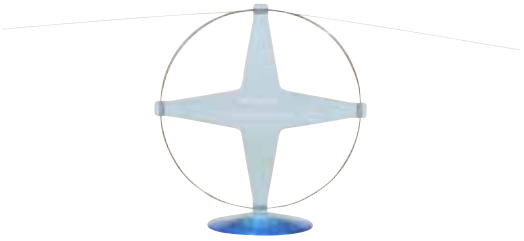
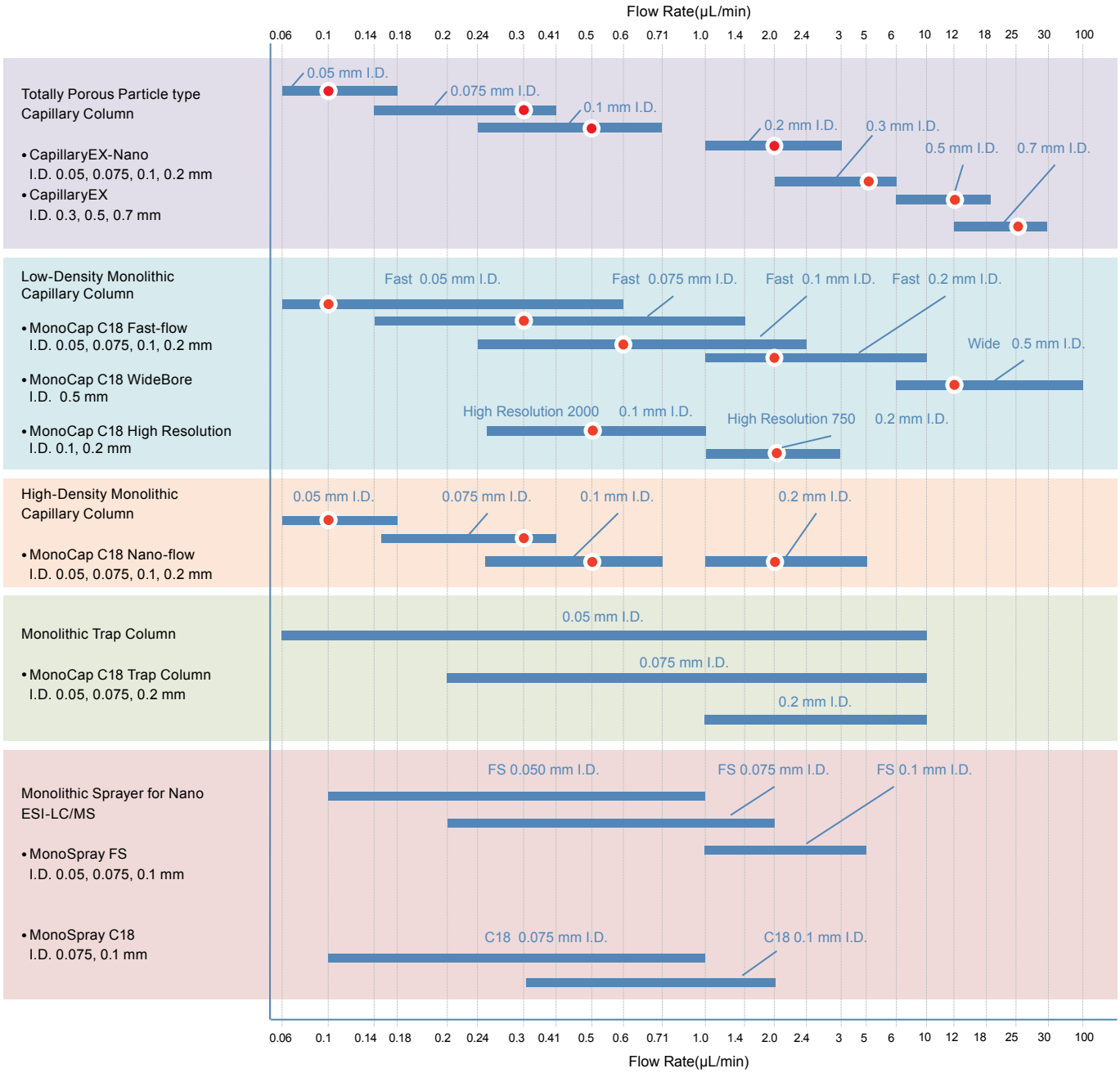
Capillary HPLC Columns

Capillary EX and Capillary EX-Nano HPLC columns are excellent in analyzing trace amounts of samples in proteomic and bioanalytical analysis with high sensitivity and high resolution. Capillary EX and Capillary EX-Nano columns are totally porous particle type columns, which the flow rate is generally set under 100 µLmin.
MonoCap is another capillary column, however, uses the monolithic silica technology offering high throughput, high sensitivity and high resolution separation of peptides and protein digests.
MonoCap Fast-Flow provides high throughput analysis at half of the operating pressure compared to totally porous particle type columns. MonoCap Nano-flow deliver extremely high sensitivity in LC/MS due to the optimization of mesopore and throughpore sizes. Electrospray emitter for ESI-LC/MS, MonoSpray offer minimized sample diffusion resulting in high sensitivity. MonoCap Trap columns are also available for on-line preconcentration or desalting of protein and peptide samples prior to HPLC separation with mass spectrometry detection.
The chart below illustrates the recommended use and flow rate ranges when using a 150 mm length column. The red circle indicates the linear velocity at 1 mm/s.

