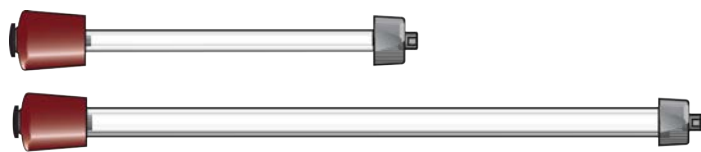


# Superose 6 Increase 5/150 GL

# Superose 6 Increase 10/300 GL

## Size exclusion chromatography columns

## Instructions for Use



Read these instructions carefully before using the columns.

### Intended use

Superose™ 6 Increase 5/150 GL and Superose 6 Increase 10/300 GL 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 products in a safe way, refer to the Safety Data Sheet.

### Quick information

Superose 6 Increase 5/150 GL and Superose 6 Increase 10/300 GL are pre-packed Tricorn™ glass columns.

Superose 6 Increase 5/150 GL is for rapid size analysis of proteins and other biomolecules. Short cycle time, together with small sample volume and low consumption of buffer make this column ideal for use in screening experiments to check protein homogeneity.

Superose 6 Increase 10/300 GL is suitable for small scale preparative purification (µg-mg) as a final polishing step, as well as for protein analysis and characterization.

The columns are supplied with two fingertight connectors 1/16" male for connection to ÄKTA™ or other systems.

**Table 1.** Resin data

Matrix	Composite of cross-linked agarose
Particle size, $d_{50V}$ <sup>1</sup>	~ 8.6 µm
Exclusion limit ( $M_r$ )	Approx. $4 \times 10^7$
Fractionation range	
globular proteins ( $M_r$ )	5000 to $5 \times 10^6$
dextran ( $M_p$ )	1000 to $3 \times 10^5$
pH stability range	
operational <sup>2</sup>	3 to 12
CIP <sup>3</sup>	1 to 14
Temperature	
operational	4°C to 40°C
storage	4°C to 30°C

<sup>1</sup> Median particle size of the cumulative volume distribution.

<sup>2</sup> pH range where resin can be operated without significant change in function.

<sup>3</sup> pH range where resin can be subjected to cleaning- or sanitization-in-place without significant change in function.

**Table 2.** Column data

	<b>5/150</b>	<b>10/300</b>
Bed dimensions (mm)	5 x 153-158	10 x 300-310
Approximate bed volume (mL)	3	24
Column efficiency (N/m)	> 42 000	> 48 000
Typical pressure drop over packed bed <sup>1</sup>	3.0 MPa <sup>2</sup> , (30 bar, 435 psi)	3.0 MPa <sup>2</sup> , (30 bar, 435 psi)
Column hardware pressure limit	10 MPa, (100 bar, 1450 psi)	5.0 MPa, (50 bar, 725 psi)

<sup>1</sup> Determine the limit according to section [Setting column pressure limits, on page 2](#).

<sup>2</sup> At maximum flow rate at 25°C in water.

**Table 3.** Flow rate limits and recommendations Superose 6 Increase 5/150 GL

Temperature		Flow rate (mL/min)
20°C to 25°C	Maximum flow rate, water	0.75
	Recommended flow rate, water	0.30
	Maximum flow rate, 20% ethanol	0.35
	Maximum flow rate, 10% glycerol	0.35
4°C to 8°C	Maximum flow rate, water	0.35
	Maximum flow rate, 20% ethanol	0.15
	Maximum flow rate, 10% glycerol	0.15

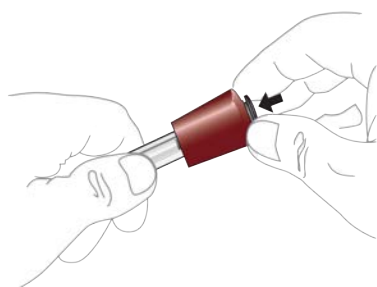
**Table 4.** Flow rate limits and recommendations Superose 6 Increase 10/300 GL

Temperature		Flow rate (mL/min)
20°C to 25°C	Maximum flow rate, water	1.5
	Recommended flow rate, water	0.5
	Maximum flow rate, 20% ethanol	0.75
	Maximum flow rate, 10% glycerol	0.75
4°C to 8°C	Maximum flow rate, water	0.75
	Maximum flow rate, 20% ethanol	0.35
	Maximum flow rate, 10% glycerol	0.35

**Note:** Most water-based buffers can be considered to be similar to water, for example phosphate and Tris buffers.

**Note:** When running viscous samples (for example containing glycerol) it is important to lower the flow rate, see recommendations above.

