

Thermo Scientific
Chromatography Columns
and Consumables 2016-2017

Connected chromatography solutions

Thermo
SCIENTIFIC

BioLC Columns and Accessories

The analysis of proteins, peptides, oligonucleotides and other biomolecules demands a range of sample separation modes, column chemistries, column configurations and detection techniques. The range of Thermo Scientific™ polymeric and silica columns in analytical and nano-scale formats are designed to handle these challenging separations.

Featured Products



MAbPac SEC-1

A size exclusion chromatography (SEC) column specifically designed for the high-resolution separation and characterization of monoclonal antibodies (mAbs) and their aggregates.

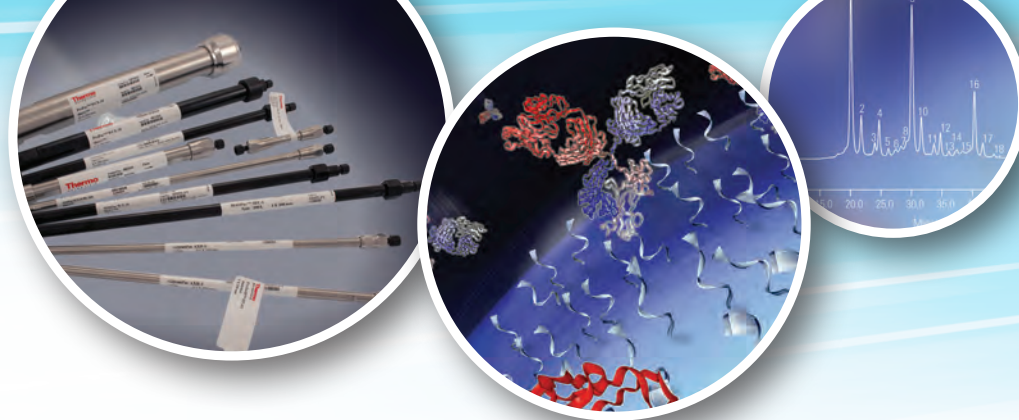
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MAbPac SCX

Strong cation exchange columns designed specifically for the high-resolution, high efficiency charged variant analysis of monoclonal antibodies and associated variants.

PAGE 3-008



Section Contents

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pH Gradient Buffers	3-010	Nano, Capillary and Micro LC Columns	3-038
GlycanPac HPLC and UHPLC Columns	3-016		



MAbPac RP

Columns designed for high-resolution accurate mass analysis of monoclonal antibodies (mAbs), antibody drug conjugates (ADCs) and other proteins using reversed-phase HPLC and LC-MS for high-resolution separations.

PAGE 3-014



EASY-Spray

EASY-Spray columns offer outstanding peak capacity for comprehensive proteome characterization and temperature control for maximum reliability and performance.

PAGE 3-040

BioLC Columns

Technical Resources



visit www.thermoscientific.com/chromexpert
to access the following information:

- BioLC Columns Selection Guide
- HPLC Phases for Biomolecules
- Columns for Protein Separations
- Columns for Monoclonal Antibody Separations
- Columns for Carbohydrate Separations
- Columns for Oligonucleotide Separations



Columns for Biomolecules

BioLC Column Lines



Monoclonal Antibodies

MABPac

MABPac Protein A

MABPac SEC-1

MABPac SCX-10

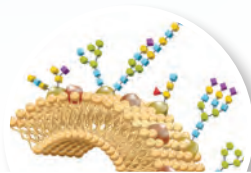
MABPac HIC

MABPac HIC-10

MABPac HIC-20

MABPac HIC-Butyl

MABPac RP



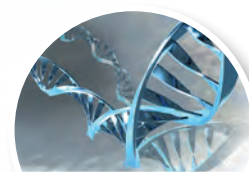
Glycans

GlycanPac

Accucore Amide-HILIC

GlycanPac AXH-1

GlycanPac AXR-1



Nucleic Acids

DNAPac

DNAPac PA100

DNAPac PA200

DNAPac RP

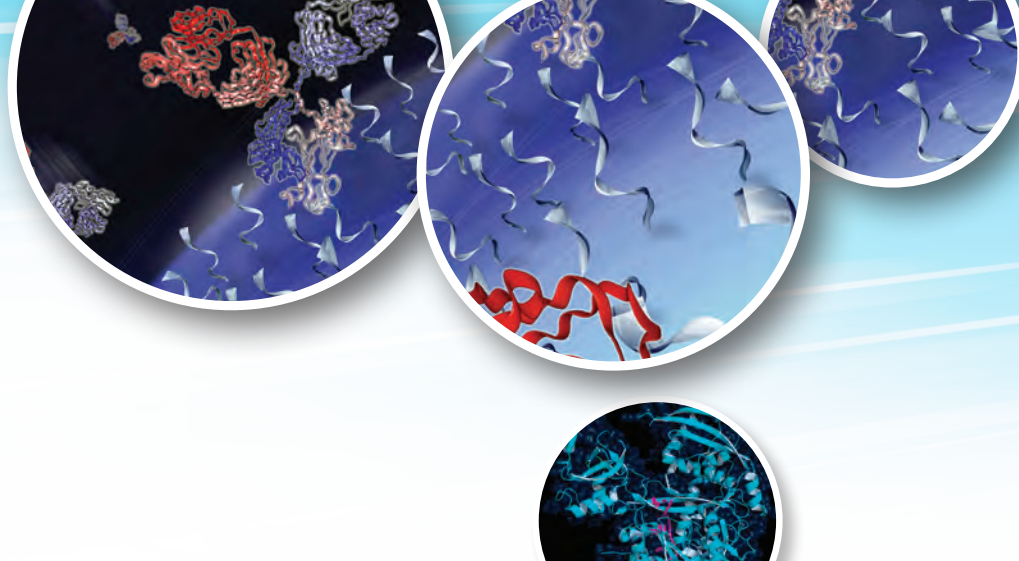
Associated products



pH Gradient Buffers



WebSeal Well Plates and Mats



Proteins / Peptides

ProPac

ProPac Ion Exchange

ProPac HIC
Hydrophobic Interaction

ProPac IMAC

ProSwift/ PepSwift

ProSwift Ion Exchange

ProSwift Rev Phase

PepSwift Rev Phase

ProSwift Con A

Others

Accucore 150

BioBasic

Acclaim 300

Associated products



SOLAμ SPE Plates



SMART Digest Kit



Viper Fingertight Fittings

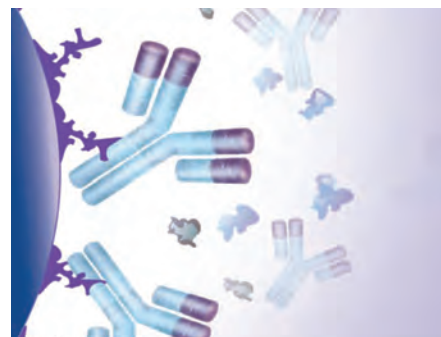
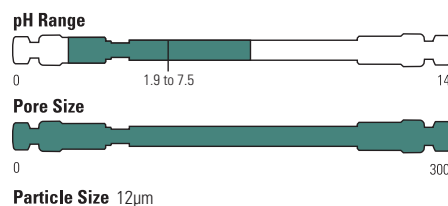
MABPac HPLC and UHPLC Columns

MABPac Protein A

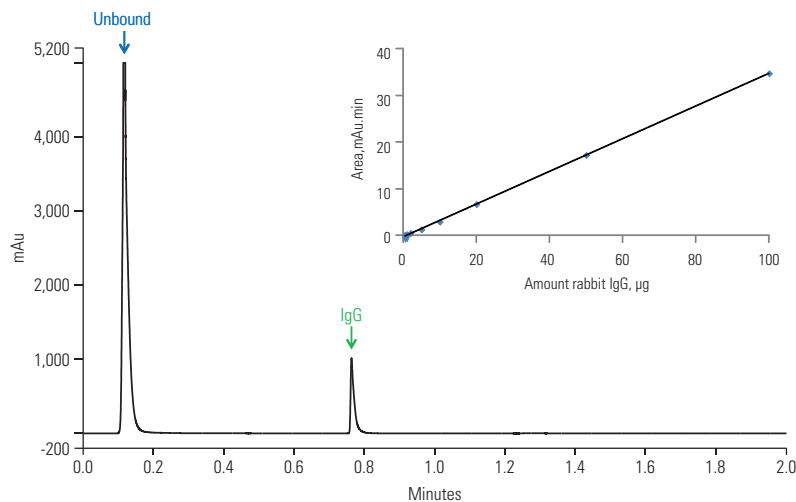
Fast mAb titer analysis

- High efficiency column
- Rugged, long column lifetime
- Excellent sample recovery
- Designed for ease of use and automation

Thermo Scientific™ MABPac™ Protein A is an affinity column designed to provide fast monoclonal antibody (mAb) titer analysis of samples such as harvest cell cultures (HCC). This HPLC column offers high throughput and accurate analysis through a combination of low back pressure and high efficiency. The MABPac Protein A column format allows rapid automation of loading, binding, elution and collection using Thermo Scientific biocompatible systems. The column is based on a novel non-porous polymeric resin consisting of a divinylbenzene core and a hydrophilic surface, optimized for affinity separation.



Harvest cell culture titer analysis



MABPac Protein A, 12µm, 35 x 4.0mm

Flow Rate:	2 mL/min
Mobile Phase A:	50mM Sodium Phosphate, 150mM NaCl, 5% acetonitrile, pH 7.5
Mobile Phase B:	50mM Sodium Phosphate, 150mM NaCl, 5% acetonitrile, pH 2.5
Gradient:	0% B for 0.2 mins, 100% B for 0.60 mins, 0% B for 1.20 mins
Temperature:	30°C
Injection Volume:	10µL
Detection:	280nm
Sample:	MAB B, 5mg/mL Harvest Cell Culture

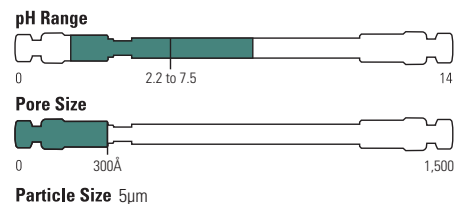
MABPac Protein A

Particle Size (µm)	Format	Length (mm)	4.0mm ID
12	HPLC Column	35	082539



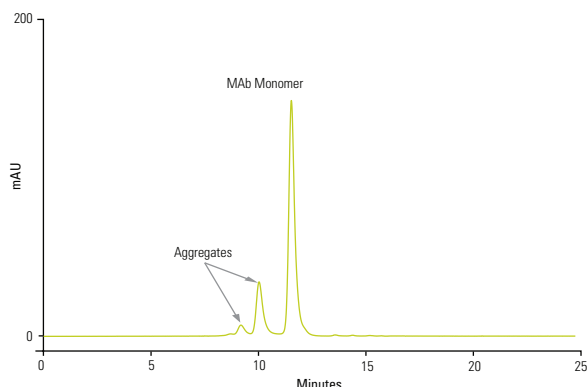
MAbPac SEC-1

A size exclusion chromatography (SEC) column specifically designed for the high-resolution separation and characterization of monoclonal antibodies (mAbs) and their aggregates



- Analysis of monoclonal antibodies (mAbs) and their aggregates
- Analysis of mAb Fab and Fc fragments, even using high and low salt concentrations
- Hydrophilic bonded layer for minimal undesired interactions between the biomolecules and the stationary phase
- Stable surface bonding leads to low column bleed and compatibility with MS, ELSD and Corona Charged Aerosol Detection (CAD)
- Separation range for globular proteins 10,000–1,000,000; exclusion limit for globular proteins >1,000,000

Monoclonal antibody aggregate separation



MAbPac SEC-1, 5 µm, 300 x 4.0mm (PEEK)

Mobile Phase: 0.3 M NaCl in 50mM phosphate buffer pH 6.8

Temperature: 30°C

Flow Rate: 0.20mL/min

Injection Volume: 2 µL

Detection: UV, 280nm

Sample: MAb (10mg/mL)

MAbPac SEC-1

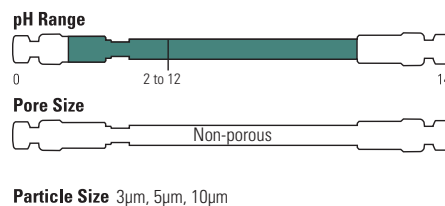
Particle Size (µm)	Format	Length (mm)	2.1mm ID	4.0mm ID	7.8mm ID
5	Guard Column	50	—	074697	—
	HPLC Column	150	088790	075592	—
		300	088789	074696	088460



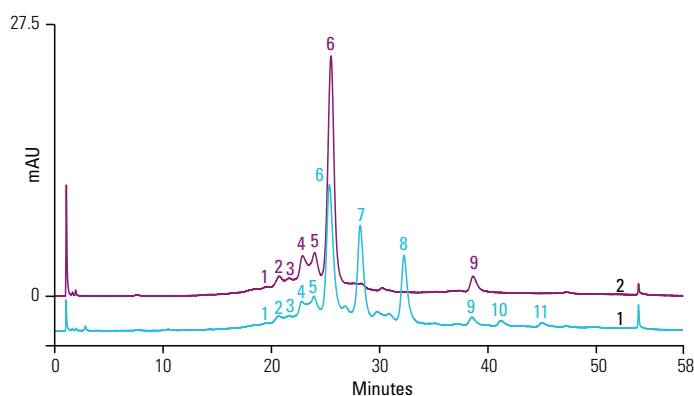
MABPac SCX-10

Strong cation exchange column designed specifically for the high-resolution, high efficiency charged variant analysis of monoclonal antibodies and associated variants

- Exceptionally high-resolution for monoclonal antibody charged variants separation
- Ideal for characterization and quality control assessment of monoclonal antibodies
- Unmatched column-to-column and lot-to-lot reproducibility
- Hydrophobic interactions greatly minimized
- Ideal for stability studies
- Meets the regulatory requirements for biopharmaceutical characterization



Baseline resolution of C-terminal lysine variants of a monoclonal antibody



MABPac SCX-10, 5µm, 250 x 4.0mm

Mobile Phase A:	20mM MES (pH 5.6) + 60mM NaCl
Mobile Phase B:	20mM MES (pH 5.6) + 300mM NaCl
Gradient:	15–36% B in 50 min
Temperature:	30°C
Flow Rate:	1mL/min
Injection Volume:	5µL
Detection:	UV at 280nm
Samples:	1. MAb B, 900µg in 100µL (no carboxypeptidase) 2. MAb B, 900µg in 100µL + carboxypeptidase, 50µg, incubation at 37°C for 3 h
Both Chromatograms:	Peaks 1–5: Acidic variants
Sample 1:	Peaks 6–8: C-Terminal lysine truncation variants of main peak Peaks 9–11: C-Terminal lysine truncation variants of minor variant peak
Sample 2:	Peak 6 results from peaks 6, 7, and 8 after CBP treatment. Peak 9 results from peaks 9, 10, and 11 after CBP treatment

