adaptor Fittings Kit**, includes luer to 10-32 fittings to connect 1 cartridge to an HPLC or NGC system
7320113	**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems
7885010	**Luer to 10-32 Adaptor Fittings Kit,** includes female slip luer to female 10-32 fitting to connect male end of luer column to NGC system

Larger volumes and special packaging for industrial applications are available on request.

Analytical Grade Ion Exchange Chromatography



AG®, Bio-Rex™, and Chelex® Resins

AG (analytical grade) resins — AG resins are primarily used for the separation of low MW compounds such as inorganic ions, organic acids, nucleic acids, or carbohydrates. They are available as both strong and weak cation and anion exchangers and as mixed-bed ion exchangers. Many are available in several ionic forms and can be converted from one form to another

- **AG 1-X8 strong anion exchanger resins** — useful for sample preparation, enzyme assays, metal separations, and peptide, protein, and nucleic acid separations
- **AG 50W-X8 strong cation exchanger resins** — particularly useful for the removal of ethidium bromide and propidium iodide from DNA samples
- **AG 501-X8 mixed-bed resins** — useful for deionization of water and nonelectrolyte solutions

Bio-Rex resin — available as weak anion and cation exchangers and as monosized mixed-bed ion exchangers. Bio-Rex 70 resins are macroreticular resins with a high capacity for high molecular weight compounds used for the purification and fractionation of proteins and peptides.

Chelex resins — contain paired iminodiacetate ions coupled to a styrene divinylbenzene support. They are unique chelating resins that bind polyvalent cations with high selectivity and are used to remove metal ions from samples and buffers.

Analytical Grade Resin Wet Mesh and Equivalent Diameters

Wet mesh (U.S. standard)	16	20	40	50	80	100	140	200	270	325	400
Diameter, µm	1,180	850	425	300	180	150	106	75	53	45	38

For More Information
Web: bio-rad.com/agresins
Request or download bullein: 6904

See Also

Poly-Prep ion exchange columns: pages 128–129.

Ordering Information

Catalog #	Description	Ionic Form	Dry Mesh Size	Wet Bead Size, µm	Nominal Shipping % Water
AG Resins					
140-1231	**AG 1-X2 Resin**, 500 g	Chloride	50–100	180–500	70–78
140-1241	**AG 1-X2 Resin**, 500 g	Chloride	100–200	106–250	70–78
140-1251	**AG 1-X2 Resin**, 500 g	Chloride	200–400	75–180	70–78
140-1253	**AG 1-X2 Resin**, 500 g	Acetate	200–400	75–180	70–78
140-1331	**AG 1-X4 Resin**, 500 g	Chloride	50–100	180–425	59–65
140-1341	**AG 1-X4 Resin**, 500 g	Chloride	100–200	106–250	59–65
140-1351	**AG 1-X4 Resin**, 500 g	Chloride	200–400	63–150	59–65
140-1421	**AG 1-X8 Resin**, 500 g	Chloride	20–50	300–1,180	39–45
140-1431	**AG 1-X8 Resin**, 500 g	Chloride	50–100	180–425	39–45
140-1441*	**AG 1-X8 Resin**, 500 g	Chloride	100–200	106–180	39–45
140-1451*	**AG 1-X8 Resin**, 500 g	Chloride	200–400	45–106	39–45
140-1422	**AG 1-X8 Resin**, 500 g	Hydroxide	20–50	300–1,180	39–45
140-1443	**AG 1-X8 Resin**, 500 g	Acetate	100–200	106–180	39–45
140-1453	**AG 1-X8 Resin**, 500 g	Acetate	200–400	45–106	39–45
140-1444	**AG 1-X8 Resin**, 500 g	Formate	100–200	106–180	39–45
140-1454	**AG 1-X8 Resin**, 500 g	Formate	200–400	45–106	39–45
142-1231	**AG 50W-X2 Resin**, 500 g	Hydrogen	50–100	300–1,180	75–83
142-1241*	**AG 50W-X2 Resin**, 500 g	Hydrogen	100–200	106–300	75–83
142-1251	**AG 50W-X2 Resin**, 500 g	Hydrogen	200–400	75–180	75–83
142-1331	**AG 50W-X4 Resin**, 500 g	Hydrogen	50–100	180–425	64–72
142-1341	**AG 50W-X4 Resin**, 500 g	Hydrogen	100–200	106–250	64–72
142-1351*	**AG 50W-X4 Resin**, 500 g	Hydrogen	200–400	63–150	64–72
142-1421	**AG 50W-X8 Resin**, 500 g	Hydrogen	20–50	300–1,180	50–56
142-1431	**AG 50W-X8 Resin**, 500 g	Hydrogen	50–100	180–425	50–56
142-1441*,**	**AG 50W-X8 Resin**, 500 g	Hydrogen	100–200	106–250	50–56
142-1451*,**	**AG 50W-X8 Resin**, 500 g	Hydrogen	200–400	63–150	50–56
142-1641	**AG 50W-X12 Resin**, 500 g	Hydrogen	100–200	106–250	42–48
142-1651	**AG 50W-X12 Resin**, 500 g	Hydrogen	200–400	53–106	42–48
141-1831	**AG MP-1M Resin**, 500 g	Chloride	50–100	150–300	56–64
141-1841	**AG MP-1M Resin**, 500 g	Chloride	100–200	75–150	56–64
141-1851	**AG MP-1M Resin**, 500 g	Chloride	200–400	38–75	56–64
143-0841	**AG MP-50 Resin**, 500 g	Hydrogen	100–200	75–150	46–52
140-4341*	**AG 4-X4 Resin**, 500 g	Free base	100–200	75–150	—
1437424*	**AG 501-X8 Resin**, 100 g	$H^+ + OH^-$	20–50	300–1,180	43–55
142-6424*,**,***	**AG 501-X8 Resin**, 500 g	$H^+ + OH^-$	20–50	300–1,180	43–55
142-6425*,**	**AG 501-X8(D) Resin**, 500 g	$H^+ + OH^-$	20–50	300–1,180	43–55
142-7834*	**AG 11 A8 Resin**, 500 g	Self-adsorbed	50–100	180–425	—
Bio-Rex Resins					
140-7841	**Bio-Rex 5 Resin**, 500 g	Chloride	100–200	75–150	50–58
140-7851	**Bio-Rex 5 Resin**, 500 g	Chloride	200–400	45–75	50–58
142-5822	**Bio-Rex 70 Resin**, 500 g	Sodium	20–50	300–1,180	65–74
142-5832*	**Bio-Rex 70 Resin**, 500 g	Sodium	50–100	150–300	65–74
142-5842	**Bio-Rex 70 Resin**, 500 g	Sodium	100–200	75–150	65–74
142-5852*	**Bio-Rex 70 Resin**, 500 g	Sodium	200–400	45–75	65–74
142-7425*	**Bio-Rex MSZ 501(D) Resin**, 500 g	$H^+ + OH^-$	25–35	500–700	—
142-7426*	**Bio-Rex MSZ 501(D) Resin**, 10 kg	$H^+ + OH^-$	25–35	500–700	—

* Also available as biotechnology grade resin.
** Also available as molecular biology grade resin.
*** Also available as reactor grade resin.

continues

Ordering Information

Catalog #	Description	Ionic Form	Dry Mesh Size	Wet Bead Size, µm	Nominal Shipping % Water
Chelex Resins					
142-2822	**Chelex 100 Resin**, 500 g	Sodium	50–100	300–1,180	68–76
142-2832*	**Chelex 100 Resin**, 500 g	Sodium	100–200	150–300	68–76
142-2842**	**Chelex 100 Resin**, 500 g	Sodium	200–400	75–150	68–76
142-2843	**Chelex 100 Resin**, 10 kg	Sodium	200–400	75–150	68–76
1422825	**Chelex 100 Resin**, 100 g	Iron	100–200	150–300	—
142-2827	**Chelex 100 Resin**, 1 kg	Iron	100–200	150–300	—
142-2826	**Chelex 100 Resin**, 10 kg	Iron	100–200	150–300	—

Catalog #	Description
AG Resins in Larger Volumes and Special Packaging for Industrial Applications	
140-1256	**AG 1-X2 Resin**, acetate, 200–400 mesh, 1 kg
140-1255	**AG 1-X2 Resin**, acetate, 200–400 mesh, 10 kg
140-1342	**AG 1-X4 Resin**, chloride, 100–200 mesh, 10 kg
140-1447	**AG 1-X8 Resin**, acetate, 20–50 mesh, 10 kg
140-1446	**AG 1-X8 Resin**, acetate, 100–200 mesh, 10 kg
140-1425	**AG 1-X8 Resin**, chloride, 20–50 mesh, 1 kg
140-1457	**AG 1-X8 Resin**, chloride, 100–200 mesh, 5 kg
140-1426	**AG 1-X8 Resin**, chloride, 20–50 mesh, 10 kg
140-1432	**AG 1-X8 Resin**, chloride, 50–100 mesh, 10 kg
140-1842	**AG 1-X8 Resin**, chloride, 100–200 mesh, 10 kg
140-1456	**AG 1-X8 Resin**, chloride, 200–400 mesh, 10 kg
140-1445	**AG 1-X8 Resin**, chloride, 100–200 mesh, 10 kg
140-1424	**AG 1-X8 Resin**, hydroxide, 20–50 mesh, 10 kg
140-2423	**AG 2-X8 Resin**, chloride, 20–50 mesh, 10 kg
140-2341	**AG 4-X4 Resin**, free base, 100–200 mesh, 5 kg
142-1232	**AG 50W-X2 Resin,** hydrogen, 50–100 mesh, 10 kg
142-1242	**AG 50W-X2 Resin,** hydrogen, 100–200 mesh, 10 kg
142-1424	**AG 50W-X8 Resin**, ultrapure, hydrogen, 20–50 mesh, 10 kg
142-1423	**AG 50W-X8 Resin**, hydrogen, 20–50 mesh, 10 kg
142-1432	**AG 50W-X8 Resin**, hydrogen, 50–100 mesh, 10 kg
142-1442	**AG 50W-X8 Resin**, hydrogen, 100–200 mesh, 10 kg
142-1452	**AG 50W-X8 Resin**, hydrogen, 200–400 mesh, 10 kg
142-1254	**AG 50W-X12 Resin**, hydrogen, 200–400 mesh, 1 kg
141-1842	**AG MP-1M Resin**, chloride, 100–200 mesh, 10 kg
141-1852	**AG MP-1M Resin**, chloride, 200–400 mesh, 10 kg
141-1853	**AG MP-1M Resin**, nitrate, 200–400 mesh, 10 kg
142-6427	**AG 501-X8 Resin**, $H^+ + OH^-$, 20–50 mesh, 10 kg
143-6426**	**AG 501-X8 Resin**, $H^+ + OH^-$, 20–50 mesh, 10 kg
143-7428*	**AG 501-X8 Resin**, $H^+ + OH^-$, 20–50 mesh, 10 kg
143-6427***	**AG 501-X8(D) Resin**, $H^+ + OH^-$, 20–50 mesh, 10 kg

continues

Ordering Information

Catalog#	Description	Particle Size, µm	Ionic Form	Application
Prepacked Poly-Prep Ion Exchange Columns				
7316211	**Poly-Prep Columns**, AG 1-X8 resin, 100–200 mesh, 50	106–180	Chloride	Separation of low molecular weight inorganic anions
7316212	**Poly-Prep Columns**, AG 1-X8 resin, 200–400 mesh, 50	45–106	Chloride	For high-resolution general purpose separations
7316221	**Poly-Prep Columns**, AG 1-X8 resin, 200–400 mesh, 50	45–106	Formate	Separation of low molecular weight biological compounds such as carboxylic acids
7316213	**Poly-Prep Columns**, AG 50W-X8 resin, 100–200 mesh, 50	106–250	Hydrogen	Separation and concentration of low molecular weight cations such as small peptides and amino acids
7316214	**Poly-Prep Columns**, AG 50W-X8 resin, 200–400 mesh, 50	63–150	Hydrogen	For high-resolution general purpose separations

* Also available as biotechnology grade resin.
** Also available as molecular biology grade resin.
*** Molecular biology grade resin; also available in biotechnology grade.

Technical and Reactor Grade Resins

Bio-Rad offers reactor grade Bio-Rex® RG 501-X8 resins for power plant deionization systems and large-scale cleanup of metals from waste water.

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

Ordering Information

Catalog #	Description	Ionic Form	Dry Mesh Size	MW Exclusion
Technical and Reactor Grade Resins				
444-9998*	**Bio-Rex RG 501-X8 Resin**, 1 ft^3, for water purification	$H^+ + OH^-$	20–50	1,000
4449999	**Bio-Rex RG 501-X8 Resin**, 500 g	$H^+ + OH^-$	20–50	1,000

* 1 ft^3 corresponds to approximately 20 kg. Larger volumes and special packaging are available on request.

Molecular Biology and Biotechnology Grade Resins

- **Molecular biology grade resins** — are chemically identical to the equivalent analytical grade resins and are certified to be free of endo- and exonuclease activities and ligase inhibitors
- **Biotechnology grade resins** — undergo special processing and contain fewer than 100 microorganisms/gram

For More Information
Web: bio-rad.com/agresins
Request or download bulletins: 6904, 6905, 6906, 6907, and 6908

Ordering Information

Catalog #	Description	Dry Mesh Ionic Form	Wet Bead Size	Size, µm	Application
Molecular Biology Grade Resins					
1436424	**AG 501-X8 Resin**, molecular biology grade, 100 g	$H^+ + OH^-$	20–50	300–1,180	Deionization
1436425	**AG 501-X8(D) Resin**, molecular biology grade, 100 g	$H^+ + OH^-$	20–50	300–1,180	~1,000 MW limit
1421253	**Chelex 100 Resin**, molecular biology grade, 50 g	Sodium	200–400	75–150	DNA extraction for PCR sample preparation
Biotechnology Grade Resins					
1431255	**AG 1-X2 Resin**, biotechnology grade, 100 g	Hydroxide	200–400	75–180	Separation of small peptides, nucleotides, and large metal complexes
1431345	**AG 1-X4 Resin**, biotechnology grade, 100 g	Hydroxide	100–200	63–150	Separation of organic acids, nucleotides, phosphoinositides, and other anions
1432445	**AG 1-X8 Resin**, biotechnology grade, 100 g	Hydroxide	100–200	106–180	Separation of inorganic and organic anions with MW <1,000
1432446	**AG 1-X8 Resin**, biotechnology grade, 100 g	Hydroxide	200–400	45–106	
1435241	**AG 50W-X2 Resin**, biotechnology grade, 100 g	Hydrogen	100–200	106–300	Separation of peptides, nucleotides, and cations
1435341	**AG 50W-X4 Resin**, biotechnology grade, 100 g	Hydrogen	200–400	75–150	Separation of amino acids, nucleotides, and cations
1435441	**AG 50W-X8 Resin**, biotechnology grade, 100 g	Hydrogen	100-200	106-250	Separation of amino acids and cations
1435451	**AG 50W-X8 Resin**, biotechnology grade, 100 g	Hydrogen	200–400	63–150	
1437834	**AG 11 A8 Resin**, biotechnology grade, 100 g	Self-adsorbed	50–100	180–425	Removal of ionic compounds
1437424	**AG 501-X8 Resin**, biotechnology grade, 100 g	$H^+ + OH^-$	20–50	300–1,180	Deionization
1437425	**AG 501-X8(D) Resin**, biotechnology grade, 100 g	$H^+ + OH^-$	20–50	300–1,180	
1432832	**Chelex 100 Resin**, biotechnology grade, 100 g	Sodium	100–200	150–300	PCR sample preparation
1435832	**Bio-Rex 70 Resin**, biotechnology grade, 100 g	Sodium	50–100	150–300	Separation of cationic proteins and amines
1435852	**Bio-Rex 70 Resin**, biotechnology grade, 100 g	Sodium	200–400	45–75	
1528920	**Bio-Beads SM-2**, 25 g	—	—	—	Detergent removal
1523920	**Bio-Beads SM-2**, 100 g	—	—	—	Detergent removal

Mixed-Mode Chromatography

Mixed-mode media offer unique separation properties and unparalleled selectivity and resolution for a variety of molecules. These products can be used at any stage in a process from initial capture to final polishing.

See Also

Resin sampler packs: page 110.

Foresight prepacked plates and columns: pages 80, 117–118, 163–164.

Nuvia™ cPrime™ Mixed-Mode Resin

Nuvia cPrime cation exchange resin is part of Bio-Rad's family of mixed-mode purification products. This resin is designed for process-scale purification of a wide variety of therapeutic proteins.

Nuvia cPrime resin's unique selectivity allows method developers to use hydrophobic and cation exchange interaction modes to achieve effective purification. Importantly, the resin has a large design space for binding and elution, allowing for the development of highly robust methods in a commercial manufacturing setting. Nuvia cPrime is built on a rigid, mechanically and chemically stable macroporous base matrix with a particle size optimized to deliver exceptional flow properties, fast mass transfer, and stability.

Nuvia cPrime mixed-mode resin delivers value by providing:

- Unique selectivity
- Simple method development
- Large design space for capture and elution of a variety of biotherapeutic proteins
- High recovery of target protein
- Mechanical and chemical stability

For More Information
Web: bio-rad.com/nuvia
Request or download bulletins: 6241, 6242, and 6418

Properties of Nuvia cPrime

Property	Description
Functional group	Hydrophobic weak cation exchange
Base matrix composition	Macroporous highly cross-linked hydrophilic polymer
Particle size	70 ± 10 µm
Dynamic binding capacity* hIgG	≥40 mg/ml
Dynamic binding capacity* lactoferrin	>60 mgl/ml
Ligand density	123 ± 20 µeq/ml
Recommended linear flow rate range	50–600 cm/hr
Pressure vs. flow performance**	Under 2 bar, flow rate of 600 cm/hr
pH stability	3–14 short term 4–13 long term
Chemical stability	1.0 N NaOH, 8 M urea, 6 M Gu-HCl, 6 M KSCN, 3 M NaCl, 1% Triton X-100, 2% SDS + 0.25 M NaCl, 20% EtOH, 70% EtOH, 30% IPA
Shipping solution	20% ethanol, 30 mM Na_2SO_3
Storage conditions	0.1 M NaOH
Shelf life***	5 years

* At 10% breakthrough hIgG.
** 20 x 20 cm packed bed (1.17 compression factor).
*** Stored at room temperature in 20% ethanol under accelerated conditions.

Ordering Information

Catalog #	Description
Nuvia cPrime Media	
1563401	**Nuvia cPrime Media**, 25 ml
1563402	**Nuvia cPrime Media**, 100 ml
156-3403	**Nuvia cPrime Media**, 500 ml
156-3404	**Nuvia cPrime Media**, 1 L
156-3405	**Nuvia cPrime Media**, 5 L
156-3406	**Nuvia cPrime Media**, 10 L
Nuvia cPrime Foresight Plates, Columns, and RoboColumn Units	
732-4705*	**Foresight Nuvia cPrime Plates**, 20 µl
732-4722	**Foresight Nuvia cPrime Column**, 1 ml
732-4742	**Foresight Nuvia cPrime Column**, 5 ml
732-4807**	**Foresight Nuvia cPrime RoboColumn Unit**, 200 µl
732-4808**	**Foresight Nuvia cPrime RoboColumn Unit**, 600 µl

* Package size: 2 x 96-well plates.
** Package size: 1 row of 8 columns.

Hydroxyapatite $(Ca_5(PO_4)_3OH)_2$ and fluoroapatite $Ca_{10}(PO_4)_6F_2$ are forms of calcium phosphate that offer unique selectivities and often separate biomolecules that appear homogeneous when other chromatographic and electrophoretic techniques are used. Hydroxyapatite and fluoroapatite chromatography can be used at any stage from initial capture to final polishing.

Ceramic Hydroxyapatites

CHT™ ceramic hydroxyapatite is a spherical, macroporous, and chemically pure form of hydroxyapatite that has been sintered at high temperatures to yield a physically and chemically robust support. It gives consistent, reproducible results over many cycles at scales up to 1.8 m, making CHT ceramic hydroxyapatite ideal for large-scale bioprocess applications. It has unique separation properties and unmatched selectivity and resolution. Applications include the purification of enzymes, antibody fragments, bispecific antibodies, and monocolonal and polyclonal antibodies of various classes; separation of supercoiled DNA from linear duplexes as well as single-stranded from double-stranded DNA; and efficient isolation and purification of viruses and virus-like particles. CHT ceramic hydroxyapatite Type I and Type II are available. The two types differ in their pore diameters and can differ slightly in protein separation, offering flexibility to select the type that provides maximum benefit in a given separation.

CHT Type I, with its smaller pore diameter and larger surface area, has higher binding capacities than CHT Type II. CHT Type II with its larger pore diameter provides higher capacity for large molecules, such as IgM and virus particles.

- High throughput
- High physical and chemical stability
- Unmatched selectivity
- Single-step clearance of impurities and aggregates
- Rapid and simple column packing

For More Information
Web: bio-rad.com/cht
Download bulletins: 2849 and 2940
Request or download bulletins: 5667, 5709, 5853, 6086, and 6549

See Also
Foresight prepacked plates and columns: pages 80, 117–118, 163–164.

Specifications

	CHT Type I, 40 µm	CHT Type II, 40 µm
Functional groups	Ca^{2+}, PO_4^{3-}, OH^-	Ca^{2+}, PO_4^{3-}, OH^-
Observed dynamic binding capacity, lysozyme	≥25 mg lysozyme/g	≥12.5 mg lysozyme/g
Nominal pore diameter	600–800 Å	800–1,000 Å
Maximum backpressure	100 bar (1,500 psi)	100 bar (1,500 psi)
Nominal mean particle size	40 ± 4 µm	40 ± 4 µm
Tap settled density* (g/ml tap settled bed)	0.63 g/ml	0.63 g/ml

* Under ideal conditions.

Properties of CHT

Property	CHT Type I, 40 µm	CHT Type II, 40 µm
Observed dynamic binding capacity, IgG*	25–60 mg IgG/ml	15–25 mg IgG/ml
Typical linear flow rate	50–1,000 cm/hr	50–1,000 cm/hr
pH stability	6.5–14	6.5–14
Base stability	At least 1 year in 0.1 N NaOH	At least 1 year in 0.1 N NaOH
Regeneration	500 mM sodium phosphate pH 7; 1 M trisodium phosphate, pH 11–12	500 mM sodium phosphate pH 7; 1 M trisodium phosphate, pH 11–12
Autoclavability (bulk)	121°C, 20 min in phosphate buffer, pH 7	121°C, 20 min in phosphate buffer, pH 7
Sanitization	1–2 N NaOH	1–2 N NaOH
Recommended column storage	1 M NaOH + 10 mM sodium phosphate	1 M NaOH + 10 mM sodium phosphate

* 40 µm particles, 300 cm/hr, 5 mM sodium phosphate, pH 6.5.

Ordering Information

Description	Type I	Type II
CHT Ceramic Hydroxyapatite, 20 µm		
20 µm particle size, 10 g	1582000	1582200
20 µm particle size, 100 g	1570020	1572000
20 µm particle size, 1 kg (1.6 L)	157-0021	157-2100
CHT Ceramic Hydroxyapatite, 40 µm		
40 µm particle size, 10 g	1584000	1584200
40 µm particle size, 100 g	1570040	1574000
40 µm particle size, 1 kg (1.6 L)	157-0041	157-4100
40 µm particle size, 5 kg (7.9 L)	157-0045	157-4500
CHT Ceramic Hydroxyapatite, 80 µm		
80 µm particle size, 10 g	1588000	1588200
80 µm particle size, 100 g	1570080	1578000
80 µm particle size, 1 kg (1.6 L)	157-0081	157-8100
80 µm particle size, 5 kg (7.9 L)	157-0085	157-8500
CHT Foresight Plates, Columns, and RoboColumn Units		
Foresight CHT Plates, 40 µm, 20 µl*	732-4716	732-4718
Foresight CHT Column, 40 µm, 1 ml	732-4735	732-4736
Foresight CHT Column, 40 µm, 5 ml	732-4755	732-4756
Foresight CHT RoboColumn Unit, 40 µm, 200 µl**	732-4822	732-4825
Foresight CHT RoboColumn Unit, 40 µm, 600 µl**	732-4823	732-4826

continues

Description	1 x 5 ml	5 x 5 ml
CHT Prepacked Bio-Scale Mini Cartridges		
CHT Type I Ceramic Hydroxyapatite	7324322	7324324
CHT Type II Ceramic Hydroxyapatite	7324332	7324334

Catalog #	Description
Bio-Scale Purification Kits	
7324407	**Bio-Scale Mini Apatite Purification Kit**, CHT Type II cartridge, CFT Type II cartridge, 1 x 5 ml each
7324408	**Bio-Scale Mini mAb Purification Kit**, UNOsphere SUPrA affinity cartridge, UNOsphere Q cartridge, CHT Type I cartridge, 1 x 5 ml each

Larger volumes and special packaging for industrial applications are available on request.
* Package size: 2 x 96-well plates.
** Package size: 1 row of 8 columns.

Ceramic Fluoroapatites

MPC™ Ceramic Hydroxyfluoroapatite

MPC ceramic hydroxyfluoroapatite $Ca_{10}(PO_4)_6(OH)_{1.5}(F)_{0.5}$ is a complementary addition to our line of ceramic apatite mixed-mode chromatography media. MPC is a composite of hydroxyapatite and fluoroapatite, which confers greater pH stability for the media to provide superior process economics to the biopharmaceutical scientist. MPC has the unique separation properties and unmatched selectivity and resolution of CHT.

CFT™ Ceramic Fluoroapatite

CFT ceramic fluoroapatite ($Ca_{10}(PO_4)_6F_2$) is a rigid spherical macroporous media used in the purification of biologically significant compounds. CFT is a composite of fluoroapatite and hydroxyapatite prepared by chemically converting hydroxyapatite nanocrystals to fluoroapatite with a fluorine reagent. CFT can be used under stringent chromatography requirements to separate acidic proteins requiring buffered conditions as low as pH 5.6.

CFT has high binding capacity and may be used reproducibly over an extended number of chromatography runs. Its increased tensile strength, chemical durability, and density provide excellent throughput and consistent performance for all separations, including biopharmaceutical process-scale manufacturing.

Features of CFT include:

- Acidic protein separation for applications requiring pH as low as 5.6
- High-density particles for fast, simple column packing
- Sintering at high temperatures for heavy-duty, durable media
- Rigid particles for fast cleaning and equilibration
- Inorganic calcium phosphate for distinct selectivities

Specifications

	MPC	CFT
Functional groups	Ca^{2+}, PO_4^{3-}, OH^-, F^-	Ca^{2+}, PO_4^{3-}, F^-
Observed dynamic binding capacity lysozyme	≥25 mg lysozyme/g	14–21.5 mg lysozyme/g
Nominal pore diameter	600–800 Å	600–800 Å
Maximum backpressure	100 bar (1,500 psi)	100 bar (1,500 psi)
Nominal mean particle size	40 ± 4 µm	40 ± 4 µm
Tap settled density* (g/ml tap settled bed)	0.72 g/ml	0.86 g/ml

* Under ideal conditions.

Properties of MPC and CFT

Property	MPC	CFT*
Observed dynamic binding capacity IgG	25–50 mg IgG/ml**	33 mg IgG/ml
Typical linear flow rate range	50–300 cm/hr	50–300 cm/hr
pH stability	6.5–14	5–14
Chemical stability	1 M NaOH, 8 M urea, 6 M guanidine-HCl, ethanol	2 M NaOH, 6 M guanidine-HCl, 8 M urea, 0.1 M sodium acetate, pH 5.7
Autoclavability (bulk)	121ºC, 20 min in phosphate buffer, pH 7	121°C, 20 min
Sanitization	1–2 N NaOH	1–2 M NaOH or KOH
Recommended column storage	0.1 N NaOH + 10 mM sodium phosphate	0.1 N NaOH or KOH

* A small amount (up to 5 mM) of sodium phosphate should be added to all unbuffered solutions as a counterion.
** 40 µm particles, 300 cm/hr, 5 mM sodium phosphate, 25 mM NaCl, pH 6.5

For More Information
Web: bio-rad.com/mpc
bio-rad.com/cft
Request or download bulletins: 6432 and 6086 (MPC); 3111 and 5853 (CFT)

Ordering Information

Description	Type I
MPC Ceramic Hydroxyfluoroapatite, 40 µm	
40 µm particle size, 10 g	1580200
40 µm particle size, 100 g	1570200
40 µm particle size, 1 kg (1.4 L)	157-0201
40 µm particle size, 5 kg (6.9 L)	157-0205
MPC Foresight Plates, Columns, and RoboColumn Units	
Foresight MPC Type I Plates, 20 µl*	732-4785
Foresight MPC Type I Column, 40 µm, 1 ml	732-4737
Foresight MPC Type I Column, 40 µm, 5 ml	732-4757
Foresight MPC Type I RoboColumn Unit, 40 µm, 200 µl**	732-4828
Foresight MPC Type I RoboColumn Unit, 40 µm, 600 µl**	732-4829

CFT Ceramic Fluoroapatite, 20 µm

1585200	40 µm particle size, 10 g
1575000	40 µm particle size, 100 g
157-5100	40 µm particle size, 1 kg (1.2 L)
157-5500	40 µm particle size, 5 kg (5.8 L)

Description	1 x 5 ml	5 x 5 ml
CFT Prepacked Bio-Scale Mini Cartridges		
CFT Type II Ceramic Fluoroapatite	7324405	7324406

Catalog #	Description
Bio-Scale Mini Cartridge Kits	
7324407	**Bio-Scale Mini Apatite Purification Kit**, CHT Type II cartridge, CFT Type II cartridge, 1 x 5 ml each
7324408	**Bio-Scale Mini mAb Purification Kit**, UNOsphere SUPrA affinity cartridge, UNOsphere Q cartridge, CHT Type I cartridge, 1 x 5 ml each

* Package size: 2 x 96-well plates.
** Package size: 1 row of 8 columns.

Bio-Gel® Hydroxyapatite HT and HTP

Hydroxyapatite ($Ca_5(PO_4)_3OH)_2$ is a form of calcium phosphate used in the chromatographic separation of biomolecules. Bio-Gel crystalline hydroxyapatite media is compatible with a wide range of aqueous buffers and organic modifiers and can be sanitized in up to 1 M NaOH. Typical pH tolerance is >6.8, however it can be used at 5.5 in single-use applications. Bio-Gel hydroxyapatite can be autoclaved in buffers that maintain a pH above 7 during the autoclaving cycle.

- **Bio-Gel HT media** — shipped in 10 mM sodium phosphate, pH 6.8 buffer containing 0.02% NaN_3. The flow rate range is 25–100 cm/hr at 10 cm bed height in a gravity-packed column. Bio-Gel HT media has a shelf life of at least one year when stored at 4°C in the shipping buffer
- **Bio-Gel HTP powder** — the dry form of Bio-Gel HT media. When hydrated, it should be stored similarly to Bio-Gel HT media; the flow rate range is similar to Bio-Gel HT media
- **DNA grade Bio-Gel HTP powder** — a smaller particle size version of Bio-Gel HTP powder, it exhibits higher capacity for biomolecules. It is generally used for single- and double-stranded DNA separations. It has an increased capacity for RNA, making it useful for DNA-RNA hybridization studies. Its flow rate is limited in gravity feed columns, but it can be used in medium-pressure columns to enhance flow rate

Bio-Gel HT and HTP

Properties of Bio-Gel HT and HTP

Property	Bio-Gel HT	Bio-Gel HTP	Bio-Gel HTP (DNA Grade)
Flow rate,* cm/hr	>25	>25	>5
BSA adsorbed,** mg per dry gram	10	10	10
Calf thymus DNA adsorbed, µg per dry gram	>500	>500	>800
Hydrated volume	—	2–3 ml/g	2–3 ml/g

* Flow rate determined on a 1.5 x 10 cm column with 40 cm hydrostatic pressure.
** Batch-wise uptake.

For More Information
Web: bio-rad.com/biogelHTandHTP
Download bulletin: LIT217

Ordering Information

Catalog #	Description
1300150	**Bio-Gel HT Hydroxyapatite**, hydrated, 250 ml
130-0151	**Bio-Gel HT Hydroxyapatite**, hydrated, 500 ml
1300420	**Bio-Gel HTP Hydroxyapatite**, powder, 100 g
130-0421	**Bio-Gel HTP Hydroxyapatite**, powder, 1 kg
130-0425	**Bio-Gel HTP Hydroxyapatite**, powder, 5 kg
1300520	**Bio-Gel HTP Hydroxyapatite**, DNA grade, 100 g

See Also

CHT ceramic hydroxyapatite: pages 89–90.
Bio-Scale Mini CHT cartridges: page 119.
Bio-Scale CHT Type I columns: page 123.

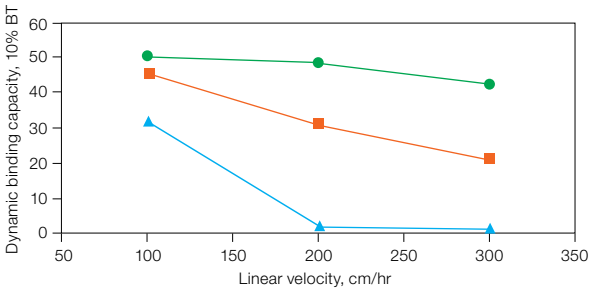
Affinity Chromatography

Nuvia™ IMAC Resin

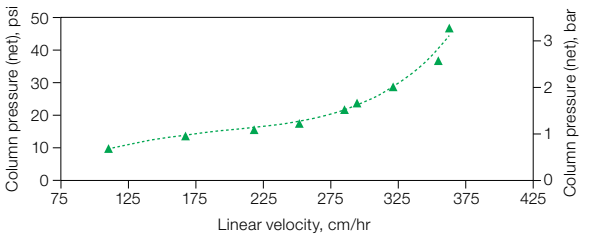
Nuvia IMAC resin is a high-capacity, next-generation metal chelate affinity chromatography resin. Nuvia IMAC delivers high binding capacity over a range of pH and flow rates, providing wide experimental design space for many applications. Immobilized metal affinity chromatography (IMAC) is a powerful purification technique that relies on the affinity that the histidine tag has for immobilized transition metals. Nuvia IMAC resins contain nitrilotriacetic acid (NTA) as the chelating ligand for di- or trivalent metal ions. Its chemical structure allows highly selective binding of recombinant histidine-tagged proteins when charged with Ni^{2+} or other transition metals, such as Zn^{2+} or Cu^{2+}. The optimized particle size and high porosity allow operation at increasingly higher flow rates without compromising binding capacity, resulting in superior mass transfer characteristics.

Nuvia IMAC is available in two forms: uncharged and charged with Ni^{2+}. The uncharged form can be charged with the metal ion of your choice for even greater purification flexibility. Nuvia IMAC can be used at any scale from laboratory to manufacturing, providing robust, reproducible, and efficient purifications each time. Nuvia IMAC resin delivers value and flexibility by providing users:

- Simple scale-up from laboratory to bioprocess manufacturing scale
- Optimized particle size for high flow rate and low backpressure
- Superior dynamic binding capacity at high flow rates
- Robust base matrix withstands repeated clean-in-place/ recharging cycles



Comparison of dynamic binding capacity vs. flow velocity of Nuvia IMAC resin (●), agarose IMAC resin A (■), and agarose IMAC resin B (▲). BT, breakthrough.



Flow performance of Nuvia IMAC resin. 20 x 20 cm column, 1.2 compression factor.

- Excellent recovery and reproducibility
- Full regulatory support

For More Information
Web: bio-rad.com/nuviaIMACresin
Download bulletin: 6859

Ordering Information

Catalog #	Description	Properties (all listed products)
Nuvia IMAC Resins		
7800800	**Nuvia IMAC Ni-Charged Resin**, 25 ml	• Ultra-high capacity at high flow rates
7800801	**Nuvia IMAC Ni-Charged Resin**, 100 ml	• pH stability across broad range
780-0802	**Nuvia IMAC Ni-Charged Resin**, 500 ml	• Robust beads
12003233	**Nuvia IMAC Ni-Charged Resin**, 5 L	
12002782	**Nuvia IMAC Ni-Charged Resin**, 10 L	
12004040*	**Nuvia IMAC Uncharged Resin**, 5 L	
12004039*	**Nuvia IMAC Uncharged Resin**, 10 L	
Nuvia IMAC Foresight Plates, Columns, and RoboColumn Units		
12004035**	**Foresight Nuvia IMAC Ni-Charged Plates**, 20 µl	
12004038	**Foresight Nuvia IMAC Ni-Charged Column**, 1 ml	
12004037	**Foresight Nuvia IMAC Ni-Charged Column**, 5 ml	
12004051***	**Foresight Nuvia IMAC Ni-Charged RoboColumn Unit**, 200 µl	
12004052***	**Foresight Nuvia IMAC Ni-Charged RoboColumn Unit**, 600 µl	

* New product. ** Package size: 2 x 96-well plates. *** Package size: 1 row of 8 columns.

Ordering Information

Catalog #	Description
Bio-Scale Mini Nuvia IMAC Cartridges	
7800811	**Bio-Scale Mini Nuvia IMAC Cartridge**, 5 ml
7800812	**Bio-Scale Mini Nuvia IMAC Cartridges**, 5 x 5 ml

See Also

Affinity media selection guide: pages 76–77.

Bio-Scale Mini cartridges: page 119.

IMAC purification kits: page 99.

Profinity™ IMAC Resins and Cartridges

Profinity IMAC resins are affinity chromatography supports for the purification of recombinant histidine-tagged proteins. Profinity IMAC resins, based on UNOsphere™ beads, contain iminodiacetic acid (IDA) as the chelating ligand for di- or trivalent metal ions. Its chemical structure allows highly selective binding of recombinant histidine-tagged proteins when charged with Ni^{2+} or other transition metals such as Zn^{2+} or Cu^{2+}. They offer high capacity at high flow rates and can be used under either nondenaturing or denaturing conditions. The resins are suitable for purification using liquid chromatographic instrumentation, gravity-flow columns, or spin columns. The resin is available in two forms: uncharged and precharged with Ni^{2+}. The uncharged form can be charged with the metal ion of your choice for even greater purification flexibility.

Features of Profinity IMAC resins include:

- Optimal ligand density for higher purity of target protein
- Superb mechanical strength
- Excellent pressure-flow properties for high maximum operating pressures and flow rates, allowing rapid purification, column cleaning, and re-equilibration
- Stability from pH 1–14
- Compatibility with denaturing agents, detergents, and reducing agents

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

Profinity IMAC Resins

Bio-Scale™ Mini Profinity™ IMAC Cartridges

Ordering Information

Catalog #	Description	Properties (all listed products)
Ready-to-Use Affinity Resins		
1560121	**Profinity IMAC Uncharged Resin**, 10 ml	• Stable from pH 1 to 14
1560123	**Profinity IMAC Uncharged Resin**, 50 ml	• Strong bead matrix for gravity flow
1560131	**Profinity IMAC Ni-Charged Resin**, 10 ml	
1560133	**Profinity IMAC Ni-Charged Resin**, 25 ml	
1560135	**Profinity IMAC Ni-Charged Resin**, 100 ml	
156-0137	**Profinity IMAC Ni-Charged Resin**, 500 ml	

Description	5 x 1 ml	1 x 5 ml	5 x 5 ml
Prepacked Bio-Scale Mini Cartridges			
Profinity IMAC Ni-Charged Resin	7324610	7324612	7324614

Larger volumes and special packaging for industrial applications are available on request.

Profinity™ Epoxide Resin

Profinity epoxide resin is an activated affinity chromatography support for the immobilization of biomolecules. Profinity epoxide is a useful support for the immobilization of ligands that contain nucleophiles such as amino, thiol, or hydroxyl groups. These groups couple to the epoxy groups on the resin, which is then used for the purification of proteins, carbohydrates, or DNA.

Profinity epoxide resin is based on UNOsphere™ beads, which have an open pore structure. The open pore structure allows coupling of large ligands for the purification of large targets such as Protein A, recombinant proteins containing MBP, and calmodulin. It is supplied as a dry powder (1 g of powder gives ~8 ml final volume).

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

Profinity Epoxide Resins

Ordering Information

Catalog #	Description
1560200	**Profinity Epoxide Resin**, 5 g
1560201	**Profinity Epoxide Resin**, 25 g

Profinity™ GST Cartridges and Kits

Profinity GST resin is an affinity chromatography support for the purification of recombinant GST-tagged proteins. Bio-Scale™ Mini Profinity™ GST cartridges are 1 and 5 ml Bio-Scale Mini cartridges filled with Profinity GST resin.

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

Ordering Information

Catalog #	Description
7324620	**Bio-Scale Mini Profinity GST Cartridges**, 5 x 1 ml
7324622	**Bio-Scale Mini Profinity GST Cartridge**, 1 x 5 ml
7324624	**Bio-Scale Mini Profinity GST Cartridges**, 5 x 5 ml
6200240	**GST Buffer Kit**, includes GST lysis, wash, and elution buffers
6200243	**GST Purification Kit**, 1 ml, includes GST purification buffer kit and 2 x 1 ml GST cartridges
6200244	**GST Purification Kit**, 5 ml, includes 2 GST purification buffer kits and 1 x 5 ml GST cartridge

Profinity eXact™ Resins and Cartridges

See Also
Bio-Scale Mini cartridges: page 119.

Profinity eXact Purification Resin, Prepacked Cartridges, and Mini Spin Columns

The Profinity eXact purification resin consists of a highly engineered subtilisin protease conjugated to an agarose-based matrix. Purity of the eluted protein using this resin is typically higher than that for other affinity-tag systems due to the specific recognition of subtilisin for its prodomain sequence (K_D <100 pM).

The resin can be packed into different column formats, including low- to medium-pressure columns, gravity-flow columns, and mini spin columns, offering added purification flexibility. Bio-Scale™ Mini cartridges are available in 1 and 5 ml volumes. Mini spin columns contain 0.1 ml resin. Additional advantages of Profinity eXact purification resin include:

- Purification and processing of fusion-tagged proteins in a single step
- On-column cleavage in as little as 30 min
- No protease addition is required
- Precise cleavage at N-terminus to generate native protein sequence

Resin is supplied in 100 mM sodium phosphate (pH 7.2) containing 0.02% sodium azide. It is also available prepacked in 1 and 5 ml cartridges and in mini spin columns.

Profinity eXact Purification Starter Kit

The Profinity eXact expression and purification starter kit can be used to easily evaluate Profinity eXact fusion-tag technology. It is suitable for new purifications requiring tag removal and for purifications where cleavage has resulted in inferior results.

- **Profinity eXact mini spin purification starter kit** — for single-step purification and on-column cleavage of the tagged protein; also includes a lyophilized lysate to ensure that preliminary purifications are a success

Profinity eXact Resin Cartridges and Bottles

Profinity eXact pPAL7 Supercoiled Expression Vector Kit

The pPAL7 supercoiled plasmid expression vector is used for routine cloning of target DNA sequences using a conventional restriction digest cloning strategy.

Profinity eXact Antibody Reagent

The Profinity eXact antibody reagent is a mouse monoclonal antibody used to detect expression of the target protein. The Profinity eXact antibody specifically recognizes the prodomain of the subtilisin protease, which is fused to the protein of interest. For convenient western blot detection of the fusion protein, Bio-Rad offers colorimetric detection kits.

For More Information
Web: bio-rad.com/affinitycartridges
Download bulletin: 5655

Resin Specifications

Functional ligand	Subtilisin protease, 27.8 kD
Base bead	6% agarose bead
Form	50% suspension in 100 mM sodium phosphate (pH 7.2), 0.02% sodium azide
Particle size range	60–160 µm
Dynamic binding capacity*	>3 mg tag-free protein/ml resin
Recommended linear flow rate	1,000 cm/hr at 25°C
pH stability	2–13
Chemical compatibility	Common reagents, including detergents, reducing agents, buffering agents, and additives
Storage	4°C
Shelf life in 20% ethanol	>1 year at 4°C
Operational temperature	4–40°C

* Dynamic binding capacity determination of a 40 kD maltose binding protein.

Note: Dynamic binding capacity is protein dependent.

Ordering Information

Catalog #	Description
1563007	**Profinity eXact Mini Spin Columns**, includes 10 spin columns, ten 2 ml capped tubes, and ten 2 ml capless tubes
7324646	**Bio-Scale Mini Profinity eXact Cartridges**, 2 x 1 ml
7324647	**Bio-Scale Mini Profinity eXact Cartridges**, 4 x 1 ml
7324648	**Bio-Scale Mini Profinity eXact Cartridge**, 1 x 5 ml
1563002	**Profinity eXact pPAL Supercoiled Expression Vector Kit**, includes 100 µl of 100 ng/µl vector, 20 reactions
1563004	**Profinity eXact Monoclonal Antibody**, 100 µl, 1 mg/ml
1563005	**Profinity eXact Purification Resin**,* 10 ml
1563006	**Profinity eXact Mini Spin Purification Starter Kit**, includes 10 prepacked spin columns, 50 x 2 ml collection tubes, lyophilized control protein lysate, bacterial lysis reagent, 50 ml bind/wash buffer, 20 ml elution buffer

* Larger volumes are available on request.

Profinia™ System Reagents and Kits

Buffers

Bio-Rad premade affinity buffer kits for recombinant-tagged protein purification come with concentrated formula sufficient for ten purifications for a 1 ml affinity cartridge. These kits provide easy and fast purification for histidine-tagged (native IMAC buffer) proteins.

- Denaturing IMAC purification can be performed with native buffer IMAC kits with the addition of urea in the purification buffers
- Kits for desalting and cartridge cleaning after affinity purification are also available
- Purification kits containing both buffer kits and appropriate cartridges are provided, if purification cartridges are desired

For More Information
Web: bio-rad.com/profiniareagents
Download bulletins: 3193, 5283, 5444, and 5456

Kits

Buffer and starter kits can be used with any instrument, gravity-flow, or spin-column purification procedure.

Profinia purification, buffer, and starter kits are designed specifically for use on the Profinia protein purification system for time savings and highly reproducible results. These kits are installed directly on the system; manual dilution of the concentrated buffers provided in the kits is not required.

For More Information
Web: bio-rad.com/profiniareagents
Download bulletin: 5574

Reagents

Individually packaged reagents are available for use with the Profinia system. While designed specifically to work with the Profinia system, these reagents also have general applicability within all stages of an affinity purification workflow, from sample preparation to protein detection.

Histidine and GST Purification *E. coli* Control Lysate
The histidine and GST purification *E. coli* control lysate is a lyophilized, dual-tagged 51 kD target protein that is meant to eliminate concerns over variability in purification buffer solutions or in the purification matrix itself. The control lysate facilitates system setup and initial purification; it is included in every Profinia IMAC and GST starter kit.

Glutathione Reagent
Powdered glutathione reagents are available for use with GST applications. The glutathione pack is essential for eluting GST fusion proteins from immobilized glutathione resins.

Histidine and GST Antibodies
Histidine-tagged and GST-tagged monoclonal antibodies are used to detect target protein expression of overexpressed 6x histidine and GST fusion proteins. They are supplied at a concentration of 1 mg/ml in phosphate buffered saline (pH 7.4) with 0.05% NaN_3.

Histidine and GST Purification *E. Coli* Control Lysate

Glutathione

Histidine and GST Antibodies

Affinity Purification Kit Selection Guide

Kit	Buffer Sets: Lysis, Wash, and Elution	Buffer Sets: Desalting and Cartridge Cleaning	Bio-Scale™ Mini Cartridges*: Affinity	Bio-Scale™ Mini Cartridges*: Desalting
IMAC Kits				
Native IMAC buffer kit	•			
Native IMAC purification kits (1 and 5 ml)	•		•	
Profinia native IMAC buffer kit	•	•		
Profinia native IMAC purification kits (1 and 5 ml)	•	•	•	•
Profinia native IMAC starter kit	•	•	•	•
GST Kits				
GST buffer kit	•			
GST purification kits (1 and 5 ml)	•		•	
Profinia GST buffer kit	•	•		
Profinia GST purification kits (1 and 5 ml)	•	•	•	•
Profinia GST starter kit	•	•	•	•
Desalting and Cartridge Cleaning Kits				
Desalting and cartridge cleaning buffer kit		•		
Profinia desalting purification kits (10 and 50 ml)		•		•

* Starter kits include histidine and GST control lysate, one 1 ml affinity cartridge, and one 10 ml desalting cartridge.

Ordering Information

Catalog #	Description
Affinity Buffer Kits	
6200239	**Native IMAC Buffer Kit**, includes native IMAC lysis, wash, and elution buffers
6200240	**GST Buffer Kit**, includes GST lysis, wash, and elution buffers
6200224	**Desalting and Cartridge Cleaning Buffer Kit**, includes desalting buffer, cleaning buffers, and cartridge storage buffer
Affinity Purification Kits	
6200241	**Native IMAC Purification Kit**, 1 ml, includes IMAC purification buffer kit and 2 x 1 ml IMAC cartridges
6200242	**Native IMAC Purification Kit**, 5 ml, includes 2 IMAC purification buffer kits and 1 x 5 ml IMAC cartridge
6200243	**GST Purification Kit**, 1 ml, includes GST purification buffer kit and 2 x 1 ml GST cartridges
6200244	**GST Purification Kit**, 5 ml, includes 2 GST purification buffer kits and 1 x 5 ml GST cartridge
Profinia Buffer Kits	
6200221	**Profinia Native IMAC Buffer Kit**, includes lysis, wash, and elution buffers, cleaning and storage solutions; sufficient for 10 applications
6200223	**Profinia GST Buffer Kit**, includes lysis, wash, and elution buffers, cleaning and storage solutions, glutathione reagent; sufficient for 10 applications
Profinia Purification Kits	
6200225	**Profinia IMAC Purification Kit**, 1 ml, includes Profinia native IMAC buffer kit, 2 x 1 ml IMAC and 2 x 10 ml desalting cartridges
6200235	**Profinia IMAC Purification Kit**, 5 ml, includes 2 Profinia native IMAC buffer kits, 1 x 5 ml IMAC and 1 x 50 ml desalting cartridge
6200226	**Profinia GST Purification Kit**, 1 ml, includes Profinia GST buffer kit, 2 x 1 ml GST and 2 x 10 ml desalting cartridges
6200236	**Profinia GST Purification Kit**, 5 ml, includes 2 Profinia GST buffer kits, 1 x 5 ml GST and 1 x 50 ml desalting cartridge
6200228	**Profinia Desalting Purification Kit**, 10 ml, includes desalting and cartridge cleaning buffer kit, 2 x 10 ml desalting cartridges
6200238	**Profinia Desalting Purification Kit**, 50 ml, includes 2 desalting and cartridge cleaning buffer kits, 1 x 50 ml desalting cartridge
6200229	**Profinia Native IMAC Starter Kit**, includes Profinia native IMAC buffer kit, 1 x 1 ml IMAC and 1 x 10 ml desalting cartridge, *E. coli* lysate
6200230	**Profinia GST Starter Kit**, includes Profinia GST buffer kit, 1 x 1 ml GST and 1 x 10 ml desalting cartridge, *E. coli* lysate, glutathione reagent
Bio-Scale Mini Affinity and Desalting Cartridges	
7324610	**Bio-Scale Mini Profinity IMAC Cartridges**, 5 x 1 ml
7324612	**Bio-Scale Mini Profinity IMAC Cartridge**, 1 x 5 ml
7324614	**Bio-Scale Mini Profinity IMAC Cartridges**, 5 x 5 ml
7324620	**Bio-Scale Mini Profinity GST Cartridges**, 5 x 1 ml
7324622	**Bio-Scale Mini Profinity GST Cartridge**, 1 x 5 ml

continues

See Also

Profinity IMAC resins: page 95.

Ordering Information

Catalog #	Description
Affinity Purification Kit Components	
6200205	**2x Native IMAC Lysis Buffer**, 125 ml
6200206	**2x Native IMAC Wash Buffer 1**, 125 ml
6200207	**2x Native IMAC Wash Buffer 2**, 100 ml
6200208	**2x Native IMAC Elution Buffer**, 100 ml
6200213	**2x GST Lysis Buffer**, 100 ml
6200215	**2x GST Elution Buffer**, 100 ml
6200216	**5x Desalting Buffer**, 200 ml
6200217	**2x Cleaning Solution 1**, 125 ml
6200218	**4x Cleaning Solution 2**, 125 ml
6200219	**2x Storage Solution**, 200 ml

See Also
Bio-Scale Mini cartridges: page 119.

UNOsphere SUPrA™ rProtein A Media

Developed for monoclonal antibody capture chromatography, UNOsphere SUPrA resin provides an ideal balance between dynamic binding capacity, flow properties, and stability. The UNOsphere™ hydrophilic polymeric support provides high-quality purifications and batch-to-batch reproducibility. As part of the proven UNOsphere resin platform, UNOsphere SUPrA resin offers flexibility and a predictable scale-up path.

Key features include:

- Built on robust polymeric beads engineered for high mechanical stability, low backpressures, and resistance to repeated clean-in-place cycles
- Designed with large pores that result in high dynamic binding capacities at fast flow rates
- Optimized to operate under a wide range of flow rates up to 600 cm/hr
- Regulatory support file and application notes are available

For More Information
Web: bio-rad.com/unospheresupra
Download bulletin: 6053
Request or download bulletins: 5728 and 5729

Properties of UNOsphere SUPrA

Property	Description	Property	Description
Composition	Highly cross-linked polymer	Working pH range	3–11
Particle size range	53–61 µm	Clean-in-place (CIP) solutions	6 M guanidine hydrochloride 10 mM hydrochloric acid 0.1 M sodium hydroxide 1 M acetic acid/20% ethanol
Ligand	Recombinant Protein A	Recommended mobile phase velocity range	100–600 cm/hr
Coupling chemistry	Epoxy	Temperature stability	2–40ºC
Dynamic binding capacity*	30 ± 3 mg/ml at 150 cm/hour 25 ± 2 mg/ml at 300 cm/hour 20 ± 2 mg/ml at 450 cm/hour (Minimum spec: 20 mg/ml at 300 cm/hour)	Delivery conditions	50% slurry in 20% ethanol
Chemical stability**	10 mM hydrochloric acid 6 M guanidine hydrochloride 0.1 M arginine (pH 2.8) 0.1 M citrate (pH 2.8) 0.1 M glycine (pH 2.8)	Storage conditions	2–8ºC

* 10% breakthrough capacity determined with 1.0 mg/ml polyclonal human IgG in 1.1 x 10 cm column.
** No significant change in chromatographic performance after storage for 24 hr at room temperature.

Ordering Information

Catalog #	Description
UNOsphere SUPrA rProtein A Media	
1560250	**UNOsphere SUPrA rProtein A Media**, 5 ml
1560218	**UNOsphere SUPrA rProtein A Media**, 25 ml
1560219	**UNOsphere SUPrA rProtein A Media**, 100 ml

Description	1 x 1 ml	5 x 1 ml	1 x 5 ml
Prepacked Bio-Scale Mini Cartridges			
UNOsphere SUPrA Affinity Media	7324200	7324201	7324202

Affi-Gel® and Affi-Prep® Protein A Resins

Chromatography on Affi-Gel and Affi-Prep Protein A resins yield highly purified immunoglobulins (IgG), selectively remove IgG prior to analysis of other IgG classes, or adsorb immune complexes for antigen purification. Protein A binds to the Fc region of immunoglobulins, especially IgG from mammalian species. Advantages include:

- High purity of IgGs
- High affinity for mammalian IgG
- High capacities for mouse IgG_1 as well as other subclasses with MAPS optimized buffer

In addition, Affi-Prep resins offer high linear flow rates up to 2,000 cm/hr, pressure stability up to 1,000 psi (70 bar), and high chemical stability, which allows sanitization with 0.1 M NaOH.

With Affi-Gel and Affi-Prep Protein A resins and MAPS II buffer, you can purify up to 10 mg of IgG_1/ml of media. This is 8–10 times higher than with standard methods.

In addition, the MAPS process and Affi-Gel Protein A permit greater binding of mouse IgG_1 than does immobilized Protein G resin.

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

Capacities of Protein A Resins

Immunoglobulin	Affi-Gel Protein A Capacity, mg/ml	Affi-Prep Protein A Capacity, mg/ml
Mouse IgG_1	6–10	7–9
Mouse IgG_{2a}	6–10	7–9
Mouse IgG_{2b}	6–10	7–9
Mouse IgG_3	6–10	7–9
Mouse IgM*	6–10	7–9
Human IgG	15	10–12
Sheep, cow, horse, goat, rabbit, dog, pig IgG	8–10	7–9

* Approximately 50% of all mouse IgMs bind using the MAPS buffer system.

Ordering Information

Catalog #	Description
Affi-Prep and Affi-Gel Media	
1560006	**Affi-Prep Protein A Media**, 5 ml
1560005	**Affi-Prep Protein A Media**, 25 ml
1536153	**Affi-Gel Protein A Media**, 5 ml
1536154	**Affi-Gel Protein A Media**, 50 ml
1536159	**Affi-Gel Protein A MAPS II Kit**, includes 5 ml Affi-Gel Protein A media, Affi-Gel Protein A MAPS II buffers, 1 x 10 cm Econo-Column column; enough to purify 500 mg of mouse IgG_1
1536161	**Protein A MAPS II Binding Buffer**, makes 5 L
Prepacked Econo-Pac Columns	
7322022	**Econo-Pac Protein A Columns**, prefilled with Affi-Gel Protein A media, 5
7322020	**Econo-Pac Protein A Kit**, 1 x 2 ml Affi-Gel Protein A column, 1 x 10 ml 10DG column, buffers

Description	5 x 1 ml	1 x 5 ml
Prepacked Bio-Scale Mini Cartridges		
Affi-Prep Protein A Media	7324600	7324602

Affi-Gel® Blue Resin

Affi-Gel Blue resin is a cross-linked agarose bead with covalently attached Cibacron Blue F3GA dye. The blue dye functions as an ionic, hydrophobic, aromatic, or sterically active binding site in various applications. Affi-Gel Blue resin is ideally suited for albumin removal (using 50–100 mesh) and enzyme purification (using 100–200 mesh). Proteins and peptides are bound and released with a high degree of specificity by manipulating the composition of the eluent buffers.

The resin is available in bottle and cartridge form.

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

Bio-Scale Mini Affi-Gel Blue Cartridge

Affi-Gel Blue Gel

Ordering Information

Catalog #	Description	Applications (all listed products)
1537301	**Affi-Gel Blue Gel**, 100 ml, 50–100 mesh	• Albumin removal
1537302	**Affi-Gel Blue Gel**, 100 ml, 100–200 mesh	• Enzyme purification
153-7303	**Affi-Gel Blue Gel**, 1 L, 100–200 mesh	
7324642	**Bio-Scale Mini Affi-Gel Blue Cartridge**, 1 x 5 ml, cartridge packed with 100–200 mesh media	
7324644	**Bio-Scale Mini Affi-Gel Blue Cartridges**, 5 x 5 ml, cartridges packed with 100–200 mesh media	

DEAE Affi-Gel® Blue Resin

DEAE Affi-Gel Blue resin is a bifunctional affinity gel containing Cibacron Blue F3GA dye covalently attached to DEAE Bio-Gel® A resin. The dye binds albumin, proteases, and other complement proteins; the DEAE group binds remaining acidic proteins. Features of DEAE Affi-Gel Blue resin include:

- Single-step IgG purification from serum; the eluted IgG contains a small amount of transferrin (samples are diluted approximately fivefold)
- No detectable proteolytic activity in the eluted IgG fraction
- Economical alternative to Protein A affinity chromatography
- Available in bottle and cartridge form

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

Bio-Scale Mini DEAE Affi-Gel Blue Cartridge

DEAE Affi-Gel Blue Gel

Ordering Information

Catalog #	Description	Applications (all listed products)
1537307	**DEAE Affi-Gel Blue Gel**, 100 ml	• Albumin, proteases, and complement protein removal
153-7306	**DEAE Affi-Gel Blue Gel**, 1 L	• IgG purification
153-7308	**DEAE Affi-Gel Blue Gel**, 5 L	
7324632	**Bio-Scale Mini DEAE Affi-Gel Blue Cartridge**, 1 x 5 ml	
7324634	**Bio-Scale Mini DEAE Affi-Gel Blue Cartridge**, 5 x 5 ml	

Description	1 x 5 ml	5 x 5 ml
Prepacked Bio-Scale Mini Cartridges		
DEAE Affi-Gel Blue Gel	7324632	7324634
Affi-Gel Blue Gel	7324642	7324644

CM Affi-Gel® Blue Resin

CM Affi-Gel Blue resin contains Cibacron Blue F3GA dye covalently coupled to CM Bio-Gel® A resin. This bifunctional gel binds both albumin and serum proteases. CM Affi-Gel Blue chromatography provides a convenient initial step in the purification of serum proteins. Features of CM Affi-Gel Blue resin include:

- Rapid removal of ≥90% of albumin and all plasminogen in serum samples
- No prior sample preparation needed
- ≥80% yield of stable antiserum free of albumin and protease activity

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

CM Affi-Gel Blue Gel

Ordering Information

Catalog #	Description
1537304	**CM Affi-Gel Blue Gel**, 100 ml
153-7305	**CM Affi-Gel Blue Gel**, 1 L

Affi-Gel® Boronate Resin

Affi-Gel boronate-derivatized polyacrylamide resin has affinity for coplanar adjacent *cis*-hydroxyl groups (*cis*-diols) and a high binding capacity, which provides highly efficient separation of low MW molecules such as nucleotides, nucleosides, catecholamines, and sugars. It has a sorbitol capacity of 130 µmol/ml.

For More Information
Web: bio-rad.com/affigelboronate
Download bulletin: 1066

Affi-Gel Boronate Gel

Ordering Information

Catalog #	Description
1536103	**Affi-Gel Boronate Gel**, 5 g
153-6104	**Affi-Gel Boronate Gel**, 50 g

Affi-Prep® Polymyxin Resin

Affi-Prep polymyxin resin consists of 2–4 mg of USP-grade polymyxin per ml of the macroporous polymeric Affi-Prep support. Affi-Prep polymyxin resin binds endotoxins from a number of different strains of gram-negative bacteria including *E. coli, Salmonella abortus, S. minnesota,* and *Serratia marcescens*. Features of Affi-Prep polymyxin resin include:

- Endotoxin removal in research and process-scale applications
- Linear flow rates to 2,000 cm/hr
- Pressure stability to 1,000 psi (70 bar)
- High chemical stability (withstands sanitization with 0.1 M NaOH)

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

Affi-Prep Polymyxin Resin

Ordering Information

Catalog #	Description
1560010	**Affi-Prep Polymyxin Resin**, 25 ml

Affi-Gel® Heparin Resin

Affi-Gel heparin resin is a ready-to-use support for the purification of a range of proteins such as coagulation factors, other plasma proteins, polynucleotide polymerases, nucleases, lipases, lipoproteins, and proteases. Heparin binds a variety of enzymes and other proteins, either ionically or by other specific enzyme-inhibitor (or enzyme-activator) interactions. Features of Affi-Gel heparin resin include:

- Heparin content ≥0.6 mg/ml
- Human antithrombin III binding capacity ≥1.2 mg/ml
- Linear flow rates of 10–20 cm/hr

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

Affi-Gel Heparin Gel

Ordering Information

Catalog #	Description
1536173	**Affi-Gel Heparin Gel**, 40 ml

Affi-Gel® 10 and Affi-Gel 15 Resins

Affi-Gel 10 and Affi-Gel 15 activated affinity resins provide spontaneous, rapid, and highly efficient coupling of ligands via primary amines. Affi-Gel 10 resin is most efficient for coupling neutral or basic proteins with pI 6.5–11. Affi-Gel 15 resin is recommended for coupling acidic proteins with pI <6.5. Affi-Gel 10 and 15 resins offer:

- Aqueous or anhydrous coupling conditions
- Complete protein coupling within 4 hr at 4°C
- Protein coupling capacity up to 35 mg/ml of resin

For More Information
Web: bio-rad.com/affigel10and15
Download bulletin: 1085

Ordering Information

Catalog #	Description
1536099	**Affi-Gel 10 Media**, 25 ml
1536046	**Affi-Gel 10 Media**, 4 x 25 ml
153-1000	**Affi-Gel 10 Media**, 1 L
1536051	**Affi-Gel 15 Media**, 25 ml
1536052	**Affi-Gel 15 Media**, 4 x 25 ml
1536098	**Affi-Gel 10/15 Combination**, includes 2 x 25 ml Affi-Gel 10 media and 2 x 25 ml Affi-Gel 15 media

Affi-Gel® Hz Hydrazide Resin

Affi-Gel Hz hydrazide activated resin couples immunoglobulin G (IgG) molecules via carbohydrate moieties on the Fc region of antibody molecules. Fc attachment results in a more specific antigen-antibody interaction and 100–300% higher antigen binding capacity than other resins. Affi-Gel Hz resin advantages include:

- Stable covalent hydrazone bonds
- Mild oxidation without alteration of antibody activity
- High antigen binding capacity
- pH stability

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

Ordering Information

Catalog #	Description
1536047	**Affi-Gel Hz Hydrazide Media**, 25 ml
1536060	**Affi-Gel Hz Immunoaffinity Kit**, includes 5 ml Affi-Gel Hz media, 2 x 25 mg Affi-Gel Hz oxidizer, 25 ml Affi-Gel Hz coupling buffer concentrate, 2 Econo-Pac 10DG desalting columns, 1 x 10 cm Econo-Column column
153-6054	**Affi-Gel Hz 10x Coupling Buffer Concentrate**, 500 ml

See Also
Affinity media selection guide: pages 76–77.

Carbodiimide Activated Resin

Affi-Gel® 102 resin is for use with 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (EDAC or EDC) carbodiimide coupling reagent, which immobilizes ligands that contain primary or terminal carboxyl groups. The resin offers flexible alternative chemistries and economy.

Affi-Gel 102 amino-terminal cross-linked agarose resins with a six-atom hydrophilic arm feature:

- EDAC carbodiimide coupling reagent
- Compatibility with carboxyl-containing ligands

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

Ordering Information

Catalog #	Description
1532401	**Affi-Gel 102 Media**, 50 ml
1530990	**EDAC**, 5 g

Size Exclusion Chromatography

Bio-Gel® P Media

Bio-Gel P polyacrylamide resin, for high-resolution gel filtration, is prepared by copolymerization of acrylamide and N,N'-methylene-*bis*-acrylamide. Bio-Gel P resin:

- Is available in several particle size ranges with molecular weight exclusion limits ranging from 100–100,000
- Is extremely hydrophilic and essentially nonionic
- Provides efficient, gentle gel filtration of sensitive compounds
- Does not support microbial growth or leach carbohydrates (due to its synthetic composition) as dextrose and agarose gels can

Bio-Gel P resin is autoclavable at pH 5.5–6.5 and operates over a pH range of 2–10 at room temperature. Flow rate and resolution increase with increasing temperature in the range of 4–80°C.

Bio-Gel P polyacrylamide resin is available as bottled resin or as prepacked spin columns and cartridges. Cartridges are packed with Bio-Gel P-6 resin, while spin columns come prepacked with both P-6 and P-30 resin in either Tris or SSC buffer.

For More Information
Web: bio-rad.com/biogelp
Download bulletin: 2068

Bio-Gel P Resin

Bio-Scale™ Mini Bio-Gel Cartridges

Bio-Gel P Polyacrylamide Resin Selection Guide

Media	MW Fractionation Range
Bio-Gel P-2	100–1,800
Bio-Gel P-4	800–4,000
Bio-Gel P-6	1,000–6,000
Bio-Gel P-6DG	1,000–6,000
Bio-Gel P-10	1,500–20,000
Bio-Gel P-30	2,500–40,000
Bio-Gel P-60	3,000–60,000
Bio-Gel P-100	5,000–100,000

Ordering Information

Catalog #	Description	Comments
1504114	**Bio-Gel P-2 Media**, fine, 100 g	Rapid carbohydrate, peptide, and protein desalting
150-4115	**Bio-Gel P-2 Media**, fine, 500 g	
12002617	**Bio-Gel P-2 Media**, fine, 1 kg	
1504118	**Bio-Gel P-2 Media**, extra fine, 100 g	
1504120	**Bio-Gel P-4 Media**, medium, 100 g	Carbohydrate and peptide separations, protein desalting
1504124	**Bio-Gel P-4 Media**, fine, 100 g	
1504128	**Bio-Gel P-4 Media**, extra fine, 100 g	
1504130	**Bio-Gel P-6 Media**, medium, 100 g	Purification of proteins and polypeptides
1504134	**Bio-Gel P-6 Media**, fine, 100 g	
1504138	**Bio-Gel P-6 Media**, extra fine, 100 g	
1500738	**Bio-Gel P-6DG Media**, 100 g	Rapid carbohydrate, peptide, and protein desalting; also available in prepacked columns and cartridges
150-0739	**Bio-Gel P-6DG Media**, 1 kg	
1504140	**Bio-Gel P-10 Media**, medium, 100 g	Purification of proteins and polypeptides
1504144	**Bio-Gel P-10 Media**, fine, 100 g	
1504150	**Bio-Gel P-30 Media**, medium, 100 g	
1504154	**Bio-Gel P-30 Media**, fine, 100 g	
12002610	**Bio-Gel P-30 Media**, fine, 1 kg	
1504160	**Bio-Gel P-60 Media**, medium, 100 g	
1504164	**Bio-Gel P-60 Media**, fine, 100 g	
12002609	**Bio-Gel P-60 Media,** fine, 1 kg	
1504170	**Bio-Gel P-100 Media**, medium, 100 g	
1504174	**Bio-Gel P-100 Media**, fine, 100 g	

continues

See Also

Sample preparation products: page 1.
Gel filtration chromatography standard: page 112.
Bio-Spin and Micro Bio-Spin prepacked columns: page 121.
Empty Econo-Pac columns: page 128.
ENrich SEC columns: page 116.

Ordering Information

Catalog #	Description
Prepacked Econo-Pac Columns	
7322010	**Econo-Pac 10DG Desalting Columns**, 30

Description	Pack of 1	Pack of 5
Prepacked Bio-Scale Mini Cartridges		
Bio-Gel P-6 Gel (Desalting), 5 ml	7324502	7324504
Bio-Gel P-6 Gel, 10 ml	—	7325304
Bio-Gel P-6 Gel, 50 ml	7325312	7325314

Catalog #	Description
Adaptor Fittings	
7320111	**Luer to M6 Adaptor Fittings Kit**, includes luer to M6 fittings to connect 1 cartridge to an FPLC system
7320112	**Luer to 10-32 Adaptor Fittings Kit**, includes luer to 10-32 fittings to connect 1 cartridge to an HPLC system
7320113	**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems

Catalog #	Description	Contents	MW	pI	For Use with
Standard					
1511901	**Gel Filtration Standard**, 6 vials	Thyroglobulin	670,000	4.5	ENrich SEC columns; Bio-Gel P media
		Bovine γ-globulin	158,000	5.1	
		Chicken ovalbumin	44,000	4.6	
		Equine myoglobin	17,000	6.9	
		Vitamin B_{12}	1,350	4.5	

Bio-Gel® A 1.5 m Media

Bio-Gel A 1.5 m resin, ideal for purification of antibodies and aggregates, consists of agarose beads in which the pore size is controlled by the percentage of agarose in the gel. It is compatible with all commonly used buffers and can be used with high-salt buffers without significantly changing the bed volume. Bio-Gel A 1.5 m resin may be used at pH 4–13 and at temperatures 2–30°C. The fractionation range is 10,000–1,500,000 daltons.

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

Ordering Information

Catalog #	Description
151-0450	**Bio-Gel A 1.5 m Gel**, fine, 500 ml

See Also
ENrich SEC columns: page 116.

Bio-Beads™ S-X Resins

Bio-Beads S-X resins are neutral porous styrene divinylbenzene beads for size exclusion chromatography of lipophilic polymers and other solutes that require organic eluents. MW exclusion limits range from 400–14,000. This range is useful for fractionation of low MW organic polymers and other hydrophobic substances. Exclusion limits are influenced by the eluent used. Bio-Beads S-X resins require an eluent that is mobile; therefore, the beads must be used in a column. The beads are compatible with benzene, toluene, xylene, carbon tetrachloride, dimethylformamide, ketones, aromatics, methylene chloride, *o*-dichlorobenzene, perchloroethylene, tetrahydrofuran, and trichlorobenzene.

Recommended flow rates depend upon the cross-linkage:

- 1% cross-linked resins are used only with gravity flow
- 3% cross-linked resins can withstand a flow of 5 ml/min with a backpressure of 20 bar or 300 psi
- 8% and 12% cross-linked resins can withstand backpressure up to 33 bar or 500 psi

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

Ordering Information

Catalog #	Description	Size, µm	ml/dry g*	Application**
1522150	**Bio-Beads S-X1 Media**, 100 g	40–80	7.5	1% cross-linked; for lipophilic polymers of MW 600–14,000
152-2151	**Bio-Beads S-X1 Media**, 1 kg	40–80	7.5	1% cross-linked; for lipophilic polymers of MW 600–14,000
1522750	**Bio-Beads S-X3 Media**, 100 g	40–80	4.75	3% cross-linked; for organic compounds of MW ≤2,000
1523350	**Bio-Beads S-X8 Media**, 100 g	40–80	3.1	8% cross-linked; for organic compounds of MW ≤1,000
1523650	**Bio-Beads S-X12 Media**, 100 g	40–80	2.5	12% cross-linked; for organic compounds of MW ≤400

Larger volumes and special packaging for industrial applications are available on request.
* Swollen in benzene.
** MW range is for beads fully swollen in benzene.

Hydrophobic Interaction Chromatography

Macro-Prep® HIC Resins

Macro-Prep HIC resins are methacrylate-based 50 µm beads for protein, polypeptide, enzyme, and nucleic acid purification. They are autoclavable and can withstand treatment in acid, base (pH up to 10), chaotropic agents, or detergents while retaining high protein binding capacities. They are available in two functional forms: a weakly hydrophobic methyl support for purification of compounds with strong hydrophobic regions, and a mildly hydrophobic t-butyl support for purification of compounds with few or weakly hydrophobic regions. Both resins are chemically and thermally stable. They can be cleaned in place with ethanol or 1% acetic acid and 1% phosphoric acid.

Macro-Prep Methyl HIC Support

For More Information
Web: bio-rad.com/macroprepHIC
Request or download bulletin: 1841

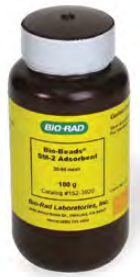
Ordering Information

Description	Methyl HIC	t-Butyl HIC
Macro-Prep HIC Support, 25 ml	1580080	1580090
Macro-Prep HIC Support, 100 ml	1560080	1560090
Macro-Prep HIC Support, 500 ml	156-0081	156-0091
Macro-Prep HIC Support, 5 L	156-0082	—
Macro-Prep HIC Support, 10 L	156-0083	156-0093

Bio-Beads™ SM-2 Adsorbents

Bio-Beads SM-2 nonpolar polystyrene adsorbents are analytical-grade neutral macroporous polymeric beads with a high surface area for adsorbing organics of MW <2,000. These beads can be used in aqueous solution and with solvents or solvent mixtures, including alcohols, petroleum ether, diethyl ether, and hexane, without expansion or contraction of the beads.

Common applications of Bio-Beads SM-2 adsorbents include the removal of detergents such as Triton X-100, the removal of organics such as polyaromatic hydrocarbons from water, cleanup of drugs from plasma and urine, cleanup of biological metabolites and pesticides, and cleanup of dyes and mycotoxins from food products.



Bio-Beads SM-2 Adsorbent

For More Information
Web: bio-rad.com/biobeads_SM2
Download bulletin: 1461
Request or download bulletin: 6905

Ordering Information

Catalog #	Description
1528920	**Bio-Beads SM-2 Adsorbents**, 25 g
1523920	**Bio-Beads SM-2 Adsorbents**, 100 g
152-3922	**Bio-Beads SM-2 Adsorbents**, 1 kg
152-3923	**Bio-Beads SM-2 Adsorbents**, 10 kg

Chromatography Sample Packs, Kits, and Standards

Sample Packs

Bio-Rad offers its most popular resins in a variety of convenient sampler packs:

- **Resin sampler pack** — includes 25 ml each of UNOsphere™ Q and S, Nuvia S, Macro-Prep® DEAE, High Q, and High S; 5 ml of UNOsphere SUPrA™; 10 g each of CHT™ ceramic hydroxyapatite Types I and II, 40 µm; and 10 g of CFT™ ceramic fluoroapatite Type II resins
- **Bio-Scale™ Mini ion exchange sampler pack** — includes one 1 ml cartridge each of UNOsphere Q and S, Macro-Prep High Q and High S, and DEAE resins
- **Bio-Scale Mini affinity sampler pack** — includes one 1 ml cartridge each of Profinity™ IMAC, Affi-Prep® Protein A, and Profinity GST resins and one 5 ml cartridge each of DEAE Affi-Gel® Blue and Affi-Gel Blue resins

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

Resin Sampler Packs

Bio-Scale Mini Cartridges

Bio-Scale Mini Ion Exchange and Affinity Sampler Packs

Ordering Information

Catalog #	Description
Process Scale Media	
1580100	**Resin Sampler Pack**, includes 25 ml each of Macro-Prep DEAE, Macro-Prep High Q, Macro-Prep High S, UNOsphere Q, UNOsphere S, 5 ml of UNOsphere SuPrA, 10 g each of CHT ceramic hydroxyapatite Types I and II, 40 µm, and 10 g of CFT ceramic fluoroapatite Type II, 40 µm
Lab Scale Media	
7324650	**Bio-Scale Mini Ion Exchange Sampler Pack**, includes one 1 ml cartridge each of UNOsphere S, UNOsphere Q, Macro-Prep High Q, Macro-Prep High S, Macro-Prep DEAE
7324651	**Bio-Scale Mini Affinity Sampler Pack**, includes one 1 ml cartridge each of Profinity IMAC, Affi-Prep Protein A, and Profinity GST, one 5 ml cartridge each of DEAE Affi-Gel Blue and Affi-Gel Blue

Bio-Scale™ Mini Kits

Bio-Scale Mini Apatite Purification Kit

CHT™ ceramic hydroxyapatite and CFT™ ceramic fluoroapatite have comparable biomolecule separation characteristics, differing mostly in the pH buffer range in which they optimally perform. Ceramic hydroxyapatite exhibits pH stability as low as 6.5, whereas the fluorine substitution in ceramic fluoroapatite extends pH stability to values as low as 5.6. The Bio-Scale Mini apatite purification kit is designed as a convenient way to evaluate which apatite material provides optimal chromatographic performance for your application.

- Prepacked cartridges with CHT Type I and II ceramic hydroxyapatite and CFT Type II ceramic fluoroapatite for convenient process development
- Low bed volume, allowing minimum requirements for sample and buffer
- Luer fitting for convenient connection to any chromatographic system
- Distinct selectivity and different pH ranges

Bio-Scale Mini mAb Purification Kit

Maximize method optimization and parameter screening for monoclonal antibodies with the Bio-Scale Mini mAb purification kit. This convenient process development

workflow–based kit contains UNOsphere SUPrA™ affinity resin, UNOsphere™ Q resin, and CHT Type I ceramic hydroxyapatite to address the entire range of needs for monoclonal antibody capture, intermediate contaminant removal, and final polishing.

- Convenient prepacked columns with a simple luer fitting for easy connection to any chromatography system
- Ideal for screening and optimization of purification protocols
- Reproducible and scalable results

For More Information
Web: bio-rad.com/resinsampling
Request or download bulletin: 5728

Ordering Information

Catalog #	Description
7324407	**Bio-Scale Mini Apatite Purification Cartridge Kit**, includes one each, 5 ml prepacked CFT ceramic fluoroapatite Type II, 40 µm and CHT ceramic hydroxyapatite Type I and II, 40 µm, multimodal chromatography media cartridges
7324408	**Bio-Scale Mini mAb Purification Cartridge Kit**, includes one each, 5 ml prepacked UNOsphere SUPrA affinity media, UNOsphere Q media, and CHT ceramic hydroxyapatite Type I, 40 µm, cartridges

See Also

Ion exchange resins: page 78.
Macro-Prep ion exchange media: page 81.
UNOsphere and Nuvia ion exchange media: page 78.
CHT ceramic hydroxyapatite: pages 89–90.
CFT ceramic fluoroapatite: pages 91–92.
Macro-Prep HIC resins: page 109.
Bio-Scale Mini cartridges: page 119.

Chromatography Standards

Ion Exchange Chromatography Standards

Bio-Rad offers two protein standards for ion exchange chromatography that are suitable for use with bulk resins, cartridges, or columns. Each standard is supplied as a set of six vials of lyophilized protein mixture for qualitative analysis only.

