

Foresight™ Pro Column, Nuvia™ Media

Product Information Sheet

Prepacked Process Chromatography Columns

Foresight Pro Columns are prepacked, good manufacturing practice (GMP) ready columns specifically designed for production-scale manufacturing of biologics. This includes a broad range of purification and polishing applications for vaccines, monoclonal antibodies, and recombinant proteins. Available with five Nuvia Resin chemistries: Nuvia HR-S (high-resolution cation exchange), Nuvia Q (high-capacity anion exchange), Nuvia HP-Q (high-performance anion exchange for large biomolecules), Nuvia aPrime 4A (strong AEX-HIC mixed-mode), and Nuvia cPrime (CEX-HIC mixed-mode). These columns deliver exceptional purification productivity, high purity, and versatile method development across a wide range of process conditions. A variety of column diameters and bed heights are available. The columns have a sanitary design with minimal dead space and effective cleanability. Connections to pumping systems are made via standard 3/4" Tri-Clamp Connectors.

Foresight Pro Columns are available with inner diameters (ID) from 5 to 13 cm and column bed heights of 10 or 20 cm (Figure 1). The robust column hardware design maintains a stable, packed resin bed. Our expert packing methodology results in reproducibly packed columns. See Table 1 for available resin types, column dimensions, and column bed volumes.

- Prepacked columns available with 5–13 cm ID and 10 or 20 cm bed height
- GMP ready
- Single-source supplier: Nuvia Ion Exchange and Mixed-Mode Media, prepacked columns, and technical support
- Validated and ready to use
- Standard Tri-Clamp Connections: plug and play
- All wetted parts meet USP Class VI requirements of USP <88>
- Resin reference sample included with each column
- Regulatory support file available



Fig. 1. Foresight Pro Columns.

Table 1. Foresight Pro Column dimensions available with Nuvia Ion Exchange and Mixed-Mode Resins.

Column ID, cm	Column Bed Height, cm	Column Bed Volume, L
5	10	0.2
5	20	0.4
8	10	0.5
8	20	1.0
10	10	0.8
10	20	1.6
13	10	1.3
13	20	2.6

ID, inner diameter.



Column Construction Materials

Foresight Pro Columns are designed for a vast range of biopharmaceutical manufacturing applications and are made of materials that provide optimal biological and chemical compatibility (Figure 2, Table 2).

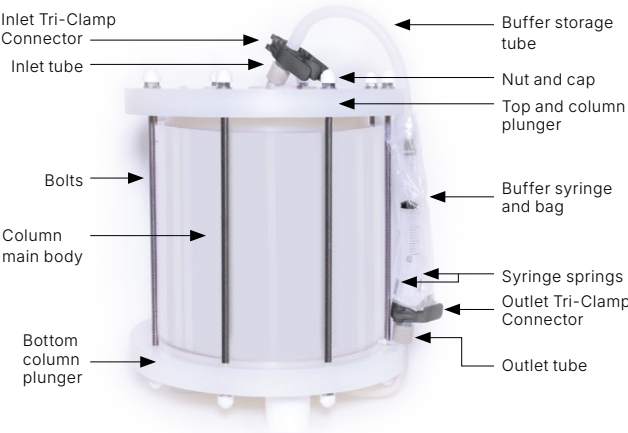


Fig. 2. 5–13 cm ID Columns.

Table 2. Contact material summaries.

Nonproduct Contact Material Summary

Element	Material
Top and bottom column plungers	Polypropylene
Holding bolt	Polyamide or 304 stainless steel

Product Contact Material Summary

Element	Material	USP <88> Biological Reactivity Test	U.S. FDA 21 CFR Part 177	Animal Origin
Column body (5 cm ID columns)	Glass	N/A	N/A	N/A
Column body (8, 10, 13 cm ID columns)	Acrylic	Class VI	177.1010	Animal-free
Flow distributors	Polypropylene	Class VI	177.1520	Animal-free
Inlet and outlet connectors	Polypropylene	Class VI	177.1520	Animal-free
Tubing connections	Reinforced elastomer tubing	Class VI	177.2600	Animal-free
O-rings and Tri-Clamp Gasket	Ethylene propylene diene monomer (EPDM)	Class VI	177.2600	Animal-free
Bed support screens	Polyamide*	Class VI	177.1500	Animal-free

* The polyamide bed support screen is welded to the polypropylene flow distributor without using any extra chemicals.