## First-time use



**Fig 1.** Illustration of how to lock the adapter. The locking ring (black) must be in the down-position to prevent uncontrolled adjustment of the column's bed height.

Before connecting the column to a chromatography system, make sure there is no air in the tubing and valves. Remove the storage/shipping device, see section [Delivery/storage, on page 5](#), and the stop plug from the column. Check that the upper adapter is locked (locking ring pressed down, see the Figure above). Make sure that the column inlet is filled with liquid and connect it drop-to-drop to the system. For maximum resolution especially on the 5/150 column, minimize dead volumes between the injection valve and the column as well as between the column outlet and the detector.

Prepare the column for first-time use as follows:

Step	Action
1	Equilibrate with at least 2 column volumes (CV) of room tempered water at a flow rate of 0.25 mL/min (5/150) or 0.5 mL/min (10/300). Be aware to lower the flow rate if run at lower temperature.
2	Set pressure limits for the column in your method according to section <a href="#">Setting column pressure limits, on page 2</a> .
3	Equilibrate with at least 2 CV eluent at a flow rate of 0.25 mL/min (5/150) or 0.5 mL/min (10/300).
4	It is recommended to perform a column performance control for future comparisons, see section <a href="#">Column performance control, on page 4</a> .



### NOTICE

Make sure not to exceed the pressure limits of the column. This is particularly important when working at low temperatures, like in a cold room, or when the column is used with 20% ethanol or other viscous solutions. Decrease the flow rate according to [Table 3, on page 2](#) or [Table 4, on page 2](#). Set pressure limits according to section [Setting column pressure limits, on page 2](#).

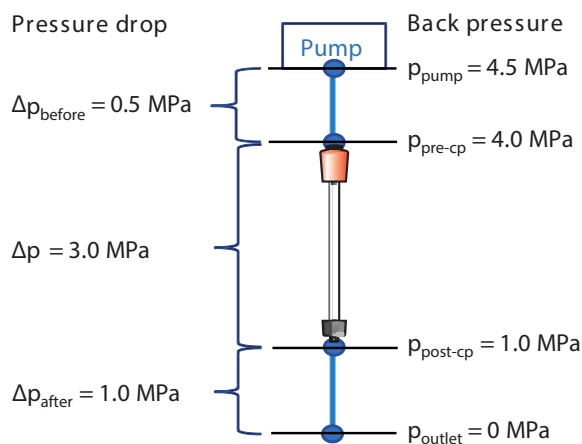
## Setting column pressure limits

There are two pressure limits to consider when running the column, the pressure drop over the packed bed and the column hardware pressure limit. The pressure drop over the packed bed differs for each column and the limit has to be individually set **as the columns are packed to withstand the maximum flow rate**. Note that it might be different compared to the value noted in [Table 2, on page 1](#).

Exceeding any pressure limit may lead to collapse of the column bed or damage to the column hardware. Increased pressure may for example be generated by one or a combination of the following parameters:

- Eluent or sample with high viscosity compared to water. This includes 20% ethanol.
- Low temperature compared to room temperature.
- Modifications to the flow path, for example changing to thinner or longer tubing.

For optimal functionality it is important to know the pressure drops over different parts of your system and how they affect the column. All ÄKTA chromatography systems measure pressure at the system pump,  $P_{\text{pump}}$  (see [Fig. 2, on page 3](#)). Some systems have additional pressure sensors located before and after the column,  $P_{\text{pre-c}}$  and  $P_{\text{post-c}}$ .



**Fig 2.** Example of the pressure in different parts of a system during run of a column.

- $\Delta p_{\text{before}}$  does not affect the column.
- The pressure on the column hardware is the sum of  $\Delta p_{\text{after}}$  and  $\Delta p$  (on some systems monitored separately as  $p_{\text{pre-c}}$ ). Do not exceed the column hardware limit!
- $\Delta p$ , is individual for each column and needs to be determined.

For more information, refer to the *ÄKTA laboratory-scale Chromatography Systems Instrument Management Handbook*.