Organic Acid Standard

Bio-Rad's organic acid standard is supplied as a set of six vials of lyophilized mixture for qualitative analysis only.

Carbohydrate Analysis Standard

Bio-Rad's carbohydrate standard is supplied as a set of six vials of lyophilized mixture for qualitative analysis only. The standards can be used for column testing or semiquantitative determination.

Gel Filtration Chromatography Standard

Bio-Rad's gel filtration standard is a calibration standard for size exclusion columns used in protein purification. The mixture includes vitamin B_{12} and myoglobin, which are visible when eluting from glass or clear plastic columns, to ensure that the column is properly packed and the sample is eluting evenly. The standard can be used with most size exclusion HPLC columns. The standard is supplied as a set of six vials of lyophilized protein mixture.

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

Standard Specifications

Description	Contents	MW	pI	For Use with
Protein Standard for Anion Exchange Chromatography	Equine myoglobin Conalbumin Chicken ovalbumin Soybean trypsin inhibitor	17,000 77,000 45,000 21,500	6.9 4.9 4.6 4.5	UNO® Q columns; Bio-Scale™ Mini UNOsphere™ Q cartridges; Macro-Prep™ High Q and DEAE resins; UNOsphere Q resin
Protein Standard for Cation Exchange Chromatography	Equine myoglobin Ribonuclease A Cytochrome c	17,000 13,500 12,000	6.9 8.7 10.7	UNO S columns; Bio-Scale Mini UNOsphere S cartridges; Macro-Prep High S and CM resins; UNOsphere S resin
Organic Acid Analysis Standard	Sodium oxalate Sodium citrate Sodium malate Sodium succinate Sodium formate Sodium acetate	134 294 196 270 69 82		Aminex® HPX-87H column; organic acid analysis kit
Carbohydrate Analysis Standard	Melezitose Maltose Glucose Mannose Fructose Adonitol (ribitol)	504 360 180 180 180 152		Aminex HPX-87C column; carbohydrate analysis kit
Gel Filtration Standard	Thyroglobulin Bovine γ-globulin Chicken ovalbumin Equine myoglobin Vitamin B_{12}	670,000 158,000 44,000 17,000 1,350	4.5 5.1 4.6 6.9 4.5	SEC columns; Bio-Gel® P resin; ENrich™ SEC columns

Ordering Information

Catalog #	Description	Contents	MW	pI	For Use with
1250561	**Protein Standard for Anion Exchange Chromatography**, 6 vials	Equine myoglobin Conalbumin Chicken ovalbumin Soybean trypsin inhibitor	17,000 77,000 45,000 21,500	6.9 4.9 4.6 4.5	ENrich Q Columns; UNO Q columns; Bio-Scale Mini UNOsphere Q cartridges; Macro-Prep High Q and DEAE media; UNOsphere Q media
1250562	**Protein Standard for Cation Exchange Chromatography**, 6 vials	Equine myoglobin Ribonuclease A Cytochrome c	17,000 13,500 12,000	6.9 8.7 10.7	ENrich S Columns; UNO S columns; Bio-Scale Mini UNOsphere S cartridges; Macro-Prep High S and CM media; UNOsphere S media
1250586	**Organic Acid Analysis Standard**, 6 vials	Sodium oxalate Sodium citrate Sodium malate Sodium succinate Sodium formate Sodium acetate	134 294 196 270 69 82		Aminex HPX-87H column; organic acid analysis kit
1250585	**Carbohydrate Analysis Standard**, 6 vials	Melezitose Maltose Glucose Mannose Fructose Adonitol (ribitol)	504 360 180 180 180 152		Aminex HPX-87H column; carbohydrate analysis kit
1511901	**Gel Filtration Standard**, 6 vials	Thyroglobulin Bovine γ-globulin Chicken ovalbumin Equine myoglobin Vitamin B_{12}	670,000 158,000 44,000 17,000 1,350	4.5 5.1 4.6 6.9 4.5	ENrich SEC columns; Bio-Gel P media

Chromatography Columns

A complete range of prepacked and empty columns and accessories is available for protein and peptide separations. Bio-Rad's many disposable spin and gravity chromatography columns are made of chemically compatible polypropylene, are autoclavable, and can be washed with NaOH. Our low-pressure glass Econo-Column® chromatography columns offer an ideal combination of performance, reliability, and value. For high-resolution separations, Bio-Rad's Bio-Scale™ MT medium-pressure columns can be run on a variety of liquid chromatography systems and are provided prepacked with selected resins.

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

Prepacked Chromatography Columns

Prepacked Cartridge Selection Guide by Application

Application	Media	Type of Separation	Chemical Form	Binding Capacity/ml
Antibody/mAb Purification	UNOsphere SUPrA™	Affinity	rProtein A	Human IgG: 30 mg/ml*
	Affi-Prep® Protein A	Affinity	Protein A	Mouse monoclonal IgG: 8–10 mg; human IgG: 16–23 mg
	UNOsphere™ Q	Strong anion exchange	$-N(CH_3)_3^+$	BSA: 180 mg/ml*
	Nuvia™ Q	Strong anion exchange	$-N(CH_3)_3^+$	IgG: >170 mg/ml at 300 cm/hr
	Nuvia™ cPrime™	Hydrophobic cation exchange	$-N(CH_3)_3^+$	Lactoferrin: >60 mg/ml; IgG: 40 mg/ml
	Nuvia S	Strong cation exchange	$-SO_3^-$	IgG: 110 mg/ml
	Nuvia HR-S	High-resolution strong cation exchange	$-SO_3^-$	IgG: ≥70 mg/ml
	CHT™ Type I, 40 µm	Hydroxyapatite	$Ca_5(PO_4)_3(OH)_2$	Human IgG: 25–60 mg
	CHT Type II, 40 µm	Hydroxyapatite	$Ca_5(PO_4)_3(OH)_2$	Human IgG: 15–25 mg
	MPC™	Hydroxyfluoroapatite	$Ca_{10}(PO_4)_6(OH)_{1.5}(F)_{0.5}$	Human IgG: 25–50 mg/ml
	CFT™	Fluoroapatite	$Ca_{10}(PO_4)_6F_2$	Lysozyme: 14–21.5 mg/g
	DEAE Affi-Gel® Blue	Affinity	Cibacron Blue F3GA and DEAE	Serum: 0.2–1.0 ml
Affinity Protein Purification	Nuvia IMAC	Affinity	Nitrilotriacetic acid (NTA)	Recombinant histidine-tagged protein: ≥40 mg
	Profinity™ IMAC	Affinity	Iminodiacetic acid	Recombinant histidine-tagged protein: ≥15 mg
	Profinity GST	Affinity	Glutathione	Recombinant GST-tagged protein: ≥10 mg/ml
	Profinity eXact™	Affinity	Modified subtilisin	Tag-free maltose-binding protein/ml resin: >3 mg/ml
	UNOsphere SUPrA	Affinity	rProtein A	Human IgG: 30 mg/ml*
Protein Purification	Nuvia Q	Strong anion exchange	$-N(CH_3)_3^+$	IgG: >170 mg/ml at 300 cm/hr
	Nuvia HP-Q	High-throughput strong anion exchange	$-N(CH_3)_3^+$	Thyroglobulin: ≥28 mg/ml at 150 cm/hr
	Nuvia cPrime	Hydrophobic cation exchange	$-N(CH_3)_3^+$	Lactoferrin: >60 mg/ml; IgG: 40 mg/ml
	Nuvia S	Strong cation exchange	$-SO_3^-$	IgG: 110 mg/ml
	Nuvia HR-S	High-resolution strong cation exchange	$-SO_3^-$	IgG: ≥70 mg/ml
	Macro-Prep® High S	Strong cation exchange	$-SO_3^-$	Human IgG: ≥49 mg
	CHT	Hydroxyapatite	$Ca_5(PO_4)_3(OH)_2$	Human IgG: 25–60 mg/ml*
	MPC	Hydroxyfluoroapatite	$Ca_{10}(PO_4)_6(OH)_{1.5}(F)_{0.5}$	Human IgG: 25–50 mg/ml
	CFT	Fluoroapatite	$Ca_{10}(PO_4)_6F_2$	Lysozyme: 14–21.5 mg/g
High-Resolution Polishing	ENrich™ Q	Strong anion exchange	$-N(CH_3)_3^+$	Albumin: 130 mg/ml
	ENrich S	Strong cation exchange	$-SO_3^-$	IgG: 120 mg/ml
	ENrich SEC	Size exclusion	–	500–70,000 Da 5,000–650,000 Da

* Binding capacity based on bulk media; check individual instruction manuals for run conditions and specifications.

Prepacked Cartridge Selection Guide by Application (cont.)

Application	Media	Type of Separation	Chemical Form	Binding Capacity/ml
Desalting, Buffer Exchange	Bio-Gel® P-6	Gel filtration	Polyacrylamide	CV: 10–22%
Purification of Serum Proteins, Enzymes	Affi-Gel® Blue	Affinity	Cibacron Blue F3GA	Serum: 0.2 ml; albumin: 11 mg
Plasmid Purification	Macro-Prep High Q	Strong anion exchange	$-N(CH_3)_3^+$	BSA: ≥37 mg
	UNOsphere Q	Strong anion exchange	$-N(CH_3)_3^+$	BSA: 180 mg
	UNOsphere S	Strong cation exchange	$-SO_3^-$	Human IgG: 60 mg
	Macro-Prep DEAE	Weak anion exchange	$-HN^+(C_2H_5)_2$	Protein: >35 mg
	CHT	Hydroxyapatite	$Ca_5(PO_4)_3(OH)_2$	Human IgG: 25–60 mg/ml*
	MPC	Hydroxyfluoroapatite	$Ca_{10}(PO_4)_6(OH)_{1.5}(F)_{0.5}$	Human IgG: 25–50 mg/ml
	CFT	Fluoroapatite	$Ca_{10}(PO_4)_6F_2$	Lysozyme: 14–21.5 mg/g

* Binding capacity based on bulk media; check individual instruction manuals for run conditions and specifications.

ENrich™ High-Resolution Ion Exchange Columns

See Also
Ion exchange chromatography standards: page 112.

ENrich ion exchange columns are designed for high-resolution separations at fast flow rates. ENrich columns run at low backpressures on the NGC™ chromatography system or any other medium- to high-pressure purification system. This allows more flow rate flexibility in both sample viscosities and temperature conditions. The 1 ml ENrich column can complete a high-resolution separation in about 10 minutes. ENrich columns are also available in 8 ml sizes.

The unique polymeric resin features:

- High capacity even at high flow rates
- Superior quality, reproducible separations
- Lower backpressure than similar resins
- Stability from pH 2–12
- Available for strong anion (Q) and strong cation (S) exchange

ENrich glass columns — provide high-resolution separation of biomolecules. The durable borosilicate glass tube and PEEK 10-32 female end fittings are compatible with all aqueous solvents.

For More Information
Visit bio-rad.com/ENrich

Ordering Information

Catalog #	Description	Column Volume, ml	Recommended Maximum Protein Load, mg/column	Column Flow Dimensions (W x L), mm	Maximum Operating Pressure psi	MPa	bar
ENrich High-Resolution Ion Exchange Columns							
7800001	**ENrich Q 5 x 50 Column**	1	100	5 x 50	500	3.45	34.5
7800003	**ENrich Q 10 x 100 Column**	8	800	10 x 100	500	3.45	34.5
7800021	**ENrich S 5 x 50 Column**	1	100	5 x 50	500	3.45	34.5
7800023	**ENrich S 10 x 100 Column**	8	800	10 x 100	500	3.45	34.5

Catalog #	Description
Fittings	
7500564	**Fitting Adapters 1/4"-28F to 10-32M**, pkg of 2, fittings to connect one HPLC column (10-32) to BioLogic DuoFlow and NGC systems
7500568	**UNO 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an HPLC system, for use with BioLogic DuoFlow and NGC systems
7800008	**Fittings, 10-32 PEEK**, black, 2/PK
7800091	**ENrich 5 Frit Kit**, includes 2 frits, 1 frit remover, 2 O-rings
7800093	**ENrich 10 Frit Kit**, includes 2 frits, 1 frit remover, 2 O-rings

ENrich™ High-Resolution Size Exclusion Columns

ENrich size exclusion columns are designed for high resolution at fast flow rates. ENrich columns run at low backpressures on the NGC™ chromatography system or any other medium- to high-pressure purification system. This allows more flow rate flexibility in both sample viscosities and temperature conditions. The 24 ml ENrich column can complete a high-resolution separation in less than 30 minutes at a flow rate of 1 ml/min.

The unique polymeric resin features:

- High resolution based on size
- Superior quality, reproducible separations
- Lower backpressure than similar resins
- Stability from pH 2–12
- Separation ranges from 500–70,000 and 5,000–650,000 Da

ENrich glass columns — provide high-resolution separation of biomolecules. The durable borosilicate glass tube and PEEK 10-32 female end fittings are compatible with all aqueous solvents.

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

Ordering Information

Catalog #	Description	Column Volume, ml	Separation Range Globular Proteins, Da	Column Dimensions (W x L), mm	Maximum Operating Pressure psi	MPa	bar
ENrich High-Resolution Ion Exchange Columns							
7801070	**ENrich SEC 70 10 x 300 Column**	24	500–70,000	10 x 300	600	4.1	41
7801650	**ENrich SEC 650 10 x 300 Column**	24	5,000–650,000	10 x 300	600	4.1	41

Catalog #	Description
Fittings	
7500564	**Fitting Adapters 1/4"-28F to 10-32M**, pkg of 2, fittings to connect one HPLC column (10-32) to BioLogic DuoFlow and NGC systems
7500568	**UNO 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an HPLC system, for use with BioLogic DuoFlow and NGC systems
7800008	**Fittings, 10-32 PEEK**, black, 2/PK
7800093	**ENrich 10 Frit Kit**, includes 2 frits, 1 frit remover, 2 O-rings

Catalog #	Description	Contents	MW	pI	For Use with
Standard					
1511901	**Gel Filtration Standard**, 6 vials	Thyroglobulin	670,000	4.5	ENrich SEC columns; Bio-Gel P media
		Bovine γ-globulin	158,000	5.1	
		Chicken ovalbumin	44,000	4.6	
		Equine myoglobin	17,000	6.9	
		Vitamin B_{12}	1,350	4.5	

Foresight™ Prepacked Plates and Columns

Foresight plates and columns are prepacked with a range of Bio-Rad's process chromatography resins, offering process scientists convenience and reliability for their high-throughput experimentation needs. The products' robust design allows researchers to use the prepacked formats through the entire purification development cycle, from high-throughput resin screening to small-scale method development and scale-up optimization.

Benefits include:

- Prepacked and ready-to-use formats designed to save process development time
- Ability to evaluate different experimental conditions to better define an operational window
- Ability to perform high-throughput experiments with minimum sample requirements
- Available in a variety of chromatography modes that are designed for large-scale bioprocess
- Compatible with robotic liquid handling workstations
- Standard 10-32 male end fittings for easy connection of column to many chromatography systems

For More Information
Web: bio-rad.com/foresight
Request or download bulletin: 6297

Ordering Information

Catalog #	Description
Foresight Plates*	
732-4714	**Foresight UNOsphere Q**, 20 µl
732-4710	**Foresight UNOsphere S**, 20 µl
732-4703	**Foresight Nuvia Q**, 20 µl
732-4701	**Foresight Nuvia S**, 20 µl
732-4707	**Foresight Nuvia HR-S**, 20 µl
12006908**	**Foresight Nuvia HP-Q**, 20 µl
732-4705	**Foresight Nuvia cPrime**, 20 µl
732-4716	**Foresight CHT Type I**, 40 µm 20 µl
732-4718	**Foresight CHT Type II**, 40 µm, 20 µl
732-4785	**Foresight MPC Type I**, 40 µm, 20 µl
12004035	**Foresight Nuvia IMAC Ni-Charged**, 20 µl

continues

Ordering Information

Description	1 ml	5 ml
Foresight Columns		
Foresight UNOsphere Q	732-4732	732-4752
Foresight UNOsphere S	732-4730	732-4750
Foresight Nuvia Q	732-4721	732-4741
Foresight Nuvia S	732-4720	732-4740
Foresight Nuvia HR-S	732-4723	732-4743
Foresight Nuvia HP-Q	12007020**	12007021**
Foresight Nuvia cPrime	732-4722	732-4742
Foresight CHT Type I, 40 µm	732-4735	732-4755
Foresight CHT Type II, 40 µm	732-4736	732-4756
Foresight MPC Type I, 40 µm	732-4737	732-4757
Foresight Nuvia IMAC Ni-Charged	12004038	12004037
Description	**200 µl**	**600 µl**
Foresight RoboColumn Units*,†		
Foresight UNOsphere Q	732-4819	732-4820
Foresight UNOsphere S	732-4813	732-4814
Foresight Nuvia Q	732-4804	732-4805
Foresight Nuvia S	732-4801	732-4802
Foresight Nuvia HR-S	732-4831	732-4832
Foresight Nuvia HP-Q	12007013**	12007014**
Foresight Nuvia cPrime	732-4807	732-4808
Foresight CHT Type I, 40 µm	732-4822	732-4823
Foresight CHT Type II, 40 µm	732-4825	732-4826
Foresight MPC Type I, 40 µm	732-4828	732-4829
Foresight Nuvia IMAC Ni-Charged	12004051	12004052

Catalog#	Description
Fittings	
7601311	**Long Fingertight Fittings**, 10-32 x 1.03", for connecting 1/16" PEEK and Tefzel tubing to an FPLC system, 4
7500564	**Fitting Adapters 1/4"-28F to 10-32M**, pkg of 2, fittings to connect one HPLC column (10-32) to BioLogic DuoFlow and NGC systems

* Package size: 2 x 96-well plates.
** Coming soon.
*** Package size: 1 row of 8 columns.
† Foresight RoboColumn units are to be used with robotic liquid handling workstations.

For more information on prepacked columns and plates, please visit **bio-rad.com/foresight**.

See Also
Ion exchange chromatography standards: page 112.

Bio-Scale™ Mini Cartridges

See Also
Bottled resins: pages 75–78.
BioLogic LP systems: page 156.

Bio-Scale Mini cartridges have a double-wall cartridge design that provides extra durability and allows easy, reliable runs at pressures up to 45 psi using the aqueous buffers most commonly employed for protein separation. The cartridges are prepacked with Bio-Rad's chromatography resins for ion exchange, affinity, size exclusion, or hydroxyapatite technology and are available in 1, 5, 10, and 50 ml formats. Bio-Scale Mini cartridges are convenient and ready to use.

The cartridges can be used with any chromatography system and are ideal with the NGC™ chromatography systems, BioLogic™ systems, or a peristaltic pump. For simple step elution, the cartridges can be used with a luer lock syringe. Fittings are available for connection to HPLC and FPLC systems.

Bio-Scale™ Mini Nuvia™ IMAC cartridges are 5 ml Bio-Scale Mini cartridges filled with Nuvia Ni-charged IMAC resin. They are used for the purification of recombinant histidine (His)-tagged proteins by immobilized metal affinity chromatography (IMAC).

For More Information
Web: bio-rad.com/cartridges
Download bulletins: 5444, 5574, and 5584

Ordering Information

Description	1 x 1 ml	5 x 1 ml	1 x 5 ml	5 x 5 ml
Prepacked Cartridge Media Type				
UNOsphere Q	—	7324100	7324102	7324104
UNOsphere S	—	7324110	7324112	7324114
UNOsphere SUPrA rProtein A	7324200	7324201	7324202	—
Nuvia S	7324420	7324421	7324422	7324423
Macro-Prep High Q	—	7324120	7324122	7324124
Macro-Prep High S	—	7324130	7324132	7324134
Macro-Prep DEAE	—	7324140	7324142	7324144
Affi-Prep Protein A	—	7324600	7324602	—
Nuvia IMAC	—	—	7800811	7800812
Profinity IMAC Ni-Charged	—	7324610	7324612	7324614
Profinity GST	—	7324620	7324622	7324624
DEAE Affi-Gel Blue	—	—	7324632	7324634
Affi-Gel Blue	—	—	7324642	7324644
CHT Type I, 40 µm	—	—	7324322	7324324
CHT Type II, 40 µm	—	—	7324332	7324334
CFT Type II	—	—	7324405	7324406

Description	Pack of 1	Pack of 5
Bio-Gel P-6 , 10 ml	—	7325304
Bio-Gel P-6 , 50 ml	7325312	7325314

Catalog #	Description
Adaptor Fittings	
7885010	**Luer to 10-32 Adaptor Fittings Kit,** includes female slip luer to female 10-32 fitting to connect male end of luer column to NGC system
7320111	**Luer to M6 Adaptor Fittings Kit**, includes luer to M6 fittings to connect 1 cartridge to an FPLC system
7320112	**Luer to 10-32 Adaptor Fittings Kit**, includes luer to 10-32 fittings to connect 1 cartridge to an HPLC system or NGC system
7320113	**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems

See Also
Ion exchange chromatography standards: page 112.

Bio-Scale™ Mini Cartridge Purification Sampler Packs and Kits

Protein purification sampler packs offer a quick way to experiment with separation techniques when the protein to be purified has not yet been characterized.

The Bio-Scale Mini ion exchange sampler pack includes a 1 ml UNOsphere™ Q cartridge, 1 ml UNOsphere S cartridge, 1 ml Macro-Prep® Q cartridge, 1 ml Macro-Prep S cartridge, and 1 ml Macro-Prep DEAE cartridge.

The Bio-Scale Mini affinity sampler pack includes a 1 ml Profinity™ IMAC cartridge, 1 ml Profinity GST cartridge, 1 ml Affi-Prep® Protein A cartridge, 5 ml DEAE Affi-Gel® Blue cartridge, and 5 ml Affi-Gel Blue cartridge.

The Bio-Scale Mini mAb purification cartridge kit includes the three most commonly used media for purification of monoclonal antibody. The kit includes a UNOsphere SUPrA™ affinity cartridge for capture, a UNOsphere Q cartridge for the intermediate step, and a CHT™ Type I, 40 µm cartridge for the polishing step.

A list of all cartridges is included above in Ordering Information for Bio-Scale Mini cartridges. For a list of all prepacked columns, see pages 114–115.

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

Ordering Information

Catalog #	Description
Bio-Scale Mini Cartridge Purification Sampler Packs and Kits	
7324650	**Bio-Scale Mini Ion Exchange Sampler Pack**, includes one 1 ml cartridge each of UNOsphere S, UNOsphere Q, Macro-Prep High Q, Macro-Prep High S, Macro-Prep DEAE
7324651	**Bio-Scale Mini Affinity Sampler Pack**, includes one 1 ml cartridge each of Profinity IMAC, Affi-Prep Protein A, Profinity GST, one 5 ml cartridge each of DEAE Affi-Gel Blue and Affi-Gel Blue
7324407	**Bio-Scale Mini Apatite Purification Cartridge Kit**, includes one each of prepacked CFT ceramic fluoroapatite Type II, 40 µm, and CHT ceramic hydroxyapatite Type I and II, 40 µm, mixed-mode chromatography media cartridges, 1 x 5 ml each
7324408	**Bio-Scale Mini mAb Purification Cartridge Kit**, includes one each of UNOsphere SUPrA A and Q cartridges and CHT Type I, 40 µm cartridge, 1 x 5 ml each
Adaptor Fittings	
7885010	**Luer to 10-32 Adaptor Fittings Kit,** includes female slip luer to female 10-32 fitting to connect male end of luer column to NGC system
7320111	**Luer to M6 Adaptor Fittings Kit**, includes luer to M6 fittings to connect 1 cartridge to an FPLC system
7320112	**Luer to 10-32 Adaptor Fittings Kit**, includes luer to 10-32 fittings to connect 1 cartridge to an HPLC system or NGC system
7320113	**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems

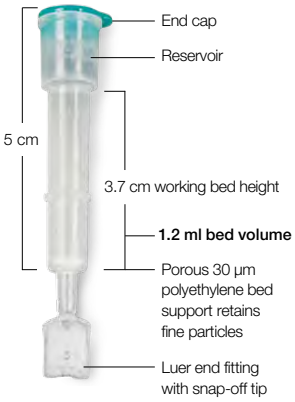
Bio-Spin® and Micro Bio-Spin™ Columns

See Also

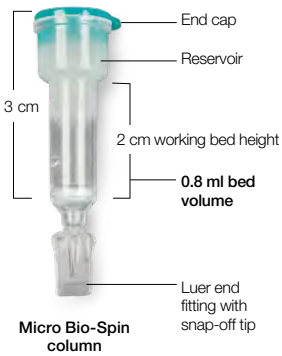
Nucleic acid sample preparation: page 9.

Bio-Spin P-6 and Micro Bio-Spin P-6 columns are ideal for desalting protein samples quickly using size exclusion chromatography. Filled with Bio-Gel® P-6 or P-30 resin, these columns are shipped fully hydrated in Tris buffer and are ready to use. These products effectively clean up and remove salts, nucleotides, dye terminators, and small molecules from protein, RNA, and DNA samples in just 10 minutes. The columns are autoclavable.

- Provide fast salt and contaminant removal in an easy-to-use spin-column format
- Remove compounds <6 kD by size exclusion chromatography
- Accommodate up to 100 µl of sample (Bio-Spin columns)
- Accommodate up to 70 µl of sample (Micro Bio-Spin columns)



Bio-Spin column



Micro Bio-Spin column

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

Bio-Spin Column Selection Guide

	Bio-Spin P-6	Micro Bio-Spin P-6	Bio-Spin P-30	Micro Bio-Spin P-30
Equilibration buffer	SSC buffer*	10 mM Tris, pH 7.4, or SSC buffer*	SSC buffer*	10 mM Tris, pH 7.4, or SSC buffer*
Applications	Desalting and buffer exchange	Desalting and buffer exchange	Desalting; nucleotide and small molecule removal	DNA sequencing reaction mixtures (Tris) and small molecule removal
Retention and recovery	90% recovery of 20 bases or bp, 99% retention of salts	90% recovery of 20 bases or bp, 99% retention of salts	95% recovery of 22 bases or bp, 98% retention of ddNTPs	95% recovery of 22 bases or bp, 98% retention of ddNTPs
MW exclusion limit, globular proteins	6,000	6,000	40,000	40,000
Sample volume	50–100 µl	10–75 µl	50–100 µl	10–75 µl
Centrifuge type	Swinging bucket	Microcentrifuge	Swinging bucket	Microcentrifuge

* 150 mM NaCl, 17.5 mM sodium citrate, pH 7.0.

Ordering Information

Catalog #	Description
7326227	**Bio-Spin P-6 Columns**, 25 with Tris buffer
7326228	**Bio-Spin P-6 Columns**, 100 with Tris buffer
7326221	**Micro Bio-Spin P-6 Columns**, 25 with Tris buffer
7326222	**Micro Bio-Spin P-6 Columns**, 100 with Tris buffer
7326006	**Bio-Spin P-30 Columns**, 25 with SSC buffer
7326202	**Micro Bio-Spin P-30 Columns**, 25 with SSC buffer
7326203	**Micro Bio-Spin P-30 Columns**, 100 with SSC buffer

Go to **bio-rad.com/cartridges** for current information on prepacked cartridges.

See Also
ProteoMiner protein enrichment system: page 7.

Mini Bio-Spin™ Columns

Mini Bio-Spin columns are available with 0.6 ml prepacked resin for both affinity-tagged purification and protein enrichment applications. The columns contain Profinity eXact™ resins for affinity-tagged purification and on-column cleavage; see page 97.

For More Information
Web: bio-rad.com/minibiospin
Download bulletins: Profinity eXact fusion-tag system — 5725, 5742, and 5766; ProteoMiner beads — 3096 and 5635

Ordering Information

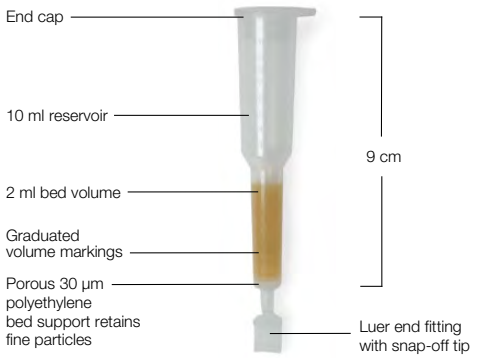
Catalog #	Description
1563007*	**Profinity eXact Mini Spin Columns**, includes ten 0.6 ml spin columns, ten 2 ml capped tubes, and ten 2 ml capless tubes

* For ProteoMiner kits, see page 7.

Poly-Prep® Ion Exchange Columns

Poly-Prep prepacked columns for gravity-flow chromatography provide convenience for sample preparation and other small-scale applications. The graduated polypropylene columns hold a standard bed volume of 2 ml of AG® ion exchange resin and include an integral 10 ml reservoir. A Poly-Prep stack cap, which allows connection to pumps, reservoirs, or columns in series, is also available.

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



Ordering Information

Catalog #	Description	Particle Size, µm	Ionic Form	Application
7316211	**Poly-Prep Columns**, AG 1-X8 resin, 100–200 mesh, 50	106–180	Chloride	Separation of low molecular weight inorganic anions
7316212	**Poly-Prep Columns**, AG 1-X8 resin, 200–400 mesh, 50	45–106	Chloride	For high-resolution random separations
7316221	**Poly-Prep Columns**, AG 1-X8 resin, 200–400 mesh, 50	45–106	Formate	Separation of low molecular weight biological compounds such as nucleotides, peptides, and carboxylic acids
7316213	**Poly-Prep Columns**, AG 50W-X8, 100–200 mesh, 50	106–250	Hydrogen	Separation and concentration of low molecular weight cations such as small peptides and amino acids
7316214	**Poly-Prep Columns**, AG 50W-X8, 200–400 mesh, 50	63–150	Hydrogen	For high-resolution random separations
7311555	**Poly-Prep Column Stack Cap**, 50			Allows connection of pumps, reservoirs, or columns in series
7328102	**Stopcock, Lock 2-Way Luer**, 10			Provides control of flow through Poly-Prep columns

Bio-Scale™ CHT™ Type I Columns

Bio-Scale CHT Type I columns are packed with CHT ceramic hydroxyapatite, Type I 10 µm resin, which has high affinity for basic proteins and lower affinity for acidic proteins. These prepacked columns allow rapid, reproducible high-resolution separations for analytical to semipreparative medium-pressure applications. These columns are ideal for use with any medium- to high-pressure chromatography system. Available bed volumes are 2, 5, 10, and 20 ml.

Bio-Scale CHT Type I Column Top-Off Support Kit
If the top of the column bed becomes fouled and the usual hygiene steps do not restore performance, a few milliliters

of the bed can be removed and replaced with fresh support. The Bio-Scale CHT Type I column top-off support kit contains 1 ml support, frits, and distribution screens for each column diameter.

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

Ordering Information

Catalog #	Description	Column Volume, ml	Recommended Flow Rate, ml/min	Recommended Flow Rate, ml/min	Column Dimensions (W x L), mm	Maximum Operating Pressure, psi
7510021	**Bio-Scale CHT2-I Column**	2	20	0.5–3.0	7 x 52	1,000
7510023	**Bio-Scale CHT5-I Column**	5	50	0.5–5.0	10 x 64	750
7510025	**Bio-Scale CHT10-I Column**	10	100	0.5–7.0	12 x 88	600
7510027	**Bio-Scale CHT20-I Column**	20	200	0.5–10.0	15 x 113	500
7510029	**CHT-I Top-Off Support Kit**, 1 ml					

See Also

Bio-Scale replacement parts: page 133.
NGC systems: page 134.
CHT ceramic hydroxyapatite: pages 89–90.
Bio-Scale Mini cartridges: page 119.

UNO® Monolith Ion Exchange Columns

UNO monolith ion exchange columns contain a patented* continuous-bed matrix, allowing biomolecule separations at high flow rates without sacrificing resolution or capacity.

UNO columns run at low backpressures on medium- to high-pressure chromatography systems. A 1 ml UNO column can complete a high-resolution separation in about 3 minutes. UNO columns are also available in 6 and 12 ml sizes.

The unique homogeneous UNO matrix:

- Provides large pore diameters especially suited for purifying larger proteins, DNA, and virus
- Has high capacity, even at high flow rates, due to the dense network of nodules that contain the ionic functional groups. These groups are completely accessible to biomolecules via the interconnecting channels
- Has the highest quality and batch-to-batch reproducibility
- Prevents fragmentation so columns last longer
- Is stable from pH 2–12
- Is available for strong anion (Q) and strong cation (S) exchange

* U.S. patent 6,423,666.

UNO replacement columns — UNO replacement columns provide a simple bed replacement as an alternative to purchasing a new column.

UNO glass columns — UNO glass columns provide high-resolution separation of biomolecules. The transparent glass tube allows easy bed inspection and column troubleshooting. Three column sizes provide flexibility for purification protocols.

UNO polishing PEEK columns — UNO polishing columns, 0.16 ml, are a late-stage purification tool to obtain the highest resolution and recovery from small sample loads. They allow you to purify and concentrate dilute samples in one step.

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

See Also

UNOsphere ion exchange resin: pages 78–79.
NGC systems: page 134.

See Also
Ion exchange chromatography standards: page 112.

Ordering Information

Catalog #	Description	Column Volume, ml	Recommended Maximum Protein Load, mg/column	Recommended Flow Rate, ml/min	Column Flow Dimensions (W x L), mm	Maximum Operating Pressure psi	MPa	bar
7200001	**UNO Q1 Column**	1.3	20	0.5–5.0	7 x 35	700	4.5	48
7200003	**UNO Q6 Column**	6	90	0.5–8.0	12 x 53	700	4.5	48
7200005	**UNO Q12 Column**	12	180	0.5–8.0	15 x 68	700	4.5	48
7200021	**UNO S1 Column**	1.3	20	0.5–5.0	7 x 35	700	4.5	48
7200023	**UNO S6 Column**	6	90	0.5–8.0	12 x 53	700	4.5	48
7200025	**UNO S12 Column**	12	180	0.5–8.0	15 x 68	700	4.5	48
UNO Replacement Columns								
7200011	**UNO Q1R Column**	1.3	20	0.5–5.0	7 x 35	700	4.5	48
7200013	**UNO Q6R Column**	6	90	0.5–8.0	12 x 53	700	4.5	48
7200015	**UNO Q12R Column**	12	180	0.5–8.0	15 x 68	700	4.5	48
7200031	**UNO SR1 Column**	1.3	20	0.5–5.0	7 x 35	700	4.5	48
7200033	**UNO S6R Column**	6	90	0.5–8.0	12 x 53	700	4.5	48
7200035	**UNO S12R Column**	12	180	0.5–8.0	15 x 68	700	4.5	48
UNO Polishing PEEK Column								
7200009	**UNO Q Polishing Column**	0.16	2	0.1–1.0	4.6 x 10	200	1.3	14
7200029	**UNO S Polishing Column**	0.16	2	0.1–1.0	4.6 x 10	200	1.3	14

Catalog #	Description
Fittings	
7500554	**1/16" OD (1.6 mm) Post-Pump Fittings**, includes Delrin nut, ferrules, lock ring, 10 sets
7500568	**UNO 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an HPLC system, for use with BioLogic DuoFlow and NGC systems
7500567	**UNO M6 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an FPLC system

See Also
Organic acid standard: page 112.
Carbohydrate analysis standard: page 112.
NGC systems: page 134.

Aminex® HPLC Columns

Aminex HPLC columns are packed with a polystyrene divinylbenzene resin. Aminex resin has high pressure stability, wide pH stability, and high column efficiency and selectivity. Aminex HPLC columns separate compounds using the ion-moderated partition chromatography technique. Aminex columns are often used in the food, beverage, and biofuel industries. Aminex columns are an industry standard for the analysis of carbohydrates, organic acids, organic bases, and other small organic molecules, including peptides and nucleic acids. To separate complex mixtures with Aminex columns, simple isocratic mobile phases (often just water) and precise temperature control are used.

Aminex columns are commonly used for USP methods under the "L" specification. Specific designations are listed in the table below.

For More Information
Web: bio-rad.com/aminex
Download bulletins: 1928 and 6333

Ordering Information

Catalog #	Description	Guard Column*	Applications	Particle Size, µm	Ionic Form	Cross-Linkage %	pH Range	USP Number
Carbohydrate Analysis Columns								
1250143	**Aminex HPX-87N Column**, 300 x 7.8 mm	1250508	Beet sugars	9	Sodium	8	5–9	L58
1250142	**Aminex HPX-87K Column**, 300 x 7.8 mm	1250128	Molasses, corn syrup	9	Potassium	8	5–9	—
1250095	**Aminex HPX-87C Column**, 300 x 7.8 mm	1250128	High fructose corn syrup	9	Calcium	8	5–9	L19
1250094	**Aminex HPX-87C Column**, 250 x 4.0 mm	1250128	Sugar alcohols	9	Calcium	8	5–9	L19
1250098	**Aminex HPX-87P Column**, 300 x 7.8 mm	1250119 or 1250118	Pentose sugars, cellulose hydrolysates, biofuels	9	Lead	8	5–9	L34
1250140	**Aminex HPX-87H Column**, 300 x 7.8 mm	1250129	Sugars with organic acids, biofuels	9	Hydrogen	8	1–3	L17
1250096	**Aminex HPX-42C Column**, 300 x 7.8 mm	1250128	Oligosaccharides, thickening agents	25	Calcium	4	5–9	—
1250097	**Fast Carbohydrate Column**, 100 x 7.8 mm	1250119 or 1250118	Glucose, galactose, sucrose, fructose	9	Lead	8	5–9	—
1250105	**Fast Carbohydrate Column**, 100 x 7.8 mm	1250119 or 1250118	Glucose, galactose, sucrose, fructose	9	Lead	8	5–9	—
Organic Acid and Alcohol Columns								
1250140	**Aminex HPX-87H Column**, 300 x 7.8 mm	1250129	Sugars with organic acids, fermentation monitoring, biofuels	9	Hydrogen	8	1–3	L17
1250100	**Fast Acid Analysis Column**, 100 x 7.8 mm	1250129	Alcohol, glycol organic acid analysis	9	Hydrogen	8	1–3	—
1250115	**Fermentation Monitoring Column**, 150 x 7.8 mm	1250129	Sugar, acids, alcohols	9	Hydrogen	8	1–3	—
Application Kits for Food Analysis**								
1250234	**Organic Acid Analysis Kit**, includes 1250140, 1250129, and 1250586	Included	Organic acids	9	Hydrogen	8	1–3	—

Catalog #	Description	Applications	Ionic Form	pH Range
Micro-Guard Cartridges				
1250118***	**De-Ashing Refill Cartridges**, 30 x 4.6 mm, 2	Aminex silver- and lead-form columns	H^+ and CO_3^-	6–8
1250119	**Carbo-P Refill Cartridges**, 30 x 4.6 mm, 2	Aminex HPX-87P column	Lead	5–9
1250128	**Carbo-C Refill Cartridges**, 30 x 4.6 mm, 2	Aminex calcium- and potassium-form columns	Calcium	5–9
1250129	**Cation H Refill Cartridges**, 30 x 4.6 mm, 2	Aminex hydrogen-form columns	Hydrogen	1–3
1250506	**Anion CO_3^- Cartridges**, 30 x 4.6 mm, 2	Aminex silver- and lead-form columns	CO_3^-	—
1250508	**Cation Na^+ Cartridges**, 30 x 4.6 mm, 2	Aminex HPX-87N column	Sodium	5–9

continues

Catalog #	Description	Contents	MW	pI	For Use with
Standards					
1250585	**Carbohydrate Analysis Standard**, 6 vials	Melezitose	504		Aminex HPX-87H column; carbohydrate analysis kit
		Maltose	360		
		Glucose	180		
		Mannose	180		
		Fructose	180		
		Adonitol (ribitol)	152		
1250586	**Organic Acid Analysis Standard**, 6 vials	Sodium oxalate	134		Aminex HPX-87H column; organic acid analysis kit
		Sodium citrate	294		
		Sodium malate	196		
		Sodium succinate	270		
		Sodium formate	69		
		Sodium acetate	82		

Catalog #	Description
Cartridge Holders and Accessories	
1250131	**Standard Cartridge Holder**, for one 30 x 4.6 mm cartridge
1250147	**Cartridge Holder Seal Replacement Kit**, for #1250131
1250148	**Cartridge Holder Seals**, for #1250131
1250139	**De-Ashing Cartridge Holder**, for #1250118, holds two 3.0 x 4.6 mm cartridges in series
7800008	**Fittings, 10-32 PEEK**, black, 2/PK

* Supplied as 2 guard columns.
** Includes 1 column and 2 Micro-Guard cartridges; requires standard cartridge holder, catalog #1250131.
*** Requires de-ashing cartridge holder, #1250139.

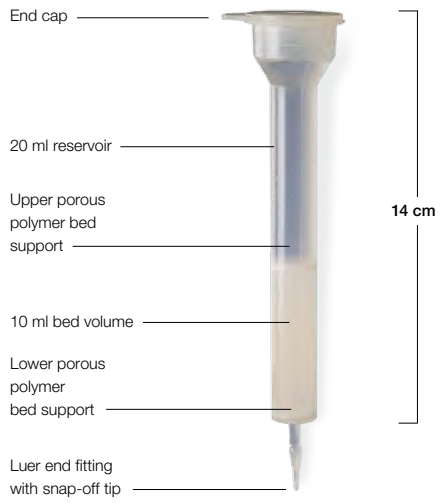
See Also
Affi-Gel Protein A MAPS II kit: page 101.
Affi-Gel Protein A resin: page 101.
DEAE Affi-Gel Blue resin: page 102.

Econo-Pac® Affinity and Desalting Columns

Econo-Pac prepacked columns for gravity-flow chromatography allow fast and easy desalting as well as simplified antibody purification.

Econo-Pac Protein A columns are well suited for binding of IgGs, especially from mammalian species. The Econo-Pac 10DG media, with a molecular exclusion limit of 6,000, is recommended specifically for desalting and buffer exchange.

The prepacked Econo-Pac columns include an upper frit, a snap-off end tip, graduated column markings, a 10 ml bed, and 30 ml total column volume. To improve column performance, use a flow adaptor, see below. For bottled size exclusion resins, see pages 107–108; for bottled affinity resins, see pages 94–97 and 100–106; and for activated affinity resins, see pages 96 and 105–106.



Ordering Information

Catalog #	Description
7322022	**Econo-Pac Protein A Columns**, prefilled with Affi-Gel Protein A media, 5
7322020	**Econo-Pac Protein A Kit**, 1 x 2 ml Affi-Gel Protein A column, 1 x 10 ml 10DG column, buffers
7322027	**Econo-Pac Serum IgG Purification Kit**, 5 x 5 ml DEAE Affi-Gel Blue columns, 5 x 10 ml 10DG columns, buffers
7322010	**Econo-Pac 10DG Desalting Columns**, 30
7380019	**Econo-Pac Flow Adaptor**, 1.5 cm column ID

Empty Columns

Bio-Rad's empty columns accommodate a range of chromatography needs, including spin columns, low-pressure columns with optional flow adaptors and jackets for temperature control, and analytical columns for medium- or high-pressure systems.

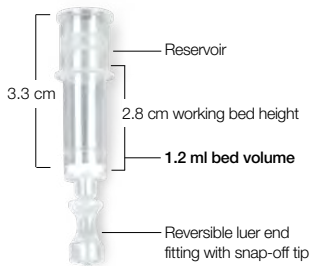
Bio-Spin®, Micro Bio-Spin™, and Mini Bio-Spin Columns

Empty Bio-Spin and Micro Bio-Spin chromatography columns are disposable polypropylene spin columns that can be packed with a variety of chromatographic media. Bio-Spin columns hold up to 1.2 ml of any resin and fit in standard swinging bucket centrifuges; Micro Bio-Spin and Mini Bio-Spin columns hold up to 0.8 and 1.2 ml of resin respectively, and fit in standard microfuges. All three columns fit standard collection tubes, have snap-off tips and polyethylene bed supports, and are autoclavable.

For More Information
Web: bio-rad.com/spincolumns
Download bulletin: 2289

See Also
Nucleic acid sample preparation: page 9.
Prepacked Bio-Spin and Micro Bio-Spin columns: page 121.

Micro Bio-Spin Column



Mini Bio-Spin Column

Bio-Spin Column

Ordering Information

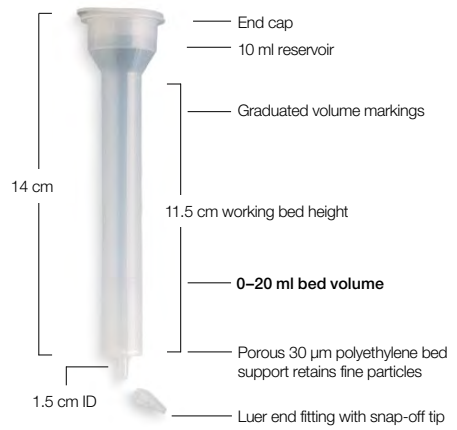
Catalog #	Description
7326008	**Bio-Spin Chromatography Columns**, empty, 100
7326025	**Bio-Spin Chromatography Columns**, empty, 1,000
7326204	**Micro Bio-Spin Chromatography Columns**, empty, 100
7326207	**Mini Bio-Spin Chromatography Columns**, empty, 100
7311660	**End Caps**, for Micro Bio-Spin chromatography columns, 1,000

See Also
Prepacked Econo-Pac columns: page 126.

Econo-Pac® Columns

Econo-Pac columns are 14 cm high, 1.5 x 12 cm polypropylene columns that may be fitted with a flow adaptor (see below) or used for gravity-flow chromatography. When used for open column work, a special upper bed support prevents the bed from running dry. Bed volumes from 1–20 ml are acceptable. These columns can be autoclaved and will retain fine particles. Columns can be easily stored in poly column racks.

For More Information
Web: bio-rad.com/econopaccolumns
Download bulletin: 2289



Poly Column Rack

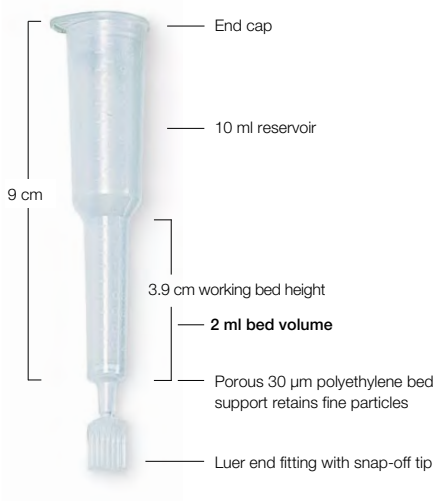
Ordering Information

Catalog #	Description
7321010	**Econo-Pac Chromatography Columns**, empty, includes upper bed supports, end caps, tip closures, 50
7321011	**Econo-Pac Chromatography Columns**, empty, includes upper bed supports, end caps, tip closures, 500
Accessories	
7380019	**Econo-Pac Flow Adaptor**, 1.5 cm column ID
7317005	**Poly Column Rack**, 20-place, with removable tube rack
7328102	**2-Way Stopcocks**, female-to-male luer, 10
7318232	**Female Luer Plugs**, 25, polypropylene
7311660	**End Caps**, for Econo-Pac columns, 1,000

Poly-Prep® Columns

Poly-Prep columns are 9 cm high, conical 0.8 x 4 cm polypropylene columns that hold up to 2 ml of chromatography resin and 10 ml of eluent or sample in an integral reservoir. These columns are ideal for sample preparation and small-scale chromatography applications, including work with radioisotopes and other applications that require disposable products. Poly-Prep columns may be autoclaved and will retain fine particles.

For More Information
Web: bio-rad.com/polyprepcolumns
Download bulletin: 2289

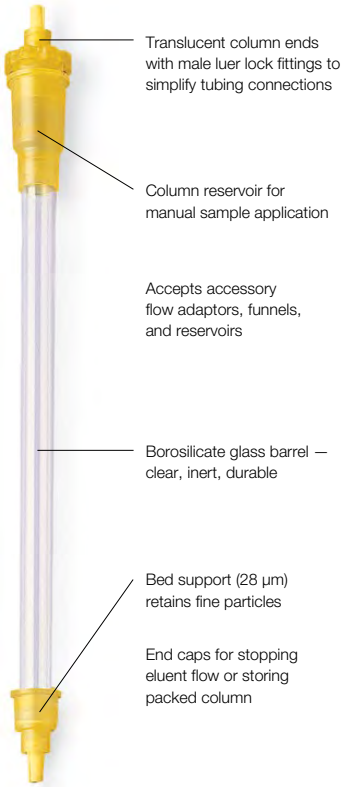


Ordering Information

Catalog #	Description
7311550	**Poly-Prep Chromatography Columns**, empty, includes end caps and tip closures, 50
7311553	**Poly-Prep Chromatography Columns**, empty, includes end caps and tip closures, 1,000
Accessories	
7311555	**Poly-Prep Column Stack Cap**, 50
7317005	**Poly Column Rack**, 20-place, with removable tube rack
7328102	**2-Way Stopcocks**, female-to-male luer, 10
7318232	**Female Luer Plugs**, polypropylene, 25
7311660	**End Caps**, for disposable plastic columns, 1,000

Glass Econo-Column® Columns

Econo-Column chromatography columns are the standard for high-quality, affordable low-pressure chromatography columns. Columns ranging from 5 to 170 cm in length and 0.5–5.0 cm in diameter are available. A porous polymer bed support at the bottom of the column retains fine particles, and translucent polypropylene end fittings allow viewing of the entire column bed. Econo-Column chromatography columns can be autoclaved and are designed to operate at pressures <1 bar (14.7 psi). Econo-Column chromatography columns accept Econo-Column funnels as well as Econo-Column flow adaptors. Econo-Column chromatography columns are packaged in quantities of 1, 2, and 4, depending on column diameter and length. For convenience, all packaging sizes contain one stopcock per column ordered.



For More Information
Web: bio-rad.com/econocolumns
Download bulletin: 2289

Ordering Information

Catalog #	ID, cm	Length, cm	Cross-Sectional Area, cm^2	Maximum Volume, ml	Columns/Pkg
7370507	0.5	5	0.20	1	2
7374506	0.5	5	0.20	1	4
7374511	0.5	10	0.20	2	4
7370517	0.5	15	0.20	3	2
7374521	0.5	20	0.20	4	4
7370707	0.7	5	0.39	2	2
7374706	0.7	5	0.39	2	4
7370712	0.7	10	0.39	4	2
7374711	0.7	10	0.39	4	4
7370717	0.7	15	0.39	6	2
7374716	0.7	15	0.39	6	4
7374721	0.7	20	0.39	8	4
7370732	0.7	30	0.39	12	2
7374731	0.7	30	0.39	12	4
7370752	0.7	50	0.39	20	2
7374006	1.0	5	0.79	4	4
7371007	1.0	5	0.79	4	2
7374011	1.0	10	0.79	8	4
7371012	1.0	10	0.79	8	2
7374021	1.0	20	0.79	16	4
7371022	1.0	20	0.79	16	2
7374031	1.0	30	0.79	24	4
7371032	1.0	30	0.79	24	2
7374051	1.0	50	0.79	40	4
7371052	1.0	50	0.79	40	2
7371091	1.0	100	0.79	79	2
7371093	1.0	120	0.79	103	2
7374150	1.5	5	1.77	9	4
7371507	1.5	5	1.77	9	2
7374151	1.5	10	1.77	18	4
7371512	1.5	10	1.77	18	2
7374156	1.5	15	1.77	27	4
7371517	1.5	15	1.77	27	2
7374152	1.5	20	1.77	35	4
7371522	1.5	20	1.77	35	2
7374153	1.5	30	1.77	53	4
7371532	1.5	30	1.77	53	2
7374155	1.5	50	1.77	89	4
7371552	1.5	50	1.77	89	2
7371576	1.5	75	1.77	124	2
7371591	1.5	100	1.77	177	2
7371593	1.5	120	1.77	230	2
7371598	1.5	170	1.77	301	2
7374250	2.5	5	4.91	25	4
7372507	2.5	5	4.91	25	2
7374251	2.5	10	4.91	49	4
7372512	2.5	10	4.91	49	2
7374252	2.5	20	4.91	98	4
7372522	2.5	20	4.91	98	2
7374253	2.5	30	4.91	147	4
7372532	2.5	30	4.91	147	2
7372551	2.5	50	4.91	246	2

continues

Ordering Information

Catalog #	ID, cm	Length, cm	Cross-Sectional Area, cm^2	Maximum Volume, ml	Columns/Pkg
7372576	2.5	75	4.91	344	2
7372591	2.5	100	4.91	491	2
7372593	2.5	120	4.91	589	2
7375011	5.0	10	19.63	196	1
7375021	5.0	20	19.63	393	1
7375031	5.0	30	19.63	589	1
7375051	5.0	50	19.63	982	1
7375071	5.0	70	19.63	1,374	1

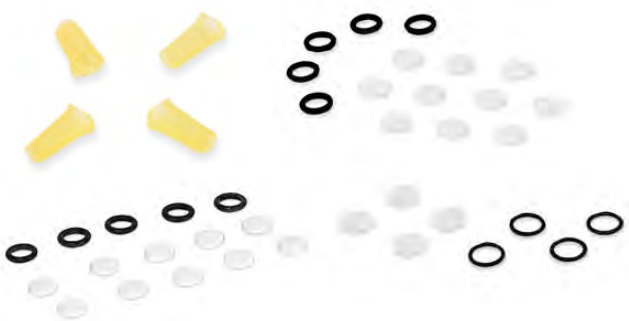
Catalog #	Description
Econo-Column Selection Packs	
7376601	**Econo-Column Selection Pack A**, includes 7 columns, 1 each of 0.7 x 10, 20, and 30 cm; 1.5 x 30 and 50 cm; 2.5 x 20 and 50 cm
7376607	**Econo-Column Selection Pack B**, includes 6 columns, 1 each of 1.0 x 20, 30, and 50 cm; 1.5 x 20, 30, and 50 cm

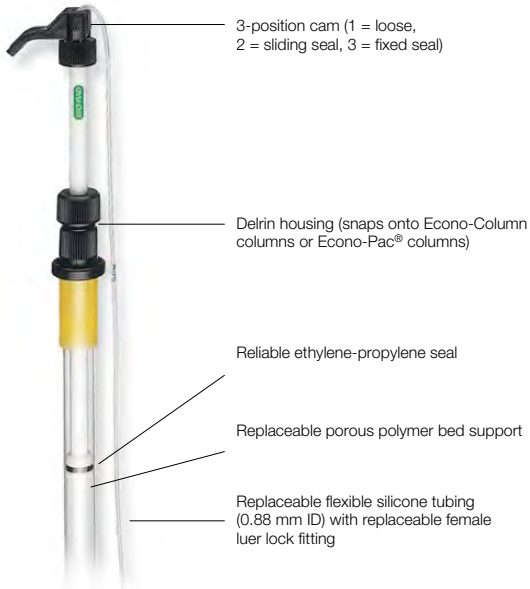
For fittings, see low-pressure fittings on page 155.

Econo-Column® Flow Adaptors

Flow adaptors significantly improve column performance by eliminating head space above the gel bed and by protecting the column bed from disruption during sample loading. Flow adaptors improve resolution by delivering buffer and sample directly to the top of the column bed. Flow adaptors are recommended for use with any low-pressure column connected to pumps, the BioLogic™ LP system, or other low-pressure systems.

Econo-Column flow adaptors are available for 1.0, 1.5, 2.5, and 5.0 cm ID Econo-Column chromatography columns (pages 129–131) and Econo-Pac® columns (page 128). Due to wear and tear of bed supports and O-rings, maintenance kits are available for standard upkeep of flow adaptors.





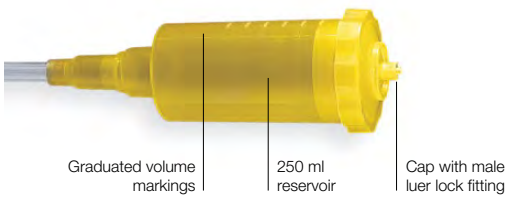
For More Information
Web: bio-rad.com/econocolumnaccessories
Download bulletin: 2289

Ordering Information

Catalog #	Description
Flow Adaptors	
7380014	**Flow Adaptor**, 1.0 cm column ID, 1–7 cm functional length
7380015	**Flow Adaptor**, 1.0 cm column ID, 1–14 cm functional length
7380016	**Flow Adaptor**, 1.5 cm column ID, 1–14 cm functional length
7380017	**Flow Adaptor**, 2.5 cm column ID, 1–14 cm functional length
7380018	**Flow Adaptor**, 5.0 cm column ID, 1–14 cm functional length (does not include cam mechanism)
7380019	**Econo-Pac Flow Adaptor**, 1.5 cm column ID
Flow Adaptor Maintenance Kits	
7380022	**Flow Adaptor Maintenance Kit**, for 5.0 cm flow adaptor, includes 2 bed supports and 2 O-rings
7380024	**Flow Adaptor Maintenance Kit**, for 1.0 cm adaptor with cam mechanism, includes 10 bed supports and 5 O-rings
7380025	**Flow Adaptor Maintenance Kit**, for 1.5 cm adaptor with cam mechanism, includes 10 bed supports and 5 O-rings
7380027	**Flow Adaptor Maintenance Kit**, for 2.5 cm adaptor with cam mechanism, includes 10 bed supports and 5 O-rings

Econo-Column® Funnel

The Econo-Column funnel, constructed of durable polypropylene, is ideal for packing columns, loading diluted samples, or delivering large volumes of buffer. It forms a tight seal with Econo-Column chromatography columns up to 2.5 cm ID (pages 129–131), Poly-Prep® columns (pages 128–129), and Econo-Pac® columns (page 128).



Ordering Information

Catalog #	Description
7310003	**Econo-Column Funnels**, 250 ml, 5

Glass Econo-Column® Reservoirs

Reservoirs are available in 500 ml and 1 L capacities and will fit 0.5, 0.7, 1.0, or 1.5 cm ID Econo-Column chromatography columns. To make a constant-pressure reservoir, close the reservoir top with a stopper that contains a piece of glass tubing extending into the reservoir. The removable upper cap has a male luer lock fitting.

Glass Econo-Column Reservoir

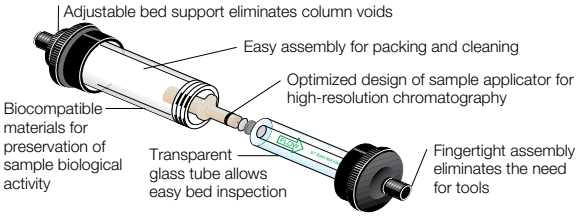
Ordering Information

Catalog #	Description
7379112	**Econo-Column Reservoir**, 500 ml
7379113	**Econo-Column Reservoir**, 1 L

Bio-Scale™ MT High-Resolution Columns

Bio-Scale MT empty columns can be packed with the resin of your choice. These columns provide extremely high resolution in most chromatography applications. Bio-Scale MT columns allow precise sample application and provide the low dead volume required for high-resolution separations. The four column sizes (2, 5, 10, and 20 ml) allow easy scale-up of separation and purification protocols. The optimized design allows easy packing, bed height adjustment, sample application, and equilibration. Bio-Scale MT columns are convenient for use with BioLogic™ systems or any medium- or high-pressure chromatography system.

For More Information
Web: bio-rad.com/MTcolumns
Download bulletin: 1970



See Also

Bio-Scale CHT Type I columns: page 123.
UNO columns: page 123.
Bio-Scale Mini cartridges: page 119.
NGC systems: page 134
ENrich columns: page 115.

Ordering Information

Catalog #	Description	Column Volume, ml	Pressure Limit, psi
Bio-Scale Columns*			
7510081	**Bio-Scale MT2 Column**, 7 x 52 mm	1.9–2.3	1,000
7510083	**Bio-Scale MT5 Column**, 10 x 64 mm	4.6–5.7	750
7510085	**Bio-Scale MT10 Column**, 12 x 88 mm	9.5–11.3	600
7510087	**Bio-Scale MT20 Column**, 15 x 113 mm	19.4–21.9	500

Catalog #	Description
Cartridge Holders and Accessories	
7510091	**Bio-Scale 2 Replacement Parts Kit**, includes 5 frits, 5 distribution screens, 2 O-rings, 1 frit remover
7510093	**Bio-Scale 5 Replacement Parts Kit**
7510095	**Bio-Scale 10 Replacement Parts Kit**
7510097	**Bio-Scale 20 Replacement Parts Kit**
7500554	**1/16" OD (1.6 mm) Post-Pump Fittings**, includes Delrin nut, ferrules, lock ring, 10 sets
7500567	**UNO M6 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an FPLC system
7500568	**UNO 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an HPLC system, for use with BioLogic DuoFlow and NGC systems

* Each Bio-Scale MT column comes with a Bio-Scale replacement parts kit.

Medium-Pressure Chromatography Systems

See Also
Multi-D chromatography applications: page 136.

NGC™ Medium-Pressure Chromatography Systems

The NGC family of medium pressure preparative chromatography systems offers a single laboratory chromatography solution that aligns and scales to fit your purification, automation, and throughput requirements. NGC laboratory scale chromatography systems provide you with a fully customizable and truly modular platform that can be designed to your current purification needs and is upgradable to meet future throughput and automation requirements.

For More Information
Web: bio-rad.com/NGCsystems
Please contact your local Sales Representative for more details.

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

NGC Quest™ and NGC Scout™ Series

NGC Discover™ Series

NGC Discover Pro Series

NGC chromatography system platforms — modular, customizable, and upgradable systems that adapt and expand to your throughput and application needs. All NGC systems are compatible with the NGC fraction collector and BioFrac™ fraction collector.

NGC Fraction Collector
(see page 147)

BioFrac Fraction Collector
(see page 149)

NGC Chromatography Systems Selection Guide

Product	Catalog #	NGC™ Quest 10 7880001	NGC Quest 10 Plus 7880003	NGC Quest 100 7880002	NGC Quest 100 Plus 7880004	NGC™ Scout 10 7880005	NGC Scout 10 Plus 7880007	NGC Scout 100 7880006	NGC Scout 100 Plus 7880008	NGC™ Discover 10 7880009	NGC Discover 100 7880010	NGC Discover Pro 10 7880011	NGC Discover Pro 100 7880012
NGC F10 pump module	7884002	•	•			•	•			•		•	
NGC F100 pump module	7884003			•	•			•	•		•		•
NGC mixer module	7884018	•	•	•	•	•	•	•	•	•	•	•	•
NGC sample inject valve module	7884007	•	•	•	•	•	•	•	•	•	•	•	•
NGC single-wavelength detector module	7884008	•		•		•		•					
NGC multi-wavelength detector module	7884009		•		•		•		•	•	•	•	•
NGC buffer blending valve module	7884010					•	•	•	•	•	•	•	•
NGC pH valve module (includes pH probe)	7884011					•	•	•	•	•	•	•	•
NGC sample pump module	7884004									•	•	•	•
NGC inlet valve module	7884006									•	•	•	•
NGC outlet valve module	7884013											•	•
NGC column switching valve module, 10 ml	7884012									•		•	
NGC column switching valve module, 100 ml	7884026									•	•	•	•
ChromLab™ software	7886000	•	•	•	•	•	•	•	•	•	•	•	•
NGC chromatography system and ChromLab software documentation	7886500	•	•	•	•	•	•	•	•	•	•	•	•

Note: All NGC systems include a touch screen and conductivity monitor and are compatible with the NGC fraction collector and BioFrac fraction collector.

Features and Benefits

Flexible, customizable chromatography systems to suit both your application and research needs.

- Adjustable and scalable platform adapts to individual application, workflow, and throughput requirements
- Plug-and-play modules enable a modular, customizable system that adapts to changing needs over time
- ChromLab software provides powerful, graphical instrument control, streamlined method development, and intuitive data analysis
- Graphical fluidics scheme selector matches the flow path to applications-based system setup
- Point-to-Plumb™ feature lighting provides step-by-step LED guided setup for easy system plumbing
- Real-time active flow path display for clear visualization of buffer, sample, and valve position and easy identification of system status
- Real-time module status displays offer immediate system diagnostics
- Pre-plumbed systems with QC-validated performance support more reproducible results and sharper peaks (included with all preconfigured NGC Quest, NGC Scout, and NGC Discover systems)
- Tier-Rotate™ system design enables optimal placement of valves and detectors to minimize hold-up volume
- Open platform is compatible with all medium-pressure chromatography columns and resins
- Compatibility of NGC and BioFrac fraction collectors allows for collection from analytical to preparative scale purifications
- Compact footprint fits on lab bench, in deli-fridge, or in coldroom

For more information about these features and benefits, please contact your local sales representative. Take a tour of the system at **bio-rad.com/NGCsystems**.

Applications and Uses of Medium-Pressure Chromatography Systems

Preparative to analytical scale isolation, purification, and analysis of multiple types of molecules, including:

- Recombinant protein purification and refolding
- Monoclonal antibody purification
- Virus removal preparations
- Analysis of plasma proteins for disease diagnosis
- Nucleic acid purifications

NGC Systems

Preconfigured NGC systems are designed with increasing automation and throughput in mind. All NGC systems include either a 10 or a 100 ml/min automated dual gradient pump, a mixer module, a sample injection valve module, and a detector with a conductivity monitor. Each preconfigured system can be further customized with additional modules to meet your specific purification needs.

NGC Quest and NGC Quest Plus

NGC Quest systems are designed for the all-purpose purification of proteins with automated pumps that provide accurate gradients for high-resolution separations. These systems support automated sample injection using fixed or dynamic sample loops.

NGC Quest 10 and Quest 100 systems feature:

- LED-based single-wavelength light source for the detection of proteins or nucleic acids (280 or 255 nm) with high-sensitivity conductivity measurements for accurate salt gradient formation

NGC Quest 10 Plus and Quest 100 Plus systems feature:

- Multi-wavelength (4) detector for simultaneous detection (190 to 800 nm) of proteins, peptides, nucleic acids, chromophores, and other biomolecular complexes with high-sensitivity conductivity measurements for accurate salt gradient formation

NGC Scout and NGC Scout Plus

NGC Scout systems are designed for method optimization with automated pumps and valves that provide accurate gradients and pH for high-resolution separations suitable for any application.

All NGC Scout 10 and Scout 100 systems include:

- All features of NGC Quest systems
- Buffer blending to automate buffer titrations for rapid scouting of pH parameters
- Compatibility for gradient separations at different pH values for rapid method development

The NGC Scout 10 and 100 systems feature:

- Single-wavelength UV (255 or 280) and conductivity detector

NGC Scout 10 Plus and Scout 100 Plus systems feature:

- Multi-wavelength (4) UV/Vis and conductivity detector

NGC Discover and Discover Pro

Both the NGC Discover and NGC Discover Pro chromatography systems are designed for higher throughput applications with rapid, robust automation for those who need to do method development.

NGC Discover 10 and 100 systems include the capabilities of the NGC Scout 10 and 100 Plus instruments but also comprise:

- A 100 ml/min integrated sample pump — supports contamination-free automated large-volume sample application
- Inlet valves — enable automated switching between buffers and samples, accelerating method development. NGC supports up to 2 inlet valves for buffers and 2 inlet valves for samples
- A column switching valve — facilitates automated column/resin scouting up to 5 columns without the need to replumb. NGC supports up to 3 column switching valves
- A sample outlet valve, a standard feature with the NGC Discover Pro systems — allows collection of up to 12 large-volume fractions and enables automated Multi-D chromatography applications. NGC supports up to 2 outlet valves

Learn More about Multi-D Chromatography
Web: bio-rad.com/Multi-D

Ordering Information

Catalog #	Description
NGC Medium-Pressure Chromatography Systems*	
7880001	**NGC Quest 10 Chromatography System**, includes automated 10 ml/min pumps, single-wavelength (UV) and conductivity detection, accurate gradients, and sample injection
7880003	**NGC Quest 10 Plus Chromatography System**, includes automated 10 ml/min pumps, multi-wavelength (UV/Vis) and conductivity detection, accurate gradients, and sample injection
7880002	**NGC Quest 100 Chromatography System**, includes automated 100 ml/min pumps, single-wavelength (UV) and conductivity detection, accurate gradients, and sample injection
7880004	**NGC Quest 100 Plus Chromatography System**, includes automated 100 ml/min pumps, multi-wavelength (UV/Vis) and conductivity detection, accurate gradients, and sample injection
7880005	**NGC Scout 10 Chromatography System**, includes NGC Quest 10 capability, automated 10 ml/min pumps, pH valve and buffer blending valve for automated gradient and buffer blending
7880007	**NGC Scout 10 Plus Chromatography System**, includes NGC Quest 10 Plus capability, automated 10 ml/min pumps, pH valve and buffer blending valve for automated gradient and buffer blending
7880006	**NGC Scout 100 Chromatography System**, includes NGC Quest 100 capability, automated 100 ml/min pumps, pH valve and buffer blending valve for automated gradient and buffer blending
7880008	**NGC Scout 100 Plus Chromatography System**, includes NGC Quest 100 Plus capability, automated 100 ml/min pumps, pH valve and buffer blending valve for automated gradient and buffer blending
7880009	**NGC Discover 10 Chromatography System**, includes NGC Scout 10 Plus capability, automated 10 ml/min pumps, sample pump for large sample injection, column switching valve (up to 5 columns), and buffer inlet valve
7880010	**NGC Discover 100 Chromatography System**, includes NGC Scout 100 Plus capability, automated 100 ml/min pumps, sample pump for large sample injection, column switching valve (up to 5 columns), and buffer inlet valve
7880011	**NGC Discover Pro 10 Chromatography System**, includes NGC Scout 10 Plus capability, automated 10 ml/min pumps, sample pump for large sample injection, sample inlet valve, column switching valve (up to 5 columns), 2 buffer inlet valves, and outlet valve
7880012	**NGC Discover Pro 100 Chromatography System**, includes NGC Scout 100 Plus capability, automated 100 ml/min pumps, sample pump for large sample injection, sample inlet valve, column switching valve (up to 5 columns), 2 buffer inlet valves, and outlet valve

* All NGC systems include ChromLab software.

Multi-D Chromatography	
12001088	**NGC Multi-D Chromatography Starter Kit**

Module Overview

The NGC family of medium-pressure chromatography systems offers flexible system configurations that enable upgrades and reconfiguration of the modules to fit multi-user needs, applications, and laboratory space requirements. All NGC systems can be individually customized using NGC plug-and-play modules that are user installable. Systems can be easily reconfigured and seamlessly upgraded with increased functionality such as higher flow rates (10 ml/min or 100 ml/min), sophisticated detection capabilities, pH monitoring, automated buffer selection, multicolumn connection, and buffer blending.

NGC Buffer Blending Valve Module

The NGC buffer blending valve is used for automatic online buffer preparation and generation of pH gradients for quick pH scouting. When used in conjunction with the dual gradient pump system, the buffer blending valve enables automated elution gradients and highly accurate buffer blending for rapid scouting and method development. The valve can also double the flow rate of a salt gradient on an F10 pump and F100 pump.

NGC Inlet Valve Module

The NGC inlet valve module allows for automatic buffer and sample selection during method running. It speeds up method development by allowing for automatic selection of up to seven buffers and a cleaning solution per valve. It also works as a mini autosampler for injecting multiple large-volume samples via the sample pump.

NGC Buffer Blending Valve Module

NGC Inlet Valve Module

NGC F10 and F100 System Pump Modules
The F10 and F100 pumps produce buffer gradient solutions. Flow rates on all pumps can be automatically controlled to avoid overpressure. NGC instruments can have up to three high-precision pumps: two system gradient pumps (Pump A and Pump B) and one sample pump.

NGC Sample Pump 100 Module
The NGC sample pump 100 module enables both the injection of large sample volumes and accurate and consistent multiple loadings from a single sample stock. This dedicated pump eliminates the risk of contaminating system pumps, allowing for automated loading of large sample volumes directly to the column. The sample pump also includes an integrated pressure sensor that protects the column and resin from overpressure.

NGC Sample Inject Valve Module
The NGC sample inject valve enables the system to load a specific predetermined volume of sample onto a column with a maximum operating pressure of 3,650 psi. It is also compatible with capillary loops and sample pumps, eliminating the need to replumb.

NGC Single-/Multi-Wavelength Detector Modules
The NGC single UV and multi UV/Vis detector modules are combined with an integrated conductivity monitor to measure buffer conductivity or salt gradients.

The single-wavelength UV detector contains an LED UV lamp and monitors UV absorbance of proteins or nucleic acids at 280 or 255 nm, one wavelength at a time.

The multi-wavelength UV/Vis detector adds flexibility to the chromatography system, enabling the simultaneous monitoring of four wavelengths (UV and Vis) for greater sensitivity and detection of proteins, peptides, nucleic acids, and chromophores such as hemoglobin.

NGC Outlet Valve Module
Use the NGC outlet valve either as a stand-alone unit or in conjunction with the BioFrac fraction collector (#7410002).

As a single, stand-alone unit, the outlet valve is capable of collecting up to 12 large-volume fractions such as flowthrough or waste. Two outlet valves may be daisy-chained to collect up to 23 large-volume fractions, including waste.

When a BioFrac fraction collector is connected, the collection sequence can be programmed to collect smaller-volume fractions in the BioFrac fraction collector and larger-volume fractions via the outlet valves, providing full flexibility.

The outlet valve also enables automated tandem/2-D and Multi-D chromatography applications by directing peaks of interest onto the next column.

NGC Sample Pump Module

Specifications for System and Sample Pump Modules

F10 Pump	
Flow rates	0.001–10 ml/min (normal range); 0.002–20 ml/min (column packing flow)
Max pressure limit	3,650 psi (252 bar, 25.2 MPa)
F100 Pump	
Flow rate setting	0.01–100 ml/min (normal range); 0.02–200 ml/min (column packing flow)
Max pressure limit	1,450 psi (100 bar, 10 MPa)
Sample Pump 100	
Flow rate	Up to 100 ml/min
Max pressure limit	1,450 psi (100 bar, 10 MPa)

NGC Multi-Wavelength Detector Module

Specifications for Single-/Multi-Wavelength Detector Modules

UV Monitor	
Single-wavelength range	255 or 280 nm
Multi-wavelength (up to 4) range	190–800 nm
Conductivity Monitor	
Conductivity range	0.01–999.99 mS/cm

Features and benefits of the NGC outlet valve module include:

- Collect up to 12 large-volume fractions with a single valve
- Collect up to 23 large-volume fractions with two valves
- Collect variable fraction sizes with the BioFrac fraction collector
- Automate multistep purifications

NGC pH Valve Module
The NGC pH valve module includes a pH electrode for accurate pH monitoring during the run (1–14). The valve is capable of directing flow to the pH electrode or bypassing the probe automatically. The valve includes an integrated calibration port, which can be used to calibrate the probe without disconnecting the probe from the system.

For sensitive applications, the software is capable of calculating and displaying temperature-compensated pH values for accuracy and ease of use.

NGC Mixer Module
The NGC mixer module homogenizes buffers from two system pumps (Pumps A and B). In addition to the mixer motor assembly, the module includes an integrated system pressure sensor. It can accommodate both F10 mixers (263 µl and 750 µl) and F100 mixers (2, 5, and 12 ml). The mixer volume can be adjusted, depending on flow rate, to achieve optimal buffer homogenization by inserting the appropriate size barrels.

NGC Air Sensor Module
The NGC air sensor module enables detection of the end of buffer and sample, thereby protecting against air entering the system and damaging pumps or columns. The module supports up to four air sensors (large- and small-bore). Each NGC air sensor extension module can be used in conjunction with the air sensor module to enable four additional air sensors (totaling up to eight).

NGC Column Switching Valve Module
The NGC column switching valve allows connection of up to five columns, enabling quick and easy column scouting without replumbing. With an internal bypass mode this valve lets buffers bypass the connected columns when priming or cleaning the system. The valve can also reverse the flow, which is ideal for column cleaning and applications that require narrow band elution.

The column switching valve has integrated pressure sensors that measure pre- and delta-column pressures. This protects the column and resin from overpressure by triggering the pumps to slow down or stop. The column switching valve can also be used to connect sample loops in multistep purifications.

NGC pH Valve Module

NGC Air Sensor Module

Signal Import Module
Adding external devices to a purification workflow provides the flexibility to increase automation and the amount of information collected. The NGC signal import module (SIM) enables analog to digital signal conversion and connection to third-party devices.

NGC Accessories

NGC Fraction Collector
The NGC fraction collector's flexibility and versatility improves high-throughput purification workflows. It can collect into multiple vessel types within a method and has increased capacity in comparison to the BioFrac fraction collector. The NGC chromatography system paired with the NGC fraction collector provides collection options for analytical to preparative chromatography applications and is well suited to meet the purification needs of industry laboratories. Please refer to page 147 for detailed product information.

BioFrac Fraction Collector
The BioFrac fraction collector is compatible with all NGC chromatography systems. It is ideal for analytical to preparative scale chromatography applications. Please refer to page 149 for detailed product information.