MABPac SCX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID
3	HPLC Column	50	—	077907	—
5	HPLC Column	50	—	078656	—
		150	—	085198	—
		250	—	078655	—
10	Guard Column	50	075749	074631	—
	HPLC Column	50	—	075603	—
		150	—	075602	—
		250	075604	074625	088784

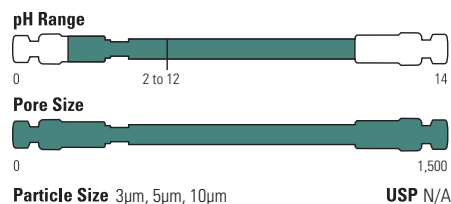


MAbPac SCX-10 RS

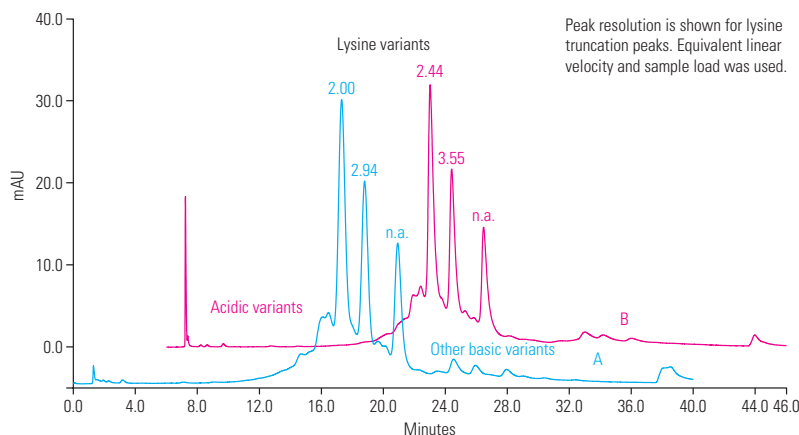
BioRS (Rapid Separation), strong cation exchange column designed for monoclonal antibodies and associated charged variants

- UHPLC, high throughput analysis
- Specially developed bio-inert PEEK lined stainless steel column hardware
- High pressure compatibility
- Suitable for operation up to 7,000 psi

Higher resolution and throughput of mAb charge variant UHPLC separations can be achieved using the MAbPac SCX-10 RS strong cation-exchange phase with specially developed bio-inert PEEK lined stainless steel column hardware. These columns are designed to be used at higher UHPLC conditions to maximize the resolution of mAb variant separation. Higher pressure compatibility of the column hardware allows use of high flow rates for faster separation.



Improved mAb resolution



MAbPac SCX, 5µm, 250 x 4.6mm

Mobile Phase A:	20 mM MES pH 5.6 + 60 mM
Mobile Phase B:	20 mM MES pH 5.6 + 300 mM NaCl
Flow Rate:	1.5 mL/min
Injection Volume:	15µL
Sample:	MAB 5mg/mL
Chromatogram A:	Gradient: 33-53% B in 30 min
Chromatogram B:	Gradient: 33-53% in 20 min

MAbPac SCX-10 RS

Particle Size (µm)	Format	Length (mm)	2.1mm ID	4.6mm ID
5	UHPLC Column	50	082675	082674
		150	088242	085209
		250	082515	082673



pH Gradient Buffers

Ready-to-use buffers for simple method development during charge variant characterization

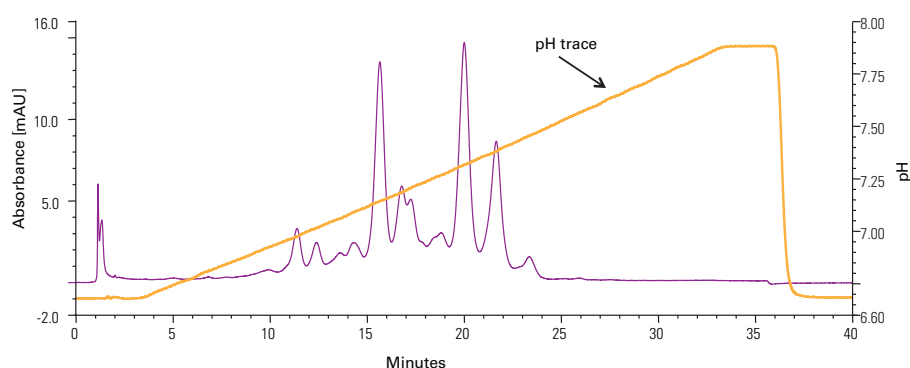
The Thermo Scientific pH gradient platform accelerates method development and facilitates method transfer to QA/QC for a wide range of protein and mAb charge variants through a generic LC-based approach to charge variant characterization.

- Patented buffer formulations enable fast, robust and reproducible pH gradients that are simple to optimize and easily automated
- Ready to use with existing LC columns and systems, without the need for time consuming mobile phase adjustments
- Applicable to the majority of mAbs

Thermo Scientific pH buffer concentrates can be purchased individually or as a pair, in quantities of 125mL or 250mL. For added convenience, the 125mL buffers can also be bundled with columns in a number of specifically preconfigured kits.



Optimization of mAb charge variant separation using a linear pH gradient: 25% B (pH 6.75) to 50% B (pH 7.9)



pH Gradient Buffers

Description		Buffer Bottle size	
Buffer		125mL	250mL
CX-1 pH Gradient Buffer A (pH 5.6)		083273	085346
CX-1 pH Gradient Buffer B (pH 10.2)		083275	085348

Kits		Buffer Bottle size	
Buffer		125mL	250mL
MABPac SCX-10 Column format			
Gradient Buffer Kit: Includes both Buffer A & Buffer B (available in either 125mL or 250mL size – one bottle each/ kit)	–	083274	085349
Gradient Starter Kit: Includes both Buffer A & Buffer B + MABPac SCX-10	10µm, 4 × 250mm column	083381	–
Gradient High Throughput Kit: Includes both Buffer A & Buffer B + MABPac SCX-10	5µm, 4 × 50mm column	083378	–
Gradient High Resolution Kit: Includes both Buffer A & Buffer B + MABPac SCX-10	5µm, 4 × 250mm column	083272	–

Monoclonal Antibody Characterization and Analysis Kits

MAb Charge Variant Analysis IEX Column Kit

MAb Charge Variant Analysis IEX Column Kit includes two ion-exchange (IEX) specialty columns for mAb charge variants analysis. This kit is a convenient starter kit for researchers at the beginning of a mAb analysis projects, and facilitates the screening of two columns for determination of the best column for their specific monoclonal antibody sample.

Included in the Kit:

- ProPac WCX-10 Analytical column, 4 × 250mm (P/N 054993)
- MAbPac SCX-10 Analytical column, 4 × 250mm (P/N 074625)

MAb Charge Variants Kit

Description	Cat. No.
MAb Charge Variant Analysis IEX Column Kit	076196

MAb Analysis IEX and SEC Column Kit

The MAb Analysis IEX and SEC Column Kit includes two columns: an ion-exchange (IEX) column and a size-exclusion (SEC) column. This kit is a convenient starter and column replacement kit for mAb analysis projects. It is useful for researchers at the beginning of mAb analysis projects, and facilitates the screening of aggregates and variants in two columns.

Included in the kit:

- MAbPac SCX-10 Analytical column, 4 × 250mm (P/N 074625)
- MAbPac SEC-1 Analytical column, 4 × 300mm (P/N 074696)

MAb Analysis Kit

Description	Cat. No.
MAb Analysis IEX and SEC Column Kit	076197



MABPac HIC Family

The MABPac HIC column family is designed for separations of monoclonal antibodies (mAbs) and related biologics by hydrophobic interaction chromatography (HIC). These columns are designed to address the separation challenges as the result of heterogeneity, complexity and diversity of mAbs and related biologics.

- Advanced column chemistry designed for separating mAbs and related biologics
- Broad selectivity coverage for most challenging separations of mAbs
- Excellent bio-compatibility
- High column efficiency
- Rugged column packing

Applications

The MABPac HIC-10 is the column of choice for intact mAbs/proteins and mAb aggregates while the MABPac HIC-20 is suited to resolve mAb fragments, oxidized mAbs and bispecific mAbs. When it comes to ADCs, MABPac HIC-Butyl is ideal for cystein-conjugated ADC while MABPac HIC-10 and MABPac HIC-20 have proven useful for several cysteine proprietary ADC molecules, as shown below.

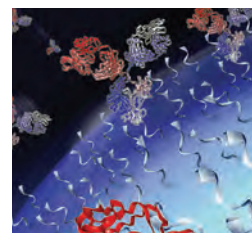
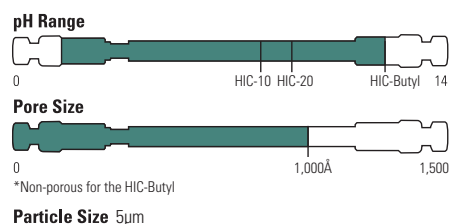
MABPac HIC Selection Guide

Column	MABPac HIC-10	MABPac HIC-20	MABPac HIC-Butyl
Intact mAbs/proteins	++++	+++	++
mAb aggregates	++++	+++	++
mAb fragments (F_{ab} and F_c)	+++	++++	+++
Oxidized mAbs	+++	++++	+++
Antibody Drug Conjugates (ADCs)	+++	+++	++++
Bispecific mAbs	+++	++++	++

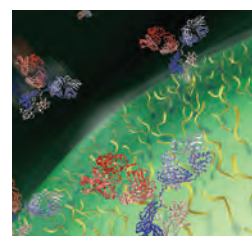
Greater number of ++++ denotes greater suitability

MABPac HIC Family

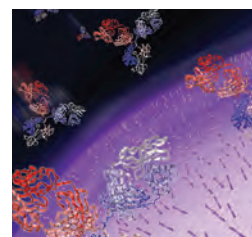
Description	Particle Size (μm)	Format	Length (mm)	4.6mm ID
MABPac HIC-10	5	Guard Cartridges (2/pk)	10	088482
		HPLC Column	100	088480
			250	088481
MABPac HIC-20	5	Guard Cartridges (2/pk)	10	088555
		HPLC Column	100	088553
			250	088554
MABPac HIC-Butyl	5	Guard Cartridges (2/pk)	10	088559
		HPLC Column	100	088558
Guard Cartridge Holder				069580



MABPac HIC-10

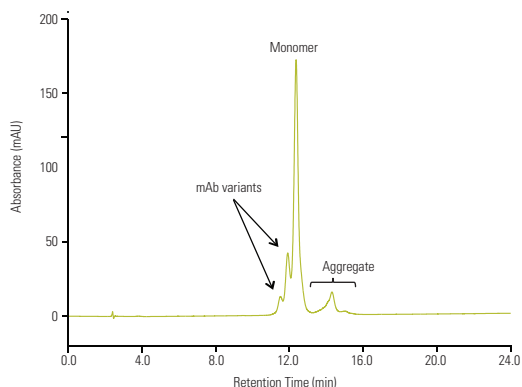


MABPac HIC-20



MABPac HIC-Butyl

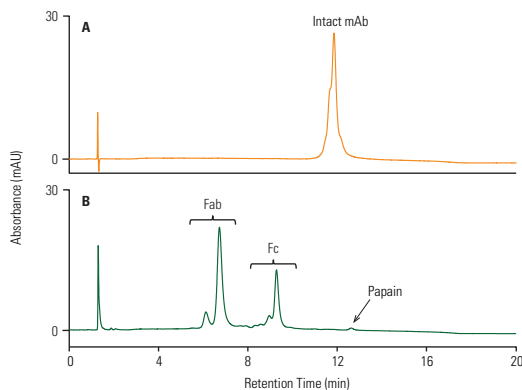
Separation of mAb Aggregates



MABPac HIC-10, 5µm, 100 x 4.6mm

Mobile Phase A:	2 M ammonium sulfate, 100mM sodium phosphate, pH 7.0		
Mobile Phase B:	100mM sodium phosphate, pH 7.0		
Gradient:	Time (min)	%A	%B
	-5.0	60	40
	0.0	60	40
	1.0	60	40
	29.0	0	100
	34.0	0	100
Temperature:	20°C		
Flow Rate:	0.5mL/min		
Injection Volume:	10µL		
Detection:	UV, 280nm		
Sample:	Monoclonal antibody (4mg/mL)		

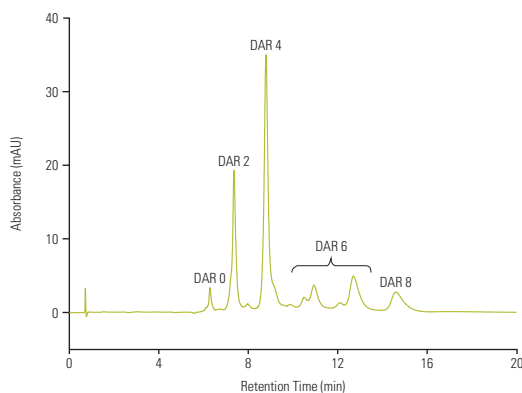
Separation of mAb Fragments



MABPac HIC-20, 5µm, 100 x 4.6mm

Mobile Phase A:	2 M ammonium sulfate, 100mM sodium phosphate, pH 7.0		
Mobile Phase B:	100mM sodium phosphate, pH 7.0		
Gradient:	Time (min)	%A	%B
	-5.0	60	40
	0.0	60	40
	1.0	60	40
	15.0	0	100
	20.0	0	100
Temperature:	30°C		
Flow Rate:	1.0mL/min		
Injection Volume:	Intact mAb: 5µL Papain digest: 12µL		
Detection:	UV, 280nm		
Sample:	a. Intact mAb (2.5mg/mL) b. Papain digest (1mg/mL)		

Separation of Antibody Drug Conjugates (ADCs)



MABPac HIC-Butyl, 5µm, 100 x 4.6mm

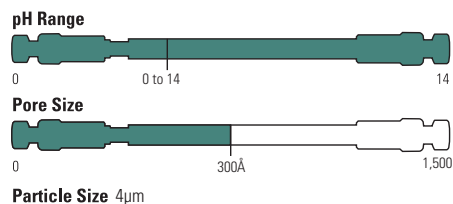
Mobile Phase A:	1.5 M ammonium sulfate, 50mM sodium phosphate, pH 7.0/ isopropanol (95:5 v/v)		
Mobile Phase B:	50mM sodium phosphate, pH 7.0/ isopropanol (80:20 v/v)		
Gradient:	Time (min)	%A	%B
	-5.0	100	0
	0.0	100	0
	1.0	100	0
	15.0	0	100
	20.0	0	100
Temperature:	25°C		
Flow Rate:	1.0mL/min		
Injection Volume:	5µL		
Detection:	UV, 280nm		
Sample:	Cys-conjugated ADC mimic (5mg/mL)		

