Chromatography: Laboratory and Process Separations

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.

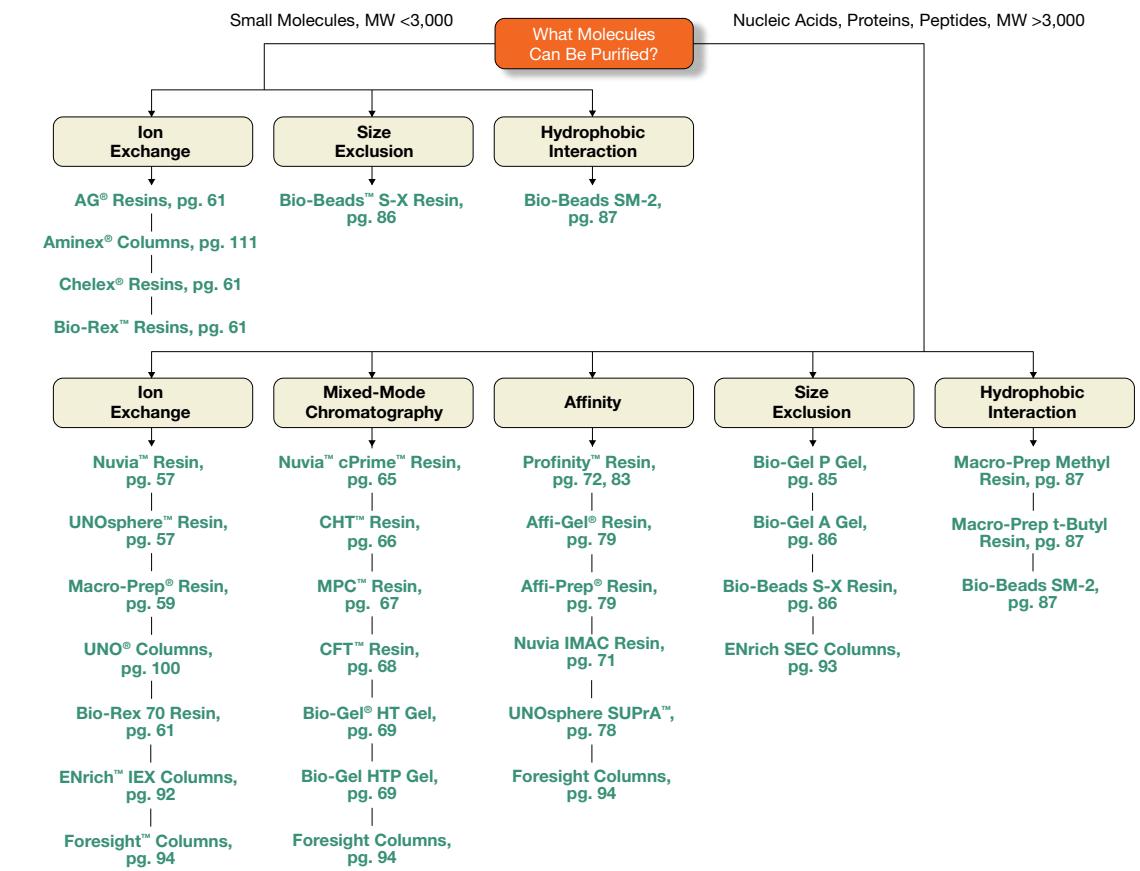
Throughput, capacity, selectivity, resolution, and process economics are among the considerations when selecting any chromatography resin, column, or instrument. We offer products for each phase of purification and manufacture resins for any scale from nanograms to kilograms.

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 2. 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 Resins/Media

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

For More Information
Request or download bulletin: 6713

Chromatography Resin/Media Selection Guide

Resin	Packaging Format*	Suitability** 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	61
AG MP-1M	B, GC	++++	++	+	Strong exchanger. Macroporous, equivalent to AG 1 for MW >1,000,000; gravity or low-pressure use	61
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	61
UNO® Q	MPC	++++			Strong exchanger. High-resolution biomolecule separation at high flow rates; pH stability 2–12	100
Macro-Prep® High Q	B, C	+++	++++	+++	Strong exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	59
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	59
Macro-Prep DEAE	B, C	+++	++++	+++	Weak exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	59
UNOsphere™ Q	B, C, F	++++	++++	++++	Strong exchanger. High-productivity, high-capacity biomolecule separation; pH stability 1–14	57
Aminex®	HPLC	++++			High-pressure separation of carbohydrates, sugars, and small organic molecules; delivers industry-standard performance (U.S. Pharmacopeia)	101
Nuvia™ Q	B, F	++++	++++	++++	Strong exchanger. Similar to UNOsphere Q but surface modification allows extremely high-capacity biomolecule separation; pH stability 1–14	57
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	61
AG MP-50	B, GC	++++	++	+	Strong exchanger. Macroporous equivalent to AG 50W for MW >1,000,000; gravity or low-pressure use	61
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	61
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	61
UNO® S	MPC	++++			Strong exchanger. High-resolution biomolecule separation at high flow rates; pH stability 2–12	100
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	59
Macro-Prep High S	B, C	+++	++++	+++	Strong exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	59
Macro-Prep CM	B	+++	++++	+++	Weak exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	59
UNOsphere S	B, C, F	++++	++++	++++	Strong exchanger. High-capacity biomolecule separation; pH stability 1–14	57
Nuvia S	B, C, F	++++	++++	++++	Strong exchanger. Similar to UNOsphere S but surface modification allows extremely high-capacity biomolecule separation; pH stability 1–14	57
Nuvia HR-S	B, C, F	++++	++++	++++	Strong exchanger. Similar to UNOsphere Rapid S but smaller particle size for high resolution	57

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

continues

Chromatography Resin/Media Selection Guide (cont.)

Resin	Packaging Format*	Suitability** Analytical Scale	Pilot/ Preparative Scale	Process Scale	Application	Page
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	61
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	61
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	61
Size Exclusion (Gel Filtration)						
Bio-Gel® P	B, C, SC, GC	++++	++++		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	85
Bio-Beads™ S-X	B	++++	++++	++	Fractionation of low MW organic polymers and other hydrophobic substances in nonpolar solvents from 400–14,000 D	86
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	78
Affi-Gel® Protein A	B, C, GC	++++	++++		IgG purification from ascites, serum, and culture fluid; low-pressure resin	79
Affi-Prep® Protein A	B, C	++++	++++	++	IgG purification from ascites, serum, and culture fluid; pressure-stable resin	79
Affi-Gel Blue	B, C, SC	++++	++++		Albumin removal and enzyme purification; Cibacron Blue F3GA dye covalently attached; purification of proteins with dinucleotide fold	80
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	80
CM Affi-Gel Blue	B	++++	++++		Albumin and protease removal for IgG purification; Cibacron Blue F3GA dye covalently attached to CM Bio-Gel A	81
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	82
Nuvia IMAC	B, C	++++	++++	++	Purification of recombinant histidine-tagged proteins; can be charged with other transition metals	71
Profinity™ IMAC	B, C	++++	++++	++	Histidine-tagged protein purification	72
Profinity GST	C	++++	++++	++	GST-tagged protein purification	73
Profinity eXact™	B, C, SC	++++	++++	++	One-step affinity tag purification and on-column cleavage	73
Affi-Prep polymyxin	B	++++	++++	++++	Removal of endotoxins; pressure-stable resin capable of sanitization procedures with NaOH	82
Affi-Gel boronate	B	++++	++		Affinity for low MW molecules containing *cis* hydroxyl (cis-diol) groups; separation of AMP from cyclic AMP	81
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	83
Affi-Gel 10	B	++++	++++		Affinity coupling; immobilization of ligands with –NH_2 groups, coupling of proteins with pI 6.5–11; low-pressure resin	83
Affi-Gel 15	B	++++	++++		Affinity coupling; immobilization of ligands with –NH_2 groups, coupling of proteins with pI <6.5; low-pressure resin	83
Affi-Gel Hz	B	++++	++++		Affinity coupling; immobilization of IgG molecules via their Fc region	84
Affi-Gel 102	B	++++	++++		Affinity coupling of ligands with –COOH groups via EDAC coupling chemistry	84
Mixed-Mode Resins and Media						
Nuvia™ cPrime™	B, C, F	++++	++++	++++	Recombinant protein purification. Uses hydrophobic and weak cation exchange modes	65
CHT™ Type I	B, C, MPC, F	++++	++++	++++	Antibody purification (higher capacity than Type II); virus purification/removal; DNA purification/removal; aggregate and endotoxin removal	66
CHT Type II	B, C, F	++++	++++	++++	Antibody purification; removal of albumin from feedstream; vaccine/VLP purification	66
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	67
CFT™ Type II	B	++++	++++	++++	Similar properties to CHT but exhibits greater stability in the lower pH range (5.5)	68
Bio-Gel HT	B	++++	+++		Purification of proteins, nucleic acids, and other biomolecules; crystalline hydroxyapatite not as mechanically stable as CHT (ceramic hydroxyapatite)	69
Bio-Gel HTP	B	++++	+++		Similar to Bio-Gel HT but in powder form	69
DNA grade Bio-Gel HTP	B	++++	+++		Similar to Bio-Gel HTP with smaller particle size; selectivity for dsDNA; separation of ss- and dsDNA	69
Hydrophobic Interaction						
Macro-Prep methyl	B	++++	++++	++	Separation of proteins based on relative hydrophobicity; pH stability 1–10	87
Macro-Prep t-butyl	B	++++	++++	++	Separation of proteins based on relative hydrophobicity; pH stability 1–10	87

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

Ion Exchange Resins

UNOsphere™ and Nuvia™ Ion Exchange Resins/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; UNOsphere S resin — 2669 and 2678

Nuvia Ion Exchange 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 resins 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

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

Properties of UNOsphere and Nuvia

Property	UNOsphere Q	UNOsphere S	Nuvia Q	Nuvia S	Nuvia HR-S
Type of ion exchanger	Strong anion	Strong cation	Strong anion	Strong cation	Strong cation
Functional group	$-N^+(CH_3)_3$	$-SO_3^-$	$-N(CH_3)_3^+$	$-SO_3^-$	$-SO_3^-$
Total ionic capacity	75–163 µeq/ml	219–315 µeq/ml	100–170 µeq/ml	90–150 µeq/ml	100–180 µeq/ml
Particle size	120 ± 15 µm	80 ± 10 µm	85 ± 15 µm	85 ± 15 µm	50 ± 10 µm
Dynamic binding capacity*					
At 150 cm/hr	180 mg BSA/ml	60 mg IgG/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	50–1,200 cm/hr	50–1,200 cm/hr	50–600 cm/hr	50–600 cm/hr	50–200 cm/hr
pH stability (accelerated, 60°C)	1–14	1–14	2–14 short term	2–14 short term	2–14 short term
	—	—	4–12 long term	4–13 long term	4–13 long term
Sanitization	0.5–1.0 M NaOH	0.5–1.0 M NaOH	0.5–1.0 M NaOH	0.5–1.0 M NaOH	0.5–1.0 M 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.

See Also

Chromatography systems: page 111.
Prepacked columns: page 91.
AEX and CEX standards: page 89.
Sample preparation products: page 2.
Resin sampler packs: page 88.
Bio-Scale Mini cartridges: page 95.

Ordering Information

Catalog #	Description	
1560311	**Nuvia S Media**, 25 ml	Ultra-high capacity strong cation process media
1560313	**Nuvia S Media**, 100 ml	
1560315	**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	
1560515	**Nuvia HR-S Media**, 500 ml	
1560517	**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	
1560415	**Nuvia Q Media**, 500 ml	
156-0417	**Nuvia Q Media**, 10 L	
1560101	**UNOsphere Q Media**, 25 ml	High-capacity strong anion media
1560103	**UNOsphere Q Media**, 100 ml	
1560105	**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	
1560115	**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

Foresight Prepacked Plates and Columns

Foresight Plates	
7324714	**Foresight UNOsphere Q**, 20 µl
7324710	**Foresight UNOsphere S**, 20 µl
7324703	**Foresight Nuvia Q**, 20 µl
7324701	**Foresight Nuvia S**, 20 µl
7324707	**Foresight Nuvia HR-S**, 20 µl

Foresight Columns	1 ml	5 ml
Foresight UNOsphere Q	7324732	7324752
Foresight UNOsphere S	7324730	7324750
Foresight Nuvia Q	7324721	7324741
Foresight Nuvia S	7324720	7324740
Foresight Nuvia HR-S	7324723	7324743

Foresight RoboColumn Units	200 µl	600 µl
Foresight UNOsphere Q RoboColumn Units	7324819	7324820
Foresight UNOsphere S RoboColumn Units	7324813	7324814
Foresight Nuvia Q RoboColumn Units	7324804	7324805
Foresight Nuvia S RoboColumn Units	7324801	7324802
Foresight Nuvia HR-S RoboColumn Units	7324831	7324832

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 1/4-28 Adaptor Fittings Kit**, includes 1/4-28 female to male luer and 1/4-28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system
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

Macro-Prep® Ion Exchange Resin/Media

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, 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; High S and High Q resins — 5643 and 5644

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
Request or download bulletin: 2292

See Also

Bio-Scale Mini, UNOsphere Q and S, Macro-Prep High Q and S, affinity, P-6 cartridges: pages 95–96.