### How to set pressure limit for ÄKTAexplorer, ÄKTApurifier, ÄKTAmicro, and other systems with a pressure sensor in the pump

Determination of column specific pressure drop over the packed bed,  $\Delta p$  (see Figure above):

Step	Action
1	$\Delta p_{\text{before}}$ is measured in absence of the column. Run the pump at <u>maximum flow rate</u> of the column in water and at the temperature for the experimental conditions. For exact values, see <a href="#">Table 3, on page 2</a> or <a href="#">Table 4, on page 2</a> . Let the flow drip from the tubing that will later be connected to the column. Note the pressure as $\Delta p_{\text{before}}$ .
2	Check that the <i>Pressure Alarm</i> in software is set to the same as the <u>Column hardware pressure limit</u> .
3	Connect the column to the system. Let the flow drip from the column outlet. The column should be equilibrated in water and at the temperature for the experimental conditions. Run the pump at the same flow rate as in step 1. Note the pressure value.
4	$\Delta p$ is calculated as the pressure value in step 3 minus $\Delta p_{\text{before}}$ . The $\Delta p$ value will be used in step 8 below.  This $\Delta p$ should not be exceeded at any temperature or using any liquid.

Setting pressure limit in method at your experimental conditions (intended system setup, flow rate, temperature and eluent):

Step	Action
5	$\Delta p_{\text{before}}$ is measured in absence of the column. Run the pump at your <u>intended flow rate</u> . Let the flow drip from the tubing that will later be connected to the column. Note the pressure as $\Delta p_{\text{before}}$ .
6	Instead of the column, connect a piece of tubing <sup>1</sup> to the system. Run the pump at the same conditions as in step 5. Note the pressure value as the <u>total system pressure</u> .
7	$\Delta p_{\text{after}}$ is calculated as the <u>total system pressure</u> value noted in step 6 minus $\Delta p_{\text{before}}$ , noted in step 5.
8	Calculate $\Delta p + \Delta p_{\text{after}} + \Delta p_{\text{before}}$ <ul style="list-style-type: none"> <li>- If this value is lower than the <u>Column hardware pressure limit</u> (see <a href="#">Table 2, on page 1</a>), set the pressure limit in your method as <math>\Delta p + \Delta p_{\text{after}} + \Delta p_{\text{before}}</math>.</li> <li>- If <math>\Delta p + \Delta p_{\text{after}}</math> exceeds the column hardware pressure limit, reduce the flow rate or <math>\Delta p_{\text{after}}</math>. Repeat step 5-8.</li> </ul>

You can now start your experiment!

### How to set pressure limit for ÄKTA pure, without a column valve or with Column Valve V9-Cs (1 column)

$p_{\text{pre-c}}$  (see Figure above) is automatically monitored by the system. This is the pressure signal to use in the following instruction. Do not use the *System pressure signal*. Note that the measured values include the tubing used to connect the column to the instrument.

Determination of column specific pressure drop over the packed bed ( $\Delta p$ ):

Step	Action
1	Check that the <i>Alarm pre column pressure</i> in software is set to the same as the <u>Column hardware pressure limit</u> (see <a href="#">Table 2, on page 1</a> ).
2	Connect the column to the system. Let the flow drip from the column outlet. The column should be equilibrated in water and at the temperature for the experimental conditions. Run the pump at <u>maximum flow rate</u> of the column in water and at the temperature for the experimental conditions. For exact values, see <a href="#">Table 3, on page 2</a> or <a href="#">Table 4, on page 2</a> .  Note the pressure value.  The now measured $p_{\text{pre-c}}$ value is the maximum pressure over the packed bed, $\Delta p$ ( <i>Delta C pressure</i> ).
3	This $\Delta p$ value should not be exceeded at any temperature or with any liquid!

Setting pressure limit in method at your experimental conditions (intended system setup, flow rate, temperature and eluent):

4	$\Delta p_{\text{after}}$ is measured in absence of the column. Run the pump at your <u>intended flow rate</u> .
5	Instead of the column, connect a piece of tubing <sup>1</sup> to the system, or bypass the column if connected to a valve. Run the pump at your intended flow rate. The now measured value is $\Delta p_{\text{after}}$ .

<sup>1</sup> Avoid thin and/or long tubing that will give back pressure.

Step	Action
6	Calculate $\Delta p + \Delta p_{\text{after}}$ . <ul style="list-style-type: none"> <li>- If this value is lower than the <a href="#">Column hardware pressure limit</a> (see <a href="#">Table 2, on page 1</a>), set the pressure limit in your method, Alarm pre column pressure, as <math>\Delta p + \Delta p_{\text{after}}</math></li> <li>- If <math>\Delta p + \Delta p_{\text{after}}</math> exceeds the column hardware pressure limit, reduce the flow rate or <math>\Delta p_{\text{after}}</math></li> </ul> Repeat step 4-6.