MAbPac RP

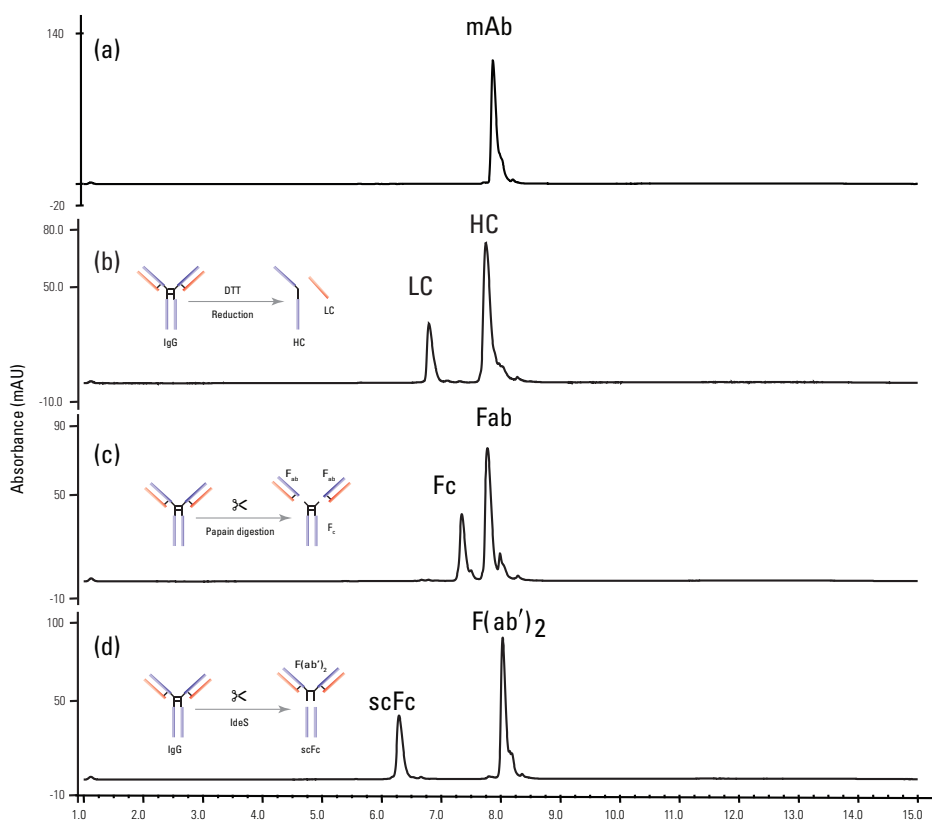
High resolution accurate mass determination of monoclonal antibody variants, antibody drug conjugates (ADC) and proteins

- Superior resolution power for monoclonal antibodies and related substances
- High efficiency with low carry-over
- Excellent MS compatibility
- Wide operating pH range: 0 – 14
- High temperature stability: up to 110°C
- High throughput

The Thermo Scientific™ MAbPac™ RP is a reverse phase (RP) liquid chromatography column designed for mAb characterization. Highly efficient separations can be achieved for mAbs and their variants, light chain (LC) and heavy chain (HC), Fc and Fab fragments, scFc and F(ab')₂ fragments. The unique column chemistry provides stability under wide pH range, high temperature, and organic mobile phases and is fully compatible with both UV and MS detection.



mAb and mAb Fragments Analysis



MAbPac RP, 4µm, 50 x 3.0mm

Mobile Phase A:	H ₂ O/FA/TFA (99.88 : 0.1:0.02 v/v/v)	
Mobile Phase B:	MeCN/ H ₂ O/FA/TFA (90: 9.88 :0.1:0.02 v/v/v/v)	
Gradient:	Time (min)	%A %B
	0.0	80 20
	1.0	80 20
	11.0	55 45
	12.0	55 45
	14.0	80 20
	12.0	80 20
Temperature:	80°C	
Flow Rate:	0.5mL/min	
Injection Volume:	5µL	
Detection:	UV, 280nm	
Sample:	(a) trastuzumab (5mg/mL)	
	(b) trastuzumab + DTT (4mg/mL)	
	(c) trastuzumab + Papain (2mg/mL)	
	(d) trastuzumab + IdeS (2mg/mL)	

MAbPac RP

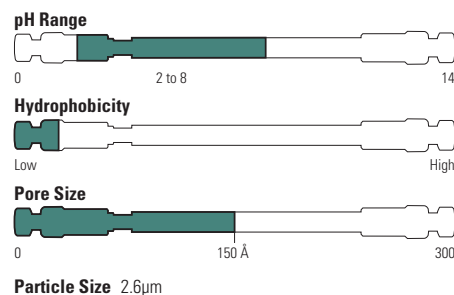
Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID
4	Guard Cartridges (2/pk)	10	088649	088646
	HPLC Column	50	088648	088645
		100	088647	088644
	Guard Cartridge Holder		069580	069580

Accucore 150-Amide-HILIC

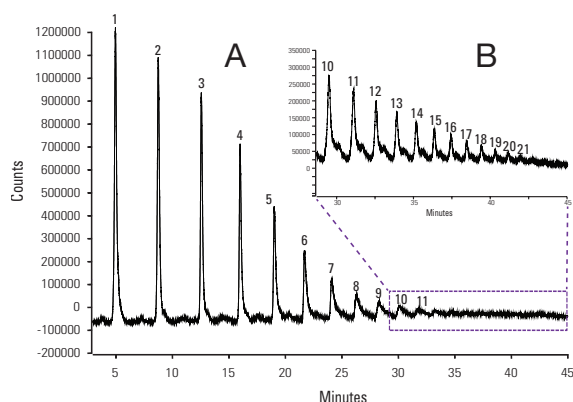
HPLC column for neutral glycan analysis

- Amide phase bonded onto 150 Å pore diameter solid core particles
- High retention of a broad range of hydrophilic analytes in HILIC mode
- Recommended for hydrophilic biomolecules such as glycans

The amide bonded phases provide strong hydrogen bonding interaction between the stationary phase and the analytes, resulting in unique selectivity compared to other HILIC phases. Combined with larger pore size of the solid core particles, Accucore 150-Amide-HILIC is well suited for separating a variety of hydrophilic molecules, including carbohydrates and peptides. As a result, the Accucore 150-Amide-HILIC is an excellent choice for glycan separations.



2-AB labeled dextran ladder



Accucore 150-Amide-HILIC, 2.6μm, 100 x 2.1mm

Mobile Phase A:	Acetonitrile
Mobile Phase B:	50mM Ammonium formate, pH 4.5
Gradient:	20–50 % B in 40.0 minutes 50 % B for 5.0 minutes 50–20 % B in 0.5 minutes 50 % B for 4.5 minutes
Temperature:	60°C
Flow Rate:	500μL/min
Backpressure at Starting Conditions:	110 bar
Injection Volume:	2μL to 5μL of sample.
Injection Wash Solvent:	80:20 (v/v) acetonitrile:water.
Detector:	Fluorescence, 330nm excitation wavelength; 420nm emission wavelength; acquisition start after 3 min from gradient start.
Run Time:	50 minutes

(A) 2μL injection of sample, where 11 glycans were separated.

(B) 5μL injection of sample, zoomed-in to the later part of the gradient rise. A further 10 glycans were detected.

Accucore 150 Amide-HILIC

Particle Size (μm)	Format	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	Defender Guard (4/pk)	10	16726-012105	16726-013005	16726-014005
	HPLC Column	50	16726-052130	16726-053030	16726-054630
		100	16726-102130	16726-103030	16726-104630
		150	16726-152130	16726-153030	16726-154630
		250	16726-252130	-	-
Guard Cartridge Holder		852-00	852-00	850-00	

For our range of nanoLC columns refer to page **3-043**

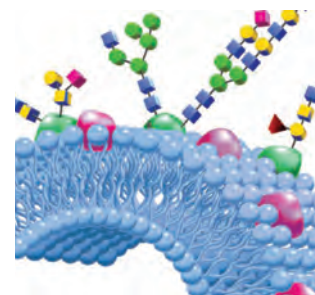
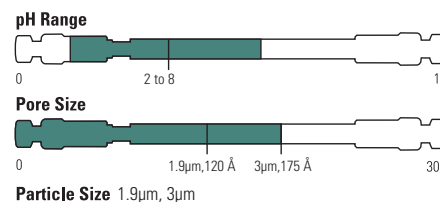
GlycanPac HPLC and UHPLC Columns

GlycanPac AXH-1

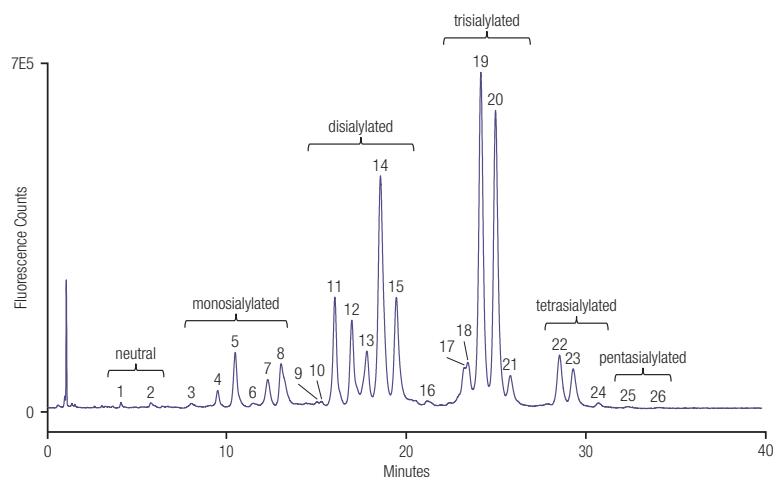
High-resolution columns for neutral and charged glycan analysis

- Unique glycan selectivity based on charge, size and polarity
- Excellent resolution for both native and labeled glycans
- Useful for both high-resolution glycan profile characterization and easy quantification of glycans based on charge, size and polarity
- Compatible with fluorescence and MS detection methods
- High chromatographic efficiency and excellent column stability

Thermo Scientific™ GlycanPac™ AXH-1 is a high-performance, silica-based HPLC column for simultaneous separation of glycans by charge, size and polarity. It is designed for high-resolution and high-throughput analysis of biologically important glycans, either labeled or native, by LC-fluorescence and LC-MS methods.



Separation of 2AB labeled N-glycans from bovine fetuin by charge, size and polarity



GlycanPac AXH-1, 1.9µm, 150 x 2.1mm

Mobile Phase A:	Acetonitrile (100%)
Mobile Phase B:	Water
Mobile Phase C:	Ammonium formate (100mM, pH = 4.4)
Temperature:	30°C
Flow Rate:	0.4mL/min
Injection Volume:	50pmoles
Detection:	Fluorescence, 320/420nm
Sample:	2AB labeled N-glycan from bovine fetuin

Time (min)	% A	% B	% C	Flow (mL/min)	Curve
-10	78	20	2	0.4	5
0	78	20	2	0.4	5
30	70	20	10	0.4	5
35	60	20	20	0.4	5
40	50	20	30	0.4	5

GlycanPac AXH-1

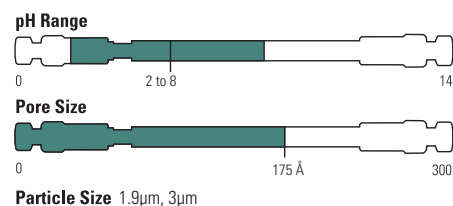
Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.9	UHPLC Column	100	082473	—	—
		150	082472	—	—
		250	082521	—	—
3	Guard Cartridges (2/pk)	10	082476	082475	082474
	HPLC Column	150	082470	082469	082468
	Guard Cartridge Holder		069580	069580	069580

GlycanPac AXR-1

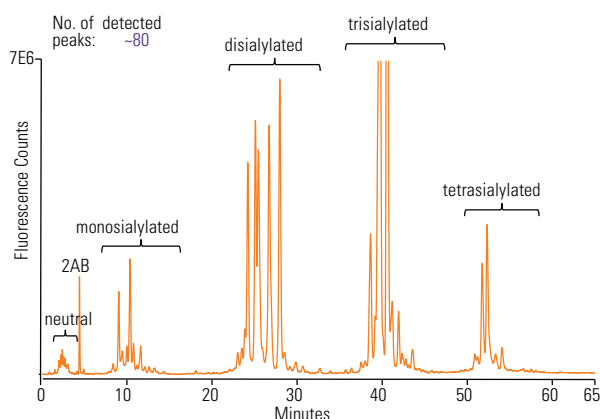
Ultra-high resolution columns for neutral, charged and glycan isomer analysis

- Excellent glycan selectivity based on hydrophobicity, charge, size and isomerization
- High resolution for isomeric glycans
- Compatibility with fluorescence and MS detection methods
- High column efficiency and stability
- Ideal tool for qualitative, quantitative and structural analysis of glycans

The GlycanPac AXR-1 column, based on high-purity and spherical silica substrates, combines both weak anion-exchange (WAX) and reversed-phase (RP) retention mechanisms for optimal selectivity and ultra-high resolution for glycan separation. The WAX functionality separates glycans based on charge, and RP property facilitates high resolution for glycans of the same charge according to their hydrophobicity, branching and isomerization. As the result, the GlycanPac AXR-1 column provides unparalleled resolutions for complex charged glycans.



Separation of 2AB labeled N-glycans from bovine fetuin



GlycanPac AXR-1, 1.9µm, 150 x 2.1mm

Mobile Phase A:	Acetonitrile
Mobile Phase B:	D.I. water
Mobile Phase C:	Ammonium formate (100mM, pH=4.4)
Flow Rate:	0.4mL/min
Temperature:	40°C
Injection Volume:	100pmoles
Detection:	Fluorescence, 320/420nm
Sample:	2AB labeled N-glycan from bovine fetuin

Time (min)	% A	% B	% C	Curve
-10	0	95	5	5
0	0	95	5	5
1	0	95	5	5
30	1	74	25	5
65	20	50	30	5

GlycanPac AXR-1

Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.9	UHPLC Column	150	088136	-	-
		250	088135	-	-
3	Guard Cartridges (2/pk)	10	088258	088259	088260
	HPLC Column	150	088251	088252	088255
	Guard Cartridge Holder		069580	069580	069580

ProPac HPLC Columns

ProPac WCX-10 and SCX-10

Weak and strong cation exchange columns with exceptionally high resolution and efficiency for separations of protein variants

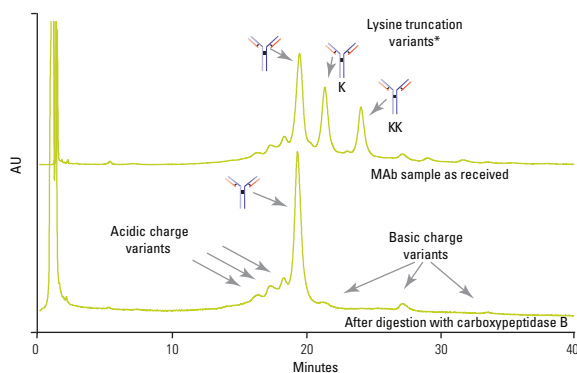
- Characterization and quality control assessment of monoclonal antibodies and other proteins
- Exceptionally high-resolution and high-efficiency separations
- Useful for characterization of related protein variants including deamidation and mAb lysine truncation variants
- ProPac WCX-10 contains carboxylate functional groups and ProPac SCX-10 contains sulfonate functional groups

ProPac WCX-10 and SCX-10 columns are non-porous particles that can resolve isoforms that differ by a single charged residue. A hydrophilic layer prevents unwanted secondary interactions, and a grafted cation exchange surface provides pH-based selectivity control and fast mass transfer for high-efficiency separation and moderate capacity.



