Prepacked chromatography columns for ÄKTA™ systems

Selection guide

Different techniques

Ion exchange chromatography (IEX)

IEX separates proteins with differences in surface charge. The separation is based on the reversible interaction between a charged protein and an oppositely charged chromatographic medium. Proteins bind as they are loaded onto the medium. Conditions are then altered so that bound substances are eluted differentially. This elution is usually performed by increases in salt concentration or changes in pH. Most commonly, samples are eluted with NaCl, using a gradient elution. Target proteins are concentrated during binding and collected in a purified, concentrated form. IEX is most suited for the capture or intermediate steps in purification.

Choosing IEX media

For most purifications, especially those where sample characteristics are unknown, it is recommended to begin with a strong ion exchanger, allowing work over a broad pH range during the initial method development.

- Strong ion exchangers: Q (anionic), S or SP (cationic) are fully charged over a broad pH range.
- Weak ion exchangers: DEAE, ANX (anionic) and CM (cationic) are fully charged over a narrower pH range (pH 2–9 and pH 6–10, respectively), but give alternative selectivities for separations.

Selecting prepacked columns, such as HiTrap™ or HiScreen™ will not only be more convenient, but will also save time in method optimization as these columns are supplied with detailed instructions for optimal performance giving reproducible results

Handbook

Ion Exchange Chromatography and Chromato-focusing, Principles and Methods, 11-0004-21

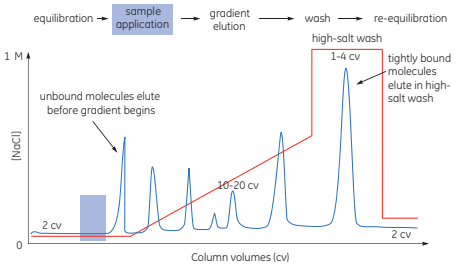


Fig 1. Typical IEX gradient elution.

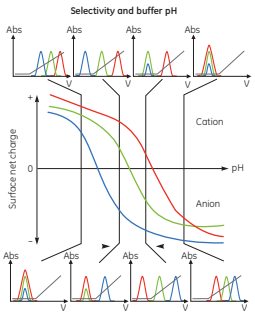


Fig 2. Effect of pH on protein binding and elution patterns.

Affinity chromatography (AC)

AC separates proteins on the basis of a reversible interaction between a protein (or group of proteins) and a specific ligand attached to a chromatographic matrix. AC requires reversible binding between the target protein and the ligand.

The sample is loaded under conditions that favor binding to the ligand. Unbound material is washed away, and the bound target protein is recovered by changing conditions to those favoring elution. Elution is performed specifically, using a competitive ligand, or non-specifically, by changing the pH and/or ionic strength. Alternatively, the target protein can be eluted by cleaving off the affinity tag. Proteins are concentrated during binding and collected in a purified, concentrated form. Alternatively, the target protein can be eluted by cleaving off the affinity tag.

Choosing AC media

A ligand already coupled to a matrix is the simplest solution.

If a ligand is available, but needs to be coupled to a pre-activated matrix, please refer to the GE Healthcare Handbook "Affinity Chromatography, Principles and Methods".

If no suitable ligand is available, decide whether it is worth the time and effort to obtain a ligand and to develop a specific affinity medium. In many cases, it may be more convenient to combine alternative purification techniques such as IEX and/or HIC

Handbooks

Affinity Chromatography, Principles and Methods, 18-1022-29

Antibody Purification, 18-1037-46

Recombinant Protein Purification, Principles and Methods, 18-1142-75

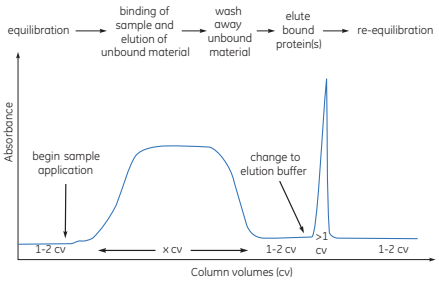


Fig 3. Typical one-step AC purification.

Size exclusion chromatography (SEC)

SEC separates proteins with differences in molecular weight. Samples are eluted isocractically (single buffer, no gradient). Since buffer composition generally does not directly affect resolution, the buffer conditions can be varied to suit the sample type or the requirements for the next purification, analysis or storage step. Proteins are collected in purified form in the chosen buffer.

Choosing SEC media

Chromatography media for SEC are made from porous matrices chosen for their inertness, low protein binding and chemical and physical stability. The size of the pores within a particle and the particle size distribution are carefully controlled to produce a variety of media with different selectivities. Today's SEC media cover a molecular weight range from M_r 100 to 100 000 000, from peptides to very large proteins, protein complexes, and viruses.

- Superdex™ is the first choice for high resolution, short run times, and high recovery.
- Sephacryl™ is suitable for fast, high recovery separations at laboratory and industrial scale.
- Superose™ offers a broad fractionation range, but is not suitable for large scale or industrial-scale separations.

After deciding upon Superdex, Sephacryl or Superose, select the medium with the fractionation range that covers the molecular weight values of interest in your sample. In cases where two media have a similar fractionation range, select the medium with the steepest selectivity curve for optimal resolution of all components in the sample. When you are interested in a specific component, select the medium where the target protein falls in the middle of the selectivity curve.

Sephadex™ is the first choice for rapid group separations such as desalting and buffer exchange. Sephadex is used at laboratory and production scale, before, between, or after other chromatography purification steps.

Handbook

Size Exclusion Chromatography Handbook, 18-1022-18

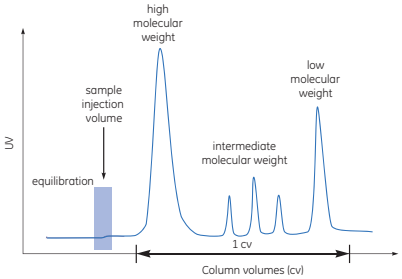


Fig 4. Typical high-resolution SEC separation.

Hydrophobic interaction chromatography (HIC)

HIC separates proteins with differences in hydrophobicity. The separation is based on the reversible interaction between a protein and the hydrophobic surface of the chromatographic medium. This interaction is enhanced by high ionic strength buffer, which makes HIC the logical 'next step' for purification of proteins that have been precipitated with ammonium sulfate or eluted in high salt during IEX. Samples in high ionic strength solution (e.g., 1.5 M $[NH_4]_2SO_4$) bind as they are loaded onto a column. Conditions are then altered so that the bound substances are eluted differentially. Elution is usually performed by decreases in salt concentration. Changes are made stepwise or with a continuously decreasing salt gradient. Most commonly, samples are eluted with a decreasing gradient of ammonium sulfate concentration. Target proteins are concentrated during binding and collected in a purified, concentrated form.

Choosing HIC media

The hydrophobicity of a protein is difficult to determine. It is recommended to screen for the most suitable media for each application using the HiTrap HIC Selection Kit or RESOURCE™ HIC Test kit.

Hydrophobic ligands that vary according to their degree of hydrophobicity are available:

Increasing hydrophobicity

butyl-S –> ether –> isopropyl –> butyl –> octyl –> phenyl

Highly hydrophobic proteins bind tightly to highly hydrophobic ligands. Note that with HIC, the chromatographic matrix as well as the hydrophobic ligand can affect the selectivity.

