Instructions 11002618 AH

HiTrap™ Capto™ Q, 1 mL and 5 mL
HiTrap Capto S, 1 mL and 5 mL
HiTrap Capto DEAE, 1 mL and 5 mL

Capto Q, Capto S and Capto DEAE are ion exchange BioProcess™ resins for capture and intermediate purification of proteins. HiTrap Capto Q, HiTrap Capto S and HiTrap Capto DEAE are prepacked 1 mL and 5 mL columns for screening of selectivity, binding and elution conditions, as well as small scale purifications.

HiTrap Capto Q, Capto S and Capto DEAE columns provide fast, reproducible and easy separations in a convenient format. The columns are used in an optimal way with liquid chromatography systems such as ÄKTA™ systems, but can also be operated with a syringe or a peristaltic pump.

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Read these instructions carefully before using HiTrap columns.

Intended use

HiTrap columns are intended for research use only, and shall not be used in any clinical or *in vitro* procedures for diagnostic purposes.

Safety

For use and handling of the product in a safe way, refer to the Safety Data Sheet.

1 Product description

HiTrap column characteristics

The columns are made of biocompatible polypropylene that does not interact with biomolecules.

The columns are delivered with a stopper at the inlet and a snap-off end at the outlet. Table 1 lists the characteristics of HiTrap columns.

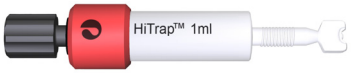

Fig 1. HiTrap, 1 mL column.

Fig 2. HiTrap, 5 mL column.

Note: *HiTrap columns cannot be opened or refilled.*

Note: *Make sure that the connector is tight to prevent leakage.*

Table 1. Characteristics of HiTrap columns.

Column volume (CV)	1 mL	5 mL
Column dimensions	0.7 × 2.5 cm	1.6 × 2.5 cm
Column hardware pressure limit	5 bar (0.5 MPa, 72 psi)	5 bar (0.5 MPa, 72 psi)

Note: *The pressure over the packed bed varies depending on a range of parameters such as the characteristics of the chromatography resin, sample/liquid viscosity and the column tubing used.*

Supplied Connector kit with HiTrap column

Connectors supplied	Usage	No. supplied
Union 1/16" male/ luer female	For connection of syringe to HiTrap column	1 or 2
Stop plug female, 1/16"	For sealing bottom of HiTrap column	2, 5 or 7

Resin properties

Capto Q, Capto S and Capto DEAE are high capacity, strong anion, strong cation and weak anion exchangers, respectively. The ligands, Q, S and DEAE, are coupled to a highly cross-linked agarose matrix. The cross-linked agarose matrix provides particle rigidity without compromising the pore size. In addition, dextran surface extenders coats the agarose matrix. This combination allows for fast mass transfer, resulting in high dynamic binding capacities of Capto Q, Capto S and Capto DEAE at high flow rates. This makes the resins suitable for high volume process scale applications. The characteristics of Capto Q, Capto S and Capto DEAE are listed in Table 2, Table 3 and Table 4, respectively.

Table 2. Characteristics of Capto Q.

Matrix	Highly cross-linked agarose, spherical	
Ion exchange type	Strong anion, Q	
Charged group	$-N^+(CH_3)_3$	
Ionic capacity	0.16 to 0.22 mmol Cl^-/mL resin	
Particle size, d_{50V}[1]	~ 90 µm	
Recommended operating flow rate[2]	HiTrap 1 mL 1 mL/min	HiTrap 5 mL 5 mL/min
Maximum operating flow rate[2]	HiTrap 1 mL 4 mL/min	HiTrap 5 mL 20 mL/min
Recommended maximum operating flow velocity (large scale)[3]	700 cm/h	
Dynamic binding capacity, Q_{B10}[4]	> 100 mg BSA/mL resin	
pH stability, operational[5]	2 to 12	
pH stability, CIP[6]	2 to 14	
pH ligand fully charged[7]	Entire pH range	
Working temperature	4°C to 30°C	
Chemical stability	Stable to commonly used aqueous buffers, 1.0 M NaOH[8], 8 M Urea, 6 M guanidine hydrochloride, 1 M acetic acid, 30% isopropanol, and 70% ethanol	
Avoid	Oxidizing agents, anionic detergents	
Storage	20% ethanol, 4°C to 30°C	