Properties of Macro-Prep

Property	High Q	DEAE	High S	CM	25 Q*	25 S
Type of resin	Strong anion	Weak anion	Strong cation	Weak cation	Strong anion	Strong cation
Functional ligand	$-N^+(CH_3)_3$	$-N^+(C_2H_5)_2$	$-SO_3^-$	$-COO^-$	$-N^+(CH_3)_3$	$-SO_3^-$
Ionic capacity	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	40 mg BSA/ml	35 mg BSA/ml	70 mg IgG/ml	25 mg hemoglobin/ml	>30 mg/ml BSA	>40 mg/ml BSA
Counter ion	Cl^-	Cl^-	Na^+	Na^+	Cl^-	Na^+
Nominal particle size	50 µm	50 µm	50 µm	50 µm	25 µm	25 µm
Nominal pore size	1,000 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	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr
Chemical stability						
1% SDS, 24 hr	•	•	•	•	•	•
6 M guanidine-HCl, 24 hr	•	•	•	•	•	•
Volume changes						
pH 4–10	<1%	<1%	<3%	<1%	<1%	<1%
0.1–1.0 M NaCl	<5%	<5%	<9%	<4%	<5%	<5%
Autoclavability (121°C, 80 min)	•	•	•	•	•	•
pH stability	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

* 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 Resin/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	
1560041	**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 DEAE Resin/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	
1560021	**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 Resin/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	
1560031	**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 Resin/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	
1560071	**Macro-Prep CM Media**, 500 ml	
156-0073	**Macro-Prep CM Media**, 10 L	
Macro-Prep 25 Q Resin/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 Resin/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	

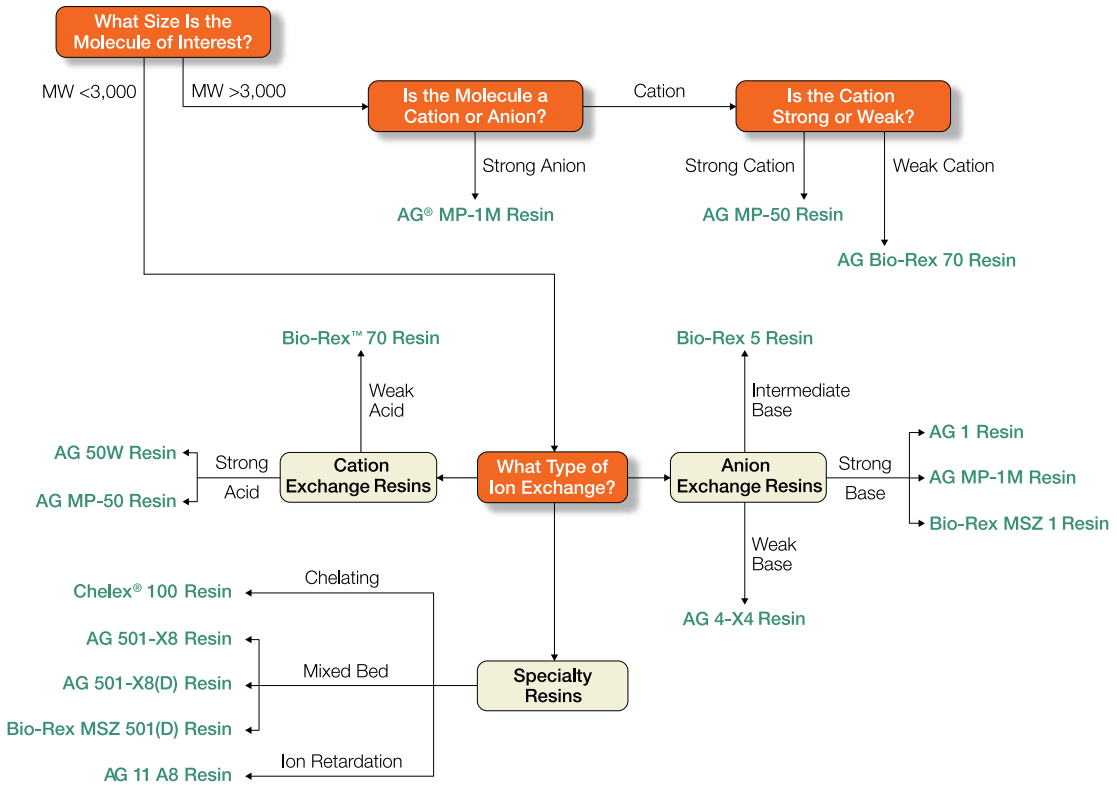
Description	5 x 1 ml	1 x 5 ml	5 x 5 ml
Prepacked Bio-Scale Mini Cartridges			
Macro-Prep High Q Media	7324120	7324122	7324124
Macro-Prep High S Media	7324130	7324132	7324134
Macro-Prep DEAE Media	7324140	7324142	7324144

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 1/4-28 Adaptor Fittings Kit**, includes 1/4-28 female to male luer and 1/4-28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system
7885010	**Luer to 10-32 Adaptor Fittings Kit,** includes female slip luer to female 10-32 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 Resins



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 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

See Also
Poly-Prep ion exchange columns: page 98.

Ordering Information

Catalog #	Description	Ionic Form	Dry Mesh Size	Wet Bead Size, µm	Nominal Shipping % Water
AG Resins					
1401231	**AG 1-X2 Resin**, 500 g	Chloride	50–100	180–500	70–78
1401241	**AG 1-X2 Resin**, 500 g	Chloride	100–200	106–250	70–78
1401251	**AG 1-X2 Resin**, 500 g	Chloride	200–400	75–180	70–78
1401253	**AG 1-X2 Resin**, 500 g	Acetate	200–400	75–180	70–78
1401331	**AG 1-X4 Resin**, 500 g	Chloride	50–100	180–425	59–65
1401341	**AG 1-X4 Resin**, 500 g	Chloride	100–200	106–250	59–65
1401351	**AG 1-X4 Resin**, 500 g	Chloride	200–400	63–150	59–65
1401421	**AG 1-X8 Resin**, 500 g	Chloride	20–50	300–1,180	39–45
1401431	**AG 1-X8 Resin**, 500 g	Chloride	50–100	180–425	39–45
1401441*	**AG 1-X8 Resin**, 500 g	Chloride	100–200	106–180	39–45
1401451*	**AG 1-X8 Resin**, 500 g	Chloride	200–400	45–106	39–45
1401422	**AG 1-X8 Resin**, 500 g	Hydroxide	20–50	300–1,180	39–45
1401443	**AG 1-X8 Resin**, 500 g	Acetate	100–200	106–180	39–45
1401453	**AG 1-X8 Resin**, 500 g	Acetate	200–400	45–106	39–45
1401444	**AG 1-X8 Resin**, 500 g	Formate	100–200	106–180	39–45
1401454	**AG 1-X8 Resin**, 500 g	Formate	200–400	45–106	39–45
1421231	**AG 50W-X2 Resin**, 500 g	Hydrogen	50–100	300–1,180	75–83
1421241*	**AG 50W-X2 Resin**, 500 g	Hydrogen	100–200	106–300	75–83
1421251	**AG 50W-X2 Resin**, 500 g	Hydrogen	200–400	75–180	75–83
1421331	**AG 50W-X4 Resin**, 500 g	Hydrogen	50–100	180–425	64–72
1421341	**AG 50W-X4 Resin**, 500 g	Hydrogen	100–200	106–250	64–72
1421351*	**AG 50W-X4 Resin**, 500 g	Hydrogen	200–400	63–150	64–72
1421421	**AG 50W-X8 Resin**, 500 g	Hydrogen	20–50	300–1,180	50–56
1421431	**AG 50W-X8 Resin**, 500 g	Hydrogen	50–100	180–425	50–56
1421441*,**	**AG 50W-X8 Resin**, 500 g	Hydrogen	100–200	106–250	50–56
1421451*,**	**AG 50W-X8 Resin**, 500 g	Hydrogen	200–400	63–150	50–56
1421641	**AG 50W-X12 Resin**, 500 g	Hydrogen	100–200	106–250	42–48
1421651	**AG 50W-X12 Resin**, 500 g	Hydrogen	200–400	53–106	42–48
1411831	**AG MP-1M Resin**, 500 g	Chloride	50–100	150–300	56–64
1411841	**AG MP-1M Resin**, 500 g	Chloride	100–200	75–150	56–64
1411851	**AG MP-1M Resin**, 500 g	Chloride	200–400	38–75	56–64
1430841	**AG MP-50 Resin**, 500 g	Hydrogen	100–200	75–150	46–52
1404341*	**AG 4-X4 Resin**, 500 g	Free base	100–200	75–150	—
1426424*,**,***	**AG 501-X8 Resin**, 500 g	$H^+ + OH^-$	20–50	300–1,180	43–55
1426425*,**	**AG 501-X8(D) Resin**, 500 g	$H^+ + OH^-$	20–50	300–1,180	43–55
1427834*	**AG 11 A8 Resin**, 500 g	Self-adsorbed	50–100	180–425	—
Bio-Rex Resins					
1407841	**Bio-Rex 5 Resin**, 500 g	Chloride	100–200	75–150	50–58
1407851	**Bio-Rex 5 Resin**, 500 g	Chloride	200–400	45–75	50–58
1425822	**Bio-Rex 70 Resin**, 500 g	Sodium	20–50	300–1,180	65–74
1425832*	**Bio-Rex 70 Resin**, 500 g	Sodium	50–100	150–300	65–74
1425842	**Bio-Rex 70 Resin**, 500 g	Sodium	100–200	75–150	65–74
1425852*	**Bio-Rex 70 Resin**, 500 g	Sodium	200–400	45–75	65–74
1427425*	**Bio-Rex MSZ 501(D) Resin**, 500 g	$H^+ + OH^-$	25–35	500–700	—

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

Chelex Resins					
1422822	**Chelex 100 Resin**, 500 g	Sodium	50–100	300–1,180	68–76
1422832*	**Chelex 100 Resin**, 500 g	Sodium	100–200	150–300	68–76
1422842**	**Chelex 100 Resin**, 500 g	Sodium	200–400	75–150	68–76
1422825	**Chelex 100 Resin**, 100 g	Iron	100–200	150–300	—

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

continues

Ordering Information

Catalog #	Description
AG Resins in Larger Volumes and Special Packaging for Industrial Applications	
1401255	**AG 1-X2 Resin**, acetate, 200–400 mesh, 10 kg
1401342	**AG 1-X4 Resin**, chloride, 100–200 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
140-2341	**AG 4-X4 Resin**, free base, 100–200 mesh, 5 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
142-1442	**AG 50W-X8 Resin**, hydrogen, 100–200 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
141-1853	**AG MP-1M Resin**, nitrate, 200–400 mesh, 10 kg
143-6427*	**AG 501-X8(D) Resin**, $H^+ + OH^-$, 20–50 mesh, 10 kg

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

* 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, chemically identical to the equivalent analytical grade resins, are certified to be free of endo- and exonuclease activities and ligase inhibitors.

- **Molecular biology grade resins** — offered in 200–400 mesh range for easy transfer after resuspension. Packaged in 100 and 50 g quantities for the small-scale reagent user and accompanied by a certificate of analysis
- **Biotechnology grade resins** — undergo special processing and contain fewer than 100 microorganisms/gram

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

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 aminescz
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 Resins/Media

Mixed-mode resins and 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.

Nuvia™ cPrime™ Mixed-Mode Resin

Nuvia cPrime hydrophobic cation exchange resin is a member 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'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 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
- Salt tolerance
- 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	110–150 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	2–14 short term 3–13 long term
Chemical stability	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 N 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
1563401	**Nuvia cPrime Media**, 25 ml
1563402	**Nuvia cPrime Media**, 100 ml
1563403	**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
7324722	**Foresight Nuvia cPrime Column**, 1 ml
7324742	**Foresight Nuvia cPrime Column**, 5 ml
7324705	**Foresight Nuvia cPrime Plates**, 20 µl*
7324807	**Foresight Nuvia cPrime RoboColumn Unit**, 200 µl**
7324808	**Foresight Nuvia cPrime RoboColumn Unit**, 600 µl**

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

See Also
Resin sampler packs: page 88.
Bio-Scale Mini CHT cartridges: page 95.
Bio-Scale CHT Type I columns: page 99.

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.

See Also
Bio-Scale CHT Type I columns: page 99.

CHT™ Ceramic Hydroxyapatite

CHT ceramic hydroxyapatite $(Ca_5(PO_4)_3OH)_2$ is a spherical macroporous form of hydroxyapatite that overcomes the limitations of the crystalline material for use in process- and laboratory-scale columns. Crystalline hydroxyapatite protocols can be transferred directly to the ceramic material with little or no modification. CHT retains the unique separation properties of crystalline hydroxyapatite, but it can be used reproducibly for hundreds of cycles at high flow rates and in large columns.

CHT is available as Type I, sintered at 400ºC, and Type II, sintered at 700ºC for durability. Type I has a high protein binding capacity and higher capacity for acidic proteins. Type II has a lower protein binding capacity and gives better resolution of nucleic acids and of proteins that elute early. Type II also has very low affinity for albumin, so it is often more suitable for purification of many species and classes of immunoglobulins. The three particle sizes, 20, 40, and 80 µm, make it easy to scale up from analytical to process-scale manufacturing. Prepacked Foresight™ plates, columns, and RoboColumn units are available for CHT Type I and CHT Type II.

Properties of CHT

Property	Types I and II	
Functional groups	Ca^{2+}, PO_4^{3-}, OH^-	
Nominal mean particle size	20, 40, and 80 µm	
Recommended linear flow rate	50–1,000 cm/hr	
Operating pH range	6.5–14	
Chemical compatibility (>24 hr)	1 M NaOH, 8 M urea, 6 M guanidine-HCl, ethanol, methanol, 100% acetonitrile	
Autoclavability (bulk)	121ºC, 20 min in phosphate buffer, pH 7	
Sanitization	1–2 M NaOH	
	Type I	**Type II**
Packing density, (g/ml packed bed)	0.63 g/ml	0.63 g/ml
Dynamic binding capacity, lysozyme	≥25 mg/g	≥12.5 mg/g
Typical IgG binding capacities at 500 cm/hr	25–60 mg/ml	15–25 mg/ml
Maximum operating pressure	100 bar (1,500 psi)	100 bar (1,500 psi)
Nominal pore diameter	600–800 Å	800–1,000 Å

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

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 Plate, 40 µm, 20 µl*	7324716	7324718
Foresight CHT Column, 40 µm, 1 ml	7324735	7324736
Foresight CHT Column, 40 µm, 5 ml	7324755	7324756
Foresight CHT RoboColumn Unit, 40 µm, 200 µl**	7324822	7324825
Foresight CHT RoboColumn Unit, 40 µm, 600 µl**	7324823	7324826

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

Ordering Information

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.