Start with a medium with low hydrophobicity if the sample is known to have hydrophobic components.

Select the medium that gives the optimal resolution and loading capacity at a low salt concentration.

Handbook

Hydrophobic Interaction and Reversed Phase Chromatography, Principles and Methods, 11-0012-69

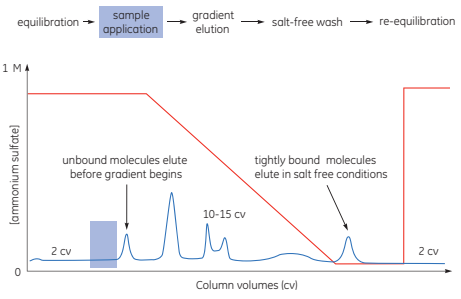


Fig 5. Typical HIC gradient elution.

Multimodal chromatography

Multimodal ligands capture target molecules through multiple types of interaction. Ionic interactions are commonly involved, but others such as hydrogen bonding and hydrophobic interactions can be significant. Chromatography media containing multimodal ligands are characterized by selectivities that are different from those of traditional ligands, thereby opening up new opportunities for solving challenging purification problems.

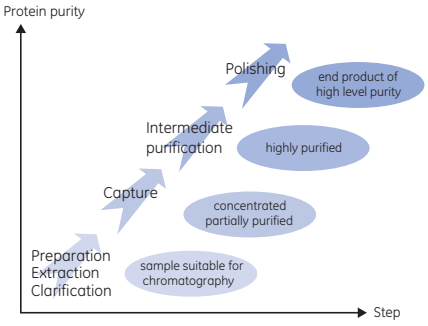
Choosing multimodal media

Capto™ adhere is a multimodal anion exchanger designed for intermediate purification and polishing of MAbs. Capto MMC is a multimodal cation exchanger with novel selectivity that allows protein binding at high conductivities. Capto Core 700 is a novel, layered bead chromatography medium consisting of a porous outer layer and multimodal ligand core. The pores of the bead outer layer prevent large targets (M_r >700 000) from binding to the ligands, while smaller impurities can enter freely into the beads.

Note that even if these media often have been designed for a specific multimodal application, they can also be used for other applications with good results.

Purification strategies

Selection of the final strategy will always depend upon specific sample characteristics, the condition of the starting material, and the required level of purity.



Guidelines for purification

1. Define objectives:
   Purity, activity, quantity required for final product
   Examples of approximate purity level requirements:
   Extremely high: > 99%
   Applications requiring essentially pure protein
   High: 95% to 99%
   X-ray crystallography and most physicochemical characterization methods
   Moderate: < 95%
   Antigen for antibody production
2. Develop analytical assays:
   Fast detection of protein activity and recovery to work efficiently
3. Define sample characteristics:
   To simplify technique selection and optimization
4. Minimize sample handling at every stage:
   Avoid lengthy procedures that risk losing activity or reducing recovery
5. Minimize the use of additives:
   Additives may need to be removed in an extra purification step or may interfere with assays
6. Remove damaging contaminants early:
   For example, proteases
7. Use a different technique at each step:
   Take advantage of sample characteristics that can be used for separation (size, charge, hydrophobicity, ligand specificity)
8. Minimize number of chromatographic steps:
   Extra steps reduce yield and increase time; combine steps logically

For every technique used there is a balance between: speed, capacity, recovery, and resolution.

Note: In this model, capacity refers to amount of target protein bound per unit volume of medium.

Note: The pressure over the packed bed varies depending on a range of parameters such as the characteristics of the chromatography medium and the column tubing used.

Glossary of terms

Target protein characteristics include: Size, charge, hydrophobicity, affinity for a specific ligand, isoelectric point (pI), pH, and temperature stability.

Sample preparation: Clarification before first chromatographic separation step. May include extraction and/or concentration procedures.

Capture: Initial purification of the target protein from crude or clarified source material. Focus on speed and capacity.

Goal: Rapid concentration, stabilization, and isolation.

Intermediate purification: Removal of bulk contaminants. Focus on capacity and resolution.

Goal: Purification and concentration.

Polishing: Removal of trace contaminants (e.g., structural variants). Focus on resolution and recovery.

Goal: End product of required high purity.