You can now start your experiment!

## How to set pressure limit for ÄKTA avant and ÄKTA pure with Column Valve V9-C (5 columns)

**Note:** This is not an optimal high performance setup. See [System recommendations, on page 5](#) and [System dead volumes, on page 7](#) for more details.

$\Delta p$  and  $p_{\text{pre-c}}$  (see [Fig. 2, on page 3](#)) are automatically monitored by the system.

**Note:** The measured values include the tubing used to connect the column to the instrument.

Step	Action
1	Check that the <i>Alarm pre column pressure</i> is set to the same as the <a href="#">Column hardware pressure limit</a> (see <a href="#">Table 2, on page 1</a> ).
2	Connect the column to the system. The column should be equilibrated in water and at the temperature for the experimental conditions. Start running the column at a low flow rate. Slowly increase the flow until the maximum flow rate for the column under these conditions or the limit set in step 1 is reached. For exact maximum flow rates under different conditions, see <a href="#">Table 3, on page 2</a> or <a href="#">Table 4, on page 2</a> . Note the pressure over the packed bed, $\Delta p$ (delta-column pressure), and set the value as <i>Alarm Delta column pressure</i> .  This $\Delta p$ should not be exceeded at any temperature or with any liquid.

You can now start your experiment!

## Column performance control

In order to detect any changes in column performance, it is very important that you make an initial test with your particular system configuration. Note that the contribution from dead volumes in the instrument to band broadening will vary depending on system set-up and will influence column efficiency. The obtained efficiency on your system might be lower compared to the specifications in [Table 2, on page 1](#).

### Column efficiency test

Column efficiency, expressed as the number of theoretical plates per meter,  $N/m$ , is calculated using the following equation:

$$N/m = 5.54 \times (V_R / W_h)^2 / L$$

where

$N/m$	=	number of theoretical plates/meter
$V_R$	=	volume eluted from the start of sample application to the peak maximum

$W_h$	=	peak width measured as the width of the recorded peak at half of the peak height
$L$	=	bed height (m)

### Column Superose 6 Increase 5/150 GL

Check the performance of the column using the following procedure:

Sample:	10 $\mu$ L 2% acetone (20 mg/mL) in buffer or water
Eluent:	Buffer or water
Flow rate:	0.30 mL/min, room temperature
Detection:	280 nm

### Column Superose 6 Increase 10/300 GL

Check the performance of the column using the following procedure:

Sample:	100 $\mu$ L 2% acetone (20 mg/mL) in buffer or water
Eluent:	Buffer or water
Flow rate:	1.0 mL/min, room temperature
Detection:	280 nm

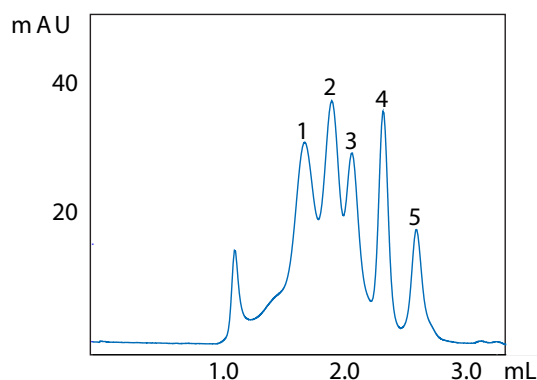
### Function test

As an alternative to the above efficiency test, check the column performance by running a function test.

### Column Superose 6 Increase 5/150 GL.

Sample:	1. Thyroglobulin ( $M_r$ 669 000) 3 mg/mL 2. Ferritin ( $M_r$ 440 000) 0.3 mg/mL 3. Aldolase ( $M_r$ 158 000) 3 mg/mL 4. Carbonic anhydrase ( $M_r$ 29 000) 1 mg/mL 5. Aprotinin ( $M_r$ 6500) 1 mg/mL
Sample volume:	12 $\mu$ L
Eluent:	0.01 M phosphate buffer, 0.14 M NaCl, pH 7.4
Flow rate:	0.3 mL/min, room temperature
Detection:	280 nm

Result is shown in [Fig. 3, on page 4](#).