1 Median particle size of the cumulative volume distribution
2) At room temperature using buffers with the same viscosity as water.
3) 1 m diameter column and 20 cm bed height using buffers with the same viscosity as water at 20°C.
4) Dynamic binding capacity at 10% breakthrough by frontal analysis at a mobile phase velocity of 600 cm/h in a Tricorn™ 5/100 column at 10 cm bed height (1 min residence time) for BSA in 50 mM Tris-HCl, pH 8.0.
5) pH range where resin can be operated without significant change in function.
6) pH range where resin can be subjected to cleaning- or sanitization-in-place without significant change in function.
7) pH range where ligand is fully charged
8) 1.0 M NaOH should only be used for cleaning purposes.

Table 3. Characteristics of Capto S.

Matrix	Highly cross-linked agarose, spherical	
Ion exchange type	Strong cation, S	
Charged group	$-SO_3^-$	
Ionic capacity	0.11 to 0.14 mmol H^+/mL resin	
Particle size, d_{50v}[1]	~ 90 µm	
Recommended operating flow rate[2]	HiTrap 1 mL 1 mL/min	HiTrap 5 mL 5 mL/min
Maximum operating flow rate[2]	HiTrap 1 mL 4 mL/min	HiTrap 5 mL 20 mL/min
Recommended maximum operating flow velocity (large scale)[3]	700 cm/h	
Dynamic binding capacity, Q_{B10}[4]	> 120 mg lysozyme/mL resin	
Dynamic binding capacity, Q_{B10}[5]	> 60 mg ß-Lactoglobulin/mL resin	
pH stability, operational[6]	4 to 12	
pH stability, CIP[7]	3 to 14	
pH ligand fully charged[8]	Entire pH range	
Working temperature[9]	4°C to 30°C	
Chemical stability	Stable to commonly used aqueous buffers, 1.0 M NaOH10, 8 M Urea, 6 M guanidine hydrochloride, 30% isopropanol and 70% ethanol	
Avoid	Oxidizing agents, cationic detergents, long exposure to pH < 3	
Storage	0.2 M sodium acetate in 20% ethanol, 4°C to 30°C	

1) Median particle size of the cumulative volume distribution
2) At room temperature using buffers with the same viscosity as water.
3) 1 m diameter column and 20 cm bed height using buffers with the same viscosity as water at 20°C.
4) Dynamic binding capacity at 10% breakthrough by frontal analysis at a mobile phase velocity of 600 cm/h in a Tricorn 5/100 column at 10 cm bed height (1 min residence time) for lysozyme in 30 mM sodium phosphate, pH 6.8.

[5] Dynamic binding capacity at 10% breakthrough by frontal analysis at a mobile phase velocity of 600 cm/h in a PEEK 7.5/100 column at 10 cm bed height (1 min residence time) for ß-lactoglobulin in 100 mM citrate, pH 3.
[6] pH range where resin can be operated without significant change in function.
[7] pH range where resin can be subjected to cleaning- or sanitization-in-place without significant change in function.
[8] pH range where ligand is fully charged; although the ligand is fully charged throughout the entire pH range, only use the resin within the stated stability ranges.
[9] Low temperatures can decrease the capacity of Capto S.
[10] 1.0 M NaOH should only be used for cleaning purposes.

Table 4. Characteristics of Capto DEAE.