Handbooks

Strategies for Protein Purification, 28-9833-31

Purifying Challenging Proteins, Principles and Methods, 28-9095-31

Prepacked columns
Ion exchange chromatography

Column	Quantity	Code number	Typical loading range (mg)	Average particle size (µm)	Flow rate (ml/min)* Recommended/ Maximum	Working pH range
Mini Q™ PC 3.2/3	1 × 0.24 ml	17-0686-01	< 1.5	3	0.55/1	3 to 11
Mini Q 4.6/50 PE	1 × 0.8 ml	17-5177-01	0.5-5	3	1/2	3 to 11
Mini S™ PC 3.2/3	1 × 0.24 ml	17-0687-01	< 1.5	3	0.55/1	3 to 11
Mini S 4.6/50 PE	1 × 0.8 ml	17-5178-01	0.5-5	3	1/2	3 to 11
Mono Q™ PC 1.6/5	1 × 0.10 ml	17-0671-01	< 3	10	0.2/0.4	2 to 12
Mono Q 5/50 GL	1 × 1 ml	17-5166-01	5-50	10	2/3	2 to 12
Mono Q 4.6/100 PE	1 × 1.7 ml	17-5179-01	8.5-85	10	2/3	2 to 12
Mono Q 10/100 GL	1 × 8 ml	17-5167-01	40-400	10	6/10	2 to 12
Mono Q HR 16/10	1 × 20 ml	17-0506-01	400-1600	10	5/10	2 to 12
Mono S™ PC 1.6/5	1 × 0.10 ml	17-0672-01	< 3	10	0.2/0.4	2 to 12
Mono S 5/50 GL	1 × 1 ml	17-5168-01	5-50	10	2/3	2 to 12
Mono S 4.6/100 PE	1 × 1.7 ml	17-5180-01	8.5-85	10	2/3	2 to 12
Mono S 10/100 GL	1 × 8 ml	17-5169-01	4-400	10	6/10	2 to 12
Mono S HR 16/10	1 × 20 ml	17-0507-01	400-1600	10	5/10	2 to 12
Mono P™ 5/50 GL	1 × 1 ml	17-5170-01	5-10	10	1.5/3	2 to 12
Mono P 5/200 GL	1 × 4 ml	17-5171-01	20-40	10	1/2	2 to 12
SOURCE™ 15Q 4.6/100 PE	1 × 1.7 ml	17-5181-01	1-40	15	2/5	2 to 12
SOURCE 15S 4.6/100 PE	1 × 1.7 ml	17-5182-01	1-40	15	2/5	2 to 13
RESOURCE Q, 1 ml	1 × 1 ml	17-1177-01	10-25	15	4/10	2 to 12
RESOURCE Q, 6 ml	1 × 6 ml	17-1179-01	60-150	15	6/60	2 to 12
RESOURCE S, 1 ml	1 × 1 ml	17-1178-01	10-25	15	4/10	2 to 13
RESOURCE S, 6 ml	1 × 6 ml	17-1180-01	60-150	15	6/60	2 to 13
HiPrep™ Q HP 16/10	1 × 20 ml	29-0181-82	200-1400 (HSA)	34	3/5	2 to 12
HiPrep SP HP 16/10	1 × 20 ml	29-0181-83	200-1100 (ribonuclease A)	34	3/5	4 to 13
HiPrep Q XL 16/10	1 × 20 ml	28-9365-38	200-2600 (BSA)	90	5/10	2 to 12
HiPrep SP XL 16/10	1 × 20 ml	28-9365-40	200-3200 (lysozyme)	90	5/10	4 to 13
HiPrep DEAE FF 16/10	1 × 20 ml	28-9365-41	10-2200 (HSA)	90	5/10	2 to 12
HiPrep CM FF 16/10	1 × 20 ml	28-9365-42	10-1000 (ribonuclease A)	90	5/10	6 to 10
HiPrep Q FF 16/10	1 × 20 ml	28-9365-43	200-2000 (HSA)	90	5/10	2 to 12
HiPrep SP FF 16/10	1 × 20 ml	28-9365-44	200-2000 (ribonuclease A)	90	5/10	4 to 13
HiTrap IEX Selection Kit	7 × 1 ml	17-6002-33	depends on medium	34 or 90	1/4	depends on medium
HiTrap SP HP	1 × 1 ml	29-0513-24	1-50 (ribonuclease A)	34	1/4	4 to 13
	5 × 1 ml	17-1151-01	1-50 (ribonuclease A)	34	1/4	4 to 13
	5 × 5 ml	17-1152-01	5-250 (ribonuclease A)	34	5/20	4 to 13
HiTrap Q HP	1 × 1 ml	29-0513-25	1-50 (HSA)	34	1/4	2 to 12
	5 × 1 ml	17-1153-01	1-50 (HSA)	34	1/4	2 to 12
	5 × 5 ml	17-1154-01	5-250 (HSA)	34	5/20	2 to 12
HiTrap DEAE FF	5 × 1 ml	17-5055-01	1-110 (HSA)	90	1/4	2 to 12
	5 × 5 ml	17-5154-01	5-550 (HSA)	90	5/20	2 to 12
HiTrap CM FF	5 × 1 ml	17-5056-01	1-50 (ribonuclease A)	90	1/4	6 to 10
	5 × 5 ml	17-5155-01	5-250 (ribonuclease A)	90	5/20	6 to 10
HiTrap Q FF	5 × 1 ml	17-5053-01	1-120 (HSA)	90	1/4	2 to 12
	5 × 5 ml	17-5156-01	5-600 (HSA)	90	5/20	2 to 12
HiTrap SP FF	5 × 1 ml	17-5054-01	1-70 (ribonuclease A)	90	1/4	4 to 13
	5 × 5 ml	17-5157-01	5-350 (ribonuclease A)	90	5/20	4 to 13
HiTrap ANX FF (high sub)	5 × 1 ml	17-5162-01	3-40 (BSA)	90	1/4	3 to 13
	5 × 5 ml	17-5163-01	15-200 (BSA)	90	5/20	3 to 13
HiTrap Q XL	5 × 1 ml	17-5158-01	10-130 (BSA)	90	1/4	2 to 12
	5 × 5 ml	17-5159-01	50-650 (BSA)	90	5/20	2 to 12
HiTrap SP XL	5 × 1 ml	17-5160-01	10-150 (lysozyme)	90	1/4	4 to 13
	5 × 5 ml	17-5161-01	50-800 (lysozyme)	90	5/20	4 to 13
HiScreen Q HP	1 × 4.7 ml	28-9505-11	5-250 (HSA)	34	0.6/1.2	2 to 12
HiScreen SP HP	1 × 4.7 ml	28-9505-15	5-250 (ribonulease A)	34	0.6/1.2	4 to 13
HiScreen Q FF	1 × 4.7 ml	28-9505-10	5-500 (HSA)	90	2.3/3.5	2 to 12
HiScreen DEAE FF	1 × 4.7 ml	28-9782-45	5-550 (HSA)	90	2.3/3.5	2 to 12
HiScreen SP FF	1 × 4.7 ml	28-9505-13	5-350 (ribonulease A)	90	2.3/3.5	4 to 13
HiTrap Capto Q ImpRes	5 × 1 ml	17-5470-51	1-100 (BSA)	40	1/4	2 to 12
	5 × 5 ml	17-5470-55	5-500 (BSA)	40	5/20	2 to 12
HiTrap Capto SP ImpRes	5 × 1 ml	17-5468-51	1-100 (lysozyme)	40	1/4	4 to 12
	5 × 5 ml	17-5468-55	5-500 (lysozyme)	40	5/20	4 to 12
HiTrap Capto S ImpAct	5 × 1 ml	17-3717-51	10-100 (antibodies)	50	1/4	4 to 12
	5 × 5 ml	17-3717-55	10-500 (antibodies)	50	5/20	4 to 12
HiTrap Capto IEX Selection Kit	5 × 1 ml	28-9343-88	depends on medium	75 or 90	1/4	depends on medium
HiTrap Capto Q	5 × 1 ml	11-0013-02	10-100 (BSA)	90	1/4	2 to 12
	5 × 5 ml	11-0013-03	50-500 (BSA)	90	5/20	2 to 12
HiTrap Capto S	5 × 1 ml	17-5441-22	10-140 (lysozyme)	90	1/4	4 to 12
	5 × 5 ml	17-5441-23	50-700 (lysozyme)	90	5/20	4 to 12
HiTrap Capto DEAE	5 × 1 ml	28-9165-37	5-90 (ovalbumin)	90	1/4	2 to 12
	5 × 5 ml	28-9165-40	25-450 (ovalbumin)	90	5/20	2 to 12
HiScreen Capto Q ImpRes	1 × 4.7 ml	17-5470-15	5-500 (BSA)	40	1.2/2.3	2 to 12
HiScreen Capto SP ImpRes	1 × 4.7 ml	17-5468-15	5-500 (lysozyme)	40	1.2/2.3	4 to 12
HiScreen Capto S ImpAct	1 × 4.7 ml	17-3717-47	10-500 (antibodies)	50	1.2/2.3	4 to 12
HiScreen Capto Q	1 × 4.7 ml	28-9269-78	50-500 (BSA)	90	2.7/5.4	2 to 12
HiScreen Capto S	1 × 4.7 ml	28-9269-79	50-700 (lysozyme)	90	2.7/5.4	4 to 12
HiScreen Capto DEAE	1 × 4.7 ml	28-9269-82	25-400 (ovalbumin)	90	2.7/5.4	2 to 12

Reversed phase chromatography

SOURCE 15RPC ST 4.6/100	1 × 1.7 ml	17-5068-01	1-17 (BSA)	15	2/5	2 to 12
RESOURCE RPC, 1 ml	1 × 1 ml	17-1181-01	1-10 (BSA)	15	2/10	2 to 12
RESOURCE RPC, 3 ml	1 × 3 ml	17-1182-01	3-30 (BSA)	15	2/10	2 to 12

- • Recommended for system
- ° Can technically be used with the system, but not an optimal combination
- * H_2O at 25°C
- † ÄKTApurifier is available in three core systems, for different levels of automation