Particle Size 10µm

MAB lysine truncation variants



ProPac WCX-10, 10µm, 250 x 4.0mm

Mobile Phase A: 20mM MES+ 115mM NaCl

+ 1mM EDTA, pH 5.5

Mobile Phase B: 20mM MES+ 145mM NaCl

+ 1mM EDTA, pH 5.5

Gradient:	t (min)	%E1	%E2
	0	100	0
	2	100	0
	40	0	100
	60	0	100

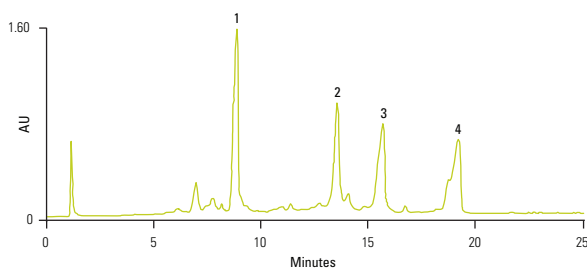
Flow Rate: 1.0mL/min

Detection: UV, 280nm

Sample: MAb

* Peak assignment supported by data from R. J. Harris, et.al, *J. Chromatogr., A* **1995**, 705, 129–134, and Carboxypeptidase B digest.

Hemoglobin variants



ProPac SCX-10, 10µm, 250 x 4.0mm

Mobile Phase A: 20mM Sodium phosphate,

4mM Potassium cyanide, pH 6

Mobile Phase B: 1 M Sodium chloride in water

Mobile Phase C: Water

Gradient:	Time	%A	%B	%C
	Init	50	0	50
	30 min	50	50	0

Flow Rate: 1mL/min

Injection Volume: 10µL

Detection: UV, 220nm

Sample: 1. Fetal hemoglobin
2. Hemoglobin
3. Sickle cell hemoglobin
4. Hemoglobin C

ProPac WCX-10 and SCX-10 *continued*

ProPac WCX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10	Guard Column	50	063480	054994	—	—
	HPLC Column	50	—	074600	—	—
		100	—	088778	—	—
		150	—	088778	—	—
		250	063472	054993	063474	088766

ProPac SCX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10	Guard Column	50	063462	079930	—	—
	HPLC Column	250	063456	054995	063700	088769

ProPac Kits

Part Number	Phase Description	Set Contents	Column Dimensions
088776	ProPac WAX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
088777	ProPac WAX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm
088774	ProPac SAX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
088775	ProPac SAX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm
088767	ProPac WCX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
088768	ProPac WCX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm
088772	ProPac SCX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
088773	ProPac SCX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm

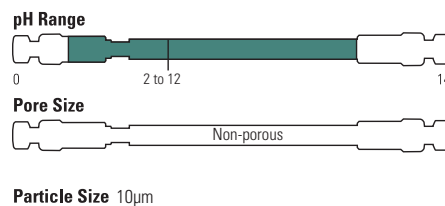


ProPac SCX-20

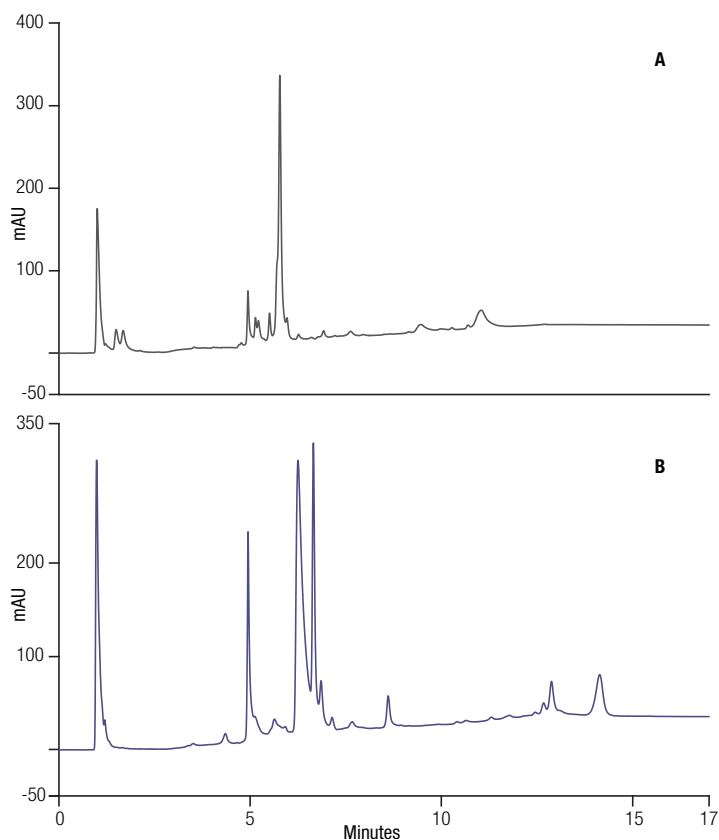
Strong cation-exchange column for high-resolution protein separations

- Grafted cation-exchange surface provides pH-based selectivity control
- Fast mass transfer for high-efficiency separation

The ProPac SCX-20 column is designed specifically to provide high-resolution UHPLC separations of proteins. The stationary phase is composed of 10µm, non-porous, solvent compatible resin beads that are uniformly coated with a highly hydrophilic layer to reduce non-specific interactions between the bead surface and the biopolymer.



Snake venoms from *Naja naja* and Russell's viper



ProPac SCX-20, 5µm, 250 x 4.0mm

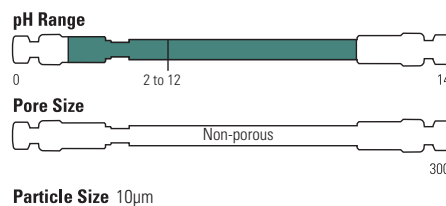
Mobile Phase A:	20mM Tris pH 7.3
Mobile Phase B:	0.5M NaCl in Eluent A
Gradient:	1–100% B in 10 min
Temperature:	30°C
Injection Volume:	10µL
Detection:	UV, 214nm
Samples:	A. Snake Venom (<i>Naja naja</i>) 1mg/mL
	B. Snake Venom (Russell's viper) 1mg/mL

ProPac SCX-20

Particle Size (µm)	Description	Length (mm)	4.0mm ID
10	Guard Column	50	074643
	HPLC Column	250	074628

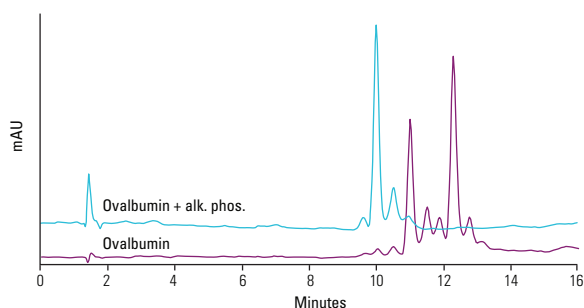
ProPac WAX-10 and SAX-10

Weak and strong anion anion-exchange providing unequalled high resolution and efficiency in the separations of protein variants



- High-efficiency, high-resolution separations
- Useful for characterization and quality control assessment of closely-related protein variants
- Supports separation of proteins that differ by as little as one amino acid residue
- Neutral hydrophilic coat that eliminates protein-resin hydrophobic interactions
- Superior lot-to-lot and column-to-column reproducibility
- ProPac WAX-10 column contains a tertiary amine functional group and ProPac SAX-10 contains a quaternary amine functional group

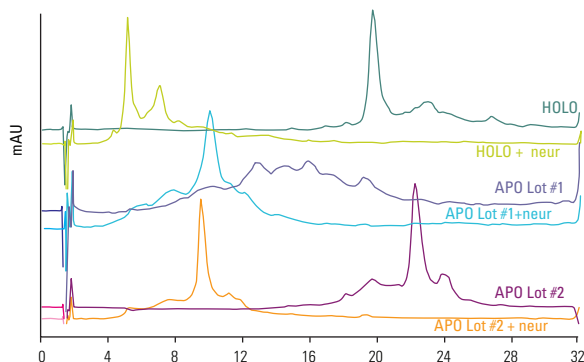
Resolution of phosphorylation variants of ovalbumin



ProPac SAX-10, 10µm, 250 x 4.0mm

Mobile Phase A:	Water
Mobile Phase B:	2.0 M NaCl
Mobile Phase C:	0.1 M Tris/HCl (pH 8.5)
Gradient:	Time %A %B %C
	0 min 80 0 20
	15 min 67.5 12.5 20
Flow Rate:	1.0mL/min
Injection Volume:	30µL
Detection:	UV, 214nm
Sample:	Ovalbumin before and after alkaline phosphatase treatment

Effect of sialylation on transferrin chromatography



ProPac SAX-10, 10µm, 250 x 4.0mm

Mobile Phase A:	Water
Mobile Phase B:	2.0 M NaCl
Mobile Phase C:	0.2 M Tris/HCl (pH 9)
Gradient:	Time %A %B %C
	0 min 87 3 10
	30 min 83 7 10
Flow Rate:	1.0mL/min
Injection Volume:	50µL
Detection:	UV, 214nm
Samples:	HOLO (iron rich) and APO (iron poor) human transferrin samples before and after neuraminidase treatment. Digestions were carried out overnight at 37°C in sodium acetate buffer at pH 5.

ProPac WAX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10	Guard Column	50	063470	055150	—	—
	HPLC Column	250	063464	054999	063707	088771

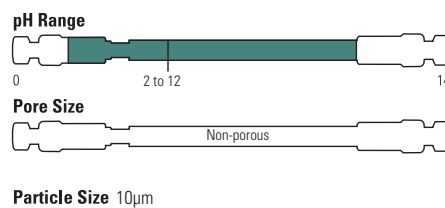
ProPac SAX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID	4 x 50mm
10	Guard Column	50	063454	054998	—	—	—
	HPLC Column	250	063448	054997	063703	088770	078990

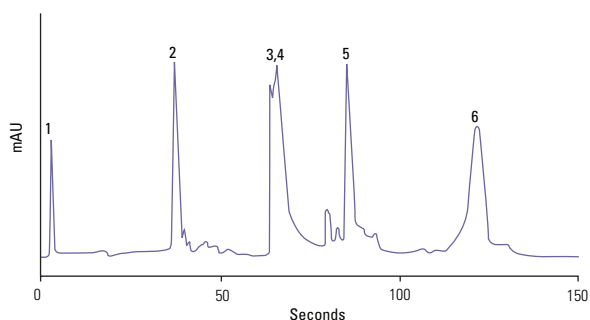
ProPac PA1

For hydrophilic anionic protein separations

- Good for hydrophilic proteins and peptides
- Ideal for high-resolution separations of proteins with pI values from 3 to 11
- Available in semipreparative format
- Pellicular packing ensures high-efficiency and fast mass transport



Gradient separation of protein standards



Column: ProPac PA1, 10µm, 50 x 4.0mm

Mobile Phase:	10 to 350mM NaCl in 1.0mM Tris, pH 8.2
Flow Rate:	5mL/min
Detection:	UV, 280nm
Analytes:	1. Horseheart Myoglobin 33µg 2. Contaminant – 3,4. Conalbumin 66 5. Ovalbumin 66 6. Soybean Trysin Inhibitor 66



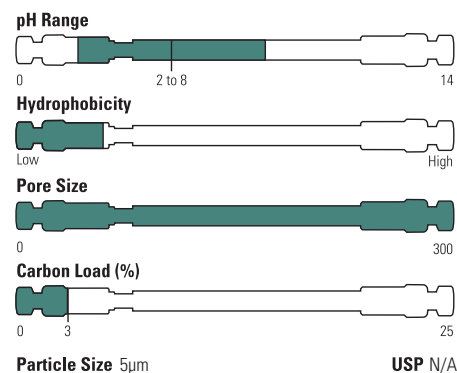
ProPac PA1

Particle Size (µm)	Format	Length (mm)	4.0mm ID	9.0mm ID
10	Guard Column	50	039657	—
	HPLC Column	250	039658	040137

BioBasic AX

Optimized for the separation of proteins, peptides, other anionic species and polar molecules

- Weak anion exchange phase for multiple charged species
- 300Å pore size for enhanced protein and peptide separations
- Suitable for HILIC retention and separation of highly polar molecules
- Superb stability under demanding pH conditions



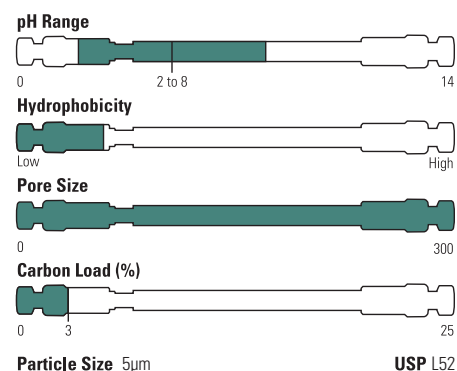
BioBasic AX

Particle Size (µm)	Format	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
5	Drop-in Guard (4/pk)	10	73105-011001	73105-012101	73105-013001	73105-014001
	HPLC Column	50	73105-051030	73105-052130	73105-053030	73105-054630
		100	73105-101030	73105-102130	73105-103030	73105-104630
		150	73105-151030	73105-152130	73105-153030	73105-154630
		250	73105-251030	73105-252130	-	73105-254630
	UNIGUARD Guard Cartridge Holder		851-00	852-00	852-00	850-00

BioBasic SCX

For the separation of proteins, peptides, and other cationic species

- Strong cation exchange phase based on sulfonic acid chemistry
- Separation and retention of basic and other cationic species
- 300Å pore size for enhanced protein and peptide separations
- Outstanding stability under demanding pH conditions



BioBasic SCX

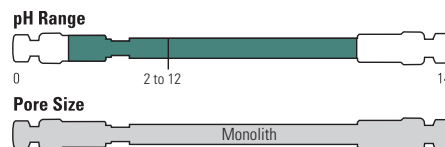
Particle Size (µm)	Format	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
5	Drop-in Guard (4/pk)	10	73205-011001	73205-012101	73205-013001	73205-014001
	HPLC Column	50	73205-051030	73205-052130	73205-053030	73205-054630
		100	73205-101030	73205-102130	73205-103030	73205-104630
		150	73205-151030	73205-152130	73205-153030	73205-154630
		250	73205-251030	73205-252130	-	73205-254630
	UNIGUARD Guard Cartridge Holder		851-00	852-00	852-00	850-00

ProSwift IEX

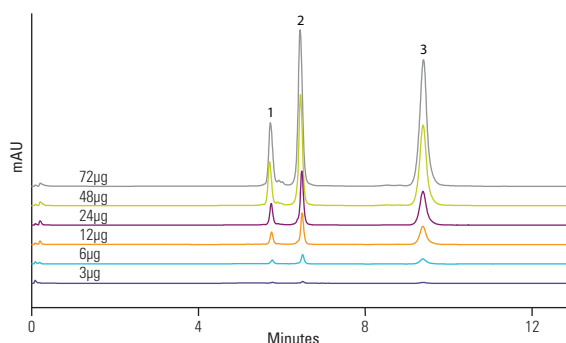
Monolith IEX columns for high-resolution and fast protein analysis

- High resolution
- High loading capacity
- Fast analysis
- Wide range of operational flow rates
- Excellent stability over a wide pH range
- Outstanding reproducibility and ruggedness

ProSwift polymer monolith (poly(Meth)acrylate) media are uniquely suited for separation of proteins. Each monolith is a single cylindrical, sponge-like polymer rod containing an uninterrupted, interconnected network of flow-through channels of a specific pore size. These large channels combined with the monolith's nonporous surfaces result in fast mass-transfer, high-resolution, and fast protein separations. The unique globular morphology of the polymer medium provides its high capacity.