CFR, Code of Federal Regulations; FDA, U.S. Food and Drug Administration; ID, inner diameter; N/A, not applicable; USP, United States Pharmacopeia.

Column Performance Testing

Packing Quality

The performance of Foresight Pro Columns was evaluated before and after International Safe Transit Association (ISTA) 2A. The column efficiency test includes the determination of the number of theoretical plates (N) per meter (Figure 3A) and the asymmetry factor (A_s) (Figure 3B).

The Foresight Pro Columns were equilibrated in the appropriate equilibration buffer. N/m and A_s values were then determined. As shown in Figures 3A and B, the columns maintained performance criteria (Table 3B) with minimal changes in both N/m and A_s, indicating excellent stability during shipping.

Table 3A. CIP efficiency specifications.

Criterion	Value
Microbial bioburden, CFU/mL	<10
Endotoxin level, EU/mL	<0.25

Table 3B. Packed column specifications.

Criterion	Value
Nuvia HR-S Media: column efficiency, plates/meter	>4,200
Nuvia HR-S Media: column asymmetry	0.80 ≤ A _s ≤ 2.2
Nuvia HP-Q Media: column efficiency, plates/meter	>4,200
Nuvia HP-Q Media: column asymmetry	0.80 ≤ A _s ≤ 1.8
Nuvia Q Media: column efficiency, plates/meter	>2,500
Nuvia Q Media: column asymmetry	0.80 ≤ A _s ≤ 1.8
Nuvia cPrime Media: column efficiency, plates/meter	>3,000
Nuvia cPrime Media: column asymmetry	0.80 ≤ A _s ≤ 1.8
Nuvia aPrime 4A Media: column efficiency, plates/meter	>4,200
Nuvia aPrime 4A Media: column asymmetry	0.80 ≤ A _s ≤ 1.8

CFU, colony forming units; EU, endotoxin units.

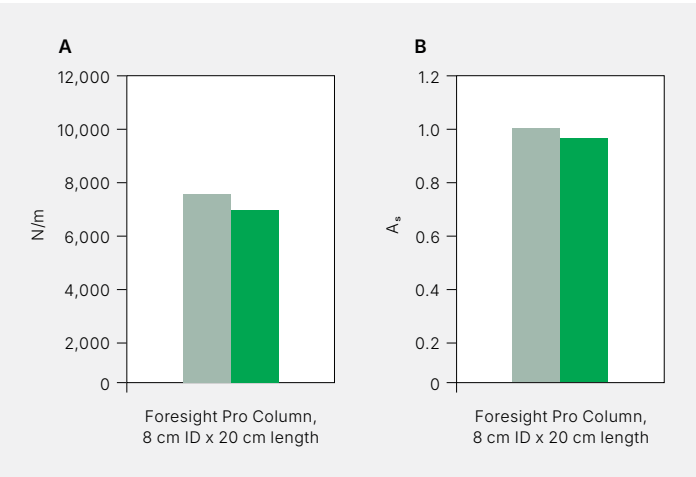


Fig. 3. Evaluation of N/m and A_s, comparing pre- and post-ISTA tests. A, evaluation of N/m; B, evaluation of A_s. Pre-ISTA test (■); post-ISTA test (■). A_s, asymmetry factor; ID, inner diameter; ISTA, International Safe Transit Association; N/m, number of theoretical plates per meter.

Cycling Data

Testing for flow stability is a further assurance that the column beds are stable. For this study, packed columns were put through ten cycles of increasing flow rates, in increments of 50 cm/hr up to a backpressure of 2 bar. Each flow rate was held for 5 minutes. This process was repeated ten times. Column efficiency was measured in terms of N/m and A_s prior to and at the end of the cycling study. All columns maintained performance criteria (Table 3B) after the tenth cycle. As Figures 4 and 5 show, changes in column efficiency were minimal, indicating a robust packed resin bed.

