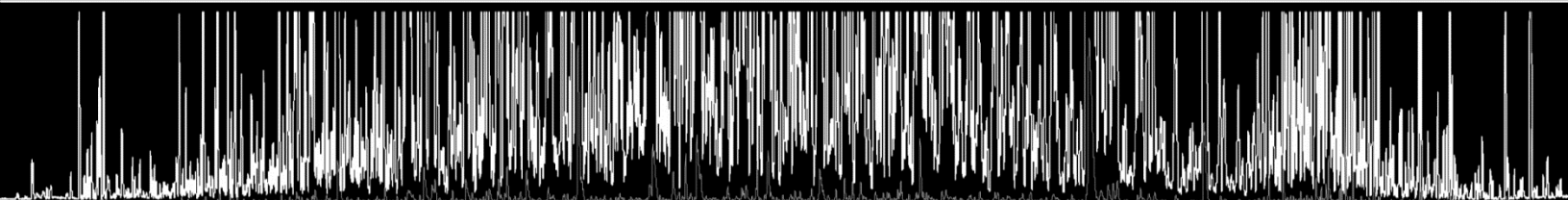




Single Cell Proteomics Ultra-Sensitive NanoLC Columns
Top-Down Proteomics High-Resolution NanoLC Columns
Bottom-Up Proteomics High-Quality NanoLC Columns
Middle-Down Proteomics High-Efficiency NanoLC Columns
Phosphoproteomics Sensitive NanoLC Columns
Peptide and Protein Fractionation Columns
Metabolite Separation Columns
MicroSPE and ESI Emitters



High-resolution nanoLC with peak capacity of >1,000 allows for tandem mass spectrometry identification of >6,000 proteins through assignment of ~60,000 peptides at a false discovery rate of 1% (ASMS 2018, San Diego)

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Ultrasensitive 10–30 µm ID NanoLC Columns for Single Cell Proteomics and Proteomic Analysis of Small Sizes of Samples

We provide 10–30 µm ID nanoLC columns for ultrasensitive mass spectrometry proteomic analysis of a single mammalian cell (e.g., ~15 µm size, 0.1–0.2 ng protein content per cell), small populations of cells (e.g., a few to 100 mammalian cells), and tiny specimen of tissue (e.g., <0.1 mm). Combined with advanced methods of proteome sample processing and mass spectrometry analysis, these ultrasensitive nanoLC columns provide a capability to assign 1,500–5,000 proteins from 1–100 mammalian cells. These very narrow columns can also be adopted for other applications where ultrasensitive nanoLC–mass spectrometry analysis is needed.

We also provide micro-solid phase extraction columns (Page 17) for robust, rapid, and total recovery loading of small sizes of samples in ultrasensitive nanoLC–mass spectrometry analysis.

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
USB01002001718I	10 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Integrated	1,100
USB01003001718I	10 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Integrated	1,300
USB01502001718I	15 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Integrated	1,000
USB01503001718I	15 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Integrated	1,150
USB02002001718I	20 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Integrated	800
USB02003001718I	20 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Integrated	900
USB02004001718I	20 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<8,000	Integrated	1,100
USB03002001718I	30 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Integrated	650
USB03003001718I	30 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Integrated	750
USB03004001718I	30 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Integrated	850
USB03005001718I	30 µm ID × 50 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Integrated	1,050
USB03006001718I	30 µm ID × 60 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Integrated	1,350
USB03004003018I	30 µm ID × 40 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Integrated	550
USB03005003018I	30 µm ID × 50 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Integrated	650
USB03006003018I	30 µm ID × 60 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Integrated	750
USB03007003018I	30 µm ID × 70 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	850
USB03008003018I	30 µm ID × 80 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	950
USB03009003018I	30 µm ID × 90 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	1,150
USB03010003018I	30 µm ID × 100 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	1,450
USB01002001718IWF	10 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Integrated	1,300
USB01003001718IWF	10 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Integrated	1,500
USB01502001718IWF	15 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Integrated	1,200
USB01503001718IWF	15 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Integrated	1,350
USB02002001718IWF	20 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Integrated	1,000
USB02003001718IWF	20 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Integrated	1,100
USB02004001718IWF	20 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<8,000	Integrated	1,300
USB03002001718IWF	30 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Integrated	750
USB03003001718IWF	30 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Integrated	850
USB03004001718IWF	30 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Integrated	950
USB03005001718IWF	30 µm ID × 50 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Integrated	1,150
USB03006001718IWF	30 µm ID × 60 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Integrated	1,450
USB03004003018IWF	30 µm ID × 40 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Integrated	650
USB03005003018IWF	30 µm ID × 50 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Integrated	750
USB03006003018IWF	30 µm ID × 60 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Integrated	850
USB03007003018IWF	30 µm ID × 70 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	950
USB03008003018IWF	30 µm ID × 80 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	1,050
USB03009003018IWF	30 µm ID × 90 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	1,250
USB03010003018IWF	30 µm ID × 100 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Integrated	1,550

Continued						
USB01002001718S	10 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Separated	900
USB01003001718S	10 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Separated	1,100
USB01502001718S	15 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Separated	800
USB01503001718S	15 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Separated	1,000
USB02002001718S	20 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Separated	650
USB02003001718S	20 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Separated	750
USB02004001718S	20 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<8,000	Separated	900
USB03002001718S	30 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Separated	500
USB03003001718S	30 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Separated	600
USB03004001718S	30 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Separated	700
USB03005001718S	30 µm ID × 50 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Separated	800
USB03006001718S	30 µm ID × 60 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Separated	950
USB03004003018S	30 µm ID × 40 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Separated	500
USB03005003018S	30 µm ID × 50 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Separated	600
USB03006003018S	30 µm ID × 60 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Separated	700
USB03007003018S	30 µm ID × 70 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	800
USB03008003018S	30 µm ID × 80 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	900
USB03009003018S	30 µm ID × 90 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	1,100
USB03010003018S	30 µm ID × 100 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	1,300
USB01002001718SWF	10 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Separated	1,100
USB01003001718SWF	10 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	3 ± 2	<5,000	Separated	1,300
USB01502001718SWF	15 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Separated	1,000
USB01503001718SWF	15 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	8 ± 3	<5,000	Separated	1,200
USB02002001718SWF	20 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Separated	850
USB02003001718SWF	20 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<5,000	Separated	950
USB02004001718SWF	20 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	15 ± 5	<8,000	Separated	1,100
USB03002001718SWF	30 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Separated	700
USB03003001718SWF	30 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<5,000	Separated	800
USB03004001718SWF	30 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Separated	900
USB03005001718SWF	30 µm ID × 50 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Separated	1,000
USB03006001718SWF	30 µm ID × 60 cm L × 360 µm OD	1.7 µm C18 (100A)	30 ± 10	<8,000	Separated	1,150
USB03004003018SWF	30 µm ID × 40 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Separated	700
USB03005003018SWF	30 µm ID × 50 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Separated	800
USB03006003018SWF	30 µm ID × 60 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<5,000	Separated	900
USB03007003018SWF	30 µm ID × 70 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	1,000
USB03008003018SWF	30 µm ID × 80 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	1,100
USB03009003018SWF	30 µm ID × 90 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	1,300
USB03010003018SWF	30 µm ID × 100 cm L × 360 µm OD	3 µm C18 (300A)	30 ± 10	<8,000	Separated	1,500

Note 1: Not-fitted columns (i.e., bare columns without fittings) are for users to flexibly utilize the columns according to users' specific instrument setups, while columns with fittings (WF, 1/16" VICI-type) are for conventional nanoLC instrument configurations. 2: MicroSPE columns (Page 17) are typically needed for quick sample loading as these ultrasensitive columns are operated at very low flows. 3: The nanoLC operation pressure listed is for the column operated at the middle value of the flow range (at room temperature). 4: Other dimensions of USB columns can be specially ordered.

High-Resolution Sensitive 50–75 μ m ID NanoLC Columns for Maximal Coverage Mass Spectrometry Proteome and Metabolome Analysis

We provide quality 50–75 μ m ID integrated nanoLC columns for mass spectrometry analysis of proteome enzymatic peptides and metabolites. These columns contain long uniform packing beds integrated with sharp ESI emitters to achieve high separation peak capacity (e.g., >1,000), high sensitivity achievable for the dimension of columns, and improved sample capacity. For example, our 75 μ m ID columns allow identifying >6,500 proteins from a 300–500 ng mammalian sample with MS/MS assignment of ~60,000 peptides (1% FDR), >3,000 proteins from a 10 ng sample with MS/MS assignment of >15,000 peptides (1% FDR), and moderate to low abundance proteins from a single mammalian cell with SRM.

Our high-resolution sensitive integrated columns are manufactured with use of 1.7 μ m and 3 μ m C18-bonded silica packings. The 1.7 μ m C18 columns fit fast peptide sequencing (e.g., by Thermo Lumos or Q Exactive) and targeted analysis (e.g., by SRM), while 3 μ m long C18 columns are used to maximize analysis coverage by extension of analysis time, especially when moderate speed mass spectrometers and moderate pressure nanoLC instruments are applied. Both types of columns are made with a large range of column lengths (e.g., 20–80 cm for 1.7 μ m C18 columns and 40–120 cm for 3 μ m C18 columns) for achieving the best analysis coverage in various applications.

In addition to integrated columns, we also provide separated columns for analysis of rough samples.