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 second-generation CHT Type I, 40 µm. 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.

Specifications

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

* Under ideal conditions.

Properties of MPC

Property	Description
Observed dynamic binding capacity IgG	25–50 mg IgG/ml MPC*
Typical linear flow rate range	50–1,000 cm/hr
pH stability	6.5–14 pH
Base stability	At least 1 year in 0.1 N NaOH
Regeneration	0.4–0.5 M sodium phosphate, pH 7–7.5, is generally sufficient. If higher concentrations are needed, use potassium phosphate
Autoclavability (bulk)	121°C, 20 min in phosphate buffer, pH 7
Sanitization	1–2 N NaOH
Recommended column storage	0.1 N NaOH

* 40 µm particles, 300 cm/hr, 5 mM sodium phosphate, 25 mM NaCl, pH 6.5.

For More Information
Web: bio-rad.com/MPC
Request or download bulletins: 6432 and 6086

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 Plate, 20 µg*	7324785
Foresight MPC Type I Column, 40 µm, 1 ml	7324737
Foresight MPC Type I Column, 40 µm, 5 ml	7324757
Foresight MPC Type I RoboColumn Unit, 40 µm, 200 µl**	7324828
Foresight MPC Type I RoboColumn Unit, 40 µm, 600 µl**	7324829

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

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 possesses separation characteristics similar to those of CHT ceramic hydroxyapatite. However, when CFT is used, purification can be performed across a range of lower pH values to obtain optimal results for the targeted biomolecule. CFT Type II is available in a 40 µm size and is sintered at high temperatures to produce a physically and chemically stable media.

CFT can be used under stringent chromatography conditions to separate acidic proteins requiring buffered conditions as low as pH 5.6 with minimal compromise to the solubility or lifespan of the media.

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

For More Information
Web: bio-rad.com/CFT
Request or download bulletins: 3111 and 5853

Properties of CFT

Property	Description
Functional groups	Ca^{2+}, PO_4^{3-}, F^-
Particle sizes	40 ± 4 µm
Recommended linear flow rate	300 cm/hr
Operating pH range	5–14
Chemical compatibility	2 M NaOH, 6 M guanidine-HCl, 8 M urea, 0.1 M sodium acetate, pH 5.7
Regeneration	
Normal conditions	400 mM sodium phosphate, pH 7.4
Difficult conditions	400–1,000 mM sodium phosphate, pH 11–12
Sanitization	1–2 M NaOH or KOH
Autoclavability (121ºC, 20 min)	Yes
Packing density (g/ml packed bed)	0.86 g/ml
Dynamic binding capacity lysozyme (Lys)	14–21.5 mg Lys/g
Typical IgG binding capacities at 300 cm/hr	33 mg/ml
Nominal pore diameter	600–800 Å
Maximum operating pressure	55 bar (800 psi)

Note: A small amount (up to 5 mM) of sodium phosphate should be added to all unbuffered solutions as a counterion.

Ordering Information

Catalog #	Description		
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

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 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

For More Information
Web: bio-rad.com/biogelHTandHTP
Request or download bulletin: LIT217

See Also

CHT ceramic hydroxyapatite: page 66.
Bio-Scale Mini CHT cartridges: page 95.
Bio-Scale CHT Type I columns: page 99.

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.

Ordering Information

Catalog #	Description
Bio-Gel Hydroxyapatite	
1300150	**Bio-Gel HT Hydroxyapatite**, hydrated, 250 ml
1300151	**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
Accessories	
7376201	**Econo-Column Open-Ended Jacketed Chromatography Column**, 1 x 30 cm, includes 2 flow adaptors for DNA hydroxyapatite chromatography, 25 ml

Recombinant-Tagged Affinity Purification

Bio-Scale™ Mini Nuvia™ IMAC Columns

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).

IMAC is a powerful purification technique that relies on the affinity that the histidine tag has for immobilized transition metals. Nuvia IMAC resins, based on Nuvia beads, 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+}. Due to its superior mass transfer characteristics, Nuvia IMAC offers high capacity at high flow rates. It can be used under either nondenaturing or denaturing conditions.

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 with aqueous buffers most commonly used for protein separation. Convenient, disposable, and ready to use, these cartridges are designed for use with a peristaltic pump or the BioLogic™, NGC™, or other chromatography systems. For simple step elution, the cartridges can be used with a luer syringe. Fittings are available for connection to HPLC- and FPLC-type systems.

Product Features:

- Superior quality, reproducible separations
- High capacity, even at high flow rates
- Stable at pH 2–14
- Simple luer fittings for easy connection to any system
- Chemically compatible polypropylene parts
- Reusable/disposable format
- Excellent single-step purity by affinity chromatography
- Quick, efficient separation of biomolecules
- Contaminant removal
- Robust base matrix

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

Ordering Information

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

Nuvia™ IMAC Resin

Nuvia IMAC resin is an ultra high capacity, next-generation affinity chromatography resin. Nuvia IMAC resin 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, based on Nuvia beads, 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+}. Due to superior mass transfer characteristics, Nuvia IMAC resin offers high capacity at high flow rates. It can be used under either nondenaturing or denaturing conditions. Nuvia IMAC resin is available in 25, 100, and 500 ml bottles.

Nuvia IMAC resin delivers value and flexibility by providing users:

- Superior quality, reproducible separations
- High capacity, even at high flow rates
- Stability at pH 2–14
- Biomolecule purification in a variety of workflows
- Excellent single-step purity by affinity chromatography
- Quick, efficient separation of biomolecules
- Contaminant removal
- Robust base matrix

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

Ordering Information

Catalog #	Description	Properties (all listed products)
7800800	**Nuvia IMAC Resin**, 25 ml	• Ultra-high capacity at high flow rates
7800801	**Nuvia IMAC Resin**, 100 ml	• pH stability across broad range
7800802	**Nuvia IMAC Resin**, 500 ml	• Robust beads

Larger volumes and special packaging are available on request. Please contact local sales specialist.

See Also
Affinity resin/media selection guide: page 56.
Bio-Scale Mini cartridges: page 95.
IMAC purification kits: page 76.

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.

Profinity IMAC Resin

Bio-Scale™ Mini Profinity™ IMAC Cartridges

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

Ordering Information

Catalog #	Description	Properties (all listed products)
Ready-to-Use Affinity Resins/Media		
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
1560125	**Profinity IMAC Uncharged Resin**, 500 ml	
1560127	**Profinity IMAC Uncharged Resin**, 1 L	
1560131	**Profinity IMAC Ni-Charged Resin**, 10 ml	
1560133	**Profinity IMAC Ni-Charged Resin**, 25 ml	
1560135	**Profinity IMAC Ni-Charged Resin**, 100 ml	
1560137	**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™ GST Cartridges and Kits

Profinity GST resins are 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 support.

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
6200223	**Profinia GST Buffer Kit**, includes lysis, wash, and elution buffers, cleaning and storage solutions, glutathione reagent; sufficient for 10 applications
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
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
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

Profinity eXact™ Resins and Cartridges

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

Profinity eXact Resin Cartridges, Spin Columns, and Bottles

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.

For More Information
Web: bio-rad.com/affinitycartridges
Request or download bulletin: 5655

See Also
Bio-Scale Mini cartridges: page 95.

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 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.

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
Request or 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 directly installed on the system; manual dilution of the concentrated buffers provided in the kits is not required.

For More Information
Request or 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		Bio-Scale™ Mini Cartridges*	
	Lysis, Wash, and Elution	Desalting and Cartridge Cleaning	Affinity	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.

See Also
Profinity IMAC resins: page 72.

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

continues

Ordering Information

Catalog #	Description
Profinia Purification Kits	
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
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

Affinity Purification

See Also
Bio-Scale Mini cartridges: page 95.

UNOsphere SUPrA™ rProtein A Resin/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
- Available in prepacked Foresight™ columns and RoboColumn units for evaluation and method development; also available in manufacturing-scale quantities
- Regulatory support file and application notes are available

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

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	1 x 1 ml	5 x 1 ml	1 x 5 ml
UNOsphere SUPrA rProtein A Resin/Media				
1560218	**UNOsphere SUPrA rProtein A Media**, 25 ml			
1560219	**UNOsphere SUPrA rProtein A Media**, 100 ml			
1560220	**UNOsphere SUPrA rProtein A Media**, 500 ml			
Prepacked Bio-Scale Mini Cartridges				
UNOsphere SUPrA Affinity Media		7324200	7324201	7324202
Foresight UNOsphere SUPrA Columns				
7324729	**Foresight UNOsphere SUPrA Column**, 1 ml			
7324749	**Foresight UNOsphere SUPrA Column**, 5 ml			
Foresight UNOsphere SUPrA RoboColumn Units				
7324834	**Foresight UNOsphere SUPrA RoboColumn Unit**, 200 µl			
7324835	**Foresight UNOsphere SUPrA RoboColumn Unit**, 600 µl			

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

Affinity Resins/Media

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
7324642	**Bio-Scale Mini Affi-Gel Blue Cartridge**, 1 x 5 ml, cartridges 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
7324632	**Bio-Scale Mini DEAE Affi-Gel Blue Cartridge**, 1 x 5 ml	• IgG purification
7324634	**Bio-Scale Mini DEAE Affi-Gel Blue Cartridge**, 5 x 5 ml	

continues

Ordering Information

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

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
Request or 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)

Affi-Prep Polymyxin Resin

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

Ordering Information

Catalog #	Description
1560010	**Affi-Prep Polymyxin Media**, 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

Affi-Gel Heparin Resin

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

Ordering Information

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

Activated Affinity Resins/Media

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

Ordering Information

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

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
Request or 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
1536054	**Affi-Gel Hz 10x Coupling Buffer Concentrate**, 500 ml

See Also
Affinity resin/media selection guide: page 56.

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 Resin

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
Request or 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 media	100–1,800
Bio-Gel P-4 media	800–4,000
Bio-Gel P-6 media	1,000–6,000
Bio-Gel P-6DG media	1,000–6,000
Bio-Gel P-10 media	1,500–20,000
Bio-Gel P-30 media	2,500–40,000
Bio-Gel P-60 media	3,000–60,000
Bio-Gel P-100 media	5,000–100,000

Ordering Information

Catalog #	Description	Comments
1504114	**Bio-Gel P-2 Media**, fine, 100 g	Rapid carbohydrate, peptide, and protein desalting
1504115	**Bio-Gel P-2 Media**, fine, 500 g	
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	
1504160	**Bio-Gel P-60 Media**, medium, 100 g	
1504164	**Bio-Gel P-60 Media**, fine, 100 g	
1504170	**Bio-Gel P-100 Media**, medium, 100 g	
1504174	**Bio-Gel P-100 Media**, fine, 100 g	

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

continues

See Also

Sample preparation products: page 2.
Gel filtration chromatography standard: page 89.
Bio-Spin and Micro Bio-Spin prepacked columns: page 97.
Empty Econo-Pac columns: page 104.
ENrich SEC columns: page 93.

Ordering Information

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 System Fittings Kit**, includes 1/4-28 female to male luer and 1/4-28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system

Bio-Gel® A 1.5 m Resin

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
1510450	**Bio-Gel A 1.5 m Gel**, fine, 500 ml

See Also
ENrich SEC columns: page 93.

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
1522151	**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

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

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.

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

Macro-Prep Methyl HIC Support

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	1560081	1560091
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
Request or download bulletin: 1461

Ordering Information

Catalog #	Description
1523920	**Bio-Beads SM-2 Adsorbents**, 100 g
152-3922	**Bio-Beads SM-2 Adsorbents**, 1 kg
1523923	**Bio-Beads SM-2 Adsorbents**, 10 kg
1528920	**Bio-Beads SM-2 Adsorbents**, 25 g

Resin and Cartridge Sampler Packs, Kits, and Standards

Sampler 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, S, and 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, and Macro-Prep High Q, High S, and DEAE resins
- **Bio-Scale Mini affinity sampler pack** — includes one 1 ml cartridge each of IMAC and Affi-Prep® Protein A 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 Resins/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, UNOsphere Rapid 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 Resins/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 IMAC and Affi-Prep Protein A, 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 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 tech note: 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, 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

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 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

See Also

Ion exchange resins: page 57.
Macro-Prep ion exchange resin/media: page 59.
UNOsphere and Nuvia ion exchange resins/media: page 57.
CHT ceramic hydroxyapatite: page 66.
CFT ceramic fluoroapatite: page 68.
Macro-Prep HIC resins: page 87.
Bio-Scale Mini cartridges: page 105.

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	Resin	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-Tagged 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 tag	Modified subtilisin	Tag-free maltose-binding protein/ml resin: >3 mg/ml
Nontagged Protein Purification	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
	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	–	0.5–70 kD 5–650 kD

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

continues

Prepacked Cartridge Selection Guide by Application (cont.)

Application	Resin	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

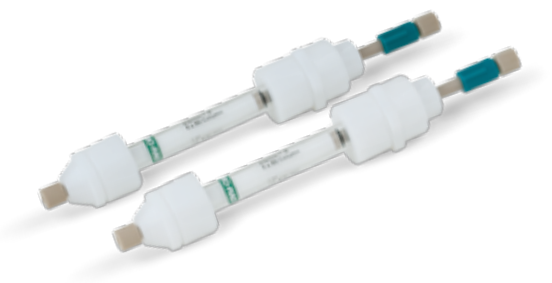
* Binding capacity based on bulk resin; check individual instruction manuals for run conditions and specifications.

ENrich™ High-Resolution Ion Exchange Columns

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 end fittings are compatible with all aqueous solvents.