Matrix	Highly cross-linked agarose, spherical	
Ion exchange type	Weak anion, DEAE	
Charged group	--$N^+H(CH_2CH_3)_2$	
Ionic capacity	0.29 to 0.35 mmol Cl^-/mL resin	
Particle size, d_{50v}[1]	~ 90 µm	
Recommended operating flow rate[2]	HiTrap 1 mL 1 mL/min	HiTrap 5 mL 5 mL/min
Maximum operating flow rate[2]	HiTrap 1 mL 4 mL/min	HiTrap 5 mL 20 mL/min
Recommended maximum operating flow velocity (large scale)[3]	700 cm/h	
Dynamic binding capacity, Q_{B10}[4]	> 90 mg ovalbumin/mL resin	
pH stability, operational[5]	2 to 12	
pH stability, CIP[6]	2 to 14	
pH ligand fully charged[7]	Below 9	
Working temperature[8]	4°C to 30°C	
Chemical stability	Stable to commonly used aqueous buffers, 1.0 M NaOH9, 8 M Urea, 6 M guanidine hydrochloride, 1 M acetic acid, 30% isopropanol, and 70% ethanol	
Avoid	Oxidizing agents, anionic detergents	
Storage	20% ethanol, 4°C to 30°C	

1) Median particle size of the cumulative volume distribution
2) At room temperature using buffers with the same viscosity as water.
3) 1 m diameter column and 20 cm bed height using buffers with the same viscosity as water at 20oC.
4) Dynamic binding capacity at 10 % breakthrough by frontal analysis at a mobile phase velocity of 600 cm/h in a Tricorn 5/100 column at 10 cm bed height (1 min residence time) for ovalbumin in 50 mM Tris-HCl, pH 8.0.
5) pH range where resin can be operated without significant change in function.
6) pH range where resin can be subjected to cleaning- or sanitization-in-place without significant change in function.
7) pH range where ligand is fully charged; although the ligand is fully charged throughout the range stated, only use the resin within the stated stability ranges.
8) Low temperatures can decrease the capacity of Capto DEAE.
9) 1.0 M NaOH should only be used for cleaning purposes.

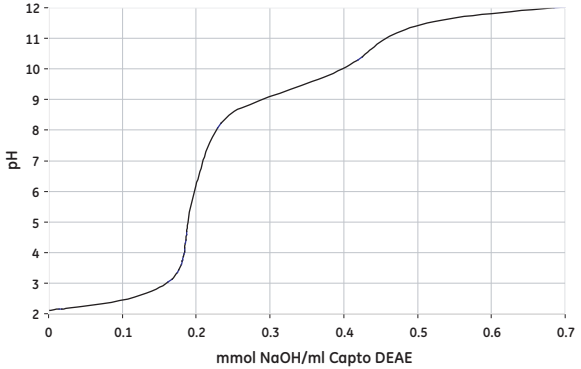

Fig 3. Titration curve for Capto DEAE. Capto DEAE has both weak and strong ion exchange properties. At pH ~ 5 most of the weak ion exchange ligands are protonated and positively charged. With increasing pH the ligands will gradually lose bound protons and thus charge. At a pH between 10 and 11 all weak ion exchange ligands are uncharged and only permanently positively charged quaternary ammonium groups remains.

2 Performing a separation

Sample preparation

Adjust the sample to the composition of the start buffer by buffer exchange using HiTrap Desalting or HiPrep™ 26/10 Desalting columns, *see* Table 5. Before application to the column, the samples can be centrifuged or filtered through a 0.45 µm filter.

Sample preparation without clarification of sample

The following sample preparation procedure is aimed to give a sample, sufficiently homogenized to be applied directly to the column without prior clarification. The protocol below has been used successfully in our own laboratories, but other established procedures may also work.

1. Dilution of cell paste: Add 5 to 10 mL of start buffer for each gram of cell paste.
2. **Enzymatic lysis:** 0.2 mg/mL lysozyme, 20 µg/mL DNAse, 1 mM $MgCl_2$, 1 mM Pefabloc™ SC or PMSF (final concentrations). Stir for 30 min at room temperature or 4°C depending on the sensitivity of the target protein.
3. **Mechanical lysis:** Sonication on ice for approx. 10 min, homogenization with a French press or other homogenizer or freeze/thaw, repeated at least five times.

   Mechanical lysis time may have to be extended compared with standard protocols to secure an optimized lysate for sample loading (to prevent clogging of the column and back pressure problems). Different proteins have different sensitivity to cell lysis and care must be taken to avoid frothing and overheating of the sample.
4. Adjust the pH of the lysate. The pH should be at least 0.5 units below (cation exchangers) or 0.5 units above (anion exchangers) the pI of the target molecule. Do not use strong bases or acids for pH-adjustment (precipitation risk). Apply the unclarified lysate on the column directly after preparation.