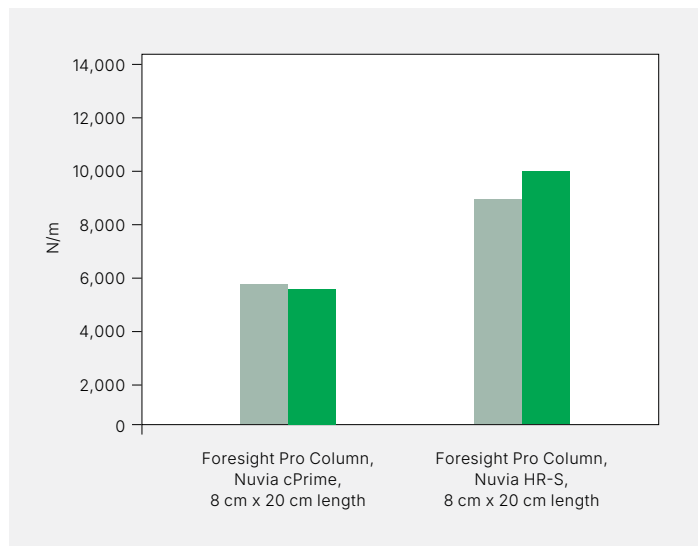


Fig. 4. Evaluation of N/m , comparing the first and tenth cycles of Foresight Pro Columns. First cycle (■); tenth cycle (■). ID, inner diameter; N/m , number of theoretical plates per meter.

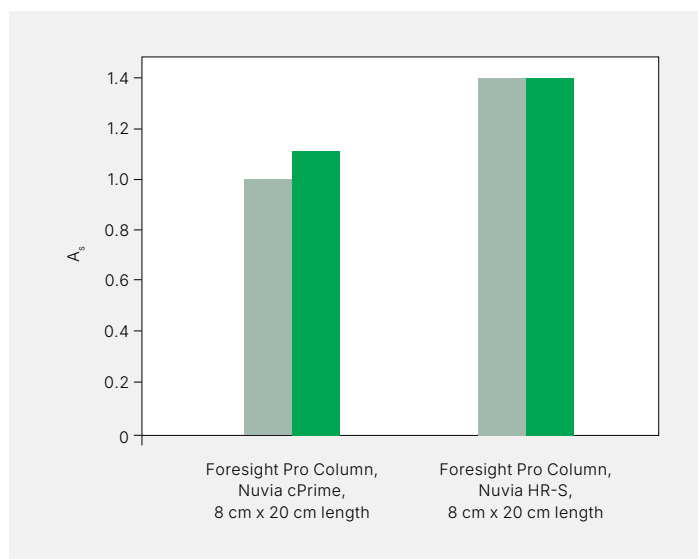


Fig. 5. Evaluation of A_s , comparing the first and tenth cycles of Foresight Pro Columns. First cycle (■); tenth cycle (■). A_s , asymmetry factor; ID, inner diameter.

Cleanability Testing

Endotoxin and bioburden tests are performed to ensure columns are in a sanitized state for shipment to customers. Each column must pass the acceptance criteria for endotoxin level (<0.25 EU/mL) and microbial bioburden (<10 CFU/mL) (see Table 3A). Shipping solutions for Foresight Pro Columns prepacked with Nuvia Resins are listed in Table 4.

Table 4. Shipping solutions for Foresight Pro Columns.