ÄKTAmicro	ÄKTA start	ÄKTAprime plus	ÄKTAxpress	ÄKTApurifier 10 plus†	ÄKTApurifier 100 plus†	ÄKTA pure 25	ÄKTA pure 150	ÄKTA avant 25	ÄKTA avant 150	ÄKTApilot
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Affinity chromatography

Column	Quantity	Code number	Typical loading range (mg)	Average particle size (µm)	Flow rate (ml/min)† Recommended/ Maximum	Working pH range
HiTrap NHS-activated HP	5 × 1 ml	17-0716-01	application dependent	34	1/4	ligand dependent
	1 × 5 ml	17-0717-01	application dependent	34	5/20	ligand dependent
HiTrap rProtein A FF	2 × 1 ml	17-5079-02	1-50 (human IgG)	90	1/4	3 to 10
	5 × 1 ml	17-5079-01	1-50 (human IgG)	90	1/4	3 to 10
	1 × 5 ml	17-5080-01	5-250 (human IgG)	90	5/20	3 to 10
	5 × 5 ml	17-5080-02	5-250 (human IgG)	90	5/20	3 to 10
HiTrap Protein A HP	1 × 1 ml	29-0485-76	1-20 (human IgG)	34	1/4	3 to 9
	2 × 1 ml	17-0402-03	1-20 (human IgG)	34	1/4	3 to 9
	5 × 1 ml	17-0402-01	1-20 (human IgG)	34	1/4	3 to 9
	1 × 5 ml	17-0403-01	5-100 (human IgG)	34	5/20	3 to 9
	5 × 5 ml	17-0403-03	5-100 (human IgG)	34	5/20	3 to 9
HiTrap Protein G HP	1 × 1 ml	29-0485-81	1-25 (human IgG)	34	1/4	3 to 9
	2 × 1 ml	17-0404-03	1-25 (human IgG)	34	1/4	3 to 9
	5 × 1 ml	17-0404-01	1-25 (human IgG)	34	1/4	3 to 9
	1 × 5 ml	17-0405-01	5-125 (human IgG)	34	5/20	3 to 9
	5 × 5 ml	17-0405-03	5-125 (human IgG)	34	5/20	3 to 9
HiTrap MabSelect™	5 × 1 ml	28-4082-53	1-30 (human IgG)	85	1/4	3 to 10
	1 × 5 ml	28-4082-55	5-150 (human IgG)	85	5/20	3 to 10
	5 × 5 ml	28-4082-56	5-150 (human IgG)	85	5/20	3 to 10
HiTrap MabSelect Xtra™	5 × 1 ml	28-4082-58	1-40 (human IgG)	75	1/4	3 to 10
	1 × 5 ml	28-4082-60	5-200 (human IgG)	75	5/20	3 to 10
	5 × 5 ml	28-4082-61	5-200 (human IgG)	75	5/20	3 to 10
HiTrap MabSelect SuRe™	1 × 1 ml	29-0491-04	1-30 (human IgG)	85	1/4	3 to 12
	5 × 1 ml	11-0034-93	1-30 (human IgG)	85	1/4	3 to 12
	1 × 5 ml	11-0034-94	5-150 (human IgG)	85	5/20	3 to 12
	5 × 5 ml	11-0034-95	5-150 (human IgG)	85	5/20	3 to 12
HiTrap Protein L	1 × 1 ml	29-0486-65	1-25 (Fab)	85	0.6/3.2	2 to 10
	5 × 1 ml	17-5478-51	1-25 (Fab)	85	0.6/3.2	2 to 10
	1 × 5 ml	17-5478-15	1-125 (Fab)	85	3.3/16	2 to 10
	5 × 5 ml	17-5478-55	1-125 (Fab)	85	3.3/16	2 to 10
HiScreen Capto L	1 × 4.7 ml	17-5478-14	1-125 (Fab)	85	0.8 to3.9	2 to 10
HiScreen MabSelect	1 × 4.7 ml	28-9269-73	5-150 (human IgG)	85	1.8/3.9	3 to 10
HiScreen MabSelect Xtra	1 × 4.7 ml	28-9269-76	5-200 (human IgG)	75	1.2/2.3	3 to 10
HiScreen MabSelect SuRe	1 × 4.7 ml	28-9269-77	5-150 (human IgG)	85	1.8/3.9	3 to 12
HiScreen MabSelect SuRe LX	1 × 4.7 ml	17-5474-15	50-300 (human IgG)	85	0.9/3.9	3 to 12
HiTrap IgM Purification HP	5 × 1 ml	17-5110-01	0.25-5 (human IgM)	34	1/4	3 to 11
HiTrap IgY Purification HP	1 × 5 ml	17-5111-01	5-100 (IgY)	34	5/20	3 to 11
HiTrap Heparin HP	5 × 1 ml	17-0406-01	0.2-3 (bovine antithrombin III)	34	1/4	5 to 10
	1 × 5 ml	17-0407-01	1-15 (bovine antithrombin III)	34	5/20	5 to 10
	5 × 5 ml	17-0407-03	1-15 (bovine antithrombin III)	34	5/20	5 to 10
HiPrep Heparin FF 16/10	1 × 20 ml	28-9365-49	5-40 (bovine antithrombin III)	90	5/10	4 to 12
HiTrap Blue HP	5 × 1 ml	17-0412-01	1-20 (HSA)	34	1/4	4 to 12
	1 × 5 ml	17-0413-01	5-100 (HSA)	34	5/20	4 to 12
HiScreen Capto Blue	1 × 4.7 ml	28-9924-74	5-150 mg HSA	90	1.2/4.6	3 to 13
HiScreen Blue FF	1 × 4.7 ml	28-9782-43	5-90 (HSA)	90	2.3/4.6	3 to 13
HiTrap Con A 4B	5 × 1 ml	28-9520-85	20-45 (porcine thyroglobulin)	90	1/4	4 to 9
	5 × 5 ml	28-9520-96	100-225 (porcine thyroglobulin)	90	5/20	4 to 9
HisTrap™ HP	1 × 1 ml	29-0510-21	1-40 (at least) (histidine)$_6$-tagged protein	34	1/4	3 to 12
	5 × 1 ml	17-5247-01	1-40 (at least) (histidine)$_6$-tagged protein	34	1/4	3 to 12
	100 × 1 ml*	17-5247-05	1-40 (at least) (histidine)$_6$-tagged protein	34	1/4	3 to 12
	1 × 5 ml	17-5248-01	5-200 (at least) (histidine)$_6$-tagged protein	34	5/20	3 to 12
	5 × 5 ml	17-5248-02	5-200 (at least) (histidine)$_6$-tagged protein	34	5/20	3 to 12
	100 × 5 ml*	17-5248-05	5-200 (at least) (histidine)$_6$-tagged protein	34	5/20	3 to 12
HisTrap excel	1 × 1 ml	29-0485-86	1-10 (histidine)$_6$-tagged protein	90	1/4	2 to 14
	5 × 1 ml	17-3712-05	1-10 (histidine)$_6$-tagged protein	90	1/4	2 to 14
	5 × 5 ml	17-3712-06	5-50 (histidine)$_6$-tagged protein	90	5/20	2 to 14
HisTrap FF	5 × 1 ml	17-5319-01	1-40 (histidine)$_6$-tagged protein	90	1/4	3 to 12
	100 × 1 ml*	17-5319-02	1-40 (histidine)$_6$-tagged protein	90	1/4	3 to 12