High-Resolution Sensitive NanoLC Integrated Columns for Acquisition of High-Quality Mass Spectral Datasets

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
HEB07502001718I	75 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	430
HEB07503001718I	75 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	480
HEB07504001718I	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	560
HEB07505001718I	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Integrated	640
HEB07506001718I	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Integrated	720
HEB07507001718I	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<10,000	Integrated	800
HEB07508001718I	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<10,000	Integrated	880
HEB05002001718I	50 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	430
HEB05003001718I	50 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	480
HEB05004001718I	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	560
HEB05005001718I	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Integrated	640
HEB05006001718I	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Integrated	720
HEB05007001718I	50 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<10,000	Integrated	800
HEB05008001718I	50 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<10,000	Integrated	880
HEB07504003018I	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<5,000	Integrated	350
HEB07505003018I	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<5,000	Integrated	380
HEB07506003018I	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<5,000	Integrated	460
HEB07507003018I	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Integrated	540
HEB07508003018I	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Integrated	620
HEB07509003018I	75 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Integrated	700
HEB07510003018I	75 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Integrated	780
HEB07512003018I	75 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<10,000	Integrated	1,000
HEB05004003018I	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<5,000	Integrated	350
HEB05005003018I	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<5,000	Integrated	380
HEB05006003018I	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<5,000	Integrated	460
HEB05007003018I	50 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Integrated	540
HEB05008003018I	50 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Integrated	620
HEB05009003018I	50 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Integrated	700
HEB05010003018I	50 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Integrated	780
HEB05012003018I	50 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<10,000	Integrated	1,000

Continued						
HEB07502001718IWF	75 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<5,000	Integrated	510
HEB07503001718IWF	75 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<5,000	Integrated	560
HEB07504001718IWF	75 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<5,000	Integrated	640
HEB07505001718IWF	75 µm ID × 50 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<8,000	Integrated	720
HEB07506001718IWF	75 µm ID × 60 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<8,000	Integrated	800
HEB07507001718IWF	75 µm ID × 70 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<10,000	Integrated	880
HEB07508001718IWF	75 µm ID × 80 cm L × 360 µm OD	1.7 µm C18 (100A)	200 ± 50	<10,000	Integrated	960
HEB05002001718IWF	50 µm ID × 20 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<5,000	Integrated	510
HEB05003001718IWF	50 µm ID × 30 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<5,000	Integrated	560
HEB05004001718IWF	50 µm ID × 40 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<5,000	Integrated	640
HEB05005001718IWF	50 µm ID × 50 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<8,000	Integrated	720
HEB05006001718IWF	50 µm ID × 60 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<8,000	Integrated	800
HEB05007001718IWF	50 µm ID × 70 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<10,000	Integrated	880
HEB05008001718IWF	50 µm ID × 80 cm L × 360 µm OD	1.7 µm C18 (100A)	100 ± 25	<10,000	Integrated	960
HEB07504003018IWF	75 µm ID × 40 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<5,000	Integrated	430
HEB07505003018IWF	75 µm ID × 50 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<5,000	Integrated	460
HEB07506003018IWF	75 µm ID × 60 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<5,000	Integrated	540
HEB07507003018IWF	75 µm ID × 70 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<8,000	Integrated	620
HEB07508003018IWF	75 µm ID × 80 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<8,000	Integrated	700
HEB07509003018IWF	75 µm ID × 90 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<8,000	Integrated	780
HEB07510003018IWF	75 µm ID × 100 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<8,000	Integrated	860
HEB07512003018IWF	75 µm ID × 120 cm L × 360 µm OD	3 µm C18 (300A)	200 ± 50	<10,000	Integrated	1,080
HEB05004003018IWF	50 µm ID × 40 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<5,000	Integrated	430
HEB05005003018IWF	50 µm ID × 50 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<5,000	Integrated	460
HEB05006003018IWF	50 µm ID × 60 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<5,000	Integrated	540
HEB05007003018IWF	50 µm ID × 70 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<8,000	Integrated	620
HEB05008003018IWF	50 µm ID × 80 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<8,000	Integrated	700
HEB05009003018IWF	50 µm ID × 90 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<8,000	Integrated	780
HEB05010003018IWF	50 µm ID × 100 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<8,000	Integrated	860
HEB05012003018IWF	50 µm ID × 120 cm L × 360 µm OD	3 µm C18 (300A)	100 ± 25	<10,000	Integrated	1,080

Note 1: These integrated columns are recommended for acquisition of quality mass spectral datasets in proteome and metabolome analysis. 2: Columns with fittings (WF; 1/16" VICI-type) can be connected to a nanoLC system by using a CoAnn connection line (Page 18) or Thermo nanoViper. 3: The operation pressure listed is for the column operated at the middle value of the flow range (at room temperature). 4: Other dimensions of columns can be specially ordered.

Special High-Resolution Sensitive NanoLC Integrated Columns for Separation of Peptides and Metabolites Having Extra Retentions

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
HEB07503001718I-060	75 um ID × 30 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<5,000	Integrated	530
HEB07504001718I-060	75 um ID × 40 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<5,000	Integrated	600
HEB07505001718I-060	75 um ID × 50 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<8,000	Integrated	700
HEB07506001718I-060	75 um ID × 60 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<8,000	Integrated	800
HEB07507001718I-060	75 um ID × 70 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<10,000	Integrated	900
HEB07508001718I-060	75 um ID × 80 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<10,000	Integrated	1,000
HEB07503001718I-300	75 um ID × 30 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<5,000	Integrated	530
HEB07504001718I-300	75 um ID × 40 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<5,000	Integrated	600
HEB07505001718I-300	75 um ID × 50 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<8,000	Integrated	700
HEB07506001718I-300	75 um ID × 60 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<8,000	Integrated	800
HEB07507001718I-300	75 um ID × 70 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<10,000	Integrated	900
HEB07508001718I-300	75 um ID × 80 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<10,000	Integrated	1,000
HEB07504003018I-200	75 um ID × 40 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	380
HEB07505003018I-200	75 um ID × 50 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	430
HEB07506003018I-200	75 um ID × 60 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	510
HEB07507003018I-200	75 um ID × 70 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	590
HEB07508003018I-200	75 um ID × 80 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<8,000	Integrated	670
HEB07509003018I-200	75 um ID × 90 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<8,000	Integrated	750
HEB07510003018I-200	75 um ID × 100 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<8,000	Integrated	830
HEB07503001718I-060WF	75 um ID × 30 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<5,000	Integrated	610
HEB07504001718I-060WF	75 um ID × 40 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<5,000	Integrated	680
HEB07505001718I-060WF	75 um ID × 50 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<8,000	Integrated	780
HEB07506001718I-060WF	75 um ID × 60 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<8,000	Integrated	880
HEB07507001718I-060WF	75 um ID × 70 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<10,000	Integrated	980
HEB07508001718I-060WF	75 um ID × 80 cm L × 360 um OD	1.7 um C18 (60A)	200 ± 50	<10,000	Integrated	1,080
HEB07503001718I-300WF	75 um ID × 30 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<5,000	Integrated	610
HEB07504001718I-300WF	75 um ID × 40 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<5,000	Integrated	680
HEB07505001718I-300WF	75 um ID × 50 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<8,000	Integrated	780
HEB07506001718I-300WF	75 um ID × 60 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<8,000	Integrated	880
HEB07507001718I-300WF	75 um ID × 70 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<10,000	Integrated	980
HEB07508001718I-300WF	75 um ID × 80 cm L × 360 um OD	1.7 um C18 (300A)	200 ± 50	<10,000	Integrated	1,080
HEB07504003018I-200WF	75 um ID × 40 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	460
HEB07505003018I-200WF	75 um ID × 50 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	510
HEB07506003018I-200WF	75 um ID × 60 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	590
HEB07507003018I-200WF	75 um ID × 70 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<5,000	Integrated	670
HEB07508003018I-200WF	75 um ID × 80 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<8,000	Integrated	750
HEB07509003018I-200WF	75 um ID × 90 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<8,000	Integrated	830
HEB07510003018I-200WF	75 um ID × 100 cm L × 360 um OD	3 um C18 (200A)	200 ± 50	<8,000	Integrated	910

Note: 1. These alternative columns are manufactured by using same protocols as for the high-resolution sensitive nanoLC integrated columns (Pages 3–5), but with use of packing particles having different sizes of surface pores that can adjust solute retention behaviors (generally, small surface pore particles provide large retention to solutes and large pore particles do inverse). 2: Columns with fittings (WF; 1/16" VICI-type) can be connected to a nanoLC system by using a CoAnn connection line (Page 18) or Thermo nanoViper. 3: The operation pressure listed is for the column operated at the middle value of the flow range (at room temperature). 4: Separated columns as well as other dimensions of columns (column length, diameter, packing particles, etc.) can be specially ordered.

High-Efficiency NanoLC Separated Columns for Mass Spectrometry Analysis of Rough Proteomic and Metabolomic Samples

We provide high quality separated nanoLC columns that need ESI emitters for nanoLC–MS analysis of peptides and metabolites. These columns are fitted with 1/16” standard fittings, or only bare packed capillary tubes that allow users to flexibly implement the columns to their nanoLC setups. The emitters of separated columns (page 18) are replaceable, which makes the separated columns favorable for analysis of rough samples containing high contents of “contaminants” (such as lipids) that may result in clogging the ESI emitter.

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
HEB07502001718S	75 um ID × 20 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<5,000	Separated	430
HEB07503001718S	75 um ID × 30 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<5,000	Separated	480
HEB07504001718S	75 um ID × 40 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<8,000	Separated	530
HEB07505001718S	75 um ID × 50 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<8,000	Separated	580
HEB07506001718S	75 um ID × 60 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<8,000	Separated	660
HEB07507001718S	75 um ID × 70 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<10,000	Separated	740
HEB07508001718S	75 um ID × 80 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<10,000	Separated	820
HEB05002001718S	50 um ID × 20 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<5,000	Separated	430
HEB05003001718S	50 um ID × 30 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<5,000	Separated	480
HEB05004001718S	50 um ID × 40 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<8,000	Separated	530
HEB05005001718S	50 um ID × 50 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<8,000	Separated	580
HEB05006001718S	50 um ID × 60 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<8,000	Separated	660
HEB05007001718S	50 um ID × 70 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<10,000	Separated	740
HEB05008001718S	50 um ID × 80 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<10,000	Separated	820
HEB07502001718SWF	75 um ID × 20 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<5,000	Separated	580
HEB07503001718SWF	75 um ID × 30 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<5,000	Separated	630
HEB07504001718SWF	75 um ID × 40 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<8,000	Separated	680
HEB07505001718SWF	75 um ID × 50 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<8,000	Separated	730
HEB07506001718SWF	75 um ID × 60 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<8,000	Separated	810
HEB07507001718SWF	75 um ID × 70 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<10,000	Separated	890
HEB07508001718SWF	75 um ID × 80 cm L × 360 um OD	1.7 um C18 (100A)	200 ± 50	<10,000	Separated	970
HEB05002001718SWF	50 um ID × 20 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<5,000	Separated	580
HEB05003001718SWF	50 um ID × 30 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<5,000	Separated	630
HEB05004001718SWF	50 um ID × 40 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<8,000	Separated	680
HEB05005001718SWF	50 um ID × 50 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<8,000	Separated	730
HEB05006001718SWF	50 um ID × 60 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<8,000	Separated	810
HEB05007001718SWF	50 um ID × 70 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<10,000	Separated	890
HEB05008001718SWF	50 um ID × 80 cm L × 360 um OD	1.7 um C18 (100A)	100 ± 25	<10,000	Separated	970
HEB07504003018S	75 um ID × 40 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<5,000	Separated	380
HEB07505003018S	75 um ID × 50 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<5,000	Separated	410
HEB07506003018S	75 um ID × 60 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<5,000	Separated	490
HEB07507003018S	75 um ID × 70 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<8,000	Separated	570
HEB07508003018S	75 um ID × 80 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<8,000	Separated	650
HEB07509003018S	75 um ID × 90 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<8,000	Separated	730
HEB07510003018S	75 um ID × 100 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<10,000	Separated	810
HEB07512003018S	75 um ID × 120 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<10,000	Separated	980
HEB05004003018S	50 um ID × 40 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<5,000	Separated	380
HEB05005003018S	50 um ID × 50 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<5,000	Separated	410
HEB05006003018S	50 um ID × 60 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<5,000	Separated	490
HEB05007003018S	50 um ID × 70 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<8,000	Separated	570
HEB05008003018S	50 um ID × 80 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<8,000	Separated	650
HEB05009003018S	50 um ID × 90 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<8,000	Separated	730
HEB05010003018S	50 um ID × 100 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<10,000	Separated	810
HEB05012003018S	50 um ID × 120 cm L × 360 um OD	3 um C18 (300A)	100 ± 25	<10,000	Separated	980