Foresight Pro Column Type	Shipping Solution
Nuvia HR-S Column shipping solution	20% ethanol + 0.1 M NaCl
Nuvia HP-Q Column	20% ethanol
Nuvia Q Column	20% ethanol + 1 M NaCl
Nuvia cPrime Column	20% ethanol + 30 mM sodium sulfite
Nuvia aPrime 4A Column	20% ethanol + 1 M NaCl

Pressure/Flow Performance

Figure 6 shows an example of the linear relationship between pressure and flow rate on Foresight Pro Columns packed with Nuvia Resins. The data indicate that the column pressure remains below 3 bar at the operating linear velocity of 250 cm/hr with the Nuvia cPrime Column (Figure 6A) and 150 cm/hr with the Nuvia HR-S Column (Figure 6B).

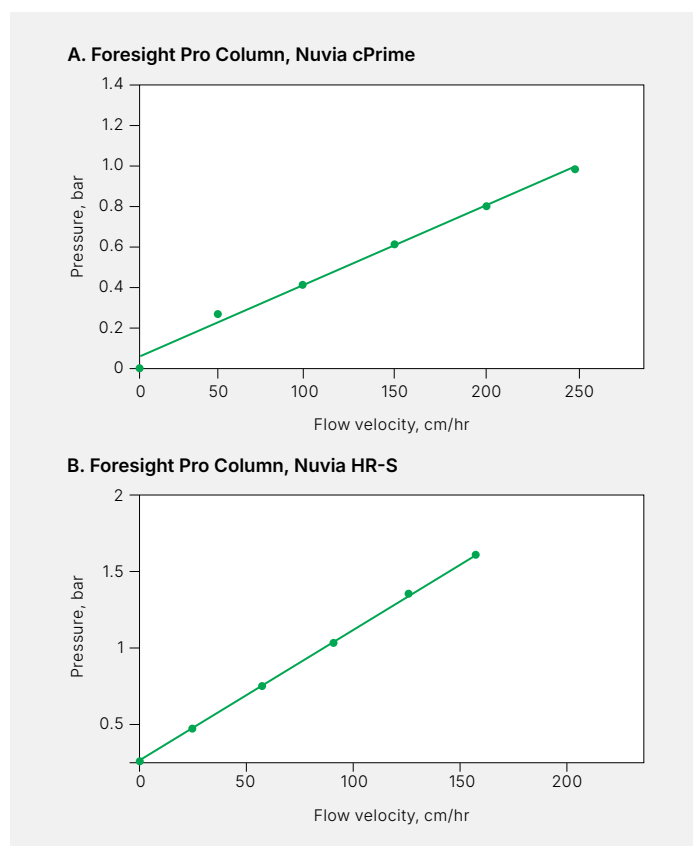


Fig. 6. Pressure/flow performance of Foresight Pro Column.

A, Foresight Pro Column, Nuvia cPrime Media (1.0 L, 8 cm ID x 20 cm length);
B, Foresight Pro Column, Nuvia HR-S Media (1.0 L, 8 cm ID x 20 cm length).

Ordering Information

Catalog # Description

Foresight Pro Column, Nuvia HR-S Media

12025762	Foresight Pro Column , Nuvia HR-S, 0.2 L, 5 cm ID x 10 cm length
12025763	Foresight Pro Column , Nuvia HR-S, 0.5 L, 8 cm ID x 10 cm length
12025764	Foresight Pro Column , Nuvia HR-S, 0.8 L, 10 cm ID x 10 cm length
12025765	Foresight Pro Column , Nuvia HR-S, 1.3 L, 13 cm ID x 10 cm length
12025770	Foresight Pro Column , Nuvia HR-S, 0.4 L, 5 cm ID x 20 cm length
12025811	Foresight Pro Column , Nuvia HR-S, 1.0 L, 8 cm ID x 20 cm length
12025812	Foresight Pro Column , Nuvia HR-S, 1.6 L, 10 cm ID x 20 cm length
12025813	Foresight Pro Column , Nuvia HR-S, 2.6 L, 13 cm ID x 20 cm length