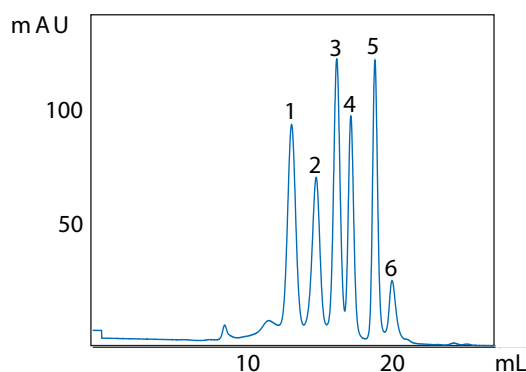


**Fig 3.** Typical chromatogram from a function test of Superose 6 Increase 5/150 GL using ÄKTAmicro.

## Column Superose 6 Increase 10/300 GL

Sample:	1. Thyroglobulin (Mr 669 000) 3 mg/mL
	2. Ferritin (Mr 440 000) 0.3 mg/mL
	3. Aldolase (Mr 158 000) 3 mg/mL
	4. Ovalbumin (Mr 44 000) 3 mg/mL
	5. Ribonuclease A (Mr 13 700) 3 mg/mL
	6. Aprotinin (Mr 6500) 1 mg/mL
Sample volume:	100 µL
Eluent:	0.01 M phosphate buffer, 0.14 M NaCl, pH 7.4
Flow rate:	0.5 mL/min, room temperature
Detection:	280 nm

Result is shown in the Figure below.



**Fig 4.** Typical chromatogram from a function test of Superose 6 Increase 10/300 GL using ÄKTAmicro.

## Try these conditions first

Eluent:	0.01 M phosphate buffer, 0.14 M NaCl, pH 7.4
Flow rate:	0.3 mL/min (5/150); 0.5 mL/min (10/300)
(room temperature)	
Sample volume:	10 µL (5/150); 100 µL (10/300)

Equilibration is not necessary between runs with the same buffer. Read the section [Optimization, on page 7](#) for information on how to optimize a separation.

## Sample recommendations

Molecular weight (Mr):	5000 to $5 \times 10^6$
Protein concentration:	Up to 50 mg/mL, for higher resolution below 10 mg/mL.
Sample volume:	4 to 50 µL (5/150) 25 to 500 µL (10/300)
Preparation:	Dissolve the sample in eluent, filter through a 0.22 µm filter or centrifuge at 10 000 g for 10 min.

**Note:** High sample viscosity (high protein concentration or additives) can cause instability of the separation and the back pressure might increase. Dilute sample or decrease flow rate during sample application.

## System recommendations

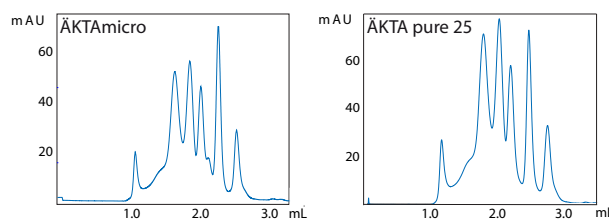
The small bed volume of the 5/150 column makes it sensitive to dead volumes in the system. For this column it is recommended to use systems like ÄKTApurifier 10, ÄKTA pure 25 without the column valve V9-C (5 columns), ÄKTAmicro, or similar. Use short, narrow capillaries and avoid all unnecessary components in the flow path. For optimal configuration of ÄKTA pure 25, see Cue Cards in the Literature list in Section [Ordering information, on page 8](#).

**Note:** Be aware of pressure limits.

The 10/300 column has a larger bed volume and can be used in systems like ÄKTAexplorer 10 and ÄKTA avant 25 in addition to the systems mentioned above. Consider actions to reduce system dead volumes if sufficient performance is not achieved

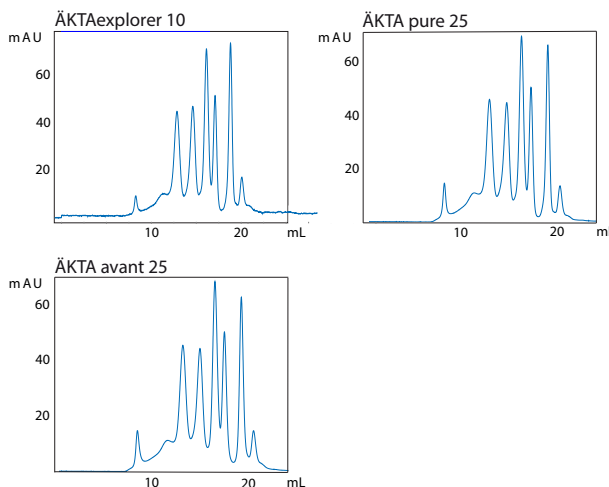
ÄKTA start is not compatible with Superose 6 Increase columns due to too low maximum operating pressure.