	5 × 5 ml	17-5255-01	5-200 (histidine)$_6$-tagged protein	90	5/20	3 to 12
	100 × 5 ml*	17-5255-02	5-200 (histidine)$_6$-tagged protein	90	5/20	3 to 12
HisPrep™ FF 16/10	1 × 20 ml	28-9365-51	20-800 (histidine)$_6$-tagged protein	90	5/10	3 to 12
HiScreen Ni FF	1 × 4.7 ml	28-9782-44	5-200 mg (histidine)$_6$-tagged protein	90	2.3/4.6	3 to 12
HisTrap FF crude	1 × 1 ml	29-0486-31	1-40 (histidine)$_6$-tagged protein	90	1/4	3 to 12
	5 × 1 ml	11-0004-58	1-40 (histidine)$_6$-tagged protein	90	1/4	3 to 12
	100 × 1 ml*	11-0004-59	1-40 (histidine)$_6$-tagged protein	90	1/4	3 to 12
	5 × 5 ml	17-5286-01	5-200 (histidine)$_6$-tagged protein	90	5/20	3 to 12
	100 × 5 ml*	17-5286-02	5-200 (histidine)$_6$-tagged protein	90	5/20	3 to 12
HiTrap TALON® crude	1 × 1 ml	29-0485-65	1-20 (histidine)$_6$-tagged protein	60-160	1/4	3 to 12
	5 × 1 ml	28-9537-66	1-20 (histidine)$_6$-tagged protein	60-160	1/4	3 to 12
	100 × 1 ml*	28-9538-05	1-20 (histidine)$_6$-tagged protein	60-160	1/4	3 to 12
	5 × 5 ml	28-9537-67	5-100 (histidine)$_6$-tagged protein	60-160	5/20	3 to 12
	100 × 5 ml*	28-9538-09	5-100 (histidine)$_6$-tagged protein	60-160	5/20	3 to 12
HiTrap IMAC HP	5 × 1 ml	17-0920-03	1-40 (histidine)$_6$-tagged protein (Ni^{2+} charged)	34	1/4	3 to 12
	5 × 5 ml	17-0920-05	5-200 (histidine)$_6$-tagged protein (Ni^{2+} charged)	34	5/20	3 to 12
HiTrap IMAC FF	5 × 1 ml	17-0921-02	1-40 (histidine)$_6$-tagged protein (Ni^{2+} charged)	90	1/4	3 to 12
	5 × 5 ml	17-0921-04	5-200 (histidine)$_6$-tagged protein (Ni^{2+} charged)	90	5/20	3 to 12
HiScreen IMAC FF	1 × 4.7 ml	28-9505-17	5-200 (histidine)$_6$-tagged protein (Ni^{2+} charged)	90	2.3/4.6	3 to 12
HiPrep IMAC FF 16/10	1 × 20 ml	28-9365-52	20-800 (histidine)$_6$-tagged protein (Ni^{2+} charged)	90	5/10	3 to 12
HiTrap Chelating HP	5 × 1 ml	17-0408-01	1-5 (histidine)$_6$-tagged protein (Ni^{2+} charged)	34	1/4	3 to 13
	1 × 5 ml	17-0409-01	1-25 (histidine)$_6$-tagged protein (Ni^{2+} charged)	34	5/20	3 to 13
	5 × 5 ml	17-0409-03	1-25 (histidine)$_6$-tagged protein (Ni^{2+} charged)	34	5/20	3 to 13
	100 × 5 ml*	17-0409-05	1-25 (histidine)$_6$-tagged protein (Ni^{2+} charged)	34	5/20	3 to 13
HiTrap Streptavidin HP	5 × 1 ml	17-5112-01	> 300 nmol biotin	34	1/4	4 to 9
HiTrap Benzamidine FF (high sub)	2 × 1 ml	17-5143-02	1-35 (trypsin)	90	1/4	2 to 8
	5 × 1 ml	17-5143-01	1-35 (trypsin)	90	1/4	2 to 8
	1 × 5 ml	17-5144-01	5-175 (trypsin)	90	5/20	2 to 8
GSTrap™ HP	5 × 1 ml	17-5281-01	1-10 (recombinant GST)	34	1/4	3 to 12
	100 × 1 ml*	17-5281-05	1-10 (recombinant GST)	34	1/4	3 to 12
	1 × 5 ml	17-5282-01	5-50 (recombinant GST)	34	5/15	3 to 12
	5 × 5 ml	17-5282-02	5-50 (recombinant GST)	34	5/15	3 to 12
	100 × 5 ml*	17-5282-05	5-50 (recombinant GST)	34	5/15	3 to 12
GSTrap FF	2 × 1 ml	17-5130-02	1-10 (recombinant GST)	90	1/4	3 to 12
	5 × 1 ml	17-5130-01	1-10 (recombinant GST)	90	1/4	3 to 12
	100 × 1 ml*	17-5130-05	1-10 (recombinant GST)	90	1/4	3 to 12
	1 × 5 ml	17-5131-01	5-50 (recombinant GST)	90	5/15	3 to 12
	5 × 5 ml	17-5131-02	5-50 (recombinant GST)	90	5/15	3 to 12
	100 × 5 ml*	17-5131-05	5-50 (recombinant GST)	90	5/15	3 to 12
GSTPrep™ FF 16/10	1 × 20 ml	28-9365-50	20-200 (recombinant GST)	90	5/10	3 to 12
GSTrap 4B	1 × 1 ml	29-0486-09	1-10 (recombinant GST)	90	0.3/1	4 to 13
	5 × 1 ml	28-4017-45	1-10 (recombinant GST)	90	0.3/1	4 to 13
	100 × 1 ml*	28-4017-46	1-10 (recombinant GST)	90	0.3/1	4 to 13
	1 × 5 ml	28-4017-47	5-50 (recombinant GST)	90	1/5	4 to 13
	5 × 5 ml	28-4017-48	5-50 (recombinant GST)	90	1/5	4 to 13
	100 × 5 ml*	28-4017-49	5-50 (recombinant GST)	90	1/5	4 to 13
StrepTrap™ HP	1 × 1 ml	29-0486-53	1-6 (*Strep*-tag™ II protein)	34	1/4	> 7
	5 × 1 ml	28-9075-46	1-6 (*Strep*-tag™ II protein)	34	1/4	> 7
	1 × 5 ml	28-9075-47	5-30 (*Strep*-tag II protein)	34	5/20	> 7
	5 × 5 ml	28-9075-48	5-30 (*Strep*-tag II protein)	34	5/20	> 7
MBPTrap™ HP	1 × 1 ml	29-0486-41	1-10 (MBP-tagged protein)	34	1/4	> 7
	5 × 1 ml	28-9187-78	1-10 (MBP-tagged protein)	34	1/4	> 7
	1 × 5 ml	28-9187-79	5-50 (MBP-tagged protein)	34	5/20	> 7
	5 × 5 ml	28-9187-80	5-50 (MBP-tagged protein)	34	5/20	> 7

- • Recommended for system
- ◦ Can technically be used with the system, but not an optimal combination
- * Special pack size delivered on specific customer order
- † H_2O at 25°C
- ‡ ÄKTApurifier is available in three core systems, for different levels of automation