Continued

HEB07504003018SWF	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<5,000	Separated	530
HEB07505003018SWF	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<5,000	Separated	560
HEB07506003018SWF	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<5,000	Separated	640
HEB07507003018SWF	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Separated	720
HEB07508003018SWF	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Separated	800
HEB07509003018SWF	75 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<8,000	Separated	960
HEB07510003018SWF	75 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<10,000	Separated	1,100
HEB07512003018SWF	75 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	200 $\pm$ 50	<10,000	Separated	1,270
HEB05004003018SWF	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<5,000	Separated	530
HEB05005003018SWF	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<5,000	Separated	560
HEB05006003018SWF	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<5,000	Separated	640
HEB05007003018SWF	50 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Separated	720
HEB05008003018SWF	50 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Separated	800
HEB05009003018SWF	50 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<8,000	Separated	960
HEB05010003018SWF	50 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<10,000	Separated	1,100
HEB05012003018SWF	50 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C18 (300A)	100 $\pm$ 25	<10,000	Separated	1,270

Note 1: These separated columns are recommended for analysis of rough samples or test of nanoLC–MS instruments, although these separated columns are made by using same protocols as for integrated columns that are suggested for acquisition of high-quality mass spectral datasets; this suggestion is based on considerations that more or less losses of samples and nanoLC efficiency exist at the junction of column–ESI emitter even with use of a zero-dead volume union for connection, which affects MS analysis coverage for complex samples. 2: Columns with fittings (WF; 1/16” VICI-type) can be connected to a nanoLC system by using a CoAnn connection line (Page 18) or Thermo nanoViper. 3: ESI HV can be applied on the column outlet union that connects an ESI emitter and the ESI emitter is coupled to ion sources by using ion source adapters (Page 18). 4: The operation pressure listed is for the column operated at the middle value of the flow range (at room temperature). 5: Other dimensions of columns can be specially ordered.

Sensitive NanoLC Columns for Mass Spectrometry Analysis of Phosphopeptides (Phosphoproteomics)

We provide nanoLC columns for sensitive nanoLC–mass spectrometry analysis of phosphopeptides. These columns, when operated at either moderate or ultrahigh pressures, provide high efficiency and high recovery separations for phosphopeptides and support highly sensitive ESI–mass spectrometry analysis of phosphopeptides. For example, our 75 μ m ID columns allow nanoLC–MS/MS assignment of >5,000 phosphopeptides for >2,000 proteins from a 10-ng phosphoproteomic sample and >20,000 phosphopeptides for >4,500 proteins from a 300-ng phosphoproteomic sample.

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
PPB02002001718I	20 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	15 $\pm$ 5	<5,000	Integrated	800
PPB02003001718I	20 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	15 $\pm$ 5	<5,000	Integrated	900
PPB03002001718I	30 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	650
PPB03003001718I	30 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	750
PPB03004001718I	30 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	850
PPB03005001718I	30 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	1,050
PPB05002001718I	50 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	430
PPB05003001718I	50 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	480
PPB05004001718I	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	560
PPB05005001718I	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Integrated	640
PPB05006001718I	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Integrated	720
PPB07502001718I	75 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	430
PPB07503001718I	75 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	480
PPB07504001718I	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	560
PPB07505001718I	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Integrated	640
PPB07506001718I	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Integrated	720
PPB05002001718S	50 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Separated	430
PPB05003001718S	50 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Separated	480
PPB05004001718S	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Separated	530
PPB05005001718S	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Separated	580
PPB05006001718S	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Separated	660
PPB05007001718S	50 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<10,000	Separated	740
PPB05008001718S	50 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<10,000	Separated	820
PPB07502001718S	75 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	430
PPB07503001718S	75 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	480
PPB07504001718S	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	530
PPB07505001718S	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	580
PPB07506001718S	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	660
PPB07507001718S	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<10,000	Separated	740
PPB07508001718S	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<10,000	Separated	820
PPB02002001718IWF	20 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	15 $\pm$ 5	<5,000	Integrated	900
PPB02003001718IWF	20 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	15 $\pm$ 5	<5,000	Integrated	1,000
PPB03002001718IWF	30 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	750
PPB03003001718IWF	30 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	850
PPB03004001718IWF	30 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	950
PPB03005001718IWF	30 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	30 $\pm$ 10	<5,000	Integrated	1,150
PPB05002001718IWF	50 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	550
PPB05003001718IWF	50 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	600
PPB05004001718IWF	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Integrated	680

Continued

PPB05005001718IWF	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Integrated	760
PPB05006001718IWF	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Integrated	840
PPB07502001718IWF	75 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	550
PPB07503001718IWF	75 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	600
PPB07504001718IWF	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<5,000	Integrated	680
PPB07505001718IWF	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Integrated	760
PPB07506001718IWF	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Integrated	840
PPB05002001718SWF	50 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Separated	580
PPB05003001718SWF	50 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Separated	630
PPB05004001718SWF	50 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<5,000	Separated	680
PPB05005001718SWF	50 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Separated	730
PPB05006001718SWF	50 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<8,000	Separated	810
PPB05007001718SWF	50 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<10,000	Separated	890
PPB05008001718SWF	50 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	100 $\pm$ 25	<10,000	Separated	970
PPB07502001718SWF	75 μ m ID $\times$ 20 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	580
PPB07503001718SWF	75 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	630
PPB07504001718SWF	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	680
PPB07505001718SWF	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	730
PPB07506001718SWF	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<8,000	Separated	810
PPB07507001718SWF	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<10,000	Separated	890
PPB07508001718SWF	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	1.7 μ m C18 (100A)	200 $\pm$ 50	<10,000	Separated	970

Note 1: Special fittings are used for making PPB WF columns for highly sensitive ESI–mass spectrometry analysis of phosphopeptides; these fitted columns can be connected to a nanoLC system by using a CoAnn connection line (Page 18) or Thermo nanoViper. 2: The ESI emitters for separated PPB columns are available (Page 18). 3: The operation pressure listed is for the column operated at the middle value of the flow range (at room temperature). 4: Other dimensions of columns can be specially ordered.

High-Resolution NanoLC Columns for Separation of Proteins and Proteoforms (Top-Down Proteomics)

We provide high-resolution nanoLC columns for separating proteoforms to achieve maximal coverage of top-down mass spectrometry analysis of proteoforms (proteome protein isoforms) to reveal proteins functioning in a specific biological process. Our high-resolution nanoLC columns generate separation peak capacities up to 800–1,000 for proteoforms, allowing characterization of >10,000 proteoforms for >1,500 proteins from a one-shot single nanoLC–tandem mass spectrometry analysis. Such analysis coverage (analysis depth) can be further greatly extended by applying the high-resolution nanoLC into various platforms of multi-dimensional top-down mass spectrometry analysis of proteoforms.

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
HRT07505003002I	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<5,000	Integrated	400
HRT07506003002I	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<5,000	Integrated	460
HRT07507003002I	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<8,000	Integrated	540
HRT07508003002I	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<8,000	Integrated	620
HRT07509003002I	75 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<8,000	Integrated	700
HRT07510003002I	75 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<10,000	Integrated	780
HRT07512003002I	75 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<12,000	Integrated	1,000
HRT10005003002I	100 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<5,000	Integrated	400
HRT10006003002I	100 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<5,000	Integrated	460
HRT10007003002I	100 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<8,000	Integrated	540
HRT10008003002I	100 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<8,000	Integrated	620
HRT10009003002I	100 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<8,000	Integrated	700
HRT10010003002I	100 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<10,000	Integrated	780
HRT10012003002I	100 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	450 $\pm$ 150	<12,000	Integrated	1,000
HRT07505003004I	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<5,000	Integrated	400
HRT07506003004I	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<5,000	Integrated	460
HRT07507003004I	75 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<8,000	Integrated	540
HRT07508003004I	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<8,000	Integrated	620
HRT07509003004I	75 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<8,000	Integrated	700
HRT07510003004I	75 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<10,000	Integrated	780
HRT07512003004I	75 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	200 $\pm$ 50	<12,000	Integrated	1,000
HRT10005003004I	100 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<5,000	Integrated	400
HRT10006003004I	100 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<5,000	Integrated	460
HRT10007003004I	100 μ m ID $\times$ 70 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<8,000	Integrated	540
HRT10008003004I	100 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<8,000	Integrated	620
HRT10009003004I	100 μ m ID $\times$ 90 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<8,000	Integrated	700
HRT10010003004I	100 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<10,000	Integrated	780
HRT10012003004I	100 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	3 μ m C4 (300A)	450 $\pm$ 150	<12,000	Integrated	1,000
HRT07506003404I	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	150 $\pm$ 50	<8,000	Integrated	570
HRT07508003404I	75 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	150 $\pm$ 50	<8,000	Integrated	690
HRT07510003404I	75 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	150 $\pm$ 50	<10,000	Integrated	870
HRT07512003404I	75 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	150 $\pm$ 50	<12,000	Integrated	1,080
HRT07515003404I	75 μ m ID $\times$ 150 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	150 $\pm$ 50	<15,000	Integrated	1,350
HRT10006003404I	100 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	300 $\pm$ 100	<8,000	Integrated	570
HRT10008003404I	100 μ m ID $\times$ 80 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	300 $\pm$ 100	<8,000	Integrated	690
HRT10010003404I	100 μ m ID $\times$ 100 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	300 $\pm$ 100	<10,000	Integrated	870
HRT10012003404I	100 μ m ID $\times$ 120 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	300 $\pm$ 100	<12,000	Integrated	1,080
HRT10015003404I	100 μ m ID $\times$ 150 cm L $\times$ 360 μ m OD	Halo 3.4 μ m C4 (400A)	300 $\pm$ 100	<15,000	Integrated	1,350
HRT07503002704I	75 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	Halo 2.7 μ m C4 (1000A)	150 $\pm$ 50	<8,000	Integrated	550
HRT07504002704I	75 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	Halo 2.7 μ m C4 (1000A)	150 $\pm$ 50	<10,000	Integrated	650
HRT07505002704I	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	Halo 2.7 μ m C4 (1000A)	150 $\pm$ 50	<15,000	Integrated	750
HRT10003002704I	100 μ m ID $\times$ 30 cm L $\times$ 360 μ m OD	Halo 2.7 μ m C4 (1000A)	300 $\pm$ 100	<8,000	Integrated	550
HRT10004002704I	100 μ m ID $\times$ 40 cm L $\times$ 360 μ m OD	Halo 2.7 μ m C4 (1000A)	300 $\pm$ 100	<10,000	Integrated	650
HRT10005002704I	100 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	Halo 2.7 μ m C4 (1000A)	300 $\pm$ 100	<15,000	Integrated	750
HRT07505003002S	75 μ m ID $\times$ 50 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<5,000	Separated	350
HRT07506003002S	75 μ m ID $\times$ 60 cm L $\times$ 360 μ m OD	3 μ m C2 (300A)	200 $\pm$ 50	<5,000	Separated	400