For More Information
Visit bio-rad.com/ENrich

Ordering Information

Catalog #	Description	Column Volume, ml	Recommended Max. Protein Load, mg/column	Column Flow Dimensions (W x L), mm	Max. Operating Pressure psi	M Pa	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	**1/4-28 Female to 10-32 Male Fittings**, includes 2 ferrule-less fittings for attaching ENrich columns to the BioLogic DuoFlow System	
7500568	**ENrich 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect ENrich column to an HPLC system	
7800008	**Fittings, 10-32 PEEK**, black, 2/PK	
7800091	**ENrich 5 Frit Kit**, includes 2 frits, 1 frit remover, 2 O-rings	Inquire
7800093	**ENrich 10 Frit Kit**, includes 2 frits, 1 frit remover, 2 O-rings	Inquire

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 M_r

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

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

See Also

Gel filtration chromatography standard: page 89.

Ordering Information

Catalog #	Description	Column Volume, ml	Separation Range Globular Proteins, M_r	Column Dimensions (W x L), mm	Max. Operating Pressure psi	M Pa	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	**1/4-28 Female to 10-32 Male Fittings**, includes 2 ferrule-less fittings for attaching ENrich columns to the BioLogic DuoFlow system	
7500568	**ENrich 10-32 Fittings Kit**, includes 2 nuts and 4 ferrules to connect ENrich column to an HPLC system	
7800008	**Fittings, 10-32 PEEK**, black, 2/PK	
7800093	**ENrich 10 Frit Kit**, includes 2 frits, 1 frit remover, 2 O-rings	Inquire

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 methods 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 resin modes that are designed for large-scale bioprocess
- Compatible with robotic liquid handling workstations

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

Ordering Information

Catalog #	Description
Foresight Plates*	
7324714	**Foresight UNOsphere Q**, 20 µl
7324710	**Foresight UNOsphere S**, 20 µl
7324709	**Foresight UNOsphere SUPrA**, 20 µl
7324703	**Foresight Nuvia Q**, 20 µl
7324701	**Foresight Nuvia S**, 20 µl
7324707	**Foresight Nuvia HR-S**, 20 µl
7324705	**Foresight Nuvia cPrime**, 20 µl
7324716	**Foresight CHT Type I**, 40 µm 20 µl
7324718	**Foresight CHT Type II**, 40 µm, 20 µl
7324785	**Foresight MPC Type I**, 40 µm, 20 µl

continues

Ordering Information

Description	200 µl	600 µl
Foresight RoboColumn Units**,***		
Profinity IMAC Ni-Charged Resin	7324200	7324202
Foresight UNOsphere Q RoboColumn Units	7324819	7324820
Foresight UNOsphere S RoboColumn Units	7324813	7324814
Foresight UNOsphere SUPrA RoboColumn Units	7324834	7324835
Foresight Nuvia Q RoboColumn Units	7324804	7324805
Foresight Nuvia S RoboColumn Units	7324801	7324802
Foresight Nuvia HR-S RoboColumn Units	7324831	7324832
Foresight Nuvia cPrime RoboColumn Units	7324807	7324808
Foresight CHT Type I RoboColumn Units, 40 µm	7324822	7324823
Foresight CHT Type II RoboColumn Units, 40 µm	7324825	7324826
Foresight MPC Type I RoboColumn Units, 40 µm	7324828	7324829

Description	1 ml	5 ml
Foresight Columns		
Foresight UNOsphere Q	7324732	7324752
Foresight UNOsphere S	7324730	7324750
Foresight UNOsphere SUPrA	7324729	7324749
Foresight Nuvia Q	7324721	7324741
Foresight Nuvia S	7324720	7324740
Foresight Nuvia HR-S	7324723	7324743
Foresight Nuvia cPrime	7324722	7324742
Foresight CHT Type I, 40 µm	7324735	7324755
Foresight CHT Type II, 40 µm	7324736	7324756
Foresight MPC Type I, 40 µm	7324737	7324757

* Package size: 2 x 96-well plates.
** 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**.

Bio-Scale™ Mini Cartridges

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-, FPLC-, and ÄKTA systems.

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

* U.S. patent 7,208,087.

See Also
Bottled resins: pages 55–56.
BioLogic systems: page 122.
Econo gradient pump: page 142.

Ordering Information

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

Description	Pack of 1	Pack of 5
Bio-Gel P-6 Media, 10 ml	—	7325304
Bio-Gel P-6 Media, 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 1/4-28 Adaptor Fittings Kit**, includes 1/4-28 female-to-male luer and 1/4-28 female-to-female luer to connect 1 cartridge to a BioLogic DuoFlow system

Bio-Scale™ Mini Cartridge Protein 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 IMAC cartridge, 1 ml 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 columns, see page 91.

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

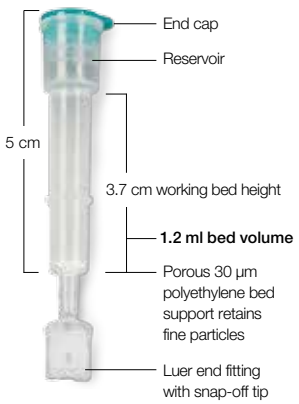
Ordering Information

Catalog #	Description
Bio-Scale Mini Cartridge Kits	
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, 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
Bio-Scale Mini Sampler Packs	
7324650	**Bio-Scale Mini Ion Exchange Sampler Pack**, includes one each UNOsphere Q, UNOsphere S, Macro-Prep Q, Macro-Prep S, Macro-Prep DEAE 1 ml cartridges
7324651	**Bio-Scale Mini Affinity Sampler Pack**, includes one each IMAC, GST, Affi-Prep Protein A 1 ml cartridges, and one each DEAE Affi-Gel Blue and Affi-Gel Blue 5 ml cartridges
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 1/4-28 Adaptor Fittings Kit**, includes luer to 1/4-28 fittings to connect 1 cartridge to a BioLogic DuoFlow system

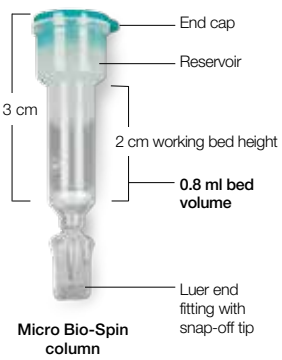
Bio-Spin® and Micro Bio-Spin™ Columns

Bio-Spin 6 and Micro Bio-Spin 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 6	Micro Bio-Spin 6	Bio-Spin 30	Micro Bio-Spin 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.

See Also
Nucleic acid sample preparation: page 9.

Ordering Information

Catalog #	Description
7326227	**Bio-Spin 6 Columns**, 25 with Tris buffer
7326228	**Bio-Spin 6 Columns**, 100 with Tris buffer
7326221	**Micro Bio-Spin 6 Columns**, 25 with Tris buffer
7326222	**Micro Bio-Spin 6 Columns**, 100 with Tris buffer
7326006	**Bio-Spin 30 Columns**, 25 with SSC buffer
7326202	**Micro Bio-Spin 30 Columns**, 25 with SSC buffer
7326203	**Micro Bio-Spin 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 73.

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

Ordering Information

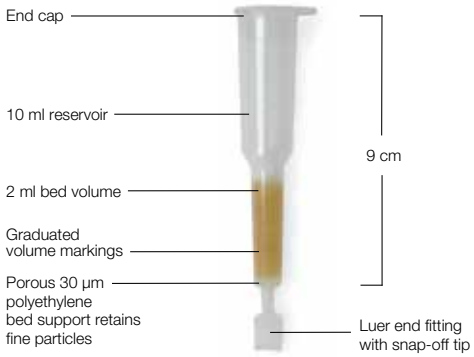
Catalog #	Description
1563007*	**Profinity eXact Mini Spin Columns**, includes ten 0.6 ml spin columns, ten 2 ml capped tubes, and ten 2 ml capless tubes

* 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	Max. 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	**Top-off Resin Kit, CHT-I**, 1 ml					

See Also

Bio-Scale replacement parts: page 110.

NGC systems: page 111.

CHT ceramic hydroxyapatite: page 66.

Bio-Scale Mini cartridges: page 95.

See Also
UNOsphere ion exchange resin: page 57.
NGC systems: page 111.

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 the BioLogic DuoFlow™ system or any other medium- to high-pressure chromatography system. 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

Ordering Information

Catalog #	Description	Column Volume, ml	Recommended Max. Protein Load, mg/column	Recommended Flow Rate, ml/min	Column Flow Dimensions (W x L), mm	Max. Operating Pressure psi	M Pa	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
7500567	**UNO M6 Fittings Kit**, includes 2 nuts and 4 ferrules to connect UNO column to an FPLC system

Aminex® HPLC Columns

See A lso

Organic acid standard: page 89.

Carbohydrate standard: page 89.

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
Request or download bulletins: 1928 and 6333

Ordering Information

Catalog #	Description	Guard Column*	Applications	Particle Size, µm	Ionic Form	Cross-Linkage %	pH Range
Carbohydrate Analysis Columns							
1250143	**Aminex HPX-87N Column**, 300 x 7.8 mm	1250508	Beet sugars (USP L58)	9	Sodium	8	5–9
1250142	**Aminex HPX-87K Column**, 300 x 7.8 mm	1250507	Molasses, corn	9	Potassium	8	5–9
1250095	**Aminex HPX-87C Column**, 300 x 7.8 mm	1250128	High fructose corn syrup (USP L19)	9	Calcium	8	5–9
1250094	**Aminex HPX-87C Column**, 250 x 4.0 mm	1250128	Sugar alcohols (USP L19)	9	Calcium	8	5–9
1250098	**Aminex HPX-87P Column**, 300 x 7.8 mm	1250119 or 1250118	Pentose sugars, cellulose hydrolysates, biofuels (USP L34)	9	Lead	8	5–9
1250140	**Aminex HPX-87H Column**, 300 x 7.8 mm	1250129	Sugars with organic acids, biofuels (USP L17)	9	Hydrogen	8	1–3
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
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**							
1250233	**Carbohydrate Analysis Kit**	Included	Carbohydrates	9	Calcium	8	5–9
1250234	**Organic Acid Analysis Kit**	Included	Organic acids	9	Hydrogen	8	1–3

continues

Ordering Information

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-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
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.

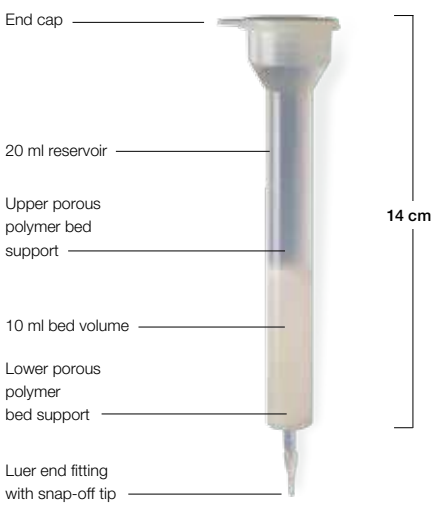
See Also
Affi-Gel Protein A MAPS II kit: page 79.
Affi-Gel Protein A resin: page 79.
DEAE Affi-Gel Blue resin: page 80.

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. Econo-Pac columns with DEAE Affi-Gel® Blue, an affinity/anion exchange chromatography resin, are well suited for obtaining highly pure IgG from a variety of species from serum samples. The Econo-Pac 10DG resin, 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 85–86; for bottled affinity resins, see pages 71–73 and 78–82; and for activated affinity resins, see pages 83–84.



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
7322026	**Econo-Pac Serum IgG Purification Column**, prefilled with DEAE Affi-Gel Blue gel, 5
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 resins. 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
Request or download bulletin: 2289

See Also
Nucleic acid sample preparation: page 9.
Prepacked Bio-Spin and Micro Bio-Spin columns: page 97.

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 102.

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
Request or download bulletin: 2289

Ordering Information

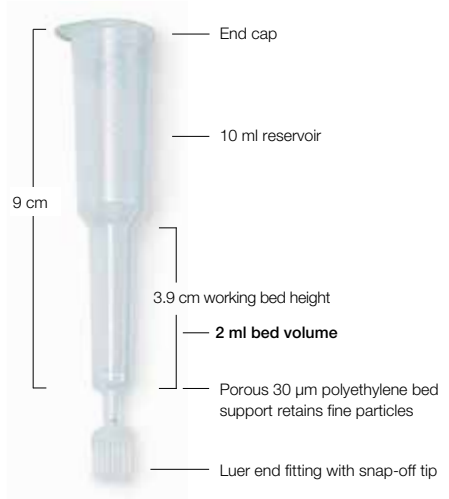
Catalog #	Description
7321010	**Econo-Pac Chromatography Columns**, empty, includes upper bed supports, end caps, tip closures, 50
7321011	**Econo-Pac Chromatography Columns**, empty, includes upper bed supports, end caps, tip closures, 500
Accessories	
7380019	**Econo-Pac Flow Adaptor**, 1.5 cm column 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

See Also
Prepacked Poly-Prep columns: page 98.

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
Request or download bulletin: 2289

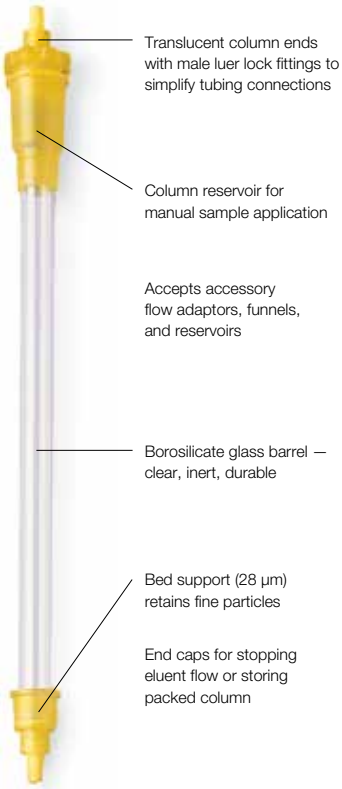


Ordering Information

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
Request or 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
7370512	0.5	10	0.20	2	2
7374511	0.5	10	0.20	2	4
7370517	0.5	15	0.20	3	2
7374516	0.5	15	0.20	3	4
7370522	0.5	20	0.20	4	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
7370722	0.7	20	0.39	8	2
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
7374751	0.7	50	0.39	20	4
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 138.