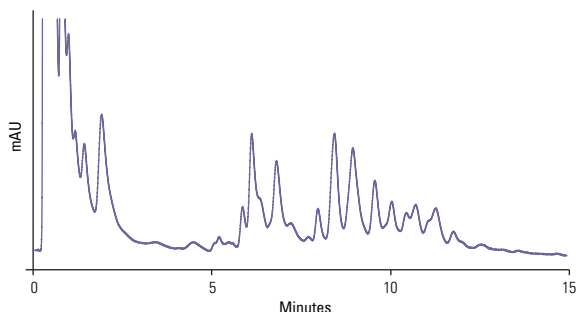
Dynamic protein loading capacity of ProSwift WCX-1S 50 x 1.0mm



ProSwift WCX-1S, 50 x 1.0mm

Mobile Phase A:	10mM Sodium phosphate (pH 7.6)
Mobile Phase B:	1 M NaCl in eluent A
Gradient:	0% B for 2 min, 0–85% B in 7.5 min, 85% B for 3 min
Temperature:	30°C
Flow Rate:	0.2mL/min
Injection Volume:	1–24µL
Detection:	UV, 280nm
Sample:	Protein mix, 1mg/mL each
Analytes:	1. Ribonuclease A 2. Cytochrome C 3. Lysozyme

Protein separation



ProSwift WAX-1S, 50 x 1.0mm

Mobile Phase A:	10mM Tris, pH 7.6
Mobile Phase B:	1 M NaCl in 10mM Tris, pH 7.6
Gradient:	5 to 55% of B in 13 min, hold for 2 min
Temperature:	30°C
Flow Rate:	0.2mL/min
Injection Volume:	1.3µL
Detection:	UV, 280nm
Sample:	1.25mg/mL <i>E. coli</i> protein

ProSwift IEX

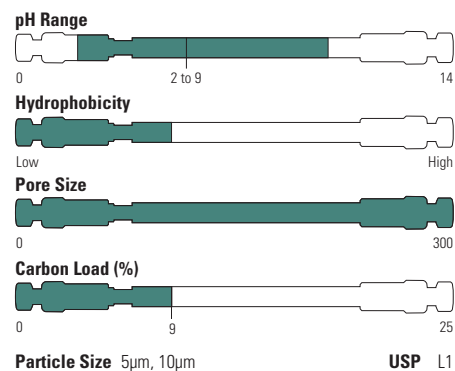
Functional Group	Length (mm)	1.0mm ID	4.6mm ID
WAX-1S	50	066642	064294
WCX-1S	50	066643	064295
SAX-1S	50	068459	064293
SCX-1S	50	071977	066765



BioBasic 18

Outstanding separation of small to medium peptides

- C18 with 300Å pore size for maximum performance with biomolecules
- High peak capacity stationary phase
- Outstanding reproducibility, efficiency and column lifetime
- Excellent for LC-MS separations



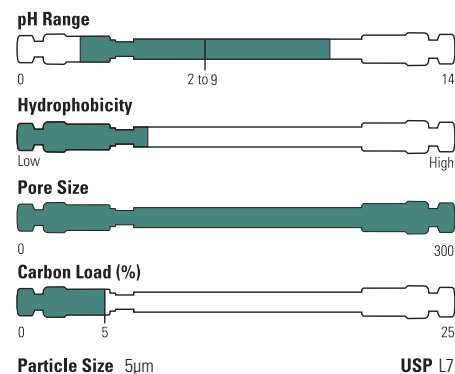
BioBasic 18

Particle Size (µm)	Format	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
5	Drop-in Guard (4/pk)	10	72105-011001	72105-012101	72105-013001	72105-014001
	HPLC Column	50	72105-051030	72105-052130	-	-
		100	72105-101030	72105-102130	72105-103030	72105-104630
		150	72105-151030	72105-152130	-	72105-154630
		250	72105-251030	72105-252130	-	72105-254630
	UNIGUARD Guard Cartridge Holder		851-00	852-00	852-00	850-00

BioBasic 8

Optimized for the separation of a wide range of peptides

- C8 with 300Å pore size for improved biomolecule analysis
- An excellent starting column for protein and peptide analysis
- Outstanding reproducibility, efficiency and column lifetime
- Excellent for LC-MS separations

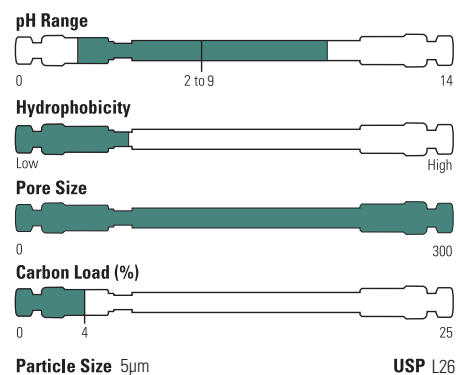


BioBasic 8

Particle Size (µm)	Format	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
5	Drop-in Guard (4/pk)	10	72205-011001	72205-012101	72205-013001	72205-014001
	HPLC Column	50	72205-051030	72205-052130	-	-
		100	72205-101030	72205-102130	72205-103030	72205-104630
		150	72205-151030	72205-152130	-	72205-154630
		250	72205-251030	72205-252130	-	72205-254630
	UNIGUARD Guard Cartridge Holder		851-00	852-00	852-00	850-00

BioBasic 4

- Based on 300Å silica for outstanding biomolecule performance
- C4 with lower carbon load for optimal retention of larger peptides and proteins
- Outstanding reproducibility, efficiency and column lifetime
- Excellent for LC-MS separations



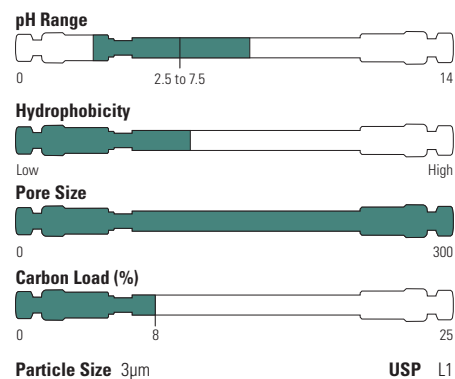
BioBasic 4

Particle Size (µm)	Format	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
5	Drop-in Guard (4/pk)	10	72305-011001	72305-012101	72305-013001	72305-014001
	HPLC Column	50	72305-051030	72305-052130	-	-
		100	72305-101030	72305-102130	72305-103030	72305-104630
		150	72305-151030	72305-152130	-	72305-154630
		250	72305-251030	72305-252130	-	72305-254630
	UNIGUARD Guard Cartridge Holder		851-00	852-00	852-00	850-00

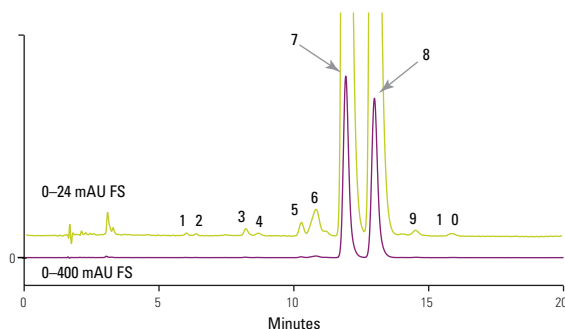
Acclaim 300 C18

High-resolution reversed-phase separation of proteins and peptides

- Designed for high-resolution peptide mapping and protein separations
- Application tested for suitability in peptide mapping
- Reproducible for dependable results
- LC-MS compatible
- Ultrapure silica with low metal content and exhaustive bonding and endcapping



Budesonide and related substances



Acclaim 300 C18, 3µm, 150 x 4.6mm

Mobile Phase A: Acetonitrile:ethanol 15:1
Mobile Phase B: 0.1% phosphoric acid
Isocratic 66% B

Temperature: 30°C

Flow Rate: 1.0mL/min

Injection Volume: 15µL

Detection: UV, 240nm

Sample: Budesonide, 500µg/mL
after three days

Analytes: 7, 8. Budesonide epimers, 99%

Reference: Hou S, Hindle M, Byron PR;
J. Pharm. Biomed. Anal. 2001 24:371-80.

Acclaim 300 C18

Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3	HPLC Column	50	060263	—	060265
		150	060264	063684	060266
5	Guard Cartridges (2/pk)	10	069690	075721	069697

Acclaim Guard Holder

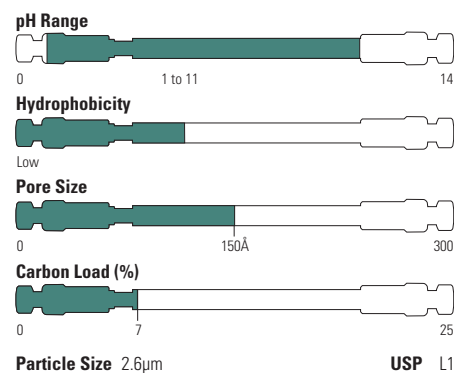
Description	Cat. No.
Acclaim SST Guard Cartridge Holder V-2	069580
Acclaim Guard Kit (Holder and Coupler) V-2	069707
Guard to Analytical Column Coupler V-2	074188

Accucore 150-C18

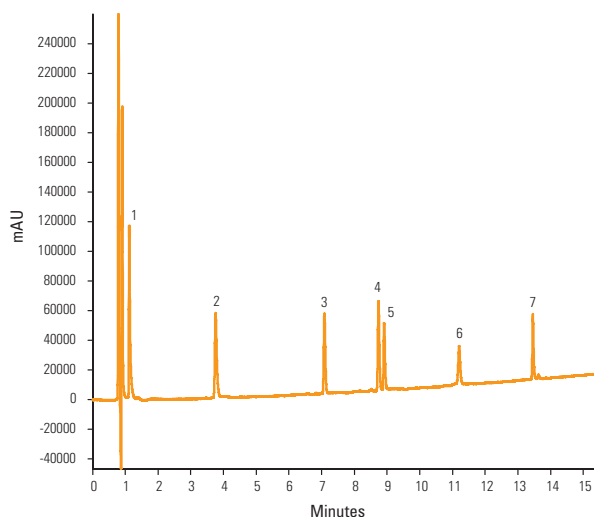
- Designed for the separation of peptides
- Outstanding resolution
- 150Å pore diameter material

Higher peak capacities facilitate increased peptide identifications. Accucore 150-C18 provides much narrower peak widths, therefore significantly higher peak capacity than a column packed with <2µm wide pore fully porous C18.

Precision of retention times is critical for reliable analysis. The Accucore 150-C18 column exhibits excellent retention time reproducibility.



Peptide separations



Accucore 150-C18, 2.6µm, 100 x 2.1mm

Mobile Phase A: 0.1% TFA in 10:90 acetonitrile:water

Mobile Phase B: 0.1% TFA in 70:30 acetonitrile:water

Gradient: 0-50% B over 15 min; hold for 2 min; drop to 0% in 0.1 min; hold at 0% B for 5 min

Temperature: 35°C

Flow Rate: 300µL/min

Injection Volume: 5µL

Detection: UV, 220nm

Analytes:
1. Glycine-Tyrosine
2. Valine-Tyrosine-Valine
3. Met-Enkephalin
4. Angiotensin III
5. Leu-Enkephalin
6. Ribonuclease A
7. Insulin

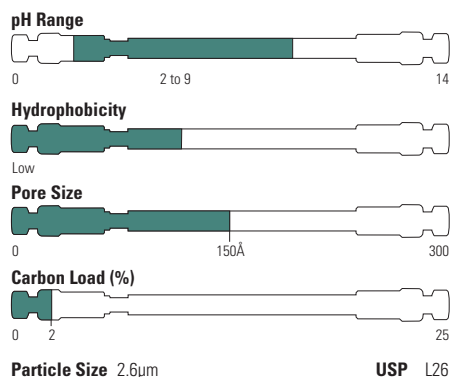
Accucore 150-C18

Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	Drop-in Guard (4/pk)	10	16126-012105	16126-013005	16126-014005
	HPLC Column	30	16126-032130	16126-033030	16126-034630
		50	16126-052130	16126-053030	16126-054630
		100	16126-102130	16126-103030	16126-104630
		150	16126-152130	16126-153030	16126-154630
UNIGUARD Guard Cartridge Holder		10	852-00	852-00	850-00

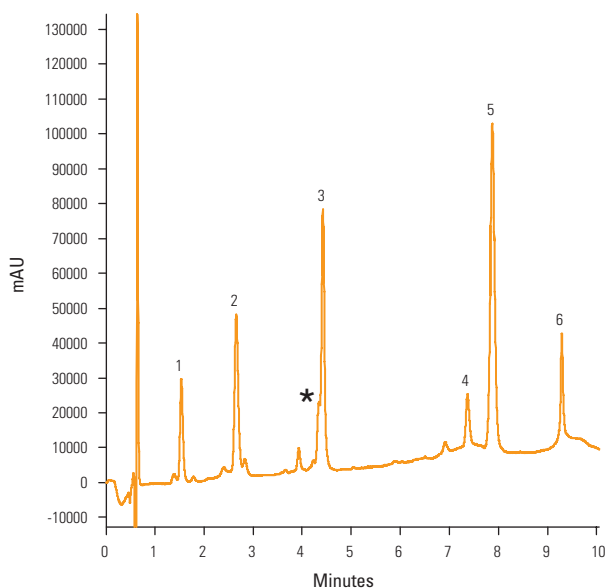
Accucore 150-C4

- Significantly lower hydrophobic retention than C18
- Ideal for retention of proteins and larger peptides

Accucore 150-C4 provides significantly sharper and higher peaks than a column packed with 5µm wide pore fully porous C4, thus offering better resolution and sensitivity. The Accucore 150-C4 also performs better than a column packed with <2µm wide pore fully porous C4 and generates only a fraction of the backpressure.