Ordering Information

Catalog #	Description
NGC Medium-Pressure Chromatography System Modules and Accessories	
System Pumps	
7884002	**NGC F10 Pump Module**, includes 10 ml/min system pump kit for creating buffer gradients; can be used in conjunction with buffer blending valve to generate flow rates up to 20 ml/min; kit includes necessary tubing and fittings
7884003	**NGC F100 Pump Module**, includes 100 ml/min system pump kit for creating buffer gradients; can be used in conjunction with buffer blending valve to generate flow rates up to 200 ml/min; kit includes necessary tubing and fittings
Sample Pump	
7884004	**NGC Sample Pump 100 Module**, includes 100 ml/min sample pump kit for automated large-volume sample application via the sample inject valve; kit includes necessary tubing and fittings
Detectors	
7884008	**NGC Single-Wavelength Detector Module**, for detection of nucleotides and proteins at 255 or 280 nm and generation of salt gradients; UV/conductivity detector kit includes necessary tubing and fittings
7884009	**NGC Multi-Wavelength Detector Module**, for simultaneous wavelength (4) monitoring of elution fractions 190–800 nm and generation of salt gradients; UV/Vis, conductivity detector kit includes necessary tubing and fittings
7885024	**NGC UV Flow Cell, 5 mm**, UV flow cell, standard with all systems. Fits single-wavelength UV and multi-wavelength UV/Vis detectors in both F10 and F100 systems
7885023	**NGC UV Flow Cell, 10 mm**, analytical UV flow cell. Fits single-wavelength UV and multi-wavelength UV/Vis detectors in F10 systems. Ideal for use at lower flow rates
7885022	**NGC UV Flow Cell, 2 mm**, preparative UV flow cell. Fits single-wavelength UV and multi-wavelength UV/Vis detectors in F100 systems. Ideal for use at high flow rates
7500230	**Backpressure Regulator**, 40 psi, restricts flow and creates appropriate backpressure to prevent bubble spiking in UV detectors
Detector Lamp Replacements	
7885000	**NGC LED Lamp Replacement**, includes 255/280 nm LED lamp replacement for single-wavelength detectors
7885001	**NGC Deuterium Lamp Replacement**, includes deuterium lamp replacement (UV) for multi-wavelength detectors
7885002	**NGC Tungsten Lamp Replacement**, includes tungsten lamp replacement (Vis) for multi-wavelength detectors
7885056	**NGC Replacement Conductivity Monitor**, includes replacement conductivity monitor
pH Valve	
7884011	**NGC pH Valve Module**, for accurate inline pH measurement; includes pH probe, tubing, and fittings
7885026	**NGC pH Probe (Ag/AgCl)**, for use with the pH valve for accurate pH monitoring (pH 0–14) during purifications
7885027	**NGC Blank pH Probe**, pH valve cap for use with the pH valve when the probe is removed
Mixer	
7884018	**NGC Mixer Module**, for use with all NGC systems; additional mixer base or barrels (ordered separately) can be extended with 2, 5, and 12 ml barrels for efficient gradient mixing at higher flow rates
7884019	**NGC F100 Mixer**, 750 µl base and top assembly, included with all 100 ml/min NGC systems
7884020	**NGC F10 Mixer**, 263 µl base and top assembly, included with all 10 ml/min NGC systems
7884021	**NGC F10 Mixer Barrel Kit**, 750 µl extension barrel for F10 263 µl mixer (part of Scout 10 and Discover 10 series)
7884022	**NGC F10 Mixer Barrel Kit**, 2 ml extension barrel for F10 263 µl mixer (optional)
7884028	**NGC F100 Mixer Barrel Kit**, 2 ml extension barrel for F100 750 µl mixer body, part of Scout 100, Discover 100 series
7884023	**NGC F100 Mixer Barrel Kit**, 5 ml extension barrel for F100 750 µl mixer (optional)
7884024	**NGC F100 Mixer Barrel Kit**, 12 ml extension barrel for F100 750 µl mixer (optional)
Valves	
7884006	**NGC Inlet Valve Module**, for automated switching between multiple buffers and samples during methods, kit includes the necessary tubing and fittings
7884007	**NGC Sample Inject Valve Module**, for manual sample application of small-volume samples via sample loops or large volume samples using a sample pump; kit includes necessary tubing, fittings, and sample injection port; valve can also be used with DynaLoops and sample pumps
7884010	**NGC Buffer Blending Valve Module**, for online buffer preparation and generating pH gradients for quick pH scouting; kit includes the necessary tubing and fittings; can also double system pump flow rate
7884012	**NGC Column Switching Valve Module**, 10 ml, for use with F10 systems and multiple columns for quick column scouting and reverse flow, holds 5 columns; kit includes the necessary tubing and fittings to accommodate the most common column types
7884013	**NGC Outlet Valve Module**, for collection of up to 12 large-volume fractions, including necessary tubing and fittings
7884026	**NGC Column Switching Valve Module**, 100 ml, for use with F100 systems and multiple columns for quick column scouting and reverse flow, holds 5 columns; kit includes the necessary tubing and fittings to accommodate the most common column types

continues

Ordering Information

Catalog #	Description
Maintenance Kits	
7885003	**Pump Maintenance Kit**, 10 ml, for regular maintenance of NGC F10 pumps, includes seals and check valves
7885004	**Pump Maintenance Kit**, 100 ml, for regular maintenance of NGC F100 pumps, includes seals and check valves
7885005	**Pump Maintenance Kit, Sample pump**, 100 ml, for regular maintenance of NGC sample pump, includes seals and check valves
Air Sensor	
7885017	**NGC Air Sensor Module**, for detection of end of buffer and sample, protects against air entering pumps and columns, supports up to 4 air sensors (large- and small-bore); kit includes 2 large-bore air sensors
7885018	**NGC Air Sensor Extension Module**, connects to the base air sensor module to support 4 additional air sensors (optional, does not include any air sensors)
7885020	**NGC Air Sensor**, small, includes air sensor; enables exclusion of air from system and columns. Detects air in small-diameter PEEK tubing
7885021	**NGC Air Sensor**, large, includes air sensor; enables exclusion of air from system and columns. Detects air in large-diameter PTFE tubing
Fraction Collectors	
17002070	**NGC Fraction Collector**, 100/240 V, includes two 13 mm racks, tubing kit, external power supply, and USB cable
7410002	**BioFrac Fraction Collector**, 100/240 V, fraction collector compatible with all NGC systems, includes power cord, rack set F1 (2 x flatpack, 13 mm), BioFrac diverter valve, fittings kit
7884025	**NGC Communication Adaptor**, enables communication between Bio-Rad devices such as the BioFrac fraction collector and the NGC system
7884016	**NGC Signal Import Module**, enables analog to digital signal conversion and connection to devices such as third-party autosamplers and external detectors, includes cable for connecting to NGC system (#7885013) and external detectors
NGC Accessories	
7885038	**NGC Column Holder**, column holder for use with NGC systems, pkg of 1
7885039	**NGC Cartridge Holder**, universal cartridge holder, holds 1–10 ml cartridges
7885041	**NGC Sample/Wash Tube Holder**, holds two 50 ml Falcon tubes, for use with NGC systems (tubes not included)
7885042	**NGC Tubing Retainers (small)**, holds small PEEK tubing in an organized manner, pkg of 3 magnetic retainers
7885035	**NGC Tubing Retainers (large)**, holds larger PTFE tubing in an organized manner, pkg of 3 magnetic retainers
7885031	**NGC Inline Filter Kit**, includes buffer inline filter kit, filters particulates from buffer and prevents clogging of columns
7884017	**NGC Fittings Kit**, includes PEEK and Tefzel nuts, ferrules, unions, plugs, tubing cutter, fittings tightener, and luer syringe, for use with NGC systems
7500230	**40 psi Backpressure Regulator**
Single-Injection Sample Loops, Kits, and Accessories	
7500471	**Sample Injection Port**, for use with AVR7-3 automated sample injection valve
1250224	**Injection Needle**, 22 gauge, blunt
7500490	**Small-Volume Sample Loop Kit**, includes 100, 250, and 500 µl PEEK loops
7500491	**Large-Volume Sample Loop Kit**, includes 1, 2, and 5 ml PEEK loops
7500482	**25 µl Tefzel Sample Loop**
7500483	**50 µl Tefzel Sample Loop**
7500492	**100 µl PEEK Sample Loop**
7500493	**250 µl PEEK Sample Loop**
7500494	**500 µl PEEK Sample Loop**
7500495	**1 ml PEEK Sample Loop**
7500496	**2 ml PEEK Sample Loop**
7500497	**5 ml PEEK Sample Loop**
Dynamic (Sliding Piston) Sample Loops, Kits, and Seal Replacement	
7500451	**DynaLoop 25 Kit**, includes 25 ml DynaLoop sliding piston loop, DynaLoop parts kit
7500452	**DynaLoop 90 Kit**, includes 90 ml DynaLoop sliding piston loop, DynaLoop parts kit
7500450	**DynaLoop Parts Kit**, includes 4 end cap O-rings, 1 sliding seal O-ring, 1 filter, 4 nut fittings, four 1/8" ferrules, five 1/4–28 nuts and ferrules, 10' of 1/8" tubing
7500475	**DynaLoop 25 Sample Loop**, 25 ml, replacement
7500476	**DynaLoop 90 Sample Loop**, 90 ml, replacement

continues

Ordering Information

Catalog #	Description
Additional Options	
7884000	**NGC Expansion Bay**, tier 3, expands base system to 3-tier system for use with additional modules
7884001	**NGC Expansion Bay**, tier 4, expands system to 4-tier system for use with additional modules
7885014	**NGC Buffer Tray**, holds up to 8 buffer bottles. Includes drain port to prevent flooding in the event of a leak
7885016	**NGC Drip Tray**, for use with NGC systems
7885040	**NGC Touch Screen Stand**, used to mount touch screen outside of coldbox or -room while tethered to the system, enables convenient system operation from the outside
7885060	**Touch Screen Bracket**, for use with standard third-party monitor stands, used to mount touch screen outside the coldroom or -box while tethered to the system, includes cable
7884015	**Computer**, for use with NGC systems, includes Intel Core i7 3.4 GHz (quad core), 4 GB RAM, 1 x 250 GB hard drive, CD/DVD drive, Microsoft Windows 7 Professional 64-bit edition
7884027	**Monitor**, for use with NGC system computer
7880020IQOQ	**NGC IQ/OQ, NGC Quest/Quest Plus IQ/OQ (with BioFrac or NGC fraction collector and air sensor)**, Installation Qualification and Operational Qualification (IQ/OQ) performed by field service engineers on location at the customer's site, duration: 1 day
7880030IQOQ	**NGC Scout/Discover/Discover Pro IQ/OQ (with BioFrac or NGC fraction collector and air sensor)**, Installation Qualification and Operational Qualification (IQ/OQ) performed by field service engineers on location at the customer's site, duration: 2–3 days

NGC™ ChromLab™ Software

ChromLab chromatography software is the integrated method development, data acquisition, and analysis software package for all NGC chromatography systems. It controls all functions for lab-scale protein purification including instrument control, method development, real-time monitoring, chromatogram comparison, and peak analysis.

This interface is also fully configured with VNC (virtual network computing), allowing you to control and monitor the system remotely from nearly any smartphone, tablet, or laptop.

ChromLab software is available in standard format or as a security edition, which provides the necessary features to permit users to operate in compliance with Title 21 of the U.S. Code of Federal Regulations Part 11 (21 CFR Part 11) within a closed system. It is compatible with Windows 7–10 64 bit.

ChromLab™ Software

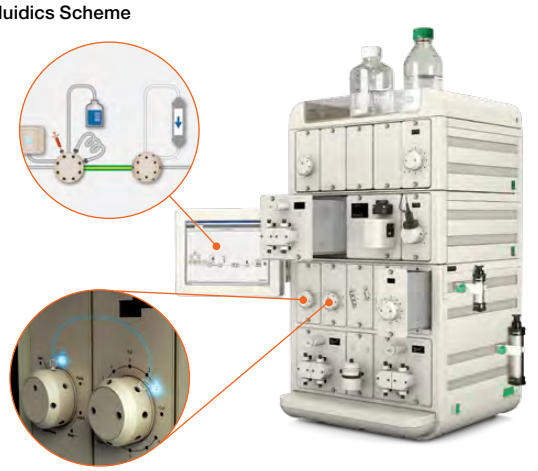
ChromLab is available in standard format. Upgrades, which are free to existing users, contain enhancements to existing ChromLab features and a linear flow rate calculator.

Graphical Instrument Setup and Control

ChromLab software instrument controls are designed around a novel fluidics scheme interface that can be customized to exact hardware configurations. ChromLab enables easy setup with its novel Point-to-Plumb™ feature. During manual data acquisition, each component of the fluidics scheme can be controlled to reach optimized conditions. In both manual and automated method-based runs, the software highlights the real-time fluidics path and module status to ensure accuracy.

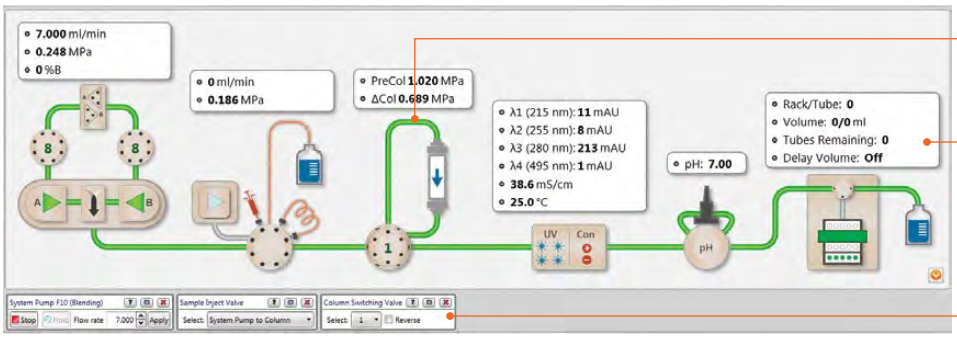
The instrument control interface is touch-screen optimized, allowing flexibility without the need for a computer adjacent to the system, thus minimizing the total footprint.

Fluidics Scheme



Click on each step in flow path for guided Point-to-Plumb LED system plumbing. Instrument LEDs blink at the next plumbing location.

Manual Instrument Control



Active flow path (green) clearly highlighted

Real-time status display of flow path devices

Graphical manual control panels allow complete, accessible manual control of the system

Complete system status and control is available via the graphical fluidics scheme.

Streamlined Method Development

ChromLab software includes templates for common chromatographic techniques and a column database for maximum versatility. Select a column from the column database. The software automatically adjusts optimal flow rate and pressure parameters for the selected column.

Methods are created by drag-and-drop functional phases. Grouping parameters into intuitive phases puts the focus on separation workflow instead of hardware controls. The interactive gradient graph enables visualization of the protocol and quick click-and-drag experimental adjustments.

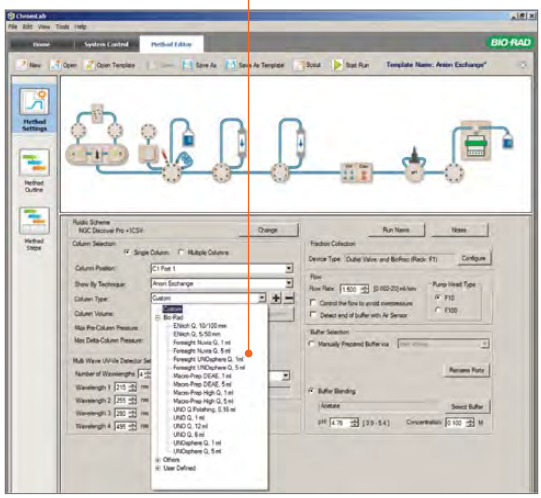
Automated Multi-D Purification Techniques

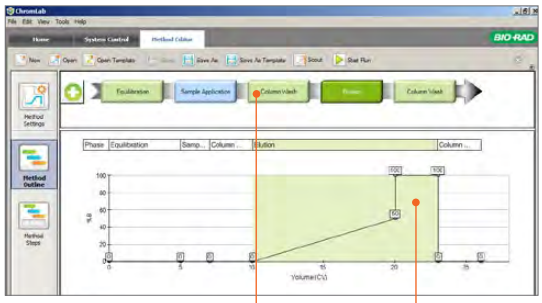
The software contains tandem and 2-D purification templates that reflect common automated multistep purification scenarios. These templates may be edited to fit your research and reduce hands-on time.

Features and Benefits of ChromLab Software

- Touch screen allows the same level of flexibility without the need for a computer adjacent to the system, minimizing the total footprint for an operational system
- Customizable chromatogram layouts with a variety of viewing and data analysis options
  - Enhances multi-user control with user-specific preferences for personalized analysis
  - Provides ultimate system control with the ability to edit on the fly and save as a new method during current run
- Rapid creation of trace comparisons for easy analysis across multiple purification runs
- Single-click peak detection and integration for quicker results
- Advanced integration parameters to enable manual integration functions and peak addition or removal for fine-tuning your data
- Intuitive, grouped data tabular layouts that organize data for easy navigation

Extensive column library selection and intuitive interface for custom self-packed columns





Phase-based method editing

Drag and adjust %B for quick adjustment to the gradient phase

Applications and Uses of ChromLab Software

- All functions of the NGC medium-pressure chromatography system are controlled for lab-scale protein purification
- Method development to identify best methods
- Real-time monitoring of proteins, peptides, nucleic acids, and chromophores
  - Provides collection flexibility with the option to collect each phase into different types of vessels
  - Enables customization of collection options based on detector signals, conductivity, pH, and %B
- Chromatogram comparison and peak analysis
- Advanced integration parameters enable manual integration functions and peak addition or removal for fine-tuning data
- Organized data and easy navigation with intuitive grouped table layouts
- Multi-instrument control
- Centralized database for easy data storage and sharing
- Fraction heat maps to help locate protein of interest
- Protein quantitation is calculated upon entering extinction coefficient

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

Learn More about Multi-D Chromatography
Web: bio-rad.com/Multi-D

Ordering Information

Catalog #	Description
7886000	**ChromLab Software CD**, single software platform compatible with all NGC systems, includes integrated system setup controls, method development, and data acquisition and analysis. Compatible with Windows 7–10 64 bit

ChromLab™ Software, User Management Edition

ChromLab Software, User Management Edition enables multiple system control from a single PC and the ability to save all methods, runs, and analyses to a centralized database. User management enables assignment of user permissions to control read, write, and edit access to all data files.

- ChromLab administrator can designate a central computer as the host of a shared ChromLab database
- Data can be shared among ChromLab computers and NGC systems

Ordering Information

Catalog #	Description
17000099	**ChromLab User Management License**, 1 seat
17000098	**ChromLab User Management License**, 3 seats
17000097	**ChromLab User Management License**, 5 seats

ChromLab™ Software, Security Edition

ChromLab, Security Edition is available with one, three, or five licenses. When enabled, Security Edition provides the necessary features to permit users to operate in compliance with Title 21 of the U.S. Code of Federal Regulations Part 11 (21 CFR Part 11) within a closed system.

ChromLab, Security Edition software provides tools to:

- Limit and authorize system access to authorized users
- Produce computer-generated audit trails
- Limit access to selected tasks through user level permissions
- Prevent falsification of data
- Generate binding signatures and records
- Create accurate and complete signed reports for FDA submissions

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

Ordering Information

Catalog #	Description
7886001	**ChromLab Security Edition (SE Software) CD**, single software platform compatible with all NGC systems, includes integrated system setup controls, method development, data acquisition, and analysis. Security Edition also provides features in accordance with 21 CFR Part 11 requirements. 1 license
7886003	**ChromLab Security Edition (SE Software) CD**, 3 licenses
7886005	**ChromLab Security Edition (SE Software) CD**, 5 licenses

ChromLab™ Software, IQ/OQ

The NGC™ IQ/OQ is designed to evaluate the installation and operation of the instrument. This service is provided by our trained field service engineers utilizing the Installation Qualification and Operational Qualification protocols we have developed. Features and benefits of NGC installation and qualification and operational qualification:

- Enable U.S. FDA 21 CFR Part 11 compliance
- Ensure system performance
- Are performed by trained field service engineers
- Are performed at customer sites

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

Ordering Information

Catalog #	Description
7880020IQOQ	**NGC Quest/Quest Plus IQ/OQ (with fraction collector and air sensor)**, Installation Qualification and Operational Qualification (IQ/OQ) performed by field service engineers on location at the customer's site, duration: 1 day
7880030IQOQ	**NGC Scout/Discover/Discover Pro IQ/OQ (with fraction collector and air sensor)**, duration: 2–3 days

Fraction Collectors

Model 2110 Fraction Collector

This easy-to-use fraction collector provides multiple collection modes for chromatographic separations. Key features include:

- Time or drop collection modes (or volume collection mode when connected to the Model EP-1 Econo™ pump or BioLogic™ LP system
- Collection of 1 drop (~50 µl) to 9 ml fractions in 80 test tubes or microtubes (with optional adaptor)
- Small (Econo-Column®) chromatography columns can be mounted to drop-forming arm to minimize dead volume
- Manual-advance tube changes
- Coldroom compatibility
- Small footprint of 24 x 33 cm
- Meets IEC 61010 and CSA 22.2 certification

For More Information
Web: bio-rad.com/model2110

Ordering Information

Catalog #	Description
7318122	**Model 2110 Fraction Collector**, 100/120 V
7318120	**Model 2110 Fraction Collector**, 220/240 V
Accessories	
7318130	**Carousel**, 80-tube capacity
7318135	**Micro Tube Adaptor**, 80 microtube capacity
7318136	**Instrument Dust Cover**
7318131	**Replacement Drop Formers**, 2
7318261*	**System Cable 1**, 8-pin mini-DIN to DB-9 connector
7318265*	**System Cable 5**, DB-9 connector to bare wires
7319010*	**System Cable 22**, Y-cable connecting Econo gradient pump to Model 2110 fraction collector
Tubes	
2239750	**Clear Polystyrene Tubes**, 13 x 100 mm, 9 ml nominal capacity, 1,000
2239751	**Natural Polypropylene Tubes**, 13 x 100 mm, 9 ml nominal capacity, 1,000
2239500	**Micro Test Tubes**, capless, 1.5 ml, polypropylene, clear, graduated, 500

* For more information, refer to the Cable Guide on page 151.

New NGC™ Fraction Collector

The NGC fraction collector's (NGC FC) flexibility and versatility improves high-throughput purification workflows. It can collect into multiple vessel types within a method and has increased capacity compared to the BioFrac™ fraction collector. The NGC chromatography system paired with the NGC fraction collector provides collection options for analytical to preparative chromatography applications and is well suited to meet the purification needs of industry laboratories.

Key features:

- Maximizes lab efficiency with automated collection into multiple vessel types within a method, from 96-well plates to 250 ml bottles
- Enables production batch capacity by collecting up to 80 unlimited volume fractions
- Has double or more the capacity of the BioFrac fraction collector
- Can connect 2 fraction collectors to the NGC chromatography system — 1 NGC FC with 1 BioFrac FC or 2 NGC FCs
- Maintains integrity of fractions with a benchtop Peltier cooling option
- Supports flow rates up to 200 ml/min
- Has a sturdy design with a new range of metal racks
- Comes factory calibrated so no need to calibrate for different rack types
- Has multitrigger collection: slope, pH, conductivity, etc
- Allows for faster downstream analysis with easy access to fractions during a run
- IEC/EN 61010, IEC/EN 61326, IEC/EN 61000, and CAN/CSA 22.2 certification

Optional Components

- Peltier cooling modules for 15 ml, 50 ml, and 96 deep well plates
- Enclosure maintains sample integrity without limiting access, protecting your samples from environmental conditions while allowing full sample access during a run
- Prep rack adaptor for limitless volume sample collection

For More Information
Web: bio-rad.com/NGCcollector
Request or download bulletin: 6963

NGC Fraction Collector

Versatile Rack Options

Power Supply and Peltier Cooling Modules

Capacity Comparison between the BioFrac and NGC Fraction Collectors

	BioFrac Fraction Collector		NGC Fraction Collector	
Cooling option	Ice bath		Peltier cooling racks	
Vessel Type Size	**Tubes/ Racks**	**Capacity**	**Tubes/ Racks**	**Capacity**
12–13 mm	90	180	96	384
15–16 mm	60	120	75	300
18–20 mm/15 ml	40	80	70	280
30 mm/50 ml	6	24	27	108
0.5 ml	63	252	—	—
1.5–2.0 ml microtubes	42	168	96	384
250 ml bottles	4	4	4	16
96-well plate	4	4	2	8
48-well plate	4	4	2	8
24-well plate	4	4	2	8
12-well plate	4	4	—	—
Prep-20 rack	20	20	20	40

Ordering Information

Catalog #	Description
17002070	**NGC Fraction Collector**, 100/240 V, includes two 13 mm racks, tubing kit, external power supply, and USB cable
Accessories	
12003752	**Rack for 13 mm Tubes**, for 96 x 13 mm tubes
12003755	**Rack for 16 mm Tubes**, for 75 x 16 mm tubes
12003756	**Rack for 18 mm/15 ml Tubes**, for 75 x 18 mm tubes
12003757	**Rack for 50 ml Tubes**, for 27 x 29 mm tubes
12003754	**Rack for Deep Well Microtiter Plate**, for 2 x 24-, 48-, and 96-well plates
12003753	**Rack for 1.5–2 ml Capless Microtubes**, for 96 tubes
12003760	**Plate Rack Riser**
17002942	**NGC Fraction Collector Rack Adaptor**
12005823	**Funnel Adaptors R/L Adaptor Kit**
12005822	**Dispense Tip Replacement Kit**
12005799	**Peltier Cooling Kit**
12003748	**Peltier Rack Power Supply**, 4-channel power supply for up to 4 Peltier rack modules
12003749	**Peltier Rack Module**, 1 insulated rack per module
12003751	**Insulated Rack for 15 ml Tubes**, for 30 x 15 ml tubes
12003759	**Insulated Rack for 50 ml Tubes**, for 14 x 50 ml tubes
12003747	**Peltier Rack Module Microtiter Plate Adaptor**, for 2 deep well microtiter plates

BioFrac™ Fraction Collector

The easy-to-program BioFrac fraction collector can be used for basic or complex fraction collection schemes. Off-the-shelf racks extend the versatility of collection schemes and provide cost-effective storage of samples. Off-the-shelf racks are autoclavable, easy to assemble, and lie flat, using little storage space

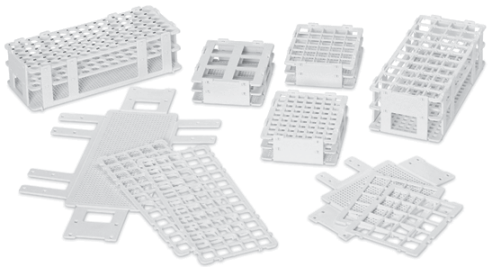
Key features include:

- Collection in time or drop mode (or volume mode when connected to an NGC™ or BioLogic™ LP chromatography system)
- Collection of peaks by peak detection, time windows (up to 20), or a combination of both
- Drop arm movement in column, row, or serpentine pattern movements for microplates or Titertube® tubes
- A dispenser arm that is manually adjustable to tube heights ≤150 mm
- Numerous off-the-shelf racks to accommodate tubes (12–20 mm diameter), Eppendorf or other microtubes (0.5, 1.5, or 2.0 ml), or scintillation vials
- Multirun feature that allows overlay of fractions
- IEC 6101A 22.2 certification

Optional Components

- BioFrac ice bath/microplate rack with tube grips that can hold 13 mm tubes
- BioFrac prep-20 preparative rack with up to 20 collection ports for collection from bottles to carboys
- Microplate drophead kit for precise collection of small volumes into microplates

For More Information
Web: bio-rad.com/biofrac
Request or download bulletin: 2711



A

B

C

D

Flexible rack options. The ice bath/microplate rack is used to collect fractions in chilled test tubes (**A**) or up to four microplates (**B**) (shown using the optional 25 µl drophead). The prep adaptor rack (**C**) is used for preparative fractionation into 1–20 collection vessels of any size. The BioFrac fraction collector holds up to four H4-high racks (**D**). The BioFrac fraction collector accepts a variety of off-the-shelf racks.

Ordering Information

Catalog #	Description
7410002	**BioFrac Fraction Collector**, input voltage 100/240 V, includes power cord, rack set F1 (2 x flatpack, 13 mm), BioFrac diverter valve, fittings kit
Accessories	
7410010	**Rack Set F1**, 2 x flatpack, with numbered tube positions, each holds 90 tubes, 12–13 mm diameter
7410011	**Rack Set F2**, 2 x flatpack, each holds 60 tubes, 15–16 mm diameter, for total of up to 120-tube collection
7410012	**Rack Set F3**, 2 x flatpack, each holds 40 tubes, 18–20 mm diameter, for total of up to 80-tube collection
7410013	**Rack Set H1**, 4 x flatpack, each holds 42 capless 1.5 ml Eppendorf/microtubes for total of up to 168-microtube collection
7410014	**Rack Set H2**, 4 x flatpack, each holds 63 capless 0.5 ml Eppendorf/microtubes for total of up to 252-microtube collection
7410015	**Rack Set H3**, 4 x flatpack, each holds 30 reduced-volume scintillation vials, 16 mm diameter, for total of up to 120-vial collection
7410016	**Rack Set H4**, 4 x flatpack, each holds 6 scintillation vials, 30 mm diameter, for total of up to 24-vial collection
7410020	**BioFrac H4-High Rack Set**, 4 x flatpack, each holds 6 centrifuge tubes, 30 mm diameter, for total of up to 24-vial collection
7410017	**BioFrac Ice Bath/Microplate Rack**, holds 120 tubes, 12–13 mm diameter; with the following capabilities: up to 4 SBS-format microplates in 96-, 48-, 24-, or 12-well configurations; Titertube microtube collection, 8 x 12, 96-tube configuration
7410018	**BioFrac Prep-20 Preparative Rack**, for fractionation into 1–20 collection vessels of any size
7410007	**BioFrac Fraction Collector Fittings Kit**, includes replacement fittings and tubing for setup of the fraction collector to the BioLogic LP or NGC system
7410088	**BioFrac Microplate Drophead Kit**, includes preassembled drophead nut with 0.020" ID Tefzel tubing; delivers approximately 25 µl per drop
7318263*	**System Cable 3**, 8-pin mini-DIN to 8-pin mini-DIN
7318286*	**System Cable 15**, 15-pin D to mini-DIN
7318287*	**System Cable 16**, 8-pin mini-DIN to 8-pin standard DIN
7318290	**BioFrac Accessory Cable**, 15-pin D to bare wires, for connecting BioFrac fraction collector to other equipment; for input or output signals
Tubes	
2239750	**Clear Polystyrene Tubes**, 13 x 100 mm, 9 ml nominal capacity, 1,000
2239751	**Natural Polypropylene Tubes**, 13 x 100 mm, 9 ml nominal capacity, 1,000
2239500	**Micro Test Tubes**, capless, 1.5 ml, polypropylene, natural, graduated, 500

* For more information, refer to the Cable Guide on page 151.
For NGC system–compatible products, see pages 137–142 for ordering information.

Chromatography Accessories

Cables

Refer to the guide to select cables to link chromatography system components together to a Bio-Rad chromatography system. Numbers in the table are cable numbers.

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

Cable Guide

	Connection to										
Connection From	BioLogic DuoFlow™ Workstation	BioLogic™ LP System	BioLogic DuoFlow Controller	BioLogic QuadTec™ UV/Vis Detector	Non-BioLogic System Compromise	Non-BioLogic System Detectors	Model 2110 Fraction Collector	BioFrac™ Fraction Collector	Model EM-1 Econo™ UV Monitor	Model EP-1 Econo Pump	Econo Gradient Pump
BioLogic DuoFlow workstation			17, 18, or 19	17, 18, 25, or 26			5	17, 18, or 19		7	17, 18, or 19
Model 2110 fraction collector	5	1			5				1	1	22
BioFrac fraction collector	17, 18, or 19	3, 15			*	*				3, 15	
Model EG-1 Econo gradient monitor					7						
Model EM-1 Econo* UV monitor						4			3		
Model EP-1 Econo pump		7			7		1	3, 15	3		
Econo gradient pump	17, 18, or 19						22				

* For replacement of the Model 2128 accessory cable, order the BioFrac accessory cable.

Ordering Information

Catalog #	Description
7318261	**System Cable 1**, 8-pin mini-DIN to DB-9 connector
7318262	**System Cable 2**, 8-pin mini-DIN to 8-pin standard DIN
7318263	**System Cable 3**, 8-pin mini-DIN to 8-pin mini-DIN
7318264	**System Cable 4**, 8-pin mini-DIN to banana plug cable
7318265	**System Cable 5**, DB-9 connector to bare wires
7318267	**System Cable 7**, 8-pin mini-DIN to bare wires
7318268	**System Cable 8**, 8-pin standard DIN to DB-9 connector
7318286	**System Cable 15**, 15-pin D to mini-DIN
7318287	**System Cable 16**, 8-pin mini-DIN to 8-pin standard DIN
7500650	**System Cable 17**, bus communication cable, 1.2 m (4')
7500651	**System Cable 18**, bus communication cable, 3.7 m (12')
7500652	**System Cable 19**, bus communication cable, 9.2 m (30')
7319010	**System Cable 22**, Y-cable for connecting Econo gradient pump to Model 2110 fraction collector
7601307	**System Cable 25 (BioLogic QuadTec RS-232)**, connects BioLogic QuadTec to ICM
7601321	**System Cable 26 (ICM Power)**, connects to 12 V power on BioLogic DuoFlow workstation
7602004	**System Cable 30**, bus communication cable, 0.3 m (1')
7602032	**System Cable 31**, USB cable
7318290	**BioFrac Accessory Cable**, 15-pin D to bare wires, for connecting BioFrac fraction collector
7885013	**NGC Autosampler Cables**, for connection with the NGC SIM

For NGC systems ordering information see page 137.

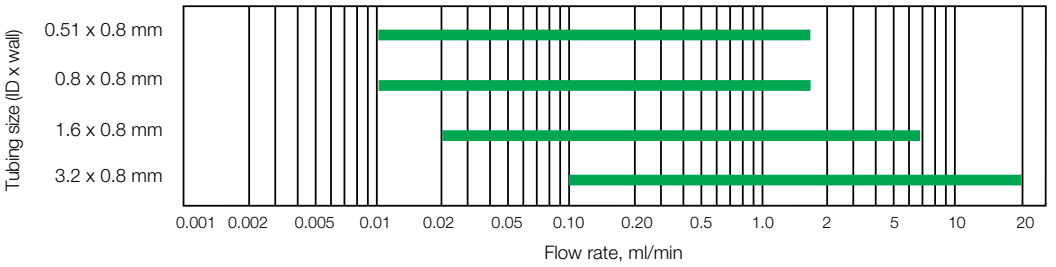
Low-Pressure Tubing

- **Silicone tubing** — contains no cytotoxic extractables and has excellent wetting properties. Autoclavable and heatable for pyrogen removal. May be damaged by concentrated acids and bases
- **Tygon tubing** — clear and tough, tolerates greater pressures than silicone; transparent; should not be autoclaved; may be damaged by high concentrations of alcohol
- **PharMed tubing** — has a wider range of chemical compatibility than silicone or Tygon and is ideal for use in pump heads of the Model EP-1 Econo™ pump, Econo gradient pump, and BioLogic™ LP system; lasts ten times longer than Tygon or silicone
- **PTFE tubing** — chemically inert; can be used with virtually any reagent, stable up to 400°C

Pump Tubing Kits

Precut tubing for the Model EP-1 Econo pump, Econo gradient pump, and BioLogic LP system is available in PharMed and silicone with a choice of 0.8, 1.6, or 3.2 mm ID. Each kit contains 20 pieces of precut pump tubing and four sets of luer lock fittings and tubing retainers.

Tubing Size Selection Chart



Tubing size selection. Comparison of flow rate ranges of various tubing sizes (ID) when used in the Econo gradient pump, the Model EP-1 Econo pump, and the BioLogic LP system.

Tubing Material Comparison

	Silicone	Tygon	PharMed	PTFE
Appearance	Translucent	Clear	Off-white	Translucent
Flexibility	Excellent	Excellent	Excellent	Fair
Autoclavability	Yes	No	Yes	Yes
Chemical compatibility	Fair	Fair	Good	Excellent
Performance in peristaltic pumps	Good	Fair	Excellent	Not acceptable

Ordering Information

Catalog #	Description
Silicone Tubing	
7318210	**Silicone Tubing**, 0.8 mm ID/0.8 mm wall, 10 m
7318211	**Silicone Tubing**, 1.6 mm ID/0.8 mm wall, 10 m
7318212	**Silicone Tubing**, 3.2 mm ID/0.8 mm wall, 10 m
Tygon Tubing	
7318213	**Tygon Tubing**, 0.51 mm ID/0.8 mm wall, 10 m
7318214	**Tygon Tubing**, 0.8 mm ID/0.8 mm wall, 10 m
7318215	**Tygon Tubing**, 1.6 mm ID/0.8 mm wall, 10 m
PharMed Tubing	
7318207	**PharMed Tubing**, 0.8 mm ID/1.0 mm wall, 10 m
7318208	**PharMed Tubing**, 1.6 mm ID/1.0 mm wall, 10 m
7318209	**PharMed Tubing**, 3.2 mm ID/1.0 mm wall, 10 m
Pump Tubing Kits	
7318240	**Pump Tubing Kit**, 0.8 mm ID silicone, 20 precut lengths and 4 sets of fittings, for use with EP-1 Econo pump
7318241	**Pump Tubing Kit**, 1.6 mm ID silicone, 20 precut lengths and 4 sets of fittings, for use with EP-1 Econo pump
7318242	**Pump Tubing Kit**, 3.2 mm ID silicone, 20 precut lengths and 4 sets of fittings, for use with EP-1 Econo pump
7318247	**Pump Tubing Kit**, 0.8 mm ID PharMed, 20 precut lengths and 4 sets of fittings
7318248	**Pump Tubing Kit**, 1.6 mm ID PharMed, 20 precut lengths and 4 sets of fittings
7318249	**Pump Tubing Kit**, 3.2 mm ID PharMed, 20 precut lengths and 4 sets of fittings
7319007	**Econo Gradient Pump Tubing Kit**, includes 2 each of 0.8, 1.6, and 3.2 mm PharMed tubing, for use with Econo gradient pump

High-Pressure Tubing and Tubing Kits

- **PTFE FEP tubing** — recommended for pre-pump connections; can withstand medium pressure; translucent, semiflexible, chemically inert, and autoclavable
- **Tefzel or PEEK tubing** — recommended for post-pump connections; both withstand high pressure and are chemically inert and autoclavable. Tefzel is translucent and slightly flexible. PEEK is opaque; the color indicates the inside diameter
- **Tubing kits** — set of premade tubing with fittings to simplify setup of the BioLogic DuoFLow™ system

Ordering Information

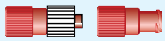
Catalog #	Description
7500603	**PTFE FEP Tubing**, 1/8" (0.125", 3.2 mm) OD x 0.062" (1.6 mm) ID, 15' (4.6 m), for pre-pump buffer inlet lines to the pump heads
7500602	**Tefzel Tubing**, 1/16" (0.062", 1.6 mm) OD x 0.020" (0.5 mm) ID, 30' (9.1 m), for system connections post-pump
7600604	**PEEK Tubing**, orange, 1/16" OD x 0.020" ID x 30', rated to 5,000 psi
7600605	**PEEK Tubing**, green, 1/16" OD x 0.030" ID x 30', rated to 3,000 psi
7600650	**F10 Tubing Kit**, includes precut and fitted PTFE, Tefzel, and orange PEEK tubing for installation of BioLogic DuoFlow basic chromatography system running at flow rates <40 ml/min
7600652	**F40 Tubing Kit**, includes precut and fitted PTFE, Tefzel, and green PEEK tubing for installation of BioLogic DuoFlow basic chromatography system running at flow rates ≥40 ml/min
7602002	**BioLogic Maximizer Tubing Kit**, includes 4 PTFE FEP prefitted tubing lengths for connection of solvent vials to the BioLogic Maximizer mixer; color coding indicates buffer solution
7602003	**BioLogic Maximizer Interconnect Tubing**, includes 2 PEEK prefitted tubing lengths for connection of BioLogic DuoFlow pumps to the BioLogic Maximizer valve system

Medium- and High-Pressure Fittings

The BioLogic DuoFlow™ and NGC™ fittings kit includes all parts necessary to connect medium- and high-pressure columns to medium-pressure chromatography systems.

For More Information
Download bulletin: column connection instructions — 5326

Ordering Information

Catalog #	Diagram	Description	Quantity
Medium- and High-Pressure Fittings Kit			
7600550		**BioLogic DuoFlow and NGC Fittings Kit**, includes PEEK and Tefzel nuts, ferrules, unions, plugs, and luer syringe	1
Individual Medium- and High-Pressure Fittings			
7885015		**PEEK Nut**, 1/8", 10	10
7885007		**10-32 PEEK Union**, 1/16", 0.020	1
7885008		**Fittings Tightener**, short	1
7885010		**Luer to 10-32 Adaptor Fittings Kit**, includes female slip luer to female 10-32 fitting to connect male end of luer column to NGC system	1
7320113		**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems	1
7500556		**Ferrule and Lock Ring**, for 1/16" OD (1.6 mm) tubing	10
7500559		**Tefzel Cap**, 1/4–28 female connection, to plug unused tubing	5
7500560		**BioLogic Fittings Tool**	1
7500561		**Tefzel Union Adaptor**, 1/4–28 to M6, to connect 1 M6 column to a BioLogic DuoFlow system	2
7500562		**Tefzel Union**, 1/4–28 to 1/4–28 to extend tubing	5
7500563		**Tefzel Plug**, 1/4–28 male connection, to plug unused ports on valves and columns	5
7500564		**Fitting Adapters 1/4"-28F to 10-32M**, pkg of 2, fittings to connect one HPLC column (10-32) to BioLogic DuoFlow and NGC systems	2
7500565		**Econo-Column to BioLogic System Fittings Kit**, 2 fittings to connect 1 Econo-Column (luer) column to a BioLogic DuoFlow system	1 set
7500566		**Bottle Cap Kit**, includes 2 bottle caps, 2 plugs	1 set
7500567		**UNO M6 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an FPLC system	1 set
7500568		**UNO 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an HPLC system, for use with BioLogic DuoFlow and NGC systems	1 set
7500569		**Delrin Nut**, for 1/16" OD (1.6 mm) tubing	10
7500570		**Delrin Nut**, for 1/8" OD (3.2 mm) tubing	5
7500571		**Ferrule and Lock Ring**, for 1/8" OD (3.2 mm) tubing	5
7500703		**Inline Filter Kit**, includes 1 inline filter and 2 replacement frits	1
7500704		**Replacement Frits**, for inline filter kit	5
7500553		**1/8" OD (3.2 mm) Pre-Pump Fittings**, includes Delrin nut, ferrules, lock ring	5
7500554		**1/16" OD (1.6 mm) Post-Pump Fittings**, includes Delrin nut, ferrules, lock ring	10
7601308		**Long Fingertight Fittings**, 10-32 x 0.82", for PEEK and Tefzel tubing	4
7601311		**Long Fingertight Fittings**, 10-32 x 1.03", for PEEK and Tefzel tubing	4

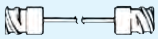
Low-Pressure Fittings

The low-pressure system fittings kit is useful to adapt various tubing sizes, to make liquid connections, and to direct and stop liquid flow.

For More Information
Download bulletin: column connection instructions — 5326

Ordering Information

Catalog #	Description
Low-Pressure Fittings Kit	
7318220	**Low-Pressure System Fittings Kit**, polycarbonate/polypropylene, 250 pieces
7319006	**Econo Gradient Pump Fittings Kit**, includes 32 fittings, 12 tubing retainers

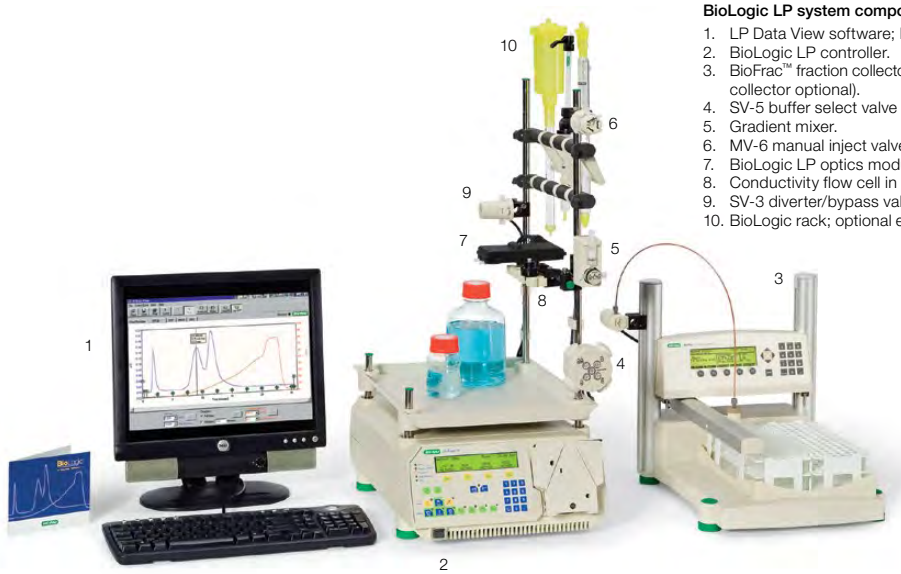
Catalog #	Diagram	Description	Quantity	Material
Individual Low-Pressure Fittings				
7318221*		**0.8 mm Barb to Female Luer**	25	Polypropylene
7318222*		**1.6 mm Barb to Female Luer**	25	Polypropylene
7318223*		**3.2 mm Barb to Female Luer**	25	Polypropylene
7318224		**0.8 mm Barb to Male Luer**	25	Polypropylene
7318225		**1.6 mm Barb to Male Luer**	25	Polypropylene
7318226		**3.2 mm Barb to Male Luer**	25	Polypropylene
7318228		**Female Luer to Female Luer**	10	Polypropylene
7318230		**Male Luer to Male Luer**	10	Polypropylene
7318232		**Female Luer Plug**	25	Polypropylene
7318233		**Male Luer Plug**	25	Polypropylene
7318229		**Female Luer T-Connector**	10	Polypropylene
7328300		**0.8 mm Barb to Barb Connector**, recommended for minimal dead-volume connection	25	Polypropylene
7328103		**3-Way Stopcock**, 2 female luer to male luer	10	Polycarbonate/ polypropylene
7328102		**2-Way Stopcock**, female luer to male luer	10	Polycarbonate/ polypropylene
7323245		**Luer Tubing Adaptor**, with 5' of 0.8 mm ID PTFE tubing	5	Polypropylene/PTFE
7328202		**Double Luer Tubing Adaptor**, with 5' of 0.8 mm ID PTFE tubing	1	Polypropylene/PTFE
7320111		**Luer to M6 Adaptor Fittings Kit**, includes luer to M6 fittings to connect 1 cartridge to an FPLC system	1	PEEK/Tefzel
7320112		**Luer to 10-32 Adaptor Fittings Kit**, includes luer to 10-32 fittings to connect 1 cartridge to an HPLC system or NGC system	1	Polypropylene/PTFE
7320113		**Luer to BioLogic and NGC Systems Fittings Kit**, low-pressure system fittings kit, includes 1/4–28 female to male and 1/4–28 female to female luers to connect 1 cartridge to BioLogic DuoFlow and NGC systems	1	Polypropylene/PTFE

* Fits inlet and outlet of Econo-Column chromatography columns and low-pressure tubing.

Low-Pressure Chromatography Systems

Bio-Rad offers the BioLogic™ LP low-pressure chromatography system and components for protein purification. It is capable of operating from 30–45 psi (2–3.4 bar) with flow rates ranging from 0.002–40 ml/min.

BioLogic™ LP Systems



BioLogic LP system components:

1. LP Data View software; PC not included.
2. BioLogic LP controller.
3. BioFrac™ fraction collector (Model 2110 fraction collector optional).
4. SV-5 buffer select valve (optional).
5. Gradient mixer.
6. MV-6 manual inject valve.
7. BioLogic LP optics module.
8. Conductivity flow cell in holder.
9. SV-3 diverter/bypass valve (optional).
10. BioLogic rack; optional expansion kit available.

The BioLogic LP low-pressure chromatography system offers high performance, versatility, ease of use, and affordability. Its compact design minimizes the workspace required in the coldroom or on the laboratory bench. The BioLogic LP system includes features such as:

- **LP Data View™ software** — easy-to-use software designed for the BioLogic LP system. The software captures data, multitasks, and prints data from any computer that runs Windows XP or Windows 7 operating systems; requires use of one serial port
- **Methods storage** — the system stores up to 50 methods; each method can include up to 50 pump steps and 50 fraction collection steps
- **Buffer selection** — select up to four buffers and completely automate sample separation with the addition of an SV-5 buffer select valve; the valve can also be used to automatically load large sample volumes
- **Detection capabilities** — the system includes both 254 and 280 nm filters for nucleic acid and protein detection and a conductivity cell to monitor gradient progress
- **A high-flow pump** — the system houses a peristaltic pump with a flow rate range of 0.05–40 ml/min (20 ml/min per channel; dual-channel peristaltic pump) and maximum backpressure of 30 psi (0.2 MPa). The system is compatible with Econo-Column® low-pressure chromatography columns, Bio-Rad chomatography resins, GE Healthcare HiTrap cartridges, SOURCE resins, and all other low-pressure chromatography resins
- **Fraction collection** — the system offers both simple and sophisticated fraction collection choices. Collect into eighty 13 x 100 mm tubes or micro tubes using the Model 2110 fraction collector (page 146), or collect into virtually any size container, from microplates to carboys, using the BioFrac fraction collector (page 149); in addition, the BioLogic LP system supports the use of other fraction collectors
- **IEC 61010 safety certification**

Specifications for BioLogic LP Dual Peristatic Pump

Flow rate	0.04–40 ml/min
Pressure limit	30 psi/ 2 bar
Techniques	Affinity, ion-exchange, size exclusion/desalting, HIC, CHT™
UV detection	254 and 280 nm
Conductivity	0–500 ms/cm
pH monitor	—
Sample loading	Custom-sized loops and MV-6 manual sample inject valve
Fraction collection	External; Model 2110 or or BioFrac™ fraction collector
Gradient	•

For More Information
Web: bio-rad.com/biologiclp
Request or download bulletins: system information — 2038 and 2327; column connection instructions — 5326 (download only)

Ordering Information

Catalog #	Description
7318300	**Standard BioLogic LP System**, 100/120 V, includes BioLogic LP controller, BioLogic rack, accessory kit with MV-6 manual inject valve, proportioning valve/mixer, UV optics, conductivity cell, tubing and fittings, column and conductivity cell holder, starter kit
7318301	**Standard BioLogic LP System**, 220/240 V, includes same as #7318300
7318302	**BioLogic LP System with Model 2110 Fraction Collector**, 110/120 V, includes standard BioLogic LP system, SV-3 diverter/bypass valve, system cable 1
7318303	**BioLogic LP System with Model 2110 Fraction Collector**, 220/240 V
7318304	**BioLogic LP System with BioFrac Fraction Collector**, 110/120 V, includes standard BioLogic LP system, system cables 3 and 15
7318305	**BioLogic LP System with BioFrac Fraction Collector**, 220/240 V
7318336	**BioLogic LP System with Model 2110 Fraction Collector and LP Data View Software**, 110/120 V, includes SV-3 diverter/bypass valve, system cable 1, 25' serial cable
7318337	**BioLogic LP System with Model 2110 Fraction Collector and LP Data View Software**, 220/240 V
7318338	**BioLogic LP System with BioFrac Fraction Collector and LP Data View Software**, 110/120 V, includes system cables 3 and 15, 25 serial cable
7318339	**BioLogic LP System with BioFrac Fraction Collector and LP Data View Software**, 220/240 V
Pump Tubing Kits	
7318320*	**MV-6 Manual Inject Valve**, 6 ports
7318321*	**SV-5 Buffer Select Valve**, 5-port, 4-position solenoid random-access valve, 30 psi (2 bar) limit
7318322*	**SV-3 Diverter/Bypass Valve**, 3-way valve
7318323	**Gradient Mixer**
7318324	**BioLogic LP Optics Module**
7318165	**UV Flow Cell**, replacement
7318166	**Lamp**, replacement
7318167	**Filter Assembly**, 254 and 280 nm
7318155	**Conductivity Flow Cell**
7318350	**BioLogic LP Starter Kit**, includes buffers, standard, anion exchange cartridge
Single-Injection Sample Loops, Kits, and Accessories	
7500492	**100 µl PEEK Sample Loop**
7500493	**250 µl PEEK Sample Loop**
7500494	**500 µl PEEK Sample Loop**
7500495	**1 ml PEEK Sample Loop**
7500496	**2 ml PEEK Sample Loop**
7500497	**5 ml PEEK Sample Loop**

*For more information, see page 158.

BioLogic™ LP Data View™ Software

BioLogic LP Data View software allows complete freedom to rescale chromatogram axes both during and after a run, to multitask during chromatogram data capture, and to print using any dedicated or networked printer.

LP Data View software:

- Runs on Windows XP or Windows 7 operating systems; requires use of one serial or USB port
- Automatically records method information for each run and allows notes to be recorded with data
- Automatically records run events such as Start, End, Fraction Advance, Hold, Pause, and Continue
- Prints customized reports
- Exports data to other applications

For More Information
Web: bio-rad.com/biologicLPcomponents
Request or download bulletin: 2038

Ordering Information

Catalog #	Description
7318365	**LP Data View Software for the BioLogic LP System**, includes software CD, cable adaptor

BioLogic™ LP Valves

Bio-Rad offers three valve options for the BioLogic LP system.

Buffer Selection and Automated Sample Loading Valve

The optional SV-5 buffer select valve expands the preparative purification capabilities of the BioLogic LP system, allowing it to control up to four buffers and to automatically inject large-volume samples. The SV-5 valve attaches directly to the BioLogic rack and is controlled by the BioLogic LP system.

Manual Sample Injection Valve

The MV-6 injection valve has six ports with female luer fittings. It accommodates user-made loops of any volume. The MV-6 valve mounts directly on the BioLogic system rack.

Fraction Collection/Column Bypass Valve

The optional SV-3 diverter/bypass valve is a two-position solenoid valve controlled through the Model EP-1 Econo pump or the BioLogic LP system. When connected to the BioLogic LP system, the SV-3 valve directs effluent flow from the column to a bypass position, or from the fraction collector to a waste position. The function of the valve is determined by the mini-DIN connection on the rear of the instrument and by the plumbing of the valve. When connected to the Model EP-1 Econo pump, the SV-3 valve functions only as a fraction collector diverter valve. The SV-3 valve connects directly to the BioLogic system rack.

Ordering Information

Catalog #	Description
7318321	**SV-5 Buffer Select Valve**, 5-port, 4-position solenoid random-access valve, 30 psi (2 bar) limit
7318320	**MV-6 Manual Inject Valve**, 6 ports
7318322	**SV-3 Diverter/Bypass Valve**, 3-way valve

BioLogic™ Rack

The BioLogic rack is an adaptable racking system made of durable, solvent-resistant polypropylene, stainless steel, and glass-filled nylon. In addition to supporting a range of chromatography systems it supports a range of columns and cartridges, valves, detection modules, buffer bottles, and peripheral equipment such as the Model 2110 fraction collector. A BioLogic rack expansion kit and optional rack components are available for custom racking applications.

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

BioLogic rack with optional expansion kit.
Dimensions are 34 x 41 x 64 cm (W x D x H).

Ordering Information

Catalog #	Description
7500251	**BioLogic Rack**, includes rack tray, 8 sleeves, 2 short vertical bars, 2 long vertical bars, column clamp set, 5 bar clamps, 4 cable organizers
7500268	**BioLogic Rack Expansion Kit**, includes 2 rack trays, 2 long vertical bars, 16 sleeves
Accessories	
7500262	**Vertical Bars**, long, 64 cm, 2
7500263	**Vertical Bars**, short, 10 cm, 2
7500264	**Horizontal Bar Kit**, includes 2 tie bars, 4 bar clamps
7500260	**Column Clamp Set**, includes 1 column clamp assembly
7500265	**Bar Clamps**, 5

Model EM-1 Econo™ UV Monitor

The Model EM-1 Econo UV monitor is a single-wavelength detector for flowthrough monitoring of effluents from chromatographic columns, centrifugation gradients, and other devices. The monitor consists of a control unit and an optics module that includes both 254 and 280 nm filters and a 2 mm pathlength flow cell.

- Portable optics module with detection close to the column outlet to maximize resolution
- Autozero functionality
- Coldroom compatibility
- LED display of absorbance

Specifications

Wavelength	254 and 280 nm
Sensitivity ranges	2.0, 1.0, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01 AUFS
Detection limit	7 µg/ml (BSA in H_2O)
Lamp	Low-pressure mercury with phosphor screen
Filters	254 and 280 nm
Output signal	0–1 V analog (impedance 150 Ω)
Operating temperature	4–40°C
Flow cell	Optical path 2 mm, internal volume 80 µl, illuminated volume 3 µl
Noise	1.0×10^{-4} OD max. peak-to-peak (dry cell); 2.0×10^{-4} OD max. peak-to-peak (flowing liquid)
Safety	Meets IEC 61010 and CSA 22.2 certification
Dimensions (W x D x H)	Base unit: 14.6 x 18.6 x 20.2 cm Optics unit: 13.2 x 15.2 x 3.8 cm

For More Information
Web: bio-rad.com/modelem1

Ordering Information

Catalog #	Description
7318160	**Model EM-1 Econo UV Monitor**, 100/120 V, includes control module, optics module, filters for 254 and 280 nm wavelengths, system cable 4, fittings kit
7318162	**Model EM-1 Econo UV Monitor**, 220/240 V
Accessories	
7318165	**UV Flow Cell**, replacement
7318166	**Lamp**, replacement
7318167	**Filter Assembly**, 254 and 280 nm

Process-Scale Separations

Bio-Rad has extensive experience serving the separation technology community with process resins that offer optimal solutions for your separation needs. To order Bio-Rad process-scale resins, contact your local Bio-Rad sales representative.

Process Resin Selection Guide

Resin	Available in Process Scale Page #	Foresight™ Prepacked Plates and Columns Page #	Resin Sampler Pack Page #	Other Prepacked Columns Page #
Affinity				
Nuvia™ IMAC	94	117–118		114
Nuvia™ IMAC, uncharged	94			
Profinity™ IMAC	95			114
UNOsphere SUPrA™ rProtein A	100–101	117–118	110	114
Affi-Prep® Protein A	101			114
Affi-Gel® 10/15	105			
Affi-Gel Blue	102			115
DEAE Affi-Gel Blue	102			114
CM Affi-Gel Blue	103			
Affi-Prep polymyxin	104			
Affi-Gel boronate	104			
Affi-Gel HZ	106			
Affi-Gel 102	106			
Analytical Grade Resins				
AG® 1, 4	83–85			
AG 50W	83–85			
AG 501	83–85			
Chelex®	83–85			
Hydrophobic Interaction				
Macro-Prep® methyl HIC	109			
Macro-Prep t-butyl HIC	109			
Bio-Beads™ SM-2	110			
Ion Exchange				
Nuvia™ Q	78–79	117–118		
Nuvia S	78–79	117–118		
Nuvia HP-Q	78–79	117–118		
Nuvia HR-S	78–79	117–118		
UNOsphere™ Q	78–79	117–118	110	114–115
UNOsphere S	78–79	117–118	110	115
Macro-Prep High Q	81–82		110	115
Macro-Prep DEAE	81–82		110	115
Macro-Prep High S	81–82		110	114
Macro-Prep CM	81–82			
Mixed-Mode				
Nuvia™ cPrime™	88–89	117–118		114
CHT™ Type I	89–90	117–118	110	114
CHT Type II	89–90	117–118	110	114
MPC™	91–92	117–118		114–115
Bio-Gel® HT/HTP	93			
CFT™ Type II	91–92		110	114–115
Size Exclusion				
Bio-Gel A	108			
Bio-Gel P	107			
Bio-Beads SM-2	110			
Bio-Beads S-X	108–109			

For product applications and descriptions, please refer to the chromatography media selection guide on pages 74–78.

Process-Scale Chromatography Resins

Nuvia™ resins — a family of next-generation ion-exchange and metal affinity products built on an industry proven rigid polymer base matrix. Nuvia Q and S resins offer superior flow properties and low nonspecific binding while delivering high capacity and unique selectivity. Nuvia HR-S is a high-resolution cation exchanger capable of separating very challenging high molecular weight impurities. Nuvia HP-Q is a new strong anion exchange resin designed for high-throughput purification of large biomolecules, such as IgA, IgM, fibrinogen, factor VIII, von Willebrand factor, and polyethylene glycol–modified proteins. Nuvia IMAC is available in two forms: uncharged and charged with Ni^{2+}. The uncharged form can be charged with the metal ion of your choice for even greater purification flexibility. Nuvia IMAC is a high-capacity metal chelate affinity resin. It has optimized particle size and high porosity that allow operation at higher flow rates without compromising binding capacity. Nuvia resins bring together a unique set of properties specifically designed to meet the demands of current and future downstream processes. Nuvia resins are flexible and robust with a large operational window, making them effective in capture and/or polish steps.

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

UNOsphere™ resins — specialized for fast mass transfer, UNOsphere resins deliver high binding capacity at high flow rates while maintaining low backpressure. These robust polymeric resins formed by single-step polymerization carry either ionic (UNOsphere Q and S) or affinity (UNOsphere SUPrA™) functionality, making them ideal for the efficient purification of biopharmaceutical molecules from feedstream at any stage of the downstream process.

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

Macro-Prep® resins — polymeric methacrylate resins are available with strong or weak ion exchange and hydrophobic (methyl and t-butyl) functionalities. These rigid macroporous hydrophilic resins provide excellent dynamic binding capacity, resolution, and throughput at high flow rates for the purification of biomolecules. Macro-Prep resins are an excellent choice for process-scale applications such as blood fractionation purification.

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

Ceramic hydroxyapatite — CHT™ is a robust mixed-mode media with unique separation properties that delivers exceptional selectivity for purification of biomolecules. As a proven scalable polishing step in mAb and vaccine purification, CHT effectively eliminates common feedstream contaminants, such as aggregates, leached Protein A, DNA, and host cell proteins, in a single step. This provides you the flexibility to maximize your process economics.

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

Ceramic fluoroapatites — MPC™ is a fluorinated derivative of ceramic hydroxyapatite providing the same robust impurity clearance as CHT. Use MPC media to maximize your process economics for specialty protein purification applications. CFT™ is a chemically pure form of fluoroapatite. It is a rigid, spherical, and macroporous media used in the purification of biologically significant compounds and is ideally suited for the bioprocessing industry. CFT can be used under stringent conditions to separate acidic proteins requiring buffered conditions as low as pH 5.6. CFT has high binding capacity and may be used reproducibly over an extended number of chromatography runs. When CFT is used, process engineers can perform purifications across a range of lower pH values to obtain optimal and reproducible results for the targeted biomolecule.

For More Information
Web: bio-rad.com/MPC
bio-rad.com/processCFT

Nuvia mixed-mode resin — Nuvia™ cPrime™ resin is designed for process-scale purification of a wide variety of therapeutic proteins. The unique selectivity allows method developers to use hydrophobic and cation exchange modes to achieve effective purification. The resin has a large design space for binding and elution, allowing for the development of highly robust methods in a commercial manufacturing setting. Nuvia resins are built on a rigid, mechanically and chemically stable macroporous base matrix with a particle size optimized to deliver exceptional flow properties, fast mass transfer, and stability.

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

AG® resins — AG resins are a highly referenced and extensively used line of chromatography resins for the separation of low molecular weight molecules, such as inorganic ions, organic acids, peptides, and carbohydrates, from biopharmaceutical preparations and ancillary buffers used in biomanufacturing. They are highly processed to remove impurities. Biotechnology-grade AG resins are further treated to reduce bioburden to extremely low levels, making them suitable for process-scale purification of biopharmaceuticals.

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

Chelex® resin — these unique chelating resins bind polyvalent cations with high selectivity and are used to remove metal ions from samples and buffers. They are extensively used in environmental applications, such as glyphosate isolation. Chelex resins are made from a styrene divinylbenzene support coupled to paired iminodiacetate ions.

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

Visit **bio-rad.com/samplenow** to request samples of these resins.

Bio-Beads™ SM-2 resin — nonpolar polystyrene-based resin for hydrophobic interaction chromatography, Bio-Beads are used extensively for the removal of nonpolar detergents from biological preparations for manufacturing at both laboratory and process scale. The resin is reusable and can be easily cleaned with alcohol solutions followed by a distilled water rinse.

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

Chromatography Resin Screening Tools

Foresight™ Prepacked Plates and Columns

Foresight plates and columns are prepacked with a range of Bio-Rad's process chromatography resins, offering process scientists convenience and reliability for their high-throughput experimentation needs. Their robust design allows process scientists to use the prepacked formats through the entire purification development cycle from high-throughput media screening and small-scale method development to scale-up optimization.

- Prepacked and ready-to-use formats are designed to save process development time
- Different experimental conditions can be evaluated to better define an operational window
- High-throughput experiments with minimal sample requirements can be performed
- Available in a variety of chromatography resin modes designed for large-scale bioprocess
- Compatible with robotic liquid handling workstations

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

Chromatography Media Available in Foresight Formats

Chromatography Resin	Mode
UNOsphere™ Q	Strong anion
UNOsphere S	Strong cation
Nuvia™ Q	Strong anion
Nuvia S	Strong cation
Nuvia HR-S	Strong cation
Nuvia HP-Q	Strong anion
Nuvia™ cPrime™	Mixed-mode hydrophobic: cationic
MPC™ Type I — 40 µm particle size	Mixed-mode metal affinity: cationic
CHT™ Type I — 40 µm particle size	Mixed-mode metal affinity: cationic
CHT Type II — 40 µm particle size	Mixed-mode metal affinity: cationic
Nuvia IMAC	Metal affinity

Ordering Information

Catalog #	Description
Foresight Plates, 2 x 96-Well	
732-4714	**Foresight UNOsphere Q**, 20 µl
732-4710	**Foresight UNOsphere S**, 20 µl
732-4703	**Foresight Nuvia Q**, 20 µl
732-4701	**Foresight Nuvia S**, 20 µl
732-4707	**Foresight Nuvia HR-S**, 20 µl
12006908*	**Foresight Nuvia HP-Q**, 20 µl
732-4705	**Foresight Nuvia cPrime**, 20 µl
732-4716	**Foresight CHT Type I**, 40 µm, 20 µl
732-4718	**Foresight CHT Type II**, 40 µm, 20 µl
732-4785	**Foresight MPC Type I**, 40 µm, 20 µl
12004035	**Foresight Nuvia IMAC Ni-Charged**, 20 µl

Description	**1 ml**	**5 ml**
Foresight Columns		
Foresight UNOsphere Q	732-4732	732-4752
Foresight UNOsphere S	732-4730	732-4750
Foresight Nuvia Q	732-4721	732-4741
Foresight Nuvia S	732-4720	732-4740
Foresight Nuvia HR-S	732-4723	732-4743
Foresight Nuvia HP-Q	12007020*	12007021*
Foresight Nuvia cPrime	732-4722	732-4742
Foresight CHT Type I, 40 µm	732-4735	732-4755
Foresight CHT Type II, 40 µm	732-4736	732-4756
Foresight MPC Type I, 40 µm	732-4737	732-4757
Foresight Nuvia IMAC Ni-Charged	12004038	12004037

Description	**200 µl**	**600 µl**
Foresight RoboColumn Units, 1 row of 8 columns**		
Foresight UNOsphere Q	732-4819	732-4820
Foresight UNOsphere S	732-4813	732-4814
Foresight Nuvia Q	732-4804	732-4805
Foresight Nuvia S	732-4801	732-4802
Foresight Nuvia HR-S	732-4831	732-4832
Foresight Nuvia HP-Q	12007013*	12007014*
Foresight Nuvia cPrime	732-4807	732-4808
Foresight CHT Type I, 40 µm	732-4822	732-4823
Foresight CHT Type II, 40 µm	732-4825	732-4826
Foresight MPC Type I, 40 µm	732-4828	732-4829
Foresight Nuvia IMAC Ni-Charged	12004051	12004052

* Coming soon.
** Foresight RoboColumn units are to be used with robotic liquid handling workstations.

Please visit **bio-rad.com/foresight** for more information on prepacked columns and plates.

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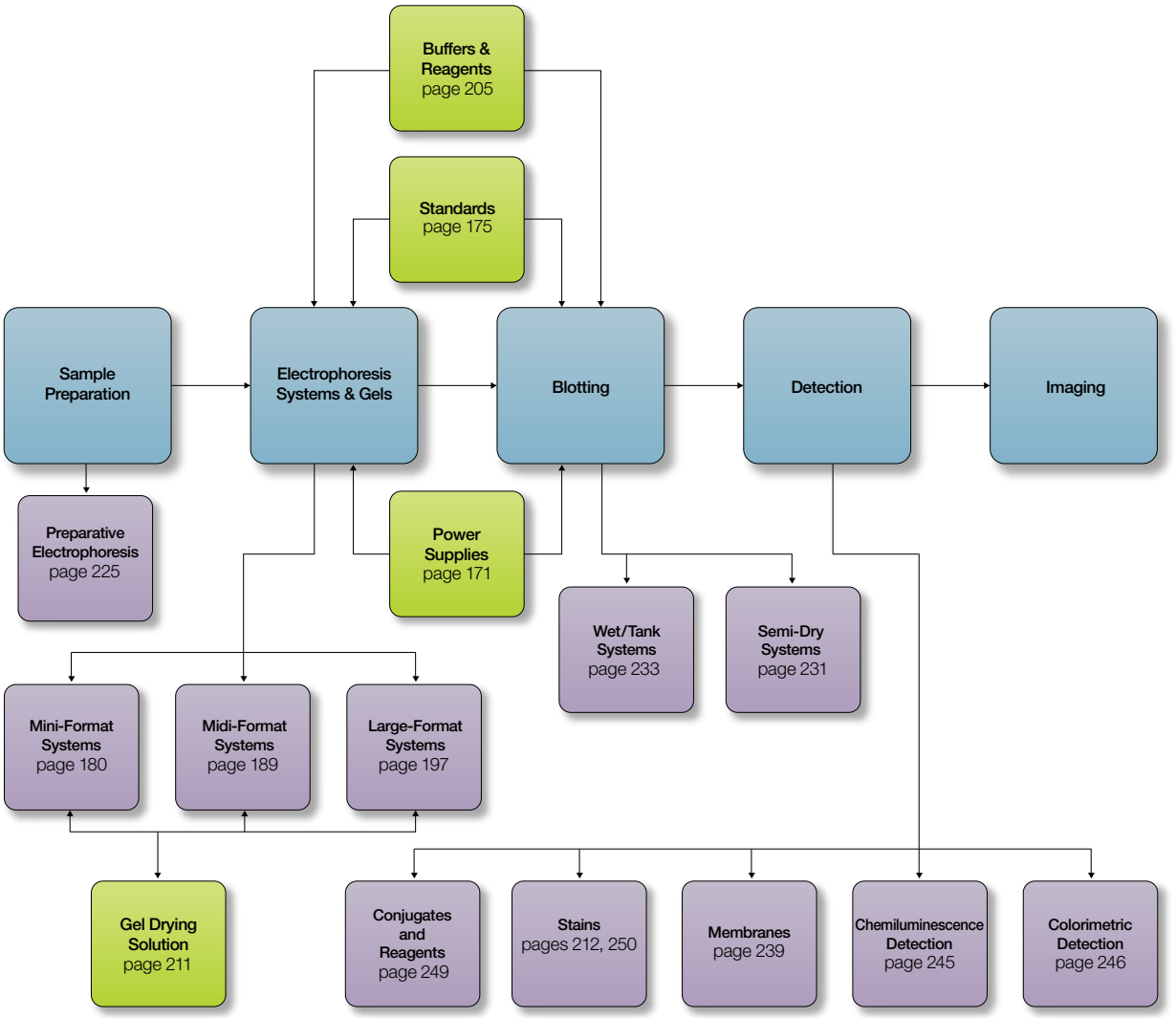
Electrophoresis and Blotting Solutions

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 molecular weight (MW) separation Run up to 12 gels with the PROTEAN Plus Dodeca cell
Compatible Gel Formats				
Precast	Mini-PROTEAN precast gels (page 184)	Criterion, Criterion™ TGX™, and Criterion XT precast gels (page 190)		
Handcast	Mini-PROTEAN empty cassettes (pages 184, 187) Mini-PROTEAN casting plates (page 182)	Criterion empty cassettes (page 195)	PROTEAN II casting plates (page 199)	PROTEAN Plus casting equipment (page 203)
Electrophoresis Cells				
	Mini-PROTEAN Tetra (page 180) Mini-PROTEAN 3 Dodeca (page 183)	Criterion (page 189) Criterion Dodeca (page 189)	PROTEAN II xi/XL (page 197) PROTEAN II xi/XL multi-cells (pages 199)	PROTEAN Plus Dodeca (page 202)

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	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 233) Criterion blotter (page 234) Trans-Blot® cell (page 235)	Criterion wire blotter (page 234) Criterion plate blotter (page 234) Trans-Blot cell (page 235) Trans-Blot Plus cell (page 236)	Trans-Blot cell (page 235) Trans-Blot Plus cell (page 236)	Trans-Blot Plus cell (page 236)
Semi-dry transfer	Trans-Blot SD cell (page 232) Trans-Blot® Turbo™ (page 231)	Trans-Blot SD cell (page 232) Trans-Blot Turbo (page 231)	Trans-Blot SD cell (page 232)	

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	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

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 separation 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

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 180.
Criterion cell: page 189.
Sub-Cell systems: page 252.

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 234.
Mini Trans-Blot cell: page 233.
Trans-Blot cell: page 235.
Trans-Blot Plus cell: page 236.
Dodeca cells: pages 183, 189, 202.

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 225.

See Also
High-throughput electrophoresis systems: pages 183, 189.
Western blotting: page 228.

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 185 (Mini-PROTEAN® TGX™ gels) and 191–192 (Criterion™ gels).

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

Protein Standards Selection Guide

	Precision Plus Protein™ Standards						Specialty Standards		
	WesternC™	Kaleidoscope™	Dual Xtra	Dual Color	All Blue	Unstained	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	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	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	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 180–204.

Horizontal electrophoresis systems: pages 251–259.

Electrophoresis and blotting buffers: pages 205–206, 243.

Protein electrophoresis stains: page 212.

Protein blotting stains: page 250.

Gel Doc EZ imaging system: page 290.

ChemiDoc MP imaging system: page 287.

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)

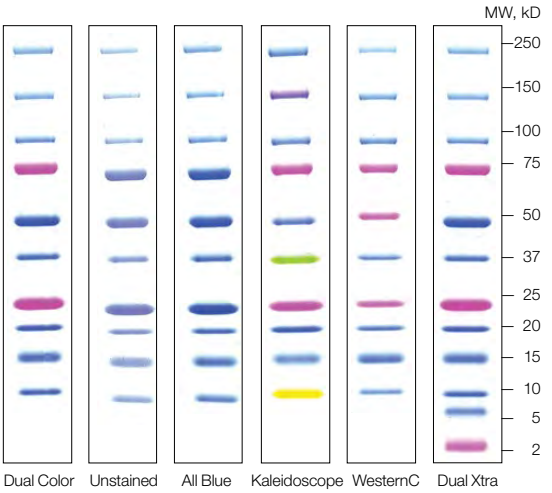
Improved Dual Color Standard

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

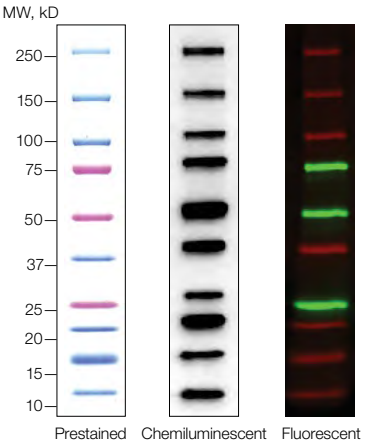
Precision Plus Protein™ WesternC™ Standards

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

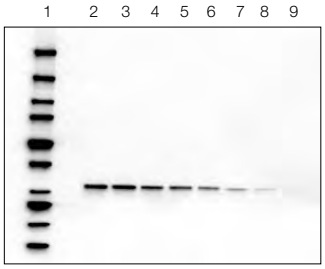


The Precision Plus Protein standards family.



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

For More Information
Request or download bulletin: 5561
Download bulletins: 2847 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

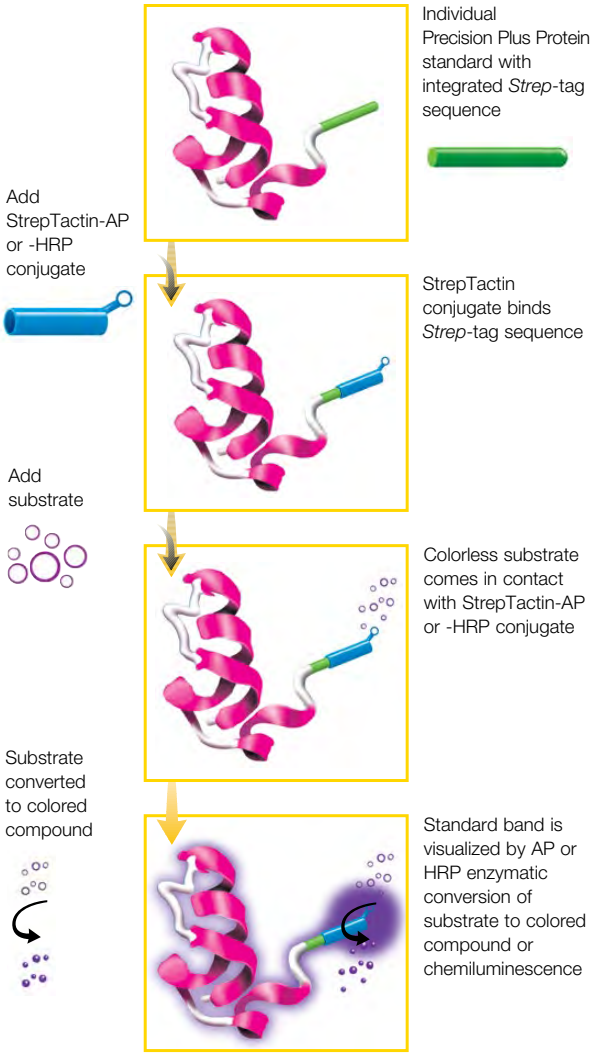
Precision Plus Protein standard plugs allow easy, quick, and clean loading of MW standards on any gel. The plugs are especially useful for vertical 2-D gels with no reference well. Precision Plus Protein unstained standards are cast in 1 mm thick agarose plugs for easy storage, handling, and loading. 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
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 is 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 Kaleidoscope 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.

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

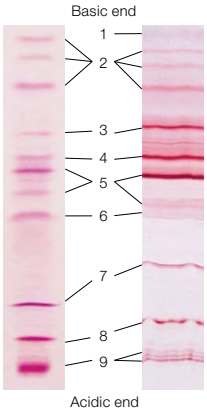
IEF Standards

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

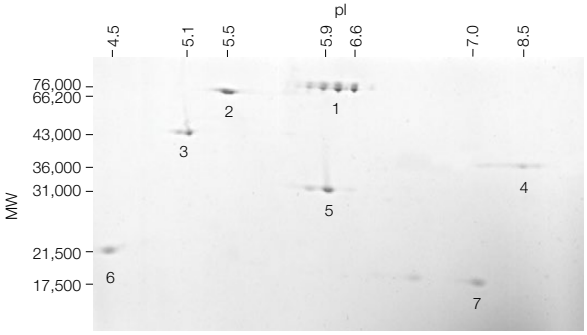
Catalog #	Description
1610310	**IEF Standards**, 250 µl

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 173.

Premixed buffers: pages 205–206.

Mini-PROTEAN precast gels: page 184.

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

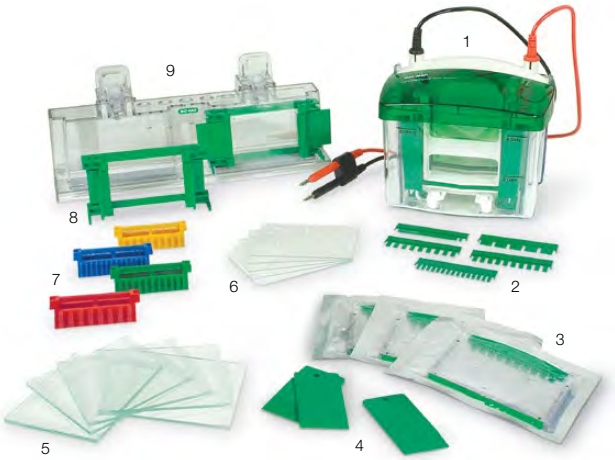
- Ground glass plates with permanently bonded spacers and improved casting gaskets guarantee perfect alignment and leakproof casting
- Casting frames*** with simple cam closure provide precision alignment on any flat surface
- Side-by-side casting stand*** allows access to both gels simultaneously, and 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 182).

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. Mini-PROTEAN® TGX™ precast gels.
4. Gel releasers.
5. Spacer plates.
6. Short plates.
7. Sample loading guides.
8. Casting frame.
9. 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	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 Supply Selection Guide, p. 171
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

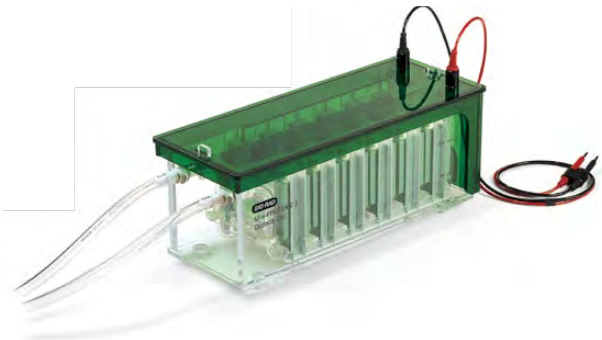
Catalog #	Description
Handcast Gel Accessories and Replacement Parts	
1658051	**Mini-PROTEAN Tetra Cell Casting Stand**, 2 core, includes clamps for use with the Mini-PROTEAN Tetra cell casting modules
1658052	**Mini-PROTEAN Tetra Cell Casting Stand**, 1 core, includes clamps for use with the Mini-PROTEAN 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 188) and Model 485 gradient former (see page 188). 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
Download bulletin: 2571

See Also

PowerPac HC power supply: page 173.
Mini-PROTEAN precast gels: page 184.
AnyGel stands: page 187.

Specifications

Number of gels	1–12
Precast gels	Mini-PROTEAN
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 Mini-PROTEAN 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 separately.

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 286).