Jacketed Econo-Column® Columns

Jacketed Econo-Column chromatography columns have an integral water jacket and are ideal for applications that require temperature control such as thermal chromatography of DNA using hydroxyapatite. 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. Jacketed Econo-Column chromatography columns accept Econo-Column funnels and flow adaptors.

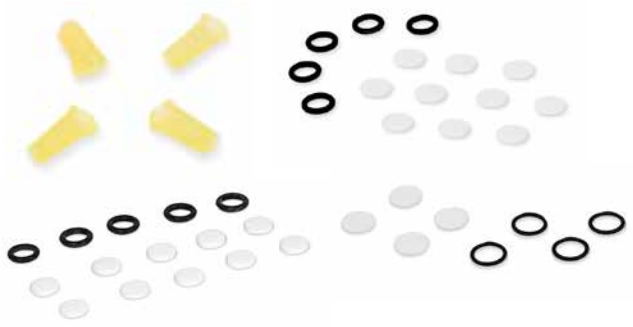
Ordering Information

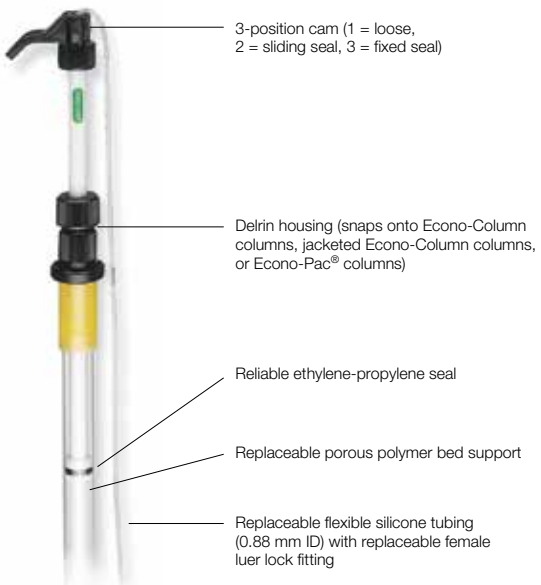
Catalog #	Description	ID, cm	Length, cm	Cross-Sectional Area, cm^2	Maximum Volume, ml	Columns/ Pkg
7376108	**Econo-Column Jacketed Column**	0.7	15	0.37	6	1
7376116	**Econo-Column Jacketed Column**	1.0	15	0.79	12	1
7376131	**Econo-Column Jacketed Column**	1.0	30	0.79	25	1
7376151	**Econo-Column Jacketed Column**	1.5	50	1.77	89	1
7376201	**Econo-Column Open-Ended Jacketed Column**	1.0	30	0.79	25	1

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 105–106), jacketed Econo-Column chromatography columns (page 107), and Econo-Pac® columns (page 104). Due to wear and tear of bed supports and O-rings, maintenance kits are available for standard upkeep of flow adaptors.





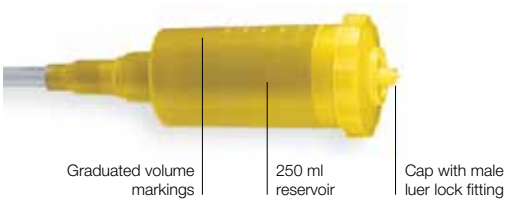
For More Information
Web: bio-rad.com/econocolumnaccessories
Request or download bulletin: 2289

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 105–106), jacketed Econo-Column chromatography columns (page 107), Poly-Prep® columns (page 104), and Econo-Pac® columns (page 104).



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

See Also

Bio-Scale CHT columns: page 99.

UNO columns: page 100.

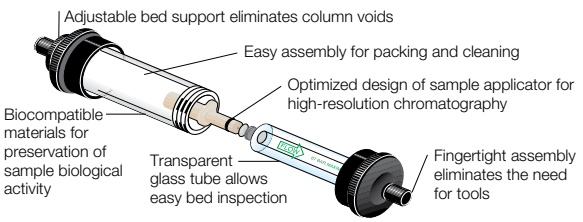
BioLogic DuoFlow systems: page 122.

Bio-Scale Mini cartridges: page 95.

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
Request or download bulletin: 1970



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

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

Medium-Pressure Chromatography Systems

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

See Also
Multi-D chromatography applications: page 113.

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 BioFrac™ fraction collector and the C-96 autosampler.

BioFrac Fraction Collector
(see page 132)

C-96 Autosampler
(see page 130)

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 BioFrac fraction collector and C-96 autosampler.

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
- BioFrac fraction collector compatibility allows for fraction 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, chromaphores, 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
- 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 that need to do method development.

Both NGC Discover 10 systems include the capabilities of the NGC Scout 10 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/media scouting up to 5 columns without the need to replumb. NGC supports up to 3 column switching valves
- A sample outlet valve, available as a standard feature with the NGC Discover Pro systems — allows the 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, column switching valve (up to 5 columns), buffer inlet valve, 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, column switching valve (up to 5 columns), buffer inlet valve, 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. The C-96 autosampler can also be plumbed through the inject valve to enable multiple small volume sample injections.

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 chromaphores 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.

NGC pH Valve Module

NGC Air Sensor Module

NGC Accessories
C-96 Autosampler
The C-96 autosampler enhances the NGC chromatography system by providing automated, accurate, and reproducible sample injections for optimal sample handling. Please refer to page 130 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 132 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, sample pumps, and the C-96 autosampler
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 Collector and Autosampler	
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
7605011	**C-96 Autosampler without Cooling**, 110/240 V, compatible with all NGC systems, includes standard 84+3 vial tray (1.5 and 10 ml), control cable set to connect with BioLogic DuoFlow system, 1 ml syringe, 2 ml sample loop; also includes #7605014, #7605026, and #7600604
7605010	**C-96 Autosampler with Cooling**, 110/240 V, compatible with all NGC systems, includes standard 84+3 vial tray (1.5 and 10 ml), control cable set to connect with BioLogic DuoFlow system, 1 ml syringe, 2 ml sample loop; also includes #7605014, #7605026, and #7600604
7884016	**NGC Signal Import Module**, enables analog-to-digital signal conversion and connection to devices such as the C-96 autosampler, 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
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 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 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 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.

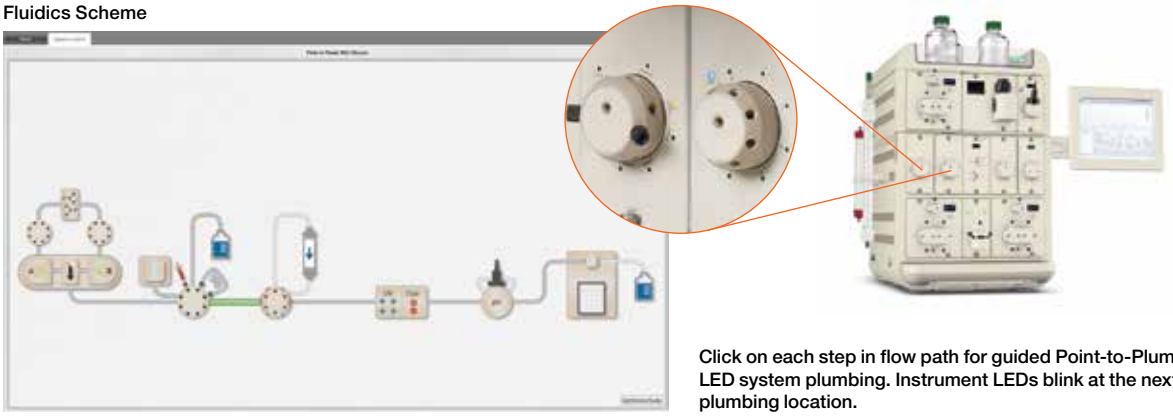
ChromLab™ Software

ChromLab is available in standard format (free) as an upgrade for existing ChromLab software users. It contains 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.

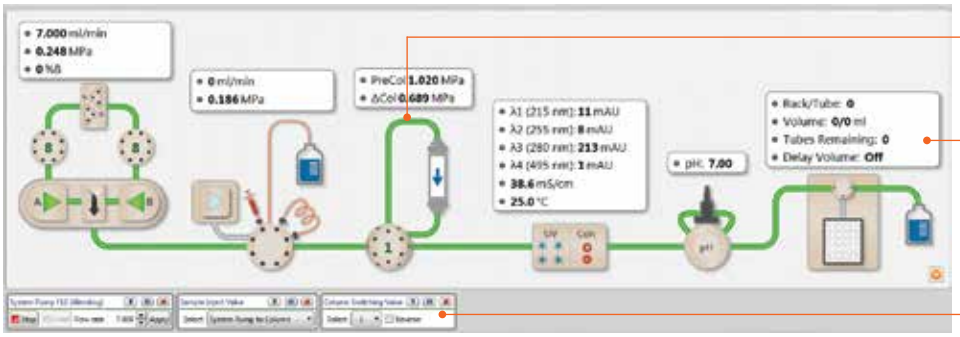
The instrument control interface is touch-screen optimized, allowing flexibility without the need for a computer adjacent to the system, thus minimizing the total footprint.

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



Complete system status and control is available via the graphical fluidics scheme.

See Also

Multi-D chromatography applications: page 113.

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 purification templates that reflect common automated 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
- 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

Applications and Uses of ChromLab Software

- Controls all functions of the NGC medium-pressure chromatography system for lab-scale protein purification
- Method development to identify best methods
- Real-time monitoring of proteins, peptides, nucleic acids, and chromophores
- 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 analysis

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, data acquisition, and analysis. Compatible with Windows 7–10 64 bit

New 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 access to and manipulation of 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 4.0 User Management License**, 1 seat
17000098	**ChromLab 4.0 User Management License**, 3 seats
17000097	**ChromLab 4.0 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
- Limit access to selected tasks through user level permissions
- Produce computer-generated audit trails
- 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 AND 21 CFR PART 11 COMPLIANT

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:

- 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 BioFrac 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 and air sensor)**, duration: 2–3 days

BioLogic DuoFlow™ Medium-Pressure Chromatography Systems

Bio-Rad offers a complete line of laboratory-scale chromatography instruments that are flexible, upgradable, and easy to use. These instruments are specifically designed for protein separations paying close attention to the selection of materials, fraction collection, and the programming flexibility required when working with biological samples.

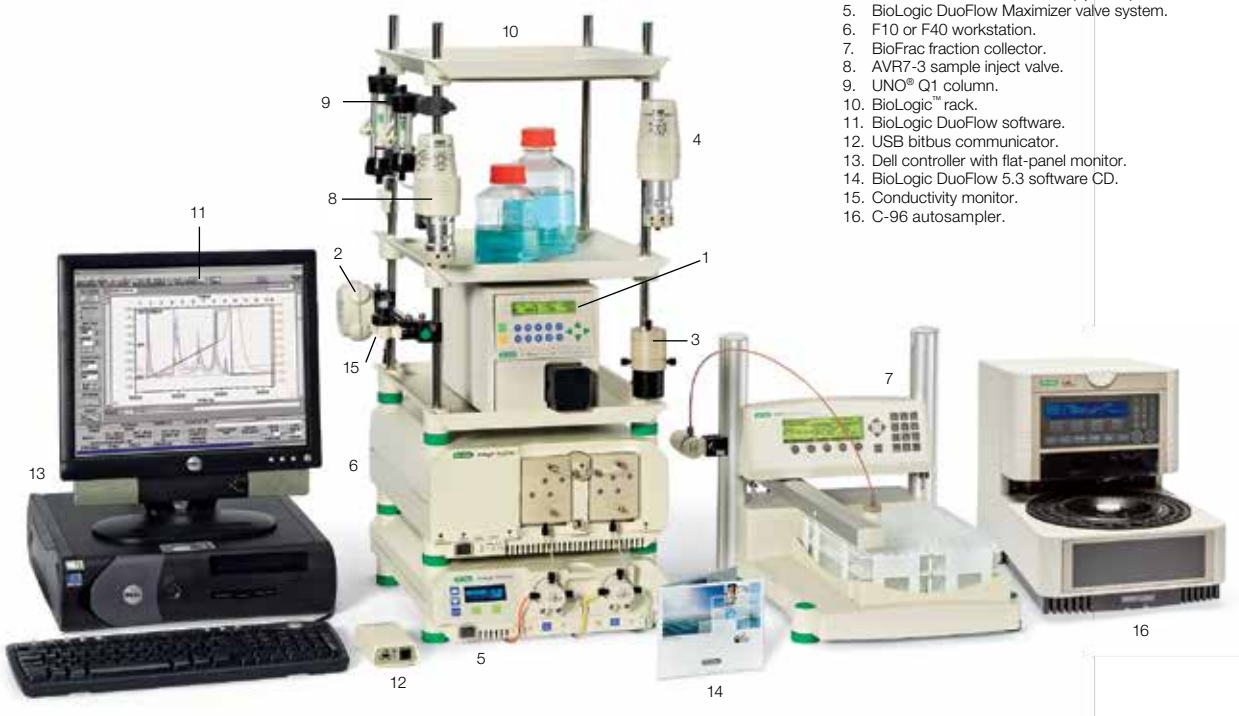
Learn More about the Technology
Web: bio-rad.com/tech/chrom

BioLogic DuoFlow Medium-Pressure Chromatography System Selection Guide

	Flow Rate	Pressure Limit	Techniques	UV Detection	Conductivity	pH Monitor	Sample Loading	Fraction Collection	Gradient
BioLogic DuoFlow 10	0.01–10 ml/min	3,500 psi/ 233 bar/ 23 MPa	Affinity, ion exchange, size exclusion/desalting, HIC, CHT™	254 and 280 nm	1–500 ms/cm	Optional	50 µl–90 ml loops and AVR7-3 automated sample inject valve	External; Model 2110 or BioFrac™ fraction collector	•
BioLogic DuoFlow 40	0.5–40 ml/min	1,000 psi/ 66 bar/ 6.6 MPa	Affinity, ion exchange, size exclusion/desalting, HIC, CHT	254 and 280 nm	1–500 ms/cm	Optional	50 µl–90 ml loops and AVR7-3 automated sample inject valve	External; Model 2110 or BioFrac fraction collector	•

Note: refer to page 139 for low-pressure chromatography systems and components; and see page 134 for chromatography accessories.