Note: *If the sonicated or homogenized unclarified cell lysate is frozen before use, precipitation and aggregation may increase. New sonication of the lysate can then prevent increased back pressure problems when loading on the column.*

Prepacked columns for desalting

Table 5. Prepacked columns.

Column	Loading volume	Elution volume
HiPrep 26/10 Desalting [1]	2.5 to 15 mL	7.5 to 20 mL
HiTrap Desalting [2]	0.25 to 1.5 mL	1.0 to 2.0 mL
PD-10 Desalting [3]	1.0 to 2.5 mL [4] 1.75 to 2.5 mL [5]	3.5 mL Up to 2.5 mL
PD MiniTrap™ G-25	0.1 to 2.5 mL [4] 0.2 to 0.5 mL[5]	1.0 mL Up to 0.5 mL
PD MidiTrap™ G-25	0.5 to 1 mL [4] 0.75 to 1 mL [5]	1.5 mL Up to 1 mL

1) Prepacked with Sephadex™ G-25 Fine and requires a pump or a chromatography system to run.
2) Prepacked with Sephadex G-25 Superfine and requires a syringe or pump to run.
3) Prepacked with Sephadex G-25 and can be run by the gravity flow or centrifugation.
4) Volumes with gravity elution.
5) Volumes with centrifugation.

Choice of start and elution buffer

The elution buffer is usually of the same composition and pH as the start buffer, but it contains additional salt, most often sodium chloride. The pH of the start buffer should be at least 0.5 to 1 pH unit above the pI of the target molecule when using an anion exchanger and at least 0.5 to 1 pH unit below the pI when using a cation exchanger.

The buffer species and buffer concentration are important for reproducible and robust methods. Table 6 and Table 7 show suitable buffers for anion and cation exchangers, respectively, and suggested starting concentrations. The buffer concentration should be at least 10 mM, and only rarely above 100 mM.

For samples with unknown charge properties, try the following:

Anion exchange (Q and DEAE)

Start buffer: 20 mM Tris-HCl, pH 8.0

Elution buffer: 20 mM Tris-HCl, 1 M NaCl, pH 8.0

Cation exchange (S)

Start buffer: 50 mM sodium acetate, pH 5.0

Elution buffer: 50 mM sodium acetate, 1 M NaCl, pH 5.0

or

Start buffer: 50 mM MES, pH 6.0

Elution buffer: 50 mM MES, 1 M NaCl, pH 6.0

Table 6. Buffers for anion exchange chromatography.

pH interval	Substance	Conc. (mM)	Counter-ion	pK_a (25°C)[1]
4.3–5.3	N-Methylpiperazine	20	Cl^-	4.75
4.8–5.8	Piperazine	20	Cl^- or $HCOO^-$	5.33
5.5–6.5	L-Histidine	20	Cl^-	6.04
6.0–7.0	Bis-Tris	20	Cl^-	6.48
6.2–7.2	Bis-Tris propane	20	Cl^-	6.65
8.6–9.6	Bis-Tris propane	20	Cl^-	9.10
7.3–8.3	Triethanolamine	20	Cl^- or CH_3COO^-	7.76
7.6–8.6	Tris	20	Cl^-	8.07
8.0–9.0	N-Methyldiethanolamine	20	SO_4^{2-}	8.52
8.0–9.0	N-Methyldiethanolamine	50	Cl^- or CH_3COO^-	8.52
8.4–9.4	Diethanolamine	20 at pH 8.4 50 at pH 8.8	Cl^-	8.88
8.4–9.4	Propane 1,3-diamino	20	Cl^-	8.88
9.0–10.0	Ethanolamine	20	Cl^-	9.50
9.2–10.2	Piperazine	20	Cl^-	9.73
10.0–11.0	Propane 1,3-diamino	20	Cl^-	10.55
10.6–11.6	Piperidine	20	Cl^-	11.12

[1] Handbook of chemistry and physics, 83rd edition, CRC, 2002–2003.