ÄKTAmicro	ÄKTA start	ÄKTAprime plus	ÄKTAxpress	ÄKTApurifier 10 plus‡	ÄKTApurifier 100 plus‡	ÄKTA pure 25	ÄKTA pure 150	ÄKTA avant 25	ÄKTA avant 150	ÄKTApilot
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Size exclusion chromatography

Column	Quantity	Code number	Fraction range (kDa) (proteins)	Typical loading range/column	Average particle size (µm)	Flow rate (ml/min)† Recommended/ Maximum	Working pH range
Superdex Peptide 3.2/300	1 × 2.4 ml	29-0362-31	0.1-7	4–50 µl	13	0.08/0.15	1 to 14
Superdex Peptide 10/300 GL	1 × 24 ml	17-5176-01	0.1-7	25–500 µl	13	0.6/1.2	1 to 14
Superdex 75 3.2/300	1 × 2.4 ml	29-0362-30	3-70	4–50 µl	13	0.05/0.10	3 to 12
Superdex 75 5/150 GL	1 × 3 ml	28-9205-04	3-70	4–50 µl	13	0.3/0.7	3 to 12
Superdex 75 10/300 GL	1 × 24 ml	17-5174-01	3-70	25–500 µl	13	0.75/1.5	3 to 12
Superdex 200 Increase 3.2/300	1 × 2.4 ml	28-9909-46	10-600	4–50 µl	8.6	0.075/0.15	3 to 12
Superdex 200 Increase 5/150 GL	1 × 3 ml	28-9909-45	10-600	4–50 µl	8.6	0.45/0.75	3 to 12
Superdex 200 Increase 10/300 GL	1 × 24 ml	28-9909-44	10-600	25–500 µl	8.6	0.75/1.8	3 to 12
Superdex 200 3.2/300¶	1 × 2.4 ml	29-0362-32	10-600	4–50 µl	13	0.05/0.10	3 to 12
Superdex 200 5/150 GL¶	1 × 3 ml	28-9065-61	10-600	4–50 µl	13	0.3/0.8	3 to 12
Superdex 200 10/300 GL¶	1 × 24 ml	17-5175-01	10-600	25–500 µl	13	0.5/1	3 to 12
HiLoad 16/600 Superdex 30 pg	1 × 120 ml	28-9893-31	10	0.6-5 ml	34	1/1.7	3 to 12
HiLoad 26/600 Superdex 30 pg	1 × 320 ml	28-9893-32	10	1.6-13 ml	34	2.5/4.2	3 to 12
HiLoad 16/600 Superdex 75 pg	1 × 120 ml	28-9893-33	3-70	0.6-5 ml	34	1/1.7	3 to 12
HiLoad 26/600 Superdex 75 pg	1 × 320 ml	28-9893-34	3-70	1.6-13 ml	34	2.5/4.2	3 to 12
HiLoad 16/600 Superdex 200 pg	1 × 120 ml	28-9893-35	10-600	0.6-5 ml	34	1/1.7	3 to 12
HiLoad 26/600 Superdex 200 pg	1 × 320 ml	28-9893-36	10-600	1.6-13 ml	34	2.5/4.2	3 to 12
Superose 6 Increase 3.2/300	1 × 2.4 ml	29-0915-98	5-5 000	4-50 µl	8.6	0.04/0.15	3 to 12
Superose 6 Increase 5/150 GL	1 × 3 ml	29-0915-97	5-5 000	4-50 µl	8.6	0.3/0.75	3 to 12
Superose 6 Increase 10/300 GL	1 × 24 ml	29-0915-96	5-5 000	25-500 µl	8.6	0.5/1.5	3 to 12
Superose 6 3.2/300**	1 × 2.4 ml	29-0362-26	5-5 000	4–50 µl	13	0.05/0.10	3 to 12
Superose 6 10/300 GL**	1 × 24 ml	17-5172-01	5-5 000	25–500 µl	13	0.3/1.2	3 to 12
Superose 12 3.2/300	1 × 2.4 ml	29-0362-25	1-300	4–50 µl	11	0.05/0.10	3 to 12
Superose 12 10/300 GL	1 × 24 ml	17-5173-01	1-300	25–500 µl	11	0.5/1.5	3 to 12
HiPrep 16/60 Sephacryl S-100 HR	1 × 120 ml	17-1165-01	1-100	0.6-5 ml	47	0.5/1	3 to 11
HiPrep 26/60 Sephacryl S-100 HR	1 × 320 ml	17-1194-01	1-100	1.6-13 ml	47	1.3/2.6	3 to 11
HiPrep 16/60 Sephacryl S-200 HR	1 × 120 ml	17-1166-01	5-250	0.6-5 ml	47	0.5/1	3 to 11
HiPrep 26/60 Sephacryl S-200 HR	1 × 320 ml	17-1195-01	5-250	1.6-13 ml	47	1.3/2.6	3 to 11
HiPrep 16/60 Sephacryl S-300 HR	1 × 120 ml	17-1167-01	10-1500	0.6-5 ml	47	0.5/1	3 to 11
HiPrep 26/60 Sephacryl S-300 HR	1 × 320 ml	17-1196-01	10-1500	1.6-13 ml	47	1.3/2.6	3 to 11
HiPrep 16/60 Sephacryl S-400 HR	1 × 120 ml	28-9356-04	20 - 8 000	0.6-5 ml	47	0.5/1	3 to 11
HiPrep 26/60 Sephacryl S-400 HR	1 × 320 ml	28-9356-05	20 - 8 000	1.6-13 ml	47	1.3/2.6	3 to 11
HiPrep 16/60 Sephacryl S-500 HR	1 × 120 ml	28-9356-06	40-20 000 (dextran)	0.6-5 ml	47	0.5/1	3 to 11
HiPrep 26/60 Sephacryl S-500 HR	1 × 320 ml	28-9356-07	40-20 000 (dextran)	1.6-13 ml	47	1.3/2.6	3 to 11
HiPrep 26/10 Desalting	1 × 53 ml	17-5087-01	> 5	1-15 ml	90	10/40	2 to 13
HiPrep 26/10 Desalting	4 × 53 ml	17-5087-02	> 5	1-15 ml	90	10/40	2 to 13
HiTrap Desalting	1 × 5 ml	29-0486-84	> 5	0.25-1.5 ml	40	5/15	2 to 13
	5 × 5 ml	17-1408-01	> 5	0.25-1.5 ml	40	5/15	2 to 13
	100 × 5 ml*	11-0003-29	> 5	0.25-1.5 ml	40	5/15	2 to 13