BioLogic DuoFlow Pathfinder™ system components:
1. BioLogic DuoFlow QuadTec™ UV/Vis detector.
2. SV5-4 select valve (optional).
3. BioLogic DuoFlow Maximizer™ mixer.
4. AVR9-8 stream-select valve (optional).
5. BioLogic DuoFlow Maximizer valve system.
6. F10 or F40 workstation.
7. BioFrac fraction collector.
8. AVR7-3 sample inject valve.
9. UNO® Q1 column.
10. BioLogic™ rack.
11. BioLogic DuoFlow software.
12. USB bitbus communicator.
13. Dell controller with flat-panel monitor.
14. BioLogic DuoFlow 5.3 software CD.
15. Conductivity monitor.
16. C-96 autosampler.



The BioLogic DuoFlow family of chromatography systems offers flexibility with multiple system configurations, many optional upgrades, and a common software platform that is intuitive and easy to follow. These systems can be used on the laboratory bench or in a coldroom and are suitable for analytical and preparative chromatography.

A Dell PC controller enables easy communication with the workstation and peripheral devices via an external USB bitbus communicator. The controller includes the Windows 7 operating system, application software, keyboard, mouse, and high-resolution flat-panel monitor.

Upgradable Systems Add Capability as Research Needs Change

BioLogic DuoFlow modular components allow the system to meet both laboratory space and application requirements. As requirements change, systems may be easily reconfigured and seamlessly upgraded with increased functionality such as higher flow rates, sophisticated detection capabilities, pH monitoring, column scouting, and buffer blending. The BioLogic DuoFlow system selection guide on the previous page lists the systems, their functions, and available options.

For More Information
Web: bio-rad.com/DFmediumpressure
Request or download bulletins: 2687 and 5369

BioLogic DuoFlow System Options	*F10 Pump*	*F40 Pump*	*BioFrac Fraction Collector*	*BioLogic Maximizer Valve System*	*BioLogic QuadTec UV/Vis Detector*	*UV (254/280 nm) Detector*	*Conductivity Monitor*	*214 nm Conversion Kit*
Page numbers for components	124	124	132	136	125	125	125	125
BioLogic DuoFlow 10 system 0.01–10 ml/min flow rate, 3,500 psi	•	○	○	○	○	•	•	○
BioLogic DuoFlow 40 system 0.5–40 ml/min* flow rate, 1,000 psi	○	•	○	○	○	•	•	○

• Included as standard; ○ option or upgrade. * To double the flow rate, use the BioLogic Maximizer valve system.

Ordering Information

Catalog #	Description
BioLogic DuoFlow Systems*	
7600037	**BioLogic DuoFlow 10 System**, 100/120 V, includes Dell controller and monitor, USB bitbus communicator, F10 workstation, MX-1 mixer, 3-tray rack, AVR7-3 sample inject valve, fittings kit, UV detector with 5 mm flow cell and 254/280 nm filters, conductivity monitor, starter kit
7600036	**BioLogic DuoFlow 10 System**, 100/120 V, for Japan and Korea only, does not include monitor
7600038	**BioLogic DuoFlow 10 System**, 220/240 V, does not include monitor
7604037	**BioLogic DuoFlow 40 System**, 100/120 V, same as #7600037 with F40 workstation replacing F10 workstation
7604036	**BioLogic DuoFlow 40 System**, 100/120 V, for Japan and Korea only, does not include monitor
7604038	**BioLogic DuoFlow 40 System**, 220/240 V, does not include monitor
7600047	**BioLogic DuoFlow 10 System with BioFrac Fraction Collector**, 100/120 V, includes Dell controller and monitor, USB bitbus communicator, F10 workstation, MX-1 mixer, 3-tray rack, AVR7-3 sample inject valve, fittings kit, UV detector with 5 mm flow cell and 254/280 nm filters, conductivity monitor, starter kit, diverter valve, two F1 racks
7600046	**BioLogic DuoFlow 10 System with BioFrac Fraction Collector**, 100/120 V, for Japan and Korea only, does not include monitor
7600048	**BioLogic DuoFlow 10 System with BioFrac Fraction Collector**, 220/240 V, does not include monitor
7604047	**BioLogic DuoFlow 40 System with BioFrac Fraction Collector**, 100/120 V, same as #7600047 with F40 workstation replacing F10 workstation
7604046	**BioLogic DuoFlow 40 System with BioFrac Fraction Collector**, 100/120 V, for Japan and Korea only, does not include monitor
7610001	**BioLogic DuoFlow 10 Core with BioFrac Fraction Collector**, 100/120 V
7610002	**BioLogic DuoFlow 10 Core with BioFrac Fraction Collector**, 220/240 V

* The 10 system includes an F10 workstation. The 40 system includes an F40 workstation.
Note: Additional detectors, valves, and accessories are optional and available.

BioLogic DuoFlow™ Workstations and Accessories

BioLogic DuoFlow Workstations

The BioLogic DuoFlow workstations, with options of F10 or F40 pumps to accommodate different flow rates, include mixer barrel extenders that provide reproducible separations across the entire range of flow rates. The workstation integrates stream-select, sample loading, and diverter valves. The pump head can be removed easily from the workstation for routine maintenance.

The BioLogic DuoFlow F10 workstation is a component of all BioLogic DuoFlow 10 and 20 systems. The BioLogic DuoFlow 40 workstation is a component of all BioLogic DuoFlow 40 and 80 systems.

F10 and F40 Pump Kits

The pump kits used in the BioLogic DuoFlow workstation are interchangeable. The F10 pump enables a flow rate of 0.01–10 ml/min at 3,500 psi (233 bar, 23 MPa) and the F40 pump enables up to 40 ml/min at 1,000 psi (66 bar, 6.6 MPa). Flow rates for each pump head can be doubled with the addition of the BioLogic Maximizer™ valve system. The kits contain fully assembled pump heads with seals and check valves installed for fast, easy pump head changes.

Mixers

The Model MX-1 and BioLogic Maximizer mixers ensure improved gradient quality for more accurate separations.

Ordering Information

Catalog #	Description
BioLogic DuoFlow Workstations	
7600150	**BioLogic DuoFlow F10 Workstation**
7600140	**BioLogic DuoFlow F40 Workstation**
Pump Kits	
7600110	**F10 Pump Kit**, converts F40 workstation to F10 pumps to enable flow rates as low as 0.01 ml/min; includes 2 fully assembled pump heads, 4 piston assemblies, F10 tubing kit, tools
7600180	**F40 Pump Kit**, expands pumping capabilities to 40 ml/min; includes 2 fully assembled pump heads, 4 piston assemblies, mixer barrel extender, 2 mm UV flow cell, F40 tubing kit, tools
Mixers	
7600170	**MX-1 Mixer**, includes mixer body (263 µl) and standard mixer barrel for total volume of 750 µl
7600171	**Mixer Barrel Extender**, for total volume of 2 ml; one included in the F40 pump kit (#7600180)
7602010	**BioLogic Maximizer Mixer**, includes 750 µl mixer body, 5 ml and 12 ml mixer barrel extenders, 5 O-rings, stirbar, installation screws
7602005	**BioLogic Maximizer Mixer Barrel Extender**, 5 ml
7602012	**BioLogic Maximizer Mixer Barrel Extender**, 12 ml
BioLogic DuoFlow Workstation Accessories	
7600164	**F10 Pump Maintenance Kit**, to service one F10 pump, includes 2 piston seals, 4 check valves, seal removal tool, 2 O-rings
7600161	**F10 Piston Seals**, 2, includes seal tool, to service one F10 pump
7600162	**F10 Piston Kit**, 2 pistons, to service one F10 pump
7600184	**F40 Pump Maintenance Kit**, to service one F40 pump, includes 2 piston seals, 4 check valves, seal removal tool, 2 O-rings
7600172	**F40 Piston Seals**, 2, includes seal tool, to service one F40 pump
7600173	**F40 Piston Kit**, 2 pistons, to service one F40 pump
7500162	**Check Valve**, 1 (4 required per pump)
7500703	**Inline Filter Kit**, includes 1 filter unit, 2 replacement frits
7500230	**40 psi Backpressure Regulator**
7600135	**BioLogic System Starter Kit**

BioLogic DuoFlow™ Detectors

BioLogic DuoFlow UV Detector with Conductivity Monitor

- Standard 254 and 280 nm filters
- Replaceable lamp with 365, 405, and 436 nm expansion filters
- 214 nm conversion kit with zinc lamp
- Standard analytical 5 mm flow cell or optional preparative 2 mm flow cell
- UV absorbance range from 0.0001–2.0 OD
- Conductivity detection range from 1–500 mS/cm

UV Detector with Conductivity Monitor

Signal Import Module (SIM)

The optional SIM allows import of an analog signal (up to 2.5 V) from a pH electrode or other external detector (for example, UV, refractive index, or fluorescence monitor). BioLogic DuoFlow system software accommodates two SIMs and can display up to four data signals simultaneously.

Signal Import Module

Ordering Information

Catalog #	Description
7500200	**BioLogic DuoFlow Detector Kit**, includes UV optics module and conductivity monitor, 5 mm analytical flow cell
7500202	**UV Optics Module**, 5 mm analytical flow cell
7500240	**Conductivity Monitor**
7500210	**Flow Cell**, preparative, 2 mm (30 ml) pathlength
7500212	**Flow Cell**, analytical, 5 mm (16 ml) pathlength
7500216	**Mercury Lamp**, for use at all wavelengths except 214 nm
7500220	**Detector Filters**, 254 and 280 nm
7500224	**Detector Filter**, 405 nm
7500225	**Detector Filter**, 436 nm
7500214	**214 nm Conversion Kit**, for detectors with serial #362BRXXXX, includes zinc lamp, housing, and 214 nm filter for peptide detection
7500217	**Zinc Lamp**, for 214 nm detection
7500221	**Detector Filter**, 214 nm, requires zinc lamp
7601300	**BioLogic QuadTec Detector Kit**, includes BioLogic QuadTec detector with 3 mm PEEK flow cell, instrument control module (ICM), system cables 25, 26, and 17 (BioLogic QuadTec RS-232, ICM power, and bus communication), U.S. power cord, 40 psi backpressure regulator
7601330	**Deuterium Lamp**, replacement
7601332	**Halogen Lamp**, replacement
7601331	**Halogen Lamp**, with holder for first-time halogen lamp change
7601306	**Standard Flow Cell**, 3 mm pathlength (2 µl)
7601406	**High-Speed Flow Cell**, 2 mm pathlength, flow rate to 80 ml/min with fittings
7601311	**Long Fingertight Fittings**, 10-32 x 1.03", 4
7601320	**Instrument Control Module (ICM) Kit**, includes ICM power cable and cable 17
7500650	**System Cable 17**, bus communication cable, 1.2 m (4')
7601307	**System Cable 25 (BioLogic QuadTec RS-232)**, connects BioLogic QuadTec detector to ICM
7601321	**System Cable 26 (ICM Power)**, connects to 12 V power on BioLogic DuoFlow workstation
7500230	**40 psi Backpressure Regulator**
7602046	**pH Tubing Kit**, includes orange and green PEEK 1/4–28 prefitted tubing lengths for connecting the pH flow cell to the chromatography system
Signal Import Module (SIM)	
7500502	**Signal Import Module**, includes 4' communication cable (system cable 17)
7602034	**Universal AC/DC Inline Adaptor for USB Bitbus Device**, required when connecting pH monitor or other external detector through SIM module on BioLogic DuoFlow systems

BioLogic DuoFlow™ Valves and Accessories

BioLogic DuoFlow Valves

The high-pressure sample injection and stream-select valves, AVR7-3 and AVR9-8, prevent pressure spikes when the valve rotates from one port to another. This feature eliminates baseline interference and is beneficial when using fragile low-pressure columns or flow-sensitive detectors. It also prevents pump shutdowns due to transient overpressure conditions. These valves can be used alone or in combinations. A valve rebuild kit is available for four of the following valve types.