## Superose 6 Increase 5/150 GL column on different systems



**Fig 5.** Comparison of protein separation on Superose 6 Increase 5/150 GL on different systems. Due to different UV cells for the systems, mAU scales differ.

## Superose 6 Increase 10/300 GL column on different systems



**Fig 6.** Comparison of protein separation on Superose 6 Increase 10/300 GL on different systems. Due to different UV cells for the systems, mAU scales differ.

Delivery/storage

The column is delivered with a storage/shipping device that prevents it from drying out. The column is equilibrated with degassed 20% ethanol.

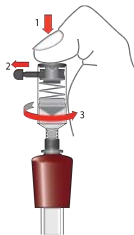
If the column is to be stored for more than 2 days after use, wash the column with 2 CV water and then equilibrate with at least 2 CV 20% ethanol.

**Note:** Use a lower flow rate for 20% ethanol. See Table 3, on page 2 and Table 4, on page 2.

We recommend that you connect the storage/shipping device according to section How to connect the storage/shipping device for long term storage.

How to remove the storage/shipping device

Step	Action
1	Push down the spring-loaded cap.
2	Remove the locking pin.
3	Release the cap and unscrew the device.



How to refill the storage/shipping device

Step	Action
1	Connect a syringe or pump to the storage/shipping device and fill with 20% ethanol over the mark on the tube. Remove the syringe or connection to the pump.
2	Tap out air bubbles and push the plunger to the mark on the device.



How to remove the storage/shipping device

Step	Action
1	Fill the column inlet and luer connector with 20% ethanol and connect the filled storage/shipping device drop-to-drop to the top of the column.

Step	Action
2	Mount the spring-loaded cap (2) and secure it with the locking pin (3).

The glass tube is coated with a protecting plastic film. Small quantities of air may occasionally be trapped between the glass and the film during manufacturing. The resulting uneven surface does not affect column performance or durability.

Choice of eluent

Select an eluent that ensures the sample is fully soluble. Also try to choose an eluent that will simplify downstream applications. For example, if the proteins/peptides are to be lyophilized, a volatile eluent is necessary. Since ionic interactions can occur with both acidic and basic proteins at very low salt concentrations, a recommended buffer is 0.01 to 0.05 M sodium phosphate with additional 0.15 to 0.3 M NaCl, pH 7.4. The Table below lists some useful eluent compositions.

Table 5. Useful eluent compositions

pH	Buffer/eluent	Properties/application examples
5.0	0.1 M ammonium acetate	Good solubility for some enzymes, e.g., cellulases. Volatile.
6.8	0.2 M sodium phosphate	Suitable for some antibody separations.
7.2	0.05 M phosphate + 0.15 M NaCl	Physiological conditions.
7.8	0.15 M ammonium hydrogen carbonate	Suitable for some DNA and protein separations. Volatile. Should be used fresh.
8.0	0.1 M Tris-HCl, 0.001 M EDTA	Very good solubility for DNA and RNA.
8.6	6 M guanidine hydrochloride in 0.05 M Tris-HCl	Good UV-transparency. Suitable if there is a need to purify proteins under denaturing conditions.
11.5	0.05 M NaOH	Good solubility for some compounds.

Buffer additives	Properties/application examples
Up to 8 M urea (pH<7)	Good solubility for many components. Biological activity can be maintained at lower urea contents. Certain risk for carbamylation of proteins.
6 M guanidine hydrochloride	Molecular weight determinations of subunits.
0.1% SDS, Tween™ or similar	Good solubility for some proteins, e.g., membrane proteins. Make sure you equilibrate completely with the detergent solution.



Buffer additives	Properties/application examples
10% acetonitrile	For separation of hydrophobic compounds. Volatile.
0.2 M arginine	Decreases tendency of aggregation.

## Buffers and solvent resistance

De-gas and filter all solutions through a 0.22 µm filter. Install an on-line filter before the injection valve.