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 from 60 to 200 bp

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

Gel Cassette Specifications

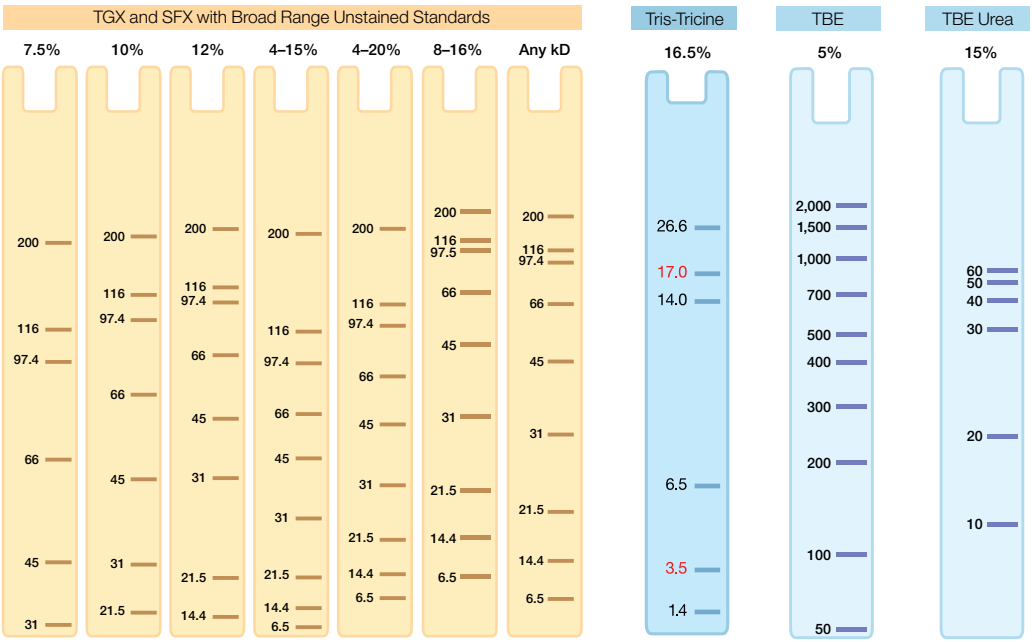
Gel dimensions (W x L x thickness)	86.0 x 72.0 x 1.0 mm
Gel cassette dimensions (W x L x thickness)	101.0 x 89.0 x 4.6 mm
Cassette material	Styrene copolymer
Comb material	Polycarbonate
Gel storage conditions	Store flat at 4°C; do not freeze

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	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	4561023**	4561024**	4561025**	4561026**	4561021
10% Resolving Gel	4561033**	4561034**	4561035**	4561036**	4561031
12% Resolving Gel	4561043**	4561044**	4561045**	4561046**	4561041
4–15% Resolving Gel	4561083**	4561084**	4561085**	4561086**	4561081
4–20% Resolving Gel	4561093**	4561094**	4561095**	4561096**	4561091
8–16% Resolving Gel	4561103	4561104	4561105	4561106	4561101
Any kD Resolving Gel	4569033**	4569034**	4569035**	4569036**	4569031
Mini-PROTEAN TGX Stain-Free Precast Gels					
7.5% Resolving Gel	4568023	4568024	4568025	4568026	4568021
10% Resolving Gel	4568033	4568034	4568035	4568036	4568031
12% Resolving Gel	4568043	4568044	4568045	4568046	4568041
4–15% Resolving Gel	4568083	4568084	4568085	4568086	4568081
4–20% Resolving Gel	4568093	4568094	4568095	4568096	4568091
8–16% Resolving Gel	4568103	4568104	4568105	4568106	4568101
Any kD Resolving Gel	4568123	4568124	4568125	4568126	4568121
Empty Cassettes and Combs					
Mini-PROTEAN Empty Cassette* **	4560003	—	4560005	—	—
Combs (for Mini-PROTEAN empty cassettes)	4560013	—	4560015	—	—

* Multichannel pipet compatible.
** Mini-PROTEAN TGX gels are available with 100 µl of dual color standard (add DC 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 206.

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
Mini-PROTEAN Precast Gels (2 per package)				
5% TBE	4565013	4565014*	4565015*	4565016
15% TBE-Urea	4566053*	—	4566055*	4566056*
16.5% Tris-Tricine	4563063	4563064	4563065*	4563066

* 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

Mini-PROTEAN® Hand Casting Accessories

See Also

Acrylamide gel-casting reagents: page 208.

Premixed buffers: pages 205–206.

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

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 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

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

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
4560013	**Mini-PROTEAN Combs**, 10-well, 50
4560015	**Mini-PROTEAN Combs**, 12-well, 50
AnyGel Stands and Accessories	
1654131	**AnyGel Stand**, single-row, holds 1 PROTEAN gel, 2 Criterion gels, or 3 Mini-PROTEAN gels
1655131	**AnyGel Stand**, 6-row, holds 6 PROTEAN gels, 12 Criterion gels, or 18 Mini-PROTEAN 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
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
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
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 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

* Order combs separately (see combs for use with glass plates on page 182) in the Mini-PROTEAN Tetra cell section.
** For multi-well comb configurations, refer to page 182.

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
Download bulletin: 2710

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

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
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)

See Also

Criterion precast gels and empty cassettes: pages 190, 195.
Criterion blotter: page 234.
PowerPac Basic and PowerPac HC power supplies: page 173.
Dodeca stainers: pages 195, 203.
AnyGel stands: page 187.
Trans-Blot Plus cell: page 236.
Imaging systems: page 286.
Imaging software: page 292.

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
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 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

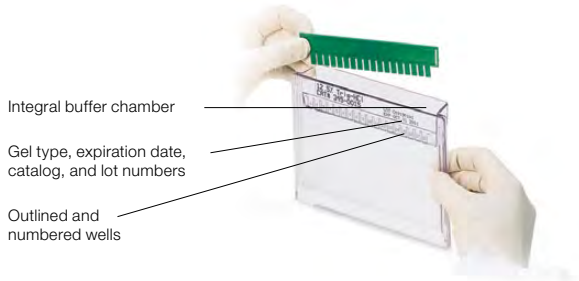
See Also

Premixed buffers: pages 205–206.
ReadyStrip IPG strips: pages 218–219.
Criterion blotter: page 234.
PowerPac power supplies: pages 171–172.
Dodeca stainers: pages 195, 203.
Criterion staining trays: page 195.
Standards: page 175.
Protein electrophoresis stains: page 212.

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 189) and 1–12 gels can be run in the high-throughput Criterion Dodeca cell (page 189).

- 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 (from date of manufacture)
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

Available Chemistries

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

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

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 286).

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.

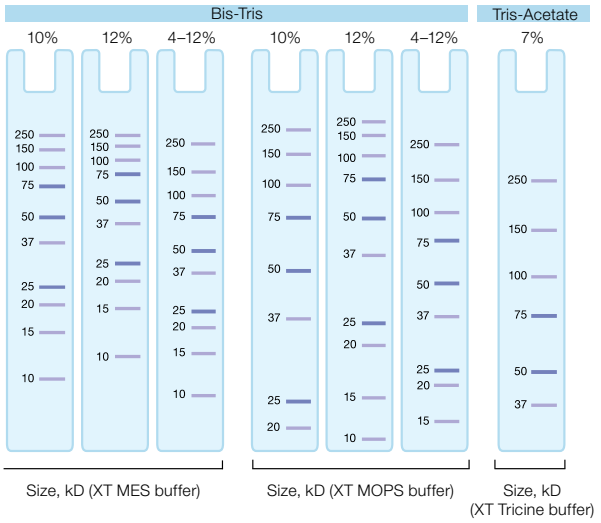
For More Information
Web: bio-rad.com/criteriongels

Specifications

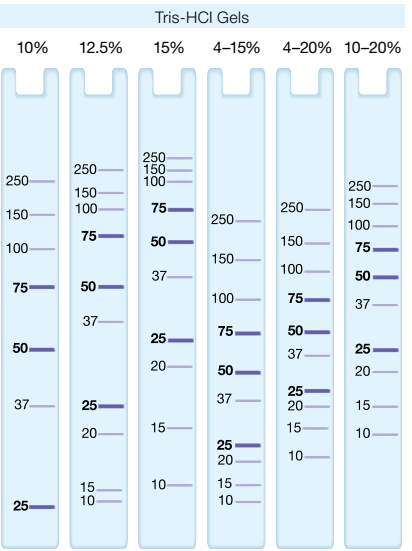
Gel dimensions	13.3 x 8.7 cm (W x L); 1.0 mm thick
Cassette dimensions	15.0 x 10.6 cm (W x L); 5.3 mm thick
Cassette material	Styrene copolymer
Comb material	Polycarbonate
Storage tray material	PET
Gel storage conditions	Store flat; do not freeze Room temperature for Bis-Tris gels 4°C for all other gel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

* From date of manufacture.

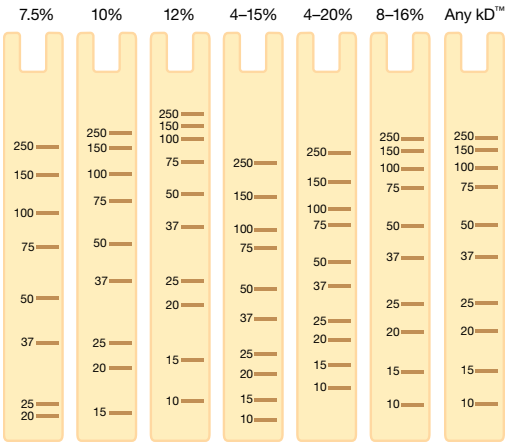
Criterion XT Migration Charts
(with Precision Plus Protein™ Unstained Standards)



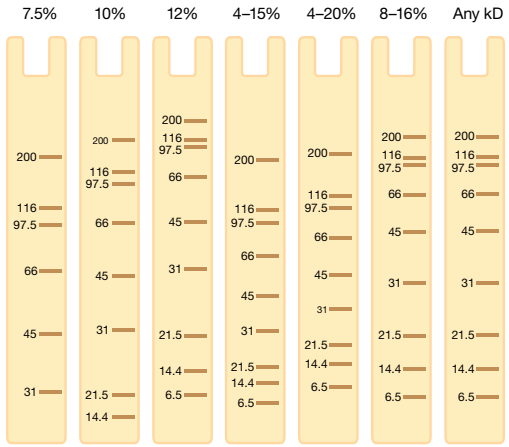
Criterion Migration Charts
(with Precision Plus Protein Unstained Standards)

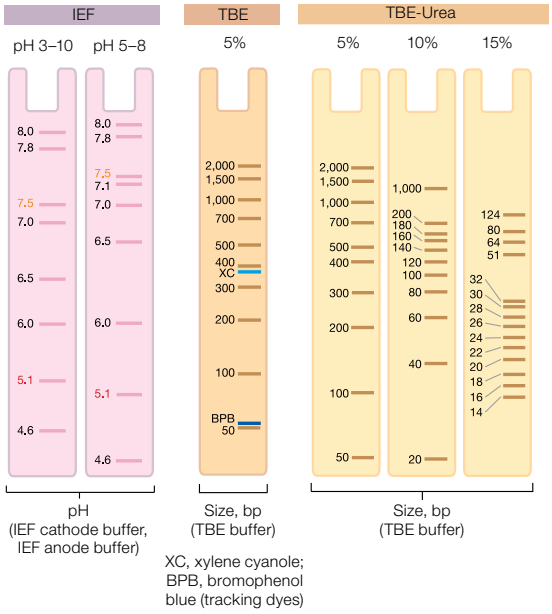


Criterion™ TGX™ and TGX Stain-Free Migration Charts
(with Precision Plus Protein Unstained Standards)



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	—	—
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
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	—	—
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
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
Criterion XT Tris-Acetate Gels					
3–8% Resolving Gel	3450129	3450130	3450131	—	—
Criterion Tris-HCl Gels					
10% Resolving Gel	3450009	3450010	3450011	—	3450101
12.5% Resolving Gel	3450014	3450015	3450016	3450017†	3450102
15% Resolving Gel	3450019	3450020	3450021	—	—
4–15% Linear Gradient	3450027	3450028	3450029	—	—
4–20% Linear Gradient	3450032	3450033	3450034	—	3450104
10–20% Linear Gradient	3450042	3450043	3450044	—	3450107
Criterion Tris-Tricine Gels					
16.5% Tris-Tricine	3450063	3450064	3450065†	—	—
Criterion IEF Gels					
pH 3–10	3450071†	3450072†	—	—	—
pH 5–8	—	3450076†	—	—	—
Criterion TBE Gels					
5% TBE Gel	3450047	3450048	3450049	—	—
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

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.

See Also
Premixed running buffers: pages 205–206.

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
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 184.

Criterion Staining Trays

Criterion staining/blotting trays are plastic trays designed specifically 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

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)

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

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 mini gels
1655131	**AnyGel Stand**, 6-row, holds 6 PROTEAN gels, 12 Criterion gels, or 18 Mini-PROTEAN 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
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

Large-Format Vertical Electrophoresis Systems

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:

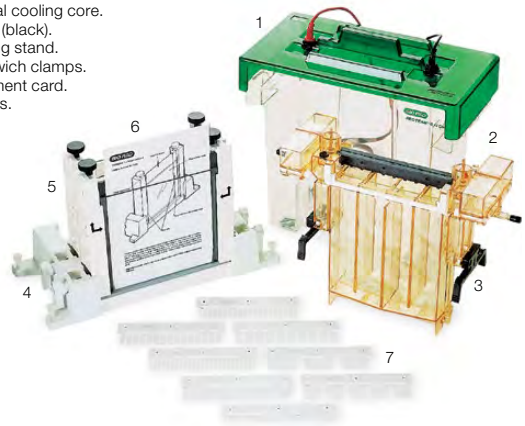
- **Leak proof** — innovative clamps exert uniform pressure along the length of the plates to prevent leaking without the use of grease or agarose plugs
- **Sharp bands and spots** — central cooling core can provide smile-free patterns with as little as 1.5 L of buffer
- **Multiple ways to customize**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

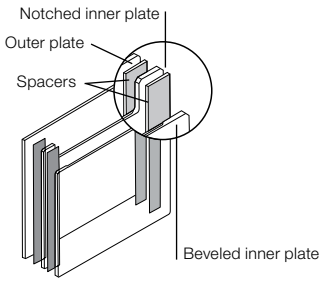
For More Information
Web: bio-rad.com/largeelectro
Request or download bulletin: 1760

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.

See Also

PowerPac Universal and PowerPac HV power supplies: pages 173–174.
PROTEAN i12 IEF cell: page 215.
Protein electrophoresis stains: page 212.
Premixed buffers: pages 205–206.
Gel clip: page 203.
Dodeca stainers: pages 195, 203.

* 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 171.

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 pages 199–200.

*** 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.

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.

See Also

PowerPac Universal power supply: page 174.

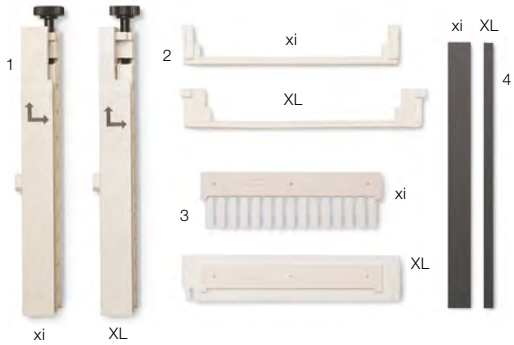
Premixed buffers and buffer reagents: page 243.

Dodeca stainers: pages 195, 203.

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
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 215.

** 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 197–200).

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 203)
- Accommodation for 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

See Also

Acrylamide gel-casting reagents: page 208.

Premixed buffers: pages 205–206.

Ordering Information

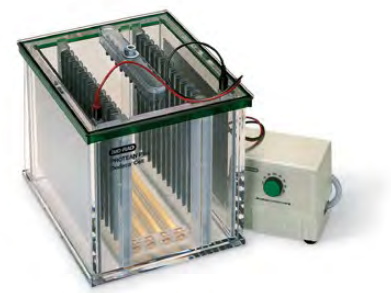
Catalog #	Description
1652025	**PROTEAN II xi Multi-Gel Casting Chamber**, includes casting chamber, sealing plate, silicone gasket, 15 separation sheets, 4 acrylic blocks, 10 xi alignment cards, tapered luer connector, leveling bubble
1652024	**PROTEAN II XL Multi-Gel Casting Chamber**, includes casting 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

See Also
PowerPac HC and PowerPac Universal power supplies: pages 173–174.
Dodeca stainers: pages 195, 203.
Gel clip: page 203.

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 203) can be used to stabilize and position gels while loading



For More Information
Web: bio-rad.com/proteandodeca
Download bulletin: 2621

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

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
Accessories and Replacement Parts	
1654158	**Recirculation Pump**, 100/120 V
1654159	**Recirculation Pump**, 220/240 V
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

Large-Format Electrophoresis Accessories

See Also
Acrylamide gel-casting reagents: page 208.
Premixed buffers: pages 205–206.

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.

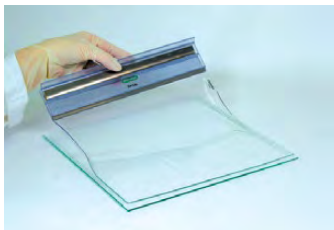
PROTEAN II xi Plate Washer/Holder

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
1654179	**2-D Comb with 1 Reference Well**, 25 cm, 1.0 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
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
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	
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

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

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
1610791	**XT Sample Buffer**, 4x, 10 ml

See Also

ReadyPrep 2-D sample preparation kit: page 3.
ReadyStrip IPG strips: pages 218–219.

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 195.

See Also
Criterion XT buffers and reagents: page 195.

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
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
Premixed Protein Running Buffers	
1610732	**10x Tris/Glycine/SDS**, 1 L
1610772	**10x Tris/Glycine/SDS**, 5 L cube
1610734	**10x Tris/Glycine**, 1 L
1610771	**10x Tris/Glycine**, 5 L cube
1610744	**10x Tris/Tricine/SDS**, 1 L
1610761	**10x IEF Anode Buffer**, 250 ml
1610762	**10x IEF Cathode Buffer**, 250 ml
Premixed Nucleic Acid Running 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

See Also
ReadyStrip IPG strips: pages 218–219.
Vertical electrophoresis systems: pages 180–204.
Horizontal electrophoresis systems: pages 251–258.

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

TGX Stain-Free™ Solutions

TGX™ Handcast Acrylamide Solutions

See Also

Mini-PROTEAN TGX precast gels: page 184.
Mini-PROTEAN TGX Stain-Free precast gels: page 184.

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 Mini-PROTEAN® 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).

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

$$\%C = \frac{\text{grams crosslinker}}{\text{grams acrylamide + grams crosslinker}} \times 100\%$$

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 184 and 190–191. Examples of migration patterns of proteins on gels of different compositions can be found on pages 185 (Mini-PROTEAN® TGX™ precast gels) and 192–193 (Criterion™ precast gels), or contact Bio-Rad Technical Support.

Acrylamide/CrossLinker 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
Download bulletins: 1156 and 1866

Ordering Information

Description

Acrylamide Solutions*	500 ml	2 x 500 ml
30% acrylamide/bis, 19:1	1610154	—
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	—
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
Premixed Acrylamide/Bis Powder	
1610125	**Acrylamide/Bis Powder**, 150 g, 37.5:1

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.

Crosslinkers and Catalysts

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

Crosslinker Application Guide

	Formal Name	Chemical Structure	Applications
Bis	N,N'-methylene-bis-acrylamide	$CH_2{=}CH{-}\overset{\overset{\displaystyle O}{\|}}{C}{-}NH{-}CH_2{-}NH{-}\overset{\overset{\displaystyle O}{\|}}{C}{-}CH{=}CH_2$	General crosslinker in PAGE

Ordering Information

Catalog #	Description
Crosslinkers	
1610201	**Bis Crosslinker**, 50 g
1610142	**2% Bis Solution**, 500 ml
1610143	**2% Bis Solution**, 2 x 500 ml
Catalysts	
1610800	**TEMED**, 5 ml (hazardous shipping charges may apply)
1610801	**TEMED**, 50 ml
1610700*	**Ammonium Persulfate (APS)**, 10 g

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

IEP/IEF Agaroses

Standard low –m_r agarose — with high strength and 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 with 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

Bromophenol Blue Tracking Dye

Bio-Rad offers bromophenol blue tracking dye to monitor protein electrophoresis runs.

Ordering Information

Catalog #	Description
1610404	**Bromophenol Blue**, 10 g

Store at room temperature, dry, and away from direct sunlight.

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

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

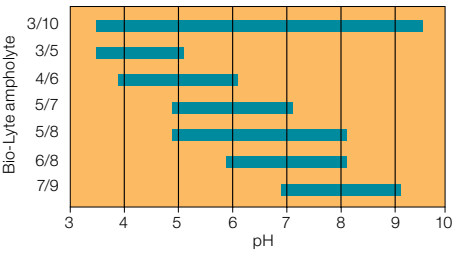
Catalog #	Description
1610301	**SDS (Sodium Dodecyl Sulfate)**, 100 g
1610302	**SDS (Sodium Dodecyl Sulfate)**, 1 kg
1610416	**SDS Solution**, 10% (w/v), 250 ml
1610418	**SDS Solution**, 20% (w/v), 1 L
1706531	**Tween 20**, EIA grade, 100 ml
1610407	**Triton X-100 Detergent**, 500 ml
1610460*	**CHAPS**, 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
ReadyStrip IPG strips: pages 218–219.
PROTEAN i12 IEF system: pages 215–216.

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 and 3/5 ampholytes extend from approximately pH 3.5 to 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 219).



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 5/8 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		
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

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

See Also
Precast polyacrylamide gels: pages 184, 190–191.
Imaging systems: page 286.

Coomassie Stains

QC Colloidal Coomassie Stain

The QC colloidal Coomassie stain provides sensitivity down to ~3 ng BSA, low background end-point 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
Download bulletin: 2423

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
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	4°C
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.

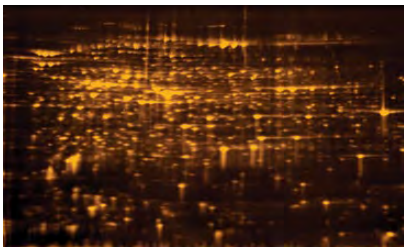
See Also
Imaging systems: page 286.
Precast polyacrylamide gels: pages 184, 190–191.
2-D electrophoresis: page 215.

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

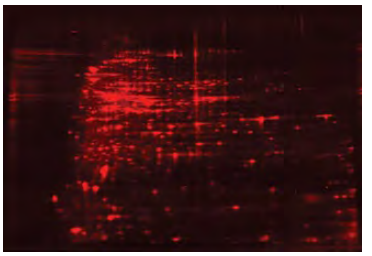


2-D gel stained with Oriole stain. *E. coli* protein (40 µg) was run on an 11 cm pH 5–8 ReadyStrip™ IPG strip for the first dimension and a Tris-HCl 8–16% Criterion™ gel for the second dimension.

Flamingo™ Fluorescent Gel Stain

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

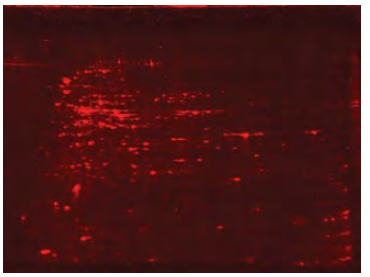


Flamingo fluorescent gel stain. *E. coli* protein sample (10 µg).

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



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

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

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 169.
For preparative IEF products see page 225.

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

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

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.

See Also

ReadyStrip IPG strips: pages 218–219.
Protein sample preparation products: page 2.
Vertical electrophoresis systems: pages 180–204.

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
Download bulletins: 2651, 6138, 6139, and 6140
Request or download bulletin: 6097

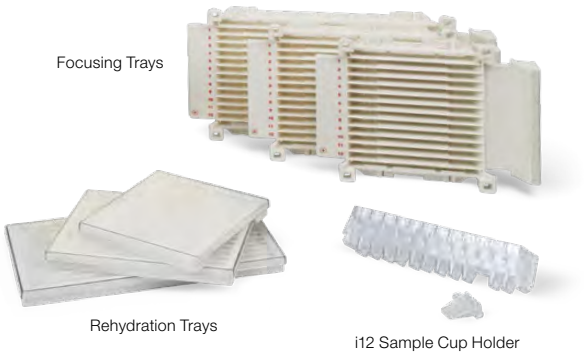
PROTEAN i12 IEF System Specifications

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
Download bulletins: 2651, 6138, 6139, and 6140
Request or download bulletin: 6097

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 216–217 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

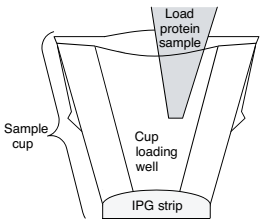
Focusing Tray for the PROTEAN IEF System

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

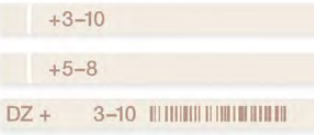
Catalog #	Description
Trays	
1654030	**7 cm Focusing Tray with Lid**
1654020	**11 cm Focusing Tray with Lid**
1654010	**17 cm Focusing Tray with Lid**
1654040	**18 cm Focusing Tray with Lid**
1654042	**24 cm Focusing Tray with Lid**
Cup Loading Tray*	
1654050	**Cup Loading Tray**, includes 1 tray base, 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.

See Also
PROTEAN i12 IEF system: pages 215–216.
ReadyPrep 2-D starter kit: page 219.

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
Download bulletin: 2442

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.

See Also

Bio-Lyte ampholytes: page 210.

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

See Also

ReadyStrip IPG strips and IEF buffers: pages 218–219.
PROTEAN i12 IEF system: pages 215–216.
Criterion system: page 189.

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

	Vials/Kit
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
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

continues

Ordering Information

Catalog #	Description
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

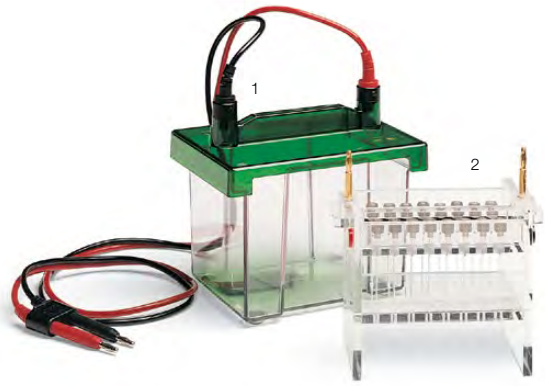
Bio-Rad offers several options for second-dimension tube gel separations using ampholytes.

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.

See Also

AnyGel stands: page 187.
PowerPac HV and PowerPac Universal power supplies: pages 173–174.
Acrylamide gel-casting reagents: page 207.

Ordering Information

Catalog #	Description
1645056*	**PowerPac HV Power Supply**, 100–120/220–240 V

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

See Also
PowerPac HV and PowerPac Universal power supplies: pages 173–174.
Acrylamide gel-casting reagents: page 207.
PROTEAN II second-dimension systems: page 197.

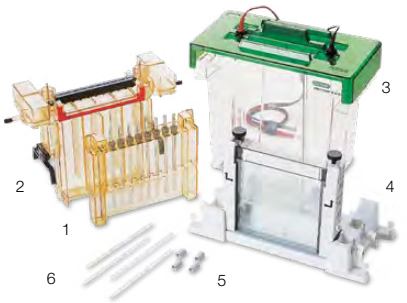
PROTEAN® II xi 2-D Tube Gel Cell

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

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



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.

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
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: pages 173–174.
PROTEAN II xi multi-cell: page 199.
Bio-Lyte ampholytes: page 210.
Acrylamide gel-casting reagents: page 207.

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: pages 173–174.

IEF standards: page 179.

Bio-Lyte ampholytes: page 210.

Acrylamide gel-casting reagents: page 207.

Agarose: page 209.

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
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 products: 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	225	SDS-PAGE or native PAGE	Protein (1–500 mg) DNA (50–300 µg) RNA (≤1 mg)	4–10 hr	1964
Mini prep cell	225	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	227	Electroelution from excised gel pieces	Protein (gel load limits) DNA (≤3 mm thick gels)	3–5 hr	—

Preparative PAGE Cells

Model 491 Prep Cell and Mini Prep Cell

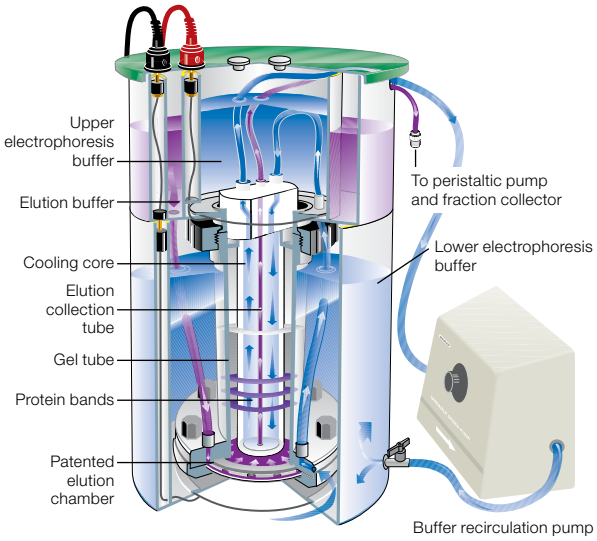
See Also

PowerPac Universal and PowerPac HV power supplies: pages 173–174.

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
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.

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	
1702927	**Model 491 Prep Cell**, 220/240 V, includes buffer recirculation pump, prep cell starter kit with protein standard
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**
1610323	**Prep Cell Starter Kit Protein Standard**, 1 ml
1702941	**Elution Manifold Base**
Mini Prep Cell	
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

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
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

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™ MP or ChemiDoc 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 184, 190–191).
2. **Visualize proteins** — protein separation is visualized and confirmed, using stain-free technology, after 1 minute activation on the ChemiDoc MP or ChemiDoc imaging system. Stain-free technology is a sensitive, time-saving alternative to traditional Coomassie staining (page 287).
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 231).
4. **Verify protein transfer** — ChemiDoc MP or ChemiDoc imaging system paired with stain-free technology enables instant verification of protein transfer (page 287).
5. **Validate and quantitate** — ChemiDoc MP or ChemiDoc imaging system and Image Lab™ desktop 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 MP or ChemiDoc imaging system

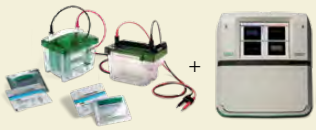
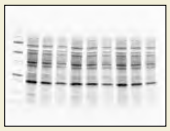
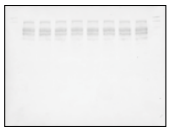
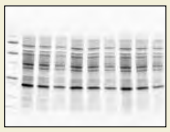
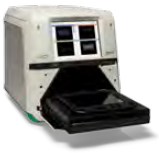
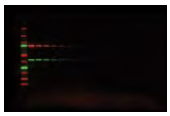
Transfer Proteins
Use the Trans-Blot Turbo system for rapid and efficient protein transfer

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

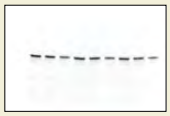
Validate Western Blot
Perform multiplex imaging and validate results by total protein normalization on the ChemiDoc MP or ChemiDoc imaging system

Bio-Rad V3 Western Workflow vs. Traditional Western Workflow

Total time: **6 hr**

Bio-Rad V3 Western Workflow		Time	Data	
1 **Electrophoresis** TGX Stain-Free™ gel Criterion™ cell ChemiDoc™ MP/ ChemiDoc system		20–30 min		**Pre-transfer gel** stain-free image to check sample integrity and separation quality
2 **Transfer** Trans-Blot® Turbo™ system ChemiDoc MP/ ChemiDoc 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 MP/ ChemiDoc system (no need to strip and reprobe)		10–15 min	Target proteins (chemiluminescence) or  Target proteins (fluorescence)	

Total time: **16 hr**

Traditional Western Workflow		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 231) 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 232)
- **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 233)
- **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 237)

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
17001917	**Trans-Blot Turbo Transfer Starter System**, mini, PVDF
17001919	**Trans-Blot Turbo Transfer Starter System**, midi, PVDF
17001918	**Trans-Blot Turbo Transfer Starter System**, mini, nitrocellulose
17001915	**Trans-Blot Turbo Transfer Starter System**, midi, nitrocellulose
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

See Also
PowerPac HC power supply: page 173.
Blotting buffers: page 243.

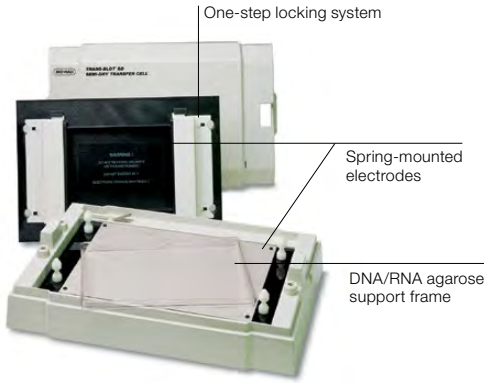
Trans-Blot® SD Semi-Dry Transfer Cell

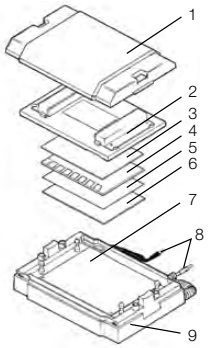
The Trans-Blot SD semi-dry transfer cell allows fast and efficient blotting without buffer tank or gel cassettes. Features include:

- 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
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.

Specifications

Maximum gel size (W x L)	24 x 16 cm
Buffer requirement	200 ml
Gel capacity	4 Mini-PROTEAN® 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 #1645052
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

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

For More Information
Download bulletin: 2033

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.

See Also
PowerPac Basic and HC power supplies: page 173.
Blotting membranes: page 239.
Blot detection reagents: page 244.
Blotting buffers: page 243.

Specifications

Maximum gel size (W x L)	10 x 7.5 cm
Buffer requirement	1.2 L
Gel capacity	2 Mini-PROTEAN handcast gels or 2 Mini-PROTEAN 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.

See Also

PowerPac Basic and PowerPac HC power supplies: page 173.

Criterion precast gels: pages 190–191.

Blotting membranes: page 239.

Blot detection reagents: page 244.

Blotting buffers: page 243.

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
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 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

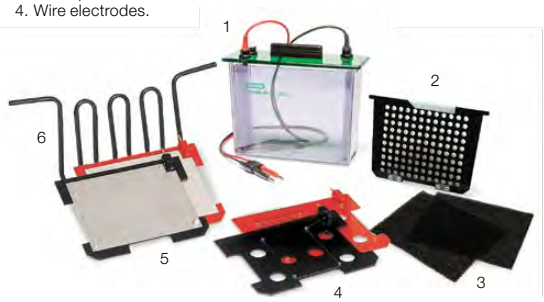
Catalog #	Description
1704070	**Criterion Blotter with Plate Electrodes**, includes cell assembled with plate electrodes, lid with cables, 2 Criterion gel holder cassettes, 1 pack precut blot absorbent filter paper, 4 foam pads, gel/blot assembly tray, roller, sealed ice block
1704071	**Criterion Blotter 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
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

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 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.

See Also

PowerPac HC power supply: page 173.
Precast gels: pages 184, 190–191.
Blotting membranes: page 239.
Blot detection reagents: page 244.
Blotting buffers: page 243.

See Also
PowerPac HC power supply: page 173.
Precast gels: pages 184, 190–191.
Blotting membranes: page 239.
Blot detection reagents: page 244.
Gel clip: page 203.
Blotting buffers: page 243.

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

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.

For More Information
Download bulletin: 2866

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, 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**

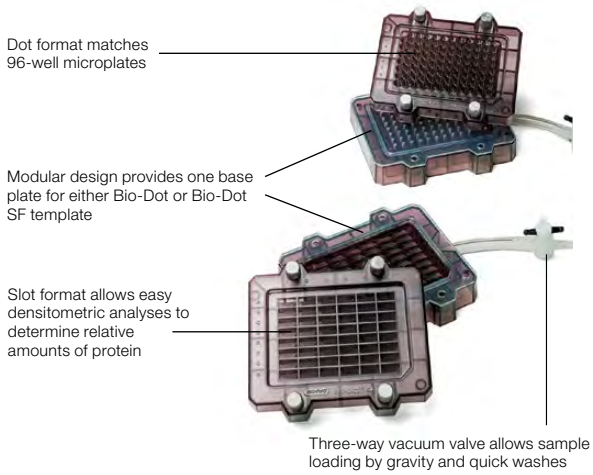
* Trans-Blot cells require the super cooling coil for high-intensity transfers; the super cooling coil is also recommended for all applications using plate electrodes.

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 231)
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	—	—	—

Nitrocellulose Membranes

See Also
Filter paper: page 242.

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	
1620232	**Nitrocellulose/Filter Paper Sandwiches**, 0.2 µm, 8.5 x 13.5 cm, 20 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	
1620234	**Nitrocellulose/Filter Paper Sandwiches**, 0.45 µm, 8.5 x 13.5 cm, 20 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.

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. The pore size of this membrane is 0.45 µm.

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. The pore size of this membrane is 0.2 µm.

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
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
1620238	**Immun-Blot PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 20 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
1620262	**Low Fluorescence PVDF/Filter Paper Sandwiches**, 8.5 x 13.5 cm, 10 pack
1620264	**Low Fluorescence PVDF Roll**, 28 x 3.8 m, 1 roll

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.

Ordering Information

Catalog #	Description
1620159	**Zeta-Probe Membrane**, 30 cm x 3.3 m, 1 roll
1620165	**Zeta-Probe Membrane**, 20 cm x 3.3 m, 1 roll

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 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 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	
1620161	**Bio-Dot/Bio-Dot SF Filter Paper**, 7.7 x 11.3 cm, 60 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 250. Tracking dyes can be found on page 266.

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**, 1 L		
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

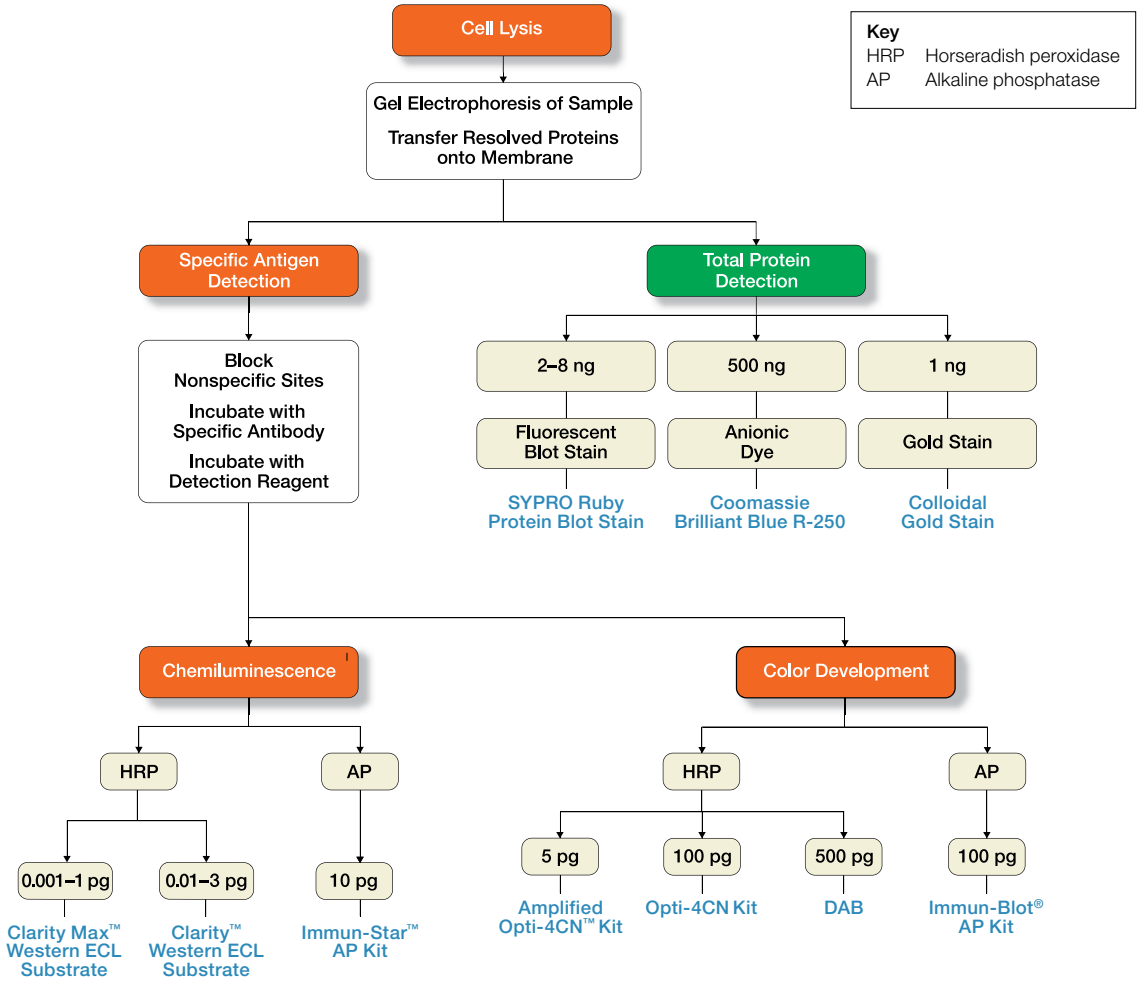
* Store at 2–8°C.

** 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, download 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 286).

Chemiluminescence-Based Kit Selection Guide

	Clarity™ Western ECL	Clarity Max™ Western ECL	Immun-Star™ AP
Lower detection limit	Mid femtogram	Low femtogram	10 pg
Signal duration	24 hr	2 hr	24 hr
Primary detection method	Digital imager and film	Digital imager and film	Film
Suggested anitbody dilution	Primary: 1:1,000–1/50,000 Secondary: 1:50,000–1/250,000	Primary: 1:1,000–1/50,000 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	Nitrocellulose, PVDF, or LF PVDF

Clarity™ and Clarity Max™ Western ECL Substrates

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

Clarity Max Western ECL Substrate

Clarity Max western ECL substrate is our brightest ECL substrate, providing additional sensitivity when you need it most. Clarity Max is perfect for blots involving low-abundance or otherwise difficult-to-detect targets. This ECL substrate completes our western ECL substrate offering and fits right into your current western blotting process. Use it in place of your current ECL substrate when you need additional sensitivity. Features include:

- Room temperature storage
- Low–femtogram level sensitivity
- Compatibility with HRP conjugates

Clarity and Clarity Max Western ECL Substrates

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
1705062	**Clarity Max Western ECL Substrate**, 100 ml, contains 50 ml Clarity Max western peroxide reagent and 50 ml Clarity Max western luminol/enhancer reagent

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
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
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
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 280.

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
1705047	**Immun-Star Goat Anti-Mouse (GAM)-HRP**, lyophilized	1706425	**Protein G-HRP**, 1 ml
1706515	**Goat Anti-Rabbit IgG (H + L)-HRP**, 2 ml	1706528	**Avidin-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 212.

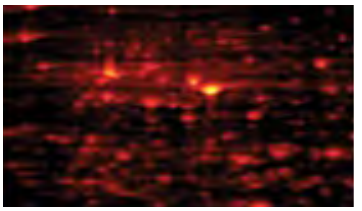
Total Protein Stains

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

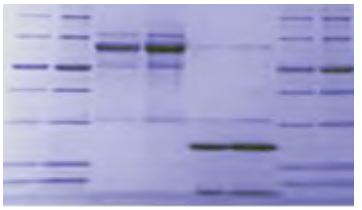
SYPRO Ruby protein blot stain provides highly sensitive detection of proteins on PVDF or nitrocellulose membranes. After staining, target proteins can be detected by colorimetric or chemiluminescence immunostaining or analyzed by microsequencing or mass spectrometry with no interference from the stain.



SYPRO Ruby protein gel stain.

Coomassie Brilliant Blue R-250 Dye

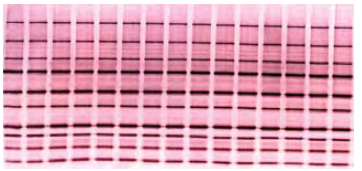
Coomassie Brilliant Blue R-250 is an anionic dye used for staining gels and membranes (PVDF and nitrocellulose). It is a rapid and inexpensive stain that can detect nanogram levels of protein. Since this dye can interfere with antibody binding sites, subsequent detection of proteins by immunostaining 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

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

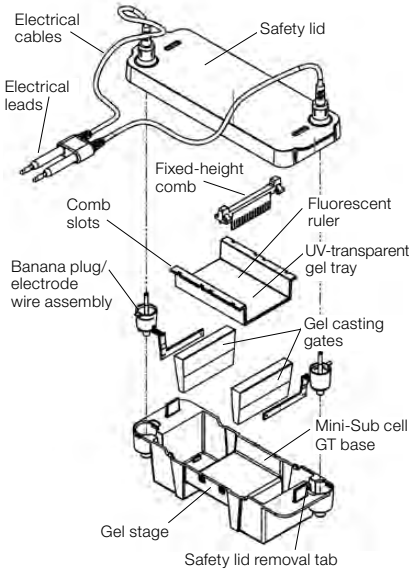
And two models configured to run ReadyAgarose™ precast gels:

- 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.

See Also

Certified agaroses: page 268.
PowerPac Basic power supply: page 173.
DNA ladders: page 269.
Premixed running buffers: page 267.
Nucleic acid reagents: page 266.
Gel documentation systems: page 286.
ReadyAgarose precast gels: page 259.

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.

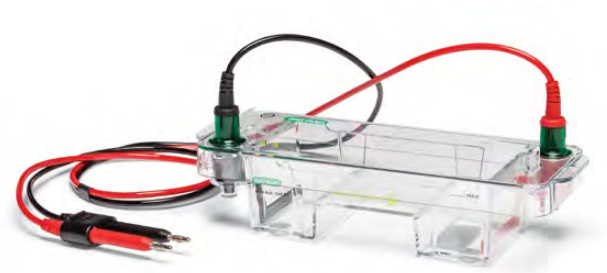
** The wide mini ReadySub-Cell GT cell is a wide Mini-Sub cell GT cell dedicated to running ReadyAgarose precast gels, gel size 15 x 10 cm; sample throughput is 20-, 32-, 2 x 32-, or 4 x 26-well. This cell does not include casting gates, tray, or combs.

*** 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) 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 (#1645050)
Mini-Sub Cell GT Systems**							
1704406	•		•		•	•	
1704466				•	•	•	
1704486	•	•	•		•	•	
1704467		•		•	•	•	
1640300		•		•	•	•	•
1704487							

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) QuickSnap Electrode Assembly**
1704363	**Mini-Sub Cell GT Cathode (Black) QuickSnap 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

* 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.

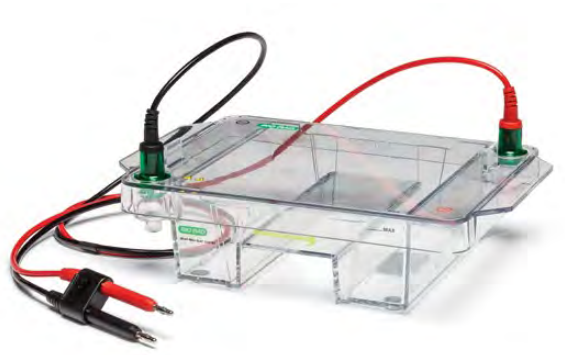
*** Combs included in systems.

† 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) 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

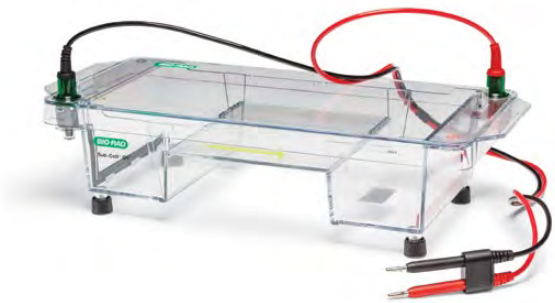
Catalog #	Casting Gates	Gel Caster	UVTP Tray, cm 15 x 7*	UVTP Tray, cm 15 x 10	Combs 15-Well	Combs 20-Well	PowerPac™ Basic Power Supply (#1645050)
Wide Mini-Sub Cell GT Systems**							
1704405	•		•		•	•	
1704468				•	•	•	
1704485	•	•	•		•	•	
1704469		•		•	•	•	
1640301		•		•	•	•	•
1704489							

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) QuickSnap Electrode Assembly**
1704373	**Wide Mini-Sub Cell GT Cathode (Black) QuickSnap 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) QuickSnap Electrode Assembly**
1704393	**Sub-Cell GT Cathode (Black) QuickSnap 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
Sub-Cell Model 96 Systems						
1704500	•	•	•		•	•
1704501		•		•	•	•

Catalog #	Description
Sub-Cell Model 96 Accessories	
1704514	**Model 96 Gel Caster**
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.

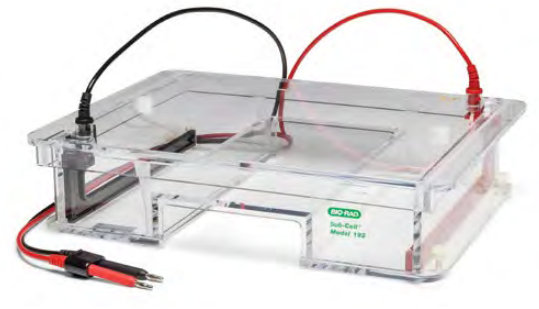
** Combs for Sub-Cell Model 96 cells can be used with Sub-Cell Model 192 cells and vice versa. Adjustable-height combs require comb holder, #1704525. Each system includes one comb holder.

*** 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
Sub-Cell Model 192 Systems								
1704511						•	•	•
1704507		•				•	•	•

Catalog #	Description
Sub-Cell Model 192 Accessories	
1704517	**Model 192 Gel Caster**
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
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 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.

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 252). They come in a choice of 27 gel types, including ReadyAgarose 96 Plus gels, which resolve DNA fragments from 20 to 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
Download bulletins: 2647 and 2980

See Also

Certified agaroses: page 268.
Nucleic acid reagents: page 266.
PowerPac Basic and PowerPac HC power supplies: page 173.
Premixed running buffers: page 267.

Ordering Information

Description	8-Well	2 x 8-Well	
Mini ReadyAgarose Gels, TBE			
1.0% plus ethidium bromide	1613004	1613010	
Mini ReadyAgarose Gels, TAE			
1.0%	1613015	—	
1.0% plus ethidium bromide	1613016	1613022	
	20-Well	**32-Well**	**2 x 32-Well**
Wide Mini ReadyAgarose Gels, TBE			
1.0% plus ethidium bromide	1613028	1613034	—
3.0% plus ethidium bromide	1613030	1613036	—
Wide Mini ReadyAgarose Gel, TAE			
1.0% plus ethidium bromide	1613044	1613050	1613054
	4 x 26-Well		
ReadyAgarose 96 Plus Gel, TBE			
3.0% plus ethidium bromide	1613062		
ReadyAgarose 96 Plus Gels, TAE			
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-well wide mini ReadyAgarose gels
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 268), standards and markers (pages 264–265), buffers (page 267), and other reagents to make PFGE simple and convenient. See page 264 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
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 263. 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 263. 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
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

See Also
Pulsed field gel electrophoresis systems: page 260.
Imaging systems: page 286.
Bioinformatics software: page 292.
Certified agaroses: page 268.

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 268 for agaroses and page 265 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.

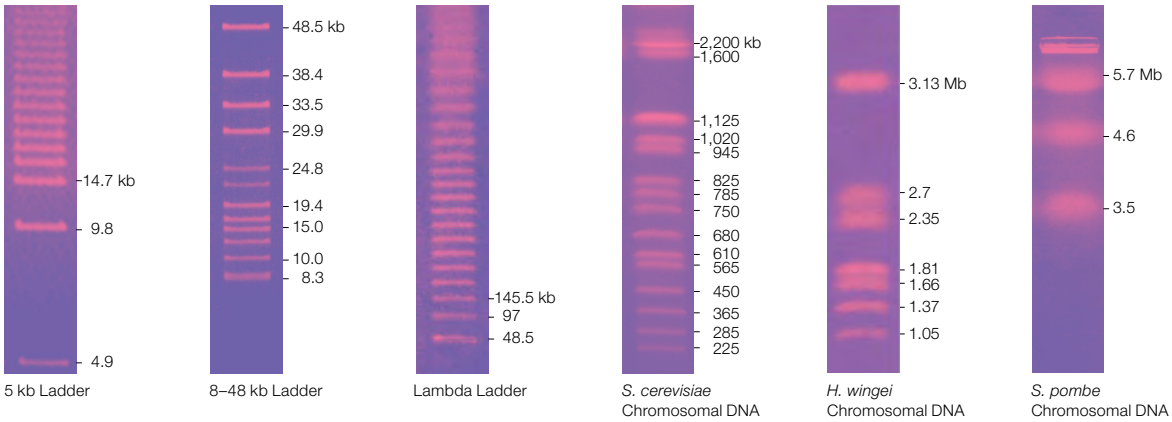
DNA Ladders Selection Guide

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

Pulsed Field Standards



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

* CHEF, clamped homogeneous electrical field. For more information, see page 260–264.

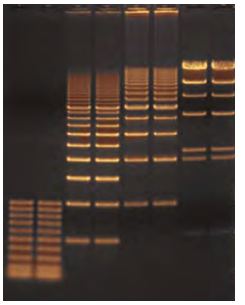
Buffers and Reagents for Nucleic Acid Electrophoresis

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 cyanole FF for monitoring nucleic acid electrophoresis

Ordering Information

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

Store at room temperature, dry, and away from direct sunlight.

See Also
UView transilluminator: page 422.

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/uview

Ordering Information

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

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 Electrophoresis Buffers	
1610773	**50x Tris/Acetic Acid/EDTA (TAE)**, 5 L cube
1610770	**10x Tris/Boric Acid/EDTA (TBE)**, 5 L cube
1610743	**50x Tris/Acetic Acid/EDTA (TAE)**, 1 L bottle
1610733	**10x Tris/Acetic Acid/EDTA (TBE)**, 1 L bottle

See Also
DNA electrophoresis systems: page 251.
Overlay agaroses: page 220.
CleanCut agarose: page 264.
CHEF genomic DNA plug kits: page 264.
Premixed running buffers: page 267.

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 agarose 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

DNA Ladders

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.

See Also

Pipet tips: pages 413–416.

Micro test tubes: pages 417–418.

ReadyAgarose precast gels: page 259.

Imaging systems: page 286.

DNA electrophoresis systems: page 251.

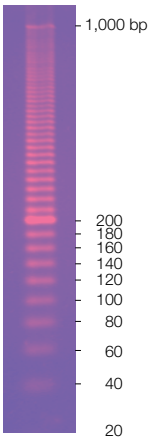
DNA Ladder Selection Guide

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 to 100 ng for DNA quantitation

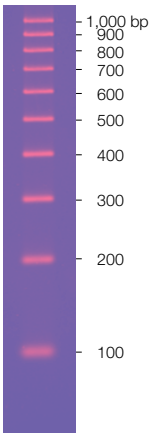
Molecular Rulers Selection Guide

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

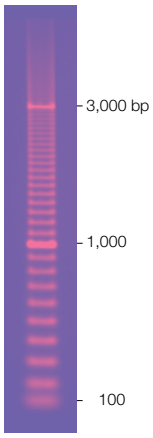
Molecular Rulers



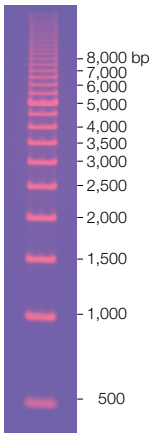
20 bp and EZ Load 20 bp Rulers



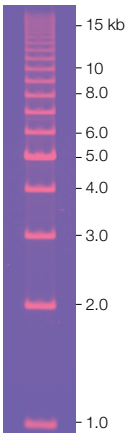
100 bp and EZ Load 100 bp Rulers



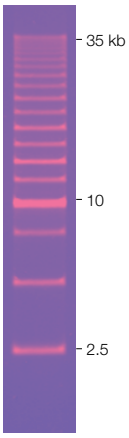
100 bp PCR and EZ Load 100 bp PCR Rulers



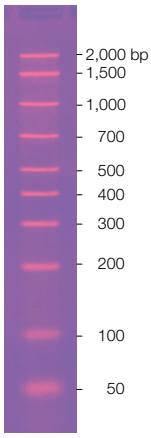
500 bp and EZ Load 500 bp Rulers



1 kb and EZ Load 1 kb Rulers

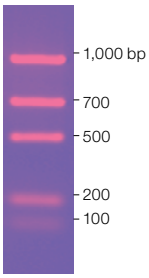


2.5 kb Ruler



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

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.

See Also

Real-time PCR systems: page 363.

Chromatography systems: page 134.

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

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

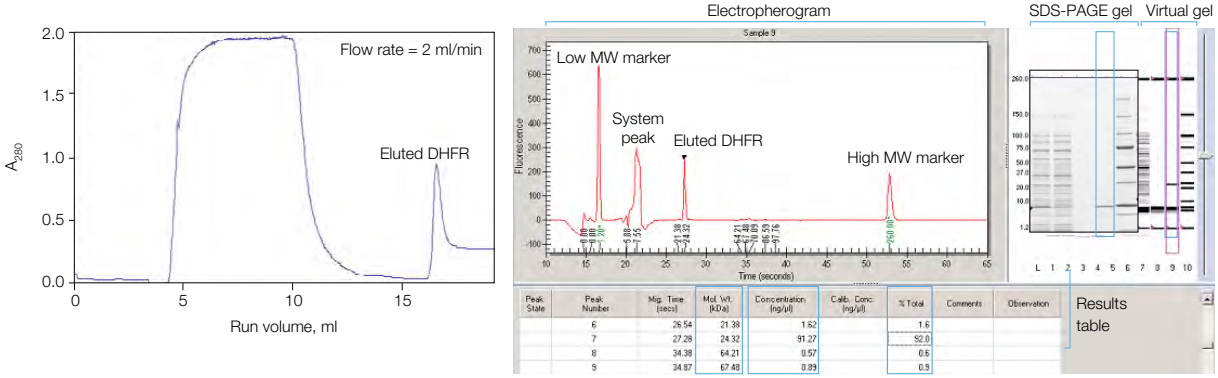
- Automatic sizing and quantitation calculations
- Intuitive navigation of separation and data analysis screens
- Quick comparisons of samples across the chip or from chip to chip
- Digital data storage for easy record keeping and reporting
- Flexible and easy export options and annotation ability for 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
Download bulletins: 3140, 3169, 3170, 3171, and 5520

Note: The Experion automated electrophoresis system was 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
- Built-in pressure-activated release mechanism ensures precise priming
- Secure locking mechanism prevents early release while priming

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.

Note: The Experion automated electrophoresis system was discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021. The Experion priming station was discontinued in 2017. The Experion priming seals and support for the Experion priming station will continue to be available through 2022.

Ordering Information

Catalog #	Description
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.

Note: The Experion automated electrophoresis system was discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021. The Experion vortex station II was discontinued in 2017. Support for the Experion vortex station II will continue to be available through 2022.

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

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
Download bulletins: 3171 and 5761

Note: The Experion automated electrophoresis system was discontinued in 2016. Analysis kits and support for this system will continue to be available through 2021. The Experion priming station and Experion vortex station II were discontinued in 2017. Support for these stations will continue through 2022.

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

See Also

Chromatography systems: page 134.

Real-time PCR systems: page 363.

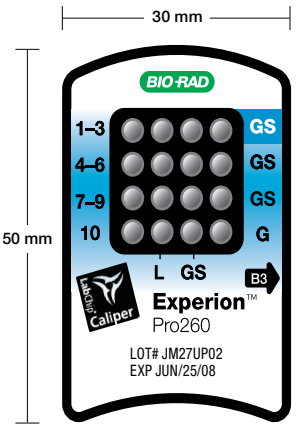
Sample preparation products: page 2.

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
Download bulletins: 3140, 3169, 3170, 3171, 5520, and 5761

Note: The Experion automated electrophoresis system was 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 of 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 was 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
Download bulletin: 5732

Note: The Experion automated electrophoresis system was 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)

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Antibodies

Antibodies 280

Antibodies

See Also

SureBeads magnetic beads system: page 2.

Bio-Rad offers an extensive selection of antibodies available through our dedicated antibody website, **bio-rad-antibodies.com**.

More than 10,000 antibodies, reagents, standards, controls, and kits are available for research use. Specificity and performance are hallmarks of the antibody collection. Antibodies can be used for many applications, including:

- Western blotting
- Flow cytometry
- Immunohistochemistry
- Enzyme-linked immunosorbent assay
- Immunofluorescence

Antibodies are available for the following research areas:

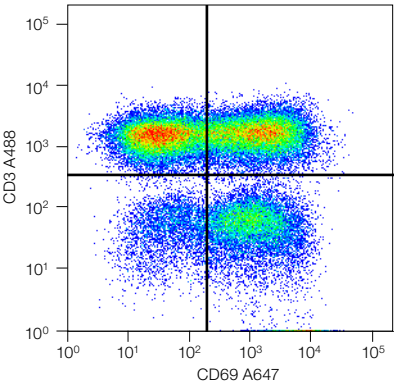
- Innate immunity
- Veterinary immunology
- Cell biology
- Apoptosis and autophagy
- Microbiology
- Neuroscience
- Immunology
- Stem cell research
- Endocrinology

Antibodies conjugated to over 20 dyes, including Alexa Fluor, DyLight, fluorescein isothiocyanate (FITC), and phycoerythrin (PE), for multicolor flow cytometry are also available.

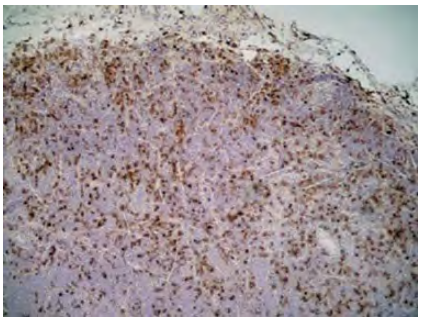
In addition, Bio-Rad offers the PrecisionAb™ antibody product line, which is exclusively validated for western blotting (see page 281).

HuCAL® Recombinant Antibody Technology
Bio-Rad uses HuCAL technology to offer a custom service for the in vitro generation of fully human monoclonal antibodies. With this technique, specific Fab antibodies can be generated within 8 weeks, with a greater than 90% success rate and without the immunization of animals. The HuCAL PLATINUM® library contains more than 45 billion functional human antibody specificities already prefabricated in an engineered Fab format. The technology uses CysDisplay®, a novel and proprietary phage display method that allows for the selection of high-affinity antibodies that are expressed on the surface of a filamentous phage. Antibodies can be customized to specific needs.

Antibodies are highly specific and come with a performance guarantee. The following data show two of the many antibody clones that are unique to Bio-Rad.



Flow cytometry analysis of activated human T cells. Human peripheral blood lymphocytes were stimulated with phytohemagglutinin and lipopolysaccharide for 48 hours prior to being dual stained with mouse anti-human CD3A488 (#MCA463A488) and CD69A647 (#MCA2806A647) in the presence of human seroblock (#BUF070A). Forward and side scatter gating was applied. Activated T cells can be identified as positive for both CD3 and CD69.



Immunoperoxidase staining of anti-rat CD68, a macrophage marker. A rat lymph node cryosection was probed with mouse anti-rat CD68 antibody, clone ED1, followed by horseradish peroxidase–conjugated goat anti-mouse IgG_1 antibody.

For More Information
Web: bio-rad-antibodies.com

PrecisionAb™ Primary Antibodies Validated for Western Blotting

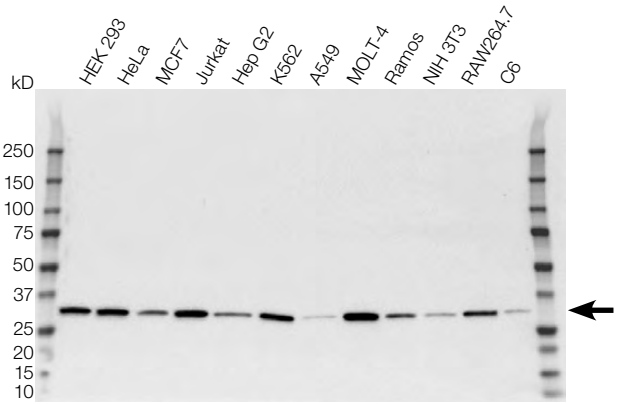
Reliable Primary Antibodies for Reproducible Western Blots

PrecisionAb antibodies are rigorously validated for western blotting. Each antibody is screened using Bio-Rad's V3 Western Workflow™. PrecisionAb antibodies are a premium line selected to deliver industry-leading quality and performance.

Product features include:

- **High specificity** — each antibody is extensively validated to ensure that it exhibits low nonspecific binding
- **High sensitivity** — all antibodies must be able to detect the protein of interest at endogenous levels
- **Reproducible performance** — stringent QC procedures ensure consistent lot-to-lot performance
- **Trial size antibody with positive control lysate** — available in a convenient 2–western blot format for a cost-effective way to assess antibody performance
- **Positive control lysate** — facilitates target band identification and troubleshooting of experimental procedures
- **Full antibody validation results and protocol** — the entire western blot is displayed for a complete picture of antibody performance; a detailed validation protocol is provided to help optimize experimental conditions
- **Expanding selection of antibodies** — offerings in cancer, neuroscience, immunity, and more

PrecisionAb antibodies are available in two formats for most SKUs except for a few targets that are expressed at detectable levels in human and animal tissue samples only.



Antibodies are validated against 12 whole-cell lysates (not overexpressed proteins). This blot represents one such validation, with the arrow indicating the presence of CDK2 protein in the various cell lysates.

Trial Size with Positive Control Lysate
Minimum two western blots (20 µl)

Antibody Only
Minimum ten western blots (100 µl)

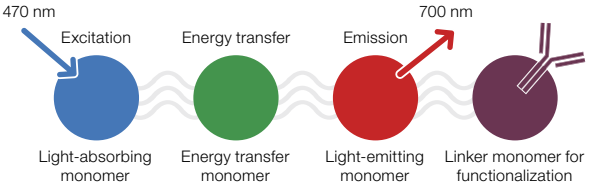
For More Information
Web: bio-rad.com/precisionab

New StarBright™ Fluorescent Secondary Antibodies

The StarBright fluorophore is composed of a condensed polymer made up of multiple light-absorbing and -emitting monomers, which provides an exceptionally bright signal compared to most traditional fluorophores.

StarBright Blue 700 (excitation/emission = 470/700 nm) and StarBright Blue 520 (excitation/emission = 488/520) are Bio-Rad's new ultrasensitive fluorescent labels that allow detection of low-abundance proteins within seconds of exposure time with minimal background. Highly cross-adsorbed goat anti-rabbit and goat anti-mouse secondary antibodies conjugated to StarBright are ideal for fluorescent western blotting, either for the detection of a single target protein or for multiplex detection of several proteins on one blot without stripping and reprobing. These antibodies are optimized for use with the ChemiDoc™ MP imaging system, permitting detection of multiple proteins in a single blot, thus saving time, sample, and reagents.

- **Easy multiplexing** — StarBright secondary antibodies can be used with IRDye 800CW or other traditional red, green, and blue (RGB) fluorophores to detect multiple proteins on the same blot. They can also be used with Bio-Rad's stain-free technology and/or hFAB™ rhodamine housekeeping protein fluorescent primary antibodies for protein normalization
- **Short exposure time** — exceptional brightness of the StarBright fluorophore leads to shorter exposure times compared to traditional fluorescent dyes: seconds vs. minutes
- **High signal-to-noise ratio** — StarBright Blue 700 secondary antibodies emit in the far red part of the spectrum where there is minimal background (excitation maximum/emission maximum = 470/700 nm)
- **Greater sensitivity** — StarBright Blue 520 is 2- to 4-fold more sensitive than other green-emitting fluorophores, such as Alexa Fluor 488 or DyLight 488
- **Low nonspecific binding** — StarBright fluorophore is conjugated to highly cross-adsorbed antibodies



Schematic representation of a StarBright Blue 700 label conjugated to an antibody. The light-absorbing monomer is excited at 470 nm and, via an efficient intramolecular transfer process, the energy is transmitted to a light-emitting monomer that emits at 700 nm. The linker monomer is used for antibody conjugation.

For More Information
Web: bio-rad.com/starbrightblue
Request or download buletin: 6911

Ordering Information

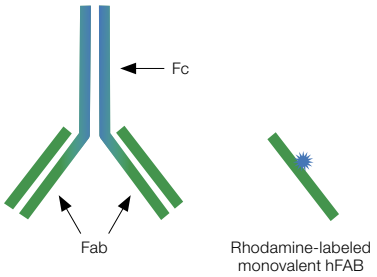
Catalog #	Description
12004159	**StarBright Blue 700 Goat Anti-Mouse IgG**, 80 µl
12004158	**StarBright Blue 700 Goat Anti-Mouse IgG**, 400 µl
12004157	**StarBright Blue 700 Goat Anti-Mouse IgG**, 5 x 400 µl
12004162	**StarBright Blue 700 Goat Anti-Rabbit IgG**, 80 µl
12004161	**StarBright Blue 700 Goat Anti-Rabbit IgG**, 400 µl
12004160	**StarBright Blue 700 Goat Anti-Rabbit IgG**, 5 x 400 µl
12005867	**StarBright Blue 520 Goat Anti-Mouse IgG**, 80 µl
12005866	**StarBright Blue 520 Goat Anti-Mouse IgG**, 400 µl
12005870	**StarBright Blue 520 Goat Anti-Rabbit IgG**, 80 µl
12005869	**StarBright Blue 520 Goat Anti-Rabbit IgG**, 400 µl

New hFAB™ Rhodamine Housekeeping Protein Fluorescent Primary Antibodies

hFAB rhodamine fluorescent primary antibodies are monovalent human Fabs, which allow one-step detection of common housekeeping proteins actin, tubulin, and GAPDH in human, mouse, or other common mammalian samples. These anti-actin, anti-tubulin, and anti-GAPDH antibodies are directly labeled with a rhodamine derivative (excitation maximum/emission maximum = 530/580 nm). The hFAB rhodamine antibodies were generated with Human Combinatorial Antibody Library (HuCAL®) technology, making these recombinant antibodies ideal for use in multiplex western blotting without worrying about species cross-reactivity.

These housekeeping antibodies can be used for protein normalization when the loading amounts are in the linear dynamic range. They can be used in multiplex experiments with StarBright™ Blue 700 fluorescent secondary antibodies as well as other traditional fluorescent antibodies, permitting detection of multiple target proteins and the housekeeping protein in a single blot.

- **Simple** — no requirement for a secondary antibody; 1-step detection of housekeeping proteins using highly cross-adsorbed antibodies for high specificity and sensitivity
- **Versatile** — compatible with a wide range of other fluorophores, including StarBright Blue 700 and DyLight 800 fluorophores, for multiplex western blotting
- **Unique** — HuCAL technology eliminates cross-reactivity with primary or secondary antibodies from other species
- **Ideal for multiplexing** — allows simultaneous detection of proteins of interest and housekeeping proteins on the same blot without stripping, reprobing, or cutting the membrane



Schematic representation comparing the structure of the IgG molecule with the rhodamine-labeled monovalent hFAB housekeeping antibody.

For More Information
Web: bio-rad.com/hkp
Request or download buletin: 6911

Ordering Information

Catalog #	Description
12004164	**hFAB Rhodamine Anti-Actin Primary Antibody**, 40 µl, pkg of 1, lyophilized rhodamine-conjugated anti-actin human Fab fragment; reconstitute to 40 µl
12004163	**hFAB Rhodamine Anti-Actin Primary Antibody**, 200 µl, pkg of 1, lyophilized rhodamine-conjugated anti-actin human Fab fragment; reconstitute to 200 µl
12004166	**hFAB Rhodamine Anti-Tubulin Primary Antibody**, 40 µl, pkg of 1, lyophilized rhodamine-conjugated anti-tubulin human Fab fragment; reconstitute to 40 µl
12004165	**hFAB Rhodamine Anti-Tubulin Primary Antibody**, 200 µl, pkg of 1, lyophilized rhodamine-conjugated anti-tubulin human Fab fragment; reconstitute to 200 µl
12004168	**hFAB Rhodamine Anti-GAPDH Primary Antibody**, 40 µl, pkg of 1, lyophilized rhodamine-conjugated anti-GAPDH human Fab fragment; reconstitute to 40 µl
12004167	**hFAB Rhodamine Anti-GAPDH Primary Antibody**, 200 µl, pkg of 1, lyophilized rhodamine-conjugated anti-GAPDH human Fab fragment; reconstitute to 200 µl

Subject Index

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Imaging Instruments, Analysis, and Software

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Blot and Gel Image Analysis Software 292

Imaging Systems

Imaging systems detect images and quantitate fluorescent, chemiluminescent, and colorimetric signals. Bio-Rad offers software (page 292) that provides automation for image acquisition with data analysis and validation. Refer to the guide below to select the imaging system best suited for your applications.

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

Imaging System Selection Guide

Application	ChemiDoc™ MP	ChemiDoc	ChemiDoc XRS+	Gel Doc™ XR+	GS-900™	Gel Doc EZ
Blot Detection						
Multiplex fluorescence	✓	—	—	—	—	—
Chemiluminescence	✓	✓	✓	—	—	—
Stain-free blots	✓	✓	✓	—	—	—
Colorimetric	✓	✓	✓	—	—	—
SYPRO Ruby protein blot stain*	✓	✓	✓	—	—	—
Nucleic Acid Detection						
Ethidium bromide stain	✓	✓	✓	✓	—	✓
SYBR® Green I and SYBR® Safe stains	✓	✓	✓	✓	—	✓
Fast Blast™ DNA stain	✓	✓	✓	✓	✓	✓
Protein Detection, 1-D Gels						
Stain-free gels	✓	✓	✓	✓	—	✓
Coomassie Blue stain	✓	✓	✓	✓	✓	✓
Silver stain	✓	✓	✓	✓	✓	✓
SYPRO Ruby protein gel stain and Flamingo™ and Oriole™ fluorescent gel stains	✓	✓	✓	✓	—	✓
Protein Detection, 2-D Gels						
Coomassie Blue stain	✓	✓	✓	✓	✓	✓
Silver stain	✓	✓	✓	✓	✓	✓
SYPRO Ruby protein gel stain and Flamingo and Oriole fluorescent gel stains	✓	✓	✓	✓	—	✓
Cy2, Cy3, Cy5 label	✓	—	—	—	—	—

✓ Recommended; — not recommended.
* Optimal with low fluorescence PVDF membrane.

ChemiDoc™ MP and ChemiDoc Imaging Systems

The ChemiDoc MP and ChemiDoc imaging systems are Bio-Rad's premium digital imaging systems.

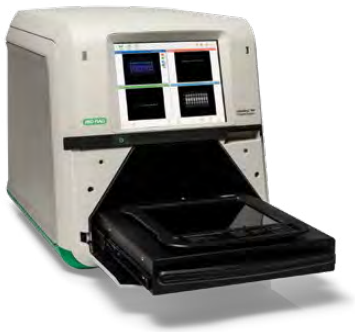
The ChemiDoc MP imaging system provides the best in chemiluminescent and fluorescent blot detection. It is designed to outperform any digital system on the market for multiplex fluorescent (red, green, and blue [RGB] and near infrared/infrared) western blotting, chemiluminescence detection, and general gel documentation applications. Simply pick the best detection method for your application. The ChemiDoc imaging system is built to allow ultrasensitive detection of chemiluminescent signal with the option to upgrade to ChemiDoc MP to enable fluorescence detection.

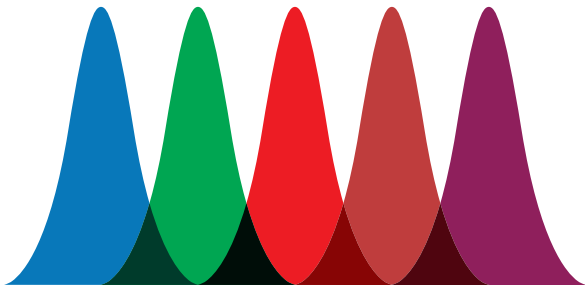
Both systems include Bio-Rad's Image Lab™ Touch software. Turn on the instrument and tap, explore, and learn in minutes, skipping lengthy instruction manuals. The software now includes advanced user accounts and administrative features for better data security and integrity.

With the ChemiDoc MP and ChemiDoc imaging systems you can:

- Get more reliable, trustworthy, and publishable data using stain-free technology to normalize your results with more than just a single protein
- Obtain the next level of fluorescence sensitivity with StarBright™ Blue 700 fluorescent secondary antibodies, which are more sensitive than traditional far red and near infrared dyes

For More Information
Web: bio-rad.com/chemidoc
Request or download bulletin: 6873





Blue	Green	Red	Far Red	Near Infrared
			StarBright Blue 700	
DyLight 488	DyLight 550	DyLight 650	DyLight 680	DyLight 800
Alexa Fluor 488	Alexa Fluor 546	Alexa Fluor 647	Alexa Fluor 680	Alexa Fluor 790
Cy2	Cy3	Cy5	Cy5.5	Cy7
	Rhodamine	SYPRO Ruby	IRDye 680	IRDye 800CW

Flexible dye selection with the ChemiDoc MP imaging system.

See Also

Stain-free gels (mini, midi formats): pages 184, 191.

V3 Western Workflow: page 228.

Trans-Blot Turbo transfer system: page 231.

Ordering Information

Catalog #	Description
12003154	**ChemiDoc MP Imaging System**, ultrasensitive chemiluminescence and fluorescence western blot imaging system
12003153	**ChemiDoc Imaging System**, ultrasensitive chemiluminescence western blot imaging system with optional upgrade for fluorescence detection
12005137	**ChemiDoc MP and ChemiDoc IQ/OQ Kit**, installation and operational qualification kit, includes protocols and imaging target
12003026	**White Sample Tray**, for white light applications
12003027	**Blue Sample Tray**, for low-intensity ultraviolet and SYBR applications
12003028	**Blot/UV/Stain-Free Sample Tray**, primary blot and gel detection tray, replacement for tray included with system
1708377	**Holder for Sample Trays and UV Shield**, pkg of 1, holds 3 sample trays and 1 UV shield; trays and shield not included
12003914	**UV Safety Shield**, to protect against UV light exposure during band excision
1708089	**Mitsubishi Thermal Printer**, optional thermal printer, for use with Bio-Rad imaging systems
1707581	**Mitsubishi Thermal Printer Paper**, pkg of 4, printer paper rolls for use with Mitsubishi thermal printer

See Also

Protein gel stains: page 212.

Nucleic acid gel stain: page 266.

Gel analysis software: page 292.

ReadyAgarose precast gel system: page 259.

Western blotting: page 228.

Gel Doc™ XR+ and ChemiDoc™ XRS+ Systems

The Gel Doc XR+ and ChemiDoc XRS+ systems are based on CCD high-resolution, high-sensitivity detection technology and provide application flexibility. Key benefits include:

- Accurate, protocol-driven gel and blot imaging and analysis
- Automated quantitative analysis of protein and DNA samples in seconds
- Wide range of applications with special accessories to preserve sample integrity for downstream research while ensuring user safety
- Publication-quality results

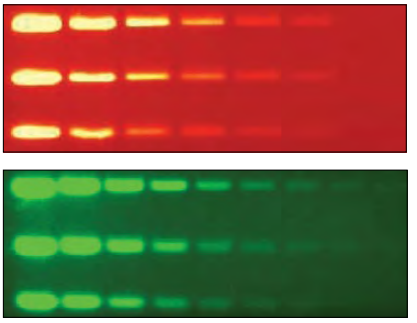
Gel Doc XR+ System

The Gel Doc XR+ system consists of a darkroom hood, CCD camera and software-controlled motorized optics, UV and white light illumination, filter slider with standard filter, and UV-protection shield. The system enables you to:

- Use stain-free technology to rapidly visualize proteins, allowing you to check electrophoresis results and transfer performance before western blotting, conserving precious samples and reducing waste
- Increase cloning efficiency and protein production by protecting DNA electrophoresis samples from UV exposure using the XcitaBlue™ conversion screen and blue light–excitable stains such as GelGreen, SYBR® Safe, and SYBR® Green I
- Maintain standard operating procedures or criteria for sample performance as there is no loss in sensitivity compared to UV and ethidium bromide staining

The Gel Doc XR+ system can be upgraded to the ChemiDoc XRS+ system.

For More Information
Request or download bulletin: 5838



An alternative to UV illumination to better preserve DNA samples. Top, serial dilutions of precision molecular mass ruler (Bio-Rad) stained with ethidium bromide (EtBr) on agarose gel imaged with UV light; **bottom**, serial dilutions of precision molecular mass ruler stained with SYBR® Safe stain on agarose gel imaged with XcitaBlue conversion screen. Lane 1 load is 51.2 ng. The Gel Doc XR+ system detects down to 100 pg. There is no loss in sensitivity when a combination of SYBR® Safe nucleic acid fluorescent stain and less harmful blue excitation is used instead of UV-excitable EtBr. The SYBR® Safe image was taken using the XcitaBlue conversion screen and SYBR® Safe/GFP emission filter.

ChemiDoc XRS+ System

The ChemiDoc XRS+ system offers sensitive chemiluminescence detection in addition to gel and blot documentation of fluorescent and colorimetric samples. The system includes a sensitive 16-bit CCD camera that is cooled for detection of faint samples. The XRS+ system is now compatible with stain-free technology, which offers checkpoints in western blot experiments and a convenient total protein loading control for data normalization.

For More Information
Web: bio-rad.com/imagingsystems
Request or download bulletin: 5837

See Also

Stain-free gels (mini, midi formats): pages 184, 191.