Intact proteins



Accucore 150-C4, 2.6µm, 100 x 2.1mm

Mobile Phase A: 0.1% TFA in 30:70 acetonitrile:water

Mobile Phase B: 0.1% TFA in 98:2 acetonitrile:water

Gradient: 0-30% B over 8 mins

30-95% B over 2 mins

95% B hold for 1 min

0% B hold for 4 mins

Temperature: 40°C

Flow Rate: 400µL/min

Injection Volume: 2µL 10pmol/µL solution

Detection: UV, 214 and 280nm

Analytes: 1. Insulin
2. Cytochrome C
3. Lysozyme
4. Myoglobin
5. Carbonic anhydrase
6. Ovalbumin
* Carbonic anhydrase impurity

Accucore 150-C4

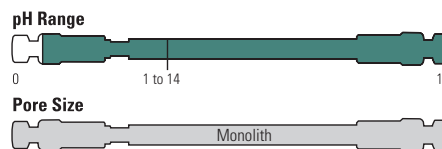
Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	Drop-in Guard (4/pk)	10	16526-012105	16526-013005	16526-014005
	HPLC Column	30	16526-032130	16526-033030	16526-034630
		50	16526-052130	16526-053030	16526-054630
		100	16526-102130	16526-103030	16526-104630
		150	16526-152130	16526-153030	16526-154630
UNIGUARD Guard Cartridge Holder		10	852-00	852-00	850-00

ProSwift RP

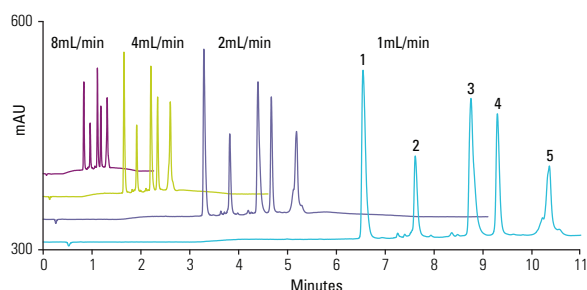
Reversed-phase monolith columns that uniquely provide the advantages of high resolution at exceptionally high flow rates for fast protein separations and analysis

- High resolution at high speed
- Highest operational flow rates available
- High throughput and improved productivity
- Excellent stability over a wide pH range of 1 to 14
- Outstanding reproducibility and ruggedness
- High stringent wash compatible, for example, 1 M NaOH
- High loading capacity

ProSwift polymer reversed-phase monolith media are (polystyrene-co-DVB) uniquely suited for the separation of proteins. Each monolith is a single cylindrical polymer rod containing an uninterrupted, interconnected network of flow-through channels of a specific pore size; ranging from small channel (1S), medium size channels (2H & 4H) to very large channel (3U) sizes. These channels and the monolith's nonporous surfaces result in fast mass transfer for high-resolution and fast protein separations. The channels also produce low backpressure, allowing the use of higher linear velocities with minimal loss of resolution.



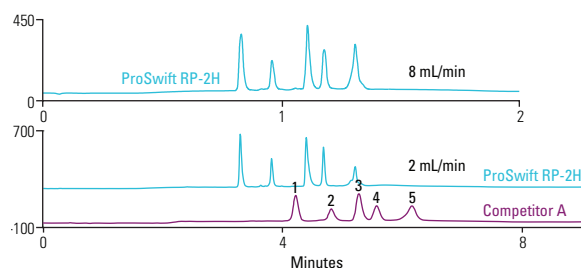
Proteins



ProSwift RP-2H, 50 x 4.6mm

Mobile Phase A:	DI H ₂ O/CH ₃ CN (95:5; V/V) + 0.1% TFA
Mobile Phase B:	DI H ₂ O/CH ₃ CN (5:95; V/V) + 0.1% TFA
Gradient:	1mL/min: 1-75% B in 12 min 2mL/min: 1-75% B in 6 min 4mL/min: 1-75% B in 3 min 8mL/min: 1-75% B in 1.5 min
Flow Rate:	1, 2, 4, or 8mL/min
Injection Volume:	5µL
Detection:	UV, 214nm
Sample:	Mixture of five proteins
Analytes:	1. Ribonuclease A 1.5mg/mL 2. Cytochrome C 0.5mg/mL 3. BSA 1.5mg/mL 4. Carbonic anhydrase 0.9mg/mL 5. Ovalbumin 1.5mg/mL

Competitive comparison



ProSwift RP-2H, 50 x 4.6mm Competitor A, 15µm, 100 x 4.6mm

Mobile Phase A:	DI H ₂ O/CH ₃ CN (95:5; V/V) + 0.1% TFA
Mobile Phase B:	DI H ₂ O/CH ₃ CN (5:95; V/V) + 0.1% TFA
Gradient:	2mL/min: 1-75% B in 6 min 8mL/min: 1-75% B in 1. min
Temperature:	30°C
Flow Rate:	2 or 8mL/min
Injection Volume:	5µL
Detection:	UV, 214nm
Sample:	Mixture of five proteins
Analytes:	1. Ribonuclease A 1.5mg/mL 2. Cytochrome C 0.5mg/mL 3. BSA 1.5mg/mL 4. Carbonic anhydrase 0.9mg/mL 5. Ovalbumin 1.5mg/mL

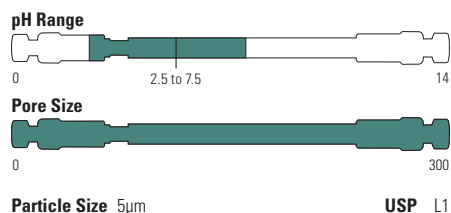
ProSwift RP

Functional Group	Length (mm)	1.0mm ID	4.6mm ID
RP-1S	50	—	064297
RP-2H	50	—	064296
RP-3U	50	—	064298
RP-4H	50	069477	—
RP-10R	50	164586	—
RP-4H	250	066640	—

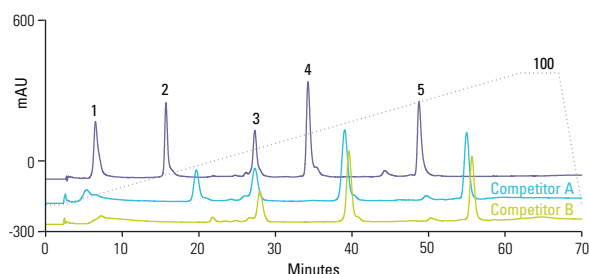
ProPac HIC-10

Hydrophobic Interaction Chromatography columns for the high-resolution separation of proteins and peptides

- High-resolution HPLC separation of proteins, protein variants and peptides
- Proteins are separated under non-denaturing conditions
- High protein loading capacity for protein purification applications
- Wide range of applications
- Based on 5µm ultra high purity spherical silica gel particles with 300Å pores



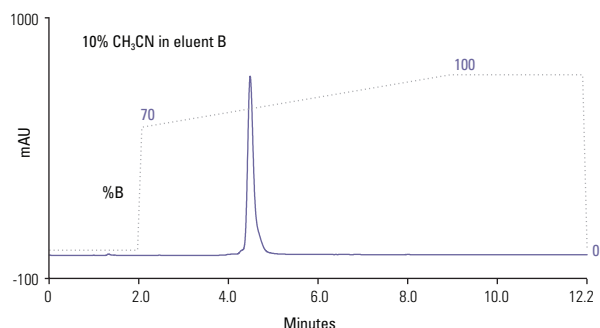
Protein mixture



ProPac HIC-10, 5µm, 75 x 7.8mm Competitors A and B, 75 x 7.5mm

Mobile Phase A:	2 M (NH ₄) ₂ SO ₄ in 0.1 M NaH ₂ PO ₄ (pH 7.0)
Mobile Phase B:	0.1 M NaH ₂ PO ₄ (pH 7.0)
Flow Rate:	1.0 mL/min
Injection Volume:	20 µL
Detection:	UV, 214 nm
Sample:	Mixture of proteins (1 mg/mL each final after 1:1 dilution with mobile phase A)
Analytes:	1. Cytochrome c 2. Myoglobin 3. Ribonuclease A 4. Lysozyme 5. Chymotrypsinogen

Monoclonal antibody



ProPac® HIC-10, 5µm 100 x 4.6mm

Mobile Phase A:	0.5 M (NH ₄) ₂ SO ₄ in 0.1 M NaH ₂ PO ₄ (pH 7.0)
Mobile Phase B:	0.1 M NaH ₂ PO ₄ (pH 7.0)
Gradient:	70–100% B in 15 min
Flow Rate:	1 mL/min
Injection Volume:	5 µL (25 µg)
Detection:	UV, 214 nm
Sample:	MAb 50 µL (50 mg/mL) + 450 µL Eluent B

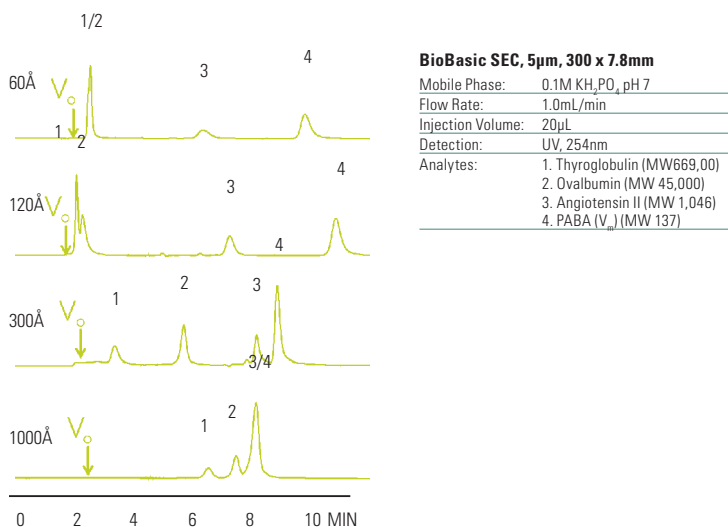
ProPac HIC-10

Particle Size (µm)	Format	Length (mm)	2.1mm ID	4.6mm ID	7.8mm ID
5	HPLC Column	75	—	—	063665
		100	063653	063655	—
		250	—	074197	—

BioBasic SEC

Superior separation of water soluble compounds

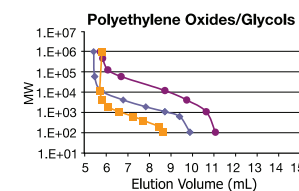
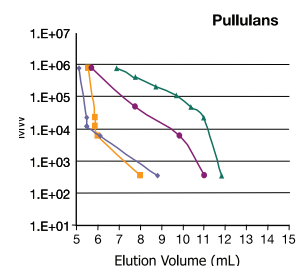
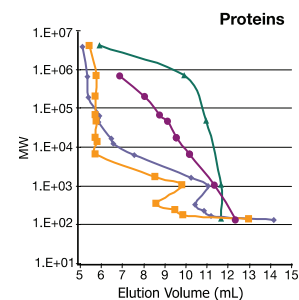
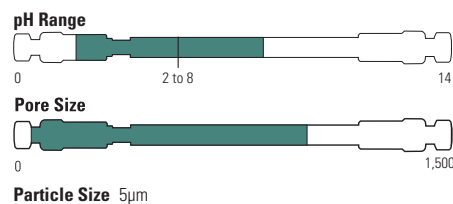
- Covers separation of analytes over a wide molecular weight range
- Long column life and high column efficiencies
- Simple mechanism of interaction based on molecular size and shape
- Ideal for sample clean-up
- Straightforward method development, simple mobile phases



Effect of pore size on SEC resolution

BioBasic SEC

Pore Size (Å)	Description	ID (mm)	Length (mm)	Cat. No.
BioBasic SEC 60				
60	Guard Column	7.8	30	73305-037821
	HPLC Column	7.8	150	73305-157846
	HPLC Column	7.8	300	73305-307846
BioBasic SEC 120				
120	Guard Column	7.8	30	73405-037821
	HPLC Column	7.8	150	73405-157846
	HPLC Column	7.8	300	73405-307846
BioBasic SEC 300				
300	Guard Column	7.8	30	73505-037821
	HPLC Column	7.8	150	73505-157846
	HPLC Column	7.8	300	73505-307846
BioBasic SEC 1000				
1000	Guard Column	7.8	30	73605-037821
	HPLC Column	7.8	150	73605-157846
	HPLC Column	7.8	300	73605-307846



BioBasic SEC,
60Å 300Å
120Å 1000Å

Molecular weight calibration curves

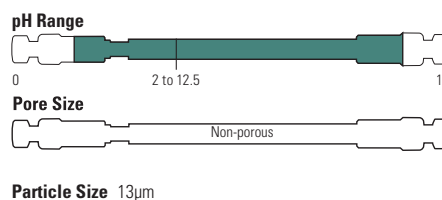
DNAPac HPLC and UHPLC Columns

DNAPac PA100

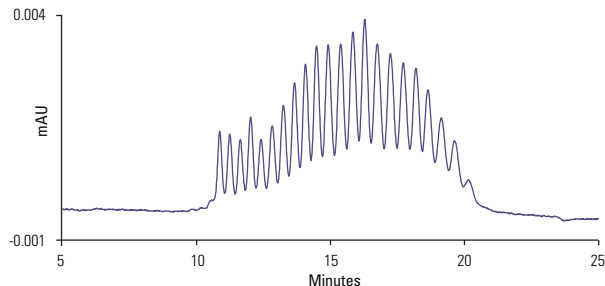
A strong anion exchange column developed to provide high-resolution analysis and purification of synthetic oligonucleotides

- High-resolution oligonucleotide separations
- Achieve n, n-1 resolution for oligonucleotides
- Resolves oligonucleotides with secondary structures
- Suitable for the analysis of phosphorothioate-based clinical samples
- Easy scale-up from 2.0mm to 22mm ID column (>100x)

The DNAPac PA100 is a high-resolution anion-exchange column that provides single-base resolution. It is stable under denaturing conditions, rugged, reliable, and can be readily scaled up. The DNAPac PA100 is a 13µm pellicular, nonporous polymeric resin with bound quaternary amine-functionalized Thermo Scientific™ Dionex™ MicroBeads™. The rapid mass-transport characteristics of this resin result in very high-resolution oligonucleotide separations. DNAPac PA100 can resolve full length from n-1, n+1, and other failure sequences.