**Note:** Buffers and solvents with increased viscosity will affect the back pressure. Reduce the flow rate if necessary. See [Table 3, on page 2](#) or [Table 4, on page 2](#).

## Long term use

Long term use refers to use where the resin is stable over a long period of time without adverse side effects on its chromatographic performance.

- All commonly used aqueous buffers, pH 3 to 12
- Urea, up to 8 M
- Ionic and non-ionic detergents, e.g., 1% SDS
- Guanidine hydrochloride, up to 6 M
- Isopropanol, up to 5%
- Methanol, up to 10%
- Sodium hydroxide, up to 0.5 M
- Dithiothreitol, up to 5 mM

## Short term use

Short term use refers to the use during regeneration, cleaning-in-place, and sanitization procedures.

- Acetonitrile, up to 30%
- Sodium hydroxide, up to 1 M
- Ethanol, up to 70%
- Methanol, up to 100%
- Acetic acid, up to 1 M
- Isopropanol, up to 30%
- Hydrochloric acid, up to 0.1 M
- Trifluoroacetic acid, up to 10%
- Formic acid, up to 70%

## Avoid:

- Oxidizing agents
- Unfiltered solutions

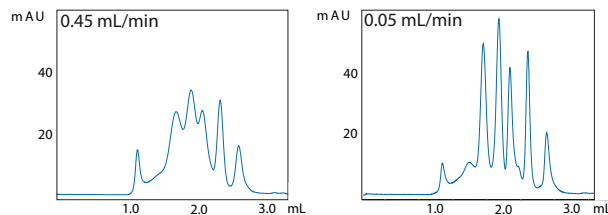
## Optimization

If your results are unsatisfactory, consider the following actions.

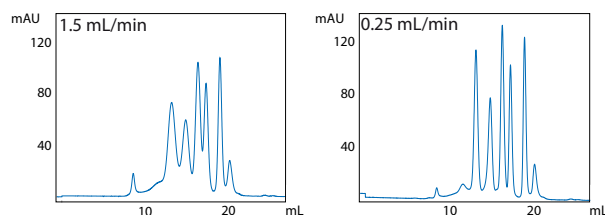
### Flow rate

**Action:** Decrease the flow rate.

**Effect:** Improves resolution for high molecular weight components. The resolution for small components may be decreased.



**Fig 7.** Comparison of protein separation on Superose 6 Increase 5/150 GL at different flow rates.

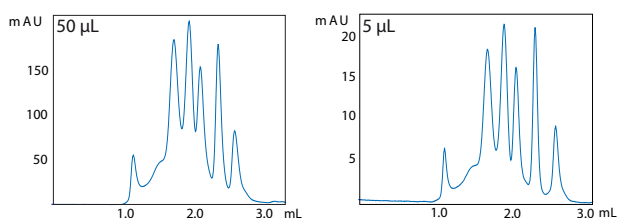


**Fig 8.** Comparison of protein separation on Superose 6 Increase 10/300 GL at different flow rates.

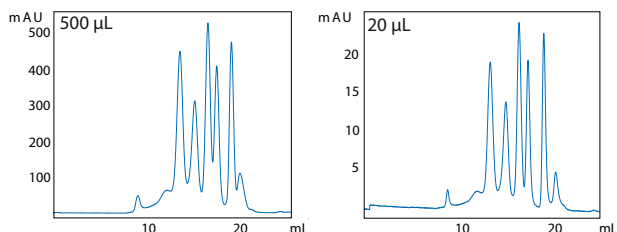
## Sample volume

**Action:** Decrease the sample volume.

**Effect:** Improves resolution.



**Fig 9.** Comparison of protein separation on Superose 6 Increase 5/150 GL using different sample volumes.

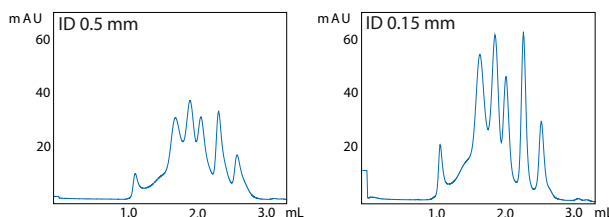


**Fig 10.** Comparison of protein separation on Superose 6 Increase 10/300 GL using different sample volumes.

## System dead volumes

**Action:** Decrease system dead volumes.

**Effect:** Improves resolution.



**Fig 11.** Comparison of protein separation on Superose 6 Increase 5/150 GL using different diameters of a 32 cm long capillary connected to the column.