V3 Western Workflow: page 228.

Trans-Blot Turbo transfer system: page 231.

Ordering Information

Catalog #	Description
1708195	**Gel Doc XR+ System with Image Lab Software**, compatible with PC or Mac, includes darkroom, UV transilluminator, epi-white illumination standard filter, camera, cables, Image Lab software
1708193	**Gel Doc XR+ IQ/OQ**, for use with Image Lab software
1708265	**ChemiDoc XRS+ System with Image Lab Software**, compatible with PC or Mac, includes darkroom hood, UV transilluminator, epi-white illumination standard filter, camera, power supply, cables, Image Lab software
1708256	**ChemiDoc XRS+ IQ/OQ**, for use with Image Lab software
Accessories	
1708199	**Gel Doc XR+ Installation Kit**
1708299	**ChemiDoc XRS+ Installation Kit**
1708289	**White Light Conversion Screen**, for use with non–touch screen ChemiDoc MP, ChemiDoc XRS+, and Gel Doc XR+ systems
1708081	**Filter**, standard emission, 62 mm
1708097	**Standard 302 nm UV Lamps**, 6 replacement bulbs
1708089	**Mitsubishi Thermal Printer**
1707581	**Mitsubishi Thermal Printer Paper**, 4 rolls, for use with Mitsubishi thermal printer
1708182	**XcitaBlue Conversion Screen Kit**, includes viewing goggles and standard detection filter
1708008	**Orange Fluorescence Reference Plate**
1703759	**Bio-Rad Fluorescent Ruler**
1703760	**Gel Cutter Ruler**
1708184	**Gel Alignment Templates**, pkg of 3, templates for aligning gels and blots, for use with ChemiDoc XRS+ and Gel Doc XR+ systems
1708026	**Image Lab Focus Calibration Target**

See Also

Stain-free gels (mini, midi formats): pages 184, 191.

V3 Western Workflow: page 228.

Trans-Blot Turbo transfer system: page 231.

Gel Doc™ EZ Imaging System

The Gel Doc EZ imaging system is a compact, automated system for obtaining publication-quality images and analyzed results with just the push of a button.

Smart Imaging

- **Modular design** — use specific trays for specific applications; clearly defined and color-coded trays eliminate any confusion in usage
- **Flexible options** — purchase only what you want and upgrade when your needs change
- **Simplicity** — create your default protocol once and simply log in to use the tray
- **Image Lab™ software** — automate image capture, analysis, user preferences, and a myriad of other features
- **Completely analyzed results** — obtain high-quality images and analyzed results, including relative MW, quantitation of bands, Excel reports, and PDFs
- **Reproducibility** — user-introduced errors are minimized; rely on the system to give consistent results time after time
- **Stain-free technology** — convert a 2 hr Coomassie staining protocol into a 5 min visualization step, no staining or destaining required

- **Compatibility** — stain-free gels are western blot compatible, allowing you to check electrophoresis results and quality prior to western blotting
- **Publication-quality images** — obtain clean and smooth images that are visually appealing and publication ready
- **Increased image resolution** — get better resolution when images are cropped or zoomed
- **Greater functionality** — no need to export images to another image editing program to change the dpi before importing for publication; define your desired dpi with Image Lab software

For More Information
Web: bio-rad.com/geldocez
Request or download bulletins: 5976 and 6088 (download only)

UV Tray
For use with fluorescent stains such as ethidium bromide, SYBR®, Oriole™ fluorescent gel stain, GelRed, SYPRO Ruby, Coomassie Fluor Orange, and Krypton stains.

White Tray
For use with protein stains such as Coomassie Blue, copper, silver, and zinc stains.

Blue Tray
For use with nucleic acid stains such as GelGreen, SYBR® Green, SYBR® Safe, and SYBR® Gold stains.

Stain-Free Tray
For use with stain-free gels, such as Mini-PROTEAN® TGX Stain-Free™ gels and Criterion™ TGX Stain-Free™ gels, and stain-free blots.

Ordering Information

Catalog #	Description
1708270	**Gel Doc EZ Imaging System with Image Lab Software**, compatible with PC or Mac, includes darkroom, camera, cables, Image Lab software; stain-free sample tray #1708274; other sample trays available separately
1708277	**Gel Doc EZ IQ/OQ**, for use with Image Lab software
Gel Doc EZ Sample Trays	
1708271	**UV Sample Tray**, for gels using ultraviolet illumination
1708272	**White Sample Tray**, for gels stained with Coomassie Blue, copper, silver, or zinc stains
1708273	**Blue Sample Tray**, for gels stained with GelGreen or any SYBR stain
1708274	**Stain-Free Sample Tray**, for stain-free gels and blots
1708276	**Sample Tray Holder**, holds 4 sample trays
Accessories	
1707581	**Mitsubishi Thermal Printer Paper**, 4 rolls, for use with Mitsubishi thermal printer
1708089	**Mitsubishi Thermal Printer**
1708097	**Standard 302 nm UV Lamps**, 6 replacement bulbs

GS-900™ Calibrated Densitometer

The GS-900 calibrated densitometer delivers superior accuracy, sensitivity, and data reproducibility. To ensure the accuracy of each scan, the GS-900 calibrated densitometer contains an internal optical density tablet, which is scanned and used for calibration before each run. Features include:

- Transmissive and reflective imaging using red, green, and blue CCD technology to optimally scan and quantitate colorimetric blots and gels treated with a variety of stains
- Accurate quantitation of samples over a large dynamic range (up to 3.4 OD) ensuring detection of both highly abundant and dilute proteins
- Scanning of larger gels for enhanced separation of proteins on oversized 29 x 33 cm imaging area
- IQ/OQ kit available for validation of the calibration functions using a NIST-traceable external target to confirm the accuracy of the internal target, guaranteeing accurate and reproducible results
- High resolution and analysis of closest bands on a gel due to 16-bit precision and 36.3 µm resolution
- Sealed imaging area to accommodate wet samples of variable thickness
- Purity analysis and lane background tools for manufacturing QC
- U.S. FDA 21 CFR Part 11 regulation compliance software available

For More Information
Web: bio-rad.com/gs900
Request or download bulletin: 6385

Ordering Information

Catalog #	Description
1707991	**GS-900 Calibrated Densitometry System**, PC-compatible calibrated densitometer, cables, Image Lab software, Biologics Analysis Workflow Starter Kit (Criterion cell, Criterion TGX precast gels, Precision Plus Protein standards, QC colloidal Coomassie stain, buffers)
1707993	**GS-900 Regulatory Tools Package**, includes GS-900 IQ/OQ Kit and Image Lab Security Edition 21 CFR Part 11 module, 1 license
1707994	**GS-900 IQ/OQ Kit**, set of protocols for installation qualification/operational qualification and NIST-traceable external step tablet for the GS-900 calibrated densitometer

See Also

Mini-format vertical electrophoresis: page 180.
Midi-format vertical electrophoresis: page 189.
Protein standards: page 175.
QC colloidal Coomassie stain: page 212.
Image Lab software: page 292.

Blot and Gel Image Analysis Software

See Also

Imaging systems: page 286.

Bio-Plex Manager software: page 300.

Microplate Manager software: page 327.

Image Lab™ Software

Image Lab is a family of software packages that provides simple application-driven image acquisition, streamlined imaging analysis, and features to support better traceability and data security (U.S. FDA 21 CFR Part 11 compliance).

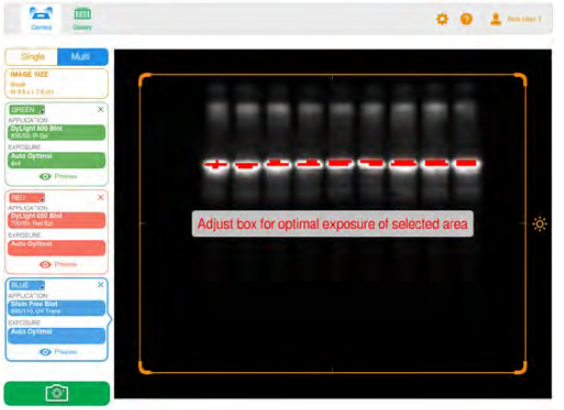
Image Lab Touch is the newest software package for image acquisition on the ChemiDoc™ MP and ChemiDoc imaging systems. New features include:

- Multiplex fluorescence acquisition
- Autoexposure and image analysis tools to get the best exposure every time
- Secured user accounts
- Multiple data export options

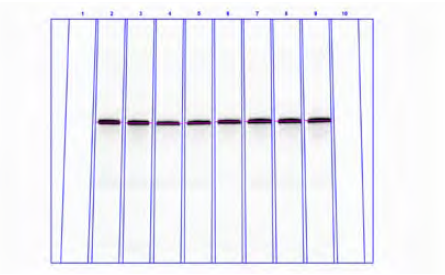
Image Lab desktop is the well-established and free Bio-Rad imaging software package with automated image acquisition by application for the ChemiDoc XRS+, Gel Doc™ XR+, and Gel Doc EZ systems, and the GS-900™ densitometer. In addition to easy acquisition it provides algorithm-driven analysis of gel and blot data using signals. Image Lab desktop is compatible with PC and Mac operating systems.

Image Lab software, Security Edition has the same features as Image Lab desktop but also provides traceability and data integrity in line with U.S. FDA 21 CFR Part 11 regulations. An additional fee is required for the Security Edition.

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



Multichannel image acquisition with Image Lab Touch software.



Chemiluminescence and stain-free blot analysis on Image Lab desktop software.

Image Lab Software Selection Guide

	Image Acquisition		Image Analysis	FDA 21 CFR Part 11 Compliance
System	**Image Lab Touch**	**Image Lab Desktop**	**Image Lab Desktop**	**Image Lab Security Edition**
ChemiDoc MP	✓	—	✓	✓
ChemiDoc	✓	—	✓	✓
ChemiDoc XRS+	—	✓	✓	✓
Gel Doc XR+	—	✓	✓	✓
GS-900	—	✓	✓	✓
Gel Doc EZ	—	✓	✓	✓

Ordering Information

Catalog #	Description
1709691	**Image Lab Software**, Security Edition for 21 CFR Part 11 compliance, 1 license
1709692	**Image Lab Software**, Security Edition for 21 CFR Part 11 compliance, 5 licenses
1709693	**Image Lab Software**, Security Edition for 21 CFR Part 11 compliance, 10 licenses

Subject Index

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Bio-Plex® Multiplex System

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Bio-Plex® Multiplex System

The Bio-Plex multiplex platform is built on the most flexible technology available. Bio-Rad offers instruments to satisfy a variety of research needs and budgets for multiplex applications. These readers include the versatile Bio-Plex 200 system and the high-throughput capacity Bio-Plex 3D suspension array system.

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

Instruments, Software, and Tools

Bio-Plex System Selection Guide

	Bio-Plex 200	Bio-Plex 3D
Features	Versatile — accommodates multiple users Flexible — can read both magnetic and nonmagnetic assays One acquisition and analysis software package User-friendly data management	Meets high-throughput needs Optimal for labs with fewer budget restrictions Offers robotics interfacing
Read time (1 x 96-well plate)	~45 min	~20 min
Plate compatibilities	96-well	96- and 384-well
Number of measurable analytes/well	100	500
Assay compatibility	All magnetic and nonmagnetic (polystyrene) bead-based assays	Most magnetic and all nonmagnetic (polystyrene) bead-based assays
Acquisition software	Bio-Plex Manager™	xPONENT
Analysis software	Bio-Plex Manager and Bio-Plex Data Pro™	Bio-Plex Manager and Bio-Plex Data Pro
On-site training	Included	Included
Footprint (W x D x H)	16.9 x 20.1 x 9.1" (43 x 51 x 23 cm)	23 x 25.7 x 18" (58.4 x 65.3 x 45.7 cm)

Bio-Plex® 200 System

The Bio-Plex 200 system integrates xMAP suspension array technology with a reliable instrument, dedicated software, and validation tools. The system includes:

- **Array reader** — distinguish up to 100 different color-coded bead sets, each representing a different assay. Results in up to 9,600 data points in 45 min from a familiar 96-well format
- **Optional high-throughput fluidics (HTF)** — delivers up to 20 L of sheath fluid (40 plates) without user intervention
- **Bio-Plex MCV plate IV** — customized for hands-free startup, shutdown, and performance testing
- **Bio-Plex Manager™ software** — controls the instrument, data acquisition, and analysis (Standard and Security Editions)

Time-saving features include:

- Simplified startup, shutdown, control, and pre- and post-run maintenance routines
- Sophisticated analysis and instrument control software
- Automated IQ/OQ

- Integrated system validation and calibration logs for a record of system performance
- Superior curve fitting, statistics reporting, and charting features
- Calibration capabilities for both broad and low range standard dilutions

For More Information
Web: bio-rad.com/bio-plex200
Download bulletin: 6006

Ordering Information

Catalog #	Description
171000201	**Bio-Plex 200 System**, 100–240 V, includes array reader, microplate platform, Bio-Plex Manager software with workstation license, PC, monitor, calibration kit, validation kit 4.0, MCV plate IV, Bio-Plex reservoir, 20 L sheath fluid, spare sample needle
171000205	**Bio-Plex 200 System with HTF**, same as #171000201 with high-throughput fluidics (HTF)
Bio-Plex 200 Accessories and Replacement Parts	
171203050	**Bio-Plex Reservoir**
171000055	**Sheath Fluid**, 1x, 20 L
171002002	**Communication Cable**, 3' CAN BUS cable, connects the array reader with the HTF system
171002003	**Communication Cable**, 5' USB cable, connects the array reader with a PC USB port
171002010	**Sheath Fluid Bottle**, 1 L
171002012	**Sheath Waste Bottle**, 1 L
171002020	**Sample Needle**, 4.6" (11.6 cm)
171002024	**Alignment Guide**, aligns the array reader on the microplate platform
171002026	**Needle Adjustment Wrench**
171002030	**Protective Shield for Sample Needle**
171002032	**Air Intake Filter**
171002033	**Syringe Seal**
171002034	**Syringe Seal with Cylinder**
171002038	**Sheath Fluid Filter with Quick Connect Tubing**, pkg of 1, replacement maintenance part for internal fluidics system on the Bio-Plex 200 system; removes >5 µm diameter particles
171002040	**Sheath Cube Filter**, pkg of 1, replacement maintenance part for use with high-throughput fluidics (HTF) system and Bio-Plex 200 system; removes >10 µm diameter particles
171002056	**HTF Tubing**, pkg of 1, air tubing HTF to reader, sheath tubing HTF to reader, tubing sheath container to HTF (including 10 µm filter), waste tubing (reader to waste container)
171002023	**Needle Guide**, allows sample needle access to microplates
Bio-Plex 200 System Performance Validation and Calibration Tools	
171203001	**Bio-Plex Validation Kit 4.0**, includes optics validation, reporter validation, classify validation, and fluidics validation bead sets for approximately 50 validation routines using Bio-Plex Manager software, current version (Standard or Security Edition), and MCV plate IV
171203033	**Bio-Plex MCV Plate IV**, for use with Bio-Plex Manager software, current version (Standard or Security Edition), and validation kit 4.0
171203060	**Bio-Plex Calibration Kit**, includes Cal1 and Cal2 calibration beads for approximately 50 daily calibration routines

Bio-Plex® 3D Multiplex System

The Bio-Plex 3D multiplex system is the next-generation multiplexing platform based on xMAP technology. Expanded multiplexing capability, faster time to results, and automation capability make it the platform of choice for high-throughput testing for nucleic acid and protein applications.

Features include:

- Rapid read times — twice as fast as with the Bio-Plex 200 system
- Measurement of up to 500 unique analytes in a single sample
- 96- and 384-well plate capability
- Laboratory information system (LIMS/LIS)–compatible software
- Automation-compatible tray design and software
- Robotics interfacing capabilities
- Compatibility with magnetic or nonmagnetic assays
- Bio-Plex Manager™ software for data analysis
- On-site training

For More Information
Web: bio-rad.com/bio-plex3D
Download bulletins: 5967 and 5980

Bio-Plex 3D Suspension Array System with Bio-Plex Manager Software

System Throughput Capabilities

Test (50 µl well volume, 2,500 beads/well)	Read Time*	Tests/Hr
96-well (100-plex)	18 min	32,000
384-well (100-plex)	1 hr 15 min	30,700
96-well (500-plex)	45 min	64,000
384-well (500-plex)	2 hr 15 min	85,000

* Read times measured across four instruments. Actual results may vary.

Ordering Information

Catalog #	Description
BioPlex3D	**Bio-Plex 3D Multiplex System**, includes Bio-Plex 3D multiplex system, xPONENT acquisition software, PC, calibration and verification reagents, Bio-Plex Manager desktop license
892018500001*	**xPONENT 21 CFR Part 11 Software Module**, enables U.S. FDA 21 CFR Part 11 compliance
892018700001*	**xPONENT Automation Module**, enables interfacing with robotics workstations
171022001*	**Swivel Base**, allows rotation of the instrument away from the robotics workstation for maintenance and sample loading
892018600001*	**xPONENT LIS Software Module**, enables interfacing with LIMS/LIS databases
892018200001*	**xPONENT Extra Seat Licenses**, 3 additional seats of xPONENT software
FM3D-CAL-K25	**Bio-Plex 3D Calibration Kit**, good for 25 uses; includes reagents, CD, 25 stripwells
FM3D-PVER-K25	**Bio-Plex 3D Performance Verification Kit**, good for 25 uses; kit includes reagents, fluidics, CD, 25 stripwells

* All additional accessories may be purchased through Bio-Rad Laboratories, Inc. at the time of system purchase. Post–system purchase accessories must be purchased directly from Luminex Corporation.

Bio-Plex® MAGPIX™ Multiplex Reader Accessories and Software

Ordering Information

Catalog #	Description
Kits and Reagents	
171213003	**Bio-Plex MAGPIX Drive Fluid**, 4 x 700 ml drive fluid for use with Bio-Plex MAGPIX multiplex reader
171213001	**Bio-Plex MAGPIX Calibration Kit**, calibration kit good for 25 uses; kit includes 5 ml calibrator, microspheres, CD, pkg of 25 8-well strips
171213002	**Bio-Plex MAGPIX Verification Kit**, verification kit good for 25 uses; kit includes MAGPIX verifier, 5 ml of microspheres, MAGPIX fluidics 1, MAGPIX fluidics 2, MAGPIX performance verification kit CD, pkg of 25 8-well strips
Bio-Plex MAGPIX Accessories	
171012004	**Bio-Plex MAGPIX Replacement Waste Fluid Container**, pkg of 1, 850 ml container, holds waste fluid, for use with Bio-Plex MAGPIX reader
171012005	**Bio-Plex MAGPIX Sample Probe**, sample probe needle for use with Bio-Plex MAGPIX multiplex reader
171012006	**Bio-Plex MAGPIX Sample Probe Height Adjustment Kit**, sample probe height adjustment kit for use with Bio-Plex MAGPIX multiplex reader
171012008	**Bio-Plex MAGPIX 96-Well Plate Heater Block**, 96-well plate heater block for use with Bio-Plex MAGPIX multiplex reader
30034376	**Bio-Plex Pro Wash Station**, for magnetic bead–based assays, includes magnetic plate carrier, waste bottle, 2 liquid bottles
171020100	**Bio-Plex Handheld Magnetic Washer**, includes magnetic washer and adjustment hex tools for use in manual wash steps for all Bio-Plex magnetic assays
171061000	**Bio-Plex Probe Height Adjustment Plate**, replacement plate for Bio-Plex MAGPIX multiplex reader

Bio-Plex Pro™ Washing Accessories

Automated Bio-Plex Pro Wash Station

The Bio-Plex Pro wash station streamlines multiplex assays by eliminating manual wash steps. Bio-Plex Pro wash stations help decrease variability and increase consistency in results between experiments and are specifically designed to perform Bio-Plex assay wash steps. Benefits include:

- Reliable and reproducible results
- Optimized onboard protocols
- Simple ELISA-like workflow

The Bio-Plex Pro wash station incorporates a magnetic plate carrier for simple and reliable hands-free washing of 96-well plates.

Wash stations include preset wash programs that have been optimized for Bio-Plex assays.

Bio-Plex Handheld Magnetic Washer

The Bio-Plex handheld magnetic washer is used in manual wash steps for all Bio-Plex magnetic assays.

Ordering Information

Catalog #	Description
30034376	**Bio-Plex Pro Wash Station**, includes magnetic plate carrier, waste bottle, 2 buffer bottles for use with magnetic beads
171020100	**Bio-Plex Handheld Magnetic Washer**, includes magnetic washer and adjustment hex tools for washing all Bio-Plex magnetic assays
Accessories	
171025001	**Bio-Plex Pro Flat Bottom Plates**, 40 x 96-well plates, for washing magnetic beads using the Bio-Plex Pro or Bio-Plex Pro II wash stations
171304500	**Bio-Plex Wash Buffer**, 1.5 L
171304502	**Filter Plate**, 1 x 96-well filter plate with clear plastic lid, plate holder tray, for washing nonmagnetic beads using the Bio-Plex Pro II wash station, optional vacuum manifold; sealing tape not included

Bio-Plex Manager™ Software, Standard Edition

Bio-Plex Manager software is a comprehensive, all-in-one software package that provides advanced data analysis for multiplex assays.

Simple Operation

- Ability to self train — just follow the steps outlined on the screen
- Familiar Windows interface — no new terms or menus to learn

Save Time

- Simplified input — values for standards are easy to enter; automatic addition of new lots reduces setup time
- Automated data processing — proprietary algorithm automatically sets the appropriate dynamic range and identifies data points outside this range
- Immediate recalculation of results efficiently updates data when settings are changed

Use Tools That Meet Your Unique Needs

- Superior sensitivity and dynamic range with onboard Brendan Scientific StatLIA 4PL and 5PL weighted curve-fitting models
- Data normalization using multiple internal controls (housekeeping genes) for gene expression applications
- Gene Manager analysis module for presence and absence analysis, pathogen detection, and genotyping applications

Analyze Data with Easy-to-Use Reports

- Automated export of standard curve graphs
- View of all wells or summary (average) of replicate samples
- Data organized by sample type, group, or well
- One-click navigation between analytes
- Flexible data presentation

Data Export, Cross-Platform Capabilities, and System Compatibility

- Import and analyze data from xPONENT and other third-party software
- Use any commercial or custom xMAP assay built on any Luminex microsphere
- Copy and paste data into popular word processing and presentation software applications
- Export to text, XML, and Excel in column or 96-well format
- Analyze data in LIMS and other third-party software by customizing export options
- Request Bio-Plex Manager 4.1.1 software for installation on Luminex systems with IS 2.3 software

Bio-Plex Manager Software Licenses

License	Capabilities and Uses
Instrument control	Full-system, data acquisition and analysis; included with all Bio-Plex 200 systems
Desktop	Single-user license for protocol setup and data analysis; does not control the array reader
Network	Multiuser (5, 10, 25, or 50) licenses for data access from a server; does not control the array reader
Security Edition	Enables U.S. FDA 21 CFR Part 11 compliance

System Requirements

CPU	Pentium 4 or higher, PC only
Operating system	Windows XP Professional, Windows 7, Windows 10

For More Information
Web: bio-rad.com/bio-plexmanager
Download bulletin: 5613

Ordering Information

Catalog #	Description
171STND01	**Bio-Plex Manager Software**, 1-user desktop license to analyze Bio-Plex data and generate protocols, does not operate the instrument
171STND05	**Bio-Plex Manager Software**, 5-user desktop license to analyze Bio-Plex data and generate protocols, does not operate the instrument
171STND10	**Bio-Plex Manager Software**, 10-user desktop license to analyze Bio-Plex data and generate protocols, does not operate the instrument
171STND25	**Bio-Plex Manager Software**, 25-user desktop license to analyze Bio-Plex data and generate protocols, does not operate the instrument

Contact Bio-Rad Technical Support to verify whether your current system is compatible with these software products.

Bio-Plex Manager™ Software Conversions and Upgrades

Bio-Plex Manager software conversions and upgrades allow you to upgrade previous versions of Bio-Plex Manager or convert non Bio-Plex® systems to run like a Bio-Plex 200 system.

- **Preprogrammed routine processes** — automate startup, calibration, validation, run, and shutdown
- **Unattended routine operations** — program pre- and post-run maintenance operations to save time

Ordering Information

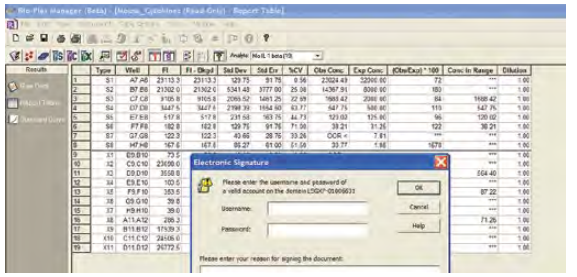
Catalog #	Description
171STND23	**Bio-Plex Manager Software for IS 2.3 System**, system license most current version, for converting Luminex IS and xPONENT systems
171SUPG30	**Bio-Plex Manager Software for 3.0 Instrument Control Software**, system license for upgrading standard or security software version 3.0 to current Bio-Plex Manager version (Security Edition upgrade requires #171SCRT00)
171SUPG40	**Bio-Plex Manager Software for 4.0 Instrument Control Software**, system license for upgrading the standard or security software version 4.0 to current Bio-Plex Manager version (Security Edition upgrade requires #171SCRT00)
171SUPG41	**Bio-Plex Manager Software for 4.1 Instrument Control Software**, system license for upgrading the standard or security software version 4.1 to current Bio-Plex Manager version (Security Edition upgrade requires #171SCRT00)
171SUPG50	**Bio-Plex Manager Software for 5.0 Instrument Control Software**, system license for upgrading the standard or security software version 5.0 to current Bio-Plex Manager version (Security Edition upgrade requires #171SCRT00)

Bio-Plex Manager™ Software, Security Edition

Includes all Standard Edition software features and has built-in security features for U.S. FDA 21 CFR Part 11 compliance:

- Control user log-in with different user levels for access to different functions
- Audit trails
- Secure protocol and data files
- Secure databases for reporting of calibration, validation, and instrument operations

For More Information
Web: bio-rad.com/bio-plexmanager
Download bulletin: 5613



Electronic signature window allows you to bring documents into a secure environment.

Ordering Information

Catalog #	Description
171SCRT00	**Bio-Plex Manager Instrument Control License**, Security Edition, upgrades workstation with Bio-Plex Manager software, allows compliance with U.S. FDA 21 CFR Part 11 regulations
171SCRT01	**Bio-Plex Manager Software**, Security Edition desktop, includes 1-user desktop license, allows compliance with U.S. FDA 21 CFR Part 11 regulations. Does not operate the instrument.
171SCRT05	**Bio-Plex Manager Software**, Security Edition desktop, includes 5-user network license, allows compliance with U.S. FDA 21 CFR Part 11 regulations. Does not operate the instrument.

Contact Bio-Rad Technical Support to verify whether your current system is compatible with these software products.

Bio-Plex Data Pro™ Software

Bio-Plex Data Pro software simplifies the management and analysis of large datasets generated from multiplex assays. The software allows up to ten data file imports per project; optional Bio-Plex Data Pro Plus software is available for projects with more than ten data file imports.

Organize Data

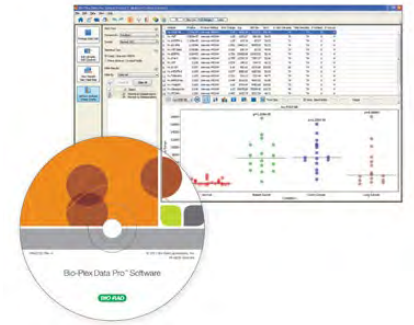
- Merge, import, sort, and filter data from multiple datasets

Automate Calculations

- Perform common calculations and statistical tests quickly and confidently

Visualize Results

- Present data clearly with customized graphs and tables



For More Information and to Download a Free Trial
Web: bio-rad.com/datapro

Ordering Information

Catalog #	Description
171001513	**Bio-Plex Data Pro Software**, includes 5 Bio-Plex Data Pro software licenses
171001523	**Bio-Plex Data Pro Plus Software**, includes 5 Bio-Plex Data Pro Plus software licenses

Bio-Plex® Assays

Bio-Plex Pro™ Human Inflammation Assays

Human Inflammation Assays

The Bio-Plex Pro human inflammation assays consist of 37 assays for biomarkers associated with inflammation pathways and consist of a 37-plex and Treg cytokine 12-plex assay and 37 singleplex sets that can be combined for a custom multiplex kit.

The assays are built on magnetic beads to enable robust quantification of multiple proteins in human serum, plasma, and cell culture media samples. These assays are perfect for broad research applications, including academic and preclinical studies in:

- Inflammation
- Autoimmune diseases
- Cancer research

Key features include:

- **Reproducibility** — validated to meet analytical standards
- **Reliability** — lot-to-lot calibration with low variability
- **Speed to results** — Up to 2,886 data points in 4 hours
- **Flexible ordering options** — order either premixed all-in-one kits or singleplex sets, or customize your assay with the Bio-Plex assay builder (**bio-rad.com/assaybuilder**)

The Bio-Plex Pro human inflammation panel includes the following targets:

APRIL / TNFSF13	sIL-6Rα	IL-27 (p28)	Osteocalcin
BAFF / TNFSF13B	IL-8	IL-28A / IFN-λ2	Osteopontin
sCD30 / TNFRSF8	IL-10	IL-29 / IFN-λ1	Pentraxin-3
sCD163 Set	IL-11	IL-32	sTNFR-1
Chitinase 3-like 1	IL-12 (p40)	IL-34	sTNFR-2
gp130 / sIL-6Rβ	IL-12 (p70)	IL-35	TSLP
IFN-α2	IL-19	LIGHT / TNFSF14	TWEAK / TNFSF12
IFN-β	IL-20	MMP-1	
IFN-γ	IL-22	MMP-2	
IL-2	IL-26	MMP-3	

For More Information
Web: bio-rad.com/bio-plexhumaninflammation
Request or download bulletin: 6625

Ordering Information

Catalog #	Description
BioPlex Pro Human Inflammation Premixed All-in-One Kits	
171AL001M	**Bio-Plex Pro Human Inflammation Panel 1, 37-Plex**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, control, buffers, diluents, streptavidin-PE, 96-well plate, and sealing tape, for the detection of 37 human inflammation biomarkers
171AL003M	**Bio-Plex Pro Human Inflammation Treg Cytokine Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, control, buffers, diluents, streptavidin-PE, 96-well plate, and sealing tape, for the detection of 12 human Treg biomarkers

continues

Ordering Information

Catalog #	Description	Catalog #	Description
Bio-Plex Pro Human Inflammation Singleplex Sets			
171BL001M	**APRIL / TNFSF13 Set**	171BL021M	**IL-27 (p28) Set**
171BL002M	**BAFF / TNFSF13B Set**	171BL022M	**IL-28A / IFN-λ2 Set**
171BL003M	**sCD30 / TNFRSF8 Set**	171BL023M	**IL-29 / IFN-λ1 Set**
171BL004M	**sCD163 Set**	171BL024M	**IL-32 Set**
171BL005M	**Chitinase 3-Like 1 Set**	171BL025M	**IL-34 Set**
171BL006M	**gp130 / sIL-6Rβ Set**	171BL026M	**IL-35 Set**
171BL007M	**IFN-α2 Set**	171BL027M	**LIGHT / TNFSF14 Set**
171BL008M	**IFN-β Set**	171BL028M	**MMP-1 Set**
171BL009M	**IFN-γ Set**	171BL029M	**MMP-2 Set**
171BL010M	**IL-2 Set**	171BL030M	**MMP-3 Set**
171BL011M	**sIL-6Rα Set**	171BL031M	**Osteocalcin Set**
171BL012M	**IL-8 Set**	171BL032M	**Osteopontin Set**
171BL013M	**IL-10 Set**	171BL033M	**Pentraxin-3 Set**
171BL014M	**IL-11 Set**	171BL034M	**sTNFR-1 Set**
171BL015M	**IL-12 (p40) Set**	171BL035M	**sTNFR-2 Set**
171BL016M	**IL-12 (p70) Set**	171BL036M	**TSLP Set**
171BL017M	**IL-19 Set**	171BL037M	**TWEAK / TNFSF12 Set**
171BL018M	**IL-20 Set**	171DL0001	**Std, 1PK**
171BL019M	**IL-22 Set**	171DL0050	**Std, 50PK**
171BL020M	**IL-26 Set**		

Standards	
171DL0001	**Bio-Plex Pro Human Inflammation Panel 1, 37-Plex Standard**, pkg of 1 vial, lyophilized mixture of 37 standard analytes
171DL0050	**Bio-Plex Pro Human Inflammation Panel 1, 37-Plex Standard**, pkg of 50 lot-matched vials, lyophilized mixture of 37 standard analytes
Reagent Kit — for use with human inflammation singleplex sets	
171304090M	**Bio-Plex Pro Reagent Kit III**, 1 x 96-well, includes detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods

Bio-Plex Pro™ Cytokine, Chemokine, and Growth Factor Assays

Bio-Plex Pro cytokine, chemokine, and growth factor assays are magnetic bead–based multiplex immunoassays offering accurate and reproducible measurements of multiple analytes simultaneously. These assays have been developed to provide reliable performance with the flexibility required to meet all of your research needs. Assays are available for human, mouse, or rat studies.

Key features includes:

- **Magnetic beads** — automated plate washing and improved reproducibility across experiments
- **Increased productivity** — measure multiple analytes simultaneously, get results in about 3 hours
- **Flexible ordering options** — order either premixed all-in-one kits or singleplex sets, or customize your assay with the Bio-Plex assay builder (**bio-rad.com/assaybuilder**)
- **Cross-platform compatibility** — can be used with all xMAP life science instruments supplied by any Luminex partner
- **Convenient pathway panels** — Th17, Th1/Th2, and TGF-β available

For More Information
Web: bio-rad.com/CCGFassays
Request or download bulletins: 5828, 6054, 6100, and 6110

Human Assays

Human Assays — Available Analytes

6Ckine / CCL21	IL-1α	IL-18	PDGF-BB
Basic FGF	IL-1β*	IP-10 / CXCL10*	RANTES
BCA-1 / CXCL13	IL-1ra	I-TAC / CXCL11	SCF
CTACK / CCL27*	IL-2*	LIF	SCGF-β
ENA-78 / CXCL5	IL-2Rα	MCP-1 / CCL2*	SCYB16 / CXCL16
Eotaxin / CCL11*	IL-3	MCP-2 / CCL8	SDF-1α
Eotaxin-2 / CCL24	IL-4*	MCP-3 / CCL7*	SDF-1α+β / CXCL12
Eotaxin-3 / CCL26	IL-5	MCP-4 / CCL13	TARC / CCL17
Fractalkine / CX3CL1	IL-6*	M-CSF	TECK / CCL25
GCP-2 / CXCL6	IL-7	MDC / CCL22	TGF-β1
G-CSF	IL-8 / CXCL8*	MIF*	TGF-β2
GM-CSF*	IL-9	MIG / CXCL9*	TGF-β3
Gro-α / CXCL1*	IL-10*	MIP-1α / CCL3*	TNF-α*
Gro-β / CXCL2	IL-12 (p40)	MIP-1β	TNF-β
HGF	IL-12 (p70)	MIP-1δ / CCL15	TRAIL
I-309 / CCL1	IL-13	MIP-3α / CCL20	VCAM-1
ICAM-1	IL-15	MIP-3β / CCL19	VEGF
IFN-α2	IL-16*	MPIF-1 / CCL23	
IFN-γ*	IL-17A	β-NGF	

* Analyte is present in multiple panels. If multiplexing, select analytes from the same panel to avoid cross reactivity.

Ordering Information

Catalog #	Description
Human Cytokine Premixed All-in-One Kits*	
M50000007A	**Bio-Plex Pro Human Cytokine 8-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-2, IL-4, IL-6, IL-8, IL-10, GM-CSF, IFN-γ, TNF-α
M5000031YV	**Bio-Plex Pro Human Cytokine 17-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-1β, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-10, IL-12 (p70), IL-13, IL-17, G-CSF, GM-CSF, IFN-γ, MCP-1, MIP-1β, TNF-α
M500KCAF0Y	**Bio-Plex Pro Human Cytokine 27-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-1β, IL-1ra, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-12 (p70), IL-13, IL-15, IL-17, basic FGF, eotaxin, G-CSF, GM-CSF, IFN-γ, IP-10, MCP-1, MIP-1α, MIP-1β, PDGF-BB, RANTES, TNF-α, VEGF
M5000005L3	**Bio-Plex Pro Human Cytokine Th1/Th2 Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-2, IL-4, IL-5, IL-10, IL-12 (p70), IL-13, GM-CSF, IFN-γ, TNF-α

continues

Ordering Information

Catalog #	Description
Bio-Plex Pro Human Cytokine Singleplex Sets, Group I and II, 1 x 96-Well**	
171B5001M	**IL-1β Set**
171B5002M	**IL-1ra Set**
171B5003M	**IL-2 Set**
171B5004M	**IL-4 Set**
171B5005M	**IL-5 Set**
171B5006M	**IL-6 Set**
171B5007M	**IL-7 Set**
171B5008M	**IL-8 Set**
171B5009M	**IL-9 Set**
171B5010M	**IL-10 Set**
171B5011M	**IL-12 (p70) Set**
171B5012M	**IL-13 Set**
171B5013M	**IL-15 Set**
171B5014M	**IL-17A Set**
171B5015M	**Eotaxin Set**
171B5016M	**Basic FGF Set**
171B5017M	**G-CSF Set**
171B5018M	**GM-CSF Set**
171B5019M	**IFN-γ Set**
171B5020M	**IP-10 Set**
171B5021M	**MCP-1 Set**
171B5022M	**MIP-1α Set**
171B5023M	**MIP-1β Set**
171B5024M	**PDGF-BB Set**
171B5025M	**RANTES Set**
171B5026M	**TNF-α Set**
171B5027M	**VEGF Set**
171B6001M	**IL-1α Set**
171B6002M	**IL-2Rα Set**
171B6003M	**IL-3 Set**
171B6004M	**IL-12 (p40) Set**
171B6005M	**IL-16 Set**
171B6006M	**CTACK Set**
171B6007M	**GRO-α Set**
171B6008M	**HGF Set**
171B6009M	**ICAM-1 Set**
171B6010M	**IFN-α2 Set**
171B6011M	**LIF Set**
171B6012M	**MCP-3 Set**
171B6013M	**M-CSF Set**
171B6014M	**MIF Set**
171B6015M	**MIG Set**
171B6016M	**β-NGF Set**
171B6017M	**SCF Set**
171B6018M	**SCGF-β Set**
171B6019M	**SDF-1α Set**
171B6020M	**TNF-β Set**
171B6021M	**TRAIL Set**
171B6022M	**VCAM-1 Set**

Note: IL-18 is available only in multiplex format.

Standards

171D50001	**Bio-Plex Pro Human Cytokine Standards Group I, 27-Plex**, pkg of 1 vial, lyophilized mixture of 27 analytes
171D10501	**Bio-Plex Pro Human Cytokine Standards Group I, 27-Plex**, pkg of 50 lot-matched vials, lyophilized mixture of 27 analytes

Reagent Kit — for use with human cytokine singleplex sets

171304090M	**Bio-Plex Pro Reagent Kit III**, 1 x 96-well, includes detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods

* Please contact your local Bio-Rad Sales Representative for pricing and availability of 10 x 96-well assay kits.

** Includes coupled magnetic beads and detection antibody. Requires the appropriate reagent kit and standards. Singleplex sets should not be mixed with others from different panels or groups.

Human Th17 Premixed All-in-One Kit

171AA001M	**Bio-Plex Pro Human Th17 Cytokine 15-Plex Panel**, 1 x 96-well, includes premixed coupled magnetic beads, detection antibodies, standards, 2-level controls, detection antibody diluent, standard diluent HB, sample diluent HB, assay buffer, wash buffer, streptavidin-PE, 96-well flat bottom plate, sealing tape, and instructions, for detecting IL-1β, IL-4, IL-6, IL-10, IL-17A, IL-17F, IL-21, IL-22, IL-23, IL-25, IL-31, IL-33, IFN-γ, sCD40L, TNF-α, (IL-17A/F available as singleplex only)

Bio-Plex Pro Human Th17 Cytokine Singleplex Sets, 1 x 96-Well**

171BA001M	**IL-1β**
171BA002M	**IL-4**
171BA003M	**IL-6**
171BA004M	**IL-10**
171BA005M	**IL-17A**
171BA006M	**IL-17F**
171BA007M	**IL-21**
171BA008M	**IL-22**
171BA009M	**IL-23**
171BA010M	**IL-25**
171BA011M	**IL-31**
171BA012M	**IL-33**
171BA013M	**IFN-γ**
171BA014M	**sCD40L**
171BA015M	**TNF-α**
171BA016M	**IL-17A/F**

continues

Ordering Information

Catalog #	Description
Standards	
171DA0001	**Bio-Plex Pro Human Th17 Cytokine Standard**, pkg of 1 vial, lyophilized mixture of 16 standard analytes
171DA0501	**Bio-Plex Pro Human Th17 Cytokine Standard**, pkg of 50 lot-matched vials, lyophilized mixture of 16 standard analytes
Reagent Kit III — for use with human Th17 cytokine singleplex sets	
171304090M	**Bio-Plex Pro Reagent Kit III**, 1 x 96-well, includes detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods
Human Chemokine Premixed All-in-One Kit	
171AK99MR2	**Bio-Plex Pro Human Chemokine Panel 40-Plex**, 1 x 96-well, includes premixed coupled magnetic beads, detection antibodies, standards, single-level controls, detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, wash buffer, streptavidin-PE, 96-well flat bottom plate, sealing tape, and instructions, for detecting 40 human chemokines shown below.

Bio-Plex Pro Human Chemokine Singleplex Sets, 1 x 96-Well**

171BK11MR2	**6Ckine / CCL21 Set**	171BK33MR2	**IL-16 Set**
171BK12MR2	**BCA-1 / CXCL13 Set**	171BK34MR2	**IP-10 / CXCL10 Set**
171BK13MR2	**CTACK / CCL27 Set**	171BK35MR2	**I-TAC / CXCL11 Set**
171BK14MR2	**ENA-78 / CXCL5 Set**	171BK36MR2	**MCP-1 / CCL2 Set**
171BK15MR2	**Eotaxin / CCL11 Set**	171BK37MR2	**MCP-2 / CCL8 Set**
171BK16MR2	**Eotaxin-2 / CCL24 Set**	171BK38MR2	**MCP-3 / CCL7 Set**
171BK17MR2	**Eotaxin-3 / CCL26 Set**	171BK39MR2	**MCP-4 / CCL13 Set**
171BK18MR2	**Fractalkine / CX3CL1 Set**	171BK41MR2	**MDC / CCL22 Set**
171BK19MR2	**GCP-2 / CXCL6 Set**	171BK42MR2	**MIF Set**
171BK21MR2	**GM-CSF Set**	171BK43MR2	**MIG / CXCL9 Set**
171BK22MR2	**Gro-α / CXCL1 Set**	171BK44MR2	**MIP-1α / CCL3 Set**
171BK23MR2	**Gro-β / CXCL2 Set**	171BK46MR2	**MIP-1δ / CCL15 Set**
171BK24MR2	**I-309 / CCL1 Set**	171BK47MR2	**MIP-3α / CCL20 Set**
171BK25MR2	**IFN-γ Set**	171BK48MR2	**MIP-3β / CCL19 Set**
171BK26MR2	**IL-1β Set**	171BK49MR2	**MPIF-1 / CCL23 Set**
171BK27MR2	**IL-2 Set**	171BK51MR2	**SCYB16 / CXCL16 Set**
171BK28MR2	**IL-4 Set**	171BK52MR2	**SDF-1α+β / CXCL12 Set**
171BK29MR2	**IL-6 Set**	171BK53MR2	**TARC / CCL17 Set**
171BK31MR2	**IL-8 / CXCL8 Set**	171BK54MR2	**TECK / CCL25 Set**
171BK32MR2	**IL-10 Set**	171BK55MR2	**TNF-α Set**

Standard	
171DK0001	**Bio-Plex Pro Human Chemokine Standard**, pkg of 1 vial, lyophilized mixture of 40 standard analytes
Reagent Kit III — for use with human chemokine singleplex sets	
171304090M	**Bio-Plex Pro Reagent Kit III**, 1 x 96-well, includes detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods

** Includes coupled magnetic beads and detection antibody. Requires the appropriate reagent kit and standards. Singleplex sets should not be mixed with others from different panels or groups.

Mouse Assays

Mouse Assays — Available Analytes

Basic FGF	IFN-γ	IL-15	I-TAC / CXCL11	MIP-3α / CCL20
BCA-1 / CXCL13	IL-1α	IL-16	KC / CXCL1	MIP-3β / CCL19
CD40L	IL-1β	IL-17A	LIF	PDGF-BB
CTACK / CCL27	IL-2	IL-17F	M-CSF	RANTES / CCL5
ENA-78 / CXCL5	IL-3	IL-18	MCP-1 / MCAF / CCL2	SCYB16 / CXCL16
Eotaxin / CCL11	IL-4	IL-21	MCP-2 / CCL8	SDF-1α / CXCL12
Eotaxin-2 / CCL24	IL-5	IL-22	MCP-3 / CCL7	TARC / CCL17
Fractalkine / CX3CL1	IL-6	IL-23 (p19)	MCP-5 / CCL12	TECK / CCL25
G-CSF	IL-9	IL-25 / IL-17E	MDC / CCL22	TGF-β1
GM-CSF	IL-10	IL-27 (p28)	MIG / CXCL9	TGF-β2
Gro / KC	IL-12 (p40)	IL-31	MIP-1α / CCL3	TGF-β3
I-309 / CCL1	IL-12 (p70)	IL-33	MIP-1β / CCL4	TNF-α
ICAM-1	IL-13	IP-10 / CXCL10	MIP-2 / CXCL2	VEGF

Ordering Information

Catalog #	Description
Mouse Cytokine Premixed All-in-One Kits*	
M60000007A	**Bio-Plex Pro Mouse Cytokine 8-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-1β, IL-2, IL-4, IL-5, IL-10, GM-CSF, IFN-γ, TNF-α
MD000000EL	**Bio-Plex Pro Mouse Cytokine 9-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-15, IL-18, basic FGF, LIF, M-CSF, MIG, MIP-2, PDGF-BB, VEGF
M60009RDPD	**Bio-Plex Pro Mouse Cytokine 23-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-1α, IL-1β, IL-2, IL-3, IL-4, IL-5, IL-6, IL-9, IL-10, IL-12 (p40), IL-12 (p70), IL-13, IL-17, eotaxin, G-CSF, GM-CSF, IFN-γ, KC, MCP-1, MIP-1α, MIP-1β, RANTES, TNF-α
M6000003J7	**Bio-Plex Pro Mouse Cytokine Th1/Th2 Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of IL-2, IL-4, IL-5, IL-10, IL-12 (p70), GM-CSF, IFN-γ, TNF-α
Mouse Th17 Premixed All-in-One Kits	
M6000007NY	**Bio-Plex Pro Mouse Cytokine Th17 Panel A 6-Plex Group I**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standard, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, and instructions, for the detection of IL-1β, IL-6, IL-10, IL-17A, IFN-γ, TNF-α
171FA001M	**Bio-Plex Pro Mouse Cytokine Th17 Panel B 8-Plex Group III**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of CD40L, IL-17F, IL-21, IL-22, IL-23 (p19), IL-31, IL-33, MIP-3α

* Please contact your local Bio-Rad Sales Representative for pricing and availability of 10 x 96-well assay kits.

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Ordering Information

Catalog #	Description	Catalog #	Description
Bio-Plex Pro Mouse Cytokine Singleplex Sets, Group I, 1 x 96-Well*			
171G5001M	**IL-1α Set**	171G5013M	**IL-17A Set**
171G5002M	**IL-1β Set**	171G5014M	**Eotaxin Set**
171G5003M	**IL-2 Set**	171G5015M	**G-CSF Set**
171G5004M	**IL-3 Set**	171G5016M	**GM-CSF Set**
171G5005M	**IL-4 Set**	171G5017M	**IFN-γ Set**
171G5006M	**IL-5 Set**	171G5018M	**KC Set**
171G5007M	**IL-6 Set**	171G5019M	**MCP-1 Set**
171G5008M	**IL-9 Set**	171G5020M	**MIP-1α Set**
171G5009M	**IL-10 Set**	171G5021M	**MIP-1β Set**
171G5010M	**IL-12 (p40) Set**	171G5022M	**RANTES Set**
171G5011M	**IL-12 (p70) Set**	171G5023M	**TNF-α Set**
171G5012M	**IL-13 Set**		
Standards			
171I50001	**Bio-Plex Pro Mouse Cytokine Standards Group I**, pkg of 1 vial, lyophilized mixture of 23 analytes		
171I10501	**Bio-Plex Pro Mouse Cytokine Standards Group I**, pkg of 50 lot-matched vials, lyophilized mixture of 23 analytes		
Bio-Plex Pro Mouse Cytokine Singleplex Sets, Group II, 1 x 96-Well*			
171G6001M	**IL-15 Set**	171G6005M	**MIG Set**
171G6002M	**Basic FGF Set**	171G6006M	**MIP-2 Set**
171G6003M	**LIF Set**	171G6007M	**PDGF-BB Set**
171G6004M	**M-CSF Set**	171G6008M	**VEGF Set**
Standards			
171I60001	**Bio-Plex Pro Mouse Cytokine Standards Group II**, pkg of 1 vial, lyophilized mixture of 9 analytes		
171I10502	**Bio-Plex Pro Mouse Cytokine Standards Group II**, pkg of 50 lot-matched vials, lyophilized mixture of 9 analytes		
Bio-Plex Pro Mouse Cytokine Singleplex Sets, Group III, 1 x 96-Well*			
171GA001M	**CD40L Set**	171GA007M	**IL-27 (p28) Set**
171GA002M	**IL-17F Set**	171GA008M	**IL-31 Set**
171GA003M	**IL-21 Set**	171GA009M	**IL-33 Set**
171GA004M	**IL-22 Set**	171GA010M**	**ICAM-1 Set**
171GA005M	**IL-23 (p19) Set**	171GA011M	**MIP-3α Set**
171GA006M	**IL-25 Set**		
Standards			
171IA0001	**Bio-Plex Pro Mouse Cytokine Standards Group III**, pkg of 1 vial, lyophilized mixture for detecting 11 analytes		
Reagent Kits — for use with mouse cytokine singleplex sets from Group I			
12002798	**Bio-Plex Pro Reagent Kit V**, 1 x 96-well, includes detection antibody diluent HP, standard diluent, sample diluent, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods		
12005847	**Bio-Plex Pro Reagent Kit V**, 10 x 96-well, includes detection antibody diluent HP, standard diluent, sample diluent, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods		
171304080M	**Bio-Plex Pro High Dilution Reagent Kit**, 1 x 96-well, includes assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent		
Bio-Plex Pro Mouse Chemokine Panel			
12002231	**Bio-Plex Pro Mouse Chemokine Panel, 33-Plex**, 1 x 96-well		
12002247	**Bio-Plex Pro Mouse Chemokine Panel, MCP-2/CCL8**, 1 x 96-well		
12002798	**Bio-Plex Pro Reagent Kit V**, 1 x 96-well		
12002796	**Bio-Plex Pro Mouse Chemokine Standards**, 1 pack		

* Includes coupled magnetic beads and detection antibody. Requires the appropriate reagent kit and standards. Singleplex sets should not be mixed with others from different panels or groups.

** Requires high dilution reagent kit.

Rat Assays

Rat Assays — Available Analytes

G-CSF	IL-5	IL-18*	TGF-β1
GM-CSF	IL-6	KC	TGF-β2
Gro / KC	IL-7	MCP-1	TGF-β3
IFN-γ	IL-10	M-CSF	TNF-α
IL-1α	IL-12 (p40)	MIP-1α	VEGF
IL-1β	IL-12 (p70)	MIP-2	
IL-2	IL-13	MIP-3α	
IL-4	IL-17A	RANTES	

* IL-18 is not available as a singleplex.

Ordering Information

Catalog #	Description
Rat Cytokine Premixed All-in-One Kits*	
12005641	**Bio-Plex Pro Rat Cytokine 23-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent HP, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of G-CSF, GM-CSF, Gro/KC, IFN-γ, IL-1α, IL-1β, IL-2, IL-4, IL-5, IL-6, IL-7, IL-10, IL-12 (p70), IL-13, IL-17A, IL-18, MCP-1, M-CSF, MIP-1α, MIP-3α, RANTES, TNF-α, VEGF
171K1002M	**Bio-Plex Pro Rat Cytokine Th1/Th2 12-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standard, assay buffer, wash buffer, detection antibody diluent HP, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent and instructions, for the detection of IL-α, IL-1β, IL-2, IL-4, IL-5, IL-6, IL-10, IL-12 (p70), IL-13, GM-CSF, IFN-γ, TNF-α

Catalog #	Description	Catalog #	Description
Bio-Plex Pro Rat Cytokine Singleplex Sets, 1 x 96-Well**			
171L1003M	**G-CSF Set**	171L1015M	**IL-12 (p40) Set**
171L1004M	**GM-CSF Set**	171L1016M	**IL-12 (p70) Set**
171L1005M	**Gro / KC Set**	171L1017M	**IL-13 Set**
171L1006M	**IFN-γ Set**	171L1018M	**IL-17A Set**
171L1007M	**IL-1α Set**	171L1020M	**M-CSF Set**
171L1008M	**IL-1β Set**	171L1027M	**MCP-1 Set**
171L1009M	**IL-2 Set**	171L1021M	**MIP-1α Set**
171L1010M	**IL-4 Set**	171L1022M	**MIP-2 Set**
171L1011M	**IL-5 Set**	171L1023M	**MIP-3α Set**
171L1012M	**IL-6 Set**	171L1024M	**RANTES Set**
171L1013M	**IL-7 Set**	171L1025M	**TNF-α Set**
171L1014M	**IL-10 Set**	171L1026M	**VEGF Set**

Standards	
171NZ0001	**Bio-Plex Pro Rat Cytokine Standards**, pkg of 1 vial, lyophilized mixture of 31 analytes. Compatible with rat cytokine and rat diabetes assays
Reagent Kits — for use with rat cytokine singleplex sets	
12002798	**Bio-Plex Pro Reagent Kit V**, 1 x 96-well, includes detection antibody diluent HP, standard diluent, sample diluent, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods
12005847	**Bio-Plex Pro Reagent Kit V**, 10 x 96-well, includes detection antibody diluent HP, standard diluent, sample diluent, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods

* Please contact your local Bio-Rad Sales Representative for pricing and availability of 10 x 96-well assay kits.

** Includes coupled magnetic beads and detection antibody. Requires the appropriate reagent kit and standards. Singleplex sets should not be mixed with others from different panels or groups.

Multi-Species TGF-β Assays

Ordering Information

Catalog #	Description
Bio-Plex Pro TGF-β Premixed All-in-One Kit (compatible with human, mouse, and rat samples)	
171W4001M	**Bio-Plex Pro TGF-β 3-Plex Assay**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay buffer, wash buffer, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard diluent, sample diluent, for the detection of TGF-β1, TGF-β2, TGF-β3
Bio-Plex Pro TGF-β Singleplex Sets, 1 x 96-Well*	
171V4001M	**TGF-β1 Set**
171V4002M	**TGF-β2 Set**
171V4003M	**TGF-β3 Set**
Standards	
171X40001	**Bio-Plex Pro TGF-β Standard**, pkg of 1 vial, lyophilized standard for detecting TGF-β1, TGF-β2, and TGF-β3 analytes
171X40501	**Bio-Plex Pro TGF-β Standard**, pkg of 50 lot-matched vials, lyophilized standard for detecting TGF-β1, TGF-β2, and TGF-β3 analytes
Reagent Kits — for use with TGF-β singleplex sets	
171304090M	**Bio-Plex Pro Reagent Kit III**, 1 x 96-well, includes detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods
12005846	**Bio-Plex Pro Reagent Kit III**, 10 x 96-well, includes detection antibody diluent HB, standard diluent HB, sample diluent HB, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods
Bio-Plex Pro Assay Accessories	
171304500	**Bio-Plex Wash Buffer**, 1.5 L
171025001**	**Bio-Plex Pro Flat Bottom Plates**, 40 x 96-well plates
171304502	**Filter Plate**, 1 x 96-well filter plate with clear plastic lid, plate-holder tray, sealing tape not included

* Includes coupled magnetic beads and detection antibody. Requires the appropriate reagent kit and standards. Singleplex sets should not be mixed with others from different panels or groups.

** Required for washing Bio-Plex Pro assays or other magnetic bead–based assays using Bio-Plex Pro and Bio-Plex Pro II wash stations.

Note: x-Plex assay panels can be ordered with any combination of available assays. For more information, go to **bio-rad.com/bio-plex/assaybuilder**.

Bio-Plex Pro™ Cell Signaling Assays

Cell Signaling Assays

The Bio-Plex Pro cell signaling assays are magnetic bead–based immunoassays designed to meet the sensitivity needs of the most discerning scientists. The multiplex format enables robust, reproducible, and simultaneous measurement of proteins involved in key intracellular signaling pathways. Choose from a broad selection of phosphoprotein and total protein targets to investigate pathways associated with cancer, cardiovascular disorders, inflammation, drug mechanism of action, diabetes, toxicology, and neurological disorders.

These assays incorporate several features to enhance both quality and ease of use:

- Assay quick guide to get you started right away
- Assay protocol optimized for exceptional sensitivity and broad dynamic range
- Flexible ordering options — order singleplex sets or visit **bio-rad.com/assaybuilder** to configure a custom premixed kit

Available Assays

Phosphoprotein		Lysate Control*	Catalog #
Akt (Ser^{473}) Akt (Thr^{308}) Erk1/2 (Thr^{202}/Tyr^{204}, Thr^{185}/Tyr^{187})	GSK-3α/β (Ser^{21}/Ser^{9}) MEK1 (Ser^{217}/Ser^{221})	EGF-treated HEK-293	171YZ0001
c-Jun (Ser^{63}) JNK (Thr^{183}/Tyr^{185}) p38 MAPK (Thr^{180}/Tyr^{182})	ATF-2 (Thr^{71}) CREB (Ser^{133}) p53 (Ser^{15})	UV-treated HEK-293	171YZ0009
EGFR (Tyr^{1068})	EGFR (Tyr^{1173})	EGF-treated HeLa	171YZ0002
HER-2 (Tyr^{1248}) HSP27 (Ser^{78})	p90 RSK (Ser^{380}) S6 ribosomal protein (Ser^{235}/Ser^{236})	EGF-treated SK-BR-3	171YZ0003
IGF-1R (Tyr^{1131})	IR-β (Tyr^{1146})	IGF-1-treated HEK-293	171YZ0005
IκB-α (Ser^{32}/Ser^{36}) NF-κB p65 (Ser^{536})	Smad2 (Ser^{465}/Ser^{467}) IR-β (Tyr^{1146})	TNF-α-treated HeLa	171YZ0008
p70 S6 Kinase (Thr^{421}/Ser^{424})	p70 S6 Kinase (Thr^{389})	NGFβ-treated PC-12	171YZ0006
PDGFR-α (Tyr^{754}) PDGFR-β (Tyr^{751}) BAD (Ser^{136})	IRS-1 (Ser^{636}/Ser^{639}) mTOR (Ser^{2448}) PTEN (Ser^{380})	PDGF-treated NIH3T3	171YZ0007
Stat1 (Tyr^{701}) Stat3 (Ser^{727})	Stat3 (Tyr^{705})	IFN-α-treated HeLa	171YZ0004
VEGFR-2 (Tyr^{1175})		VEGF-treated HUVEC	171YZ0010
ZAP-70 (Tyr^{319})		H_2O_2-treated Jurkat	171YZ0012
Lyn (Tyr^{507})	Syk (Tyr^{352})	H_2O_2-treated Ramos	171YZ0011
c-Abl (Tyr^{245})		Untreated K-562	171YZT003
Src (Tyr^{416})		Src-transfected NIH3T3	171YZ0013
Negative control for all phosphoprotein assays		Phosphatase-treated HeLa	171YZB001

Total Target			Lysate Control*	Catalog #
Total Akt Total Erk 1/2 Total GSK-3b Total IκB-α	Total JNK Total MEK1 Total mTOR Total p38 MAPK	Total p70 S6 Kinase Total PTEN Total Smad2 Total IGF-1R	Untreated HeLa	171YZT002
Total c-Jun Total CREB			Untreated HEK-293	171YZT001
Total Src			Src-transfected NIH3T3	171YZ0013
Total Btk			H_2O_2-treated Ramos	171YZ0011
Total ZAP-70			H_2O_2-treated Jurkat	171YZ0012
Total HER-2			EFG-treated SK-BR-3	171YZ0003
Negative control for all target assays			Detection antibody diluent**	

Housekeeping Protein	Lysate Control*	Catalog #
Human GAPDH	Untreated HeLa	171YZT002
β-Actin	Untreated HeLa	171YZT002
Negative control for all target assays	Detection antibody diluent**	

* All controls are shipped as one vial of lyophilized cell lysate.

** Included with the Bio-Plex Pro cell signaling reagent kit (#171304006M).

For More Information
Web: bio-rad.com/cellsignalingassays
Download bulletin: 5483
Request or download bulletin: 5405

Ordering Information

Catalog #	Description
Premixed All-in-One Kits	
LQ00006JK0K0RR	**Bio-Plex Pro Cell Signaling Akt Panel 8-Plex Assay**, 1 x 96-well
LQ00000S6KL81S	**Bio-Plex Pro Cell Signaling MAPK Panel 9-Plex Assay**, 1 x 96-well

continues

Ordering Information

Catalog #	Phosphoprotein	Catalog #	Phosphoprotein
Phosphoprotein Singleplex Sets*			
171V50001M	**Akt (Ser^{473}) Set**	171V50033M	**mTOR (Ser^{2448}) Set**
171V50002M	**Akt (Thr^{308}) Set**	171V50013M	**NF-κB p65 (Ser^{536}) Set**
171V50024M	**ATF-2 (Thr^{71}) Set**	171V50014M	**p38 MAPK (Thr^{180}/Tyr^{182}) Set**
171V50025M	**BAD (Tyr^{223}) Set**	171V50034M	**p53 (Ser^{15}) Set**
171V50027M	**c-Abl (Tyr^{245}) Set**	171V50016M	**p70 S6 Kinase (Thr^{389}) Set**
171V50003M	**c-Jun (Ser^{63}) Set**	171V50015M	**p70 S6 Kinase (Thr^{421}/Ser^{424}) Set**
171V50028M	**CREB (Ser^{133}) Set**	171V50035M	**p90 RSK (Ser^{380}) Set**
171V50004M	**EGFR (Tyr^{1068}) Set**	171V50017M	**PDGFR-α (Tyr^{754}) Set**
171V50005M	**EGFR (Tyr^{1173}) Set**	171V50018M	**PDGFR-β (Tyr^{751}) Set**
171V50006M	**Erk 1/2 (Thr^{202}/Tyr^{204}, Thr^{185}/Tyr^{187}) Set**	171V50037M	**PTEN (Ser^{380}) Set**
171V50007M	**GSK-3α/β (Ser^{21}/Ser^{9}) Set**	171V50038M	**S6 Ribosomal Protein (Ser^{235}/Ser^{236}) Set**
171V50008M	**HER-2 (Tyr^{1248}) Set**	171V50019M	**Smad2 (Ser^{465}/Ser^{467}) Set**
171V50029M	**HSP27 (Ser^{78}) Set**	171V50039M	**Src (Tyr^{416}) Set**
171V50009M	**IGF-1R (Tyr^{1131}) Set**	171V50020M	**Stat1 (Tyr^{701}) Set**
171V50031M	**IR-β (Tyr^{1146}) Set**	171V50021M	**Stat3 (Ser^{727}) Set**
171V50030M	**IRS-1 (Ser^{636}/Ser^{639}) Set**	171V50022M	**Stat3 (Tyr^{705}) Set**
171V50010M	**IκB-α (Ser^{32}/Ser^{36}) Set**	171V50040M	**Syk (Tyr^{352}) Set**
171V50011M	**JNK (Thr^{183}/Tyr^{185}) Set**	171V50023M	**VEGFR-2 (Tyr^{1175}) Set**
171V50032M	**Lyn (Tyr^{507}) Set**	171V50041M	**ZAP-70 (Tyr^{319}) Set**
171V50012M	**MEK1 (Ser^{217}/Ser^{221}) Set**		
Total Target Singleplex Sets*			
171V60001M	**Akt Set**	171V60007M	**JNK Set**
171V60012M	**Btk Set**	171V60008M	**MEK1 Set**
171V60002M	**c-Jun Set**	171V60015M	**mTOR Set**
171V60013M	**CREB Set**	171V60009M	**p38 MAPK Set**
171V60003M	**Erk1/2 Set**	171V60010M	**p70 S6 Kinase Set**
171V60004M	**GSK-3β Set**	171V60016M	**PTEN Set**
171V60005M	**HER-2 Set**	171V60011M	**Smad2 Set**
171V60014M	**IGF-1R Set**	171V60017M	**Src Set**
171V60006M	**IκB-α Set**	171V60018M	**ZAP-70 Set**
Housekeeping Protein Singleplex Sets*			
171V60019M	**Human GAPDH Set**	171V60020M	**β-Actin Set**

Bio-Plex Pro Cell Signaling Reagents — cell signaling reagent kits are required to run the singleplex sets

171304006M	**Bio-Plex Pro Cell Signaling Reagent Kit**, 1 x 96-well, includes assay cell lysis buffer, cell lysis factor QG, cell wash buffer, bead resuspension buffer, detection antibody diluent, wash buffer, streptavidin-PE, 96-well flat bottom plate, sealing tape, instructions
171304515	**Bio-Plex Pro Cell Signaling Wash Buffer**, 330 ml, for 1 x 96-well assay, for use with Bio-Plex Pro cell signaling assays only, compatible with both magnetic and vacuum separation methods

* Lysate controls are recommended for singleplex sets.

Bio-Plex Pro™ RBM Apoptosis Assays

Apoptosis Assays

The Bio-Plex Pro RBM apoptosis assays, developed in partnership with Myriad RBM, comprise a highly relevant set of intracellular proteins involved in the commitment, onset, and induction of apoptosis by the intrinsic pathway. The assays are built on magnetic beads to enable robust quantification of multiple proteins in cell and tissue lysates, and are available as premixed all-in-one kits.

Key features include:

- Analytically validated to standards set forth by the Clinical Laboratory Standards Institute (CLSI)
- Manufactured in accordance with GMP guidelines
- Lot-to-lot correlation specification of $R^2 \geq 0.9$ for consistently reproducible results
- 2-level quality controls with lot-specific ranges
- Assay quick guide to get you started right away
- Fastest available assay protocols and a convenient all-in-one kit format
- Magnetic beads for simplified plate processing

Available Bio-Plex Pro RBM Apoptosis Analytes

Panel 1	Panel 2	Panel 3
Bak	Bad	Active caspase-3
Bax	Bax / Bcl-2 dimer	Bcl-xL / Bak dimer
Lamin B	Bcl-xL	Mcl-1 / Bak dimer
Smac	Bim	Survivin
	Mcl-1	

Ordering Information

Catalog #	Description
Bio-Plex Pro RBM Apoptosis Assays	
171WAR1CK	**Bio-Plex Pro RBM Apoptosis Panel 1**, 1 x 96-well all-in-one kit that includes premixed magnetic capture beads and detection antibodies, standards, 2-level controls, standard diluent, buffers (blocking, lysate dilution (LDB), cytosolic extraction (CEB), 10x assay), 10x streptavidin-PE, flat bottom plate, plate seals, and instructions, for the detection of the following analytes in cell and tissue lysates: Bak, Bax, Lamin B, and Smac
171WAR2CK	**Bio-Plex Pro RBM Apoptosis Panel 2**, 1 x 96-well all-in-one kit that includes premixed magnetic capture beads and detection antibodies, standards, 2-level controls, standard diluent, buffers (blocking, lysate dilution (LDB), cytosolic extraction (CEB), 10x assay), 10x streptavidin-PE, flat bottom plate, plate seals, and instructions, for the detection of the following analytes in cell and tissue lysates: Bad, Bax / Bcl-2 dimer, Bcl-xL, Bim, and Mcl-1
171WAR3CK	**Bio-Plex Pro RBM Apoptosis Panel 3**, 1 x 96-well all-in-one kit that includes premixed magnetic capture beads and detection antibodies, standards, 2-level controls, standard diluent, buffers (blocking, lysate dilution (LDB), cytosolic extraction (CEB), 10x assay), 10x streptavidin-PE, flat bottom plate, plate seals, and instructions, for the detection of the following analytes in cell and tissue lysates: active caspase-3, Bcl-xL / Bak dimer, Mcl-1 / Bak dimer, and survivin

Bio-Plex Pro™ RBM Kidney Toxicity Assays

Kidney Toxicity Assays

The Bio-Plex Pro RBM kidney toxicity assays, developed in partnership with Myriad RBM, comprise a highly relevant set of biomarkers for early detection and characterization of kidney toxicity/injury.

The assays are built on magnetic beads to enable robust quantification of multiple proteins in human, canine, and rat urine samples.

Key features include:

- Analytically validated to standards set forth by the Clinical Laboratory Standards Institute (CLSI)
- Manufactured in accordance with GMP guidelines

- Lot-to-lot correlation specification of $R^2 \geq 0.9$ for consistently reproducible results
- 2-level quality controls with lot-specific ranges
- Assay quick guide to get you started right away
- Fastest available assay protocols and a convenient all-in-one kit format
- Magnetic beads for simplified plate processing

Ordering Information

Catalog #	Description
Bio-Plex Pro RBM Kidney Toxicity Assays	
171ATR1CK	**Bio-Plex Pro RBM Human Kidney Toxicity Panel 1**, 1 x 96-well, includes premixed magnetic capture beads, premixed detection antibodies, standards mix, 2-level controls, blocking buffer, standard diluent, sample dilution buffer, 10x assay buffer, 10x streptavidin-PE, 96-well flat bottom plate, plate seals, and instructions, for the detection of the following analytes: calbindin, clusterin, GST-π, IL-18, KIM-1, MCP-1
171ATR2CK	**Bio-Plex Pro RBM Human Kidney Toxicity Panel 2**, 1 x 96-well, includes premixed magnetic capture beads, premixed detection antibodies, standards mix, 2-level controls, blocking buffer, standard diluent, sample dilution buffer, 10x assay buffer, 10x streptavidin-PE, 96-well flat bottom plate, plate seals, and instructions, for the detection of the following analytes: albumin, B2M, cystatin C, NGAL, osteopontin, TFF3
171KTR1CK	**Bio-Plex Pro RBM Rat Kidney Toxicity Panel 1**, 1 x 96-well, includes premixed magnetic capture beads, premixed detection antibodies, standards mix, 2-level controls, blocking buffer, standard diluent, sample dilution buffer, 10x assay buffer, 10x streptavidin-PE, 96-well flat bottom plate, plate seals, and instructions, for the detection of the following analytes: clusterin, IL-18, KIM-1, MCP-1, osteopontin
171KTR2CK	**Bio-Plex Pro RBM Rat Kidney Toxicity Panel 2**, 1 x 96-well, includes premixed magnetic capture beads premixed detection antibodies, standards mix, 2-level controls, blocking buffer, standard diluent, sample dilution buffer, 10x assay buffer, 10x streptavidin-PE, 96-well flat bottom plate, plate seals, and instructions, for the detection of the following analytes: B2M, calbindin, cystatin C, NGAL
171KTR3CK	**Bio-Plex Pro RBM Rat Kidney Toxicity Albumin Kit**, 1 x 96-well, includes premixed magnetic capture beads, premixed detection antibodies, standards mix, 2-level controls, blocking buffer, standard diluent, sample dilution buffer, 10x assay buffer, 10x streptavidin-PE, 96-well flat bottom plate, plate seals, and instructions, for the detection of albumin

Bio-Plex Pro™ Diabetes Assays

Diabetes Assays

The Bio-Plex Pro diabetes assays are magnetic bead–based multiplex assays designed for enhanced assay sensitivity and assay working ranges. These assays detect human, non-human primate, mouse, and rat diabetes-related biomarkers using as little as 12.5 µl of sample per well.

Key features include:

- **Increased productivity** — measure up to 10 diabetes and obesity markers, plus adiponectin and adipsin, in only 3 hours
- **Expanded multiplexability** — mix diabetes assays with a host of compatible assays from our cytokine menu
- **Option to use a magnetic wash station** — simplify assay workflow and improve data consistency between experiments
- **Flexible ordering options** — order either premixed all-in-one kits or singleplex sets, or customize your assay with the Bio-Plex assay builder (**bio-rad.com/assaybuilder**)

- **Robustness** — performance tested in serum and plasma matrices
- **Cross-platform compatibility** — can be used with all xMAP life science instruments supplied by any Luminex partner

For More Information
Web: bio-rad.com/bio-plexprodiabetes
Download bulletin: 6119
Request or download bulletins: 6342

Available Bio-Plex Pro Diabetes Assays

Human (compatible with non-human primate samples)*	Mouse	Rat
Adiponectin	Adiponectin	Ghrelin
Adipsin	Ghrelin	GLP-1
C-Peptide	GIP	Glucagon
Ghrelin	GLP-1	Leptin
GIP	Glucagon	PAI-1
GLP-1	Insulin	
Glucagon	Leptin	
Insulin	PAI-1	
Leptin	Resistin	
PAI-1		
Resistin		
Visfatin		

* See instruction manual for details.

Ordering Information

Catalog #	Description
Human Premixed All-in-One Kits (compatible with non-human primate samples)	
171A7001M	**Bio-Plex Pro Human Diabetes 10-Plex Panel**, 1 x 96-well, includes premixed coupled magnetic beads, detection antibodies, standards, assay and wash buffers, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, standard and sample diluents for the detection of C-Peptide, ghrelin, GIP, GLP-1, glucagon, insulin, leptin, PAI-1, resistin, and visfatin
171A7002M	**Bio-Plex Pro Human Diabetes Adipsin and Adiponectin Assays**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay and wash buffers, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, serum-based diluent for the detection of adipsin and adiponectin
171A7003M	**Bio-Plex Pro Human Diabetes Adiponectin Assay**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay and wash buffers, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, serum-based diluent for the detection of adiponectin
171A7004M	**Bio-Plex Pro Human Diabetes Adipsin Assay**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay and wash buffers, detection antibody diluent, streptavidin-PE, flat bottom plate, sealing tape, serum-based diluent for the detection of adipsin

Bio-Plex Pro Human Diabetes Singleplex Sets, 1 x 96-Well*			
171B7003M	**C-Peptide Set**	171B7008M	**Insulin Set**
171B7004M	**Ghrelin Set**	171B7009M	**Leptin Set**
171B7005M	**GIP Set**	171B7010M	**PAI-1 Set**
171B7006M	**GLP-1 Set**	171B7011M	**Resistin Set**
171B7007M	**Glucagon Set**	171B7012M	**Visfatin Set**

Standards	
171D70001	**Bio-Plex Pro Human Diabetes Standards**, pkg of 1 vial, lyophilized mixture of 12 analytes
171D70050	**Bio-Plex Pro Human Diabetes Standards**, pkg of 50 lot-matched vials, lyophilized mixture of 12 analytes

Mouse Premixed All-in-One Kits	
171F7001M	**Bio-Plex Pro Mouse Diabetes 8-Plex Panel**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay and wash buffers, detection antibody diluent, streptavidin-PE, filter plate, flat bottom plate, sealing tape, standard and sample diluents for the detection of ghrelin, GIP, GLP-1, glucagon, insulin, leptin, PAI-1, and resistin
171F7002M	**Bio-Plex Pro Mouse Diabetes Adiponectin Assay**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, assay and wash buffers, detection antibody diluent, streptavidin-PE, filter plate, flat bottom plate, sealing tape, serum-based diluent for the detection of adiponectin

Bio-Plex Pro Mouse Diabetes Singleplex Sets, 1 x 96-Well*			
171G7002M	**Ghrelin Set**	171G7006M	**Insulin Set**
171G7003M	**GIP Set**	171G7007M	**Leptin Set**
171G7004M	**GLP-1 Set**	171G7008M	**PAI-1 Set**
171G7005M	**Glucagon Set**	171G7009M	**Resistin Set**

Standards	
171I70001	**Bio-Plex Pro Mouse Diabetes Standards**, pkg of 1 vial, lyophilized mixture of 9 standard analytes, includes adiponectin, ghrelin, GIP, GLP-1, glucagon, insulin, leptin, PAI-1, and resistin

Bio-Plex Pro Rat Diabetes Singleplex Sets, 1 x 96-Well*			
171L7001M	**Ghrelin Set**	171L7006M	**Leptin Set**
171L7003M	**GLP-1 Set**	171L7007M	**PAI-1 Set**
171L7004M	**Glucagon Set**		

Standards	
171NZ0001	**Bio-Plex Pro Rat Standards**, pkg of 1 vial, lyophilized mixture of 31 standard analytes. Compatible with rat cytokine and rat diabetes assays

Reagent Kit — for use with human diabetes singleplex sets	
171304070M	**Bio-Plex Pro Reagent Kit with Flat Bottom Plate**, 1 x 96-well, includes flat bottom plate, assay and wash buffers, detection antibody diluent, streptavidin-PE, sealing tape, standard and sample diluents, and instructions, for use with magnetic separation methods

Reagent Kit — for use with rat and mouse singleplex sets	
12002798	**Bio-Plex Pro Reagent Kit V**, 1 x 96-well, includes detection antibody diluent HP, standard diluent, sample diluent, assay buffer, concentrated wash buffer, streptavidin-PE, flat bottom plate, sealing tape, for magnetic separation methods

* Includes coupled magnetic beads and detection antibody. Requires the appropriate reagent kit and standards. Singleplex sets should not be mixed with others from different panels or groups.

Bio-Plex Pro™ Human Isotyping Assays

Human Isotyping Assays

Bio-Plex Pro human isotyping assays are magnetic bead–based multiplex immunoassays offering accurate and reproducible measurements of multiple analytes simultaneously. These assays have been developed to provide reliable performance with the flexibility required to meet your research needs. They incorporate several features to enhance both quality and ease of use.

- **Magnetic beads** — simplified plate processing and improved reproducibility
- **Convenience** — all-in-one kit format for both multiplex and singleplex assays

Available Assays

IgG_1	IgA
IgG_2	IgM
IgG_3	IgE
IgG_4	IgG Total

- **1-level quality control**
- **Optimization** — one diluent optimized for use with samples, standards, and controls
- **Assay quick guide** — to get you started right away

For More Information
Web: bio-rad.com/isotyping
Request or download bulletin: 6344

Ordering Information

Catalog #	Description
Bio-Plex Pro Human Isotyping Panel Premixed All-in-One Multiplex Kit	
171A3100M	**Bio-Plex Pro Human Isotyping Panel, 6-Plex**, 1 x 96-well, includes coupled magnetic beads, detection antibodies, standards, 1-level quality controls, detection antibody diluent, isotyping diluent (for use with samples, standards, and controls), assay buffer, wash buffer, streptavidin-PE, 96-well flat bottom plate, sealing tape, assay quick guide, and product data sheet, for detection of IgG_1, IgG_2, IgG_3, IgG_4, IgA, and IgM
Bio-Plex Pro Human Isotyping All-in-One Singleplex Kits*	
171A3101M	**IgA Kit**, 1 x 96-well
171A3104M	**IgM Kit**, 1 x 96-well
171A3102M	**IgE Kit**, 1 x 96-well
171A3103M	**IgG Total Kit**, 1 x 96-well

* Singleplex kits are specific for each assay indicated and include coupled magnetic beads, detection antibodies, standards, 1-level quality controls, detection antibody diluent, isotyping diluent (for use with samples, standards, and controls), assay buffer, wash buffer, streptavidin-PE, 96-well flat bottom plate, sealing tape, assay quick guide, and product data sheet.

Bio-Plex Pro™ Mouse Chemokine Panel

Mouse Chemokine Panel

The Bio-Plex Pro mouse chemokine panel is a ready-to-use, 1 x 96-well kit containing premixed magnetic capture beads and detection antibodies, standards, and buffers optimized to detect 33 biologically relevant mouse chemokines and cytokines in a single well. This assay delivers superior sensitivity and sample detection using minimal input sample volumes, thereby conserving precious mouse samples.