Table 7. Buffers for cation exchange chromatography

pH interval	Substance	Conc. (mM)	Counter-ion	pK_a (25°C)[1]
1.4–2.4	Maleic acid	20	Na^+	1.92
2.6–3.6	Methyl malonic acid	20	Na^+ or Li^+	3.07
2.6–3.6	Citric acid	20	Na^+	3.13
3.3–4.3	Lactic acid	50	Na^+	3.86
3.3–4.3	Formic acid	50	Na^+ or Li^+	3.75
3.7–4.7	Succinic acid	50	Na^+	4.21
5.1–6.1	Succinic acid	50	Na^+	5.64
4.3–5.3	Acetic acid	50	Na^+ or Li^+	4.75
5.2–6.2	Methyl malonic acid	50	Na^+ or Li^+	5.76
5.6–6.6	MES	50	Na^+ or Li^+	6.27
6.7–7.7	Phosphate	50	Na^+	7.20
7.0–8.0	HEPES	50	Na^+ or Li^+	7.56
7.8–8.8	BICINE	50	Na^+	8.33

[1] Handbook of chemistry and physics, 83rd edition, CRC, 2002.2003.

First time use or after long term storage

Flow: 1 mL/min (HiTrap 1 mL), 5 mL/min (HiTrap 5 mL).

1. Remove the stopper and connect the column to the system (or syringe) with a drop-to-drop connection to avoid introducing air into the column.
2. Remove the snap-off end at the column outlet and wash with 1 column volume of ultra pure water. This step ensures removal of ethanol and avoids the precipitation of buffer salts upon exposure to ethanol. The step can be omitted if precipitation is not likely to be a problem.
3. Wash with 5 column volumes of start buffer.
4. Wash with 5 column volumes of elution buffer.
5. Wash with 5 column volumes of start buffer.

Separation by gradient elution

Linear ionic strength gradients should always be used for method development or when starting with an unknown sample. Linear ionic strength gradients are easy to prepare and very reproducible when generated by a suitable chromatography system. The results obtained can then serve as a base from which to optimize the separation.

Flow: 1 mL/min (HiTrap 1 mL), 5 mL/min (HiTrap 5 mL). Collect fractions throughout the separation.

1. Equilibrate the column with at least 5 column volumes of start buffer for Capto Q and Capto S and at least 10 column volumes of start buffer for Capto DEAE or until the UV baseline, eluent pH and conductivity are stable.
2. Adjust the sample to the chosen starting pH and conductivity and apply to the column.
3. Wash with 5 to 10 column volumes of start buffer or until no material appears in the effluent.
4. Begin elution using a gradient volume of 10 to 20 column volumes and an increasing salt concentration up to 0.5 M NaCl (50% elution buffer).
5. Wash with 5 column volumes of 1 M NaCl (100% elution buffer) to elute any remaining ionically bound material.
6. Re-equilibrate with 5 to 10 column volumes of start buffer or until the UV baseline, eluent pH, and conductivity reach the required values.

Screening of selectivity

HiTrap columns are a convenient format for screening the selectivity of different ion exchange resins.

3 Optimization

Screening for optimal loading conditions

Scout for optimal loading conditions by testing a range of pH values within which the target protein is known to be stable. If the isoelectric point of the target protein is known, then begin with a narrower pH range, for example, 0.5 to 1 pH unit away from the isoelectric point. In some cases the sample conductivity is equally important as the pH when scouting for optimal loading conditions. We therefore also recommend to scout for optimal ionic strength by varying the conductivity of the sample between 2 and 15 mS/cm.

Users of ÄKTA design systems with BufferPrep functionality can select from a range of buffer recipes to test resins over a range of pH values and elution conditions.

Flow: 1 mL/min (HiTrap 1 mL), 5 mL/min (HiTrap 5 mL). Collect fractions throughout the separation.