For more information, see also the Literature list in Section [Ordering information, on page 8](#)

## Cleaning-in-place (CIP)

Perform the following regular cleaning cycle after 10 to 20 separation cycles. Increasing pressure drop over the packed bed indicate that the column needs to be cleaned.

**Note:** When performing CIP, reversed flow is recommended.

### Regular cleaning

Step	Action
1	Wash the column with 1 CV 0.5 M sodium hydroxide alternatively 0.5 M acetic acid at a flow rate of 0.1 mL/min (5/150) or 0.5 mL/min (10/300).
2	Immediately rinse the column with 1 CV water followed by at least 2 CV eluent at a flow rate of 0.1 mL/min (5/150) or 0.5 mL/min (10/300).

Before the next run, equilibrate the column until the UV baseline and pH are stable. Check that the column performance has been restored according to section [Column performance control, on page 4](#).

### More rigorous cleaning

- Depending on the nature of the contaminants, the cleaning solutions in section [Buffers and solvent resistance, on page 7](#) may be used. Always rinse with at least 2 CV water after any of the cleaning solutions have been used.
- If column performance is not restored, wash the column with 3 CV 0.5 M arginine. Rinse with at least 2 CV water.
- If column performance is still not restored, inject a solution of 1 mg/mL pepsin in 0.1 M acetic acid containing 0.5 M NaCl and leave overnight at room temperature or one hour at 37°C. After enzymatic treatment, clean the column according to the procedure described in the section [Regular cleaning, on page 8](#).
- Change the filter at the top of the column. (Since contaminants are introduced with the liquid flow, many of them are caught by the filter). Instructions for changing the filter are supplied with the Filter Kit. Perform a regular cleaning as described above.
- If necessary, suspend 2 to 3 mm of the top of the gel bed and remove it with a Pasteur pipette. Adjust the adaptor to eliminate the space above the gel.

## Troubleshooting

Symptom	Remedy
Increased back-pressure over the column and/or loss of resolution.	Confirm that the column is the cause (see below). If so, clean it according to the procedure described in section <a href="#">Cleaning-in-place (CIP), on page 8</a> (CIP).

Symptom	Remedy
	To confirm that the high back-pressure in the system is caused by the column, disconnect one piece of equipment at a time (starting at the fraction collector) with the pumps running.
	Check the pressure reading after each piece has been disconnected to determine the source of the back-pressure.
Air in the column	Note that small amounts of air will normally not affect the performance of the column. Run 3 to 4 CV well de-gassed eluent in an <u>upflow direction</u> at a flow rate of 0.2 mL/min (5/150) or 0.5 mL/min (10/300) at room temperature.
Space between gel bed and adaptor	Turn down the adaptor to the gel bed. Perform a column performance control.

## Ordering information

Product	Quantity	Product code
Superose 6 Increase 10/300 GL	1	29091597
Superdex 200 Increase 10/300 GL	1	29091596

### Related products

Product	Quantity	Product code
Superose 6 Increase 3.2/300	1	29091598
Superdex™ 30 Increase 10/300 GL	1	29219757
Superdex 30 Increase 3.2/300	1	29219758
Superdex 75 Increase 10/300 GL	1	29148721
Superdex 75 Increase 5/150 GL	1	29148722
Superdex 75 Increase 3.2/300	1	29148723
Superdex 200 Increase 3.2/300	1	28990946
Superdex 200 Increase 5/150 GL	1	28990945
Superdex 200 Increase 10/300 GL	1	28990944
Gel filtration LMW Calibration Kit	1	28403841
Gel filtration HMW Calibration Kit	1	28403842

### Accessories

Product	Quantity	Product code
Tricorn 10 Filter Kit <sup>1</sup>	1	29053612
Tricorn 5 Filter Kit <sup>1</sup>	1	29053586
Filter tool	1	18115320
Fingertight connector, 1/16" male	10	18111255
Tricorn storage/shipping device	1	18117643

<sup>1</sup> Do not store exposed to daylight.



## Literature

Document	Product code
Size Exclusion Chromatography, Principles & Methods	18102218
ÄKTA laboratory-scale Chromatography Systems Instrument Management Handbook	29010831
Procedure: Maintenance and cleaning of size exclusion chromatography columns	29140760
Cue Cards: Optimal configuration of ÄKTA pure 25 for small scale SEC	29181181

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