Continued

HRT07507003002S	75 um ID × 70 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Separated	480
HRT07508003002S	75 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Separated	560
HRT07509003002S	75 um ID × 90 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Separated	640
HRT07510003002S	75 um ID × 100 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<10,000	Separated	720
HRT07512003002S	75 um ID × 120 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<12,000	Separated	960
HRT10005003002S	100 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<5,000	Separated	350
HRT10006003002S	100 um ID × 60 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<5,000	Separated	400
HRT10007003002S	100 um ID × 70 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Separated	480
HRT10008003002S	100 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Separated	560
HRT10009003002S	100 um ID × 90 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Separated	640
HRT10010003002S	100 um ID × 100 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<10,000	Separated	720
HRT10012003002S	100 um ID × 120 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<12,000	Separated	960
HRT07505003004S	75 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<5,000	Separated	350
HRT07506003004S	75 um ID × 60 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<5,000	Separated	400
HRT07507003004S	75 um ID × 70 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Separated	480
HRT07508003004S	75 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Separated	560
HRT07509003004S	75 um ID × 90 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Separated	640
HRT07510003004S	75 um ID × 100 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<10,000	Separated	720
HRT07512003004S	75 um ID × 120 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<12,000	Separated	960
HRT10005003004S	100 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<5,000	Separated	350
HRT10006003004S	100 um ID × 60 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<5,000	Separated	400
HRT10007003004S	100 um ID × 70 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Separated	480
HRT10008003004S	100 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Separated	560
HRT10009003004S	100 um ID × 90 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Separated	640
HRT10010003004S	100 um ID × 100 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<10,000	Separated	720
HRT10012003004S	100 um ID × 120 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<12,000	Separated	960
HRT07506003404S	75 um ID × 60 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<8,000	Separated	500
HRT07508003404S	75 um ID × 80 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<8,000	Separated	630
HRT07510003404S	75 um ID × 100 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<10,000	Separated	800
HRT07512003404S	75 um ID × 120 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<12,000	Separated	1,030
HRT07515003404S	75 um ID × 150 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<15,000	Separated	1,300
HRT10006003404S	100 um ID × 60 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<8,000	Separated	500
HRT10008003404S	100 um ID × 80 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<8,000	Separated	630
HRT10010003404S	100 um ID × 100 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<10,000	Separated	800
HRT10012003404S	100 um ID × 120 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<12,000	Separated	1,030
HRT10015003404S	100 um ID × 150 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<15,000	Separated	1,300
HRT07503002704S	75 um ID × 30 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<8,000	Separated	500
HRT07504002704S	75 um ID × 40 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<10,000	Separated	600
HRT07505002704S	75 um ID × 50 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<15,000	Separated	700
HRT10003002704S	100 um ID × 30 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<8,000	Separated	500
HRT10004002704S	100 um ID × 40 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<10,000	Separated	600
HRT10005002704S	100 um ID × 50 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<15,000	Separated	700
HRT07505003002IWF	75 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<5,000	Integrated	500
HRT07506003002IWF	75 um ID × 60 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<5,000	Integrated	540
HRT07507003002IWF	75 um ID × 70 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Integrated	620
HRT07508003002IWF	75 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Integrated	700
HRT07509003002IWF	75 um ID × 90 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Integrated	780
HRT07510003002IWF	75 um ID × 100 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<10,000	Integrated	860
HRT07512003002IWF	75 um ID × 120 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<12,000	Integrated	1,080
HRT10005003002IWF	100 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<5,000	Integrated	500
HRT10006003002IWF	100 um ID × 60 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<5,000	Integrated	540
HRT10007003002IWF	100 um ID × 70 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Integrated	620
HRT10008003002IWF	100 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Integrated	700
HRT10009003002IWF	100 um ID × 90 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Integrated	780
HRT10010003002IWF	100 um ID × 100 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<10,000	Integrated	860
HRT10012003002IWF	100 um ID × 120 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<12,000	Integrated	1,080
HRT07505003004IWF	75 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<5,000	Integrated	500
HRT07506003004IWF	75 um ID × 60 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<5,000	Integrated	540
HRT07507003004IWF	75 um ID × 70 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Integrated	620
HRT07508003004IWF	75 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Integrated	700

Continued

HRT07509003004IWF	75 um ID × 90 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Integrated	780
HRT07510003004IWF	75 um ID × 100 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<10,000	Integrated	860
HRT07512003004IWF	75 um ID × 120 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<12,000	Integrated	1,080
HRT10005003004IWF	100 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<5,000	Integrated	500
HRT10006003004IWF	100 um ID × 60 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<5,000	Integrated	540
HRT10007003004IWF	100 um ID × 70 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Integrated	620
HRT10008003004IWF	100 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Integrated	700
HRT10009003004IWF	100 um ID × 90 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Integrated	780
HRT10010003004IWF	100 um ID × 100 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<10,000	Integrated	860
HRT10012003004IWF	100 um ID × 120 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<12,000	Integrated	1,080
HRT07506003404IWF	75 um ID × 60 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<8,000	Integrated	650
HRT07508003404IWF	75 um ID × 80 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<8,000	Integrated	780
HRT07510003404IWF	75 um ID × 100 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<10,000	Integrated	960
HRT07512003404IWF	75 um ID × 120 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<12,000	Integrated	1,160
HRT07515003404IWF	75 um ID × 150 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<15,000	Integrated	1,430
HRT10006003404IWF	100 um ID × 60 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<8,000	Integrated	600
HRT10008003404IWF	100 um ID × 80 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<8,000	Integrated	780
HRT10010003404IWF	100 um ID × 100 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<10,000	Integrated	960
HRT10012003404IWF	100 um ID × 120 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<12,000	Integrated	1,160
HRT10015003404IWF	100 um ID × 150 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<15,000	Integrated	1,430
HRT07503002704IWF	75 um ID × 30 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<8,000	Integrated	630
HRT07504002704IWF	75 um ID × 40 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<10,000	Integrated	730
HRT07505002704IWF	75 um ID × 50 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<15,000	Integrated	830
HRT10003002704IWF	100 um ID × 30 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<8,000	Integrated	630
HRT10004002704IWF	100 um ID × 40 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<10,000	Integrated	730
HRT10005002704IWF	100 um ID × 50 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<15,000	Integrated	830
HRT07505003002SWF	75 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<5,000	Separated	500
HRT07506003002SWF	75 um ID × 60 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<5,000	Separated	550
HRT07507003002SWF	75 um ID × 70 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Separated	630
HRT07508003002SWF	75 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Separated	710
HRT07509003002SWF	75 um ID × 90 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<8,000	Separated	790
HRT07510003002SWF	75 um ID × 100 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<10,000	Separated	870
HRT07512003002SWF	75 um ID × 120 cm L × 360 um OD	3 um C2 (300A)	200 ± 50	<12,000	Separated	1,090
HRT10005003002SWF	100 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<5,000	Separated	500
HRT10006003002SWF	100 um ID × 60 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<5,000	Separated	550
HRT10007003002SWF	100 um ID × 70 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Separated	630
HRT10008003002SWF	100 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Separated	710
HRT10009003002SWF	100 um ID × 90 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	Separated	790
HRT10010003002SWF	100 um ID × 100 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<10,000	Separated	870
HRT10012003002SWF	100 um ID × 120 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<12,000	Separated	1,090
HRT07505003004SWF	75 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<5,000	Separated	500
HRT07506003004SWF	75 um ID × 60 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<5,000	Separated	550
HRT07507003004SWF	75 um ID × 70 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Separated	630
HRT07508003004SWF	75 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Separated	710
HRT07509003004SWF	75 um ID × 90 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<8,000	Separated	790
HRT07510003004SWF	75 um ID × 100 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<10,000	Separated	870
HRT07512003004SWF	75 um ID × 120 cm L × 360 um OD	3 um C4 (300A)	200 ± 50	<12,000	Separated	1,090
HRT10005003004SWF	100 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<5,000	Separated	500
HRT10006003004SWF	100 um ID × 60 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<5,000	Separated	550
HRT10007003004SWF	100 um ID × 70 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Separated	630
HRT10008003004SWF	100 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Separated	710
HRT10009003004SWF	100 um ID × 90 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	Separated	790
HRT10010003004SWF	100 um ID × 100 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<10,000	Separated	870
HRT10012003004SWF	100 um ID × 120 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<12,000	Separated	1,090
HRT07506003404SWF	75 um ID × 60 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<8,000	Separated	670
HRT07508003404SWF	75 um ID × 80 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<8,000	Separated	790
HRT07510003404SWF	75 um ID × 100 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<10,000	Separated	970
HRT07512003404SWF	75 um ID × 120 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<12,000	Separated	1,100
HRT07515003404SWF	75 um ID × 150 cm L × 360 um OD	Halo 3.4 um C4 (400A)	150 ± 50	<15,000	Separated	1,350

Continued

HRT10006003404SWF	100 um ID × 60 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<8,000	Separated	670
HRT10008003404SWF	100 um ID × 80 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<8,000	Separated	790
HRT10010003404SWF	100 um ID × 100 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<10,000	Separated	970
HRT10012003404SWF	100 um ID × 120 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<12,000	Separated	1,100
HRT10015003404SWF	100 um ID × 150 cm L × 360 um OD	Halo 3.4 um C4 (400A)	300 ± 100	<15,000	Separated	1,350
HRT07503002704SWF	75 um ID × 30 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<8,000	Separated	670
HRT07504002704SWF	75 um ID × 40 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<10,000	Separated	770
HRT07505002704SWF	75 um ID × 50 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	150 ± 50	<15,000	Separated	870
HRT10003002704SWF	100 um ID × 30 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<8,000	Separated	670
HRT10004002704SWF	100 um ID × 40 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<10,000	Separated	770
HRT10005002704SWF	100 um ID × 50 cm L × 360 um OD	Halo 2.7 um C4 (1000A)	300 ± 100	<15,000	Separated	870

Note 1: The columns with fittings (WF; 1/16" VICI-type) can be connected to a nanoLC system by using a CoAnn connection line (Page 18) or Thermo nanoViper. 2: The ESI emitters for separated columns are available (Page 18). 3: The nanoLC operation pressure listed is for column operated at the middle value of the flow range (at room temperature). 4: Other dimensions of columns can be specially ordered.