Sample Loading Options

- **Single-injection loops for the AVR7-3 sample inject valve** — for 25 µl to 5 ml samples
- **DynaLoop™ sample loops** — dynamic (sliding piston) 25 and 90 ml sample loops allow large-volume sample loading or repetitive injection of smaller volumes
- **Econo™ gradient pump or Model EP-1 Econo pump** — can load large sample volumes directly onto the column
- **SV5-4 select valve** — can be used to automate large sample loading or as a buffer selector in chromatography protocols
- **SVT3-2 diverter valve** — can be used as a buffer selector, for large sample loading, and for diverting buffer flow

BioLogic DuoFlow Valves

AVR7-3 Valve

- Automation of single sample injections using single-injection loops (from 25 µl to 5 ml)
- Reverse-flow chromatography for affinity purifications
- 2-column switching
- Sequential binding and elution

AVR9-8 Valve

- Multiple buffer selection
- 8-column switching
- Large-volume fraction collection
- Tandem chromatography

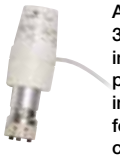
SV5-4 Select Valve

- Automation of large-sample loading
- Buffer selection in chromatography protocols

SVT3-2 Diverter Valve

- Buffer selection
- Loading of large samples
- Diverting buffer flow

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

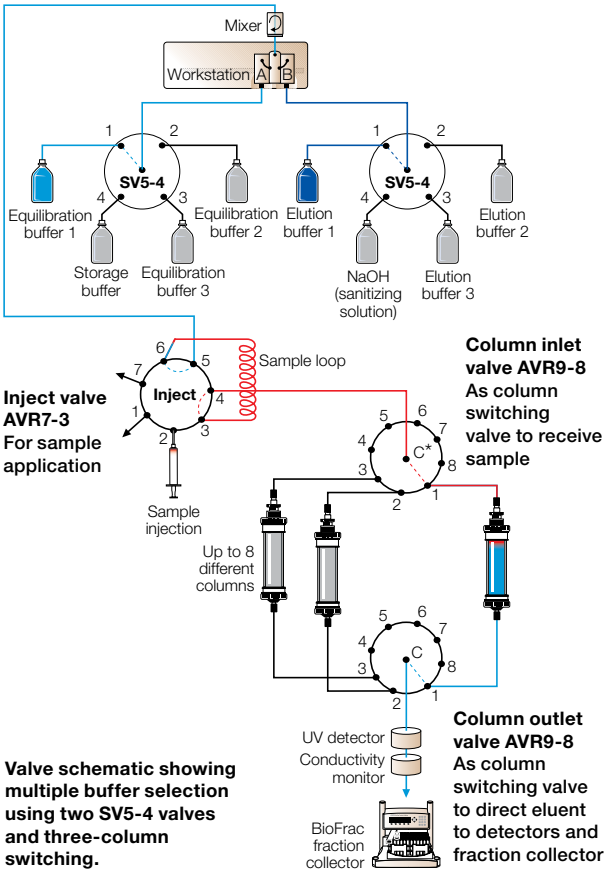


AVR7-3, a 7-port, 3-position (load, inject, purge) high-pressure sample inject valve also used for reverse-flow chromatography and two-column switching.

SVT3-2, a 3-way solenoid valve for sample loading, or a fraction collector diverter valve.

AVR9-8, a 9-port, 8-position high-pressure valve for stream selection, column switching, and large-volume fraction collection.

SV5-4, a 5-port, 4-position solenoid valve for multiple buffer selection.



Inject valve AVR7-3 For sample application

Column inlet valve AVR9-8 As column switching valve to receive sample

Column outlet valve AVR9-8 As column switching valve to direct eluent to detectors and fraction collector

Valve schematic showing multiple buffer selection using two SV5-4 valves and three-column switching.

Ordering Information

Catalog #	Description
BioLogic DuoFlow Valves and Rebuild Kits	
7600406	**AVR7-3 Automated Sample Injection Valve**, 7-port, 3-position high-pressure valve, 3,500 psi (233 bar) limit
7600401	**AVR7-3 Valve Rebuild Kit**
7600408	**AVR9-8 Stream-Select Valve**, 9-port, 8-position high-pressure valve, 3,500 psi (233 bar) limit
7600403	**AVR9-8 Valve Rebuild Kit**
7600410	**SVT3-2 Diverter Valve**, 3-port, 2-position solenoid valve, 30 psi (2 bar) limit
7600411	**SVT3-2 Valve Rebuild Kit**
7500415	**SV5-4 Select Valve**, 5-port, 4-position solenoid valve, 30 psi (2 bar) limit
BioLogic DuoFlow Fittings Kit	
7600550	**BioLogic DuoFlow Fittings Kit**
BioLogic 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**
BioLogic 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**
BioLogic 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

BioLogic DuoFlow™ Software, Version 5.3

BioLogic DuoFlow software is easy and intuitive. It walks you through simple step-by-step protocols to create and run methods and analyze the results. The software offers functions such as:

- **Scouting wizard** — provides simplified setup of scouting experiments
- **Method templates** — allow easy method creation with predefined chromatography method templates for all commonly used chromatography experiments
- **Buffer blending** — controls automatic buffer pH blending of up to four stock solutions when used in combination with the BioLogic Maximizer™ valve system

BioLogic DuoFlow software provides peak recovery control and data review with the following features:

- **Trace Compare function** — permits overlay of different chromatograms for comparison of runs
- **Fraction identification** — provides BioFrac™ fraction collector numbering schemes that number tubes by collection order or by rack grid number
- **Threshold collection** — allows collection of fractions when a detector signal is above or below a defined threshold
- **Tagging of peaks** — labels peaks with name, retention time, absorbance units (UV trace), pH, or conductivity
- **Selection of an activity trace** — permits data collected by an offline method to be included with the BioLogic DuoFlow run data; a histogram of the offline data can overlay the chromatogram peaks

System Requirements

Operating system	Windows XP or Windows 7
Processor	Pentium 4 at 2 GHz
RAM	512 MB
Screen resolution	1,024 x 768
Hard drive space	40 GB
Drive	CD-ROM
USB port	2.0 Hi-Speed

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

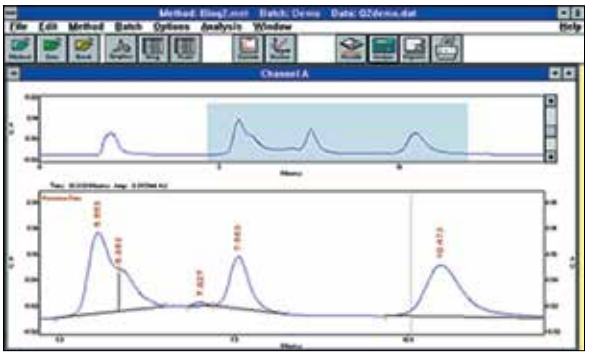
Ordering Information

Catalog #	Description
7602050	**BioLogic DuoFlow Software Version 5.3 Upgrade**, upgrades existing BioLogic DuoFlow version 5.0 systems, includes version 5.3 software CD

EZLogic™ Integration Software

This powerful software package provides all the tools necessary to quantitate samples, integrate and overlay chromatograms, determine retention times, view the results, and generate customized reports. Graphical capabilities include split-screen chromatogram views, zooming, multiple parameter annotation, and color selection.

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



EZLogic integration software screen.

Ordering Information

Catalog #	Description
7500111	**EZLogic Integration Software Package**

BioLogic DuoFlow™ IQ/OQ Protocols

Bio-Rad offers qualification protocols and services for the BioLogic DuoFlow chromatography systems and their peripheral components, including the BioLogic Maximizer™ valve system for buffer blending, the BioLogic QuadTec™ UV/Vis detector, and the BioFrac™ fraction collector. Bio-Rad's IQ/OQ protocols are designed to help comply with U.S. FDA regulatory requirements. Procedures are performed by factory-trained and certified technicians using instruments and reagents traceable to NIST standards.

IQ service verifies that the BioLogic DuoFlow chromatography system is properly installed. OQ service tests the performance of the installed system and provides a record that confirms critical functions and safety features.

For more information on IQ/OQ for the BioLogic DuoFlow chromatography system, contact your local Bio-Rad sales representative.

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

C-96 Autosampler

The C-96 autosampler, with optional Peltier cooling, connects with the NGC™ and the BioLogic DuoFlow™ chromatography systems to provide automated sample injections. Easy-to-install accessories allow injection volumes from 5 µl to 5 ml. Three injection modes with programmable sample and reagent mixing make the C-96 a versatile autosampler.

- Easy to connect to the NGC system and the BioLogic DuoFlow chromatography systems
- Simple programming via front panel user interface
- Automated, highly reproducible injection of sample volumes from 5 µl to 5 ml

For More Information
Web: bio-rad.com/c96

Ordering Information

Catalog #	Description
7605010	**C-96 Autosampler with Cooling**, 110–240 V, includes standard 84+3 vial tray (1.5 and 10 ml), control cable set to connect with BioLogic DuoFlow system, 1 ml syringe, 2 ml sample loop; also includes #7605014, #7605026, and #7600604
7605011	**C-96 Autosampler**, 110–240 V, includes standard 84+3 vial tray (1.5 and 10 ml), control cable set to connect with BioLogic DuoFlow system, 1 ml syringe, 2 ml sample loop; also includes #7605014, #7605026, and #7600604
7605012	**Prep Bio Kit**, contains 24-position tray for 10 ml vials (22 mm OD), 2.5 ml syringe, 10 ml PEEK loop, 0.75 mm ID PEEK injection valve, prep needle, 6 mm fitting wrench, for use with C-96 autosamplers
7605013	**Syringe**, pkg of 1, 1 ml syringe, for use with C-96 autosamplers
7605014	**Connector Kit**, contains nuts and ferrules to plumb the syringe valve, for use with C-96 autosamplers
7605024	**Sample Tray**, pkg of 1, large-capacity 96-position tray for 1.5 ml vials (12 mm OD), for use with C-96 autosamplers
7600604	**PEEK Tubing**, pkg of 1, 1/16" OD x 0.020" ID x 30' high-pressure tubing, rated to 5,000 psi, orange
7605026	**Fittings Kit**, contains 10-32 short nuts and ferrules to plumb the injection valve, for use with C-96 autosamplers
7605027	**Needle**, pkg of 1, 45 µl needle, for use with C-96 autosamplers
7605028	**Prep Kit Needle**, pkg of 1, needle for large sample volume, for use with C-96 autosamplers
7605017	**Analytical Bio Kit**, includes 250 µl syringe, 500 µl buffer tubing, 100 and 200 µl PEEK sample loops, standard sample needle, 6 mm fitting wrench, for use with C-96 autosamplers
7885011	**NGC Autosampler**, includes NGC SIM and connector cable
7885012	**NGC Autosampler with Cooling**, includes NGC SIM and connector cable

For NGC system–compatible products, see pages 117–118 for ordering information.

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, BioLogic™ LP system, or BioLogic DuoFlow™ 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, natural, graduated, 500

* For more information, refer to the Cable Guide on page 134.

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

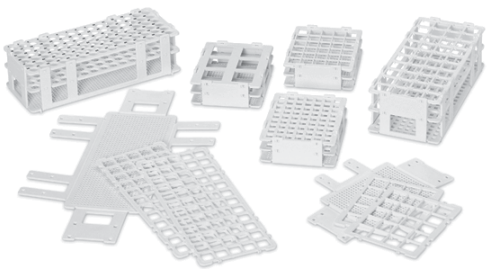
Key features include:

- Collection in time or drop mode (or volume mode when connected to an NGC™, BioLogic DuoFlow™, or BioLogic™ LP chromatography system, or Model EP-1 Econo™ pump)
- 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 BioLogic DuoFlow chromotography 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 134.
For NGC system–compatible products, see pages 117–118 for ordering information.

Chromatography Accessories

Cables

Refer to the guide to select cables to link chromatography system components together or to link components from other manufacturers 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, 19, or 21	17, 18, 25, or 26			5	17, 18, 19, or 21		7	17, 18, 19, or 21
Model 2110 fraction collector	5	1			5				1	1	22
BioFrac fraction collector	17, 18, 19, or 21	3, 15			*	*				3, 15	23
Isco Retriever II collector	12								12		
Gilson FC 203 fraction collector		14								14	
GE Healthcare FRAC-100 fraction collector		9								9	
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, 19, or 21						22	23			

* 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')

continues

Ordering Information

Catalog #	Description
7500652	**System Cable 19**, bus communication cable, 9.2 m (30')
7500655	**System Cable 21**, BioLogic HR system communication cable, 30 m (100')
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 114.
For BioLogic DuoFlow systems ordering information see page 123.

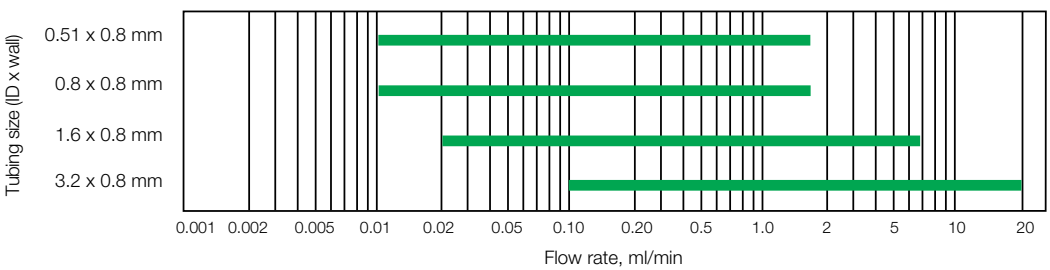
Low-Pressure Tubing

- **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

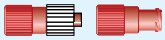
Catalog #	Description
7500603	**PTFE FEP Tubing**, 1/8" (0.125", 3.2 mm) OD x 0.062" (1.6 mm) ID, 15' (4.6 m), for pre-pump buffer inlet lines to the pump heads
7500602	**Tefzel Tubing**, 1/16" (0.062", 1.6 mm) OD x 0.020" (0.5 mm) ID, 30' (9.1 m), for system connections post-pump
7600604	**PEEK Tubing**, 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
7602046	**pH Tubing Kit**, includes orange and green PEEK 1/4–28 prefitted tubing lengths for connection of the pH flow cell to the chromatography system
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™ fittings kit includes all parts necessary to connect medium- and high-pressure columns to medium-pressure chromatography systems.

For More Information
Request or download bulletin: column connection instructions — 5326

Ordering Information

Catalog #	Diagram	Description	Quantity
Medium- and High-Pressure Fittings Kit			
7600550		**BioLogic System 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		**Adaptor**, FEM Slip Luer-FEM 10-32 + Adap, Quick Con, M Luer-FEM 10-32	1
7320113		**Luer to BioLogic System Fittings Kit**, includes 1/4–28 female to male luer, 1/4–28 female to female luer, to connect 1 cartridge to a BioLogic DuoFlow system	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		**HPLC Column to BioLogic System Adaptors**, 2 fittings to connect 1 HPLC column (10-32) to a BioLogic DuoFlow system	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	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
Request or download bulletin: column connection instructions — 5326

Ordering Information

Catalog #	Description
Medium- and High-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
7328302		**0.8 mm Barb T-Connector**, recommended for minimal dead-volume connection	25	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
7328107		**3-Way Stopcock**, nylon, solvent resistant	10	Nylon/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	1	Polypropylene/PTFE
7320113		**Luer to BioLogic System Fittings Kit**, includes 1/4–28 female to male luer, 1/4–28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system	1	Polypropylene/PTFE

* Fits inlet and outlet of Econo-Column chromatography columns and low-pressure tubing.