Foresight Pro Column, Nuvia HP-Q Media

12025818	Foresight Pro Column , Nuvia HP-Q, 0.2 L, 5 cm ID x 10 cm length
12025819	Foresight Pro Column , Nuvia HP-Q, 0.5 L, 8 cm ID x 10 cm length
12025820	Foresight Pro Column , Nuvia HP-Q, 0.8 L, 10 cm ID x 10 cm length
12025821	Foresight Pro Column , Nuvia HP-Q, 1.3 L, 13 cm ID x 10 cm length
12025826	Foresight Pro Column , Nuvia HP-Q, 0.4 L, 5 cm ID x 20 cm length
12025827	Foresight Pro Column , Nuvia HP-Q, 1.0 L, 8 cm ID x 20 cm length
12025828	Foresight Pro Column , Nuvia HP-Q, 1.6 L, 10 cm ID x 20 cm length
12025829	Foresight Pro Column , Nuvia HP-Q, 2.6 L, 13 cm ID x 20 cm length

Foresight Pro Column, Nuvia aPrime 4A Media

12025834	Foresight Pro Column , Nuvia aPrime 4A, 0.2 L, 5 cm ID x 10 cm length
12025835	Foresight Pro Column , Nuvia aPrime 4A, 0.5 L, 8 cm ID x 10 cm length
12025836	Foresight Pro Column , Nuvia aPrime 4A, 0.8 L, 10 cm ID x 10 cm length
12025837	Foresight Pro Column , Nuvia aPrime 4A, 1.3 L, 13 cm ID x 10 cm length
12025842	Foresight Pro Column , Nuvia aPrime 4A, 0.4 L, 5 cm ID x 20 cm length
12025843	Foresight Pro Column , Nuvia aPrime 4A, 1.0 L, 8 cm ID x 20 cm length
12025844	Foresight Pro Column , Nuvia aPrime 4A, 1.6 L, 10 cm ID x 20 cm length
12025845	Foresight Pro Column , Nuvia aPrime 4A, 2.6 L, 13 cm ID x 20 cm length

Catalog # Description

Foresight Pro Column, Nuvia cPrime Media

12025850	Foresight Pro Column , Nuvia cPrime, 0.2 L, 5 cm ID x 10 cm length
12025851	Foresight Pro Column , Nuvia cPrime, 0.5 L, 8 cm ID x 10 cm length
12025852	Foresight Pro Column , Nuvia cPrime, 0.8 L, 10 cm ID x 10 cm length
12025853	Foresight Pro Column , Nuvia cPrime, 1.3 L, 13 cm ID x 10 cm length
12025858	Foresight Pro Column , Nuvia cPrime, 0.4 L, 5 cm ID x 20 cm length
12025859	Foresight Pro Column , Nuvia cPrime, 1.0 L, 8 cm ID x 20 cm length
12025860	Foresight Pro Column , Nuvia cPrime, 1.6 L, 10 cm ID x 20 cm length
12025861	Foresight Pro Column , Nuvia cPrime, 2.6 L, 13 cm ID x 20 cm length

Foresight Pro Column, Nuvia Q Media

12025866	Foresight Pro Column , Nuvia Q, 0.2 L, 5 cm ID x 10 cm length
12025867	Foresight Pro Column , Nuvia Q, 0.5 L, 8 cm ID x 10 cm length
12025868	Foresight Pro Column , Nuvia Q, 0.8 L, 10 cm ID x 10 cm length
12025869	Foresight Pro Column , Nuvia Q, 1.3 L, 13 cm ID x 10 cm length
12025874	Foresight Pro Column , Nuvia Q, 0.4 L, 5 cm ID x 20 cm length
12025875	Foresight Pro Column , Nuvia Q, 1.0 L, 8 cm ID x 20 cm length
12025876	Foresight Pro Column , Nuvia Q, 1.6 L, 10 cm ID x 20 cm length
12025877	Foresight Pro Column , Nuvia Q, 2.6 L, 13 cm ID x 20 cm length

Visit bio-rad.com/ForesightProColumn for more information on Foresight Pro Columns.

Visit bio-rad.com/ForesightProGuide for the user guide.

Visit bio-rad.com/ScreeningTools for more information on Foresight screening tools.

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The Foresight Pro Column hardware design is covered by U.S. Patent Number 11,841,350 and foreign counterparts.

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