High-Resolution NanoLC Columns for Middle-Down Mass Spectrometry Proteomic Analysis

The C4 and C18 columns used for separation of peptides and proteins can also be used for separation of moderate size polypeptides (MWs 5–15 kDa; middle-down proteomic analysis targets). In addition, we provide C8 nanoLC columns with peak capacities of >1,000 for universal separation of middle size polypeptides. These columns are designed for maximizing analysis coverage of middle-down proteomics aiming at determination of protein post-translational modifications (PTMs).

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Column Feature	Price (\$)
HRM07505003008I	75 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<5,000	Integrated	500
HRM07506003008I	75 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Integrated	580
HRM07507003008I	75 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Integrated	660
HRM07508003008I	75 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Integrated	740
HRM07509003008I	75 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Integrated	820
HRM07510003008I	75 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Integrated	900
HRM10005003008I	100 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<5,000	Integrated	500
HRM10006003008I	100 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Integrated	580
HRM10007003008I	100 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Integrated	660
HRM10008003008I	100 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Integrated	740
HRM10009003008I	100 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Integrated	820
HRM10010003008I	100 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Integrated	900
HRM07505003008S	75 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<5,000	Separated	450
HRM07506003008S	75 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Separated	530
HRM07507003008S	75 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Separated	610
HRM07508003008S	75 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Separated	690
HRM07509003008S	75 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Separated	770
HRM07510003008S	75 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Separated	850
HRM10005003008S	100 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<5,000	Separated	450
HRM10006003008S	100 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Separated	530
HRM10007003008S	100 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Separated	610
HRM10008003008S	100 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Separated	690
HRM10009003008S	100 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Separated	770
HRM10010003008S	100 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Separated	850
HRM07505003008IWF	75 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<5,000	Integrated	580
HRM07506003008IWF	75 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Integrated	660
HRM07507003008IWF	75 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Integrated	740
HRM07508003008IWF	75 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Integrated	820
HRM07509003008IWF	75 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Integrated	900
HRM07510003008IWF	75 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Integrated	980
HRM10005003008IWF	100 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<5,000	Integrated	580
HRM10006003008IWF	100 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Integrated	660
HRM10007003008IWF	100 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Integrated	740
HRM10008003008IWF	100 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Integrated	820
HRM10009003008IWF	100 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Integrated	900
HRM10010003008IWF	100 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Integrated	980
HRM07505003008SWF	75 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<5,000	Separated	580
HRM07506003008SWF	75 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Separated	660
HRM07507003008SWF	75 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Separated	740
HRM07508003008SWF	75 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<8,000	Separated	820
HRM07509003008SWF	75 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Separated	900
HRM07510003008SWF	75 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	200 ± 50	<10,000	Separated	980
HRM10005003008SWF	100 um ID × 50 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<5,000	Separated	580
HRM10006003008SWF	100 um ID × 60 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Separated	660
HRM10007003008SWF	100 um ID × 70 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Separated	740
HRM10008003008SWF	100 um ID × 80 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<8,000	Separated	820
HRM10009003008SWF	100 um ID × 90 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Separated	900
HRM10010003008SWF	100 um ID × 100 cm L × 360 um OD	3 um C8 (300A)	450 ± 150	<10,000	Separated	980

Note 1: The columns with fittings (WF; 1/16" VICI-type) can be connected to nanoLC systems by using a CoAnn connection line (Page18) or Thermo nanoViper. 2: The nanoLC operation pressure listed is for the column operated at the middle value of the flow range (at room temperature). 3: Other properties and dimensions of columns (column length, diameter, packings, etc.) can be specially ordered.

Peptide High-pH RPLC Fractionation Columns for Two-Dimensional Bottom-Up Proteomic Analysis

Peptide high-pH RPLC fractionation in combination with low-pH nanoLC constructs an effective two-dimensional separation platform for bottom-up proteomic analysis.

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Price (\$)
HPH07505003018SWF	75 um ID × 50 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<8,000	600
HPH07508003018SWF	75 um ID × 80 cm L × 360 um OD	3 um C18 (300A)	200 ± 50	<10,000	800
HPH10005003018SWF	100 um ID × 50 cm L × 360 um OD	3 um C18 (300A)	450 ± 150	<8,000	600
HPH10008003018SWF	100 um ID × 80 cm L × 360 um OD	3 um C18 (300A)	450 ± 150	<10,000	800
HPH15005003018SWF	150 um ID × 50 cm L × 360 um OD	3 um C18 (300A)	800 ± 200	<8,000	600
HPH15008003018SWF	150 um ID × 80 cm L × 360 um OD	3 um C18 (300A)	800 ± 200	<10,000	800
HPH20005003018SWF	200 um ID × 50 cm L × 360 um OD	3 um C18 (300A)	1,500 ± 500	<8,000	650
HPH20008003018SWF	200 um ID × 80 cm L × 360 um OD	3 um C18 (300A)	1,500 ± 500	<10,000	850
HPH32005003018SWF	320 um ID × 50 cm L × 1.6 mm OD	3 um C18 (300A)	1,500 ± 200	<8,000	700
HPH32008003018SWF	320 um ID × 80 cm L × 1.6 mm OD	3 um C18 (300A)	1,500 ± 200	<10,000	900
HPH53005003018SWF	530 um ID × 50 cm L × 1.6 mm OD	3 um C18 (300A)	1,500 ± 200	<8,000	800
HPH53008003018SWF	530 um ID × 80 cm L × 1.6 mm OD	3 um C18 (300A)	1,500 ± 200	<10,000	1,000

Note 1: The pH of mobile phases should be limited to <10. 2: Other dimensions and packings of columns for peptide fractionation can be specially ordered.

Protein/Proteoform RPLC Fractionation Columns for Multi-Dimensional Top-Down Proteomic Analysis

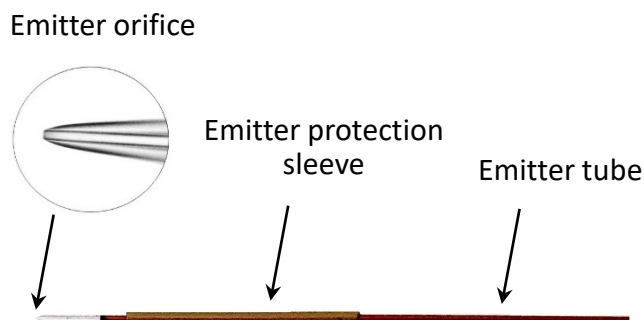
RPLC can be used to fractionate proteins/proteoforms to construct multi-dimensional top-down proteomic analysis when combined with other format(s) of chromatography and electrophoresis separations.

Product #	Dimension	Packing Particles	Flow Rate (nL/min)	Operation Pressure (psi)	Price (\$)
HPF10005003002SWF	100 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<8,000	600
HPF10008003002SWF	100 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	450 ± 150	<10,000	800
HPF10005003004SWF	100 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<8,000	600
HPF10008003004SWF	100 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	450 ± 150	<10,000	800
HPF20005003002SWF	200 um ID × 50 cm L × 360 um OD	3 um C2 (300A)	1,500 ± 500	<8,000	650
HPF20008003002SWF	200 um ID × 80 cm L × 360 um OD	3 um C2 (300A)	1,500 ± 500	<10,000	850
HPF20005003004SWF	200 um ID × 50 cm L × 360 um OD	3 um C4 (300A)	1,500 ± 500	<8,000	650
HPF20008003004SWF	200 um ID × 80 cm L × 360 um OD	3 um C4 (300A)	1,500 ± 500	<10,000	850
HPF32005003002SWF	320 um ID × 50 cm L × 1.6 mm OD	3 um C2 (300A)	4,000 ± 500	<8,000	700
HPF32008003002SWF	320 um ID × 80 cm L × 1.6 mm OD	3 um C2 (300A)	4,000 ± 500	<10,000	900
HPF32005003004SWF	320 um ID × 50 cm L × 1.6 mm OD	3 um C4 (300A)	4,000 ± 500	<8,000	700
HPF32008003004SWF	320 um ID × 80 cm L × 1.6 mm OD	3 um C4 (300A)	4,000 ± 500	<10,000	900
HPF53005003002SWF	530 um ID × 50 cm L × 1.6 mm OD	3 um C2 (300A)	10,000 ± 500	<8,000	800
HPF53005003004SWF	530 um ID × 50 cm L × 1.6 mm OD	3 um C4 (300A)	10,000 ± 500	<8,000	1,000
HPF20005003404SWF	200 um ID × 50 cm L × 1.6 mm OD	Halo 3.4 um C4 (400A)	1,500 ± 200	<8,000	650
HPF32005003404SWF	320 um ID × 50 cm L × 1.6 mm OD	Halo 3.4 um C4 (400A)	4,000 ± 300	<8,000	750
HPF53005003404SWF	530 um ID × 50 cm L × 1.6 mm OD	Halo 3.4 um C4 (400A)	10,000 ± 500	<8,000	850
HPF20003002704SWF	200 um ID × 30 cm L × 1.6 mm OD	Halo 2.7 um C4 (1000A)	1,500 ± 200	<8,000	550
HPF32003002704SWF	320 um ID × 30 cm L × 1.6 mm OD	Halo 2.7 um C4 (1000A)	4,000 ± 300	<8,000	650
HPF53003002704SWF	530 um ID × 30 cm L × 1.6 mm OD	Halo 2.7 um C4 (1000A)	10,000 ± 500	<8,000	750

Note: Other dimensions and packings of columns for protein/proteoform fractionation can be specially ordered.