1 Decide what pH values and conductivities are to be investigated. Prepare samples according to this.

2 Start buffers: set up a series of buffers with pH values in the range 5–9 (Capto Q and Capto DEAE) or 4–8 (Capto S) and with 0.5 to 1 pH unit intervals between each buffer. *See* Table 6 and Table 7 for recommended buffers. Where the conductivity of the buffers should be considered, it can either be adjusted by increasing the buffer concentration or adding sodium chloride.

3 Elution buffers: set up a second series of buffers with the same pH values, but including 1 M NaCl.

4 Equilibrate with at least 5 column volumes of start buffer for Capto Q and Capto S and at least 10 column volumes of start buffer for Capto DEAE or until the UV baseline, eluent pH and conductivity are stable.

5 Apply a known amount of the sample.

6 Wash with at least 5 column volumes of start buffer or until no material appears in the effluent.

7 Elute bound material with elution buffer (3 to 5 column volumes is usually sufficient, but other volumes may be required dependent on the exact experimental conditions).

8 Analyze all fractions (for example by an activity assay) and determine purity and the amount bound to the column.

9 Perform steps 4–8 for the next buffer pH.

10 Select pH and conductivity: the most suitable buffer should a) allow the target protein to bind and b) recover the protein with as high purity as possible.

Note: *For Capto S and Capto DEAE the dynamic binding capacities for certain proteins decrease at lower temperatures. Screening for buffer concentration will give the optimal dynamic binding capacity at a given temperature.*

Separation by step elution

Reduce separation time and buffer consumption by transferring to a step elution.

Flow: 1 mL/min (HiTrap 1 mL), 5 mL/min (HiTrap 5 mL). Collect fractions throughout the separation.

1 Equilibrate the column with at least 5 column volumes of start buffer for Capto Q and Capto S and at least 10 column volumes of start buffer for Capto DEAE or until the UV baseline, eluent pH, and conductivity are stable.

2 Adjust the sample to the chosen starting pH and conductivity and apply to the column.

3 Wash with 5 to 10 column volumes of start buffer or until no material appears in the effluent.

4 Elute with 5 column volumes of start buffer including NaCl at chosen concentration.

5 Repeat step 4 at higher NaCl concentrations until the target protein has been eluted.

6 Wash with 5 column volumes of a high salt solution (1 M NaCl in start buffer) to elute any remaining ionically bound material.

7 Re-equilibrate with 5 to 10 column volumes of start buffer or until the UV baseline, eluent pH, and conductivity reach the required values.

Save time by using higher flow rates during the high salt wash and re-equilibration steps. Do not exceed the maximum recommended flow and back pressure for the column.

Further optimization

HiTrap columns are best suited for initial screening of binding and elution conditions, further optimization is preferably done on a larger column such as Tricorn and XK columns.

4 Cleaning

Correct preparation of samples and buffers, including a high salt wash (1–2 M NaCl) after each separation, should maintain columns in good condition. However, reduced performance, increased back pressure or blockage indicates that the resin needs cleaning.

The following procedure removes common contaminants:

Flow: 1 mL/min (HiTrap 1 mL), 5 mL/min (HiTrap 5 mL),

1 Wash with at least 2 column volumes of 2.0 M NaCl.

2 Wash with at least 4 column volumes of 1.0 M NaOH.

3 Wash with at least 2 column volumes of 2.0 M NaCl.

4 Rinse with at least 2 column volumes of distilled water.

5 Wash with 5 column volumes of start buffer for Capto Q and Capto S and at least 10 column volumes of start buffer for Capto DEAE or until eluent pH and conductivity have reached the required values.

Note: *For some contaminants a more rigorous CIP procedure can be required for Capto DEAE than for Capto Q and Capto S. For more details, see instructions "Capto S, Capto Q, Capto DEAE", product code 28407452.*

5 Storage

Wash with 2 column volumes of ultra pure water followed by 2 column volumes of 20% ethanol (Capto Q and Capto DEAE) or 20% ethanol containing 0.2 M sodium acetate (Capto S). Store at 4°C to 30°C. Do not freeze. Make sure that the column is sealed well to avoid drying out.