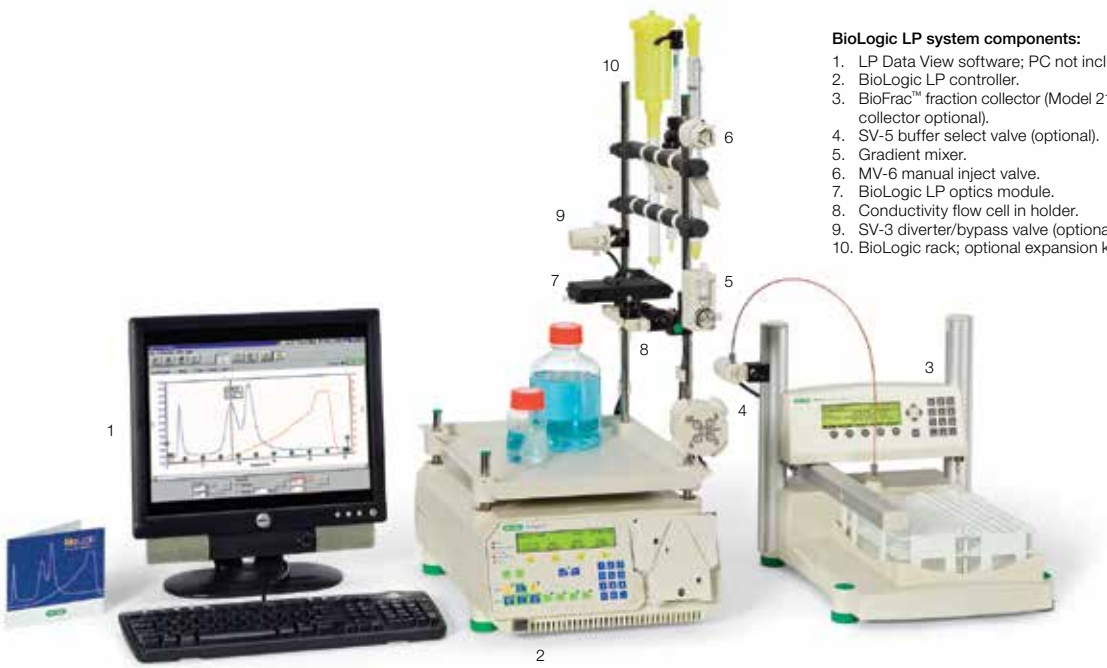
Low-Pressure Chromatography Systems

Bio-Rad offers the BioLogic low pressure system and components for protein purification. All are capable of operating from 30–45 psi (2–3.4 bar) with flow rates ranging from 0.002–40 ml/min.

Low-Pressure Chromatography System Selection Guide

	Flow Rate	Pressure Limit	Techniques	UV Detection	Conductivity	pH Monitor	Sample Loading	Fraction Collection	Gradient
BioLogic™ LP dual peristaltic pump	0.04–40 ml/min	30 psi/ 2 bar	Affinity, ion-exchange, size exclusion/desalting, HIC, CHT™	254 and 280 nm	0–500 ms/cm	—	Custom-sized loops and MV-6 manual sample inject valve	External; Model 2110 or BioFrac™ fraction collector	•
Econo gradient pump	0.002–40 ml/min	30 psi/ 2 bar	Affinity, ion exchange, size exclusion/desalting, HIC, CHT™	254 and 280 nm	0–500 ms/cm with EG monitor	—	Custom-sized loops and MV-6 manual sample inject valve	External; Model 2110 or BioFrac fraction collector	•

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 131), or collect into virtually any size container, from microplates to carboys, using the BioFrac™ fraction collector (page 132); in addition, the BioLogic LP system supports the use of other fraction collectors
- **IEC 61010 safety certification**

For More Information
Web: bio-rad.com/biologiclp
Request or download bulletins: system information — 2038 and 2327; column connection instructions — 5326

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

* For more information, see page 141.

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 and the Econo™ gradient pump rack.

Fraction Collection/Column Bypass Valve

The optional SV-3 diverter/bypass valve is a two-position solenoid valve controlled through the Econo gradient pump, 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 either the Model EP-1 Econo pump or the Econo gradient pump, the SV-3 valve functions only as a fraction collector diverter valve. The SV-3 valve connects directly to the BioLogic system rack and the Econo gradient pump 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

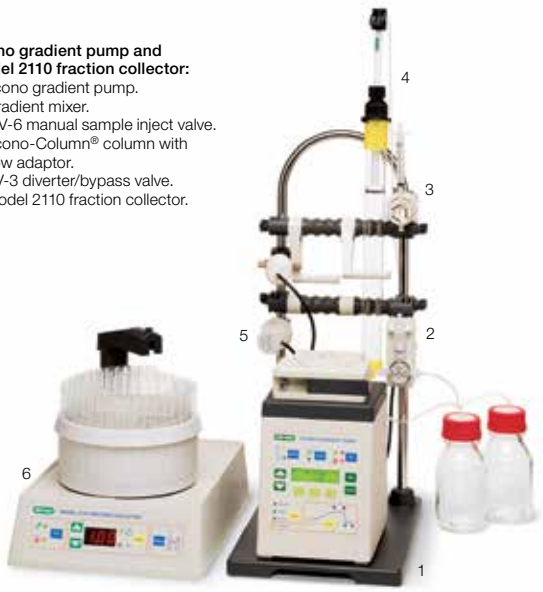
Econo™ Gradient Pump

The Econo gradient pump is suited for any low-pressure protein purification application. It is the only stand-alone peristaltic pump capable of both isocratic and gradient elution. The Econo gradient pump works seamlessly with other Bio-Rad instruments such as the Model 2110 and BioFrac™ fraction collectors, the EM-1 UV monitor, and the EG-1 gradient monitor. Configure the system according to your needs and budget using the Econo gradient pump as a starting point.

The Econo gradient pump is a two-channel bidirectional pump that is ideal for preparative applications and for purification of recombinant proteins.

- Simple setup and programming
- Flow rates of 0.1–40 ml/min
- Control of a gradient mixer for binary gradient formation
- Control of an optional fraction collector and diverter valve
- Automated calibration procedures for a variety of tubing sizes
- Maximum pressure of 30 psi
- Compatible with the BioLogic DuoFlow™ chromatography systems

For More Information
Web: bio-rad.com/econogradient
Request or download bulletin: 2438



Econo gradient pump and Model 2110 fraction collector:
1. Econo gradient pump.
2. Gradient mixer.
3. MV-6 manual sample inject valve.
4. Econo-Column® column with flow adaptor.
5. SV-3 diverter/bypass valve.
6. Model 2110 fraction collector.

Ordering Information

Catalog #	Description
7319001	**Econo Gradient Pump**, 100/120 V, includes tubing and fittings kits
7319002	**Econo Gradient Pump**, 220/240 V
Combination Systems	
7319030	**Econo Gradient Pump Combo 1**, 100/120 V, includes Econo gradient pump, gradient mixer valve
7319032	**Econo Gradient Pump Combo 1**, 220/240 V
7319034	**Econo Gradient Pump Combo 2**, 100/120 V, includes Econo gradient pump, gradient mixer valve, MV-6 manual inject valve, rack with column clamps
7319036	**Econo Gradient Pump Combo 2**, 220/240 V
7319038	**Econo Gradient Pump Combo 3**, 100/120 V, includes Econo gradient pump, gradient mixer valve, rack with column clamps
7319040	**Econo Gradient Pump Combo 3**, 220/240 V
Valves	
7318322	**SV-3 Diverter/Bypass Valve**, 3-way valve
7318323	**Gradient Mixer**
7318320	**MV-6 Manual Inject Valve**, 6 ports
Cables*	
7319010	**System Cable 22**, Y-cable for connecting Econo gradient pump to Model 2110 fraction collector
Accessories	
7319004	**Econo Gradient Pump Rack**, preassembled
7319006	**Econo Gradient Pump Fittings Kit**, includes 32 fittings, 12 tubing retainers
7319007	**Econo Gradient Pump Tubing Kit**, includes 2 each of 0.8, 1.6, and 3.2 mm PharMed tubing

* For more information, refer to the Cable Guide on page 134.

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	Noise	1.0×10^{-4} OD max. peak-to-peak (dry cell); 2.0×10^{-4} OD max. peak-to-peak (flowing liquid)
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	Safety	Meets IEC 61010 and CSA 22.2 certification
Filters	254 and 280 nm		
Output signal	0–1 V analog (impedance 150 Ω)	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
Operating temperature	4–40°C		
Flow cell	Optical path 2 mm, internal volume 80 µl, illuminated volume 3 µl		

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 Columns and Plates Page #	Resin Sampler Pack Page #	Other Prepacked Columns Page #
Affinity				
Nuvia™ IMAC	71			91
Profinity™ IMAC	72			91
UNOsphere SUPrA™ rProtein A	78	94–95	88	91
Affi-Prep® Protein A	79			91
Affi-Gel® 10/15	83			
Affi-Gel Blue	80			92
DEAE Affi-Gel Blue	80			91
CM Affi-Gel Blue	81			
Affi-Prep polymyxin	82			
Affi-Gel boronate	81			
Affi-Gel HZ	84			
Affi-Gel 102	84			
Analytical Grade Resins				
AG® 1, 4	61			
AG 50W	61			
AG 501	61			
Chelex®	61			
Hydrophobic Interaction				
Macro-Prep® methyl HIC	87			
Macro-Prep t-butyl HIC	87			
BioBeads™ SM-2	87			
Ion Exchange				
Nuvia™ Q	57	94–95		
Nuvia S	57	94–95		
Nuvia HR-S	57	94–95		
UNOsphere™ Q	57	94–95	88	91–92
UNOsphere S	57	94–95	88	92
Macro-Prep High Q	59		88	92
Macro-Prep DEAE	59		88	92
Macro-Prep High S	59		88	91
Macro-Prep CM	59			
Mixed-Mode				
Nuvia™ cPrime™	65	94–95		91
CHT™ Type I	66	94–95	88	91
CHT Type II	66	94–95	88	91
MPC™	67	94–95		91–92
Bio-Gel® HT/HTP	69			
CFT™ Type II	68		88	91–92
Size Exclusion				
Bio-Gel A	86			
Bio-Gel P	85			
Bio-Beads SM-2	87			
Bio-Beads S-X	86			

For product applications and descriptions, please refer to the chromatography resin/media selection guide on pages 55–56.

Process-Scale Chromatography Resin

Nuvia™ resins — a family of next-generation ion-exchange 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 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 feed stream 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 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

CHT™ ceramic hydroxyapatite media — 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. Use **CFT™ ceramic fluoroapatite** for protein separations requiring acidic-buffered conditions.

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

MPC™ media — MPC is a fluorinated derivative of ceramic hydroxyapatite providing the same robust impurity clearance as CHT Type I, 40 µm. Use MPC to maximize your process economics for specialty protein purification applications. Contact your local Bio-Rad representative for additional information.

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

Nuvia™ cPrime™ resin — this 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 interaction modes to achieve effective purification. The resins have 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.

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

CFT™ ceramic fluoroapatite media — this chemically pure form of fluoroapatite is a rigid, spherical, and macroporous media used in the purification of biologically significant compounds. It 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/processCFT

AG® resin — 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

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 Resins/Media Available in Foresight Formats

Chromatography Resin	Mode
UNOsphere™ Q	Strong anion
UNOsphere S	Strong cation
UNOsphere SUPrA	rProtein A
Nuvia™ Q	Strong anion
Nuvia S	Strong cation
Nuvia™ cPrime™	Mixed-mode hydrophobic: cationic
Nuvia HR-S	Strong cation
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

Ordering Information

Catalog #	Description
Foresight Plates, 2 x 96-Well	
7324714	Foresight UNOsphere Q, 20 µl
7324710	Foresight UNOsphere S, 20 µl
7324709	Foresight UNOsphere SUPrA, 20 µl
7324703	Foresight Nuvia Q, 20 µl
7324701	Foresight Nuvia S, 20 µl
7324707	Foresight Nuvia HR-S, 20 µl
7324705	Foresight Nuvia cPrime, 20 µl
7324716	Foresight CHT Type I, 40 µm, 20 µl
7324718	Foresight CHT Type II, 40 µm, 20 µl
7324785	Foresight MPC Type I, 40 µm, 20 µl

continues

Ordering Information

Description	1 ml	5 ml
Foresight Columns		
Foresight UNOsphere Q	7324732	7324752
Foresight UNOsphere S	7324730	7324750
Foresight UNOsphere SUPrA	7324729	7324749
Foresight Nuvia Q	7324721	7324741
Foresight Nuvia S	7324720	7324740
Foresight Nuvia HR-S	7324723	7324743
Foresight Nuvia cPrime	7324722	7324742
Foresight CHT Type I, 40 µm	7324735	7324755
Foresight CHT Type II, 40 µm	7324736	7324756
Foresight MPC Type I, 40 µm	7324737	7324757
Foresight RoboColumn Units, 1 row of 8 columns*		
Foresight UNOsphere Q RoboColumn Unit	7324819	7324820
Foresight UNOsphere S RoboColumn Unit	7324813	7324814
Foresight UNOsphere SUPrA RoboColumn Unit	7324834	7324835
Foresight Nuvia Q RoboColumn Unit	7324804	7324805
Foresight Nuvia S RoboColumn Unit	7324801	7324802
Foresight Nuvia HR-S RoboColumn Unit	7324831	7324832
Foresight Nuvia cPrime RoboColumn Unit	7324807	7324808
Foresight CHT Type I, 40 µm RoboColumn Unit	7324822	7324823
Foresight CHT Type II, 40 µm RoboColumn Unit	7324825	7324826
Foresight MPC Type I, 40 µm RoboColumn Unit	7324828	7324829

* 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.

Subject Index