Accessories:

1. Pulled Emitter for ESI-MS and Separated NanoLC Column-ESI-MS

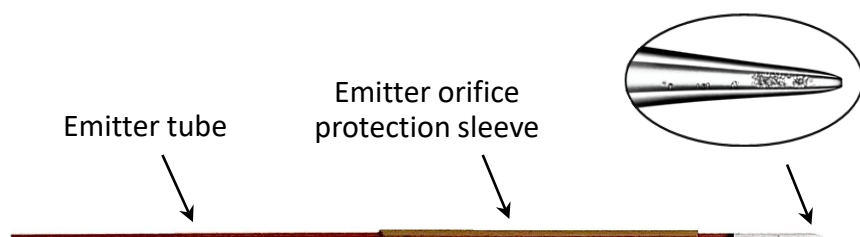


Product #	Emitter Tube Dimension	Orifice (um)	Used for flow (nL/min)	Used for NanoLC Column with ID (um)	Price (\$)
TIP36005015-7	360 um OD × 50 um ID × 7 cm L	13-15	300-600	100	25
TIP36005015-10	360 um OD × 50 um ID × 10 cm L	13-15	300-600	100	30
TIP36005015-12	360 um OD × 50 um ID × 12 cm L	13-15	300-600	100	30
TIP36003015-7	360 um OD × 30 um ID × 7 cm L	13-15	300-600	100	25
TIP36003015-10	360 um OD × 30 um ID × 10 cm L	13-15	300-600	100	30
TIP36003015-12	360 um OD × 30 um ID × 12 cm L	13-15	300-600	100	30
TIP36003010-7	360 um OD × 30 um ID × 7 cm L	8-10	150-300	75	25
TIP36003010-10	360 um OD × 30 um ID × 10 cm L	8-10	150-300	75	30
TIP36003010-12	360 um OD × 30 um ID × 12 cm L	8-10	150-300	75	30
TIP36002010-7	360 um OD × 20 um ID × 7 cm L	8-10	150-300	75	25
TIP36002010-10	360 um OD × 20 um ID × 10 cm L	8-10	150-300	75	30
TIP36002010-12	360 um OD × 20 um ID × 12 cm L	8-10	150-300	75	30
TIP36002007-7	360 um OD × 20 um ID × 7 cm L	5-7	100-150	50	30
TIP36002007-10	360 um OD × 20 um ID × 10 cm L	5-7	100-150	50	30
TIP36002007-12	360 um OD × 20 um ID × 12 cm L	5-7	100-150	50	30
TIP36001507-7	360 um OD × 15 um ID × 7 cm L	5-7	100-150	50	30
TIP36001507-10	360 um OD × 15 um ID × 10 cm L	5-7	100-150	50	30
TIP36001507-12	360 um OD × 15 um ID × 12 cm L	5-7	100-150	50	30
TIP36001505-7	360 um OD × 15 um ID × 7 cm L	3-5	30-60	30	30
TIP36001505-10	360 um OD × 15 um ID × 10 cm L	3-5	30-60	30	30
TIP36001505-12	360 um OD × 15 um ID × 12 cm L	3-5	30-60	30	30
TIP36001005-7	360 um OD × 10 um ID × 7 cm L	3-5	30-60	30	30
TIP36001005-10	360 um OD × 10 um ID × 10 cm L	3-5	30-60	30	30
TIP36001005-12	360 um OD × 10 um ID × 12 cm L	3-5	30-60	30	30
TIP36001004-7	360 um OD × 10 um ID × 7 cm L	2-4	20-30	20	30
TIP36000504-7	360 um OD × 5 um ID × 7 cm L	2-4	20-30	20	35
TIP36000503-7	360 um OD × 5 um ID × 7 cm L	2-3	10-20	15	35

Note: Other dimensions of ESI emitters can be specially ordered.

2. Empty fritted fused silica capillary tubes for self pack nanoLC columns

Empty self pack nanoLC column tube with fritted pulled emitter



Product #	Emitter tube dimensions	Orifice (um)	Price (\$)
ICT36010015F-15	360 um OD × 100 um ID × 15 cm L	15	45
ICT36010015F-25	360 um OD × 100 um ID × 25 cm L	15	45
ICT36010015F-50	360 um OD × 100 um ID × 50 cm L	15	50
ICT36007515F-15	360 um OD × 75 um ID × 15 cm L	15	45
ICT36007515F-25	360 um OD × 75 um ID × 25 cm L	15	45
ICT36007515F-50	360 um OD × 75 um ID × 50 cm L	15	50

Empty self pack nanoLC column tube with fritted blunt end



Product #	Emitter tube dimensions	Price (\$)
SCT360100100F-15	360 um OD × 100 um ID × 15 cm L	45
SCT360100100F-25	360 um OD × 100 um ID × 25 cm L	45
SCT360100100F-50	360 um OD × 100 um ID × 50 cm L	50
SCT360075075F-15	360 um OD × 75 um ID × 15 cm L	45
SCT360075075F-25	360 um OD × 75 um ID × 25 cm L	45
SCT360075075F-50	360 um OD × 75 um ID × 50 cm L	50

3. MicroSPE Used for Sample Loading in NanoLC–Mass Spectrometry Analysis

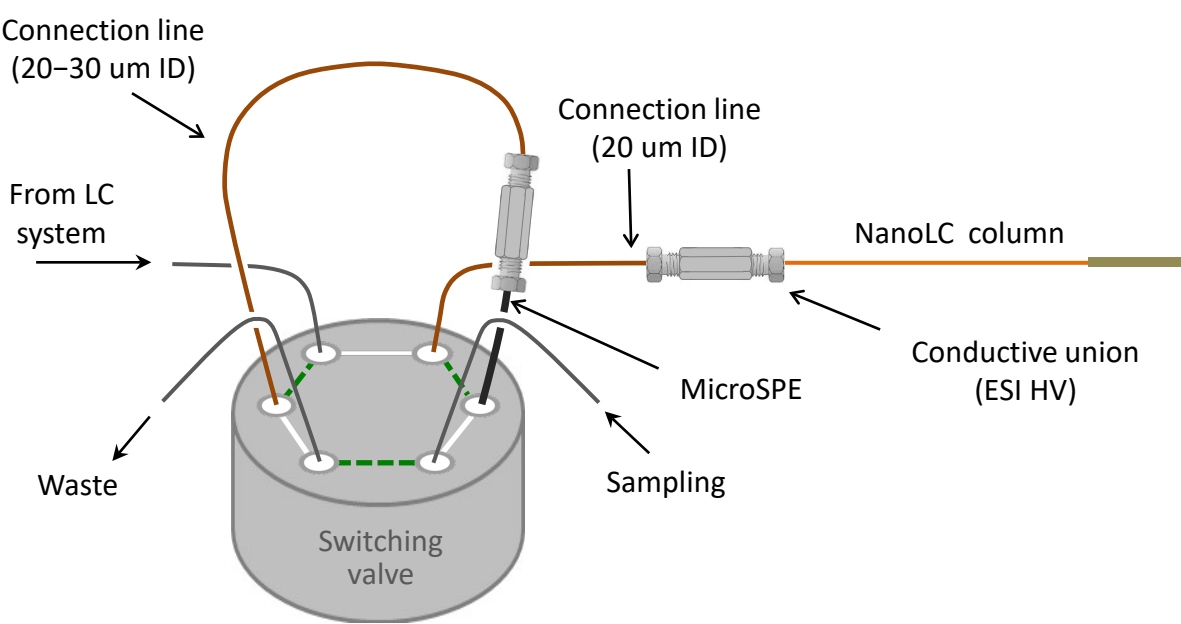
Bare microSPE (sealed at two ends)



MicroSPE with 1/16" fittings



Connection of microSPE and nanoLC column



Product #	Dimension	Packing Particles	Price (\$)
Bare MicroSPE			
SPE20005C18	200 um ID × 360 um OD × 5–6 cm L	5 um C18 (300A)	80
SPE15005C18	150 um ID × 360 um OD × 5–6 cm L	5 um C18 (300A)	80
SPE10005C18	100 um ID × 360 um OD × 5–6 cm L	5 um C18 (300A)	80
SPE07505C18	75 um ID × 360 um OD × 5–6 cm L	5 um C18 (300A)	80
SPE05005C18	50 um ID × 360 um OD × 5–6 cm L	5 um C18 (300A)	80
SPE03005C18	30 um ID × 360 um OD × 5–6 cm L	5 um C18 (300A)	100
SPE20005C08	200 um ID × 360 um OD × 5–6 cm L	5 um C8 (300A)	80
SPE15005C08	150 um ID × 360 um OD × 5–6 cm L	5 um C8 (300A)	80
SPE10005C08	100 um ID × 360 um OD × 5–6 cm L	5 um C8 (300A)	80
SPE07505C08	75 um ID × 360 um OD × 5–6 cm L	5 um C8 (300A)	80
SPE05005C08	50 um ID × 360 um OD × 5–6 cm L	5 um C8 (300A)	80