6 Adjusting pressure limits in chromatography system software

Pressure generated by the flow through a column affects the packed bed and the column hardware, see Fig 4. Increased pressure is generated when running/using one or a combination of the following conditions:

- High flow rates
- Buffers or sample with high viscosity
- Low temperature
- A flow restrictor

Note: *Exceeding the flow limit (see Tables 2 to 4) may damage the column.*

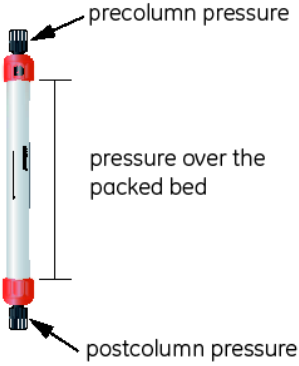

Fig 4. Precolumn and postcolumn measurements.

ÄKTA avant and ÄKTA pure

The system will automatically monitor the pressures (precolumn pressure and pressure over the packed bed, Δp). The precolumn pressure limit is the column hardware pressure limit (see Table 1).

The maximum pressure the packed bed can withstand depends on resin characteristics and sample/liquid viscosity. The measured value also depends on the tubing used to connect the column to the instrument.

ÄKTAexplorer, ÄKTApurifier, ÄKTAFPLC and other systems with pressure sensor in the pump

To obtain optimal functionality, the pressure limit in the software may be adjusted according to the following procedure:

1. Replace the column with a piece of tubing. Run the pump at the maximum intended flow rate. Note the pressure as *total system pressure*, P1.
2. Disconnect the tubing and run the pump at the same flow rate used in step 1. Note that there will be a drip from the column valve. Note this pressure as P2.
3. Calculate the new pressure limit as a sum of P2 and the column hardware pressure limit (see Table 1). Replace the pressure limit in the software with the calculated value.

   The actual pressure over the packed bed (Δp) will during run be equal to actual measured pressure - *total system pressure* (P1).

Note: *Repeat the procedure each time the parameters are changed.*

7 Ordering information

Product	Quantity	Product code
HiTrap Capto Q	5 × 1 mL	11001302
	5 × 5 mL	11001303
HiTrap Capto S	5 × 1 mL	17544122
	5 × 5 mL	17544123
HiTrap Capto DEAE	5 × 1 mL	28916537
	5 × 5 mL	28916540

Related Products	Quantity	Product code
Capto Q[1]	25 mL	17531610
	100 mL	17531602
	1 L	17531603
Capto S[1]	25 mL	17544110
	100 mL	17544101
Capto DEAE[1]	25 mL	17544310
	100 mL	17544301
	1 L	17544303
HiPrep 26/10 Desalting	1 × 53 mL	17508701
	4 × 53 mL	17508702
HiTrap Desalting	1 × 5 mL	29048684
	5 × 5 mL	17140801
PD MidiTrap G-25	50 Columns	28918008
PD MiniTrap G-25	50 Columns	28918007
PD-10 Desalting	30 Columns	17085101

[1]Capto Q, Capto S and Capto DEAE are available in process scale quantities. Please contact your local representative.

Accessories	Quantity	Product code
1/16" male/luer female *(For connection of syringe to top of HiTrap column)*	2	18111251
Tubing connector flangeless/M6 female *(For connection of tubing to bottom of HiTrap column)*	2	18100368
Tubing connector flangeless/M6 male *(For connection of tubing to top of HiTrap column)*	2	18101798
Union 1/16" female/M6 male *(For connection to original FPLC System through bottom of HiTrap column)*	6	18111257
Union M6 female /1/16" male *(For connection to original FPLC System through top of HiTrap column)*	5	18385801
Union luerlock female/M6 female	2	18102712
HiTrap/HiPrep, 1/16" male connector for ÄKTA design	8	28401081
Stop plug female, 1/16" *(For sealing bottom of HiTrap column)*	5	11000464
Fingertight stop plug, 1/16"	5	11000355

Literature	Product code
Data File: Capto Q Capto S and Capto DEAE	11002576
Handbook: Ion Exchange Chromatography, Principles and Methods	11000421
Ion Exchange Chromatography Columns and Media, Selection Guide	18112731

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