Hydrophobic interaction chromatography

Column	Quantity	Code number	Typical loading range/column	Average particle size (µm)	Flow rate (ml/min)† Recommended/ Maximum	Working pH range
HiTrap HIC Selection Kit	7 × 1 ml	28-4110-07	depends on medium (see below)	90 or 34	1/4	3 to 13
HiTrap Phenyl FF (low sub)	5 × 1 ml	17-1353-01	ligand density: 25 µmol/ml	90	1/4	3 to 13
	5 × 5 ml	17-5194-01	ligand density: 25 µmol/ml	90	5/20	3 to 13
HiTrap Phenyl FF (high sub)	5 × 1 ml	17-1355-01	ligand density: 40 µmol/ml	90	1/4	3 to 13
	5 × 5 ml	17-5193-01	ligand density: 40 µmol/ml	90	5/20	3 to 13
HiTrap Phenyl HP	5 × 1 ml	17-1351-01	ligand density: 25 µmol/ml	34	1/4	3 to 13
	5 × 5 ml	17-5195-01	ligand density: 25 µmol/ml	34	5/20	3 to 13
HiTrap Butyl HP	5 × 1 ml	28-4110-01	ligand density: 50 µmol/ml	34	1/4	3 to 13
	5 × 5 ml	28-4110-05	ligand density: 50 µmol/ml	34	5/20	3 to 13
HiTrap Butyl FF	5 × 1 ml	17-1357-01	ligand density: 40 µmol/ml	90	1/4	3 to 13
	5 × 5 ml	17-5197-01	ligand density: 40 µmol/ml	90	5/20	3 to 13
HiTrap Butyl-S FF	5 × 1 ml	17-0978-13	ligand density: 10 µmol/ml	90	1/4	3 to 13
	5 × 5 ml	17-0978-14	ligand density: 10 µmol/ml	90	5/20	3 to 13
HiTrap Octyl FF	5 × 1 ml	17-1359-01	ligand density: 5 µmol/ml	90	1/4	3 to 13
	5 × 5 ml	17-5196-01	ligand density: 5 µmol/ml	90	5/20	3 to 13
SOURCE 15PHE 4.6/100 PE	1 × 1.7 ml	17-5186-01	ligand density: Not available	15	1/5	2 to 12
RESOURCE ETH	1 × 1 ml	17-1184-01	ligand density: Not available	15	2/9.6	2 to 12
RESOURCE ISO	1 × 1 ml	17-1185-01	ligand density: Not available	15	2/9.6	2 to 12
RESOURCE PHE	1 × 1 ml	17-1186-01	ligand density: Not available	15	2/9.6	2 to 12
RESOURCE HIC Test Kit	3 × 1 ml	17-1187-01	ligand density: Not available	15	2/9.6	2 to 12
HiPrep Phenyl HP 16/10	1 × 20 ml	29-0181-84	ligand density: 25 µmol/ml	34	2.5/5	3 to 13
HiPrep Phenyl FF (high sub) 16/10	1 × 20 ml	28-9365-45	ligand density: 40 µmol/ml	90	5/10	3 to 13
HiPrep Phenyl FF (low sub) 16/10	1 × 20 ml	28-9365-46	ligand density: 25 µmol/ml	90	5/10	3 to 13
HiPrep Butyl FF 16/10	1 × 20 ml	28-9365-47	ligand density: 40 µmol/ml	90	5/10	3 to 13
HiPrep Octyl FF 16/10	1 × 20 ml	28-9365-48	ligand density: 5 µmol/ml	90	5/10	3 to 13
HiScreen Capto Phenyl (high sub)	1 × 4.7 ml	28-9924-72	ligand density: 27 µmol/ml	90	1.2/4.6	3 to 13
HiScreen Capto Butyl	1 × 4.7 ml	28-9924-73	ligand density: 53 µmol/ml	90	1.2/4.6	3 to 13
HiScreen Butyl FF	1 × 4.7 ml	28-9269-84	ligand density: 40 µmol/ml	90	1.2/1.9	3 to 13
HiScreen Butyl-S FF	1 × 4.7 ml	28-9269-85	ligand density: 10 µmol/ml	90	2.3/3.5	3 to 13
HiScreen Octyl FF	1 × 4.7 ml	28-9269-86	ligand density: 5 µmol/ml	90	1.2/1.9	3 to 13
HiScreen Phenyl FF (high sub)	1 × 4.7 ml	28-9269-88	ligand density: 40 µmol/ml	90	2.3/3.5	3 to 13
HiScreen Phenyl FF (low sub)	1 × 4.7 ml	28-9269-89	ligand density: 25 µmol/ml	90	2.3/3.5	3 to 13
HiScreen Phenyl HP	1 × 4.7 ml	28-9505-16	ligand density: 25 µmol/ml	34	0.6/1.2	3 to 13
HiScreen Butyl HP	1 × 4.7 ml	28-9782-42	ligand density: 50 µmol/ml	34	0.6/1.2	3 to 13

Multimodal chromatography

Column	Quantity	Code number	Typical loading range (mg)	Average particle size (µm)	Flow rate (ml/min)† Recommended/ Maximum	Working pH range
HiTrap Capto MMC	5 × 1 ml	11-0032-73	5-45 (BSA at 30 mS/cm)	75	1/4	2 to 12
	5 × 5 ml	11-0032-75	25-200 (BSA at 30 mS/cm)	75	5/20	2 to 12
HiTrap Capto adhere	5 × 1 ml	28-4058-44	Not available	75	1/4	3 to 12
	5 × 5 ml	28-4058-46	Not available	75	5/20	3 to 12
HiScreen Capto MMC	1 × 4.7 ml	28-9269-80	25-200 (BSA at 30 mS/cm)	75	2/4.7	2 to 12
HiScreen Capto adhere	1 × 4.7 ml	28-9269-81	Not available	75	2/4.7	3 to 12
HiTrap Capto Core 700	5 × 1 ml	17-5481-51	1-13 ovalbumin	85	0.6/1.9	3 to 13
HiScreen Capto Core 700	1 × 4.7 ml	17-5481-15	5-65 ovalbumin	85	0.8/2.3	3 to 13

- • Recommended for system
- o Can technically be used with the system, but not an optimal combination
- * Special pack size delivered on specific customer order
- † H_2O at 25°C
- ‡ ÄKTApurifier is available in three core systems, for different levels of automation
- § Dead volume in the system must be minimized to get the highest resolution
- ¶ Superdex 200 columns are being replaced by Superdex 200 Increase columns and will be discontinued from 31 December 2015
- ** Superose 6 columns are being replaced by Superose 6 Increase columns and will be discontinued from 31 December 2016

ÄKTAmicro	ÄKTA start	ÄKTAprime plus	ÄKTAxpress	ÄKTApurifier 10 plus‡	ÄKTApurifier 100 plus‡	ÄKTA pure 25§	ÄKTA pure 150	ÄKTA avant 25§	ÄKTA avant 150	ÄKTApilot
•				o		o		o		
•				•		•				
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ÄKTAmicro	ÄKTA start	ÄKTAprime plus	ÄKTAxpress	ÄKTApurifier 10 plus‡	ÄKTApurifier 100 plus‡	ÄKTA pure 25	ÄKTA pure 150	ÄKTA avant 25	ÄKTA avant 150	ÄKTApilot
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ÄKTAmicro	ÄKTA start	ÄKTAprime plus	ÄKTAxpress	ÄKTApurifier 10 plus‡	ÄKTApurifier 100 plus‡	ÄKTA pure 25	ÄKTA pure 150	ÄKTA avant 25	ÄKTA avant 150	ÄKTApilot
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Empty column and chromatography media guide

Our chromatography columns offer quality, versatility, precision, and engineering excellence. Combined with an extensive range of chromatography media, they provide excellent performance. This section summarizes our empty column range in combination with the most suitable chromatography media.