Oligonucleotides



DNAPac PA100, 13µm, 250 x 4.0mm

Mobile Phase: 410-510mM NaCl
in 25mM Tris-Cl, pH 8.0
Flow Rate: 1.5mL/min
Detection: UV, 260nm
Sample: pd(A)₄₀₋₆₀

DNAPac PA100

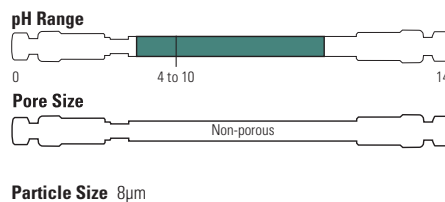
Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
13	Guard Column	50	088761	043018	088764	088765
	HPLC Column	250	088760	043010	043011	088759

DNAPac PA200

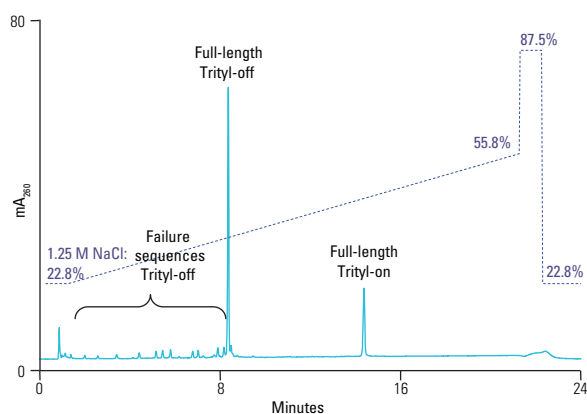
A strong anion exchange column developed to provide the best resolution for analysis and purification of synthetic oligonucleotides

- Achieve n, n-1 resolution for oligonucleotides
- Resolve oligonucleotides with secondary structures
- Assay phosphorothioate purity
- Selectivity control with eluent pH, salt, and solvent
- Resolve RNA with aberrant (2', 5') links from normal ssRNA
- Separate individual phosphorothioate diastereoisomers
- HR/AM AXLC/MS via automated desalting

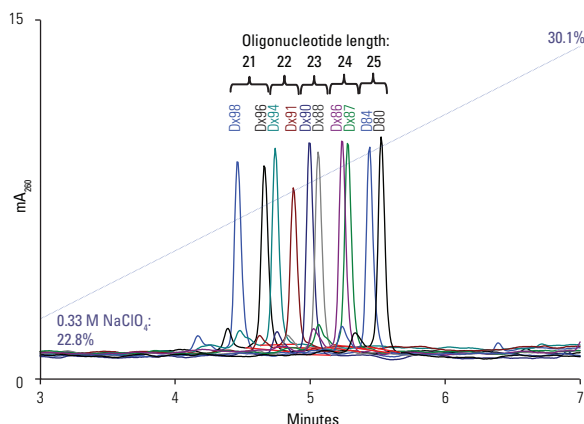
The DNAPac PA200 is packed with a pellicular anion-exchange resin composed of an 8µm diameter nonporous polymeric substrate to which quaternary amine-functionalized Dionex MicroBeads are bound. The rapid mass transport characteristics of this resin result in high-resolution oligonucleotide separations. DNAPac PA200 can resolve full length from n-1, n+1, and other failure sequences not possible with other columns.



Target, failure and trityl-on oligonucleotides



Separation of oligonucleotides by length



DNAPac® PA200, 8µm, 250 x 4.0mm

Mobile Phase:	NaClO ₄ , pH 6.5 with 20% CH ₃ CN
Flow Rate:	1.2mL/min
Injection Volume:	8µL
Detection:	UV, 260nm

DNAPac PA200

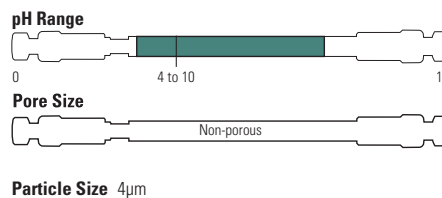
Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
8	Guard Column	50	063423	062998	063419	088780
	HPLC Column	250	063425	063000	063421	088781

DNAPac PA200 RS

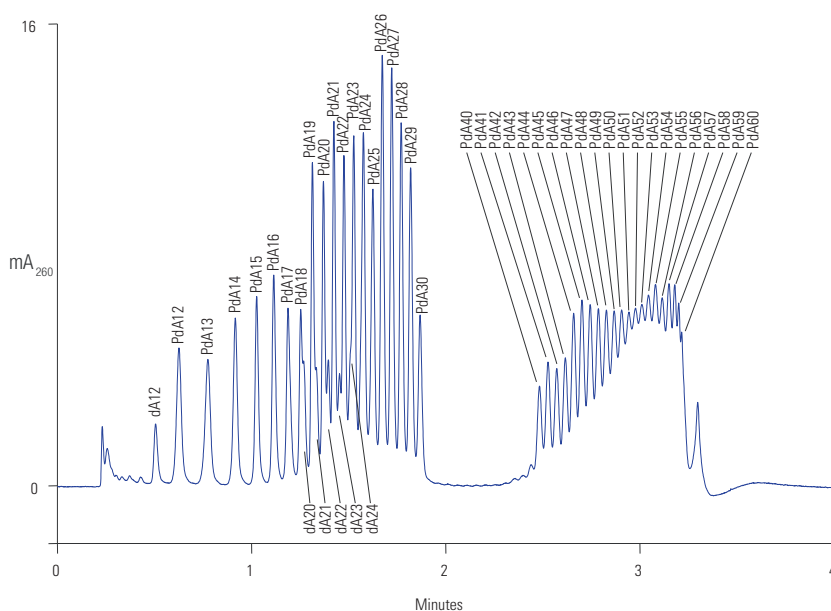
UHPLC Solutions for nucleic acid analysis

- Provide single base resolution of oligonucleotides
- Higher efficiency to improve resolution
- Improved throughput
- Ruggedness consistent with the DNAPac PA200 column line
- Stable to 10,000 psi

DNAPac PA200 RS columns are packed with smaller, 4µm particles, for improved resolution and better performance. The smaller particles also allow shorter columns to provide significantly higher throughput. These columns are packed in bio-inert PEEK-lined stainless steel (SST) bodies, designed to protect from unwanted interactions of eluents and analytes with metals, while maintaining 10,000 psi stability. These columns offer exceptional resolution of oligonucleotides, including isomer separations; and are able to resolve full length oligonucleotides from n-1 and n+1 oligonucleotides and other failure sequences.



Partial resolution of 46 oligonucleotides



DNAPac PA200 RS, 4µm, 50 x 4.6mm

Mobile Phase A:	20 mM Tris pH 8
Mobile Phase B:	A + 1.25 M NaCl
Gradient:	28–43% B in 4 CV* (2.56 min) curve 3**
Temperature:	30°C
Flow Rate:	1.30mL/min
Injection Volume:	2.5µL
Sample:	PdA12–30, 40–60

*CV = column volumes

**Curve 3 indicates continuously changing gradient, asymptotically approaching a maximum salt concentration. Programmed in Chromleon 6.8.

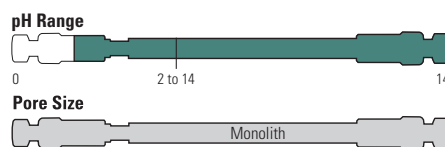
DNAPac PA200 RS

Particle Size (µm)	Format	Length (mm)	4.6mm ID
4	BioRS column	50	082508
		150	082509
		250	082510

DNASwift SAX-1S

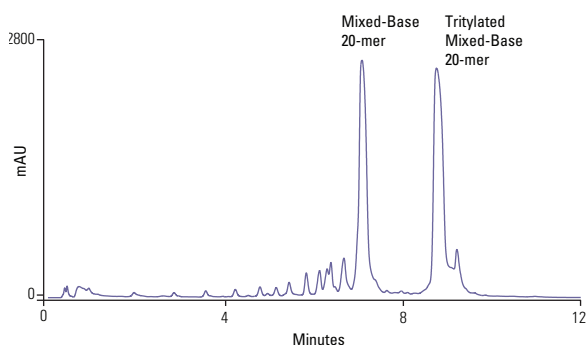
A strong anion exchange monolith column that provides improved capacity and industry-leading oligonucleotide yield-purity performance.

- Micromole purifications in a 5mm ID column body
- Substantial capacity in a small format
- Tunable selectivity control, like the DNAPac columns, for high resolution
- Compatible with high pH mobile phases, solvents, or high temperatures
- Ideal for therapeutic and diagnostic oligonucleotide research
- Purify difficult oligonucleotide products



The DNASwift column is a unique porous polymer monolith coated with functionalized latex nanobeads, optimized for oligonucleotide separations. The monolith, a polymer cylinder with interconnected flow through channels, provides fast mass transfer, low back pressure (for increased flow rates), very high capacity, and refined selectivity control.

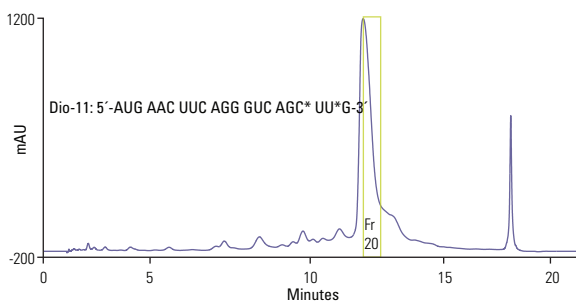
Tritylated oligonucleotide



DNASwift SAX-1S, 150 x 5.0mm

Mobile Phases A:	15mM Tris, pH 8
Mobile Phases B:	15mM Tris, pH 8, 1.25 M NaCl
Gradient:	8–64% B in 10 min
Flow Rate:	1.5mL/min
Injection Volume:	20µL
Detection:	UV, 260nm
Sample:	Derivatized mixed-base 20mer, 20mg/mL

Purification of a 21-base RNA Sample with aberrant 2'-5' linkages at the 1 and 3 positions from the 3' end



DNASwift SAX-1S, 150 x 5.0mm

Mobile Phase A:	40mM Tris, pH 7
Mobile Phase B:	40mM Tris, pH 7 + 1.25 M NaCl
Gradient:	26–42% B in 10 column volumes
Temperature:	30°C
Flow Rate:	1.5mL/min
Injection Volume:	125µg
Detection:	UV, 260nm

DNASwift SAX-1S

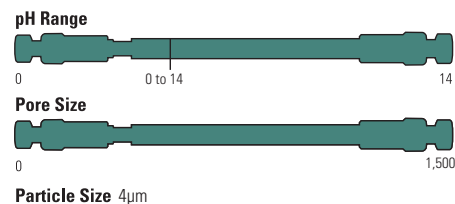
Length (mm)	5.0mm ID
150	066766

DNAPac RP

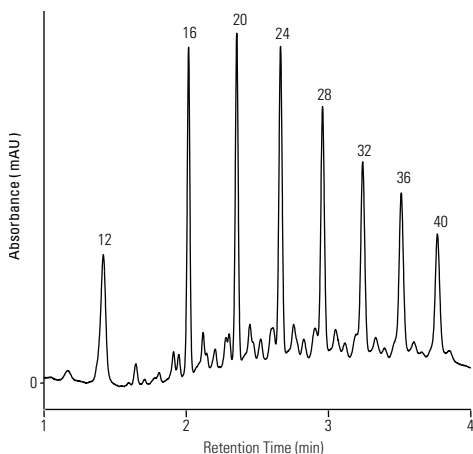
Reverse phase (RP) column specifically for analysis of oligonucleotides and double stranded (ds) DNA and RNA fragments.

- Excellent MS compatibility
- Wide operating pH range: 0–14
- High temperature stability: up to 110°C
- High throughput

The DNAPac RP is based on wide-pore, 4µm polymer particles. The unique column chemistry provides excellent performance under a broad range of pH (0-14), high temperature (up to 110°C) and mobile phase composition. The large pore size of the resin enables efficient separation of small to large oligonucleotides.



Fast analysis of mixed base DNA



DNAPac RP, 4µm, 50 x 2.1mm

Mobile Phase A: 25 mM HAA, pH 8.5

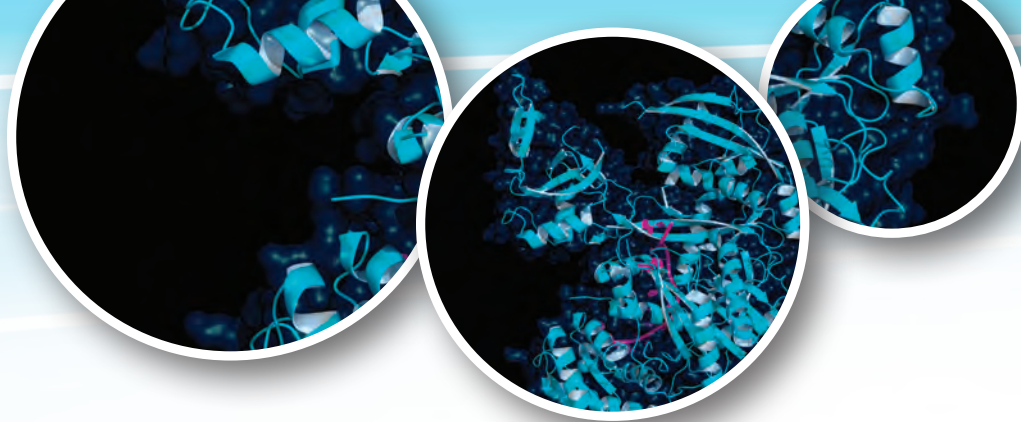
Mobile Phase B: 25 mM HAA, pH 8.5 / Acetonitrile (50:50 v/v)

Gradient:	Time (min)	%A	%B
	-0.1	67	33
	0.0	67	33
	3.0	41	59
	3.1	5	95
	4.9	5	95
	5.0	67	33
	8.5	67	33

Gradient Curve:	3
Temperature:	65°C
Flow Rate:	0.8mL/min
Injection Volume:	4µL
Detection:	UV, 260 nm
Sample:	8-Combo DNA
Peak Label:	Length of DNA

DNAPac RP

Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID
4	Guard Cartridges (2/pk)	10	088925	088921
	HPLC Column	50	088924	088920
		100	088923	088919
	Guard Cartridge Holder		069580	069580



Nano, Capillary and Micro LC Columns

Delivering high performance separations to -omics research

Our columns have been specifically designed to combine high performance with ease of use. From the “plug and spray” EASY-Spray columns to the innovative nanoViper fitted Acclaim PepMap range and the Monolithic PepSwift and ProSwift columns.

- **LC-MS Compatible Formats**

Offering the highest sensitivity

- **1200 bar Compatible Nano Columns**

With increased length to increase peak capacity

- **Monolithic Polymer Phases**

For high throughput peptide and protein analysis



The Bio LC web page contains the latest news, applications and downloads for the nano, capillary and microbore range. Visit www.thermoscientific.com/columns

NanoLC

Technical Resources



visit www.thermoscientific.com/chromexpert
to access the following information:

- Application Areas by Column Format
- Chemistries



EASY-Spray Columns

“Plug and Spray” nano LC columns for routine and robust performance.