Benefits include:

- Sample efficiency — essential for mouse models
- Short protocol — results in 4 hours
- Flexible ordering options — order either premixed all-in-one kits or singleplex sets, or customize with your assay with the Bio-Plex assay builder (**bio-rad.com/assaybuilder**)

The Bio-Plex Pro mouse chemokine panel includes the following targets*:

BCA-1 / CXCL13	IL-2	MCP-5 / CCL12	TARC / CCL17
CTACK / CCL27	IL-4	MDC / CCL22	TECK / CCL25
ENA-78 / CXCL5	IL-6	MIP-1α / CCL3	TNF-α
Eotaxin / CCL11	IL-10	MIP-1β / CCL4	
Eotaxin-2 / CCL24	IL-16	MIP-2 / CXCL2	
Fractalkine / CX3CL1	IP-10 / CXCL10	MIP-3α / CCL20	
GM-CSF	I-TAC / CXCL11	MIP-3β / CCL19	
I-309/CCL1	KC / CXCL1	RANTES / CCL5	
IFN-γ	MCP-1 / CCL2	SCYB16 / CXCL16	
IL-1β	MCP-3 / CCL7	SDF-1α / CXCL12	

* MCP-2 / CCL8 is available separately as a single-plex.

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

Ordering Information

Catalog #	Description
12002231	**Bio-Plex Pro Mouse Chemokine Panel, 33-Plex**, 1 x 96-well
12002247	**Bio-Plex Pro Mouse Chemokine Panel, MCP-2/CCL8**, 1 x 96-well
12002798	**Bio-Plex Pro Reagent Kit V**, 1 x 96-well
12002796	**Bio-Plex Pro Mouse Chemokine Standards**, 1 pack

Bio-Plex Pro™ Human Apolipoprotein Assay Panel

Human Apolipoprotein Assay Panel

The Bio-Plex Pro human apolipoprotein panel is a sensitive, magnetic bead–based multiplex assay that allows the accurate measurement of ten apolipoproteins in diverse matrices, including serum and plasma. The multiplexing feature makes it possible to quantitate the level of multiple apolipoproteins in a single microplate well in just 3 hours, with a sample volume as low as 10 µl.

This panel is offered in a convenient, all-in-one, 10-plex kit format that includes assay, reagent, and buffers. Standard diluents for serum and plasma are included, along with two-level controls and lyophilized standards.

Benefits include:

- Robust performance, including lot-to-lot consistency data in each kit
- Fast assay protocol with short sample incubation times
- Easy collection and management of large datasets with Bio-Plex Manager™ and Bio-Plex Data Pro™ software, plus automated data optimization
- Reproducibility and simplified washing using a magnetic workflow

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

Available Human Apolipoprotein Assay Panel Analytes

Apo-A1	Apo-E
Apo-A2	Apo-H
Apo-B	Clusterin / Apo-J
Apo-C1	C-reactive protein (CRP)
Apo-C3	
Apo-D	

Ordering Information

Catalog #	Description
12003081	**Bio-Plex Pro Human Apolipoprotein Assay Panel, 10-Plex**, 1 x 96-well, includes magnetic capture beads, detection antibodies, vial of standards, 2-level controls, diluents, buffers, streptavidin-PE, flat bottom plate, and plate seals, for the detection of 9 human apolipoproteins and CRP

Bio-Plex® COOH Beads and Related Reagents

Bio-Plex Pro™ Magnetic COOH Beads

Carboxylated beads that enable you to build your own magnetic assays for use with either magnetic- or vacuum-based separation protocols during assay preparation. The magnetic beads are available in 20 bead regions in 1 ml vials for immediate delivery (4 ml vials are available with a 30-day lead time). The Bio-Plex® amine coupling kit provides a complete set of reagents for coupling proteins to the beads. For nucleic acid coupling, refer to the instruction manual.

- Suitable for protein and nucleic acid multiplex assays
- Compatible with all Luminex xMAP readers, both Bio-Plex Pro and Bio-Plex Pro II wash stations, and Bio-Plex handheld magnetic washers

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

Ordering Information

Catalog #	Description
MC100xx01*	**Bio-Plex Pro Magnetic COOH Beads**, 1 ml
MC100xx04*	**Bio-Plex Pro Magnetic COOH Beads**, 4 ml

*xx = bead region. Bead regions available: 26–29, 34–37, 43–46, 52–55, and 62–65.

Bio-Plex® Nonmagnetic COOH Beads

Develop your own Bio-Plex suspension array assays using these beads. The beads are internally labeled with two fluorescent dyes. Use the Bio-Plex amine coupling kit to attach nucleic acids, antibodies, or other proteins to polystyrene beads for multianalyte analysis of any sample in a 96-well format.

- **Flexible assays** — quickly add or remove analytes from your menu
- **Ready-to-use reagent kits** — optimized for Bio-Plex COOH beads
- **Complete solution** — one-stop source for all your assay needs
- **Compatibility** — works with 200 and 3D xMAP readers

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

Ordering Information

Catalog #	Description
1715060xx*	**Bio-Plex Nonmagnetic COOH Beads**, 1.25 x 10^7 beads/ml, 1 ml
1716060xx*	**Bio-Plex Nonmagnetic COOH Beads**, 16 ml

*xx = bead region. Bead regions available, 11, 16, 18, 20, 24–28, 30, 31, 33, 35, 38, 42–46, 50–53, 56, and 66.

Bio-Plex® Amine Coupling Kit

This kit was developed specifically for immobilizing antibodies or other proteins on Bio-Plex nonmagnetic COOH beads.

- Sufficient reagents for 30 coupling reactions using 100 µl of Bio-Plex COOH beads
- Each coupling reaction supports the analysis of 200 samples
- Tested on proteins from 6–150 kD
- For use with antibodies or other proteins

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

Ordering Information

Catalog #	Description
Bio-Plex Amine Coupling Kit	
171406001*	**Bio-Plex Amine Coupling Kit**, 30 reactions, includes bead wash buffer, bead activation buffer, storage buffer, staining buffer, coupling reaction tubes
Bio-Plex Streptavidin-PE	
171304501	**Bio-Plex Streptavidin-PE**, streptavidin-phycoerythrin for 10 x 96-well reactions

Note: Streptavidin-PE is a component of all reagent kits and is also available separately.

* For protein coupling only.

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Microplate Absorbance Readers and Accessories

Instruments and Software

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iMark™ Microplate Absorbance Reader

This reader offers a preprogrammed validation protocol and a built-in printer. The instrument can be used as a stand-alone reader or controlled by a PC or Mac with Microplate Manager® 6 software, and comes with six standard absorbance filters: 415, 450, 490, 595, 655, and 750 nm. Five additional filters are available (405, 540, 550, 570, and 630 nm) as well custom filters at 5 nm intervals from 400–750 nm on request.

- Ability to read flat, U-, or V-bottom microplates or 8- or 12-well strip plates
- Automatic calibration before each reading
- Variable-speed plate-shaking capability
- Multilingual interface and LCD display (English, Japanese, Chinese, and Russian)

For More Information
Web: bio-rad.com/iMark
Request or download bulletin: 5670

Ordering Information

Catalog #	Description
1681130	**iMark Microplate Absorbance Reader**, 100/240 V, includes 6 filters (415, 450, 490, 595, 655, 750 nm), built-in plate shaker, onboard software and thermal printer, one roll printer paper, USB2 and power cables
1681135	**iMark Microplate Absorbance Reader with Microplate Manager 6 Software**, for PC and MAC
Accessories	
1660495	**8-Channel Professional Adjustable-Volume 20–200 µl Digital Micropipet**, pkg of 1, 8-channel 20–200 µl adjustable-volume micropipet, includes volume lock mechanism, curved tip ejector, rotating manifold, fully autoclavable
1686940	**Checkmark Reader Performance Verification Kit**, includes absorbance calibration plate, Checkmark software
1682230	**IQ/OQ Kit for iMark Microplate Absorbance Reader**, includes #1686940, IQ/OQ protocols

xMark™ Microplate Absorbance Spectrophotometer

With its monochromator design and spectral scanning feature (which eliminates the need for filters), this spectrophotometer can find the best wavelength within a broad range for any photometric application. The xMark spectrophotometer can read all standard microplates, from 6- to 1,536-well formats, and can perform a wide range of end-point and kinetic applications with spectral scanning within low UV to infrared wavelengths.

- Monochromator-based system for maximum optical efficiency and flexibility in photometry reading
- High-performance optics for low- or high-density formats
- Imaging capabilities for pixel intensity data in a single well or entire plate
- Includes Microplate Manager® software
- Built-in plate shaker with variable mixing direction and adjustable speed and incubator with programmable temperature control

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

Ordering Information

Catalog #	Description
1681150	**xMark Microplate Absorbance Spectrophotometer**, PC or Mac, built-in incubator, plate shaker, Microplate Manager 6 software, USB2 and power cables
1682000	**Plate Adaptor**, for using Terasaki plate with xMark microplate absorbance spectrophotometer
Accessories	
1682250	**IQ/OQ Kit for xMark Microplate Absorbance Spectrophotometer**, includes #1686940, IQ/OQ protocols

Microplate Manager® 6 Software

Bio-Rad's iMark™ microplate reader and xMark™ microplate spectrophotometer can be utilized to their full potential with Microplate Manager 6 software. This comprehensive software package allows powerful, versatile colorimetric and turbidimetric analyses and report analysis for raw data, qualitative, and quantitative calculations based on absorbance limits, matrix of equations, normalization, and curve fit. Microplate Manager software expands your range of data analysis options to include kinetics and screening, and adds the functionality of flexible template creation for any standard microplate format up to 1,536 wells and for 60- and 70-well Terasaki plates. The custom reporting function provides one-button screening for predefined assays such as those for TSE screening.

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

Ordering Information

Catalog #	Description
1689520	**Microplate Manager 6 Software**, PC and Mac, for end-point and kinetic data analysis with iMark microplate absorbance reader and xMark microplate spectrophotometer

ImmunoWash™ 1575 Microplate Washer

The ImmunoWash 1575 microplate washer makes it easy to customize your plate-washing protocols. It offers complete control of needle position to perform special wash routines and maximize wash efficiency. This washer includes a wide choice of wash sequences to facilitate protocol creation and storage. It's compatible with strips and 96-well microplates that have flat, U-, or V-bottom wells.

- Programmable needle positions (horizontal and vertical) to an accuracy of 0.1 mm for bottom washing, crosswise aspiration, and overflow washing
- Dispensing speed control
- A plate-shaking option to help minimize bubbles and adherence of liquid to well sides

- Waste bottle sensor to detect high waste liquid levels
- Up to 75 programmable washing sequences

For More Information
Web: bio-rad.com/immunowash
Download bulletins: 2054 and 2135

Ordering Information

Catalog #	Description
1707009	**ImmunoWash 1575 Microplate Washer**, 110–240 V, includes bottle and tubing set, 8-port manifold, aerosol protection cover
1707021	**ImmunoWash 1575 12-Channel Manifold**
1707026	**ImmunoWash 1575 Standard Maintenance Kit**

ELISA Reagents and Kits

See Also
Blotting-grade conjugates: page 256.

ELISA Reagents

Enzyme-Antibody Conjugates

Bio-Rad offers enzyme-antibody conjugates and ELISA soluble substrate systems suitable for use in all microtitration enzyme immunoassays. Antibodies are available conjugated to HRP or AP enzymes.

Substrate Systems

The AP substrate kit contains *p*-nitrophenyl phosphate (pNPP) tablets and dilution buffer concentrate to prepare 500 ml of working solution. Benefits of the AP system include an extremely linear reaction rate and low background values for accurate quantitation by ELISA.

There are two convenient substrate systems for detection of HRP-labeled antibodies. Both the 2,2'-azino-di(3-ethylbenzothiazoline)-6-sulfonic acid (ABTS) peroxidase substrate kit and the 3,3',5,5'-tetramethylbenzidine (TMB) peroxidase substrate kit contain liquid reagents that are mixed just prior to use.

The single-component TMB peroxidase EIA substrate kit makes microplate assays convenient and fast.

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

Ordering Information

Catalog #	Description
Enzyme-Antibody Conjugates	
1721011	**Goat Anti-Mouse IgG (H + L)-HRP Conjugate**, 2 ml
1721033	**Goat Anti-Human IgG (γ)-HRP Conjugate**, 1 ml
1721019	**Goat Anti-Rabbit IgG (H + L)-HRP Conjugate**, 1 ml
1721034	**Rabbit Anti-Goat IgG (H + L)-HRP Conjugate**, 1 ml
1721017	**Rabbit Anti-Sheep IgG (H + L)-HRP Conjugate**, 1 ml
1721037	**Rabbit Anti-Goat IgG (H + L)-AP Conjugate**, 1 ml
Substrate Systems	
1721063	**AP Substrate Kit**, contains 100 pNPP tablets and 100 ml 5x concentrate diethanolamine buffer
1721064	**HRP Substrate Kit**, contains 180 ml ABTS, 20 ml hydrogen peroxide
1721066	**TMB Peroxidase EIA Substrate Kit**, contains 180 ml TMB solution, 20 ml hydrogen peroxide
1721067	**TMB Peroxidase EIA Substrate Kit**, contains 900 ml TMB solution, 100 ml hydrogen peroxide
1721068	**Single-Component TMB Peroxidase EIA Substrate Kit**, contains 100 ml TMB solution
1721072	**Single-Component TMB Peroxidase ELISA Substrate Kit**, contains 1 L TMB solution

Mouse Antibody Isotyping Kit

This kit provides a convenient ELISA method for identifying the class, subclass, and light-chain type of mouse IgGs in tissue culture supernatant and ascites fluid. The kit allows screening of up to 12 different antibody samples per plate. Each sample is reacted with eight subclass-specific antisera to determine the heavy- and light-chain types of the monoclonal antibody.

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

Ordering Information

Catalog #	Description
1722051	**Mouse Typer Isotyping Kit**, includes mouse isotyping panel, affinity purified goat anti-rabbit IgG (H + L)
1722055	**Mouse Typer Isotyping Panel**, includes 10 ml each ultrapure rabbit anti-mouse subclass-specific antiserum to mouse IgG_1, IgG_{2a}, IgG_{2b}, IgG_3, IgM, IgA, κ-chain, and λ-chain

Subject Index

ELISA Reagents, 328
iMark™ Microplate Absorbance Reader, 326
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Microplate Manager® 6 Software, 327
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Transfection

Transfection Technologies 332

Lipid Transfection Reagents 333

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Biolistic Particle Delivery Systems 339

Transfection Technologies

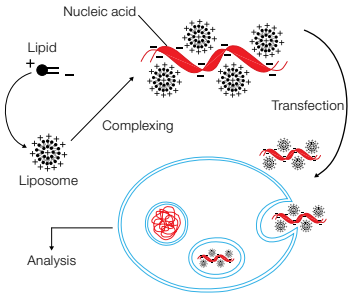
Introducing DNA and RNA into cells is a powerful tool for evaluating gene expression. Bio-Rad's transfection products offer choices for gene delivery to bacterial, fungal, plant, and animal cells. Use the guide below to select the most appropriate transfection technology for your application.

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

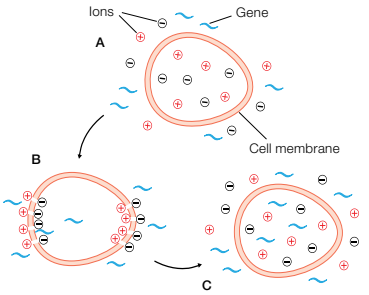
Transfection Technologies	Page	Plants								Bacteria		Fungi		Animals							
		Plant Cell Suspension Cultures	*Plant Cell Adherent Cultures*	*Plant Cell Callus or Explants*	*Pollen*	*Leaves (in situ)*	*Detached Leaves*	*Meristems (in situ)*	*Detached Meristems*	*Gram-Positive Bacteria*	*Gram-Negative Bacteria*	*Yeast*	*Other Fungi*	*Skin or Organs (in vivo)*	*Organ Cultures*	*Ex Vivo Cells or Tissues (e.g., blood)*	*Suspension Cell Cultures*	*Mammalian Cells — Gene Knockdowns*	*Adherent Cells, Trypsinized*	*Adherent Cells, Attached*	*Organelles (chloroplasts, mitochondria)*
Lipid Transfection																					
siLentFect™ lipid reagent for RNAi	333													○	○	•	●	●	●	●	
TransFectin™ lipid reagent	334													○	○	•	●	●	●	●	
Electroporation																					
Gene Pulser Xcell™ total system	336	•*		•*			○		○	●	●	●	●			•	●	●	●		
Gene Pulser Xcell eukaryotic system	336	•*		•*			○		○	○	○	○	○			•	●	●	●		
Gene Pulser Xcell microbial system	336								●	●	●	●									
MicroPulser™ electroporator	337								•	●	●	●									
Biolistic Particle Delivery																					
Helios® gene gun system	340	•	●	•	•	●	●	●	○	○	●	•	•	●	○	●	●		●	•	•
PDS-1000/He™ system	341	●	●	●	●		●		●	○	○	•	•		●	○	●		•	●	●
PDS-1000/He system with Hepta™ adaptor	342	●	●	●	●		●		●	○	○	•	•		●	○	●		●	●	●

● First choice, highly recommended.
• Recommended, but other technologies may be better suited to that application.
○ Possible, but little data to support its effectiveness.
* Protoplasts required.

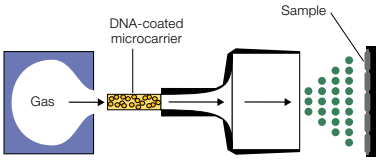
Lipid Transfection
page 333



Electroporation
page 334



Biolistic Particle Delivery
page 339



Helios Gene Gun System Particle Delivery Method

Lipid Transfection Reagents

Lipid transfection is the process of using lipids to enable a cell to absorb DNA from outside itself. The liposome easily merges with the membrane of the cell since they are both composed of a phospholipid bilayer. Once the liposome and membrane are merged the genetic material can then be released inside the cell. Some familiar aliases for lipid transfection are lipid-mediated delivery, lipofection, and liposome-based gene transfection.

Lipid transfection has been shown to be successful in transfecting adherent and suspension cells and some primary cells (for example, mES and neuronal cells). Common applications employing lipid transfection include RNAi studies, protein production, viral production, gene function analysis, and cell-based assays.

Lipid Transfection Reagents Selection Guide

	siLentFect™ Lipid Reagent	TransFectin™ Lipid Reagent
Description	RNAi-specific lipid	General-purpose lipid
Applications	RNAi (siRNA delivery)*	Gene expression RNAi (siRNA/shRNA delivery)
Cell lines**	Variety of adherent and suspension cell lines, including A549, BHK, HeLa, K562, primary fibroblasts, and Vero	Variety of adherent and suspension cell lines, including A549, HeLa, HUVEC, MCF-7, and primary fibroblasts
Shelf life	6 months	6 months

* siLentFect can successfully cotransfect an siRNA molecule with a plasmid DNA.
** For a more complete list of cell lines, see below (siLentFect lipid reagent) and page 334 (TransFectin lipid reagent), or go to **bio-rad.com/lipids**.

siLentFect™ Lipid Reagent for RNAi

Effective Gene-Specific Silencing with Low Toxicity
siLentFect lipid reagent delivers siRNA to a broad variety of cultured mammalian cells for RNAi applications. RNAi is a powerful technique used for the specific inhibition of gene expression. An intrinsic cellular mechanism in most eukaryotes, RNAi helps regulate the expression of genes critical to cell fate determination, differentiation, survival, and defense from viral infection.

- **Effective gene-specific silencing** — achieve 90–99% gene-specific knockdown of both high- and low-abundance genes using as little as 1 nM siRNA for certain gene targets
- **Low amounts of siRNA and lipid required** — the high affinity of siLentFect lipid reagent for siRNA allows the use of less lipid and less siRNA per experiment, decreasing the likelihood of off-target effects, reducing cost, and minimizing the experimental bias caused by cell stress/death
- **Simple, flexible protocol** — easily adaptable protocol for high-throughput applications; successfully transfect cells by adding siLentFect reagent and siRNA directly to the culture or by adding siLentFect-siRNA complexes to trypsinized cells still in suspension

- **Cotransfection capabilities** — simultaneous delivery of siRNA and dsDNA vectors for optimization and dual expression analysis
- **Works with many cell types** — 184htrt, 4T1, A549, Caco-2, CHO-K1, COS-7, HEK 293, HeLa, HepG2, HUVEC, LNCaP, MCF-7, murine EC, NIH 3T3, PC-3, primary fibroblast, primary keratinocyte, primary ovarian, SVEC4, VSMC

For More Information
Web: bio-rad.com/silentfect
Download bulletins: 3105, 5439, and 5894

Ordering Information

Catalog #	Description
1703360	**siLentFect Lipid Reagent for RNAi**, 0.5 ml
1703361	**siLentFect Lipid Reagent for RNAi**, 1.0 ml
1703362	**siLentFect Lipid Reagent for RNAi**, 5 x 1.0 ml

See Also

TC20 automated cell counter: pages 28–29.

Experion automated electrophoresis system: page 271.

Supermixes for PCR and real-time PCR: page 375.

Real-time PCR systems: page 363.

See Also

Supermixes for PCR and real-time PCR: page 375.

Real-time PCR systems: page 363.

Total RNA extraction kits: page 9.

Plasmid purification kits: page 13.

TransFectin™ Lipid Reagent

Efficient Delivery for High Gene Expression Levels
TransFectin lipid reagent delivers nucleic acids to a broad range of cell lines with high efficiency. Advantages of this reagent include:

- **Enables high-efficiency results** — effective transfection of both easy- and difficult-to-transfect cells
- **Minimally affects cell viability** — less cytotoxicity than other high-efficiency products makes it appropriate for sensitive cell lines; lower toxicity leads to healthier cells for post-transfection analysis
- **Simple to use** — part of an easy three-step protocol; dilute TransFectin reagent and nucleic acid in the appropriate medium, mix, incubate, and add to the cell culture. There is no need to change the medium for most cell types after addition of the complexes; just incubate and assay for expression
- **Allows flexibility in experimental conditions** — efficient transfection in both the presence and absence of serum-containing media; exceptional results are obtained when cells are transfected at densities between 40 and 90%

- **Affordable** — minimal amounts of TransFectin reagent are required for optimal transfection results compared to other reagents; using less lipid reduces the cost per transfection and reduces toxicity effects

For More Information
Web: bio-rad.com/transfectin
Download bulletins: 2873 and 3197

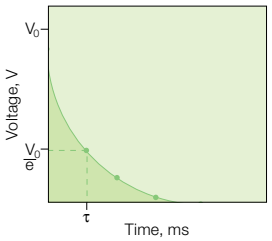
Ordering Information

Catalog #	Description
1703350	**TransFectin Lipid Reagent**, 0.5 ml
1703351	**TransFectin Lipid Reagent**, 1.0 ml
1703352	**TransFectin Lipid Reagent**, 5 x 1.0 ml

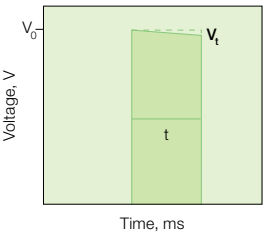
Electroporation Systems and Buffers

Electroporation is a powerful, highly efficient technique for introducing molecules (nucleic acids, proteins, carbohydrates, dyes) and viral particles into a wide variety of prokaryotic and eukaryotic cells. A high-intensity electric field transiently permeabilizes the membrane, enabling uptake of molecules from the surrounding medium. Electroporation provides a valuable and effective alternative to chemical, biological, and other physical methods of transfection.

For More Information
Web: bio-rad.com/electroporation
Online protocols: bio-rad.com/transfectionprotocols



Exponential-decay pulse. When a capacitor charged to a voltage V_0 is discharged into cells, the voltage applied to the cells decreases exponentially over time. The time required for the initial voltage to drop to V_0/e is referred to as the time constant (τ) and is a convenient expression of the pulse length.



Square-wave pulse. Truncating the pulse from a capacitor after discharging it into the sample generates a square-wave pulse. The pulse length is the time the cells are subjected to the discharge. A slight drop in voltage occurs with all square-wave instruments. This drop in voltage is called the pulse droop and is measured as a percentage of the initial voltage.

A Choice of Exponential-Decay or Square-Wave Pulse
The Gene Pulser Xcell™ electroporation system generates both exponential and square waveforms, allowing you to choose the waveform and protocol that work best for your cells. Both exponential-decay and square-wave pulses have been used effectively for electroporation. Depending on cell type, the shape of the wave can have a significant effect on the transfection efficiency. Electrofusion is also possible with the Gene Pulser® system.

Electroporation Systems Selection Guide

	Gene Pulser Xcell System page 336	**MicroPulser™ System** page 337
Plate-based system	No	No
Cuvette-based system	Yes	Yes
Eukaryotic or prokaryotic	Both	Prokaryotic
Recommended cells	Mammalian, bacterial, and fungal cell lines	Bacterial, yeast, and other microorganisms
Chamber	ShockPod™ chamber	ShockPod chamber
System options	Gene Pulser Xcell total system Gene Pulser Xcell eukaryotic system Gene Pulser Xcell microbial system	—

Gene Pulser® Electroporation Buffer

The formulation of Gene Pulser electroporation buffer simulates the natural cell environment to minimize cell mortality while ensuring highly efficient delivery of nucleic acids. This electroporation buffer is a universal reagent for introducing siRNA, plasmid DNA, and other molecules into various mammalian cells, including difficult-to-transfect and primary cells. The buffer is compatible with electroporation systems, including Gene Pulser Xcell, Gene Pulser II, and most other systems. It is compatible with both exponential and square waveforms.

Gene Pulser electroporation buffer:

- Allows you to optimize multiple electroporation parameters, including voltage and capacitance, for each cell type
- Improves transfection efficiency and cell viability
- Exhibits low conductivity — compatible with cuvette or multiwell plate formats

For More Information
Web: bio-rad.com/electroporationbuffer
Download bulletin: 5582

Ordering Information

Catalog #	Description
1652676	**Gene Pulser Electroporation Buffer**, 10 x 1.8 ml
1652677	**Gene Pulser Electroporation Buffer**, 30 ml

Gene Pulser Xcell™ Electroporation Systems

The Gene Pulser Xcell system is a modular electroporation system for transfecting every cell type. The system includes a main unit, a ShockPod™ cuvette chamber, and your choice of accessory modules: the capacitance extender (CE module) or the pulse controller (PC module).

Features and Benefits

- **Universal electroporation** — transfects all cell types, from primary and stem cells to bacteria and yeast
- **Preset protocols** — include the most common mammalian and bacterial cell types
- **Flexibility** — choice of programs for preset protocols, optimization protocols, manual operation, or user protocols
- **Protocol library** — collection of electroporation protocols for every cell type including primary, immortal, and bacterial cells
- **Data management** — enables storage and recall of parameters used in the previous 100 experiments for easy troubleshooting
- **Reproducibility** — uses PulseTrac™ circuitry and arc protection to ensure reproducibility and sample protection

Gene Pulser Xcell System Selection Guide

System		Comments
Gene Pulser Xcell Total System		The complete electroporation system for transfection of both eukaryotic and prokaryotic cells; includes both the CE and the PC modules.
Gene Pulser Xcell Eukaryotic System		For the electroporation of most eukaryotic cells, including mammalian cells and plant protoplasts; includes the CE module.
Gene Pulser Xcell Microbial System		For the electroporation of bacteria and fungi as well as other applications where high-voltage pulses are applied to samples of small volume; includes the PC module.

For More Information
Web: bio-rad.com/xcell
Download bulletin: 5445
Request or download bulletin: 5542

Ordering Information

Catalog #	Description
1652660	**Gene Pulser Xcell Total System**, for mammalian and microbial cells, 100/240 V, 50/60 Hz, exponential-decay and square-wave delivery, includes main unit, CE module, PC module, ShockPod cuvette chamber, 15 sterile cuvettes (5 each of 0.1, 0.2, and 0.4 cm gap), cuvette rack
1652661	**Gene Pulser Xcell Eukaryotic System**, 100/240 V, 50/60 Hz, exponential-decay (25–3,275 µF range) and square-wave delivery, includes main unit, CE module, ShockPod cuvette chamber, 5 sterile cuvettes (0.4 cm gap), cuvette rack
1652662	**Gene Pulser Xcell Microbial System**, 100/240 V, 50/60 Hz, exponential-decay delivery, includes main unit, PC module, ShockPod cuvette chamber, 10 sterile cuvettes (5 each of 0.1 and 0.2 cm gap), cuvette rack
Components	
1652666	**Gene Pulser Xcell Main Unit**, 100/240 V, 50/60 Hz
1652667	**Gene Pulser Xcell CE Module**, 25–3,275 µF range controlled by main unit, includes integral leads
1652668	**Gene Pulser Xcell PC Module**, 50–1,000 Ω range controlled by main unit, includes integral leads
1652669	**Gene Pulser Xcell ShockPod Cuvette Chamber**, includes integral leads for connection to Gene Pulser Xcell, Gene Pulser II, or MicroPulser electroporators
1652095	**Gene Pulser Cuvette Rack**

MicroPulser™ Electroporator

The MicroPulser electroporator is a simple yet versatile instrument that enables safe and reproducible transformation of bacteria, yeast, and other microorganisms. Transformation efficiencies much higher than those obtained with chemical methods can be achieved. Unique features of the system include:

- One-button pulse delivery, attached cuvette chamber, and rapid charge time for fast sample handling
- Delivery of exponential waveform for prokaryotic cells
- Convenient preset optimized programs for commonly studied bacteria and fungi
- Arc quenching system that significantly reduces arcing, protecting against loss of valuable samples
- Broad range of parameters for manual optimization
- High-voltage (3,000 V) capability for improved efficiency in larger-volume cuvettes
- Compact, space-saving design
- Audible and visible pulse indicators
- Display of time constant and actual voltage delivered to monitor reproducibility

For More Information
Web: bio-rad.com/micropulser
Download bulletin: 2751
Request or download bulletin: 5542

MicroPulser electroporator with cuvette chamber attached.
Electroporator is shown connected to the cuvette chamber.

Ordering Information

Catalog #	Description
1652100	**MicroPulser Electroporator**, includes a cuvette chamber with leads, 10 sterile cuvettes (5 each of 0.1 cm and 0.2 cm gap)

Gene Pulser®/MicroPulser™ Electroporation Cuvettes

Bio-Rad offers high-quality electroporation cuvettes that deliver consistent pulses to your valuable samples, ensuring reproducible results. Cuvettes are available in three different gap widths: 0.4, 0.2, and 0.1 cm, for optimal field strength delivery to a wide range of cell types. Features of the cuvettes include:

- **Guaranteed efficiency** — manufactured to precise gap tolerances to ensure maximum electroporation efficiency and reproducibility between experiments
- **Universal compatibility** — can be used with Gene Pulser Xcell™, Gene Pulser II, and most other electroporation systems
- **Ensured sterility** — each cuvette is assembled in a cleanroom environment, washed, fitted with a snug cap, individually wrapped, and sterilized by gamma irradiation
- **Sturdy construction** — durable polycarbonate withstands pulses of very high voltage
- **Color-coded caps and bags** — easy identification of different cuvette sizes
- **Consistent chamber shape** — seamless plastic molding eliminates leaking and keeps the aluminum plates parallel, which is essential for uniform sample treatment and safety
- **Smooth electrode surface** — the aluminum plates are subjected to an 11-step etching and cleaning process for uniform pulse delivery to the entire sample

For More Information
Web: bio-rad.com/electroporationcuvettes
Request or download bulletins: 1908 and 5542

Ordering Information

Catalog #	Description
Standard Packs	
1652088	**Gene Pulser/MicroPulser Cuvettes**, 0.4 cm gap, 50
1652086	**Gene Pulser/MicroPulser Cuvettes**, 0.2 cm gap, 50
1652089	**Gene Pulser/MicroPulser Cuvettes**, 0.1 cm gap, 50
Jumbo Packs*	
1652091	**Gene Pulser/MicroPulser Cuvettes**, 0.4 cm gap, 500
1652092	**Gene Pulser/MicroPulser Cuvettes**, 0.2 cm gap, 500
1652093	**Gene Pulser/MicroPulser Cuvettes**, 0.1 cm gap, 500
Mini Packs	
1652081	**Gene Pulser/MicroPulser Cuvettes**, 0.4 cm gap, 5
1652082	**Gene Pulser/MicroPulser Cuvettes**, 0.2 cm gap, 5
1652083	**Gene Pulser/MicroPulser Cuvettes**, 0.1 cm gap, 5

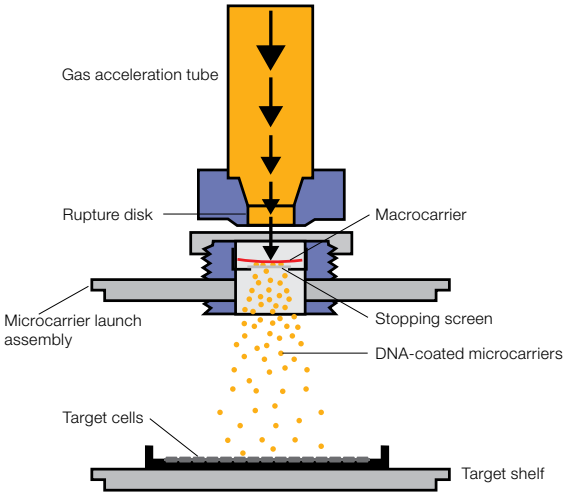
* Please inquire about volume pricing.

Biolistic Particle Delivery Systems

Biolistic technology, or particle bombardment, is a direct physical method of delivering nucleic acids into cells. The Helios® gene gun and PDS-1000/He™ systems use advanced biolistic technology to transform cells in situ. This technology can be applied to the widest range of targets, including cell cultures, tissues, organs, plants, animals, and bacteria as well as organelles. The instruments use a helium pulse to accelerate high-density gold or tungsten particles coated with nucleic acids directly into target cells. Adjusting the pressure of the helium enables accurate penetration through the plant cell wall or cell membrane and into the cell.

Particle Delivery Application Notes and Protocols
Bio-Rad offers detailed application notes and protocols describing biological and bombardment conditions for many applications. Visit us on the Web at **bio-rad.com/biolistics** to download application notes and protocols.

For More Information
Web: bio-rad.com/biolistics
Download bulletin: 5443



PDS-1000/He system particle delivery method. High-pressure helium is used to propel a macrocarrier sheet loaded with DNA-coated gold or tungsten microcarriers toward target cells. The macrocarrier is halted after a short distance and the DNA coated microcarriers continue traveling toward the target to penetrate the cells.

Biolistic Systems Selection Guide by Application

Factors Affecting Transformation	Helios Gene Gun System	PDS-1000/He System	PDS-1000/He System with Hepta™ Adaptor
Experimental conditions	In situ, in vitro, in vivo, ex vivo	In vitro, ex vivo, in vivo (plants)	In vitro, ex vivo, in vivo (plants)
Target area	Small (2 cm^2)	Large (40 cm^2)	Largest (~75 cm^2)
Pressure range	100–600 psi	450–2,200 psi	450–2,200 psi, reduced by 7-way spread of helium
Target type	**Animals:** Any tissue exposed to barrel (skin, organs); cell, explant, and organ culture **Plants:** Field and greenhouse use, plant cell culture, explants **Yeast, bacteria, other microbes**	**Animals:** Cell and organ culture **Plants:** Small intact plants, plant cell culture, explants **Yeast, bacteria, other microbes** **Organelles (chloroplasts, mitochondria, etc.)**	**Animals:** Cell and organ culture **Plants:** Cells with thin cell walls **Yeast, bacteria, other microbes**

Helios® Gene Gun System

The Helios gene gun is a convenient handheld device that provides rapid and direct gene delivery to cells in situ. The unit uses an adjustable helium pulse to sweep DNA-, RNA-, or biomaterial-coated gold microcarriers from the inner wall of a small plastic cartridge directly into target cells. Cartridge "bullets" are simple to prepare using the tubing prep station.

- Provides easy-to-use, rapid, versatile gene delivery independent of target cell type
- Facilitates both transient and stable expression
- Requires only small amounts of DNA and cells; no carrier DNA needed
- Enables codelivery of more than one plasmid
- Allows transfer of large DNA fragments
- Targets intracellular gene delivery to many cells
- Works for both in vitro and in vivo transformation
- Delivers no extraneous genes or proteins
- Interactive CD-ROM (available separately; order the Particle Delivery Systems Training and Application Guide CD-ROM) guides all aspects of transfection using biolistic particle delivery technology

The Helios gene gun system includes one vial of each of the three sizes of gold microcarriers and a cartridge kit that includes 15 m (50') of Tefzel tubing, five cartridge collection/storage vials, five desiccant pellets, and 0.5 g of PVP for the sample tubing coating procedure. This is sufficient material (excluding nucleic acids, spermidine, $CaCl_2$, and absolute ethanol) for preparing approximately 1,000 gene gun samples.

For More Information
Web: bio-rad.com/helios
Download bulletins: 5443 and 5446

Ordering Information

Catalog #	Description
1652431*	**Helios Gene Gun System**, 100/120 V, includes Helios gene gun kit, helium hose assembly, helium regulator, tubing prep station, syringe kit, Tefzel tubing, tubing cutter, Helios gene gun optimization kit
1652432	**Helios Gene Gun System**, 220/240 V
1652451	**Helios Gene Gun Low-Pressure System**, 100/120 V, same as #1652431 with low-pressure regulator (maximum 400 psi)
1652452	**Helios Gene Gun Low-Pressure System**, 220/240 V

* Additional items required for operation of the Helios gene gun system: helium tank, grade 4.5 (99.995% pure) or higher, pressurized to the desired output pressure. Required items for tubing preparation: nitrogen tank, grade 4.8 (99.998% pure) or higher; nitrogen regulator (#1652425 recommended for U.S. standard connections); 100% ethanol (fresh for each microcarrier precipitation); spermidine; plasmid.

Accessories for Helios® Gene Gun

Sample Preparation Accessories for Helios Gene Gun
Gold microcarriers, Tefzel tubing, cartridge collection/storage vials, and desiccant pellets are needed for Helios gene gun sample preparation. The gold microcarriers are available in 0.6, 1.0, and 1.6 µm diameters. Lengths of Tefzel tubing (up to 76 cm or 30") are coated with the DNA- or RNA-microcarrier complexes using the tubing prep station. Coated tubing is cut into 1.25 cm (0.5") cartridges using the tubing cutter. Sample cartridges can be stored for later use at 4°C in cartridge collection/storage vials with a desiccant pellet. Additional barrel liners, cartridge holders, and other accessories are also available.

Ordering Information

Catalog #	Description
1652412	**Helium Hose Assembly**, with Swagelok quick-connect fittings
1652413	**Helium Regulator**, CGA 580 female fitting (U.S. standard), with pressure relief valve; maximum pressure 2,600 psi
1652414	**Low-Pressure Helium Regulator for Helios Gene Gun**, maximum pressure 400 psi
1652418	**Tubing Prep Station**, 100/120 V, includes tubing support cylinder, power cord, O-rings, tubing prep unit, 12' Nalgene nitrogen regulator hose, two 3/16" barb-to-male Luer-Lok fittings, nitrogen flowmeter fitting, two 1/8" barb-to-male Luer-Lok fittings, 5/64" hex wrench, 10 ml syringe holder
1652420	**Tubing Prep Station**, 220/240 V
1652421	**Syringe Kit**, includes syringe adaptor tubing (silicone, 5', 0.104" ID x 0.192" OD), five 10 ml syringes, syringe adaptor fitting, five 1/8" barb-to-female Luer-Lok fittings
1652422	**Tubing Cutter**, includes tubing cutter unit, 10 razor blades
1652424	**Helios Gene Gun Optimization Kit**, includes 0.25 g 0.6 µm gold microcarriers, 0.25 g 1.0 µm gold microcarriers, 0.25 g 1.6 µm gold microcarriers, cartridge kit
1652440	**Cartridge Kit**, contains 0.5 g PVP (MW 360,000), 5 cartridge collection/storage vials, 5 desiccant pellets, 50' Tefzel tubing
1652262	**0.6 µm Gold Microcarriers**, 0.25 g
1652263	**1.0 µm Gold Microcarriers**, 0.25 g
1652264	**1.6 µm Gold Microcarriers**, 0.25 g
1652425	**Nitrogen Regulator for U.S. Standard Connections**
1652416	**O-Rings**, 5
1652417	**Barrel Liner**, 5
1652426	**Cartridge Holder**, white, 5
1652435	**Cartridge Extractor Tool**, for removal of discharged cartridge
1652436	**Battery**, 9 V
1652441	**Tefzel Tubing**, 15 m (50')
1652475	**Helios Diffusion Screens**, 5
1652411	**Helios Gene Gun Kit**, 100/120 V, includes Helios gene gun, 5 O-rings, 5 barrel liners, 5 white cartridge holders, cartridge extractor tool, 9 V battery

PDS-1000/He™ and Hepta™ Systems

PDS-1000/He System

The PDS-1000/He system accelerates nucleic acid-coated gold or tungsten microparticles (0.6–1.6 µm) to velocities necessary to transfect cells, tissues, or organelles. The system uses a burst of high-pressure helium gas to accelerate a plastic macrocarrier disk carrying microparticles toward target cells. A stopping screen retains the macrocarrier while allowing the microparticles to penetrate the target cells. The PDS-1000/He system provides:

- A reproducible method for transfecting intact cells in culture, requiring little manipulation of cells
- Transfection of cells with unique growth requirements that are not amenable to other methods of gene transfer
- Interactive training and application guide (CD-ROM, available separately)

Hepta Adaptor PDS-1000/He System

PDS-1000/He System with Hepta Adaptor

The Hepta adaptor, which fits into the shocking chamber of the PDS-1000/He system, splits the helium shock wave over seven macrocarriers. By spreading the DNA-coated particles over a larger area, the system maximizes the number of cells transformed, increasing transfection efficiency by a factor of seven to ten. Pressure and particle velocity are reduced, making the system ideal for plants and cell cultures that require less forceful penetration.

Accessories for the PDS-1000/He and Hepta Systems

Accessories for the PDS-1000/He and Hepta systems include:

- Rupture disks of various strengths to control the force of the helium shock wave
- Gold particles (microcarriers) of various diameters
- Macrocarriers
- Stopping screens
- Optimization kit to help fine-tune the bombardment conditions for your cells of interest. The kit contains samples of the gold microcarriers and 7 rupture disks, stopping screens, and macrocarriers for 500 bombardments
- Not provided: helium tank, grade 4.5 (99.995% pure) or higher, pressurized to 2,600 psi; vacuum source

For More Information
Web: bio-rad.com/pds1000
Download bulletins: 5443 and 5447

Ordering Information

Catalog #	Description
1652257*	**PDS-1000/He System**, includes helium pressure regulator, solenoid, spacer rods, microcarrier launch assembly, target shelf, 5 macrocarrier holders, tubing
1652258*	**PDS-1000/He Hepta System**, includes PDS-1000/He system, Hepta adaptor
1652225	**Hepta Adaptor for PDS-1000/He System**, includes 5 stopping screens
1652259	**Voltage Converter**, for 220/240 V line voltage
Accessories	
1652278	**500 Optimization Kit**, includes 0.25 g each of 0.6, 1.0, and 1.6 µm gold microcarriers, 100 each of 7 rupture disks, 500 macrocarriers, 500 stopping screens
1652335	**Macrocarriers**, 500
1652322	**Macrocarrier Holders**, 5
1652326	**450 psi Rupture Disks**, 100
1652327	**650 psi Rupture Disks**, 100
1652328	**900 psi Rupture Disks**, 100
1652329	**1,100 psi Rupture Disks**, 100
1652330	**1,350 psi Rupture Disks**, 100
1652331	**1,550 psi Rupture Disks**, 100
1652332	**1,800 psi Rupture Disks**, 100
1652336	**Stopping Screens**, 500
1652226	**Hepta Stopping Screens**, 50
1652262	**0.6 µm Gold Microcarriers**, 0.25 g
1652263	**1.0 µm Gold Microcarriers**, 0.25 g
1652264	**1.6 µm Gold Microcarriers**, 0.25 g

* Additional items required for operation of the PDS-1000/He system: helium tank, grade 4.5 (99.995% pure) or higher, pressurized to 2,600 psi; vacuum source.

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DNA Amplification/PCR

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Digital PCR

Droplet Digital™ PCR Systems

Several areas of research depend on the ability to study target DNA sequence variations. Digital PCR technology offers the ability to quantify molecular genetic changes. It is employed by researchers using numerous applications such as copy number variation, mutation detection, gene expression analysis, cell-free DNA quantification, genome edit detection, microRNA (miRNA) detection, genetically modified organism (GMO) quantification, biomarker discovery, and viral load quantification. Bio-Rad's QX ONE™, QX200™ AutoDG™, and QX200 Droplet Digital PCR (ddPCR™) systems, combined with our ddPCR supermixes, ddPCR assays and kits, and reliable thermal cyclers, offer researchers an easy-to-use, highly precise, and reproducible digital PCR package.

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

See Also
C1000 Touch thermal cycler: page 360.
PX1 PCR plate sealer: page 393.

New QX ONE™ Droplet Digital™ PCR System

The QX ONE Droplet Digital PCR (ddPCR™) system expands upon the most proven digital PCR technology for unmatched precision and sensitivity in absolute quantification with advanced multiplex capabilities, high throughput, and fully integrated operation. The QX ONE ddPCR system takes care of droplet generation, thermal cycling, and reading so that you don't have to.

High Throughput
- Automated, walk-away operation
- Fully integrated instrument and consumable with droplet generation, cycling, and reading in a single plate
- 7-plate capacity, continuous operation with random access
- Onboard consumable monitoring and hot-swap capability

Advanced Multiplexing
- 4-color detection and analysis
- New ddPCR multiplex supermix
- Software support for amplitude multiplexing, probe mixing, and drop-off assay strategies

Seamless Integration
- Compatible with existing Bio-Rad ddPCR supermixes, assays, and kits
- Probe and EvaGreen® chemistries are available
- Software is available in regulatory edition for U.S. FDA 21 CFR Part 11 compliant operation

Easy to Use
- Simple, intuitive setup
- Onboard touch screen
- Live data preview
- Radio frequency identification (RFID)–barcoded consumables
- Installation qualification (IQ), operational qualification (OQ), and performance qualification (PQ), for confidence in your system's precision and accuracy

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

Ordering Information

Catalog #	Description
QX ONE Droplet Digital PCR System	
12006536	**QX ONE Droplet Digital PCR System**, fully integrated, 4-color, high-throughput Droplet Digital PCR platform
Consumables and Accessories	
12006057	**QX ONE Droplet Reader Oil**, for use with droplet reader in the QX ONE ddPCR system, enough for 10 ddPCR plates
12006058	**QX ONE Droplet Generation Oil for Probes**, for use with droplet generator in the QX ONE ddPCR system, enough for 20 ddPCR plates
12006059	**QX ONE Droplet Generation Oil for EvaGreen**, for use with droplet generator in the QX ONE ddPCR system, enough for 20 ddPCR plates
12006858	**GCR96 Cartridge**, for use with QX ONE ddPCR system, 96 reactions
12006859	**GCR96 Cartridges**, for use with QX ONE ddPCR system, 96 reactions, pkg of 10
12006860	**GCR32 Cartridge**, for use with QX ONE ddPCR system, 32 reactions
12006871	**GCR32 Cartridges**, for use with QX ONE ddPCR system, 32 reactions, pkg of 10
12006060	**QX ONE Droplet Reader Waste Bottle**, extra bottle for collection of system waste

QX200™ Droplet Digital™ PCR Systems

See Also
C1000 Touch thermal cycler: page 360.
PX1 PCR plate sealer: page 393.

The QX200 Droplet Digital PCR (ddPCR™) system provides an absolute quantification of target DNA or RNA molecules with unmatched precision and sensitivity for digital PCR applications.

Benefits

- Most precise and sensitive digital PCR solution for a wide variety of applications
- Flexible digital PCR chemistry — optimized for TaqMan hydrolysis probes and EvaGreen® dye assays
- Flexible assay setup — scalable for high sensitivity or high throughput
- Simple and easy-to-use workflow with 96-sample throughput
- Droplet partitioning by the QX200 Droplet Digital technology reduces bias from amplification efficiency and PCR inhibitors
- Simplified quantification — standard curves are not required

Applications

- **Mutation detection** — superior sensitivity for detection of rare single nucleotide polymorphisms (SNPs), allelic variants, and circulating DNA in tissue and liquid biopsy samples
- **Copy number variation** — high precision and resolution to discriminate between small changes in copy number and distinguish changes in a complex background
- **Genome editing** — detection of rare genome editing events and distinction between homology-directed repair (HDR) and non-homologous end joining (NHEJ) DNA repair mechanisms
- **Pathogen detection** — quantification of low-abundance microorganisms in complex backgrounds, monitoring of microbial drug resistance, measurement of viral loads, and microbiome analysis
- **Gene expression analysis** — reliably measure low levels of mRNA and miRNA without using a standard curve
- **Next-generation sequencing (NGS)** — quantify NGS libraries without the use of standard curves; validate NGS results
- **Environmental** — popular for quality testing in a wide variety of environmental samples such as soil and water
- **Food testing** — validated method for routine evaluation of GMOs

The QX200 droplet generator partitions samples containing genomic DNA, cDNA, or RNA into ~20,000 nanoliter-sized droplets (8 samples/run). After PCR using a Bio-Rad thermal cycler, droplets from each sample are streamed in single file through the QX200 droplet reader. The PCR-positive and PCR-negative droplets are counted to provide absolute quantification of target DNA in digital form (96 samples/run).

Accessories

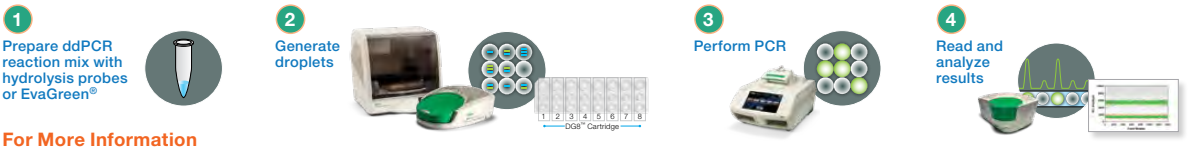
Droplet generation and reader oils, ddPCR reagents, droplet generator cartridges, and gaskets are used with the system.

Automated Droplet Generator

The automated droplet generator provides hands-free droplet generation for up to 96 samples quickly and reproducibly.

- Provides a high-throughput solution for digital PCR with the QX200 AutoDG ddPCR system
- Minimizes setup time
- Eliminates user-to-user variability
- Reduces contamination risk during droplet generation

Droplet Digital PCR Workflow



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

Ordering Information

Catalog #	Description
QX200 Droplet Digital PCR System	
1864001	**QX200 Droplet Digital PCR System**, includes droplet generator, droplet reader, laptop computer, software, associated component consumables
1864100	**QX200 AutoDG Droplet Digital PCR System**, includes automated droplet generator, droplet reader, laptop computer
1864002	**QX200 Droplet Generator**, includes droplet generator, 1 box of 24 cartridges, 1 pkg of 24 gaskets, 2 cartridge holders, 1 power cord
1864101	**Automated Droplet Generator**, includes automated droplet generator, 1 power cord
1864003	**QX200 Droplet Reader**, includes droplet reader, 2 plate holders, 1 USB cable, 1 power cord
Consumables and Accessories for QX200 ddPCR System	
1863004	**ddPCR Droplet Reader Oil**, 2 x 1 L bottles
1863005	**Droplet Generation Oil for Probes**, 10 x 7 ml bottles
1864008	**DG8 Cartridges for QX200 Droplet Generator**, 1 pkg of 24 cartridges
1863009	**DG8 Gaskets for QX200 Droplet Generator**, 1 pkg of 24 gaskets
1864007	**Droplet Generator Cartridges and Gaskets**, 5 pkg of 24 DG8 cartridges, 5 pkg of 24 DG8 gaskets
1863051	**DG8 Cartridge Holder**
12006834	**Droplet Reader Plate Holder**
12001925	**ddPCR 96-Well Plates**, pkg of 25, clear shell, clear well, semi-skirted plates, for use with QX200 and QX200 AutoDG Droplet Digital PCR systems
1864005	**Droplet Generation Oil for EvaGreen**, 2 x 7 ml bottles
1864006	**Droplet Generation Oil for EvaGreen**, 10 x 7 ml bottles
Consumables and Accessories for Automated Droplet Generator Only	
1864108	**DG32 Automated Droplet Generator Cartridges**, 1 pkg of 30, enough for 10 x 96-well ddPCR plates
1864109	**DG32 Automated Droplet Generator Cartridges**, 1 pkg of 60, enough for 20 x 96-well ddPCR plates
1864110	**Automated Droplet Generation Oil for Probes**, 140 ml, enough for 20 x 96-well ddPCR plates
1864112	**Automated Droplet Generation Oil for EvaGreen**, 140 ml, enough for 20 x 96-well ddPCR plates
1864120	**Pipet Tips for AutoDG System**, 1 pkg of 20, enough for 10 x 96-well ddPCR plates
1864121	**Pipet Tips for AutoDG System**, 1 pkg of 40, enough for 20 x 96-well ddPCR plates
1864125	**Pipet Tip Waste Bins for AutoDG System**, 1 pkg of 10, enough for 10 x 96-well ddPCR plates

Droplet Digital™ PCR Reagents and Consumables

Bio-Rad offers PCR reagents for exclusive use with the Droplet Digital PCR (ddPCR™) systems. These reagents include supermixes, consumables, and assays for a range of digital PCR applications.

ddPCR™ Supermix for Probes (No dUTP)

ddPCR supermix for probes (no dUTP) is a ready-to-use 2x supermix containing all components except primers and template. The supermix has been optimized to deliver maximum PCR efficiency, specificity, and sensitivity.

- Limits nonspecific PCR amplification
- Allows for DNA recovery after amplification
- Recommended for use with ddPCR assays

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6338

Ordering Information

Catalog #	Description
1863023	**ddPCR Supermix for Probes (No dUTP)**, 2 x 1 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1863024	**ddPCR Supermix for Probes (No dUTP)**, 5 x 1 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1863025	**ddPCR Supermix for Probes (No dUTP)**, 5 x 5 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems

New ddPCR™ Multiplex Supermix

The ddPCR multiplex supermix is a 4x supermix specifically designed and optimized for multiplexing using the QX ONE™ Droplet Digital™ PCR (ddPCR) system.

- Optimized for multiplex assays
- Allows for more sample input
- Limits nonspecific PCR amplification

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

Ordering Information

Catalog #	Description
12005909	**ddPCR Multiplex Supermix**, 2 x 0.5 ml vials, 4x supermix, for use with QX ONE ddPCR system
12005910	**ddPCR Multiplex Supermix**, 5 x 0.5 ml vials, 4x supermix, for use with QX ONE ddPCR system
12005911	**ddPCR Multiplex Supermix**, 5 x 2.5 ml vials, 4x supermix, for use with QX ONE ddPCR system

ddPCR™ Supermix for Probes

ddPCR supermix for probes is a ready-to-use 2x supermix used to partition and amplify DNA for digital PCR. It is suitable for use with UNG decontamination protocols, which prevent the reamplification of carryover PCR products between experiments.

- Ensures precise target quantification
- Uses standard cycling protocols for probe-based simplex or duplex Droplet Digital™ PCR

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6338

Ordering Information

Catalog #	Description
1863026	**ddPCR Supermix for Probes**, 2 x 1 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1863010	**ddPCR Supermix for Probes**, 5 x 1 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1863027	**ddPCR Supermix for Probes**, 5 x 5 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1863028	**ddPCR Supermix for Probes**, 10 x 5 ml vials, 2x supermix, for use with QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems

ddPCR™ Supermix for Residual DNA Quantification

ddPCR supermix for residual DNA quantification is a 2x concentrated, ready-to-use digital PCR master mix optimized to deliver maximum PCR efficiency, specificity, and sensitivity for direct quantification of residual host cell DNA with the QX200™, QX200™ AutoDG™, and QX ONE™ Droplet Digital™ PCR (ddPCR) systems.

- No DNA purification required
- Free of detectable *Escherichia coli*, Chinese hamster ovary (CHO), mouse, human, and yeast DNA
- Contains all components required for hydrolysis probe–based ddPCR assays, except primers, probe(s), and template
- Limits nonspecific PCR amplification
- Includes hot-start polymerase to keep enzyme inactive during sample droplet partitioning
- Provides absolute quantification of residual host cell DNA, which is critical for environmental monitoring, food testing, etc

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

See Also
C1000 Touch thermal cycler: page 360.
PX1 PCR plate sealer: page 393.

Ordering Information

Catalog #	Description
1864037	**ddPCR Supermix for Residual DNA Quantification**, 2 x 1 ml vials, 2x supermix, for use in residual DNA detection with the QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1864038	**ddPCR Supermix for Residual DNA Quantification**, 5 x 1 ml vials, 2x supermix, for use in residual DNA detection with the QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1864039	**ddPCR Supermix for Residual DNA Quantification**, 5 x 5 ml vials, 2x supermix, for use in residual DNA detection with the QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems
1864040	**ddPCR Supermix for Residual DNA Quantification**, 10 x 5 ml vials, 2x supermix, for use in residual DNA detection with the QX200, QX200 AutoDG, and QX ONE Droplet Digital PCR systems

One-Step RT-ddPCR Advanced Kit for Probes

One-step RT-ddPCR advanced kit for probes is a reverse transcription digital PCR supermix delivering improved efficiency, specificity, and sensitivity for precise RNA target quantification. It contains thermostable enzymes that allow for RNA templates to be reverse transcribed and subsequently amplified in the same reaction tube.

- Optimized enzyme blend enables partitioning of RNA samples into droplets while keeping enzymes inactive until reverse transcription at 50°C
- Contains RNase inhibitor that protects the RNA throughout the workflow

For More Information
Web: bio-rad.com/digitalpcr
Download bulletin: 6250

Ordering Information

Catalog #	Description
1864021	**One-Step RT-ddPCR Advanced Kit for Probes**, 2 x 1 ml, 200 x 20 µl reactions
1864022	**One-Step RT-ddPCR Advanced Kit for Probes**, 5 x 1 ml, 500 x 20 µl reactions

QX200™ ddPCR™ EvaGreen® Supermix

The QX200™ ddPCR™ EvaGreen® supermix is a ready-to-use 2x supermix containing a dsDNA binding dye. The supermix supports dsDNA detection following amplification using commercially available primer assays.

- Recommended for use with Bio-Rad's ddPCR gene expression assays
- Compatible with QX200, QX200™ AutoDG™, and QX ONE™ Droplet Digital™ PCR systems

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6473

Ordering Information

Catalog #	Description
1864033	**QX200 ddPCR EvaGreen Supermix**, 2 x 1 ml vials
1864034	**QX200 ddPCR EvaGreen Supermix**, 5 x 1 ml vials
1864035	**QX200 ddPCR EvaGreen Supermix**, 5 x 5 ml vials
1864036	**QX200 ddPCR EvaGreen Supermix**, 10 x 5 ml vials

ddPCR™ 96-Well Plates

Designed and validated for Bio-Rad's Droplet Digital™ PCR workflow, ddPCR 96-well plates are for use with the QX200™ and QX200™ AutoDG™ Droplet Digital PCR systems. These 96-well semi-skirted PCR plates are optimized for maximum ddPCR performance.

- Compatible with the QX200 and QX200 AutoDG Droplet Digital PCR systems
- Compatible with the ddPCR residual DNA quantification workflow
- Free of detectable DNase and RNase
- Validated for use with pierceable foil heat seals and the PX1™ PCR plate sealer

For More Information
Web: bio-rad.com/ddPCRplates
Download bulletin: 10000060943

Ordering Information

Catalog #	Description
12001925	**ddPCR 96-Well Plates**, pkg of 25, clear shell, clear well, semi-skirted plates, for use with QX200 and QX200 AutoDG Droplet Digital PCR systems

Droplet Digital™ PCR Assays and Kits

Droplet Digital™ PCR Assays

Bio-Rad offers a comprehensive assay portfolio for digital PCR, including:

ddPCR™ Mutation Detection Assays
ddPCR mutation detection assays offer superior sensitivity for detection of rare single nucleotide polymorphisms (SNPs) and allelic variants.

- Wet-lab validated assays are available for more than 200 targets
- Wet-lab validated assays are guaranteed to work when used as instructed
- Validation data are available online
- Assays can be designed instantly for targets/sequences for which validated assays are not available
- Suitable for use with circulating tumor DNA, liquid biopsy, and formalin-fixed, paraffin-embedded (FFPE) and other tissue samples
- Orderable in convenient single-tube format (mutant and wild-type assays in a single tube)
- Positive control sequences provided
- Available in Cy5/Cy5.5 for exclusive use on the QX ONE™ Droplet Digital PCR system

ddPCR Copy Number Determination Assays
ddPCR copy number determination assays offer high precision and resolution to discriminate between small changes in copy number.

- Wet-lab validated assays are available for more than 700 targets
- Wet-lab validated centromeric reference assays are available for ~60 targets
- Validation data are available online
- Assays can be designed instantly for targets/sequences for which validated assays are not available
- Orderable in FAM or HEX, and also in Cy5/Cy5.5 for use on the QX ONE Droplet Digital PCR system
- Reference assays available

ddPCR Genome Edit Detection Assays
ddPCR assays for detection of homology-directed repair (HDR) and non-homologous end joining (NHEJ) events in user-specified sequences allow rapid assessment of HDR and NHEJ edits generated by CRISPR-Cas9 or other genome editing tools.

- Detection of editing events present at frequencies ≤0.5%
- Absolute quantification of genome editing events from as little as 5 ng of total genomic DNA (cells from single well of a 96-well plate)
- Assays distinguish between homozygous and heterozygous edits in clonal populations
- Results are easily analyzable using Drop Off Analysis mode in the QuantaSoft™ Analysis Pro software

ddPCR Expert Design Assays
ddPCR expert design assays encompass a wide variety of applications, including assays for translocations, mutation detection, and multiplex mutation screening.

- Assays are available for *EML4-ALK* mRNA fusions, *RET* mRNA fusions, *ROS1* mRNA fusions, *TERT C228T* promoter mutation, *TERT C250T* promoter mutation, *ESR1* multiplex mutation detection, and more
- Orderable using a unique assay ID corresponding to a specific formulation of primers and probes
- Validation is recommended prior to use

New assays are added regularly. Contact your Bio-Rad representative for updates.

The digital assay site allows users to find and buy mutation detection, copy number determination, and genome edit detection assays designed specifically for Droplet Digital PCR (ddPCR) for any target. The digital assay site can be accessed directly at **bio-rad.com/digital-assays**.

Simply submit your target and the site provides the best possible assay — a fully wet-lab validated assay where available, or a quick design by a digital PCR optimized engine. Built by the experts in digital PCR at Bio-Rad's Digital Biology Center, the engine takes into consideration everything from GC content and melting temperature to primer placement, probe length, and even genome specificity when designing an assay.

24/7 Self-Service

- Find, design, and buy an assay through **bio-rad.com** anytime
- Customizable assay name printed on the tube
- Positive control sequences provided for mutation detection assays

Getting Your ddPCR Assay Is as Easy as 1-2-3!

- Choose your application
- Enter target or sequence information
- Pick a size and add to your Bio-Rad cart

For More Information
Web: bio-rad.com/digitalPCR
Request or download bulletin: 6901

ddPCR™ Gene Expression Assays

Gene Expression EvaGreen® and Probe Assays

- Over 60,000 optimized assays available for human, mouse, and rat genomes
- Option of hydrolysis probe–based detection assays or unlabeled primer assays for use with QX200™ ddPCR™ EvaGreen® supermix
- Available with either FAM or HEX fluorophores
- Compatible with the QX200, QX200™ AutoDG™, and QX ONE™ Droplet Digital™ PCR systems

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6512

Ordering Information
Visit **bio-rad.com/PrimePCR** to place an order.

ddPCR™ Residual DNA Quantification Kits

The amount of residual host cell DNA (HCD) present in biopharmaceutical products, such as biologics and vaccines, must meet guidelines established by regulatory agencies, including the World Health Organization, the European Pharmacopoeia, and the U.S. Food and Drug Administration, to ensure product quality and safety. The ddPCR CHO and *E. coli* residual DNA quantification (RDQ) kits allow highly sensitive and precise detection of residual host cell DNA directly from various complex sample matrices, eliminating the need for DNA extraction.

- Direct sample input
- Highly sensitive, precise detection and quantification of HCD without a standard curve
- Minimal method development
- Accurate quantification even with highly fragmented DNA

- Fast, simple workflow
- High sample throughput

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6820

Ordering Information

Catalog #	Description
17000031	**ddPCR CHO Residual DNA Quantification Kit**, includes 20x CHO RDQ assay and 2x ddPCR supermix for residual DNA quantification
17000032	**ddPCR *E. coli* Residual DNA Quantification Kit**, includes 20x *E. coli* RDQ assay and 2x ddPCR supermix for residual DNA quantification

ddPCR™ Library Quantification Kit

The ddPCR library quantification kit is the optimal solution for quality control of NGS libraries. This kit has been experimentally validated to ensure optimal performance. The assay generates data plots that are rich with qualitative library information, a feature not available with other methodologies such as quantitative PCR. With absolute quantification, standard curves and size adjustment calculations are not necessary to obtain precise library quantitation. When paired with the QX200™ or QX ONE™ Droplet Digital™ PCR system, this kit allows accurate quantification and provides a qualitative measure of the DNA library prior to sequencing on an Illumina platform.

- Contains all the necessary components to create droplets and quantify NGS libraries
- Provides both quantitative and qualitative data (including adapter dimers and relative library size diversity)

- Enables more efficient and consistent loading and balancing of libraries for sequencing runs

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6402

Ordering Information

Catalog #	Description
1863040	**ddPCR Library Quantification Kit for Illumina TruSeq**, includes 1 vial of primers and probes at 20x concentration, 2x ddPCR supermix for probes (no dUTP)

ddPCR™ Multiplex Mutation Screening Kits

Droplet Digital™ PCR (ddPCR) multiplex mutation screening kits are designed for rapid screening of several key cancer mutations in a single reaction with high precision and sensitivity. These kits are ideal for use with FFPE samples, liquid biopsy, fresh/frozen tissue, and samples with low yield or inhibitory substances. The kits contain an optimized, validated ddPCR mutation screening multiplex assay and ddPCR supermix for probes (no dUTP).

- Screen multiple mutations in a single well
- Detect with high sensitivity (limit of detection ≤0.5%)
- Process numerous samples in a rapid, cost-effective manner
- Work with low amounts of input DNA without preamplification
- Use with Bio-Rad's QX200™, QX200™ AutoDG™, and QX ONE™ Droplet Digital PCR systems

Note: For research use only.

For More Information
Web: bio-rad.com/digitalpcr
Request or download bulletin: 6782

Mutations Detected by ddPCR Multiplex Mutation Screening Kits

Catalog Number	ddPCR Multiplex Mutation Screening Kit*	Mutations Detected
12001037	*BRAF V600*	*V600E, V600K, V600R*
1863506	*KRAS G12/G13*	*G12A, G12C, G12D, G12R, G12S, G12V, G13D*
12001626	*KRAS Q61*	*Q61H* (183A>C), *Q61H* (183A>T), *Q61K, Q61L, Q61R*
12001094	*NRAS G12*	*G12A, G12C, G12D, G12R, G12S, G12V*
12001627	*NRAS G12/G13*	*G12A, G12C, G12D, G12S, G12V, G13D, G13R, G13V*
12001006	*NRAS Q61*	*Q61H* (183A>C), *Q61H* (183A>T), *Q61K, Q61L, Q61R*
12002392	*EGFR* exon 19 deletions	>15 *EGFR* exon 19 deletions

* Assays for each of the mutations detected by these kits can also be ordered individually. Each kit contains 20x ddPCR mutation screening multiplex assay (1 x 200 µl) and 2x ddPCR supermix for probes (no dUTP) (2 x 1 ml).

Ordering Information

Catalog #	Description
12001037	**ddPCR *BRAF V600* Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)
1863506	**ddPCR *KRAS G12/G13* Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)
12001626	**ddPCR *KRAS Q61* Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)
12001094	**ddPCR *NRAS G12* Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)
12001627	**ddPCR *NRAS G12/G13* Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)
12001006	**ddPCR *NRAS Q61* Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)
12002392	**ddPCR *EGFR* Exon 19 Deletions Screening Kit**, includes 20x multiplex assay and 2x ddPCR supermix for probes (no dUTP)

ddPCR™ *SMN1* Copy Number Determination Kit

The ddPCR *SMN1* copy number determination kit can be used for copy number determination of the survival motor neuron 1 (*SMN1*) gene. It contains a duplex assay, ddPCR supermix for probes (no dUTP) and positive controls for 0, 1, and 2 copies of *SMN1*.

- Predesigned and wet-lab validated copy number assay
- Uniform cycling conditions
- Contains all the necessary components to create droplets and determine copy number of the *SMN1* target

For More Information
Web: bio-rad.com/digitalpcr
Download bulletin: 6630

Ordering Information

Catalog #	Description
1863500	**ddPCR *SMN1* Copy Number Determination Kit**, includes assay at 20x concentration, 2x ddPCR supermix for probes (no dUTP), and positive controls

ddPCR™ *SMN2* Copy Number Determination Kit

The ddPCR *SMN2* copy number determination kit can be used for copy number determination of the survival motor neuron 2 (*SMN2*) gene. It contains a duplex assay, ddPCR supermix for probes (no dUTP) and positive controls for 2, 3, and 4 copies of *SMN2*.

- Predesigned and wet-lab validated copy number assay
- Uniform cycling conditions
- Contains all the necessary components to create droplets and determine copy number of the *SMN2* target

For More Information
Web: bio-rad.com/digitalpcr
Download bulletin: 6631

Ordering Information

Catalog #	Description
1863503	**ddPCR *SMN2* Copy Number Determination Kit**, includes assay at 20x concentration, 2x ddPCR supermix for probes (no dUTP), and positive controls

ddSEQ™ Single-Cell Sequencing Solution

This platform brings Bio-Rad's Droplet Digital™ technology to single-cell gene expression studies. In partnership with Illumina®, the single-cell sequencing solution provides a comprehensive workflow for robust, flexible, and high-throughput single-cell analysis.

ddSEQ™ Single-Cell Isolator

Single-cell RNA sequencing (RNA-Seq) provides deep insight into cell function, disease progression, and identification of therapeutic targets in research. By profiling hundreds to tens of thousands of single cells, researchers can differentiate individual cells in heterogeneous populations. The ddSEQ single-cell isolator works with Illumina® Bio-Rad® kits such as the SureCell™ WTA 3' library prep kit. The technology utilizes disposable microfluidic cartridges to coencapsulate single cells and barcodes into subnanoliter droplets, where cell lysis and barcoding occur. RNA-Seq libraries are subsequently prepared and sequenced, and analysis is conducted via the single-cell analysis BaseSpace® app.

- Process hundreds to tens of thousands of cells per day
- Sensitive and unbiased characterization of transcriptional signatures

- Scalable solution to accommodate a wide range of experimental designs
- Agnostic to mammalian cell size, enabling unbiased profiling of diverse cell populations
- An end-to-end single-cell sequencing solution with simple yet powerful data analysis options

For More Information
Web: bio-rad.com/ddSEQtechnology
Request or download bulletin: 6855

Ordering Information

Catalog #	Description
12004336	**ddSEQ Single-Cell Isolator**, includes single-cell isolator and associated component consumables for single-cell next-generation sequencing (NGS) applications using Illumina Bio-Rad single-cell sequencing solution kits

Thermal Cyclers for PCR

Instruments range from the compact T100™ thermal cycler to the flexible 1000-series. Multiple modules and chassis provide options for low- to high-throughput capabilities.

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

Thermal Cycler Selection Guide

Feature	C1000 Touch™ page 360	S1000™ page 360	T100™ page 362
Peltier-effect technology	•	•	•
Upgradable to real-time PCR	•		
Interchangeable sample blocks	•	•	
Number of wells	96, 96 deep, dual 48, or 384	96, 96 deep, dual 48, or 384	96
Gradient capability	•	•	•
Graphical user interface	•		•
Full-color display	•		•
Fast PCR protocol templates	•	•	•
Programmable ramp rates	•	•	•
Networking capability	•	•	
Heated lid	Adjustable	Adjustable	Fixed
USB flash drive compatibility	•		•

1000-Series Thermal Cyclers

Bio-Rad's 1000-series thermal cyclers offer a fully modular platform. Choose the full-featured C1000 Touch™ cycler, the S1000™ cycler, or connect multiple S1000 cyclers to a C1000 Touch to easily run multiplate experiments. The cyclers can accommodate different throughput needs with easily interchangeable reaction blocks.

T100™ Thermal Cycler

The T100 thermal cycler is a compact, 96-well thermal cycler that offers a comprehensive package of features, including an easy-to-use touch screen, thermal gradient, and reliable performance.

C1000 Touch Thermal Cycler

T100 Thermal Cycler

S1000 Thermal Cycler

See Also

CFX96 Touch real-time PCR detection system: page 365.

CFX384 Touch real-time PCR detection system: page 367.

C1000 Touch™ Thermal Cycler

The C1000 Touch cycler is the flagship of the 1000-series thermal cycling platform, offering unmatched performance for fast, reliable results. The touch-screen interface allows ways to optimize protocols and monitor runs.

Benefits include:

- Easily upgrade to real-time PCR using the CFX96™, CFX96 deep well, or CFX384™ optical reaction module
- Save time creating and viewing protocols using the large color touch-screen display and intuitive graphical programming
- Email notification of run completion capability
- Back up your data and manage and transfer files using a USB flash drive
- Optional log-in, restricted user privileges, and secure mode for controlled environments and file protection

- Increase throughput simply and easily by connecting up to 3 S1000™ cyclers to your C1000 Touch

For More Information
Web: bio-rad.com/C1000Touch
Request or download bulletins: 6085 and 6094

Ordering Information

Catalog #	Description
1841100	**C1000 Touch Thermal Cycler Chassis**, includes power cord; does not include reaction module
1851148	**C1000 Touch Thermal Cycler with Dual 48/48 Fast Reaction Module**, includes C1000 Touch thermal cycler chassis, dual 48/48 fast reaction module
1851196	**C1000 Touch Thermal Cycler with 96-Well Fast Reaction Module**, includes C1000 Touch thermal cycler chassis, 96-well fast reaction module
1851197	**C1000 Touch Thermal Cycler with 96–Deep Well Reaction Module**, includes C1000 Touch thermal cycler chassis, 96–deep well reaction module
1851138	**C1000 Touch Thermal Cycler with 384-Well Reaction Module**, includes C1000 Touch thermal cycler chassis, 384-well reaction module

S1000™ Thermal Cycler

The S1000 thermal cycler can be used as a stand-alone, dependable instrument for PCR, or up to three S1000 cyclers can be connected to a C1000 Touch™ thermal cycler to form a high-throughput multi-bay instrument. The S1000 cycler offers the same thermal performance as the C1000 Touch cycler and lets you:

- Choose a reaction module that suits your needs — dual 48/48-well fast, 96-well fast, 96–deep well, or 384-well format
- Get optimal sealing using your favorite vessels and sealers with the redesigned, fully adjustable heated lid

For More Information
Web: bio-rad.com/S1000
Request or download bulletins: 6082 and 6094

Ordering Information

Catalog #	Description
1842000	**S1000 Thermal Cycler Chassis**, includes power cord; does not include reaction module
1852148	**S1000 Thermal Cycler with Dual 48/48 Fast Reaction Module**, includes S1000 thermal cycler chassis, dual 48/48 fast reaction module
1852196	**S1000 Thermal Cycler with 96-Well Fast Reaction Module**, includes S1000 thermal cycler chassis, 96-well fast reaction module
1852197	**S1000 Thermal Cycler with 96–Deep Well Reaction Module**, includes S1000 thermal cycler chassis, 96–deep well reaction module
1852138	**S1000 Thermal Cycler with 384-Well Reaction Module**, includes S1000 thermal cycler chassis, 384-well reaction module
Accessories	
1848000	**USB Cable**, for use with C1000, C1000 Touch, and S1000 thermal cyclers
1849000	**Tube Frame**, supports individual 0.2 ml tubes in the C1000, C1000 Touch, and S1000 dual 48- and 96-well reaction modules
1849001	**Tube Frame**, supports individual 0.2 ml tubes in the C1000 Touch and S1000 96–deep well reaction module
1849010	**Touch-Screen Protector**, for use with C1000 Touch thermal cycler, 2
1841001	**1000-Series Connectivity Kit**, includes mouse, mouse pad, USB key

Reaction Modules

Reaction Module Specifications

Reaction Module	96-Well Fast	96–Deep Well	Dual 48/48-Well Fast	384-Well
Sample capacity	96 x 0.2 ml tubes or 1 x 96-well plate	96 x 0.2 ml tubes, 48 x 0.5 ml tubes, or 1 x 96-well plate	2 x 48 x 0.2 ml tubes or 2 x 48-well plates	1 x 384-well plate
Maximum ramp rate	5°C/sec	2.5°C/sec	4°C/sec	2.5°C/sec
Temperature range	0–100°C	0–100°C	0–100°C	0–100°C
Temperature accuracy	±0.2°C of programmed target at 90°C	±0.2°C of programmed target at 90°C	±0.2°C of programmed target at 90°C	±0.2°C of programmed target at 90°C
Temperature uniformity	±0.4°C well-to-well within 10 sec of arrival at 90°C	±0.4°C well-to-well within 10 sec of arrival at 90°C	±0.4°C well-to-well within 10 sec of arrival at 90°C	±0.4°C well-to-well within 10 sec of arrival at 90°C

Thermal Gradient (available on all reaction modules)

Gradient range	30–100°C
Temperature differential range	1–24°C

Ordering Information

Catalog #	Description
1840148	**Dual 48/48 Fast Reaction Module**, independent dual 48-well reaction module, fits C1000, C1000 Touch, and S1000 thermal cyclers, gradient enabled
1840196	**96-Well Fast Reaction Module**, fits C1000, C1000 Touch, and S1000 thermal cyclers, gradient enabled
1840197	**96–Deep Well Reaction Module**, fits C1000, C1000 Touch, and S1000 thermal cyclers, gradient enabled
1840138	**384-Well Reaction Module**, fits C1000, C1000 Touch, and S1000 thermal cyclers, gradient enabled

See Also

PCR plastic consumables: pages 394–395.

PCR and real-time PCR reagents: page 375.

Nucleic acid sample preparation: page 9.

T100™ Thermal Cycler

The T100 thermal cycler is a compact, 96-well thermal cycler that offers a comprehensive package of features, including an easy-to-use touch screen, thermal gradient, and reliable performance.

With the T100 thermal cycler, you can:

- Save time programming with the intuitive touch screen
- Get superior results faster by optimizing your PCR assays in a single run using a thermal gradient
- Save valuable benchspace with the compact design
- Keep your protocols organized using personalized folders or a USB flash drive

For More Information
Web: bio-rad.com/T100
Request or download bulletin: 6065

Ordering Information

Catalog #	Description
1861096	**T100 Thermal Cycler**, includes 96-well thermal cycler, power cord, tube support ring
1862000	**Tube Support Ring**, extra tube support ring for use with individual tubes in the T100 thermal cycler, 2
1863000	**Touch-Screen Protector**, for use with T100 thermal cycler, 2
Recommended Consumables	
1708890	**iScript cDNA Synthesis Kit**, 25 x 20 µl reactions, includes 5x iScript reaction mix, iScript reverse transcriptase, nuclease-free water
1708896	**iScript Select cDNA Synthesis Kit**, 25 x 20 µl reactions, includes 5x iScript reaction mix, iScript reverse transcriptase, oligo(dT), random primer mix, gene specific primer enhancer solution, nuclease-free water
1708870	**iTaq DNA Polymerase**, 250 U (5 U/µl), includes 10x PCR buffer, 50 mM $MgCl_2$ solution
1725301	**iProof High-Fidelity DNA Polymerase**, 100 U (2 U/µl), includes 5x HF buffer, 5x GC buffer, 50 mM $MgCl_2$ solution, DMSO
HSS9601	**Hard-Shell High-Profile 96-Well Semi-Skirted PCR Plates**, clear shell, clear well, 25
MLP9601	**Multiplate High-Profile 96-Well Unskirted PCR Plates**, clear, 25
MSB1001	**Microseal 'B' Adhesive Seals**, optically clear, 100
TBS1201	**0.2 ml 12-Tube Strips without Caps**, clear, 100
TCS1201	**Domed 12-Cap Strips**, for 0.2 ml PCR tubes and plates, clear, 200
TWI0201	**0.2 ml PCR Tubes with Domed Caps**, clear, 1,000

Real-Time PCR Systems

Bio-Rad's real-time PCR detection systems are available as individual systems or as upgrades to Bio-Rad's C1000 Touch™ thermal cyclers. The detection systems' optical modules allow up to five-target sequence detection via fluorescence detection chemistry in a 96- or 384-well plate format.