Characteristics of our laboratory columns are:

- Advanced design for uniform flow and minimal dead volume
- A range of laboratory columns with diameters up to 50 mm and lengths up to 100 cm
- Made of biocompatible materials with excellent chemical resistance
- Column volumes can be adjusted with the use of an adapter,which is provided with most columns

A variety of prepacked columns are available, including a comprehensive range of columns for process-scale chromatography. In addition, our Custom Products service can create prepacked combinations of columns and media to meet special requirements.

Tricorn™ columns are appropriate for high-performance chromatography media such as Sepharose High Performance, Superdex prep grade, and SOURCE. When working with capture media such as Capto, MabSelect or Sepharose Fast Flow, a Tricorn Coarse Filter Kit is recommended to use for reducing the risk of clogging.

HiScale™ is a family of high-performance, pressure-stable columns designed for preparative chromatography and process development. The user-friendly design and axial compression capabilities of the columns allow for simplified operation with a wide range of media including high-flow agarose media such as MabSelect and Capto.

XK columns are specified to run most chromatography media including Superdex prep grade and Sepharose High Performance.

FineLINE™ columns are especially suitable for packing SOURCE media. FineLINE Pilot 35 is well-suited for both down scaling from larger FineLINE columns, as well as up scaling from laboratory-scale columns.

AxiChrom™ columns are developed for use with high-flow agarose media, but are also compatible with traditional agarose chromatography media such as Sepharose. Packing is facilitated by the Intelligent Packing methodology, which provides UNICORN™ preprogrammed methods that save time and ensure accurate and reproducible packing results. AxiChrom 50 can be used for easy scale-up to larger AxiChrom columns.

	Recommended column			
Bulk media	**Tricorn**	**HiScale**	**XK**	**AxiChrom**
Size exclusion				
Sephadex	○	•	•	
Sepharose	•	•	•	
Sephacryl	•	•	•	
Superdex prep grade	•	•	•	
Superose prep grade	•	•	•	
Ion exchange				
Capto	•	•	○	•
Sepharose Fast Flow	•	•	•	•
Sepharose High Performance	•	•	•*	•
Sepharose XL	•	•	•	
SOURCE	•	•	•	
MacroCap™	•	•	•	
Affinity				
Sepharose 6B/4B/CL-4B	•	•	•	
Sepharose Fast Flow	•	•	•	•
Sepharose High Performance	•	•	•*	•
MabSelect	•	•	○	•
Reversed phase				
SOURCE	•	•		
Hydrophobic interaction				
Sepharose Fast Flow	•	•	•	•
Sepharose High Performance	•	•	•*	•
SOURCE	•	•		
Systems				
ÄKTAmicro	•			
ÄKTA start			•	
ÄKTAprime plus		○	•	
ÄKTAxpress	○†	○†	○†	
ÄKTApurifier 10	•	•	•	
ÄKTApurifier 100	•	•	•	
ÄKTA pure 25	•	•	•	
ÄKTA pure 150		•	•	•
ÄKTA avant 25	•	•	•	
ÄKTA avant 150		•	•	•
ÄKTApilot		•	•	•

- • Recommended combination
- ○ Can technically be used, but not an optimal combination
- * Not recommended for XK 50
- † For optimal performance use prepacked columns where purification parameters are predefined

For more information visit www.gelifesciences.com/protein-purification or www.gelifesciences.com/bioprocess or www.gelifesciences.com/purification_techsupport

ÄKTA systems

One platform from basic research to small-scale production

ÄKTA is a Swedish word that means true, genuine or real. ÄKTA systems help you make real progress in biomolecule purification and separation.

To 100 000 scientists worldwide – purifying proteins for structural or functional studies, developing protocols and optimizing methods for biomolecule purification, purifying synthetic peptides or nucleic acids – the name ÄKTA has always meant outstanding protein purification.

With the ability to purify virtually 100% of all biomolecules, ÄKTA systems can handle the simplest and the toughest of challenges. It gives you speed, ease of use, and flexibility whatever your purification application or scale.

ÄKTA systems cover all major chromatographic and cross-flow filtration techniques, from research laboratory to process development and manufacturing.

GE Healthcare has been developing products and methodology for the separation of biomolecules for more than 50 years. The FPLC™ System was developed in the early 1980s, with features designed to help scientists overcome the difficulties of working with biological material. These features became the blueprint for the successor to FPLC, today's ÄKTA system family.

ÄKTA systems work with UNICORN software, which makes it simple to control every stage of your purification processes. A broad range of prepacked columns, chromatography media and filters provide more options for optimized results.

ÄKTA start

ÄKTA start is a one step preparative chromatography system for laboratory scale protein purification. ÄKTA start is designed as a stand-alone system, with intuitive design, simple flow path, and user-friendly interface.

ÄKTAprime plus

ÄKTAprime plus is a compact system designed for simple purification of proteins at laboratory scale. In combination with pre-installed templates and prepacked columns, ÄKTAprime plus performs the most common purification techniques at the touch of a button.

ÄKTAxpress

ÄKTAxpress is an excellent solution for unattended multistep protein purification of tagged proteins and antibodies. By using this system, high protein purity in 100 mg yields are achieved with minimal invested manpower. The footprint is small; two systems fit in a cold cabinet.

ÄKTA pure

ÄKTA pure is a flexible and easily customizable protein purification system that can be tailored to meet any protein purification challenge. The system is available in two versions. ÄKTA pure 25 for fast purification of proteins, peptides and nucleic acid from pictogram to microgram levels.
ÄKTA pure 150 provides increased productivity and is designed for smooth handling of higher sample volumes and collection of larger amounts of target protein.

ÄKTA avant

ÄKTA avant is available in two versions. ÄKTA avant 25 is optimized for media screening and method optimization using small columns. ÄKTA avant 150 is designed for scaling up to larger columns, as well as fine-tuning and robustness testing of the optimized process. ÄKTA avant systems allow fast and reliable method development and scale-up of chromatographic processes.

ÄKTApilot

ÄKTApilot is a benchtop process development and production system.
The hygienic design, high level of automation, accuracy, reproducibility and reliable operation make ÄKTApilot an excellent system for scale-up, process optimization, and production.

ÄKTA system guide

Way of working	ÄKTAmicro	ÄKTA start	ÄKTAprime plus	ÄKTAxpress	ÄKTApurifier	ÄKTA pure	ÄKTA avant	ÄKTApilot
Scale								
Laboratory scale	•	•	•	•	•	•	•	–
Process development	–	–	–	–	–	–	•	•
Regulatory demands								
System control and data handling for regulatory requirements	•	–	–	•	•	•	•	•
Type of work								
Method development	–	•	–	–	o	o	•	•
Generic methods	•	•	•	•	•	•	•	•
Micropreparative	•	–	–	–	–	–	–	–
Characterization	•	–	–	–	–	o	–	–
Automation								
Buffer preparation	–	–	–	–	o	o	•	–
pH scouting	–	–	–	–	o	o	•	–
Media or column scouting	–	–	–	–	•	•	•	•
Multistep purification	–	–	o	•	–	–	–	–
Software								
UNICORN	•	•	–	•	•	•	•	•
PrimeView	–	–	•	–	–	–	–	–

- • Recommended
- o Optional
- – Not recommended or not applicable