- Simple to use format
- Routine research methodology
- Excellent performance for peptide separations
- Available with wide pore phases and monoliths for the separation of intact proteins

Acclaim PepMap C18 100Å

Particle size (µm)	Length (mm)	50µm ID	75µm ID
2	150	ES801	ES804
	250	—	ES802
	500	—	ES803
	750	—	ES805
3	150	—	ES800

Acclaim PepMap C18 300Å

Particle size (µm)	Length (mm)	50µm ID	75µm ID
5	150	—	ES812

PepSwift

Length (mm)	200µm ID
250	ES810



EASY-Spray Emitters

Integrated sprayer coupled with a transfer line.

- Pre-made connections
- Easy installation in the MS Ion Source
- No chromatography required

EASY-Spray Emitters

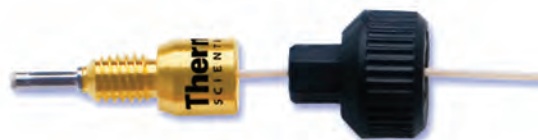
Description	Cat. No.
EASY-Spray Emitter, nanoflow (Emitter ID 7µm, Transfer line ID 20µm, Transfer line length 500mm)	ES791
EASY-Spray Emitter, microflow (Emitter ID 20µm, Transfer line ID 75µm, Transfer line length 500mm)	ES792



nanoViper Fingertight Fittings

Designed to be a virtually dead volume-free fingertight UHPLC fitting system.

- Provides virtually zero-dead-volume connections
- Compatible with backpressures up to 1000 bar (14,500 psi)
- Suitable for temperatures up to 80°C
- Easy to use 1/32" PEEK sheathed fused silica and fingertight design
- Works with virtually any valve and any column from any manufacturer



The nanoViper connections come preassembled and high pressure tested. The fittings do not “grab” the tubing at a single point. It seals at the tip and not with a ferrule. Nor does it “grab” the tubing at a single point. It is this feature that gives nanoViper fittings their UHPLC, virtually dead-volume-free capabilities.

nanoViper Fingertight Fittings

Length (mm)	Green 10µm ID	Orange 20µm ID	Brown 50µm ID	Black 75µm ID	Red 100µm ID	Purple 150µm ID
70	-	6041.5120	6041.5123	6041.5126	6041.5810	6041.5817
150	6041.5118*	6041.5121	6041.5124	6041.5127	6041.5811	6041.5818
250	-	-	-	6041.5730	6041.5812	6041.5819
350	-	6041.5240	6041.5540	6041.5735	6041.5813	6041.5820
450	-	-	-	-	6041.5814	6041.5821
550	-	6041.5260	6041.5560	6041.5760	6041.5815	6041.5822
650	-	6041.5275	6041.5575	6041.5775	6041.5824	-
750	-	6041.5280	6041.5580	6041.5780	6041.5816	6041.5823
850	-	-	-	6041.5785	-	-
950	-	6041.5122	6041.5125	6041.5128	-	-
1100				6041.5711		

*180mm Length

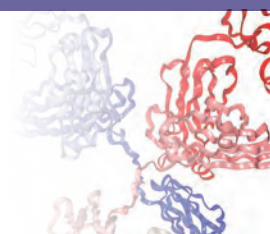
Trap Column Cartridges Holders with nanoViper Fittings

Description	Cartridge Length (mm)	Fitting ID (µm)	Cat. No.
µ-Precolumn holder for trap cartridges with 2 x 100mm length nanoViper fittings	5	30	164649
	15	75	164650

Sample Loops with nanoViper Fittings

Volume (µL)	Cat. No.	Quantity
1	6826.2401	1 Each
5	6826.2405	1 Each
10	6826.2410	1 Each
20	6826.2420	1 Each
50	6826.2450	1 Each
125	6826.2412	1 Each

Find out more about how SMART Digest Kits can benefit your workflow at:
www.thermoscientific.com/SMARTdigest



nanoViper Application Kits

nanoViper fittings are also included in tubing and application kits designed for use with the UltiMate 3000 RSLCnano systems.

nanoViper Fitting Kits for UltiMate 3000 RSLCnano Systems

Description	Tubing	Samples	Trap Column	Separation Column	RSLCnano Systems
Direct Injection nano LC Kit	Y	Y	—	Y	6720.0300
Direct Injection capillary LC Kit	Y	Y	—	Y	6720.0305
Preconcentration nano LC kit	Y	Y	Y	Y	6720.0310
Preconcentration capillary LC kit	Y	Y	Y	Y	6720.0315
Preconcentration monolithic LC kit	Y	Y	Y	Y	6720.0320
2D salt plugs kit	Y	Y	Y	Y	6720.0325
Automated off line SCX-RP peptides kit	Y	Y	Y	Y	6720.0330
Automated off line RP-RP peptides kit	Y	Y	Y	Y	6720.0340
Tandem nano LC kit	Y	Y	Y	Y	6720.0335
FLM nanoViper tubing kit (All tubing for nano LC preconcentration)	Y	—	—	—	6041.5100
MS connection kit	Y	—	—	—	6720.0345
EASY-Spray connection kit (Supports direct injection as well as preconcentration)	Y	Y	Y	—	6720.0395



Acclaim PepMap NanoLC columns

The standard for peptide separations in proteomics

- High-resolution protein identification
- Highest sensitivity in LC-MS
- Fitted with nanoViper fittings as standard



Acclaim PepMap C18 100Å

Particle size (µm)	Length (mm)	nanoViper Column				nanoViper FS
		50µm ID	75µm ID	300µm ID	1000µm ID	75µm ID
2	50	164561	164563	164560	164454	—
	150	164562	164534	164537	164711	164769
	250	164709	164536	—	—	164734
	500	164710	164540	—	—	164738
3	50	164712	164567	164716	164717	—
	150	164713	164568	164571	164572	164738
	250	164714	164569	—	—	—
	500	164715	164570	—	—	164739
	750	—	—	—	—	164939
5	50	—	—	164901	164899	—
	150	—	—	164902	164900	—

Note: nanoViper FS Columns have 45mm of Fused Silica for use with PEEK sleeves and Microtight unions

Acclaim PepMap C8 100Å

Particle size (µm)	Length (mm)	nanoViper Column			
		50µm ID	75µm ID	300µm ID	1000µm ID
3	150	—	164706	164722	164723

Acclaim PepMap C4 300Å

Particle size (µm)	Length (mm)	nanoViper Column			
		50µm ID	75µm ID	300µm ID	1000µm ID
5	150	—	164707	164720	164721

Acclaim PepMap C18 300 Å

Particle size (µm)	Length (mm)	nanoViper Column			
		50µm ID	75µm ID	300µm ID	1000µm ID
5	150	—	164708	164718	164719

Accucore NanoLC Columns

Accucore 150-C18

		nanoViper Column
Particle size (µm)	Length (mm)	75µm ID
2.6	150	16126-157569
	500	16126-507569

Accucore 150-C4

		nanoViper Column
Particle size (µm)	Length (mm)	75µm ID
2.6	150	16526-157569
	500	16526-507569

Accucore 150-Amide-HILIC

		nanoViper Column
Particle size (µm)	Length (mm)	75µm ID
2.6	150	16726-157569



MSPac™ DS-10 MS Desalter Cartridge

Built for LC-MS compatibility

- High confidence with low peak carryover
- Antibody and protein desalting with a high load capacity
- High pH stability: 0 - 14
- IEX, pH-gradient, SEC fraction use
- MS sensitivity improvement



MSPac DS-10 MS Desalter Cartridge

Item	Cat. No.
Desalter Cartridge - 2 Pack	089170
Cartridge Holder	069580

Monolithic Capillary and Micro HPLC Columns

High-speed peptide and protein separations

- High-resolution for protein identification, biomarker discovery, and systems biology
- High column-to-column reproducibility
- nanoViper fittings for easy column installation

The monolithic structure offers a high-quality alternative to traditional microparticulate sorbents, providing important advantages to the chromatographic separation. High-sensitivity proteomics and biotech applications are easily performed using these columns.



PepSwift

Length (mm)	PepSwift		
	100µm ID	200µm ID	500µm ID
5	—	164558	—
50	164584	164557	164585
250	164543	164542	—

ProSwift RP-4H

Length (mm)	ProSwift		
	100µm ID	200µm ID	500µm ID
100	—	—	164925
250	164922	164923	—
500	164921	—	—

ProSwift C4 RP-5H

Length (mm)	ProSwift		
	100µm ID	200µm ID	500µm ID
100	—	—	164931
250	164929	164930	164932
500	164928	—	—



Trap columns – nano trap design

Acclaim PepMap C18 100Å

Type	Part number	Particle Size	ID	Bed Length (mm)	Total Length	Quantity
nanoViper Column	164535	3	75	20	150	2 Pack
	164705	3	75	20	70	2 Pack
	164564	5	100	20	150	2 Pack
Classic Column	164197	5	100	10	150	2 Pack
	164199	5	100	20	150	2 Pack
	164213	5	200	20	150	2 Pack

Note: 164705 is a shorter total length used for vented column set up for example with EASY nLC 1000

Trap Columns – Cartridge (Set of 5)

Acclaim PepMap C18 100Å

Length (mm)	300µm ID	1000µm ID
5	160454	160434
15	–	160438

Acclaim PepMap C8 100Å

Length (mm)	300µm ID
5	161194

Acclaim PepMap C4 300Å

Length (mm)	300µm ID
5	163591

Acclaim PepMap C18 300Å

Length (mm)	300µm ID
5	163589

Accucore 150-C18

Length (mm)	300µm ID
5	16126-900379

Accucore 150-C4

Length (mm)	300µm ID
5	16526-900379

Accucore 150-Amide-HILIC

Length (mm)	300µm ID
5	16726-900379

µ-Precolumn™ holder, 5mm, with 30µm ID connecting tubing, nanoViper fittings

Length (mm)	300µm ID
5	164649



1st dimension columns for 2D separations

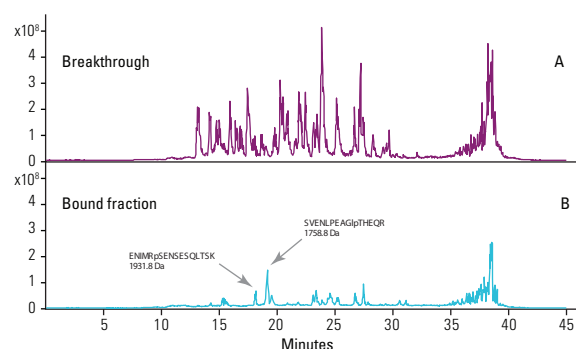
Improving separation efficiency with multidimensional analysis.

There are dedicated application kits which utilize either SCX or RP as the first dimension
A TiO₂ trapping column can be added to the application for phosphopeptide analysis

1st dimension columns

Chemistry	Part Number	Description	Application
SCX	164565	300µm ID x 10cm, packed with Poros 10 S, nanoViper column	2D Salt plugs
	164566	1.0mm ID x 15cm, packed with Polysulfoethyl ASP, 5µm, 300Å, nanoViper column	Automated off-line 2D LC of Peptides, micro SCX x nano RP
RP	164592	300µm ID x 15cm, packed with Acclaim PA2, nanoViper column	Automated off-line 2D LC, Cap RP (basic) x Nan RP (acidic)
TiO ₂	164205	100µm ID x 1cm packed with TiO ₂	Phosphopeptide analysis
	164215	200µm ID x 1cm packed with TiO ₂	Phosphopeptide analysis

Isolation of two synthetic phosphopeptides from a BSA tryptic digest



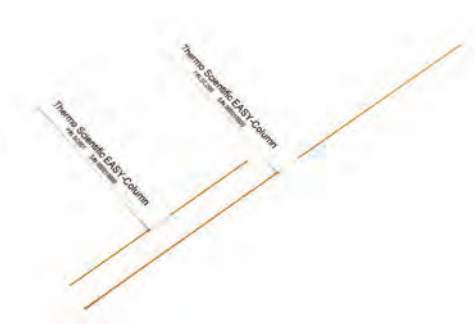
Trap Column:	200µm ID x 1cm, packed with TiO₂, 5µm
100µm ID x 1cm, packed with Acclaim PepMap C18, 5µm	
Separation Column:	Acclaim PepMap C18, 3µm, 75µm x 15cm
Loading Solvent:	0.05% HFBA in DI H ₂ O
Wash Solvent:	0.01% HFBA in DI H ₂ O
Mobile Phase A:	0.05% TFA in DI H ₂ O
Mobile Phase B:	0.04% TFA in acetonitrile/ DI H ₂ O (80:20 v/v)
TiO₂ Trap	
Mobile Phase:	250mM NH ₄ HCO ₃ in DI H ₂ O, pH 9.0
Gradient:	3–40% acetonitrile in 30 min
Flow Rate:	300nL/min
Loading Flow:	8µL/min
Injection Volume:	5µL
Detection:	MS

EASY-Columns

Excellence in nanoscale separations

- Compatible with any nanoscale HPLC system
- Simple, flexible design

EASY-Column capillary LC columns are produced with a focus on design simplicity using metal-free fused capillaries and can be used on any nano LC system



EASY-Columns

Description	Cat. No.	Quantity
EASY-Column, 2cm, ID 100µm, 5µm, C18-A1 (Trap column)	SC001	3 Pack
EASY-Column, 10cm, ID 75µm, 3µm, C18-A2 (Analytical column)	SC200	1 Each
EASY-Column, 10cm, ID 75µm, 3µm, C18-A2 (Analytical column)	SC2003	3 Pack
HPLC-to-Column Connector kit Zero-dead-volume union (1/32in OD tubing), 10x SC603	SC600	1 Each
A/B Mixing Tee & Venting Tee for two-column setup Nanoliter-dead-volume tee (1/32in OD tubing), 10 sleeves for 360µm OD fused silica (10xSC603).	SC601	1 Each
Connector Kit for two-column setup Zero-dead-volume union (1/32in OD tubing), Nanoliter-dead-volume tee (1/32 inch OD tubing), 10x SC603	SC602	1 Each
Sleeves (2cm, 1/32in OD) for 360µm OD fused silica	SC603	30 Pack

Nano Instruments

Thermo Scientific nanoLC systems offer market leading performance and integrate seamlessly with all Thermo Scientific nanoESI sources and MS families



EASY-nLC1200

Operational simplicity and excellent performance

- Increased robustness
- Improved performance at 1200 bar
- Improved throughput
- Intelligent maintenance

EASY-nLC1200

Operational simplicity and excellent performance

- Easily configured for routine nano LC
- Wide range of flows available from 20nL/min to 50 μ L/min
- Customized application set up easily established



For more product information visit our website:
www.thermoscientific.com/en/products/nano-capillary-systems.html

Notes

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for Chromatographers



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