Continued			
SPE20005C04	200 um ID × 360 um OD × 5–6 cm L	5 um C4 (300A)	120
SPE15005C04	150 um ID × 360 um OD × 5–6 cm L	5 um C4 (300A)	120
SPE10005C04	100 um ID × 360 um OD × 5–6 cm L	5 um C4 (300A)	120
SPE07505C04	75 um ID × 360 um OD × 5–6 cm L	5 um C4 (300A)	120
SPE05005C04	50 um ID × 360 um OD × 5–6 cm L	5 um C4 (300A)	120
SPE20005C02	200 um ID × 360 um OD × 5–6 cm L	5 um C2 (300A)	120
SPE15005C02	150 um ID × 360 um OD × 5–6 cm L	5 um C2 (300A)	120
SPE10005C02	100 um ID × 360 um OD × 5–6 cm L	5 um C2 (300A)	120
SPE07505C02	75 um ID × 360 um OD × 5–6 cm L	5 um C2 (300A)	120
SPE05005C02	50 um ID × 360 um OD × 5–6 cm L	5 um C2 (300A)	120
SPE20003C18	200 um ID × 360 um OD × 5–6 cm L	3 um C18 (300A)	80
SPE15003C18	150 um ID × 360 um OD × 5–6 cm L	3 um C18 (300A)	80
SPE10003C18	100 um ID × 360 um OD × 5–6 cm L	3 um C18 (300A)	80
SPE07503C18	75 um ID × 360 um OD × 5–6 cm L	3 um C18 (300A)	80
SPE05003C18	50 um ID × 360 um OD × 5–6 cm L	3 um C18 (300A)	80
SPE03003C18	30 um ID × 360 um OD × 5–6 cm L	3 um C18 (300A)	100
SPE20003C08	200 um ID × 360 um OD × 5–6 cm L	3 um C8 (300A)	80
SPE15003C08	150 um ID × 360 um OD × 5–6 cm L	3 um C8 (300A)	80
SPE10003C08	100 um ID × 360 um OD × 5–6 cm L	3 um C8 (300A)	80
SPE07503C08	75 um ID × 360 um OD × 5–6 cm L	3 um C8 (300A)	80
SPE05003C08	50 um ID × 360 um OD × 5–6 cm L	3 um C8 (300A)	80
SPE20003C04	200 um ID × 360 um OD × 5–6 cm L	3 um C4 (300A)	120
SPE15003C04	150 um ID × 360 um OD × 5–6 cm L	3 um C4 (300A)	120
SPE10003C04	100 um ID × 360 um OD × 5–6 cm L	3 um C4 (300A)	120
SPE07503C04	75 um ID × 360 um OD × 5–6 cm L	3 um C4 (300A)	120
SPE05003C04	50 um ID × 360 um OD × 5–6 cm L	3 um C4 (300A)	120
SPE20003C02	200 um ID × 360 um OD × 5–6 cm L	3 um C2 (300A)	120
SPE15003C02	150 um ID × 360 um OD × 5–6 cm L	3 um C2 (300A)	120
SPE10003C02	100 um ID × 360 um OD × 5–6 cm L	3 um C2 (300A)	120
SPE07503C02	75 um ID × 360 um OD × 5–6 cm L	3 um C2 (300A)	120
SPE05003C02	50 um ID × 360 um OD × 5–6 cm L	3 um C2 (300A)	120
<i>MicroSPE with 1/16" fittings</i>			
SPE20005C18WF	200 um ID × 1/16" OD × 5–6 cm L	5 um C18 (300A)	160
SPE15005C18WF	150 um ID × 1/16" OD × 5–6 cm L	5 um C18 (300A)	160
SPE10005C18WF	100 um ID × 1/16" OD × 5–6 cm L	5 um C18 (300A)	160
SPE07505C18WF	75 um ID × 1/16" OD × 5–6 cm L	5 um C18 (300A)	160
SPE05005C18WF	50 um ID × 1/16" OD × 5–6 cm L	5 um C18 (300A)	160
SPE03005C18WF	30 um ID × 1/16" OD × 5–6 cm L	5 um C18 (300A)	180
SPE20005C08WF	200 um ID × 1/16" OD × 5–6 cm L	5 um C8 (300A)	160
SPE15005C08WF	150 um ID × 1/16" OD × 5–6 cm L	5 um C8 (300A)	160
SPE10005C08WF	100 um ID × 1/16" OD × 5–6 cm L	5 um C8 (300A)	160
SPE07505C08WF	75 um ID × 1/16" OD × 5–6 cm L	5 um C8 (300A)	160
SPE05005C08WF	50 um ID × 1/16" OD × 5–6 cm L	5 um C8 (300A)	160
SPE20005C04WF	200 um ID × 1/16" OD × 5–6 cm L	5 um C4 (300A)	200
SPE15005C04WF	150 um ID × 1/16" OD × 5–6 cm L	5 um C4 (300A)	200
SPE10005C04WF	100 um ID × 1/16" OD × 5–6 cm L	5 um C4 (300A)	200
SPE07505C04WF	75 um ID × 1/16" OD × 5–6 cm L	5 um C4 (300A)	200
SPE05005C04WF	50 um ID × 1/16" OD × 5–6 cm L	5 um C4 (300A)	200
SPE20003C02WF	200 um ID × 1/16" OD × 5–6 cm L	5 um C2 (300A)	200
SPE15003C02WF	150 um ID × 1/16" OD × 5–6 cm L	5 um C2 (300A)	200
SPE10003C02WF	100 um ID × 1/16" OD × 5–6 cm L	5 um C2 (300A)	200
SPE07503C02WF	75 um ID × 1/16" OD × 5–6 cm L	5 um C2 (300A)	200
SPE05003C02WF	50 um ID × 1/16" OD × 5–6 cm L	5 um C2 (300A)	200

Continued			
SPE20003C18WF	200 um ID × 1/16" OD × 5–6 cm L	3 um C18 (300A)	160
SPE15003C18WF	150 um ID × 1/16" OD × 5–6 cm L	3 um C18 (300A)	160
SPE10003C18WF	100 um ID × 1/16" OD × 5–6 cm L	3 um C18 (300A)	160
SPE07503C18WF	75 um ID × 1/16" OD × 5–6 cm L	3 um C18 (300A)	160
SPE05003C18WF	50 um ID × 1/16" OD × 5–6 cm L	3 um C18 (300A)	160
SPE03003C18WF	30 um ID × 1/16" OD × 5–6 cm L	3 um C18 (300A)	180
SPE20003C08WF	200 um ID × 1/16" OD × 5–6 cm L	3 um C8 (300A)	160
SPE15003C08WF	150 um ID × 1/16" OD × 5–6 cm L	3 um C8 (300A)	160
SPE10003C08WF	100 um ID × 1/16" OD × 5–6 cm L	3 um C8 (300A)	160
SPE07503C08WF	75 um ID × 1/16" OD × 5–6 cm L	3 um C8 (300A)	160
SPE05003C08WF	50 um ID × 1/16" OD × 5–6 cm L	3 um C8 (300A)	160
SPE20003C04WF	200 um ID × 1/16" OD × 5–6 cm L	3 um C4 (300A)	200
SPE15003C04WF	150 um ID × 1/16" OD × 5–6 cm L	3 um C4 (300A)	200
SPE10003C04WF	100 um ID × 1/16" OD × 5–6 cm L	3 um C4 (300A)	200
SPE07503C04WF	75 um ID × 1/16" OD × 5–6 cm L	3 um C4 (300A)	200
SPE05003C04WF	50 um ID × 1/16" OD × 5–6 cm L	3 um C4 (300A)	200
SPE20003C02WF	200 um ID × 1/16" OD × 5–6 cm L	3 um C2 (300A)	200
SPE15003C02WF	150 um ID × 1/16" OD × 5–6 cm L	3 um C2 (300A)	200
SPE10003C02WF	100 um ID × 1/16" OD × 5–6 cm L	3 um C2 (300A)	200
SPE07503C02WF	75 um ID × 1/16" OD × 5–6 cm L	3 um C2 (300A)	200
SPE05003C02WF	50 um ID × 1/16" OD × 5–6 cm L	3 um C2 (300A)	200

Note: Other dimensions and configurations of microSPE can be specially ordered.

4. Adaptors for Securing NanoLC Columns on Specific Ion Sources



Easy-Spray^M ion source adaptor (ESA-01)

Product #	Price (\$)
ESA-01	75

5. Very-High Pressure (~20,000psi) Connection Lines for Connecting NanoLC Columns



VHPCLD

Product #	ID (um)	Length (cm)	Price (\$)
VHPCLD01010	10	10	70
VHPCLD01020	10	20	75
VHPCLD02010	20	10	70
VHPCLD02020	20	20	75
VHPCLD02030	20	30	80
VHPCLD02050	20	50	90
VHPCLD03010	30	10	70
VHPCLD03020	30	20	75
VHPCLD03030	30	30	80
VHPCLD03050	30	50	90
VHPCLD05010	50	10	70
VHPCLD05020	50	20	75
VHPCLD05030	50	30	80
VHPCLD05050	50	50	90



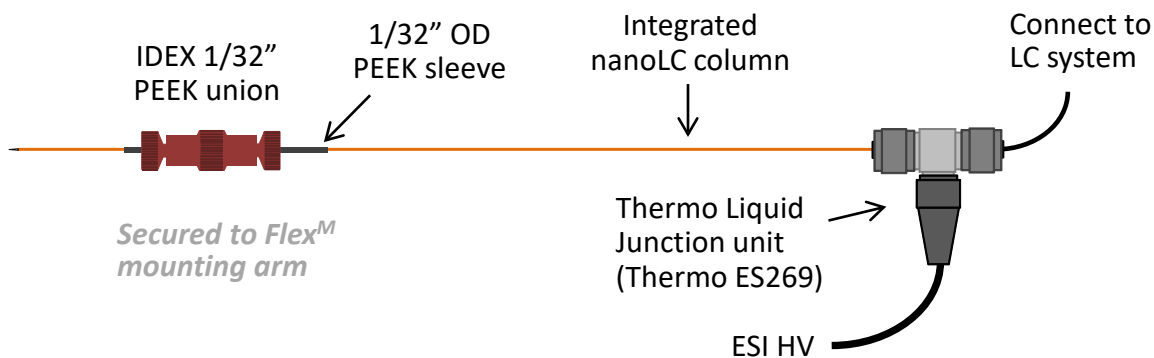
VHPCLS

Product #	ID (um)	Length (cm)	Price (\$)
VHPCLS01010	10	10	60
VHPCLS01020	10	20	65
VHPCLS02010	20	10	60
VHPCLS02020	20	20	65
VHPCLS02030	20	30	70
VHPCLS02050	20	50	80
VHPCLS03010	30	10	60
VHPCLS03020	30	20	65
VHPCLS03030	30	30	70
VHPCLS03050	30	50	80
VHPCLS05010	50	10	60
VHPCLS05020	50	20	65
VHPCLS05030	50	30	70
VHPCLS05050	50	50	80

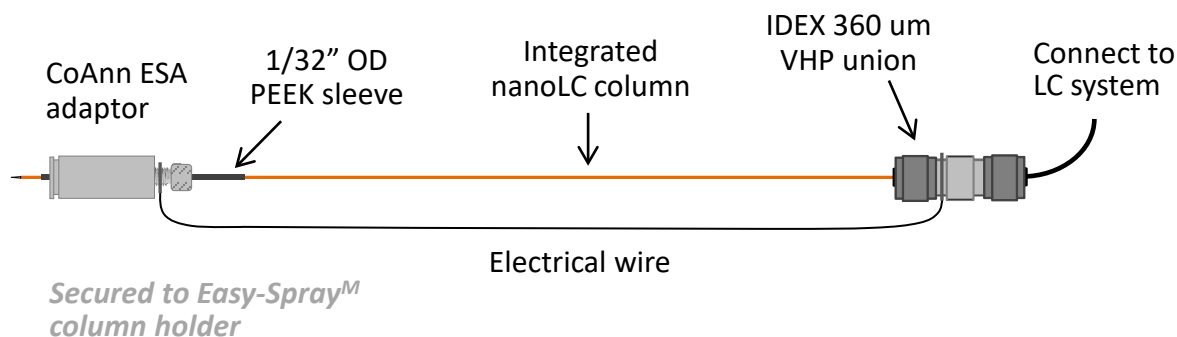
Appendices: Installation of CoAnn Technologies NanoLC Columns