All systems support integrated data analysis for PrimePCR™ disease and biological pathway panels as well as automated multiplate gene expression analysis, absolute quantification, copy number variation, and high resolution melt genotyping applications. See the selection guide below for comparative specifications.

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

See Also

Total RNA extraction kits: page 9.

Experion automated electrophoresis system: page 271.

PCR and real-time PCR reagents: page 375.

PrimePCR assays and panels: page 373.

PX1 PCR plate sealer: page 393.

PCR plastic consumables: pages 394–395.

Real-Time PCR System Selection Guide

Feature	CFX Connect™	CFX96 Touch™	CFX96 Touch Deep Well	CFX384 Touch™
Base thermal cycler	CFX Connect	C1000 Touch	C1000 Touch	C1000 Touch
Sample capacity	96 wells	96 wells	96 wells	384 wells
Sample volume	Up to 50 µl	Up to 50 µl	Up to 125 µl	Up to 30 µl
Light source	3 filtered LEDs in optics shuttle	6 filtered LEDs in optics shuttle	6 filtered LEDs in optics shuttle	5 filtered LEDs in optics shuttle
Optical detection	3 photodiodes in optics shuttle	6 photodiodes in optics shuttle	6 photodiodes in optics shuttle	5 photodiodes in optics shuttle
Excitation range	450–535 nm	450–684 nm	450–684 nm	450–650 nm
Detection range*	515–580 nm	515–730 nm	515–730 nm	515–690 nm
Multiplex capability	Up to 2 targets	Up to 5 targets	Up to 5 targets	Up to 4 targets
FRET capability	•	•	•	•
Maximum ramp rate	5°C/sec	5°C/sec	2.5°C/sec	2.5°C/sec
Gradient capability	•	•	•	•
Gradient range	30–100°C	30–100°C	30–100°C	30–100°C
Maximum gradient span	24°C	24°C	24°C	24°C
CFX qualification plate	•	•	•	•

* Refer to system instruction manuals or bulletins 6093, 6096, and 6105 for information about useful detection ranges for specific dyes.

CFX Connect™ Real-Time PCR Detection System

The CFX Connect real-time PCR detection system offers two-target analysis in a 96-well format. The system incorporates innovative optical technologies with long-lasting LEDs and solid-state components to provide maximum reliability and flexibility. Included with the system is the powerful, easy-to-use CFX Maestro™ software for system operation and data analysis.

- Save time and reduce costs by optimizing assays in a single run using the thermal gradient
- Quickly and accurately validate and analyze data with the advanced analysis modules of CFX Maestro software
- Analyze data when and where you want by receiving email notification with an attached data file when a run is complete
- Increase throughput and flexibility by running up to 4 instruments from 1 computer

For More Information
Web: bio-rad.com/cfxconnect
Request or download bulletins: 6102, 6103, and 6105

Ordering Information

Catalog #	Description
1855200	**CFX Connect Real-Time PCR Detection System with Starter Package**, includes CFX Connect thermal cycler chassis, CFX Connect optical reaction module, CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1855201	**CFX Connect Real-Time PCR Detection System**, includes CFX Connect thermal cycler chassis, CFX Connect optical reaction module, communication cable. Does not include CFX Maestro software. Please order separately
12004110	**CFX Maestro Software**, compatible with Windows 7, 8, and 10, includes USB installation drive, video quick guides, PDF instruction manual, license for qbase+ software
Accessories	
1845098	**CFX Qualification Plate**, 96-well format, for use with CFX96, CFX96 Touch, CFX96 Touch Deep Well, or CFX Connect system, includes 1 predispensed plate containing supermix, primer mix, nuclease-free water
HSP9601	**Hard-Shell Low-Profile 96-Well Skirted PCR Plates**, white shell, clear well, 50
MSB1001	**Microseal 'B' Adhesive Seals**, optically clear, package of 100
1814000	**PX1 PCR Plate Sealer**, includes heat sealing instrument, 96-well/384-well plate support block, sealing frame, power cord
1814030	**Optically Clear Heat Seal**, package of 100

CFX96 Touch™ Real-Time PCR Detection System

The CFX96 Touch real-time PCR detection system meets all your real-time PCR needs — whether you are running your first experiment or analyzing complex gene expression studies. With five-target detection, industry-leading stand-alone functionality, superior thermal cycler performance, and easy-to-use software, the CFX96 Touch system has been designed to advance your quantitative PCR (qPCR).

The CFX96 Touch real-time PCR detection system makes it easy to:

- Rapidly screen expression from a few to hundreds of genes with PrimePCR™ assay panels. Just drag and drop the run file to start runs with a single click
- Monitor amplification traces on the touch screen in real time. At run completion, automatically receive the data file for remote monitoring and data analysis
- Conserve your samples and reagents with true five-target multiplexing
- Conduct powerful statistical analysis and data visualization with CFX Maestro™ software
- Expand your qPCR throughput with a simple upgrade to the CFX384™ optical reaction module
- Save time and reduce costs by optimizing assays in a single run using the thermal gradient

For More Information
Web: bio-rad.com/cfx96-pcr
Request or download bulletins: 6075, 6076, and 6093

Ordering Information

Catalog #	Description
1845096*	**CFX96 Optical Reaction Module for Real-Time PCR Systems with Starter Package**, for use with C1000 Touch thermal cycler chassis, includes CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1845097*	**CFX96 Optical Reaction Module for Real-Time PCR Systems**, for use with C1000 Touch thermal cycler chassis, includes communication cable. Does not include CFX Maestro software. Please order separately
1855196	**CFX96 Touch Real-Time PCR Detection System with Starter Package**, includes C1000 Touch thermal cycler chassis, CFX96 optical reaction module, CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1855195	**CFX96 Touch Real-Time PCR Detection System**, includes C1000 Touch thermal cycler chassis, CFX96 optical reaction module, communication cable. Does not include CFX Maestro software. Please order separately
12004110	**CFX Maestro Software**, compatible with Windows 7, 8, and 10, includes USB installation drive, video quick guides, PDF instruction manual, license for qbase+ software
Accessories	
1845098	**CFX Qualification Plate**, 96-well format, for use with CFX96, CFX96 Touch, CFX96 Touch deep well, or CFX Connect system, includes 1 predispensed plate containing supermix, primer mix, nuclease-free water
TLS0801	**Low-Profile 8-Tube Strips without Caps (0.2 ml)**, clear, 120 strips (960 tubes)
TCS0803	**Optical Flat 8-Cap Strips**, for 0.2 ml PCR tubes and plates, ultraclear, 120
HSP9601	**Hard-Shell Low-Profile 96-Well Skirted PCR Plates**, white shell, clear well, 50
MSB1001	**Microseal 'B' Adhesive Seals**, optically clear, package of 100
1814000	**PX1 PCR Plate Sealer**, includes heat sealing instrument, 96-well/384-well plate support block, sealing frame, power cord
1814030	**Optically Clear Heat Seal**, package of 100

* Order to upgrade an existing C1000 or C1000 Touch thermal cycler.

CFX96 Touch™ Deep Well Real-Time PCR Detection System

The CFX96 Touch deep well real-time PCR detection system offers precise quantification and target discrimination for up to five targets in large reaction volumes. The system incorporates industry-leading technology to provide robust and reliable results.

The CFX96 Touch deep well real-time PCR detection system makes it easy to:

- Use reaction volumes up to 125 µl
- Rapidly screen expression from a few to hundreds of genes with PrimePCR™ assay panels. Just drag and drop the run file to start runs with a single click
- Monitor amplification traces on the touch screen in real time. At run completion, automatically receive the data file for remote monitoring and data analysis
- Conserve your samples and reagents with true five-target multiplexing
- Conduct powerful statistical analysis and data visualization with CFX Maestro™ software
- Save time and reduce costs by optimizing assays in a single run using the thermal gradient

For More Information
Web: bio-rad.com/CFX96DeepWell
Download bulletins: 6238 and 6243

Ordering Information

Catalog #	Description
1844096*	**CFX96 Deep Well Optical Reaction Module for Real-Time PCR Systems with Starter Package**, for use with C1000 Touch thermal cycler chassis, includes CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1844095*	**CFX96 Deep Well Optical Reaction Module for Real-Time PCR Systems**, for use with C1000 Touch thermal cycler chassis, includes communication cable. Does not include CFX Maestro software. Please order separately
1854096	**CFX96 Touch Deep Well Real-Time PCR Detection System with Starter Package**, includes C1000 Touch thermal cycler chassis, CFX96 deep well optical module, CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1854095	**CFX96 Touch Deep Well Real-Time PCR Detection System**, includes C1000 Touch thermal cycler chassis, CFX96 deep well optical module, communication cable. Does not include CFX Maestro software. Please order separately
12004110	**CFX Maestro Software**, compatible with Windows 7, 8, and 10, includes USB installation drive, video quick guides, PDF instruction manual, license for qbase+ software
Accessories	
1845098	**CFX Qualification Plate**, 96-well format, for use with CFX96, CFX96 Touch, CFX96 Touch deep well, or CFX Connect system, includes 1 predispensed plate containing supermix, primer mix, nuclease-free water
TLS0801	**Low-Profile 8-Tube Strips without Caps (0.2 ml)**, clear, 120 strips (960 tubes)
TCS0803	**Optical Flat 8-Cap Strips**, for 0.2 ml PCR tubes and plates, ultraclear, 120
HSP9601	**Hard-Shell Low-Profile 96-Well Skirted PCR Plates**, white shell, clear well, 50
MSB1001	**Microseal 'B' Adhesive Seals**, optically clear, package of 100
1814000	**PX1 PCR Plate Sealer**, includes heat sealing instrument, 96-well/384-well plate support block, sealing frame, power cord
1814030	**Optically Clear Heat Seal**, package of 100

* Order to upgrade an existing C1000 or C1000 Touch thermal cycler.

CFX384 Touch™ Real-Time PCR Detection System

The CFX384 Touch real-time PCR detection system brings flexibility and ease of use to researchers performing high-throughput real-time PCR in a 384-well format. With the ability to run without a computer, superior performance, and powerful yet easy-to-use software, the CFX384 Touch system has been designed to advance your qPCR.

The CFX384 Touch real-time PCR detection system makes it easy to:

- Rapidly screen expression of hundreds of genes with PrimePCR™ assay panels. Just drag and drop the run file to start runs with a single click
- Verify the performance of your CFX real-time PCR detection system using the CFX qualification plate, system test software, IQ/OQ, and automated data quality control
- Integrate a laboratory information management system (LIMS) using built-in LIMS file management
- Pair with the CFX automation system II to automate your high-throughput qPCR runs
- Conduct powerful statistical analysis and data visualization with CFX Maestro™ software
- Combine the CFX384 Touch system with good laboratory practice standards by using CFX Maestro software, Security Edition, which complies with U.S. FDA 21 CFR Part 11 regulations, for data collection and analysis

For More Information
Web: bio-rad.com/cfx384-pcr
Download bulletin: 6077
Request or download bulletins: 6072 and 6096

Ordering Information

Catalog #	Description
1845384*	**CFX384 Optical Reaction Module for Real-Time PCR Systems with Starter Package**, for use with C1000 Touch thermal cycler chassis, includes CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1845385*	**CFX384 Optical Reaction Module for Real-Time PCR Systems**, for use with C1000 Touch thermal cycler chassis, includes communication cable. Does not include CFX Maestro software. Please order separately
1855484	**CFX384 Touch Real-Time PCR Detection System with Starter Package**, includes C1000 Touch thermal cycler chassis, CFX384 optical reaction module, CFX Maestro software, license for qbase+ software, communication cable, reagents, consumables
1855485	**CFX384 Touch Real-Time PCR Detection System**, includes C1000 Touch thermal cycler chassis, CFX384 optical reaction module, communication cable. Does not include CFX Maestro software. Please order separately
12004110	**CFX Maestro Software**, compatible with Windows 7, 8, and 10, includes USB installation drive, video quick guides, PDF instruction manual, license for qbase+ software
Accessories	
1845099	**CFX Qualification Plate**, 384-well format, for use with CFX384 or CFX384 Touch system, includes 1 predispensed plate containing supermix, primer mix, nuclease-free water
HSP3805	**Hard-Shell 384-Well Standard PCR Plates**, clear shell, white well, 50
MSB1001	**Microseal 'B' Adhesive Seals**, optically clear, package of 100
1814000	**PX1 PCR Plate Sealer**, includes heat sealing instrument, 96-well/384-well plate support block, sealing frame, power cord
1814030	**Optically Clear Heat Seal**, package of 100

* Order to upgrade an existing C1000 or C1000 Touch thermal cycler.

See Also

PrimePCR assays and panels: page 373.

CFX qualification plate: page 369.

CFX Automation System II

The CFX automation system II is ideally suited to meet the high-throughput PCR requirements of today's drug discovery and screening workflows. It works with up to two CFX real-time PCR detection systems to enable walk-away, high-throughput quantitative PCR (qPCR) operation. Each rack can hold up to forty-eight 384-well PCR plates or thirty-two 96-well plates, facilitating the generation of large volumes of data and rapid data analysis. The software is designed to work seamlessly with CFX systems, eliminating the need for automation system expertise. Powerful software features enable the pairing of cycling information with specific barcoded plates and the direct importing of barcode information from laboratory information management systems (LIMS). The intuitive calibration wizard makes it simple to add CFX systems at any point or recalibrate the automation system when required.

The CFX automation system II makes it easy to:

- **Save valuable laboratory space** — a single plate handler can service 2 CFX systems in a compact footprint
- **Meet changing throughput demands** — scalable design enables beginning with 1 CFX system and adding another CFX system when required
- **Stay organized** — track samples using the barcode reader and integrate with LIMS
- **Save time** — seamless software integration with PrimePCR™ assays minimizes time-consuming setup and analysis
- **Analyze data when and where you want** — receive email notification with an attached data file at the completion of each run

For More Information
Web: bio-rad.com/automation
Request or download bulletins: 6626 and 6629

Ordering Information

Catalog #	Description
1845075	**CFX Automation System II for Real-Time PCR Systems**, includes plate handler and barcode scanner, mounting plate, automation software; does not include CFX real-time PCR detection system

CFX Automation System II Software 2.1

CFX automation system II software 2.1 is designed for customers using CFX real-time PCR detection systems with the CFX automation system II for high-throughput qPCR. This latest update will now:

- Support all barcode alphanumeric characters and many ASCII symbols in barcode 128, allowing customers to use plate barcodes with symbols and incorporate these into the run file name
- Allow researchers to resize the barcode column in the Plate List Grid for better viewing of the entire barcode string
- Provide improvements to the automatic error recovery logic and calibration for better overall system performance

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

Real-Time PCR Instrument Validation Tool

Bio-Rad's real-time PCR instrument validation tool allows you to easily test the performance of your real-time PCR system.

Instrument Validation Tool

	CFX Connect™	CFX96 Touch™	CFX96 Touch Deep Well	CFX384 Touch™
CFX qualification plate	•	•	•	•

CFX Qualification Plate

The CFX qualification plate is an easy-to-use tool for validating the performance of your CFX system. The plate is predispensed with an optimized assay, supermix, and nuclease-free water. The CFX qualification plate can be incorporated into an instrument qualification procedure for easy tracking of your instrument's performance. Features include:

- 2-fold discrimination with 99.7% confidence level
- Predefined thermal cycling protocol and plate templates for a streamlined workflow
- Ability to generate a full PDF report with CFX Manager™ software 3.1 or CFX Maestro™ software

For More Information
Web: bio-rad.com/cfxqualification
Request or download bulletin: 6323

Ordering Information

Catalog #	Description
1845098	**CFX Qualification Plate**, 96-well format, for use with CFX96, CFX96 Touch, CFX96 Touch deep well, or CFX Connect system, includes 1 predispensed plate containing supermix, primer mix, nuclease-free water
1845099	**CFX Qualification Plate**, 384-well format, for use with CFX384 or CFX384 Touch system, includes 1 predispensed plate containing supermix, primer mix, nuclease-free water

Real-Time PCR Software

Bio-Rad's real-time PCR software supports multi-instrument control and collection and analysis of real-time PCR data. Probe and primer design software enables rapid design of robust real-time PCR assays.

Amplification Software System Requirements

	Minimum	Recommended
Operating system	Windows 7, 8	Windows 10
Processor	1 GHz	2 GHz
RAM	1 GB (2 GB for Windows 7)	2 GB
Hard drive space	10 GB	20 GB
Screen resolution	1,024 x 768 with true-color mode	1,280 x 1,024 with true-color mode
Drive	USB 2.0 Hi-Speed or above	USB 2.0 Hi-Speed or above

New CFX Maestro™ Software

Go from quantification cycles (Cq) to statistically driven results with the latest CFX software. With just a few clicks, you can turn your carefully crafted plate setup into powerful studies with tools such as *t*-tests, clustergrams, volcano plots, and one-way analysis of variance (ANOVA). Then, prepare your results for publications and posters with highly customizable data visualization tools. With just one tool you can achieve the best quality data and publication-ready results. With CFX Maestro software you can:

- **Obtain statistics quickly and easily** — *t*-tests and 1-way ANOVA
- **Convert complex studies into clear results** — visualize the largest multiplate studies with single-window and box-and-whisker charts, scatter plots, clustergrams, volcano plots, and heat maps
- **Apply customizable and high-resolution graphics** — produce publication-ready graphics in just a few clicks
- **Integrate data with PrimePCR™ assays** — easily import PrimePCR plate maps and reference gene controls

CFX Maestro Software Requirements

	Minimum	Recommended
Compatible real-time PCR system	CFX96 Touch™, CFX96 Touch deep well, CFX Connect™, CFX384 Touch™	CFX96 Touch, CFX96 Touch deep well, CFX Connect, CFX384 Touch
Operating system	Windows 7, Mac OS X El Capitan	Windows 10, macOS Sierra
Processor	1 GHz	2 GHz
RAM	1 GB (2 GB for Windows 7)	2 GB
Hard drive space	10 GB	20 GB
Screen resolution	1,024 x 768 with true-color mode	1,280 x 1,024 with true-color mode
Drive	USB 2.0 Hi-Speed or above	USB 2.0 Hi-Speed or above

For More Information
Web: bio-rad.com/cfx-maestro-software

Ordering Information

Catalog #	Description
12004110	**CFX Maestro Software**, compatible with Windows 7, 8, and 10, includes USB installation drive, video quick guides, PDF instruction manual, license for qbase+ software
12004128	**CFX Maestro Software for Mac**, compatible with Mac OS X El Capitan and macOS Sierra, includes USB installation drive, video quick guides, PDF instruction manual, license for qbase+ software; does not support instrument control

New CFX Maestro™ Software, Security Edition

CFX Maestro software, Security Edition provides tools for U.S. FDA 21 CFR Part 11 compliance so that you can stay focused on building powerful, statistically significant studies. Security Edition uses a hardware protection key to encrypt files, track electronic signatures, and ensure that files cannot be opened or edited by other programs. Now, you can be certain that the integrity and validity of your data are preserved. With CFX Maestro software, Security Edition you can:

- **Get control where you need it** — password protect protocol and data files so that only the intended users have access
- **Benefit from fast and automatic tracking** — time- and date-stamped audit trails make tracking changes easy
- **Be standard operating procedure (SOP) ready** — assign user permissions and add electronic signatures to improve SOP traceability

CFX Maestro Software, Security Edition Requirements

	Minimum	Recommended
Compatible real-time PCR system	CFX96 Touch™, CFX96 Touch deep well, CFX Connect™, CFX384 Touch™	CFX96 Touch, CFX96 Touch deep well, CFX Connect, CFX384 Touch
Operating system	Windows 7	Windows 10
Processor	1 GHz	2 GHz
RAM	1 GB (2 GB for Windows 7)	2 GB
Hard drive space	10 GB	20 GB
Screen resolution	1,024 x 768 with true-color mode	1,280 x 1,024 with true-color mode
Drive	USB 2.0 Hi-Speed or above	USB 2.0 Hi-Speed or above

For More Information
Web: bio-rad.com/cfx-maestro-software-security-edition

Ordering Information

Catalog #	Description
1845001	**CFX Maestro Software, Security Edition**, includes 1 user license, USB installation drive, HASP HL key
1845005	**CFX Maestro Software, Security Edition**, includes 5 user licenses, 5 USB installation drives, 5 HASP HL keys

CFX Maestro™ Software, Chinese and Russian Editions

CFX Maestro software, Chinese and Russian Editions work with the regional settings of the Windows 7, 8, and 10 operating systems to provide localized, language-specific environments. The Chinese and Russian Editions also provide hardware protection to CFX Maestro software: a HASP hardware license (HL)-based key must be attached to a USB port on the computer to use the software in regional language mode.

For More Information
Web: bio-rad.com/cfx-maestro-software-chinese-edition; bio-rad.com/cfx-maestro-software-russian-edition

Ordering Information

Catalog #	Description
1845008	**CFX Maestro Software, Chinese Edition**, includes 3 user licenses, 3 USB installation drives, 3 HASP HL keys
1845028	**CFX Maestro Software, Russian Edition**, includes 3 user licenses, 3 USB installation drives, 3 HASP HL keys

Precision Melt Analysis™ Software

Precision Melt Analysis software imports and analyzes data files generated from the CFX96 Touch™, CFX96 Touch™ Deep Well, CFX384 Touch™, or CFX Connect™ real-time PCR detection systems to genotype samples based on the thermal denaturation properties of double-stranded DNA. The software can be used for a variety of genotyping applications, including scanning for new gene variants, screening DNA samples for SNPs, identifying insertions/deletions or other unknown mutations, and determining the percentage of methylated DNA in unknown samples. The software enables you to:

- Assign sample genotypes automatically, based on cluster analysis, or manually, using multiple data view options, to tailor the software to the appropriate analysis
- Generate a basic representation of the different clusters based on curve shifting (homozygotes) and curve shape change (heterozygotes) using the normalized melt curves plot feature
- Compare data between multiple file runs by combining them into a single melt study — develop a standard library of melt curve runs to analyze an unlimited number of melt experiments without having to export data
- View multiple displays of the data, including a simultaneous display of the original melt curves and the normalized plot
- Export data to multiple formats, including spreadsheet, image, XML, and HTML files
- Analyze multiple experiments from a single plate using the Well Groups feature
- Arrange melt data or melt study data into a customizable report

For More Information
Web: bio-rad.com/precision-melt-analysis-software
Download bulletin: 5798

Ordering Information

Catalog #	Description
1845025	**Precision Melt Analysis Software**, includes 2 user licenses, installation CD, 2 HASP HL keys, melt calibration kit
1845015	**Precision Melt Analysis Software Only**, includes 2 user licenses, installation CD, 2 HASP HL keys
1845020	**Melt Calibration Kit**, includes melt calibration DNA standard, melt primers, precision melt supermix

Gene Expression Assays and PCR Arrays

PrimePCR™ assays and arrays for real-time PCR are wet-lab validated or expertly designed to ensure optimal assay performance and compliance with the minimum information for publication of quantitative real-time PCR experiments (MIQE) guidelines (Bustin et al. 2009).

See Also

iScript advanced cDNA synthesis kit for RT-qPCR: page 388.

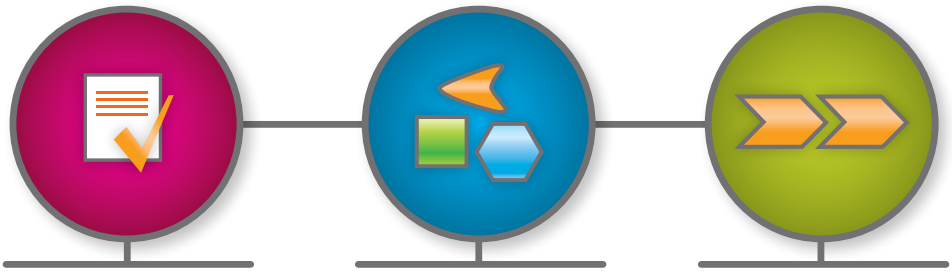
SsoAdvanced™ universal SYBR® Green supermix: page 377.

SsoAdvanced universal probes supermix: page 378.

PrimePCR™ Assays and Panels

Wet-Lab Validated or Expertly Designed for Guaranteed Performance

Every mRNA gene expression assay for human, mouse, and rat has been wet-lab validated to meet stringent performance standards, providing confidence in results while eliminating time-consuming assay design and optimization. The assay design algorithm that was optimized during the wet-lab validation process has been used to expertly design assays for ten additional genomes that are guaranteed to perform.



Wet-Lab Validation of Most Common Genomes

Wide Range of Predesigned Disease- and Pathway-Specific Panels

Complete Solution for Real-Time PCR

Expert Design for All Assays

Design Parameter	Why It Matters
Maximum transcript coverage	Not detecting the maximum number of transcripts underrepresents expression of target
Intron-spanning assay design when possible	Genomic DNA amplification can lead to false-positive results, which is problematic when checking for small changes in gene expression
Secondary structure avoided	Secondary structure can impede polymerase activity and reduce PCR efficiency
Single nucleotide polymorphisms (SNPs) avoided	SNPs destabilize binding; mismatching results in reduced PCR efficiency, delayed shift in quantification cycle (Cq), and underestimation of gene expression
Specific sequences identified (specificity)	Coamplification of off-target sequences can cause high PCR efficiency and/or false-positive signals
Universal assay conditions tested	Assays work on any instrument with any protocol

Wet-Lab Validation for Human, Mouse, and Rat Assays

Design Parameter	Why It Matters
Specificity	Validation with next-generation sequencing and melt curve analysis prevents coamplification of off-target sequences that could cause high PCR efficiency and/or false-positive signals
Sensitivity/dynamic range	Not understanding the detection limits of the assay could lead to high PCR efficiency and/or false-positive signals
R^2 value	Without a good R^2 value, the Cq value will not be a reliable way to calculate the expression
Efficiency	High or low efficiency could cause misrepresentation of gene expression data

PrimePCR Genome and Product Summary

	Expertly Designed, Wet-Lab Validated Assays	Expertly Designed Genomes
	Human, Mouse, and Rat	Rhesus Monkey, Yeast, Zebrafish, Cow, Pig, Rabbit, Dog, Chicken, Rice, and *Arabidopsis*
SYBR® Green and probe assays	•	•
PreAmp assays	•	•
Pathway, collection, disease, and SABiosciences PCR arrays	•	
Custom plates	•	•
Control assays	•	•
Reference gene assays	•	•
Reference gene panels	•	

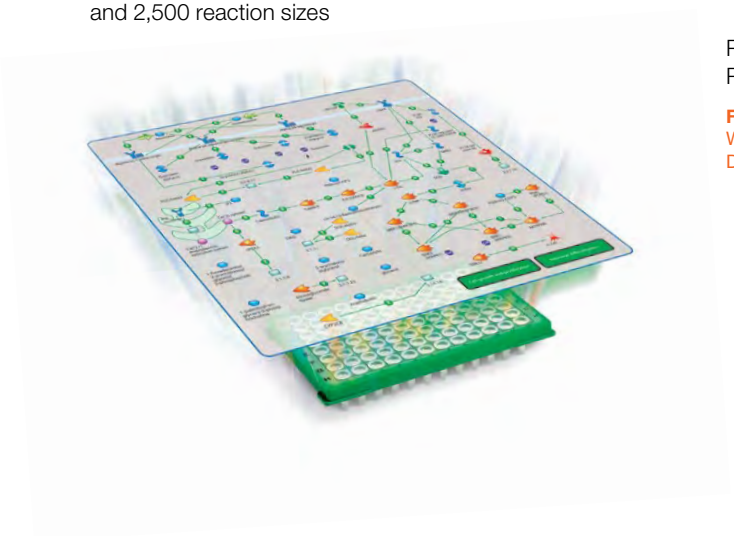
Wide Range of Pathway and Collection PCR Arrays
Predesigned plates are available for signaling and disease pathways to help identify and investigate key targets in a biological pathway of interest. Predesigned plates can be modified to include user-selected assays.

Customizable 96- and 384-Well Plate Formats
Easy-to-use custom plate configurator allows users to lay out assays on a plate exactly as they choose.

Fully Integrated with CFX Maestro™ Software
Full integration with CFX real-time PCR systems and data analysis software streamlines data collection and analysis.

The PrimePCR qPCR product family includes:

- **Predesigned primer assays** — genome-wide assays for SYBR® Green gene expression analysis available in 200, 1,000, and 2,500 reaction sizes
- **Predesigned probe assays** — genome-wide 5' nuclease probe assays in several reporter dye options for gene expression analysis available in 500, 1,000, and 2,500 reaction sizes
- **Custom assays** — order your primer and probe sequences of interest, available in 200, 500, 1,000, and 2,500 reaction sizes



- New **Human long noncoding RNA (lncRNA) gene expression assays** — 20 predesigned array plates and preamplification assay pools for streamlined discovery. Individual assays are available in both SYBR®- and probe-based formats for more than 14,000 lncRNA gene targets
- **Custom PCR plates** — custom-configured 96- and 384-well PCR plates
- **Pathway and collection PCR arrays** — predesigned 96- and 384-well PCR pathway and collection panels
- **DNA templates** — synthetic DNA templates can be used as a positive control to trigger amplification for the corresponding gene-specific assay
- **Experimental controls** — control assays are available for reverse transcription, RNA quality, genomic DNA contamination, and PCR performance
- **Reference gene assays** — commonly used reference gene assays are available to normalize for variation in the amount of input mRNA among samples
- **PreAmp assays** — assays for the unbiased, target-specific preamplification of up to 100 gene targets in a single reaction

PrimePCR assays are also available for Droplet Digital™ PCR. Please see page 354 for more information.

For More Information
Web: bio-rad.com/primepcr
Download bulletins: 6262, 6263, and 6290

PCR and Real-Time PCR Reagents

Bio-Rad's PCR reagents and kits feature advanced enzyme technology and buffer formulations for reliable amplification, robust reverse transcription, and high-quality real-time PCR data.

Go to **bio-rad.com/ReagentsSelector** for the PCR and qPCR Reagents Selector.

Real-Time PCR Supermixes, Kits, and Assays

Real-time PCR supermixes are designed for superior qPCR performance under any condition, with any detection chemistry, and on any instrument.

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

Reagent Compatibility with Instruments

	SYBR® Green Supermixes				Probes Supermixes				One-Step Kits for RT-qPCR	
Real-Time qPCR Instrument	SsoAdvanced™ Universal SYBR® Green Supermix	iTaq™ Universal SYBR® Green Supermix	SsoAdvanced™ Universal Inhibitor-Tolerant SYBR® Green Supermix	iQ™ SYBR® Green Supermix	SsoAdvanced Universal Probes Supermix	iTaq Universal Probes Supermix	iQ Supermix	iQ Multiplex Powermix	iTaq™ Universal SYBR® Green One-Step Kit	iTaq Universal Probes One-Step Kit
Bio-Rad										
CFX96™, CFX96 Touch™, CFX384™, CFX384 Touch™, CFX Connect™	•	•	•	•	•	•	•	•	•	•
iQ™, iQ™5, MyiQ™, MyiQ™2	•	•	•	•	•	•	•	•	•	•
MiniOpticon™, DNA Engine Opticon® 1 and 2	•	•	•	•	•	•	•	•	•	•
Applied Biosystems										
StepOne/StepOne Plus	•	•	•	◆	•	•	◆	◆	•	•
7000, 7300, 7500, 7700, 7900HT, ViiA 7, QuantStudio (all systems)	•	•	•	—	•	•	—	—	•	•
Stratagene										
Mx3000P, 3005P, 4000	•	•	•	•	•	•	•	•	•	•
Eppendorf										
Mastercycler ep *realplex* 2 or 4	•	•	•	•	•	•	•	•	•	•
QIAGEN/Corbett										
Rotor-Gene 3000, 6000, Q	•	•	•	•	•	•	•	•	•	•
Roche										
LightCycler 480	•	•	•	•	•	•	•	•	•	•
LightCycler 96	•	•	•	•	•	•	•	•	•	•
LightCycler 1.0, 1.5, 2.0	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Illumina										
Eco	•	•	•	•	•	•	•	•	•	•
Thermo Fisher Scientific										
PikoReal	•	•	•	•	•	•	•	•	•	•
Idaho Technology										
LightScanner HR-1	•	•	•	•	•	•	•	•	•	•
LightScanner 32	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

• Recommended for use as is; ◆ ROX reference setting must be turned "off"; ▲ BSA must be added according to instrument specifications

Use this selection guide to choose the right product for your application.

Real-Time PCR Supermixes Selection Guide

Feature	Sso7d-Driven Superior Performance on Any Instrument	Advanced Formulation for Reliable and Universal Performance	Fast qPCR with EvaGreen®	Reliable and Trusted Performance
Product	SsoAdvanced™ Universal Supermixes	iTaq™ Universal Supermixes	SsoFast™ EvaGreen® Supermixes	iQ™ Supermixes
Available detection chemistry	SYBR® Green and probe	SYBR® Green and probe	EvaGreen®	SYBR® Green and probe
Sso7d fusion protein technology	Yes	No	Yes	No
Sensitive detection of low-abundance targets	●●●	●●●	●●●	●●
Efficient amplification of difficult targets	●●●	●●	●●	●●
Tolerance to PCR inhibitors	●●●	●●	●●	●
Broad reaction conditions and assay compatibility*	●●●	●●	●●	●
Polymerase activation (cDNA/gDNA)	30 sec/2 min	30 sec/2 min	30 sec/2 min	3 min
Fast cycling compatibility	Yes	Yes	Yes	Yes
Instrument compatibility	Any instrument	Any instrument	Select instruments	Select instruments

* Compatible with a broad range of primer concentrations, salt concentrations, annealing temperatures, and cycling protocols.
●●● Excellent ●● Good ● Fair

SsoAdvanced™ Universal SYBR Green® Supermix

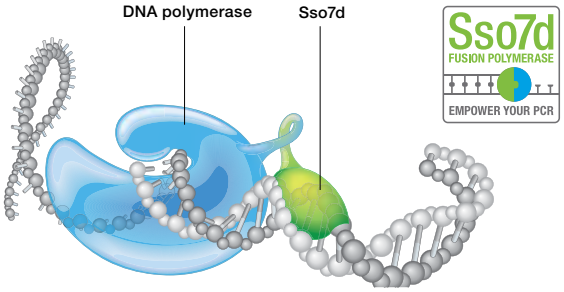
SsoAdvanced™ universal SYBR® Green supermix is an exclusive high-performance real-time PCR supermix based on Bio-Rad's patented* Sso7d fusion protein technology and advanced buffer formulation. This supermix is uniquely formulated to provide high processivity, increased PCR inhibitor tolerance, and robust performance with challenging templates and targets in SYBR® Green–based qPCR. It delivers superior performance for a wide range of applications on any qPCR platform and is validated to ensure optimal results with Bio-Rad's PrimePCR™ gene expression assays.

SsoAdvanced™ universal SYBR® Green supermix allows you to:

- **Achieve superior qPCR results under various experimental conditions** — for example, different primer concentrations, salt concentrations, annealing temperatures of various assays, and/or cycling protocols (standard or fast)
- **Increase your qPCR sensitivity and detection efficiency from compromised samples** — the highly processive Sso7d fusion polymerase has increased resistance to various PCR inhibitors, enhancing sensitivity and overall performance
- **Shorten time to results without compromising qPCR data quality** — the Sso7d fusion polymerase and optimized buffer provide rapid polymerization kinetics and instant polymerase activation
- **Use with any real-time PCR system** — the universal reference dye in this supermix enables ROX normalization of qPCR data regardless of the ROX level requirements of the qPCR system

Instrument Compatibility

The SsoAdvanced™ universal SYBR® Green supermix is compatible with all commercially available and all Bio-Rad real-time qPCR systems



The dsDNA binding protein, Sso7d, stabilizes the polymerase-template complex, increases processivity, and provides greater speed and reduced reaction times compared to traditional DNA polymerases. Sso7d fusion polymerases are significantly more resistant to PCR inhibitors, making the SsoAdvanced supermixes ideal choices for challenging applications, such as direct qPCR, without the need for sample preparation.

Applications and Uses of SsoAdvanced™ Universal SYBR® Green Supermix

- qPCR/real-time PCR
- Gene expression analysis
- Pathway analysis
- Absolute quantification
- Chromatin immunoprecipitation (ChIP) qPCR
- Mutation detection
- Pathogen detection
- Viral detection (load)
- Genetically modified organism (GMO) testing
- Genetic profiling

For More Information
Web: bio-rad.com/supermixes
View the Universal Real-Time PCR Reagents Web App: bio-rad.com/App/UniversalSupermixes

View the Understanding Real-Time PCR Supermixes Tutorial: bio-rad.com/supermixes_tutorial

Ordering Information

Catalog #	Description
1725270	**SsoAdvanced Universal SYBR Green Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725271	**SsoAdvanced Universal SYBR Green Supermix**, 5 ml (5 x 1 ml vials), 500 x 20 µl reactions
1725272	**SsoAdvanced Universal SYBR Green Supermix**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions
1725274	**SsoAdvanced Universal SYBR Green Supermix**, 25 ml (5 x 5 ml vials), 2,500 x 20 µl reactions
1725275	**SsoAdvanced Universal SYBR Green Supermix**, 50 ml (10 x 5 ml vials), 5,000 x 20 µl reactions

* U.S. patents 6,627,424; 7,541,170; and 7,560,260.

SsoAdvanced™ Universal Probes Supermix

SsoAdvanced universal probes supermix is an exclusive high-performance real-time PCR supermix based on Bio-Rad's patented* Sso7d fusion protein technology and advanced buffer formulation. This supermix is uniquely formulated to provide high processivity, increased PCR inhibitor tolerance, and robust performance with challenging templates and targets in probe-based qPCR. It delivers superior performance for a wide range of applications on any qPCR platform and is validated to ensure optimal results with Bio-Rad's PrimePCR™ gene expression assays.

SsoAdvanced universal probes supermix allows you to:

- **Carry out high-performance singleplex and duplex reactions** — the highly processive Sso7d fusion polymerase and advanced formulation enable robust performance in singleplex or duplex qPCR, allowing cost and time savings
- **Achieve superior qPCR results under various experimental conditions** — for example, different primer concentrations, salt concentrations, annealing temperatures of various assays, and/or cycling protocols (standard or fast)
- **Increase your qPCR sensitivity and detection efficiency from compromised samples** — the highly processive Sso7d fusion polymerase has increased resistance to various PCR inhibitors, enhancing sensitivity and overall performance
- **Shorten time to results without compromising qPCR data quality** — the Sso7d fusion polymerase and optimized buffer provide rapid polymerization kinetics and instant polymerase activation
- **Use with any real-time PCR system** — the universal reference dye in this supermix enables ROX normalization of qPCR data regardless of the ROX level requirements of the qPCR system

Applications and Uses of SsoAdvanced Universal Probes Supermix

- qPCR/real-time PCR
- Gene expression analysis
- Absolute quantification
- Genotyping (allelic discrimination)
- Mutation detection
- Pathogen detection
- Viral detection (load)
- GMO testing
- Genetic profiling

Instrument Compatibility

The SsoAdvanced universal probes supermix is compatible with all commercially available and all Bio-Rad real-time qPCR systems.

For More Information
Web: bio-rad.com/supermixes
View the Universal Real-Time PCR Reagents Web App: bio-rad.com/App/UniversalSupermixes

View the Understanding Real-Time PCR Supermixes Tutorial: bio-rad.com/supermixes_tutorial

Ordering Information

Catalog #	Description
1725280	**SsoAdvanced Universal Probes Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725281	**SsoAdvanced Universal Probes Supermix**, 5 ml (5 x 1 ml vials), 500 x 20 µl reactions
1725282	**SsoAdvanced Universal Probes Supermix**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions
1725284	**SsoAdvanced Universal Probes Supermix**, 25 ml (5 x 5 ml vials), 2,500 x 20 µl reactions
1725285	**SsoAdvanced Universal Probes Supermix**, 50 ml (10 x 5 ml vials), 5,000 x 20 µl reactions

* U.S. patents 6,627,424; 7,541,170; and 7,560,260.

SsoAdvanced™ Universal Inhibitor-Tolerant SYBR® Green Supermix

SsoAdvanced™ universal inhibitor-tolerant SYBR® Green supermix is an exclusive high-performance real-time PCR supermix based on Bio-Rad's patented* Sso7d fusion protein technology and advanced buffer formulation. This supermix is specifically formulated for SYBR® Green–based qPCR with challenging samples, including crude lysates and inhibitor-rich samples. This supermix delivers high processivity, unrivaled PCR inhibitor tolerance, and robust performance across a wide range of applications on any qPCR platform and is validated to ensure optimal results with Bio-Rad's PrimePCR™ gene expression assays.

SsoAdvanced universal inhibitor-tolerant SYBR® Green supermix allows you to:

- **Skip RNA and DNA extraction by using crude samples** — achieve superior data using crude lysates from plants, seeds, cells, bacteria, or formalin-fixed, paraffin-embedded (FFPE) samples
- **Power through PCR inhibitors** — delivers unrivaled performance with common PCR inhibitors such as heparin, polysaccharides, culture media, and more
- **Increase cDNA loading** — add up to 20% cDNA from our iScript™ advanced cDNA synthesis kit for RT-qPCR or iScript reverse transcription supermix for RT-qPCR
- **Obtain high-quality qPCR results under various experimental conditions** — for example, different primer concentrations, annealing temperatures, salt concentrations, and/or cycling protocols (standard or fast)

Sso7d FUSION POLYMERASE
EMPOWER YOUR PCR

- **Shorten time to results without compromising qPCR data quality** — the Sso7d fusion polymerase and optimized buffer provide rapid polymerization kinetics and instant polymerase activation
- **Use with any real-time PCR system** — the universal reference dye in this supermix enables ROX normalization of qPCR data regardless of the ROX level requirements of the qPCR system

Applications and Uses of SsoAdvanced™ Universal Inhibitor-Tolerant SYBR® Green Supermix

- Viral and bacterial detection
- GMO testing
- Single nucleotide polymorphism (SNP) genotyping
- Mutation detection
- Environmental monitoring
- Gene expression
- Pathway analysis

Instrument Compatibility

The SsoAdvanced™ universal inhibitor-tolerant SYBR® Green supermix is compatible with all commercially available and all Bio-Rad real-time qPCR systems.

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

Ordering Information

Catalog #	Description
1725016	**SsoAdvanced Universal Inhibitor-Tolerant SYBR Green Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725017	**SsoAdvanced Universal Inhibitor-Tolerant SYBR Green Supermix**, 5 ml (1 x 5 ml vial), 500 x 20 µl reactions
1725018	**SsoAdvanced Universal Inhibitor-Tolerant SYBR Green Supermix**, 10 ml (2 x 5 ml vials), 1,000 x 20 µl reactions

* U.S. patents 6,627,424; 7,541,170; and 7,560,260.

iTaq™ Universal Supermixes

iTaq universal supermix is a 2x concentrated, ready-to-use supermix formulated to deliver robust qPCR results with superior sensitivity, efficiency, and specificity. This supermix is available with SYBR® Green or probe-based chemistries.

Features and benefits include:

- Advanced buffer formulation developed for optimal qPCR results with SYBR® Green or fluorogenic probe (simplex and duplex)
- Antibody-mediated hot-start iTaq DNA polymerase for fast activation and superior specificity
- Optimized for consistent results using both standard and fast cycling protocols
- Blend of reference dyes for universal real-time PCR instrument compatibility

Instrument Compatibility
The iTaq™ universal SYBR® Green supermix and probes supermix are compatible with all commercially available and all Bio-Rad real-time qPCR systems.

For More Information
Web: bio-rad.com/supermixes
View the Universal Real-Time PCR Reagents Web App: bio-rad.com/App/UniversalSupermixes

View the Understanding Real-Time PCR Supermixes Tutorial: bio-rad.com/supermixes_tutorial

Ordering Information

Catalog #	Description
1725120	**iTaq Universal SYBR Green Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725121	**iTaq Universal SYBR Green Supermix**, 5 ml (5 x 1 ml vials), 500 x 20 µl reactions
1725122	**iTaq Universal SYBR Green Supermix**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions
1725124	**iTaq Universal SYBR Green Supermix**, 25 ml (5 x 5 ml vials), 2,500 x 20 µl reactions
1725125	**iTaq Universal SYBR Green Supermix**, 50 ml (10 x 5 ml vials), 5,000 x 20 µl reactions
1725130	**iTaq Universal Probes Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725131	**iTaq Universal Probes Supermix**, 5 ml (5 x 1 ml vials), 500 x 20 µl reactions
1725132	**iTaq Universal Probes Supermix**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions
1725134	**iTaq Universal Probes Supermix**, 25 ml (5 x 5 ml vials), 2,500 x 20 µl reactions
1725135	**iTaq Universal Probes Supermix**, 50 ml (10 x 5 ml vials), 5,000 x 20 µl reactions

SsoFast™ EvaGreen® Supermixes

SsoFast™ EvaGreen® Supermix

- Instant activation of antibody-mediated hot-start Sso7d fusion polymerase generates qPCR results in less than 30 min
- Sensitive amplification and detection from a single copy of a target gene
- Efficient discrimination and reliable quantification from 1.33-fold serial dilutions of template
- Minimal PCR inhibition of EvaGreen® and Sso7d polymerase generates greater fluorescent signals, resulting in increased sensitivity

Sso7d FUSION POLYMERASE
EMPOWER YOUR PCR

SsoFast™ EvaGreen® Supermix with Low ROX

- Instant activation of antibody-mediated hot-start Sso7d fusion polymerase generates qPCR results in approximately 40 min
- Preblended with ROX for optimal performance on Applied Biosystems standard and fast 7500 and ViiA 7 qPCR instruments
- Sensitive amplification and detection from a single copy of a target gene
- Minimal PCR inhibition of EvaGreen® and Sso7d polymerase generates greater fluorescent signals, resulting in increased sensitivity

Instrument Compatibility

The SsoFast™ EvaGreen® supermixes are compatible with select commercially available instruments and all Bio-Rad real-time qPCR systems.

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

Ordering Information

Catalog #	Description
1725200	**SsoFast EvaGreen Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725201	**SsoFast EvaGreen Supermix**, 5 ml (5 x 1 ml vials), 500 x 20 µl reactions
1725202	**SsoFast EvaGreen Supermix**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions
1725203	**SsoFast EvaGreen Supermix**, 20 ml (1 x 20 ml bottle), 2,000 x 20 µl reactions
1725204	**SsoFast EvaGreen Supermix**, 25 ml (5 x 5 ml vials), 2,500 x 20 µl reactions
1725205	**SsoFast EvaGreen Supermix**, 50 ml (10 x 5 ml vials), 5,000 x 20 µl reactions
1725210	**SsoFast EvaGreen Supermix with Low ROX**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725211	**SsoFast EvaGreen Supermix with Low ROX**, 5 ml (5 x 1 ml vials), 500 x 20 µl reactions
1725102	**SsoFast EvaGreen Supermix with Low ROX**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions
1725213	**SsoFast EvaGreen Supermix with Low ROX**, 20 ml (1 x 20 ml bottle), 2,000 x 20 µl reactions

iQ™ Supermixes

iQ™ SYBR® Green Supermix

- Formulated for efficient and sensitive SYBR® Green–based PCR in a wide variety of real-time PCR instruments
- Reliable detection of low-, medium-, and high-abundance target genes
- Antibody-mediated hot-start polymerase for quick activation and increased specificity

iQ Supermix

- Formulated for efficient and sensitive qPCR using fluorogenic probes in a wide variety of real-time PCR instruments
- Reliable quantification of up to 2 targets over a wide dynamic range of human genomic DNA and plasmid DNA concentrations
- Antibody-mediated hot-start iTaq™ DNA polymerase for quick activation and increased specificity

iQ Multiplex Powermix

- Robust supermix optimized for sensitive and efficient multiplex qPCR of up to 5 targets
- Reliable quantification of up to 4 targets when tone differs in expression up to 10^6-fold relative to the others
- Linearity over 6 orders of magnitude of input cDNA and 4 orders of magnitude of input gDNA
- Suitable for a wide variety of applications, including gene expression analysis, SNP genotyping, SNP analysis, GMO detection, and viral load detection

For More Information
Request or download bulletin: 6090

Ordering Information

Catalog #	Description
1708880	**iQ SYBR Green Supermix**, 2.5 ml (2 x 1.25 ml vials), 100 x 50 µl reactions
1708882	**iQ SYBR Green Supermix**, 12.5 ml (10 x 1.25 ml vials), 500 x 50 µl reactions
1708884	**iQ SYBR Green Supermix**, 25 ml (20 x 1.25 ml vials), 1,000 x 50 µl reactions
1708885	**iQ SYBR Green Supermix**, 50 ml (50 ml bottle), 2,000 x 50 µl reactions
1708886	**iQ SYBR Green Supermix**, 25 ml (5 x 5 ml vials), 1,000 x 50 µl reactions
1708887	**iQ SYBR Green Supermix**, 50 ml (10 x 5 ml vials), 2,000 x 50 µl reactions
1708860	**iQ Supermix**, 2.5 ml (2 x 1.25 ml vials), 100 x 50 µl reactions
1708862	**iQ Supermix**, 12.5 ml (10 x 1.25 ml vials), 500 x 50 µl reactions
1708864	**iQ Supermix**, 25 ml (20 x 1.25 ml vials), 1,000 x 50 µl reactions
1725848	**iQ Multiplex Powermix**, 1.25 ml (1 x 1.25 ml vial), 50 x 50 µl reactions
1725849	**iQ Multiplex Powermix**, 5 ml (4 x 1.25 ml vials), 200 x 50 µl reactions

See Also
PCR plastic consumables: pages 394–395.

iTaq™ Universal SYBR® Green One-Step Kit

The iTaq™ universal SYBR® Green one-step kit is a fast and convenient solution for real-time PCR using the powerful combination of RNase H+ MMLV reverse transcriptase, specificity enhancer, and hot-start iTaq DNA polymerase in one fast reaction. It provides improved PCR efficiency, wider dynamic range, superior sensitivity and better specificity, and inhibitor tolerance without affecting performance, even with cell lysates.

- **Increase sensitivity, specificity, and efficiency** — advanced formulation enables robust performance with a wide variety of sample types and target sequences
- **Use any real-time PCR system** — the universal reference dye in this reaction mix enables ROX normalization of qPCR data regardless of the ROX level requirements of the qPCR system
- **Achieve superior real-time PCR results under most conditions** — robust formulation delivers consistent performance in fast cycling across a broad range of reaction conditions, primer concentrations, and temperature ranges
- **Obtain better results with PrimePCR™ assays** — real-time PCR assays are expertly designed and wet-lab validated to ensure optimal assay performance

Applications and Uses of iTaq™ Universal SYBR® Green One-Step Kit

- Real-time PCR
- Gene expression analysis
- Absolute quantification
- Pathogen/virus detection

Instrument Compatibility

The iTaq™ universal SYBR® Green one-step kit is compatible with all commercially available and all Bio-Rad real-time qPCR systems.

For More Information
Web: bio-rad.com/supermixes
View the Universal Real-Time PCR Reagents Web App: bio-rad.com/App/UniversalSupermixes

Ordering Information

Catalog #	Description
1725150	**iTaq Universal SYBR Green One-Step Kit**, 100 reactions, 1 ml (1 x 1 ml vial), includes 25 µl RT (1 vial), nuclease-free water (1 vial)
1725151	**iTaq Universal SYBR Green One-Step Kit**, 500 reactions, 5 ml (5 x 1 ml vials), includes 125 µl RT (1 vial), nuclease-free water (1 vial)

iTaq™ Universal Probes One-Step Kit

See Also
PCR plastic consumables: pages 394–395.

The iTaq universal probes one-step kit is a fast and convenient solution for real-time PCR using the powerful combination of RNase H+ MMLV reverse transcriptase and hot-start iTaq DNA polymerase in one fast reaction. It provides improved PCR efficiency, wider dynamic range, superior sensitivity and specificity, and inhibitor tolerance without affecting performance, even with cell lysates.

- **Increase sensitivity, specificity, and efficiency** — advanced formulation enables robust performance with a wide variety of sample types and target sequences
- **Obtain superior results with multiplex reactions** — enhanced chemistry enables up to 3 target amplifications at the same time, resulting in higher data precision with fewer pipetting steps and reduced sample usage
- **Carry out high-throughput real-time PCR screening and validation** — simplified workflow and reduced cycling times enable screening and validation of a great number of samples and targets in a short period of time
- **Use any real-time PCR system** — the universal reference dye in this reaction mix enables ROX normalization of qPCR data regardless of the ROX level requirements of the qPCR system
- **Achieve superior real-time PCR results under most conditions** — robust formulation delivers consistent performance in fast cycling across a broad range of reaction conditions, primer concentrations, and temperature ranges

Applications and Uses of iTaq Universal Probes One-Step Kit

- Real-time PCR
- Gene expression analysis
- Multiplexing
- Absolute quantification
- Pathogen/virus detection

Instrument Compatibility

The iTaq universal probes one-step kit is compatible with all commercially available and all Bio-Rad real-time qPCR systems.

For More Information
Web: bio-rad.com/supermixes
View the Universal Real-Time PCR Reagents Web App: bio-rad.com/App/UniversalSupermixes

Ordering Information

Catalog #	Description
1725140	**iTaq Universal Probes One-Step Kit**, 100 reactions, 1 ml (1 x 1 ml vial), includes 50 µl RT (1 x 50 µl vial), nuclease-free water (1 vial)
1725141	**iTaq Universal Probes One-Step Kit**, 500 reactions, 5 ml (5 x 1 ml vials), includes 250 µl RT (2 x 125 µl vials), nuclease-free water (1 vial)

SsoAdvanced™ PreAmp Supermix

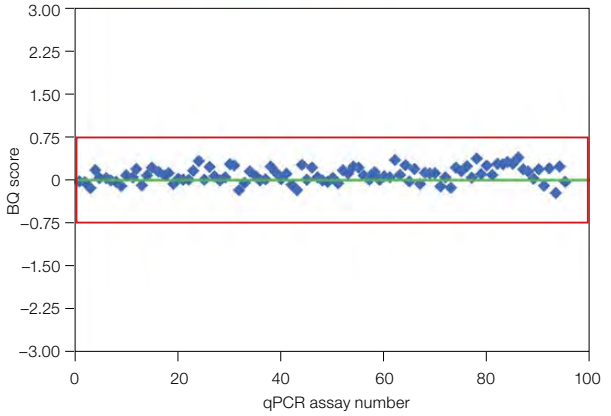
SsoAdvanced PreAmp supermix is a 2x concentrated, ready-to-use reaction master mix optimized for unbiased, target-specific preamplification of cDNA and gDNA. This supermix preamplifies DNA templates using up to 400 PrimePCR™ PreAmp assays (for use downstream with PrimePCR gene expression assays), custom designed SYBR® Green or hydrolysis probe assays, and TaqMan assays.

Sso7d Fusion Polymerase Technology Enables Unbiased Preamplification

The SsoAdvanced PreAmp supermix utilizes our highly processive Sso7d fusion polymerase to enable preamplification of up to 400 targets with minimal bias. The increased processivity of the Sso7d fusion polymerase ensures that all targets — even difficult targets — are amplified efficiently. This reduction of preamplification bias is critical for ensuring accuracy of the results from downstream quantitative real-time PCR analysis.

- **Analyze up to 400 targets** — when the number of genes that can be analyzed in an experiment is limited by the amount of sample, preamplification will extend the amount of sample available for analysis
- **Requires as little as 100 pg DNA** — enables analysis of any precious or limited sample, such as stem cells, laser capture microdissections, and formalin-fixed paraffin-embedded tissues
- **Optimized for use with PrimePCR assays** — use PrimePCR PreAmp assays before downstream analysis with PrimePCR gene expression assay

For More Information
Web: bio-rad.com/PreAmp
Request or download bulletin: 6576



Minimal bias observed during preamplification of 100 targets. Preamplification was performed on a cDNA sample for ten cycles using SsoAdvanced PreAmp supermix and 100 PrimePCR PreAmp assays. The preamplified cDNA was diluted and used in qPCR analysis alongside cDNA that was not subject to preamplification. The bias quantification (BQ) score shows the difference in the results (quantification cycle [Cq] value) for the samples with and without preamplification. BQ scores close to zero indicate a lack of preamplification bias.

Ordering Information

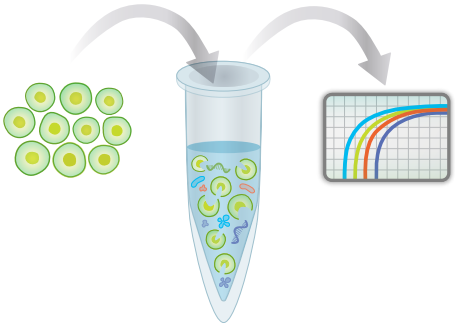
Catalog #	Description
1725160	**SsoAdvanced PreAmp Supermix**, 1.25 ml (1 x 1.25 ml vial), 50 x 50 µl reactions

SingleShot™ Cell Lysis Kits

SingleShot cell lysis kits rapidly generate cell lysates that are optimized for reverse transcription quantitative PCR (RT-qPCR) analysis without RNA purification.

Features include:

- Compatibility with 10–100,000 adherent or suspension cells
- Lysates prepared in 20 minutes
- Complete removal of genomic DNA
- Preservation of RNA integrity by an RNase inhibitor
- Simple, short protocol suitable for automation and high-throughput experiments
- No loss of rare transcripts from column purification
- Produces accurate and sensitive qPCR data
- Validated with PrimePCR™ assays and panels
- Results comparable to those produced using purified RNA



SingleShot Cell Lysis Kit

The SingleShot cell lysis kit provides the reagents necessary for producing RT-qPCR–ready cell lysates in approximately 20 minutes. Reagents for RT-qPCR are not included.

SingleShot Two-Step Kits

SingleShot two-step kits include reagents to perform RT-qPCR using a two-step workflow with separate cDNA synthesis and qPCR steps. These kits provide RT-qPCR data from cultured cells in just a little over 2 hours. The SingleShot RNA control is included to help optimize cell number input and the amount of lysate used in the RT-qPCR.

SingleShot One-Step Kits

SingleShot one-step kits include reagents to perform one-step RT-qPCR utilizing integrated cDNA synthesis and qPCR steps. These kits provide RT-qPCR data from cultured cells in approximately 1.5 hours. The SingleShot RNA control is included to help optimize cell number input and the amount of lysate used in the RT-qPCR.

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

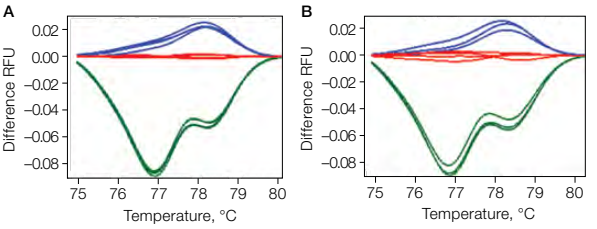
Ordering Information

Catalog #	Description
1725080	**SingleShot Cell Lysis Kit**, 100 x 50 µl reactions
1725081	**SingleShot Cell Lysis Kit**, 500 x 50 µl reactions
One-Step Kits	
1725070	**SingleShot Probes One-Step Kit**, 100 x 50 µl reactions
1725095	**SingleShot SYBR Green One-Step Kit**, 100 x 50 µl reactions
Two-Step Kits	
1725090	**SingleShot Probes Kit**, 100 x 50 µl reactions
1725085	**SingleShot SYBR Green Kit**, 100 x 50 µl reactions

Precision Melt Supermix (HRM)

- Sensitive and specific discrimination of class I–IV SNPs across a broad range of amplicons
- Ideal solution for insertions or deletions >6 base pairs
- De novo SNP discovery
- Accurate quantification of CpG methylation status for epigenetic studies
- Ideal for mutation screening of small mutations or when using a primer walking approach for larger regions
- Exceptional room temperature stability for high-throughput high resolution melt (HRM) studies
- Optimized formulation containing EvaGreen® dye delivers robust PCR and HRM performance

For More Information
Web: bio-rad.com/supermixes
Download bulletins: 5798 and 6137



Exceptional stability enables high-throughput genotyping analysis with precision melt supermix. Specific amplification and accurate discrimination of a class IV SNP (84 bp amplicon) from mouse genomic DNA was performed on a CFX384™ real-time PCR detection system either 0 hr (**A**) or 48 hr (**B**) after reaction setup. Wild type (■), heterozygote (■), and homozygous mutant (■) are shown in the difference plots normalized to wild-type samples. Total run time including melt curve = 150 min. RFU, relative fluorescence units.

Ordering Information

Catalog #	Description
1725110	**Precision Melt Supermix**, 2 ml (2 x 1 ml vials), 200 x 20 µl reactions
1725112	**Precision Melt Supermix**, 10 ml (10 x 1 ml vials), 1,000 x 20 µl reactions

New ZDC Multiplex RT-PCR Assay*

The ZDC multiplex RT-PCR assay is a one-step reverse transcription PCR (RT-PCR) assay for the simultaneous detection of Zika (ZIKV), dengue (DENV 1–4), and chikungunya (CHIKV) viral RNAs by real-time PCR. The assay includes all the controls needed for reliable results, thus providing researchers with a robust tool to identify ZIKV, DENV, and CHIKV nucleic acids in RNA extracted from a wide range of sample types.

- Enough to perform 200 tests
- 1-step procedure with RT and amplification performed in a single tube
- 3-plex assay for the simultaneous detection of ZIKV, DENV 1–4, and CHIKV RNA
- Internal control included for use as a fourth target in the multiplex assay
- Wet-lab validated on the CFX96 Touch™ real-time PCR detection system and Applied Biosystems 7500 real-time PCR system
- Compatible with most quantitative PCR (qPCR) systems on the market
- Compatible with RNA extracted from multiple starting materials (serum, plasma, serum-free body fluids, cerebrospinal fluids, and mosquitoes)
- High-standard GMP manufacturing procedures used for key components of the kit
- Compatible with RNase P detection assays as additional or alternative internal control

RNase P Detection Assays

The RNase P assays are hydrolysis probe–based assays for the detection of human RNase P nucleic acid sequence. Available in two different configurations, Cy5.5 and TAMRA, the RNase P assay can be included as an additional control in the ZDC multiplex RT-PCR and other assays.

* For research use only, not for diagnostic purposes.

For More Information
Web: bio-rad.com/ZDCassay
Download bulletin: 6978

Ordering Information

Catalog #	Description
12003818	**ZDC Multiplex RT-PCR Assay**, reverse transcription PCR assay for the detection of Zika, dengue, and chikungunya viral RNAs, 200 reactions
12004601	**RNase P Assay (Cy5.5)**, pkg of 1, vial, 440 µl 12.5x concentrated primers/probe solution
12004602	**RNase P Assay (TAMRA)**, pkg of 1, vial, 440 µl 12.5x concentrated primers/probe solution
12004860	**ZDC Clear Control Solution**, pkg of 1, 5 ml tube, for use with RNase P assay and ZDC multiplex RT-PCR assay
12005062	**ZDC Buffer T**, pkg of 5, 1.8 ml tubes, for use with ZDC multiplex RT-PCR assay

Reverse Transcription Reagents

Bio-Rad's reverse transcription reagents are formulated for efficient reverse transcription across a broad linear dynamic range. A potent RNase A inhibitor protects RNA during setup and reverse transcription. Reagents have flexible input RNA capacity to suit different experimental needs and are optimized for gene expression analysis using real-time PCR.

For More Information
Web: bio-rad.com/RTreagents
bio-rad.com/rt_tutorial

Feature	RECOMMENDED Minimum Reaction Setup Time	Effective Genomic DNA Removal before RT	Maximum Input RNA for High cDNA Yields	Flexible Priming Options	Reliable Value Solution
Product	iScript Reverse Transcription Supermix for RT-qPCR	iScript gDNA Clear cDNA Synthesis Kit	iScript Advanced cDNA Synthesis Kit for RT-qPCR	iScript Select cDNA Synthesis Kit	iScript cDNA Synthesis Kit
Applications	▪ Gene expression ▪ RNA quantification	▪ Gene expression ▪ RNA quantification	▪ Gene expression ▪ RNA quantification	▪ Gene expression ▪ Cloning ▪ RNA quantification	▪ Gene expression ▪ RNA quantification
Total input RNA	1 µg–1 pg	1 µg–1 pg	7.5 µg–100 fg	1 µg–1 pg	1 µg–100 fg
Format	1 tubes	3 tubes	2 tubes	5 tubes	2 tubes
Kit contents	▪ 5x iScript RT supermix ▪ No-RT control supermix	▪ 5x iScript RT supermix ▪ No-RT control supermix ▪ DNase ▪ DNase buffer	▪ iScript reverse transcriptase ▪ 5x iScript advanced reaction mix	▪ iScript reverse transcriptase ▪ 5x iScript reaction mix ▪ 3 priming options	▪ iScript reverse transcriptase ▪ 5x iScript reaction mix
Time to produce cDNA	26 min	36 min	21 min	40–90 min	26 min
RNase H+ activity	High	High	High	High	High

iScript™ Reverse Transcription Kits

iScript Advanced cDNA Synthesis Kit for RT-qPCR

- Increased qPCR data throughput and cost effectiveness from a single 20 µl RT reaction
- Superior sensitivity and broad linear dynamic range for RT (7.5 µg–100 fg)
- 2-tube kit (5x iScript reaction mix and iScript reverse transcriptase) for ease of use and reduced reaction setup time
- Optimized blend of oligo(dT) and random primers ensures complete and unbiased RNA sequence representation
- RNase H+ MMLV reverse transcriptase (preblended with RNase inhibitor) delivers high sensitivity for reverse transcription quantitative PCR (RT-qPCR) and eliminates additional RNase H+ step
- Potent blend of RNase A inhibitor protects RNA during setup and RT
- Short 21 min protocol allows fast qPCR data generation

iScript Reverse Transcription Supermix for RT-qPCR

- 1-tube format for simple and fast setup and reduced pipetting variability
- 5x formulation enables RNA volumes up to 16 µl, avoiding the need to concentrate your sample
- Liquid format at –20°C offers superior stability and eliminates freeze/thaw cycle

- Superior sensitivity and broad linear dynamic range for RT (1 µg–1 pg)
- Optimized blend of oligo(dT) and random primers ensures complete and unbiased RNA sequence representation
- RNase H+ MMLV reverse transcriptase (preblended with RNase inhibitor) delivers high sensitivity for RT-qPCR and eliminates additional RNase H+ step
- Potent blend of RNase A inhibitor protects RNA during setup and RT
- Short 26 min protocol allows fast qPCR data generation

iScript cDNA Synthesis Kit

- 2-tube kit (5x iScript reaction mix and iScript reverse transcriptase) for ease of use and reduced reaction setup time
- Superior sensitivity and broad linear dynamic range for RT (1 µg–100 fg)
- Optimized blend of oligo(dT) and random primers ensures complete and unbiased RNA sequence representation
- RNase H+ MMLV reverse transcriptase (preblended with RNase inhibitor) delivers high sensitivity for RT-qPCR and eliminates additional RNase H+ step
- Potent blend of RNase A inhibitor protects RNA during setup and RT
- Short 26 min protocol allows fast qPCR data generation

iScript Select cDNA Synthesis Kit

- 5-tube kit (random primers, oligo(dT), 5x iScript Select reaction mix, iScript reverse transcriptase, and gene-specific primer-enhancer solution)
- Choice of priming strategy
- Reliable synthesis of long cDNA >6 kb in length
- Superior sensitivity and broad linear dynamic range for RT (1 µg–1 pg)

iScript gDNA Clear cDNA Synthesis Kit

iScript gDNA clear cDNA synthesis kit generates qPCR-ready cDNA free of gDNA for accurate gene expression analysis in as little as 36 minutes. The kit consists of the iScript reverse transcription supermix and a specially formulated DNase. Features and benefits include:

- Effective gDNA clearance in 10 min with a specially formulated DNase
- Convenient all-in-one RT supermix for simple and fast setup and reduced pipetting variability
- Simple workflow and short 36 min protocol for fast generation of gDNA-free cDNA
- Ready-to-use no RT control included in the kit to monitor gDNA contamination

For More Information
Request or download bulletin: 6090

Ordering Information

Catalog #	Description
iScript Advanced cDNA Synthesis Kit for RT-qPCR	
1725037	**iScript Advanced cDNA Synthesis Kit for RT-qPCR**, 25 x 20 µl reactions, includes 100 µl 5x iScript advanced reaction mix, 25 µl iScript advanced reverse transcriptase, and nuclease-free water
1725038	**iScript Advanced cDNA Synthesis Kit for RT-qPCR**, 100 x 20 µl reactions, includes 400 µl 5x iScript advanced reaction mix, 100 µl iScript advanced reverse transcriptase, and nuclease-free water
iScript Reverse Transcription Supermix for RT-qPCR	
1708840	**iScript Reverse Transcription Supermix for RT-qPCR**, 25 x 20 µl reactions, includes 100 µl 5x iScript RT supermix, 200 µl 5x iScript RT supermix no-RT control (50 reactions), and nuclease-free water
1708841	**iScript Reverse Transcription Supermix for RT-qPCR**, 100 x 20 µl reactions, includes 400 µl 5x iScript RT supermix, 200 µl 5x iScript RT supermix no-RT control (50 reactions), and nuclease-free water
iScript cDNA Synthesis Kit	
1708890	**iScript cDNA Synthesis Kit**, 25 x 20 µl reactions, includes 100 µl 5x iScript reaction mix, 25 µl iScript reverse transcriptase, and nuclease-free water
1708891	**iScript DNA Synthesis Kit**, 100 x 20 µl reactions, includes 400 µl 5x iScript reaction mix, 100 µl iScript reverse transcriptase, and nuclease-free water
iScript Select cDNA Synthesis Kit	
1708896	**iScript Select cDNA Synthesis Kit**, 25 x 20 µl reactions, includes 400 µl iScript Select reaction mix, 25 µl iScript reverse transcriptase, 200 µl oligo(dT) mix, 200 µl random primer mix, 200 µl gene-specific primer enhancer solution, and nuclease-free water
1708897	**iScript Select cDNA Synthesis Kit**, 100 x 20 µl reactions, includes 400 µl iScript Select reaction mix, 100 µl iScript reverse transcriptase, 200 µl oligo(dT) mix, 200 µl random primer mix, 200 µl gene-specific primer enhancer, and nuclease-free water
iScript gDNA Clear cDNA Synthesis Kit	
1725034	**iScript gDNA Clear cDNA Synthesis Kit**, 25 x 20 µl reactions, includes 100 µl 5x iScript RT supermix, 200 µl 5x iScript no-RT control supermix, 12.5 µl iScript DNase, 150 µl iScript DNase buffer, 1.5 ml nuclease free water
1725035	**iScript gDNA Clear cDNA Synthesis Kit**, 100 x 20 µl reactions, includes 400 µl 5x iScript RT supermix, 400 µl 5x iScript no-RT control supermix, 50 µl iScript DNase, 150 µl iScript DNase buffer, 1.5 ml nuclease free water

New iScript™ Explore One-Step RT and PreAmp Kit

The iScript Explore kit includes a highly sensitive reagent to generate preamplified cDNA directly from RNA in a single step. This kit is well suited for detecting many targets from a limited sample or for reliable detection of targets expressed at low levels. The reagent's patented* Sso7d fusion protein provides unbiased target-specific preamplification of up to 100 targets. The kit also integrates an effective genomic DNA removal step, which helps ensure only the transcripts of interest are detected by quantitative PCR.

- Eliminates protocol steps by completing reverse transcription and preamplification in a single step
- Enables reliable detection of genes expressed at low levels
- Facilitates highly sensitive detection of a large number of targets
- Incorporates an effective genomic DNA removal step, providing confidence that results are only for the transcript of interest

Sso7d FUSION POLYMERASE
EMPOWER YOUR PCR

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

Ordering Information

Catalog #	Description
12004856	**iScript Explore One-Step RT and PreAmp Kit**, 50 x 50 µl reactions, includes 100 µl iScript advanced reverse transcriptase, 1.25 ml 2x preamplification mix, 100 µl reaction booster, 50 µl DNase, 150 µl DNase buffer, and nuclease-free water
17002826	**iScript Explore One-Step RT and PreAmp Kit**, 250 x 50 µl reactions, includes 5 x 100 µl iScript advanced reverse transcriptase, 5 x 1.25 ml 2x preamplification mix, 5 x 100 µl reaction booster, 5 x 50 µl DNase, 5 x 150 µl DNase buffer, and nuclease-free water

* U.S. patents 6,627,424; 7,541,170; and 7,560,260.

Standard PCR Reagents

iProof™ High-Fidelity DNA Polymerase

- A high-fidelity DNA polymerase with 52-fold more accuracy than Taq DNA polymerase
- Unique *Pyrococcus*-like proofreading enzyme is fused to a dsDNA binding protein, Sso7d
- Long and fast PCR applications — fragments up to 37 kb are amplified in less time (15–30 sec/kb) and with less enzyme (0.25–1 U/reaction)
- Convenient 2x supermix formats available with GC or HF high-fidelity buffers

For More Information
Web: bio-rad.com/standardpcrreagents
Request or download bulletin: 5211

dNTP Mix

- Formulated for consistency and higher efficiency in PCR and qPCR
- Robust dNTP solution withstands multiple rounds of freeze-thawing and temperature cycling

iTaq DNA Polymerase

- Antibody-mediated hot-start DNA polymerase for quick 3 min activation at 95°C
- The hot-start polymerase prevents nonspecific amplification and primer-dimers in both PCR and real-time PCR applications

For More Information
Download bulletin: 2779

Ordering Information

Catalog #	Description
iProof High-Fidelity DNA Polymerase, Master Mixes, and Buffers	
1725300	**iProof High-Fidelity DNA Polymerase**, 2 U/µl, 20 U, includes 5x reaction buffers, $MgCl_2$ solution, DMSO
1725301	**iProof High-Fidelity DNA Polymerase**, 2 U/µl, 100 U
1725302	**iProof High-Fidelity DNA Polymerase**, 2 U/µl, 500 U
1725330	**iProof High-Fidelity PCR Kit**, 2 U/µl, 50 U, includes 5x reaction buffers, $MgCl_2$ solution, DMSO, dNTPs, λ DNA, 1.3 and 10 kb primers, DNA standard
1725331	**iProof High-Fidelity PCR Kit**, 2 U/µl, 200 U, includes 5x reaction buffers, $MgCl_2$ solution, DMSO, dNTPs, λ DNA, 1.3 and 10 kb primers, DNA standard
1725310	**iProof HF Master Mix**, 2.5 ml, 100 x 50 µl reactions (for highest fidelity with most templates)
1725320	**iProof GC Master Mix**, 2.5 ml, 100 x 50 µl reactions (for GC-rich templates)
dNTP Mix	
1708874	**dNTP Mix**, 200 µl premixed solution, contains 10 mM each dNTP (dATP, dCTP, dGTP, dTTP)
iTaq DNA Polymerase	
1708870	**iTaq DNA Polymerase**, 5 U/µl, includes 250 U polymerase, 1.25 ml 10x PCR buffer
1708875	**iTaq DNA Polymerase**, 5 U/µl, includes 5,000 U polymerase, 25 ml 10x PCR buffer, 25 ml 50 mM $MgCl_2$ solution
$MgCl_2$	
1708872	**$MgCl_2$ Solution**, 50 mM, 1.25 ml

PCR and Real-Time PCR Accessories

ROX Passive Reference Dye

- Formulated as a 50x concentrated stock solution for use on Applied Biosystems 7000, 7300, 7700, and 7900 qPCR instruments
- For instruments that use 580–585 nm excitation for passive reference, such as Stratagene Mx3000P, Mx3005P, and Mx4000, and Applied Biosystems 7500 real-time PCR instruments, treat as a 750x concentrated solution
- An internal reference is not required for any Bio-Rad real-time detection system

Precision Blue™ Real-Time PCR Dye

- Concentrated, ready-to-use dye to increase visibility of real-time PCR reaction mixtures
- Optimized for use with all Bio-Rad universal real-time supermixes and one-step kits

For More Information
Request or download bulletin: 6090

Ordering Information

Catalog #	Description
1725858	**ROX Passive Reference Dye**, 0.5 ml
1725555	**Precision Blue Real-Time PCR Dye**, 55 µl, 200x concentrated blue visualization dye for use with real-time PCR systems

PCR Plate Sealer

PX1™ PCR Plate Sealer

The PX1 PCR plate sealer consistently seals PCR plates by providing uniform heat and pressure across an entire microplate when sealing. This semiautomated heat sealer helps deliver reliable results by removing human variability from plate sealing and minimizing sample evaporation.

The PX1 sealer features an easy-to-use, intuitive touch-screen interface. The thermal sealing process is simplified by allowing sealing temperature and time to be modified with the touch of a button.

- **Fast startup time** — avoid delaying an experiment while the sealer warms up
- **Extremely intuitive** — save time programming the instrument
- **Quickly access sealing protocols** — save programming time by using stored protocols

- **Compact footprint** — accommodate crowded laboratory benches
- **Fully validated** — have confidence in your results

For More Information
Web: bio-rad.com/pcrplatesealer
Request or download bulletin: 6257

See Also

Heat sealing films and foils: page 406.

SsoAdvanced™ universal SYBR® Green supermix: page 377.

iTaq™ universal SYBR® Green supermix: page 380.

Ordering Information

Catalog #	Description
PX1 PCR Plate Sealer	
1814000	**PX1 PCR Plate Sealer**, includes heat sealing instrument, 96-well/384-well plate support block, sealing frame, power cord
Accessories	
1814080	**Sealing Frame**, extra sealing frame for use with PX1 PCR plate sealer, 1
1814085	**Plate Support Block**, extra plate support block for use with PX1 PCR plate sealer, 1
Heat Seals for PX1 PCR Plate Sealer	
1814030	**Optically Clear Heat Seal**, package of 100
1814035	**Permanent Clear Heat Seal**, package of 100
1814040	**Pierceable Foil Heat Seal**, package of 100
1814045	**Peelable Foil Heat Seal**, package of 100

For more information about heat seals that are compatible with the PX1 PCR plate sealer, see page 397.

PCR Plastic Consumables

Bio-Rad thin-wall PCR tubes, PCR plates, seals, and accessories are manufactured for optimal fit and cycling performance in a variety of thermal cyclers and real-time PCR instruments, including all Bio-Rad platforms. These high-quality consumables are suitable for a wide variety of applications. Bio-Rad tubes, tube caps, and PCR plates are molded, inspected, and packaged in a Class 100,000 or 10,000 cleanroom environment to prevent possible nucleic acid or nuclease contamination, then process-sampled and tested to be negative for DNase, RNase, and human DNA.

For More Information
Web: bio-rad.com/pcrplastics
Request or download bulletin: 6090

Instrument Compatibility of PCR Plastic Consumables

	Individual and Strip Tubes			384-Well Plates		96-Well Plates	
	Individual High-Profile	**Strips High-Profile**	**Strips Low-Profile**	**Hard-Shell® Standard**	**Hard-Shell 480**	**Microseal® Semi-Skirted High-Profile**	**Microseal Skirted Low-Profile**
Product	TBI0201, TFI0201, TWI0201 page 396	TBCxxxx,* TBSxxxx* page 396	TLS08xx* page 396	HSP3xxx* page 402	HSR48xx* page 403	MSSxxxx* page 401	MSP9xxx* page 401
Thermal Cycler							
Bio-Rad® C1000™, C1000 Touch™, S1000™	•	•	•	•	•		•
Bio-Rad® DNA Engine®, Tetrad®, Tetrad 2, Dyad®, Dyad Disciple™, PTC-100®	•	•	•	•	•		•
Bio-Rad® T100™, MyCycler™, iCycler®	•	•					
Bio-Rad® MJ Mini™	•	•	•				
Applied Biosystems 0.2 ml tube cyclers (2720, 9700, Veriti)	•	•				•	
Applied Biosystems 0.1 ml tube cyclers (9800 fast, Veriti fast)			•				
Applied Biosystems 384-well cyclers (9700, Veriti)				•	•		
Eppendorf Mastercycler series	•	•	•	•	•		•
Real-Time PCR Instrument							
Bio-Rad® CFX Connect™, CFX96™, CFX96 Touch™, CFX384™,** CFX384 Touch™**			•	•	•		•
Bio-Rad® iCycler iQ®, iQ™5, MyiQ™, MyiQ™2		•					
Bio-Rad® Chromo4™		•	•				•
Bio-Rad® DNA Engine Opticon®, Opticon™ 2			•				•
Bio-Rad® MiniOpticon™**			•				
Applied Biosystems standard systems (7300, 7500, 7900HT, ViiA 7)		•		•	•	•	
Applied Biosystems fast systems (7500 fast, 7900HT fast, StepOne, StepOnePlus, ViiA 7)			•	•	•		
Eppendorf Mastercycler ep *realplex*		•	•				•
Stratagene (Agilent) Mx series		•					
Corbett (QIAGEN) Rotor-Gene	•						
Roche LightCycler 480					•		
Other Instruments							
Applied Biosystems DNA sequencers (3100, 3700, 3730)				•		•	
Idaho Technology LightScanner				•			•

continues

Instrument Compatibility of PCR Plastic Consumables (cont.)

	96- and 48-Well Plates						
	Hard-Shell Semi-Skirted High-Profile	**Hard-Shell Skirted Low-Profile**	**Hard-Shell Semi-Skirted Low-Profile**	**Hard-Shell 480**	**Multiplate™ Unskirted High-Profile**	**Multiplate Unskirted Low-Profile**	**iQ™ Semi-Skirted High-Profile**
Product	HSS9xxx* page 399	HSP9xxx* page 399	HSL9xxx page 399	HSR9xxx page 399	MLPxxxx* page 400	MLLxxxx* page 400	2239441 page 401
Thermal Cycler							
Bio-Rad C1000, C1000 Touch, S1000	•	•	•		•	•	•
Bio-Rad DNA Engine, DNA Engine Tetrad®, DNA Engine Tetrad 2, DNA Engine Dyad®, Dyad Disciple, PTC-100	•	•			•	•	•
Bio-Rad MyCycler					•		•
Bio-Rad T100, iCycler	•				•		•
Bio-Rad MJ Mini					•	•	
Applied Biosystems 0.2 ml tube cyclers (2720, 9700, Veriti)	•				•		•
Applied Biosystems 0.1 ml tube cyclers (9800 fast, Veriti fast)			•			•	
Eppendorf Mastercycler series	•	•	•		•	•	•
Real-Time PCR Instrument							
Bio-Rad CFX Connect, CFX96, CFX96 Touch		•	•			•	
Bio-Rad iCycler iQ, iQ 5, MyiQ, MyiQ2	•				•		•
Bio-Rad Chromo4	•	•			•	•	•
Bio-Rad DNA Engine, DNA Engine Opticon, Opticon 2		•				•	
Bio-Rad MiniOpticon**						•	
Applied Biosystems standard systems (7500, 7900HT, ViiA 7)	•				• Except 7900HT		• Except 7900HT
Applied Biosystems (StepOnePlus)						•	
Applied Biosystems (7500 fast, ViiA 7 fast)			•			•	
Applied Biosystems (QuantStudio 96 Standard)	•						
Eppendorf Mastercycler ep *realplex*	•	•	•		•	•	•
Stratagene (Agilent) Mx series	•				•		•
Roche LightCycler 480/96				•			
Other Instruments							
Applied Biosystems DNA sequencers (3100, 3700, 3730)	•				•		
Idaho Technology LightScanner		•			•	•	

* Go to the page numbers shown for the list of catalog numbers containing this prefix.

** CFX384, CFX384 Touch, and MiniOpticon real-time PCR detection systems are factory calibrated for white tubes and white-well plates. White plastics are recommended due to their superior signal-to-noise ratio. Using clear tubes or clear-well plates on these instruments will require user calibration.

Thin-Wall PCR Tubes

PCR Tubes and Strips

Individual PCR Tubes, 0.2 and 0.5 ml

These high-profile PCR tubes have double-locking caps that won't pop open during cycling. PCR volume ranges are 5–125 µl for 0.2 ml tubes and 10–200 µl for 0.5 ml tubes. Tubes with flat, frosted caps for easy labeling are available in both 0.2 and 0.5 ml sizes (not suitable for real-time PCR). The 0.5 ml individual tubes with attached caps are available in resealable plastic bags of 100 tubes.

PCR Tube and Cap Strips

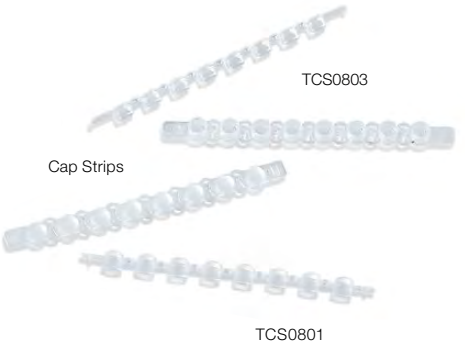
Both tubes and caps are available in strips of 8 or 12 for use in 48- and 96-well sample blocks.

- Tight sealing and convenient handling for multiple samples
- Choice of domed or flat optical cap strips

High-Profile PCR Tube Strips
Recommended reaction volumes are 5–125 µl. Tube strips and domed cap strips are also available packaged together in convenient bags sufficient for 96 samples. The resealable bags protect unused tubes and caps from accidental contamination.

Low-Profile PCR Tube Strips
These tubes reduce the potential for condensation and also allow greater light capture in fluorescence assays such as those performed in real-time PCR. Low-profile tubes are ideal for use in fast and low-volume PCR reactions. Overall height, including flat optical caps and 96-place rack, is 18.3 mm. Tube height is 15.5 mm. Low-profile tubes are available in opaque white for optical applications.

Flat and Domed Cap Strips for PCR Tubes and PCR Plates
These cap strips provide extremely tight sealing of all Bio-Rad PCR tubes and plates during thermal cycling and cold storage. Flat cap strips feature ultraclear upper surfaces, which are ideal for fluorescence applications. Average light transmittance is 1.7-fold higher than with standard-clarity domed cap strips. Flat caps are available in strips of 8 and domed caps are available in strips of 8 or 12. Use of a capping tool is recommended for proper sealing of caps on tubes or plates.



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

Ordering Information

Catalog #	Description
Individual PCR Tubes with Attached Caps (0.2 ml)	
TFI0201	**PCR Tubes with Flat Caps (0.2 ml)**, clear, 1,000
TWI0201	**PCR Tubes with Domed Caps (0.2 ml)**, clear, 1,000
Individual PCR Tubes without Caps (0.2 ml)	
TBI0201	**PCR Tubes without Caps (0.2 ml)**, clear, 1,000
Individual PCR Tubes with Attached Caps (0.5 ml)	
TBI0501	**PCR Tubes with Flat Caps (0.5 ml)**, clear, 1,000 (2 bags of 500)
TBI0502	**PCR Tubes with Flat Caps (0.5 ml)**, clear, 800 (8 bags of 100)
High-Profile Tube Strips without Caps (0.2 ml)	
TBS0201	**8-Tube Strips without Caps**, clear, 125 strips (1,000 PCR tubes)
TBS1201	**12-Tube Strips without Caps**, clear, 100 strips (1,200 PCR tubes)
Low-Profile 8-Tube Strips without Caps (0.2 ml)	
TLS0801	**Low-Profile 8-Tube Strips without Caps**, clear, 120 strips (960 PCR tubes)
TLS0851	**Low-Profile 8-Tube Strips without Caps**, white, 120 strips (960 PCR tubes)
Domed Cap Strips	
TCS0801	**Domed 8-Cap Strips**, for PCR tubes and plates, clear, 130
TCS1201	**Domed 12-Cap Strips**, for PCR tubes and plates, clear, 200
Optical Flat Cap Strips	
TCS0803	**Optical Flat 8-Cap Strips**, for PCR tubes and plates, ultraclear, 120
High-Profile Polypropylene Tube Strips with Domed Cap Strips (0.2 ml)	
TBC0802	**8-Tube Strips and Domed Cap Strips**, clear, 20 bags of 12 x 8-tube strips and 12 x 8-cap strips (1,920 PCR tubes and caps)
TBC1202	**12-Tube Strips and Domed Cap Strips**, clear, 20 bags of 8 x 12-tube strips and 8 x 12-cap strips (1,920 PCR tubes and caps)

Capping Tools and Racks

96-Place PCR Tube Rack and Cover

These stackable storage units for tubes and unskirted and semi-skirted PCR plates provide a stable platform for preparing or centrifuging reactions.

PCR Tube Rack

The PCR tube rack conforms to ANSI/SBS standards and provides a stable platform for PCR tubes and 96-well plates.

Easy Cap™ Tool

The Easy Cap tool provides the pressure necessary to achieve a tight seal, one tube at a time, when capping individual or strip tubes. The narrow end securely fastens domed caps to tubes or 96-well PCR plates. The wide end firmly holds thin-wall 0.5 ml tubes to prevent accidental crushing when opening or closing. The side slot allows easy opening of tight-fitting caps without generating aerosols.

Strip Cap Tool

This tool quickly and easily seals 8- and 12-cap strips on PCR plates or tubes. A grooved channel on one side is designed to seal domed caps, while the flat edge on the opposite side seals flat caps. For best results, seal tube strips while they are in a thermal cycler block or in a 96-place rack.

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

Ordering Information

Catalog #	Description
TRC9601	**PCR Tube Racks**, ANSI/SBS standard, white, 10
TRC0501	**96-Place Racks**, with covers, for PCR tubes and unskirted and semi-skirted microplates, assorted colors, 5
ECT1000	**Easy Cap Tool**, ensures tight seal for 0.2 ml PCR tubes or 96-well microplates
ECT2000	**Strip Cap Tool**, for sealing 8- and 12-cap strips on PCR plates or tubes

PCR Plates

Multiplate™ 48-Well PCR Plates

The versatile, unskirted design and 48-well format make these Multiplate unskirted PCR plates ideal for laboratories using 48-well blocks on Bio-Rad instruments. The plates are suitable for reaction volumes of 5–125 µl. The polypropylene construction of Multiplate PCR plates confers very low protein binding and excellent preservation of sample volume. When less than a full plate is needed, these plates can be easily cut with scissors to the required size. Two plate styles are available:

- **High-profile (20.7 mm) wells, clear color** — designed to fit in most thermal cyclers
- **Low-profile (15.5 mm) wells, clear color or white** — optimized for fast PCR and low-volume reactions

For More Information
Web: bio-rad.com/48wellpcrplates

Multiplate High-Profile 48-Well Unskirted PCR Plate

Multiplate Low-Profile 48-Well Unskirted PCR Plate

Ordering Information

Catalog #	Description
MLP4801	**Multiplate High-Profile 48-Well Unskirted PCR Plates**, clear, 50 plates
MLL4801	**Multiplate Low-Profile 48-Well Unskirted PCR Plates**, clear, 50 plates
MLL4851	**Multiplate Low-Profile 48-Well Unskirted PCR Plates**, white, 50 plates

Hard-Shell® 96-Well PCR Plates

Hard-Shell PCR plates are specifically designed to withstand the stresses of heat sealing, thermal cycling, and robotic handling. The patented* two-component design features a skirt and deck molded from a rigid, thermostable polymer. The thin-wall wells are molded of virgin polypropylene selected for low DNA binding. These plates can withstand –80°C storage and high centrifugation forces, making them convenient for alcohol precipitations. Uniform wells reduce well-to-well variability in optical assays.

- White-well option allows increased fluorescent signal strength
- Black alphanumeric labeling for easy well identification
- Color-coded skirts with clear or white wells
- Low-cost, user-readable barcode option

Hard-Shell Low-Profile 96-Well Skirted PCR Plates

- Reaction volumes of 5–125 µl (200 µl maximum)
- Low-profile (16.06 mm) wells optimized for low-volume reactions and fast PCR
- Full skirt for robotic handling and labeling surface
- Footprint and well spacing that match ANSI/SBS standard dimensions
- Barcoded plates are available

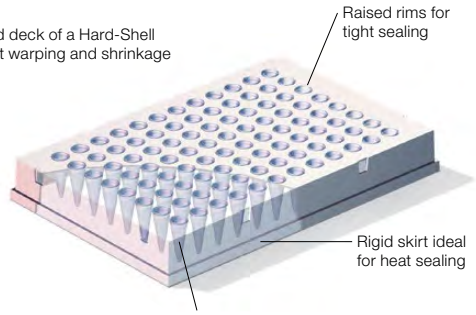
Hard-Shell High-Profile 96-Well Semi-Skirted PCR Plates

- Reaction volumes of 5–125 µl (350 µl maximum)
- High-profile (20.75 mm) wells that fit most thermal cyclers, real-time PCR detection systems, and DNA sequencers
- Warp-free half-height skirt for improved robotic handling
- Barcoded plates are available

Hard-Shell Low-Profile 96-Well Semi-Skirted PCR Plates

- Reaction volumes of 5–125 µl (200 µl maximum)
- Low-profile (15.50 mm) wells optimized for low-volume reactions and fast PCR
- Semi-skirted design enables compatibility with Applied Biosystems 7500 fast and ViiA 7 fast instruments
- Footprint and well spacing that match ANSI/SBS standard dimensions
- Barcoded plates are available

*U.S. patents 6,340,589; 6,528,302; and 7,347,977.



Hard-Shell High-Profile 96-Well Semi-Skirted PCR Plate

Hard-Shell 96-Well 480 PCR Plates

Hard-Shell 96-well 480 PCR plates are optimized to work on the Roche LightCycler 480 and 96 systems with a 96-well block. They are designed to withstand the stresses of thermal cycling. Superior stability and flatness is provided via a two-component design. Features include:

- Designed specifically for the Roche LightCycler 480 and 96
- Extremely uniform wells that reduce well-to-well variability in real-time PCR
- Warp-free skirt and deck
- Black alphanumeric labeling for easy well identification
- Footprint and well spacing that match ANSI/SBS standard dimensions
- Barcoded along row A
- 200 µl maximum volume

For More Information
Web: bio-rad.com/96wellpcrplates
Download bulletin: 5496

See Also
PX1 PCR plate sealer: page 393.
Heat sealing films and foils: page 406.
PCR plate seals: page 404.

Ordering Information

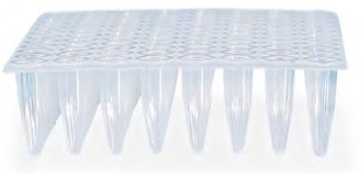
Description	Clear Wells	White Wells	Black Wells
Hard-Shell Low-Profile 96-Well Skirted PCR Plates			
White shell, 50 plates	HSP9601	HSP9655	—
Red shell, 50 plates	HSP9611	—	—
Yellow shell, 50 plates	HSP9621	—	—
Blue shell, 50 plates	HSP9631	HSP9635	—
Green shell, 50 plates	HSP9641	HSP9645	—
Black shell, 50 plates	HSP9661	HSP9665	HSP9666
White shell, barcoded, 50 plates	HSP9901	HSP9955	—
White shell, bulk pack of 400 plates	HSP9601B	—	—
Hard-Shell High-Profile 96-Well Semi-Skirted PCR Plates, 25 plates			
Clear shell	HSS9601	—	—
Green shell	HSS9641	—	—
Black shell	—	HSS9665	—
Clear shell, barcoded	HSS9901	—	—
Hard-Shell Low-Profile 96-Well Semi-Skirted PCR Plates, 25 plates			
Clear shell	HSL9601	HSL9605	—
Green shell	HSL9641	HSL9645	—
Clear shell, barcoded	HSL9901	HSL9905	—

Catalog #	Description
Hard-Shell 96-Well 480 PCR Plates	
HSR9905	**Hard-Shell 96-Well 480 PCR Plates**, clear shell/white well PCR plate for use with Roche LightCycler 480 real-time PCR system, barcoded, rigid 2-component design, 25 plates
HSR9905K	**Hard-Shell 96-Well 480 PCR Plates Kit**, for use with Roche LightCycler 480 real-time PCR system, includes 100 barcoded clear shell/white well PCR plates (4 packs of #HSR9905) and 100 Microseal 'C' optical seals (#MSC1001)
HSR9901	**Hard-Shell 96-Well 480 PCR Plates**, clear shell/clear well PCR plate for use with Roche LightCycler 480 real-time PCR system, barcoded, rigid 2-component design, 25 plates
HSR9901K	**Hard-Shell 96-Well 480 PCR Plates Kit**, for use with Roche LightCycler 480 real-time PCR system, includes 100 barcoded clear shell/clear well PCR plates (4 packs of #HSR9901) and 100 Microseal 'C' optical seals (#MSC1001)

Multiplate™ 96-Well PCR Plates

Multiplate High-Profile 96-Well Unskirted PCR Plates

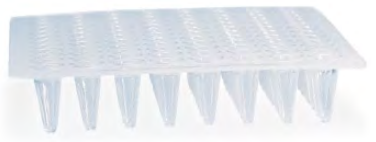
The single-component polypropylene construction of Multiplate PCR plates confers very low protein binding and excellent retention of sample. When less than a full plate is needed, these plates are easily cut with scissors to the required size. The plates are suitable for PCR volumes of 5–125 µl.



Multiplate High-Profile 96-Well Unskirted PCR Plate

Multiplate Low-Profile 96-Well Unskirted PCR Plates

Multiplate low-profile PCR plates combine the unskirted feature of the original Multiplate plate but are 5 mm lower in overall height. The lower height (15.50 mm) reduces the potential for condensation and offers advantages for fast PCR, low-volume reactions, and light capture in fluorescence assays such as real-time PCR. A rigid top surface provides firm handling while still allowing the plate to be cut for use in other formats.



Multiplate Low-Profile 96-Well Unskirted PCR Plate

For More Information
Web: bio-rad.com/96wellpcrplates

Ordering Information

Catalog #	Description
Multiplate High-Profile 96-Well Unskirted PCR Plates	
MLP9601	**Multiplate High-Profile 96-Well Unskirted PCR Plates**, clear, 25 plates
MLP9651	**Multiplate High-Profile 96-Well Unskirted PCR Plates**, white, 25 plates
MLP9631	**Multiplate High-Profile 96-Well Unskirted PCR Plates**, blue, 25 plates
Multiplate Low-Profile 96-Well Unskirted PCR Plates	
MLL9601	**Multiplate Low-Profile 96-Well Unskirted PCR Plates**, clear, 25 plates
MLL9651	**Multiplate Low-Profile 96-Well Unskirted PCR Plates**, white, 25 plates

iQ™ High-Profile 96-Well Semi-Skirted Real-Time PCR Plates

These semi-skirted, high-profile PCR plates are optimized for iQ™5, iCycler iQ®, MyiQ™2, and MyiQ™ real-time PCR detection systems. The semi-skirted design adds stiffness and a labeling surface. Plates are perforated every three columns for easy setup of triplicate reactions.

For More Information
Web: bio-rad.com/96wellpcrplates

Ordering Information

Catalog #	Description
2239441	**iQ High-Profile 96-Well Semi-Skirted PCR Plates**, 25 plates

Microseal® 96-Well PCR Plates

Microseal High-Profile 96-Well Semi-Skirted PCR Plates

These PCR plates are designed for Applied Biosystems 0.2 ml tube cyclers, standard real-time PCR systems, and DNA sequencers. They are not recommended for use in Bio-Rad thermal cyclers because the raised ridges around the plate prevent proper sealing in these instruments.

Microseal High-Profile 96-Well Semi-Skirted PCR Plate

Microseal Low-Profile 96-Well Skirted PCR Plates

These PCR plates feature single-component construction and a skirted design that is suitable for high-throughput plate handling. The robot-friendly design features low-binding polypropylene construction, locator holes, and flat vertical sidewalls for secure handling and easy barcoding. Raised rims around wells provide an excellent surface for tight sealing with a variety of sealing methods and allow easy release of the sealer from the plate. Barcoded plates are also available.

Microseal Low-Profile 96-Well Skirted PCR Plate

For More Information
Web: bio-rad.com/96wellpcrplates

Ordering Information

Catalog #	Description
Microseal High-Profile 96-Well Semi-Skirted PCR Plates	
MSS9601	**Microseal High-Profile 96-Well Semi-Skirted PCR Plates**, clear, 25 plates
Microseal Low-Profile 96-Well Skirted PCR Plates	
MSP9601	**Microseal Low-Profile 96-Well Skirted PCR Plates**, clear, 50 plates
MSP9605	**Microseal Low-Profile 96-Well Skirted PCR Plates**, barcoded, clear, 50 plates

Hard-Shell® 384-Well Standard PCR Plates

Hard-Shell PCR plates are designed to withstand the stresses of thermal cycling and robotic handling. The patented* two-component design provides superior stability and flatness, allowing precise positioning for automation. Features include:

- Reaction volumes of 1–30 µl (50 µl maximum)
- Minimized well-to-well variability that results in extremely uniform results in real-time PCR
- Compatibility with most 384-well thermal cyclers, real-time PCR detection systems, and DNA sequencers
- White-well option for increased fluorescent signal strength
- Color-coded skirts with clear or white wells
- Warp-free skirt and deck for improved robotic handling
- Footprint and well spacing that match ANSI/SBS standard dimensions
- Low-cost, user-readable barcode option

For More Information
Web: bio-rad.com/384wellpcrplates
Download bulletin: 5496

Ordering Information

Description	Clear Wells	White Wells	Black Wells
Hard-Shell 384-Well Standard PCR Plates			
Clear shell, 50 plates	HSP3801	HSP3805	—
Red shell, 50 plates	HSP3811	—	—
Yellow shell, 50 plates	HSP3821	—	—
Blue shell, 50 plates	HSP3831	—	—
Green shell, 50 plates	HSP3841	—	—
Black shell, 50 plates	—	HSP3865	HSP3866
Clear shell, barcoded, 50 plates	HSP3901	HSP3905	—
Clear shell, bulk pack of 500 plates	HSP3801B	—	—

Hard-Shell® 384-Well 480 PCR Plates

Hard-Shell 384-well 480 PCR plates are optimized to work on the Roche LightCycler 480 and a range of Bio-Rad and Applied Biosystems instruments. They are designed to withstand the stresses of thermal cycling and robotic handling. The two-component design provides superior stability and flatness. Features include:

- Reaction volumes of 1–30 µl (50 µl maximum)
- Minimized well-to-well variability that results in extremely uniform results in real-time PCR
- Warp-free skirt and deck for improved robotic handling
- Black alphanumeric labeling for easy well identification
- Footprint and well spacing that match ANSI/SBS standard dimensions
- Barcoded at row A and column 24 side; available in clear or white well

For More Information
Web: bio-rad.com/384wellpcrplates
Download bulletin: 5496

Ordering Information

Catalog #	Description
HSR4805	**Hard-Shell 384-Well 480 PCR Plates**, clear shell/white well PCR plate for Roche LightCycler 480 real-time PCR system, barcoded, rigid 2-component design, 50 plates
HSR4805K	**Hard-Shell 384-Well 480 PCR Plates Kit**, for use with Roche LightCycler 480 real-time PCR system, includes 100 barcoded clear shell/white well PCR plates (2 packs of #HSR4805) and 100 Microseal 'C' optical seals (#MSC1001)
HSR4801	**Hard-Shell 384-Well 480 PCR Plates**, clear shell/clear well PCR plate for Roche LightCycler 480 real-time PCR system, barcoded, rigid 2-component design, 50 plates
HSR4801K	**Hard-Shell 384-Well 480 PCR Plates Kit**, for use with Roche LightCycler 480 real-time PCR system, includes 100 barcoded clear shell/clear well PCR plates (2 packs of #HSR4801) and 100 Microseal 'C' optical seals (#MSC1001)

Microseal® 384-Well Skirted PCR Plates

Microseal 384-well skirted PCR plates feature single-component construction and are ideal for high-throughput thermal cycling applications.

- Barcoded plates are available
- Footprint and well spacing that match ANSI/SBS standard dimensions

For More Information
Web: bio-rad.com/384wellplates

Ordering Information

Description	50 Plates	Barcoded, 50 Plates
Microseal 384-Well Skirted PCR Plates		
Clear	MSP3842	MSP3846
White	MSP3852	—
Black	MSP3862	—

* U.S. patents 6,340,589; 6,528,302; and 7,347,977.

PCR Seals

Effective sealing is essential for PCR and qPCR reactions. Besides cap strips (pages 396–397), Bio-Rad offers many sealing options to fit your needs.

PCR Plate Seals

Microseal® 'C' Optical Seals
- Optically clear adhesive films designed for tight seals even on wells with raised rims
- Pressure-sensitive adhesive allows easy application during plate sealing
- Designed with superior optical properties for real-time PCR

Microseal 'B' Adhesive Seals, Optically Clear
- Strongest adhesive-based optically clear sealing option designed for real-time PCR plates
- Withstands multiple storage or transport temperatures (–40 to 110°C)

Microseal 'A' Film
- A nonoptical, nonadhesive sealing option for quick pressure-based sealing of plates
- Allows easy removal without the risk of aerosol formation, minimizing cross-contamination
- Convenient option for standard PCR needs

Microseal 'F' Foil
- Aluminum foil allows opaque sealing option for DNA sequencing (ABI 3700 DNA analyzer) and sample storage
- Acts as a barrier against evaporation in extreme temperatures (–80 to 105°C)
- Pierceable foil for easy sample retrieval

Microseal 'C' Optical Seals

Microseal 'B' Adhesive Seals

Microseal 'A' Film

Microseal 'F' Foil

96-Well PCR Plate Sealing Mats
These reusable mats are convenient for sealing 96-well PCR plates; they are not suitable for qPCR.

Pressure Pad
This foam pad with magnet distributes lid pressure uniformly over sealing film on plates used in thermal cyclers.

Optical Compression Pad (96-well)
This compression pad enhances the seal integrity of Microseal 'B' clear seals when used in real-time PCR detection systems.

Optical Film Sealing Kit
The sealing kits contain 100 Microseal 'B' clear seals and an optical compression pad.

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

96-Well PCR Plate Sealing Mat

Sealing Roller

Optical Compression Pad

Ordering Information

Catalog #	Description
MSC1001	**Microseal 'C' Optical Seals**, 100 pressure-sensitive adhesive seals
MSA5001	**Microseal 'A' Film**, 50 seals
MSB1001	**Microseal 'B' Adhesive Seals**, 100 optically clear seals
MSF1001	**Microseal 'F' Foil**, 100 adhesive seals
MSR0001	**Sealing Roller**, for sealing PCR plates with films
ADR3296	**Optical Compression Pad**, for improved film sealing of 96-well plates in DNA Engine Opticon 2 and Chromo4 systems
ADR5001	**Pressure Pad**, uniformly distributes lid pressure for sealing film
MSO1001	**Optical Film Sealing Kit**, for 96-well plates, includes optical compression pad, 100 Microseal 'B' clear adhesive seals
2239442	**96-Well PCR Plate Sealing Mats**, 5

See Also
PX1 PCR plate sealer: page 393.
PCR plates: page 398.

Heat Sealing Films and Foils

Bio-Rad offers a family of heat sealing films and foils for use with the PX1™ PCR plate sealer. These sealing solutions help deliver consistent and reliable data by minimizing sample evaporation during thermal cycling.

For More Information
Web: bio-rad.com/heatseals
Request or download bulletin: 6257

Optically Clear Heat Seals

These clear polymer films provide a secure sealing option for PCR and real-time PCR applications. The seals are peelable pre- and post-cycling, allowing easy sample retrieval when desired. Features include:

- High light transmission, ideal for optical assays
- Low level of autofluorescence to minimize interference with qPCR detection
- Clear film enables easy inspection of sample wells
- Seal integrity from –80 to 110°C

Optically Clear Heat Seal

Permanent Clear Heat Seal

These seals provide the strongest heat sealing option and are ideal when seals will not be removed. These seals are recommended for water bath cycling. Features include:

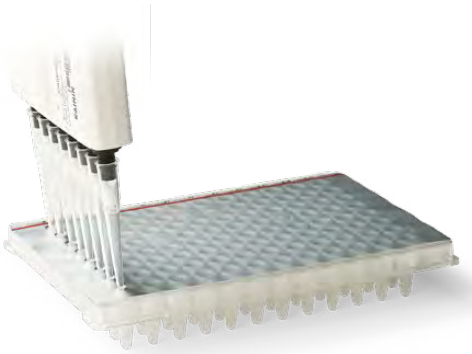
- Strong permanent adhesive can withstand water bath cycling
- Clear film enables easy inspection of sample wells
- High solvent resistance
- Seal integrity from –80 to 110°C

Permanent Clear Heat Seal

Pierceable Foil Heat Seal

This seal provides a secure sealing option for standard PCR and Droplet Digital™ PCR (ddPCR™) applications. This pierceable foil film enables sample retrieval from select wells. Plates with pierced seals can be resealed with another pierceable foil heat seal. Features include:

- Compatible with Droplet Digital PCR as validated using the QX200™ ddPCR system workflow
- High solvent resistance
- Colored stripe clearly identifies sealing surface
- Seal integrity from –20 to 110°C



Pierceable Foil Heat Seal

Peelable Foil Heat Seal

The peelable foil heat seal is ideal for sample storage. This seal can be easily peeled from PCR plates stored in a –80°C freezer or in liquid nitrogen. This seal is also validated for sealing PCR plates. Features include:

- Forms a peel-away seal
- Moderate solvent resistance
- Seal integrity from –200 to 110°C

Peelable Foil Heat Seal

For More Information
Web: bio-rad.com/heatseals
Request or download bulletin: 6257

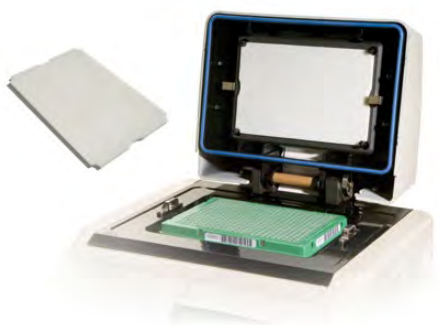
Ordering Information

Catalog #	Description
1814030	**Optically Clear Heat Seal**, package of 100
1814035	**Permanent Clear Heat Seal**, package of 100
1814040	**Pierceable Foil Heat Seal**, package of 100
1814045	**Peelable Foil Heat Seal**, package of 100

Sealing Pads for Automation

Microseal® 'P' and 'P+' Sealing Pads

These reusable sealing pads are designed to adhere to a motorized heated lid. Use 'P' pads with Power Bonnet™ lids, and 'P+' pads with Moto Alpha™ units. Microseal 'P+' pads provide improved sealing of low-volume reactions — as low as 5 µl in 96-well plates and 1 µl in 384-well plates. Each pad may be used for approximately 25 runs.

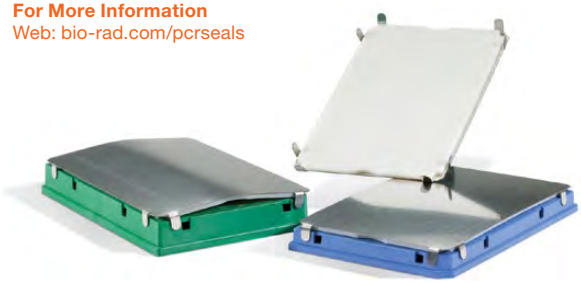


Microseal 'P+' Sealing Pad

Auto-Sealing Lids for PCR Plates

These lids are reusable, automation-friendly sealers that prevent evaporation and contamination during reaction assembly and seal tightly for thermal cycling when the cycler lid is closed. They can be reused up to 50 times. The lids are constructed of metal with an attached compressible pad. Two varieties are available: a self-releasing arched lid and an arched lid with wide tabs for robotic grippers.

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



Auto-Sealing Lids

Ordering Information

Catalog #	Description
Microseal 'P' and 'P+' Pads	
MSP1001	**Microseal 'P' Pads**, reusable, for Power Bonnet lids, 10
MSP1002	**Microseal 'P+' Pads**, reusable, for Moto Alpha unit lids, 10
MSP1003	**Microseal 'P' Replacement Pads**, for MSL2032, reusable, 10
Auto-Sealing Lids for PCR Plates	
MSL2022	**Arched Auto-Sealing PCR Plate Lids**, reusable, 4
MSL2032	**Arched Auto-Sealing PCR Plate Lids with Wide Tabs**, reusable, 4

Chill-out™ Liquid Wax

Chill-out liquid wax provides an excellent vapor barrier that may be used instead of mineral oil in thermal cyclers without heated lids. After cycling, the tubes are chilled below 10°C to harden the wax. The solid layer protects samples from spills or aerosol formation but is easy to penetrate with a pipet tip for sample retrieval. Chill-out liquid wax is available in a clear formulation for use in fluorescence assays, such as those performed in real-time PCR, and in a bright red formulation, easily visible when recovering reaction products (not recommended for sealing Microseal® 384-well PCR plates).

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

Ordering Information

Catalog #	Description
CHO1401	**Chill-out Liquid Wax**, red, 100 ml
CHO1404	**Chill-out Liquid Wax**, red, 1 L
CHO1411	**Chill-out Liquid Wax**, clear, optical grade, 100 ml
CHO1414	**Chill-out Liquid Wax**, clear, optical grade, 1 L

Frame-Seal™ Incubation Chambers

Frame-Seal incubation chambers are easy-to-use, strongly adhesive hybridization chambers with flexible plastic coverslips. They provide vapor-tight sealing for FISH, polonies, in situ PCR, and PRINS and allow samples to be recovered easily. The seal withstands temperatures up to 97°C. Frame-Seal chambers should be used with plain (unprinted) glass slides. Slides with highly hydrophobic ink patterns are not recommended for use with Frame-Seal chambers. They are UV-treatable for inactivation of contaminating DNA.

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

Ordering Information

Catalog #	Description
SLF0201	**Frame-Seal Incubation Chambers**, 9 x 9 mm, 25 µl capacity, coverslips included, 100
SLF0601	**Frame-Seal Incubation Chambers**, 15 x 15 mm, 65 µl capacity, coverslips included, 100
SLF1201	**Frame-Seal Incubation Chambers**, 17 x 28 mm, 125 µl capacity, coverslips included, 100
SLF3001	**Frame-Seal Incubation Chambers**, 19 x 60 mm, 300 µl capacity, coverslips included, 100

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Plastic Consumables and General Laboratory Equipment

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General Laboratory Equipment **422**

Plastic Consumables

For liquid-handling applications, Bio-Rad offers pipets, pipet tips, reagent reservoirs, 96-well EIA plates, and tubes.

Pipets

A full set of high-precision micropipets is available for all your liquid handling needs.

Micropipets and Accessories

Professional Micropipets
These adjustable-volume digital pipets deliver exceptional performance and are guaranteed to function efficiently and reliably for years. Micropipets are available in five volume ranges: 0.1–2.0, 0.5–10, 2–20, 20–200, and 100–1,000 µl.

Micropipet features include:

- Adjustable digital dial with volume lock
- Improved ergonomic handle and tip ejector
- Accommodation of standard pipet tips and serological pipets
- 3-year warranty*
- Fully autoclavable*

* Except pipet controller.

Professional Micropipets

Professional Micropipet Specifications

	Volume Range, µl	Channels	Adjustable-Volume Increments, µl
P2	0.1–2.0	1	0.002
P10	0.5–10	1	0.02
P20	2–20	1	0.02
P200	20–200	1	0.2
P1000	100–1,000	1	2.0
8-channel, P50	5–50	8	0.2
8-channel, P200	20–200	8	0.2

8-Channel Professional Micropipet
These multichannel micropipets are ideal for use with standard 96-well formats. They have an adjustable working volume range of 5–50 µl or 20–200 µl. A volume lock feature will prevent any accidental volume changes. Along with its ergonomic handle for right- and left-hand use, the manifold can rotate 360° for added pipetting comfort. A curved ejector design pushes tips off in a single step with minimal applied force.

Each channel has an independent precision piston assembly to ensure accuracy and reproducibility from one pipetting series to the next as well as between channels. Each pipet has been tested and supplied with a certificate of quality and a calibration key. The multichannel pipet is fully autoclavable.

8-Channel Professional Micropipet

Professional Pipet Controller
This lightweight, ergonomic, cordless pipet controller can be used with all plastic or glass pipets between 0.1 and 100 ml. Single-hand operation is easy with two-button speed control for aspirating and dispensing. A large LCD display clearly indicates battery status, pipet mode, and pipet speed. The unit comes with a bench stand, wall mount, charger, and 0.45 µm filter.

Pipet Controller

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

Professional Micropipet Set with Backpack
The professional micropipet set with backpack is a ready-to-go, complete set for those who need to start up a new lab or refresh lab equipment to meet their pipetting needs. This set comes with four professional micropipets (0.5–10, 2–20, 20–200, and 100–1,000 µl), a round carousel pipet rack that can hold up to six single-channel micropipets, four racks of Bio-Rad pipet tips (TBR-14, -35, -40, and Prot/Elec™) for general lab use, and a Bio-Rad backpack.

Carousel Pipet Rack
This round benchtop pipet rack holds up to six single-channel pipets.

Professional Micropipet Set with Backpack

Ordering Information

Catalog #	Description
1660499	**Professional Micropipet**, adjustable volume, 0.1–2.0 µl
1660505	**Professional Micropipet**, adjustable volume, 0.5–10 µl
1660506	**Professional Micropipet**, adjustable volume, 2–20 µl
1660507	**Professional Micropipet**, adjustable volume, 20–200 µl
1660508	**Professional Micropipet**, adjustable volume, 100–1,000 µl
1660496	**Professional Micropipet**, 8-channel, adjustable volume, 5–50 µl
1660495	**Professional Micropipet**, 8-channel, adjustable volume, 20–200 µl
1660486	**Professional Micropipet Set with Backpack**, set includes 4 professional series micropipets: P10, P20, P200, P1000, carousel pipet rack, 4 racks of pipet tips (TBR-14, -35, -40, Prot/Elec), and Bio-Rad backpack
1660490	**Professional Pipet Controller**, 120 V, 0.1–100 ml, includes bench stand, charger, wall mount, 0.45 µm filter
1660491	**Professional Pipet Controller**, 220 V, 0.1–100 ml, includes bench stand, charger, wall mount, 0.45 µm filter
1660487	**Carousel Pipet Rack**, holds 6 single-channel micropipets

Pipet Tips

Bio-Rad's pipet tips are made from virgin polypropylene and have been accurately molded for an airtight fit. The tips are guaranteed to have a smooth interior surface, which is essential for precision pipetting.

- Tips and racks are autoclavable at 120°C at 15 lb of pressure for 15 min; tips presterilized by e-beam irradiation are also available
- All materials used in both clear and colored pipet tips have been formulated without heavy metals
- Xcluda™ pipet tips have been independently tested and certified to be free of DNase, RNase, and pyrogens
- Pipet tip racks are manufactured from polypropylene, with a plastic content code of 5, and are free of labels for convenient recycling

Tip Selection Guide

Pipet Type	Tip Type
Bio-Rad Professional	
0.1–2.0 µl	Xcluda™ A, Seque/Pro™, BR-14, TBR-14
0.5–10 µl	Xcluda A, Seque/Pro, BR-31, TBR-14
2–20 µl	Xcluda B, Prot/Elec™, BR-35, TBR-35
20–200 µl	Xcluda D, Prot/Elec, MTP-26, -35, -37, -38, MTP-28-S, BR-35, -37, -38, -39, TBR-35
100–1,000 µl	Xcluda H, BR-40, 41, TBR-40, -41
Costar (8-Pette, 12-Pette)	
20–200 µl	28
25–200 µl	28
Eppendorf	
0.5–10 µl	Seque/Pro, Xcluda F, 31
2–20 µl	Prot/Elec, Xcluda B, 14, 35, 37–39
10–100 µl	Prot/Elec, Xcluda C and G, 35, 37–39
50–250 µl	39, 40, 41
100–1,000 µl	Xcluda H, 41
Excalibur	
1–200 µl	Prot/Elec, 35, 37–39
200–1,000 µl	40, 41
Thermo Labsystems Finnpipette	
5–40 µl	Prot/Elec, Xcluda B, C, G, 35, 37–39
40–200 µl	Prot/Elec, Xcluda C and G, 35, 37–39
200–1,000 µl	Xcluda E

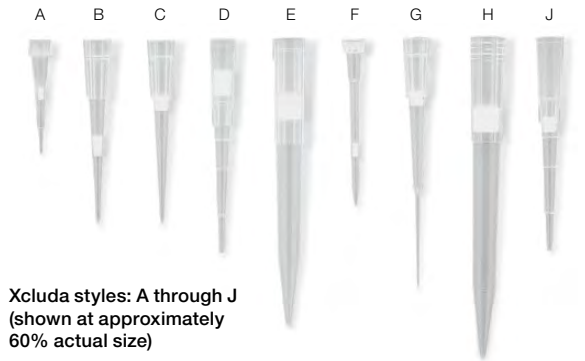
Pipet Type	Tip Type
Oxford Benchmate	
0.5–10 µl	Seque/Pro, Xcluda A, 14
10–50 µl	Xcluda J, 35, 37–39
40–200 µl	Prot/Elec, Xcluda C, D, G, 35, 37–39
200–1,000 µl	Xcluda E
Rainin Pipetman and EDP Series	
0.1–10 µl	Seque/Pro, Xcluda F, 31
2–20 µl	Prot/Elec, Seque/Pro, Xcluda B, 31, 35, 37–39
10–100 µl	Prot/Elec, Xcluda C and G, 35, 37–39
20–200 µl	Prot/Elec, Xcluda D, 35, 37–39
100–1,000 µl	Xcluda E, 40, 41
Socorex	
0.5–10 µl	Seque/Pro
1–200 µl	Prot/Elec, 35, 37–39
200–1,000 µl	40, 41
Titertek Flow	
5–200 µl	26
5–300 µl	Xcluda D
Volac	
1–20 µl	Prot/Elec, 31, 35, 37–39
1–200 µl	Prot/Elec, 35, 37–39
200–1,000 µl	40, 41

See Also
Thermal cyclers for PCR: page 359.
Real-time PCR systems: page 363.

Xcluda™ Aerosol Barrier Pipet Tips

Xcluda aerosol barrier pipet tips guard against aerosol contamination of samples, a feature of particular importance in PCR experiments. The barrier will not seal on contact with liquid, which protects samples from accidental loss, if unintentional overpipetting occurs. Offered in nine different styles, the tips fit a variety of pipets. They are available presterilized in fully enclosed racks and are independently tested and certified to be free of DNase, RNase, and pyrogens.

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



Xcluda styles: A through J (shown at approximately 60% actual size)

Ordering Information

Catalog #	Description
2112001	**Xcluda Style A**, 0.5–10 µl, 960
2112006	**Xcluda Style B**, 2–20 µl, 960
2112011	**Xcluda Style C**, 10–100 µl, 960
2112016	**Xcluda Style D**, 20–200 µl, 960
2112021	**Xcluda Style E**, 100–1,000 µl, 960
2112026	**Xcluda Style F**, 0.5–10 µl, 1,000
2112031	**Xcluda Style G**, 10–100 µl, 1,000
2112036	**Xcluda Style H**, 100–1,000 µl, 1,000
2112041	**Xcluda Style J**, 10–100 µl, 960
1660491	**Professional Pipet Controller**, 220 V, 0.1–100 ml, includes bench stand, charger, wall mount, 0.45 µm filter
1660492	**Professional Pipet Controller**, 220 V for Australia, 0.1–100 ml, includes bench stand, charger, wall mount, 0.45 µm filter
1660487	**Carousel Pipet Rack**, holds 6 single-channel micropipets

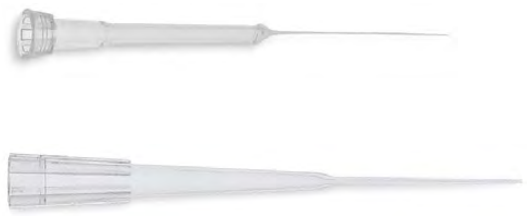
Pipet Tips for Gel Loading

Seque/Pro™ Capillary Pipet Tips

Seque/Pro capillary pipet tips have an average OD of <0.3 mm, making them ideal for loading sequencing gels or IEF tube gels. Seque/Pro tips perform best when used with Eppendorf ultra micropipets (0.5–10 µl) and can also be used with Rainin Pipetman 10 and 20 µl pipets.

Prot/Elec™ Pipet Tips

Prot/Elec tips fit easily within a gap of 0.75 mm between vertical slab gel plates while maintaining a large bore for fast sample flow. The 200 µl capacity tips are molded to fit Rainin Pipetman 20, 100, and 200 pipets and Eppendorf 20 and 100 µl pipets. Prot/Elec tips are also available with an aerosol barrier to guard against airborne contaminants and cross-contamination of samples (see Xcluda style G).



For More Information
Web: bio-rad.com/gelloading
Request or download bulletin: 5676

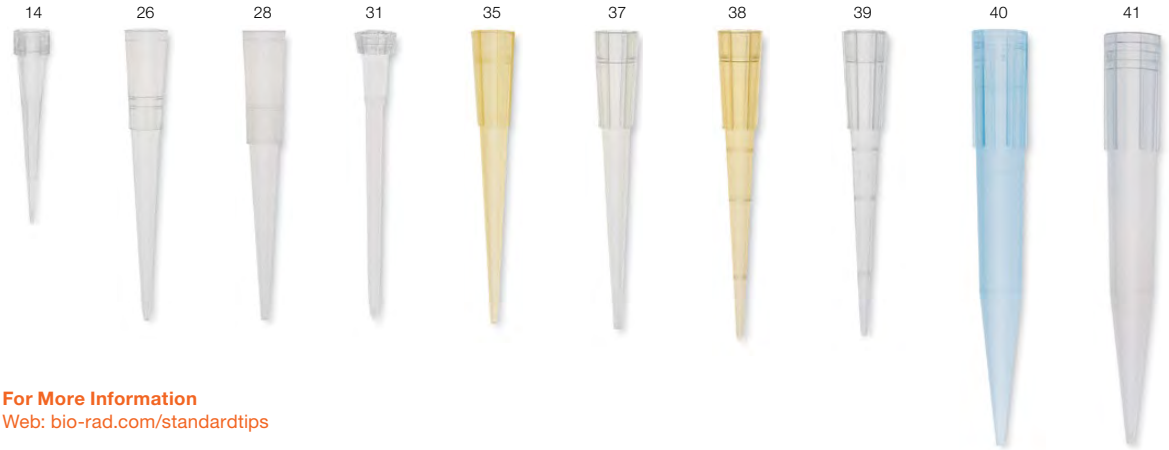
See Also
Vertical electrophoresis systems: pages 180–204.

Ordering Information

Catalog #	Description
2239911	**Seque/Pro Capillary Pipet Tips**, in enclosed autoclavable rack, 0.5–10 µl, 200
2239912	**Seque/Pro Capillary Pipet Tips**, sterilized in enclosed rack, 0.5–10 µl, 200
2239915	**Prot/Elec Pipet Tips**, bulk pack, plastic bag in dust-free box, 1–200 µl, 1,000
2239917	**Prot/Elec Pipet Tips**, racked, 12 x 17 format, 204 per rack with a cover on each rack, 1–200 µl, 1,020
2239916	**Prot/Elec Pipet Tips**, racked, 8 x 12 format, 96 per rack with a cover on each rack, 1–200 µl, 960

Standard Pipet Tips

See Also
PCR tubes: pages 396–397.

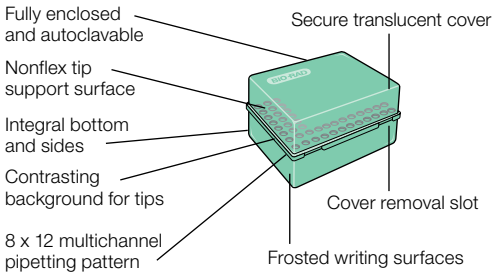


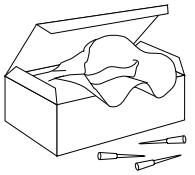
For More Information
Web: bio-rad.com/standardtips

Tip Packaging Options

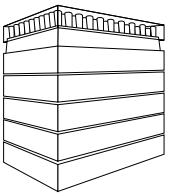
	Standard Tip Type Number									
Packaging Option	**14**	**26**	**28**	**31**	**35**	**37**	**38**	**39**	**40**	**41**
BR	•		•	•	•	•	•	•	•	•
RBR					•					
TBR	•				•				•	•
MTP		•			•	•	•			
MTP-S (sterilized)			•		•	•	•			

MTP
8 x 12 format, enclosed, nonflex racks are suitable for repeated reloading and autoclaving. Racked tips are also available presterilized.

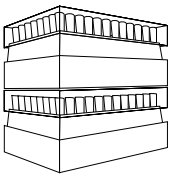




BR
Bulk tips, plastic bag in a dust-free box.



RBR
Racked tips, one cover on a stack of nested racks.



TBR
Ideal for autoclaving, each rack has its own lid and covered bottom for full enclosure.

Ordering Information

Catalog #	Description
MTP 8 x 12 Format, Enclosed Racks	
2239301	**MTP-26 Tips**, clear, 5–200 µl, 960
2239303	**MTP-35 Tips**, yellow, 1–200 µl, 960
2239304	**MTP-37 Tips**, clear, 1–200 µl, 960
2239313	**MTP-38 Tips**, yellow, graduated, beveled, 1–200 µl, 960
MTP-S 8 x 12 Format, Enclosed Racks, Presterilized*	
2239307	**MTP-28-S Tips**, clear, 25–200 µl, 960
2239308	**MTP-35-S Tips**, yellow, 1–200 µl, 960
2239309	**MTP-37-S Tips**, clear, 1–200 µl, 960
2239318	**MTP-38-S Tips**, yellow, graduated, beveled, 1–200 µl, 960
BR Bulk Tips	
2239014	**BR-14 Tips**, clear, 0.1–10 µl, 1,000
2239028	**BR-28 Tips**, clear, 25–200 µl, 1,000
2239031	**BR-31 Tips**, clear, 0.5–10 µl, 1,000
2239035	**BR-35 Tips**, yellow, 1–200 µl, 1,000
2239037	**BR-37 Tips**, clear, 1–200 µl, 1,000
2239038	**BR-38 Tips**, yellow, graduated, beveled, 1–200 µl, 1,000
2239039	**BR-39 Tips**, clear, graduated, beveled, 1–200 µl, 1,000
2239040	**BR-40 Tips**, blue, 100–1,000 µl, 500
2239041	**BR-41 Tips**, clear, 100–1,000 µl, 500
RBR Racked Tips, One Cover on Nested Racks	
2239135	**RBR-35 Tips**, yellow, 1–200 µl, 1,000
TBR Racked Tips, Cover on Each Rack	
2239354	**TBR-14 Tips**, clear, 0.1–10 µl, 1,000
2239347	**TBR-35 Tips**, yellow, 1–200 µl, 1,000
2239350	**TBR-40 Tips**, blue, 100–1,000 µl, 1,000
2239351	**TBR-41 Tips**, clear, 100–1,000 µl, 1,000

* Presterilized racks and polyethylene plugs are not suitable for autoclaving. Order unsterilized racks to reload tubes and autoclave.

Micro Test Tubes

Titertube® Micro Test Tubes

Tubes and racks are made of polypropylene; they are autoclavable to 120°C and freezable to –80°C. The polyethylene plugs, which seal tightly for storage, are not designed for repeated use and cannot be autoclaved. The tubes are offered in sterile and unsterilized strips of eight, which may be cut to separate the tubes. Titertube micro test tubes have:

- 1 ml capacity, 8.8 x 45 mm
- Spacing that matches 96-well plates
- Enclosed racks that stack to store 5,800 samples/ft^3
- Racks with a grid for identification of contents

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

Ordering Information

Catalog #	Description
2239390	**Titertube Micro Test Tubes**, unsterilized, 10 racks of 96 tubes
2239395*	**Titertube Micro Test Tubes**, presterilized, 10 racks of 96 tubes
2239391	**Titertube Micro Test Tubes**, unsterilized, bulk, 1,000
2239393	**Titertube Plugs**, unsterilized, 960 in 120 strips of 8
2239392*	**Titertube Plugs**, presterilized, 960 in 120 strips of 8
2239394	**Titertube Rack**, empty, holds 96 Titertube micro test tubes, 10

* Presterilized racks and polyethylene plugs are not suitable for autoclaving. Order unsterilized racks to reload tubes and autoclave.

EZ Micro™ and Standard Micro Test Tubes

EZ Micro graduated polypropylene test tubes have a frosted marking area and a flat top that is pierceable by a 19 gauge or thicker needle. Standard polypropylene micro test tubes are recommended for solvent extraction and heating when a very tight cap seal is required. Because of their tighter cap fit, standard tubes may be more difficult to manipulate in applications that require repeated opening and closing of the tubes. Separate polyethylene caps for the 1.5 ml capless tubes have a knurled top for easy handling.

For More Information
Web: bio-rad.com/ezmicro
Request or download bulletin: 5676

The micro test tubes are:

- Suitable for general-purpose benchtop centrifuge use; sturdy uniform walls easily withstand up to 13,000 x g
- Autoclavable* to 120°C; freezable to –80°C
- Available in 2 ml, 1.5 ml, and 500 µl sizes

* 1.5 ml colored microcentrifuge tubes are not autoclavable.

Ordering Information

Catalog #	Description
2239503	**EZ Micro Test Tubes**, 500 µl, clear, 1,000
2239480	**EZ Micro Test Tubes**, 1.5 ml, clear, 500
2239430*	**EZ Micro Test Tubes**, 2 ml, clear, 500
2239501	**Micro Test Tubes**, standard, 1.5 ml, clear, 500
2239500	**Micro Test Tubes**, capless, 1.5 ml, polypropylene, clear, graduated, 500
2239490	**Separate Caps**, for capless micro test tubes, white, 1,000
1660473	**Colored Microcentrifuge Tubes**, 1.5 ml, 6 colors, 600

* To fit centrifuges, 2 ml tubes have thinner walls than standard tubes and are intended for short runs at less than 13,000 x g. Heavy samples, high g forces, long runs, or centrifuges that radiate excessive heat may damage these tubes.

Screwcap Micro Test Tubes

Screwcap micro test tubes and caps are made of polypropylene. O-rings are made of a blend of polyethylene and polypropylene. Features include:

- O-ring operating range from –55 to 150°C
- Uniform walls for uniform heat transfer
- Conical bottoms for pellet collection
- Knurled caps for easy handling

For More Information
Web: bio-rad.com/screwcap
Request or download bulletin: 5676

Ordering Information

Catalog #	Description
2240165	**0.5 ml Conical Tubes**, with installed O-ring screwcaps, sterilized, 500
2240185	**0.5 ml Skirted Tubes**, with installed O-ring screwcaps, sterilized, 500
2240100	**1.5 ml Conical Tubes**, with separate O-ring screwcaps, unsterilized, 500
2240110	**1.5 ml Conical Tubes**, with installed O-ring screwcaps, sterilized, 500
2240130	**2.0 ml Skirted Tubes**, with separate O-ring screwcaps, unsterilized, 500
2240140	**2.0 ml Skirted Tubes**, with installed O-ring screwcaps, sterilized, 500

Reservoirs, EIA Plates, and Additional Plastic Products

Reagent Reservoirs

Disposable reagent reservoirs are presterilized and compatible with multichannel pipets. Their sloping design enables effective liquid pickup. The 50 ml capacity is graduated to 25 ml in 5 ml increments.

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

Reagent Reservoir

Ordering Information

Catalog #	Description
2244872	**Sterilized Reagent Reservoirs**, graduated, polystyrene, 5 per package, box of 200

96-Well EIA Plates

For EIAs, ELISAs, and other protein-binding assays, use the Costar 96-well flat bottom EIA plate. This plate binds more protein more uniformly than any other plate.

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

Costar 96-Well
Flat Bottom EIA Plate

Ordering Information

Catalog #	Description
2240096	**Costar 96-Well Flat Bottom EIA Plates**, polystyrene, 5 per package, box of 100

See Also
PCR tubes: pages 396–397.
ELISA reagents: page 328.
Microplate readers: page 326.

See Also
Cuvettes: pages 23–24.

Tube Racks and Storage Boxes

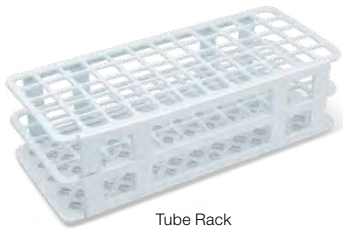
Bio-Rad plastic racks and storage units provide the ultimate in ease of storage and sample organization.

Racks and Storage Box Selection Guide

	Capacity	Dimensions (W x D x H)
Green racks	80 x 1.5/2.0 ml tubes	6.1 x 23.1 x 2.7 cm
Tube racks	60 x 15 ml 24 x 50 ml	10.5 x 24.6 x 7.2 cm 11.0 x 30.0 x 8.5 cm
Storage boxes	100 x 1.5/2.0 ml tubes	14.2 x 14.2 x 5.5 cm

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

Storage Boxes and Green Rack


Tube Rack

Ordering Information

Catalog #	Description
1660481	**Green Racks**, hold 80 x 1.5/2.0 ml tubes, set of 5
1660483	**Tube Racks**, hold 60 x 15 ml tubes, set of 5
1660484	**Tube Racks**, hold 24 x 50 ml tubes, set of 5
1660482	**Storage Boxes**, hold 100 x 1.5/2.0 ml tubes, set of 5, multicolored

Additional Plastic Consumables

Bio-Rad now offers a wide selection of disposable plastic components for your everyday cell/bacterial culturing uses in the lab.

- **Petri dishes** – ready-to-use polystyrene cell and bacterial culture petri dishes, 60 mm diameter, sterile
- **Gel staining trays** — disposable plastic trays ideal for staining mini gels
- **Inoculation loops** — the loops are smooth and flexible, making it easy to achieve uniform and smooth streaking without damaging the agar surface. Using disposable inoculation loops eliminates the risk of cross-contamination due to improper sterilization and the loops do not need flaming, which reduces fire hazards in the laboratory; 10 µl, sterile
- **Jellyfish foam floating racks** — hold up to 12 microcentrifuge tubes, for use in cold and hot water baths
- **Disposable plastic transfer pipets** — polyethylene plastic pipet bulbs for liquid handling needs; sterile and nonsterile pipets are available
- **Conical centrifuge tubes** — 15 ml polypropylene conical tubes with volume graduations and screw caps
- **Cell culture tubes** — round bottom snap cap culture tube, 14 ml, sterile

Gel Staining Trays

Petri Dishes

15 ml Conical Centrifuge Tubes

Jellyfish Foam Floating Rack

Disposable Plastic Transfer Pipets

Inoculation Loops

Cell Culture Tubes

Ordering Information

Catalog #	Description
1660476	**Cell Culture Tubes**, 17 x 100 mm, 14 ml, sterile, 25
1660475	**Conical Centrifuge Tubes**, 15 ml, 50
1660470	**Petri Dishes**, 60 mm diameter, sterile, 500
1660471	**Inoculation Loops**, 10 µl, sterile, 80
1660474	**Disposable Plastic Transfer Pipets**, sterile, 1 ml, graduated, 500
1660480	**Disposable Plastic Transfer Pipets**, nonsterile, 1 ml, graduated, 500
1660477	**Gel Staining Trays**, 4
1660479	**Jellyfish Foam Floating Racks**, 8

General Laboratory Equipment

See Also

UView 6x loading dye: page 266.

UView™ Transilluminator

Visualize your gel using the compact UView transilluminator.

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

Ordering Information

Catalog #	Description
1660531	**UView Transilluminator**

Centrifuges

- **Mini centrifuge** — includes microtube and PCR strip tube rotors and 0.4 and 0.5 ml tube adaptors; the maximum speed is 6,000 rpm (2,000 x g)
- **Model 16K microcentrifuge** — accommodates 1.5 or 2.0 ml tubes and has a quick-spin feature; the maximum speed is 14,000 rpm (16,000 x g). Safe for coldroom operation
- **PCR tube adaptor for model 16K microcentrifuge** — holds two PCR 8-tube strips or 16 individual 0.2 ml tubes

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

Model 16K Microcentrifuge
(PCR tube adaptor sold separately)

Mini Centrifuge
(includes PCR tube adaptor)

Ordering Information

Catalog #	Description
1660603	**Mini Centrifuge**, 120 V
1660613	**Mini Centrifuge**, 220 V
1660623	**Mini Centrifuge**, 220 V (UK)
1660602	**Model 16K Microcentrifuge**, 120 V
1660612	**Model 16K Microcentrifuge**, 220 V
1660620	**PCR Tube Adaptor**, for model 16K microcentrifuge

Mixing Devices

- **Mini rocker** — provides superior three-dimensional mixing action; gentle yet thorough rocking makes it ideal to use for western blot incubations and gel staining. Compact footprint requires minimal benchspace
- **Tube roller** — allows mixing of samples both horizontally and vertically. The compact design enables it to fit inside our mini incubation oven, making it ideal for mixing liquids while incubating. Comes with three interchangeable tube rotisseries to accommodate tubes from 1.5–50 ml. Compact footprint requires minimal benchspace
- **BR-2000 vortexer** — a general-purpose vortex mixer; a flathead dimpled adaptor is also available
- **UltraRocker™ rocking platform** — dual-platform rocker that can be used for staining and destaining gels and blots, Southern hybridization, and overnight incubation
- **Digital hotplate stirrer** — go from ambient temperature to 380ºC in minutes with an adjustable spin speed from 200 to 1,500 rpm. This affordable model offers an exceptionally durable chemical resistant white ceramic work surface. The space-efficient design (7 x 10.5 in. footprint) makes it ideal for use on crowded benchtops and inside biohoods. Advanced microprocessor controls allow quick, precise adjustment of speed and temperature. The large backlit LCD provides constant temperature and speed updates with just a glance while a safety LED indicates when the top plate is above 50°C

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

Mini Rocker

Tube Roller

BR-2000 Vortexer
(flathead dimpled adaptor sold separately)

UltraRocker Rocking Platform

Digital Hotplate Stirrer

See Also

Micro test tubes: page 417.

PCR tubes: pages 396–397.

Ordering Information

Catalog #	Description
1660710	**Mini Rocker**, 120 V, includes two blotting boxes
1660720	**Mini Rocker**, 230 V (EU/UK), includes two blotting boxes
1660711	**Tube Roller**, 120 V, includes 3 tube carousels for 1.5, 15, and 50 ml tubes
1660721	**Tube Roller**, 230 V, includes 3 tube carousels for 1.5, 15, and 50 ml tubes
1660722	**Tube Roller**, 230 V (UK), includes 3 tube carousels for 1.5, 15, and 50 ml tubes
1660610	**BR-2000 Vortexer**, 120 V
1660611	**BR-2000 Vortexer**, 230 V
1660621	**BR-2000 Vortexer**, 230 V (UK)
1660622	**Flathead Dimpled Adaptor**, for BR-2000 vortexer
1660709	**UltraRocker Rocking Platform**, 120 V
1660719	**UltraRocker Rocking Platform**, 230 V
12004615	**Digital Hotplate Stirrer**, 120 V, for U.S. and Canada
12004616	**Digital Hotplate Stirrer**, 230 V, for Europe
12004617	**Digital Hotplate Stirrer**, 230 V, for UK
12004618	**Digital Hotplate Stirrer**, 230 V, for Australia

Temperature Control Equipment

- **Benchtop shaking incubator** — handles small batch culture needs easily, for example, growing bacteria or yeast up to 4 L. The incubation temperature can be set in 0.1° increments up to 65°C. The shaker speed is adjustable between 20 and 300 rpm for periods up to 99 hours or continuous operation. It features outstanding temperature uniformity and stability. Secure a wide variety of vessels with many available accessories
- **Digital dry bath** — digitally controlled dry bath that is ideal for a multitude of laboratory procedures where incubation of samples is needed. It is accurate, built for safe continuous operation, economical, and versatile. Comes with one aluminum alloy 1.5 ml heating block (24 x 1.5 ml capacity). Additional 0.5, 2.0, and 15 ml heating blocks with 24 x 0.5, 24 x 2.0, and 12 x 15 ml capacity, respectively, can be purchased separately; 15 ml dry bath block not shown
- **Mini incubation oven** — can accommodate up to eighty 6.5 cm plates and operates at temperatures up to 60°C. Contains a rear port to allow insertion of our tube roller or mini rocker for temperature-controlled mixing
- **Water bath** — temperature controlled, dependable, affordable water bath that includes stainless steel tank and lid, electrostatically applied finish that resists rust, corrosion, and scratches, over-temperature protection, and thermometer

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

Benchtop Shaking Incubator

Digital Dry Bath

0.5 ml
Dry Bath Block

2.0 ml
Dry Bath Block

Mini Incubation Oven

Water Bath

Ordering Information

Catalog #	Description
17002944	**Benchtop Shaking Incubator Starter Set**, 120 V, includes 6 flask clamps
17002945	**Benchtop Shaking Incubator Expanded Set**, 120 V, includes 34 flask clamps and 1 petri dish shelf
17002946	**Benchtop Shaking Incubator Starter Set**, 230 V (EU/UK), includes 6 flask clamps
17002947	**Benchtop Shaking Incubator Expanded Set**, 230 V (EU/UK), includes 34 flask clamps and 1 petri dish shelf
1660562	**Digital Dry Bath**, 120 V, includes 1.5 ml heating block
1660563	**Digital Dry Bath**, 230 V (EU/UK), includes 1.5 ml heating block
1660565	**Digital Dry Bath Heating Block, 0.5 ml**, for 24 x 0.5 ml tubes
1660566	**Digital Dry Bath Heating Block, 2.0 ml**, for 24 x 2.0 ml tubes
1660567	**Digital Dry Bath Heating Block, 15 ml**, for 12 x 15 ml tubes
1660501	**Mini Incubation Oven**, 120 V
1660521	**Mini Incubation Oven**, 230 V
1660504	**Temperature-Controlled Water Bath**, 120 V
1660524	**Temperature-Controlled Water Bath**, 230 V
1660712	**Mini Incubation Oven and Mini Rocker**, 120 V
1660713	**Mini Incubation Oven and Tube Roller**, 120 V

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Bio-Rad Explorer™ Educational Products

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Hands-On Inquiry-Based Science Education

Do You Have Teaching Responsibilities?

The Bio-Rad Explorer™ program makes it easy for educators to meet AAAS and NSF's goals for Vision and Change in Undergraduate Biology Education. The program provides kits, a textbook, and modular lab series that bring project-based learning and research skills into the classroom. Meet the challenge to:

- Integrate core concepts and competencies throughout your curriculum
- Focus on student-centered and project-based learning
- Engage the biology community in the implementation of change

For more information about the products listed here, request the current Bio-Rad Explorer catalog (bulletin 2112) or visit explorer.bio-rad.com.

BIO-RAD Explorer™
HANDS-ON INQUIRY-BASED SCIENCE EDUCATION

New Giant Panda Problem Kit for AP Biology

Can your students help save the giant panda population?
In recent decades, the giant panda population has been severely threatened by habitat destruction, poaching, and slow reproduction. Have your students take on the role of conservation biologist as they design experiments to assess fertility in giant pandas using the power of an enzyme-linked immunosorbent assay (ELISA).

- Curriculum and materials for 2 inquiry-based laboratories and 2 additional activities
- Genuine antibody and antigen ELISA
- Student-designed protocols and data collection

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

A ThINQ!™ Kit

ThINQ!™ investigation kits provide materials and curriculum for flexible, inquiry-based labs.

Ordering Information

Catalog #	Description
17002878EDU	**Giant Panda Problem Kit for AP Biology**, includes reagents, disposable plastic transfer pipets, microplates, tubes, and curriculum, including teacher manual; provides materials for 32 students or 8 workstations

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

Photosynthesis and Cellular Respiration Kit for AP Biology

Energy transfer your students can actually see!
Have your students explore both photosynthesis and cellular respiration with premade algae beads in a simple, easy-to-use colorimetric assay.

Microalgae immobilized in alginate beads cause a vibrant shift in the color of indicator solution depending on whether photosynthesis or cellular respiration is dominant.

- Ready-to-use, reliable, and reusable algae beads
- Curriculum and materials for 6 inquiry-based laboratories (32 students)
- Student-generated, quantifiable data
- Optional protocol for spectrophotometry

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

ThINQ!™ investigation kits provide materials and curriculum for flexible, inquiry-based labs.

Ordering Information

Catalog #	Description
17001238EDU	**Photosynthesis and Cellular Respiration Kit for AP Biology**, includes algae beads, colorimetric CO_2 indicator, consumables, and curriculum, including teacher manual; provides materials for 32 students or 8 workstations

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

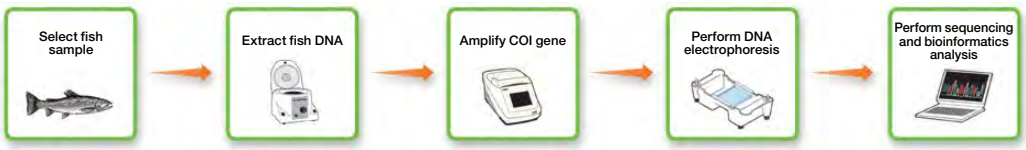
Fish DNA Barcoding Kit

What happens if one fish gets substituted for another?
Most of the time, the consumer won't even notice. But what happens if substituting a less expensive fish for a more expensive one becomes a common practice? Or if a poisonous fish like pufferfish makes it into our food supply, or we deplete our oceans of critically endangered species? Bio-Rad's Fish DNA Barcoding kit helps students answer these and similar real-world questions, contributing to the global species barcoding initiative while also learning advanced genetic analysis skills.

- Real-world application
- Inquiry-based hands-on laboratory
- Aligns with AP Biology Big Ideas 1, 2, 3, and 4

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

Fish DNA Barcoding Flowchart



Ordering Information

Catalog #	Description
1665100EDU	**Fish DNA Barcoding Kit**, includes reagents for DNA extraction and PCR for up to 16 fish samples. Purchase sequencing module (U.S. only) separately
1665115EDU	**DNA Barcoding Sequencing Module**, prepaid sequencing service for up to 9 samples. Includes shipping of samples. Valid for use with 1665100EDU. U.S. only

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

Biotechnology: A Laboratory Skills Course

This laboratory textbook blends textbook theory with hands-on laboratory activities and real-world applications for your biotechnology course, and it incorporates Bio-Rad Explorer™ kits for easy implementation supported by live technical support. This textbook encourages the next generation of biotechnologists by:

- Developing key skills with multiple activities
- Encouraging students to consider the broader implications of biotechnology with bioethics case studies
- Broadening occupational awareness with profiles of careers in biotech
- Letting students answer a research question using independent research

The teacher supplement provides a thorough background on preparation, setup, results analysis, and assessment. It also provides guidance on how to implement and build your biotechnology course. Chapters include:

- The Biotechnology Industry
- Laboratory Skills
- Microbiology and Cell Culture
- DNA Structure and Analysis
- Bacterial Transformation and Plasmid Purification
- Polymerase Chain Reaction
- Protein Structure and Analysis
- Immunological Applications
- Research Projects

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

Ordering Information

Catalog #	Description
1661027EDU	**Biotechnology: A Laboratory Skills Course**, teacher edition, includes one student edition and one teacher supplement
1661025EDU	**Biotechnology: A Laboratory Skills Course**, student edition
1661026EDU	**Biotechnology: A Laboratory Skills Course**, teacher supplement
1661051EDU	**Laboratory Notebook**
1661052EDU	**Supplementary Materials DVD Set**

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

Project-Based Learning Modular Laboratory Explorer Series

Integrated College Level Molecular Biology Labs
Looking for authentic project-based learning lab experiences that carry a gene or protein of interest from isolation to analysis? Bio-Rad's modular lab series provide validated procedures, easy preparation, and reproducible success year after year. Visit **bio-rad.com/EDU/highered** to learn about our advanced series for cloning, sequencing, bioinformatics, and protein expression and purification using affinity chromatography. These flexible, modular lab series can be used as capstone projects or a complete molecular biology course.

Cloning and Sequencing Explorer Series*	Protein Expression and Purification Series*
1. Nucleic Acid Extraction	1. Growth and Expression
2. *GAPDH* PCR	2. SDS-PAGE Electrophoresis
3. Electrophoresis	3. Purification Process Options:
4. PCR Kleen™ Spin Purification	Centrifugation Purification
5. Ligation and Transformation	Hand-Packed Column Purification
6. Microbial Culturing	Prepacked Cartridge Purification
7. Aurum™ Plasmid Mini Purification	4. DHFR Enzymatic Assay
8. Sequencing and Bioinformatics	5. Assessment

* Available as a complete series or as individual modules.

For More Information
Web: bio-rad.com/cloninglab
bio-rad.com/proteinpurificationlab

Ordering Information

Catalog #	Description
Cloning and Sequencing Explorer Series	
1665000EDU*	**Complete Cloning and Sequencing Explorer Series**, includes all 8 modules (sequencing service not included)
1665005EDU*	**Nucleic Acid Extraction Module**
1665010EDU*	***GAPDH* PCR Module**
1660451EDU	**Electrophoresis Module**
7326300EDU	**PCR Kleen Spin Purification Module**
1665015EDU*	**Ligation and Transformation Module**
1665020EDU	**Microbial Culturing Module**
7326400EDU	**Aurum Plasmid Mini Purification Module**
1665025EDU*	**Sequencing and Bioinformatics Module**, includes sequencing primers, control plasmid, and bioinformatics subscription; sequencing service not included

continues

Ordering Information

Catalog #	Description
Protein Expression and Purification Series	
1665040EDU*	**Protein Expression and Purification Series**, centrifugation purification process
1665045EDU*	**Protein Expression and Purification Series**, hand-packed purification process
1665050EDU*	**Protein Expression and Purification Series**, prepacked purification process
1665070EDU	**Protein Expression and Purification Series Assessment Module**, formative and summative assessment tool
1665055EDU*	**Growth and Expression Module**
1665060EDU*	**SDS-PAGE Electrophoresis Module**
1665041EDU	**Centrifugation Purification Module**
1665046EDU	**Hand-Packed Purification Module**
1665051EDU	**Prepacked Purification Module**
1665065EDU*	**DHFR Enzymatic Assay Module**

* Ships with both temperature-sensitive and room temperature components. Immediately store temperature-sensitive items at 4°C or –20°C as indicated.

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

Rapid Blotting and V3 Western Workflow™

V3 Western Workflow™ (stain-free rapid blotting)

Western Blotting in Less than 2 Hours!
The rapid blotting or V3 Western Workflow (stain-free rapid blotting) allows you to complete an entire western blot workflow in less than 2 hours in the classroom. TGX Stain-Free™ gels combined with the super-fast Trans-Blot® Turbo™ transfer system provide maximum time savings, allowing you to complete the workflow in a single lab block period. Teach students about the exciting chemistry that allows visualization of samples separated on PAGE gels without staining.

For More Information
Web: bio-rad.com/EDU/rapidblotting

Hands-On Time Expenditure (in minutes)

	Tank blotting	Rapid blotting (staining required)	V3 Western Workflow (stain-free rapid blotting)
Protein extraction and electrophoresis	33	33	33
Protein visualization	180	180	<3
Protein transfer			
Equilibration	15	0	0
Setup	30	5	5
Transfer	30–150	15	15
Immunoblotting	45	45	45
Color detection	All options: 10 min to overnight		
Total hands-on time	343–463 (5 hr 43 min to 7 hr 43 min)	288 (4 hr 48 min)	111 (1 hr 51 min)

Total time savings of 55 min to 7 ½ hr

Ordering Information

Catalog #	Description
1662875EDU	**Rapid Blotting and V3 Western Workflow Starter Kit**, comprehensive protein classroom study kit, includes protein profiler module (#1662700EDU), western blot module (#1662800EDU), Trans-Blot Turbo mini nitrocellulose transfer pack, TGX Stain-Free gels, application note, for 32 students

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

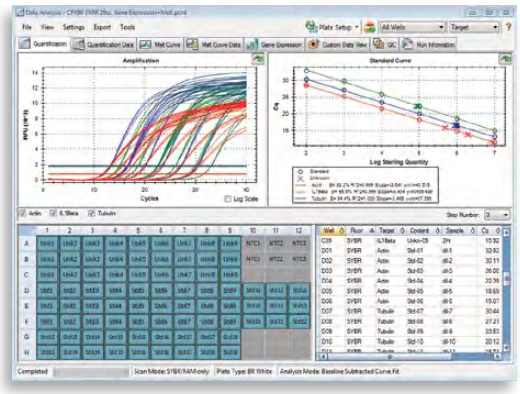
Real-Time PCR

Real-Time PCR Kits

How much DNA Is There?

The Bio-Rad® Crime Scene Investigator PCR Basics™ kit is a good starting point for novices to become familiar with real-time PCR techniques using real-time PCR technology. Additionally, DNA fingerprints can still be investigated using gel electrophoresis and melt curve analysis, showing how real-time and standard PCR can be complementary techniques.

The Bio-Rad® GMO Investigator™ kit is a tool for teaching the principles of PCR and its use in testing foods for genetic modifications. Demonstrate how much plant DNA is present and then compare how much genetically modified organism (GMO) DNA is recovered from each food sample when using real-time PCR. It is even possible to determine what fraction of a food product has been made with genetically modified ingredients in the same manner standard testing labs do.



- Quantify DNA
- Discover key differences between standard and real-time PCR analysis
- Analyze and evaluate real-time PCR results
- Perform melt curve analysis
- Determine the accuracy and reliability of pipetting techniques
- Learn DNA amplification using real-time PCR

For More Information
Web: bio-rad.com/EDU/real-time

Ordering Information

Catalog #	Description
1662660EDU	**Crime Scene Investigator PCR Basics Real-Time PCR Starter Kit**
1662560EDU	**GMO Investigator Real-Time PCR Starter Kit**

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

Classroom Kits

Bio-Rad Explorer™ Kits

Bio-Rad Explorer kits address the critical need for inquiry-based activities — an important component of scientific literacy for an educated citizenry and a launch point of experience and practical training for students interested in careers in life science. The kits range from introductory to advanced topics, including courses guiding students through entire molecular biology workflows.

Areas of biotechnology applications covered include:

- Transformation and microbiology
- Protein analysis and chromatography
- DNA analysis
- PCR amplification
- Fully developed course series in DNA and protein (see page 431)

Ordering Information

Catalog #	Description
Introductory Kits	
1660003EDU*	**pGLO Bacterial Transformation Kit**, provides materials for 32 students or 8 workstations
1662300EDU	**Genes in a Bottle Kit**, includes 1 DNA extraction module (#1662000EDU) and DNA necklace module (#1662250EDU); provides materials for 36 students or 9 workstations
1665075EDU	**IDEA Kit — Inquiry Dye Electrophoresis Activity**, provides materials for 32 students or 8 workstations
1665090EDU	**STEM Electrophoresis Classroom Kit**, provides materials for 32 students or 8 workstations
1662900EDU*	**Got Protein? Kit**, provides materials for 320 students or 80 workstations
1665030EDU	**Microbes and Health Kit**, provides materials for 32 students or 8 workstations
1660008EDU	**Size Exclusion Chromatography Kit**, provides materials for 32 students or 8 workstations
Intermediate Kits	
1665120EDU	***C. elegans* Behavior Kit**, provides materials for 32 students or 8 workstations
1662400EDU*	**ELISA Immuno Explorer Kit**, provides materials for 48 students or 12 workstations
1665035EDU*	**Biofuel Enzyme Kit**, provides materials for 32 students or 8 workstations
1660007EDU*	**Forensic DNA Fingerprinting Kit**, provides materials for 32 students or 8 workstations
1660013EDU*	**pGLO Kit SDS-PAGE Extension**, provides materials for 32 students or 8 workstations
1660005EDU*	**Green Fluorescent Protein (GFP) Chromatography Kit**, provides materials for 32 students or 8 workstations
1660006EDU*	**Secrets of the Rainforest Kit**, provides materials for 32 students or 8 workstations
1660001EDU*	**Analysis of Precut Lambda DNA Kit**, provides materials for 32 students or 8 workstations
1660002EDU*	**Restriction Digestion and Analysis of Lambda DNA Kit**, provides materials for 32 students or 8 workstations
Advanced Kits	
1662700EDU*	**Comparative Proteomics Kit I: Protein Profiler Module**, provides materials for 32 students or 8 workstations
1662800EDU*	**Comparative Proteomics Kit II: Western Blot Module**, provides materials for 32 students or 8 workstations
1662600EDU*	**Crime Scene Investigator PCR Basics Kit**, provides materials for 32 students or 8 workstations
1662100EDU*	**PV92 PCR Informatics Kit**, provides materials for 32 students or 8 workstations
1662500EDU*	**GMO Investigator Kit**, provides materials for 32 students or 8 workstations

* Ships with both temperature-sensitive and room temperature components. Immediately store temperature-sensitive items at 4°C or –20°C as indicated.

EDU price discounts are for qualified educational institutions and educators only. Items are available at list price for noneducators (must be ordered without an EDU suffix).

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The ZDC multiplex RT-PCR assay is intended for research use only and not for use in diagnostic procedures.

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Sample Preparation

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