1. Mount CoAnn Bare Integrated Column on Thermo Flex^M and Easy-Spray^M Ion Sources

On Flex^M ion source



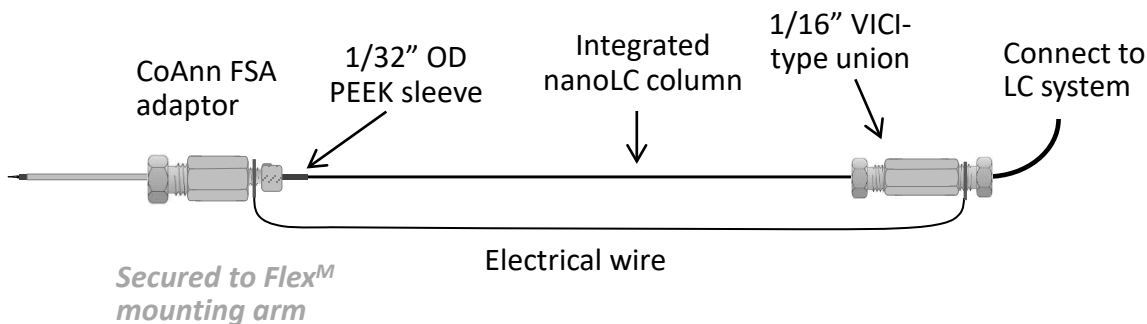
On Easy-Spray^M ion source



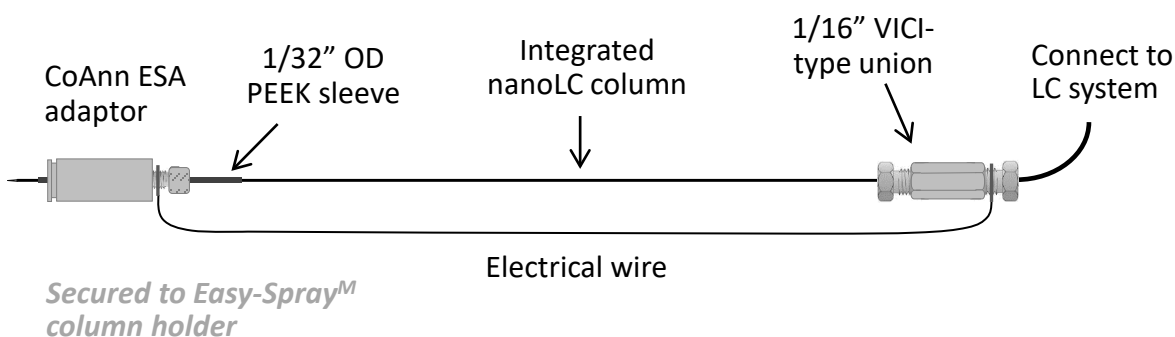
Note: the column connections can resist pressures up to 15,000 psi (~1030 bar) supported by the IDEX 360 um VHP union.

2. Mount CoAnn Fitted Integrated Column on Thermo Flex^M and Easy-Spray^M Ion Sources

On Flex^M ion source

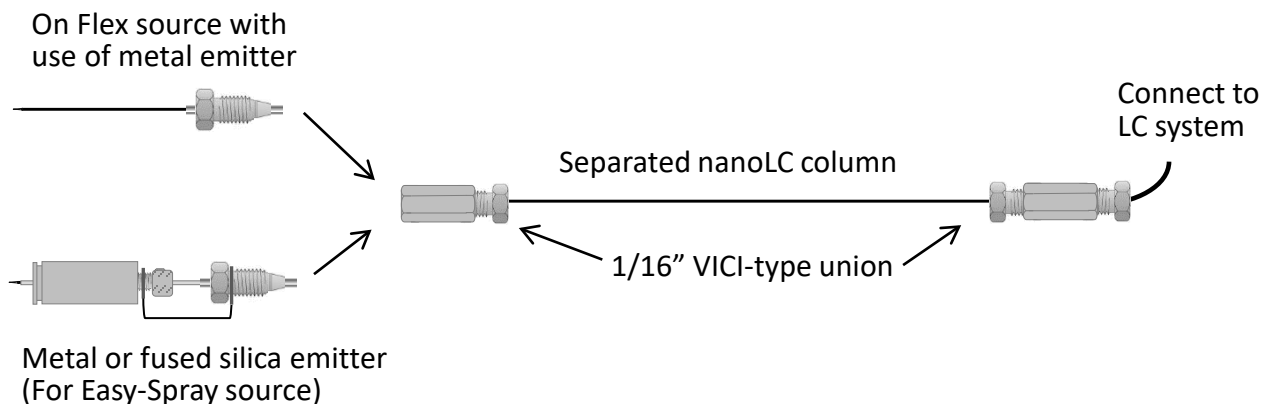


On Easy-Spray^M ion source



Note: Connecting the integrated column inlet to a LC system can be done by using a CoAnn connection line that resists pressures up to ~20,000 psi (~1380 bar) (page 20) or Thermo nanoViper.

3. Connect CoAnn Separated Column to LC System and Thermo ESI Ion Sources

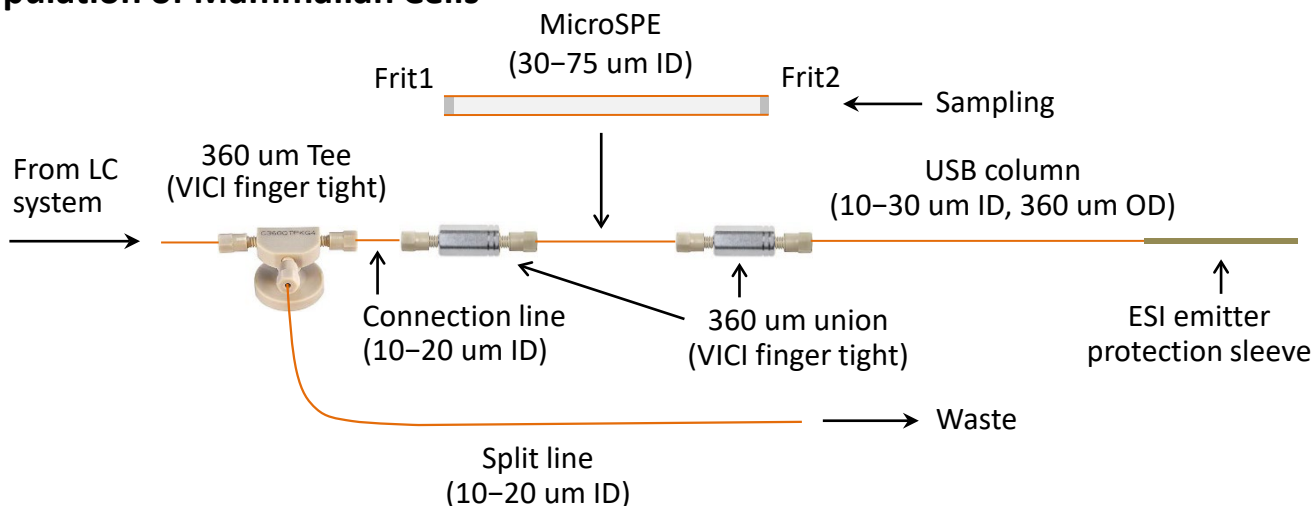


Note: Connecting the separated column inlet to a LC system can be done by using a CoAnn connection line that resists a pressure up to ~20,000 psi (~1380 bar) (page 20) or Thermo nanoViper.

If requested, male fittings can be fitted on column inlet for mounting a separated column to a switching valve or other female fittings. This CANNOT be done by tearing down the union fittings and mounting its male parts to other female fittings as adaptor depths of different female fittings may be varied.

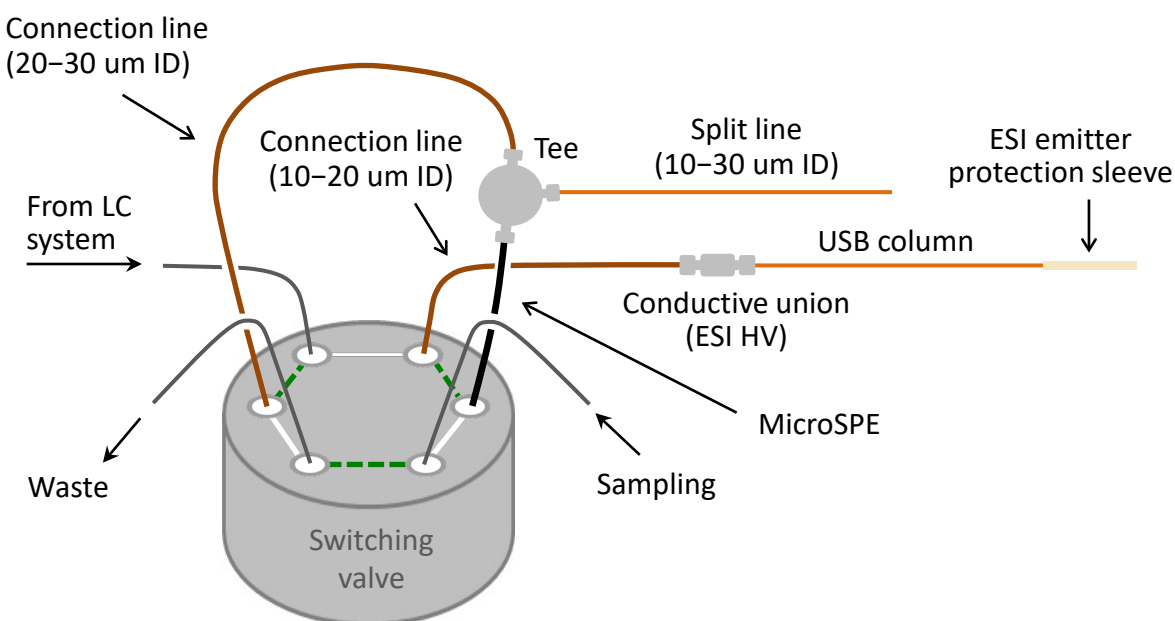
4. Manual Operation Setup for Ultra-Sensitive NanoLC-MS Analysis of Individual or Small

Population of Mammalian Cells



Operation: Load a sample on the microSPE and connect the loaded end of the microSPE to the USB column inlet via a 360 µm union (VICI), connect the other end of the microSPE to another union where ESI HV is applied, and connect the union to a 360 µm tee (VICI) via a connection line (360 µm OD fused silica capillary tube). Connect a split line to the tee and control the split flow with the length of the split narrow fused silica capillary tube. The flow split can be removed if LC pumps accurately output mobile phase flows small enough for operating the USB column.

5. Automatic Operation Setup for Ultra-Sensitive NanoLC-MS Analysis of Individual or Small Population of Mammalian Cells



Note: If a LC system can accurately output mobile phase flows small enough for operating a USB column the flow split can be removed by using a union to connect the microSPE and the connection line.

The setup can also be used for routine 50–75 µm ID nanoLC-MS analysis (typically without need of flow split).

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