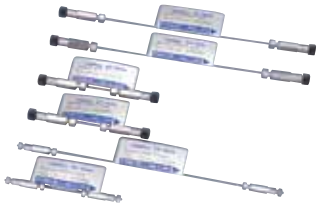


MonoCap High Resolution 2000

Figure 1 : Recommended Use and Flow Rate Ranges



Totally Porous Particle type Capillary HPLC Columns



Capillary EX-Nano

Capillary EX

Columns with I.D. sizes of 0.05, 0.075, 0.1 and 0.2 mm are Capillary EX-Nano columns. I.D. sizes of 0.3, 0.5 and 0.7 mm are Capillary EX columns. Capillary EX-Nano columns introduces a fused silica capillary tube having a very smooth and clean inner surface resulting in high theoretical plates.
Capillary EX columns employs the same column hardware used in analytical columns, which is very easy to use.

Phase	I.D. (mm)	Particle Size (µm)	Length50 mm	Length150 mm	Length250 mm
			Cat.No.	Cat.No.	Cat.No.
InertSustain C18	0.05	3	5020-15038	5020-15088	5020-15138
		5	5020-15037	5020-15087	5020-15137
	0.075	3	5020-15188	5020-15238	5020-15288
		5	5020-15187	5020-15237	5020-15287
	0.1	3	5020-15338	5020-15388	5020-15438
		5	5020-15337	5020-15387	5020-15437
	0.2	3	5020-15488	5020-15538	5020-15588
		5	5020-15487	5020-15537	5020-15587
	0.3	3	5020-11539	5020-11589	–
		5	5020-11538	5020-11588	–
	0.5	3	5020-11639	5020-11689	–
		5	5020-11638	5020-11688	–
	0.7	3	5020-11739	5020-11789	–
		5	5020-11738	5020-11788	–
Inertsil ODS-4	0.05	3	5020-15002	5020-15052	5020-15102
		5	5020-15001	5020-15051	5020-15101
	0.075	3	5020-15152	5020-15202	5020-15252
		5	5020-15151	5020-15201	5020-15251
	0.1	3	5020-15302	5020-15352	5020-15402
		5	5020-15301	5020-15351	5020-15401
	0.2	3	5020-15452	5020-15502	5020-15552
		5	5020-15451	5020-15501	5020-15551
	0.3	3	5020-11502	5020-11552	–
		5	5020-11501	5020-11551	–
	0.5	3	5020-11602	5020-11652	–
		5	5020-11601	5020-11651	–
	0.7	3	5020-11702	5020-11752	–
		5	5020-11701	5020-11751	–
Inertsil ODS-3	0.05	3	5020-15005	5020-15055	5020-15105
		4	5020-15004	5020-15054	5020-15104
		5	5020-15003	5020-15053	5020-15103
	0.075	3	5020-15155	5020-15205	5020-15255
		4	5020-15154	5020-15204	5020-15254
		5	5020-15153	5020-15203	5020-15253
	0.1	3	5020-15305	5020-15355	5020-15405
		4	5020-15304	5020-15354	5020-15404
		5	5020-15303	5020-15353	5020-15403
	0.2	3	5020-15455	5020-15505	5020-15555
		4	5020-15454	5020-15504	5020-15554
		5	5020-15453	5020-15503	5020-15553
	0.3	3	5020-11505	5020-11555	–
		4	5020-11504	5020-11554	–
		5	5020-11503	5020-11553	–
	0.5	3	5020-11605	5020-11655	–
		4	5020-11604	5020-11654	–
		5	5020-11603	5020-11653	–
	0.7	3	5020-11705	5020-11755	–
		4	5020-11704	5020-11754	–
		5	5020-11703	5020-11753	–

* End-fittings are Valco 1/16" (10-32 UNF).
* Valco 1/32" (6-40 UNF) end-fittings can also be arranged upon request, indicate "1/32" when ordering.
* The maximum operating pressure of 0.05 to 0.2 mm I.D. columns are 15 MPa, 150 Bar.
* The maximum operating pressure of 0.3 to 0.7 mm I.D. columns are 20 MPa, 200 Bar.

Totally Porous Particle type Capillary HPLC Columns

Phase	I.D. (mm)	Particle Size (μm)	Length 50 mm	Length 150 mm	Length 250 mm
			Cat.No.	Cat.No.	Cat.No.
Inertsil ODS-SP	0.05	3	5020-15007	5020-15057	5020-15107
		5	5020-15006	5020-15056	5020-15106
	0.075	3	5020-15157	5020-15207	5020-15257
		5	5020-15156	5020-15206	5020-15256
	0.1	3	5020-15307	5020-15357	5020-15407
		5	5020-15306	5020-15356	5020-15406
	0.2	3	5020-15457	5020-15507	5020-15557
		5	5020-15456	5020-15506	5020-15556
	0.3	3	5020-11507	5020-11557	–
		5	5020-11506	5020-11556	–
	0.5	3	5020-11607	5020-11657	–
		5	5020-11606	5020-11656	–
	0.7	3	5020-11707	5020-11757	–
		5	5020-11706	5020-11756	–
Inertsil ODS-P	0.05	3	5020-15009	5020-15059	5020-15109
		5	5020-15008	5020-15058	5020-15108
	0.075	3	5020-15159	5020-15209	5020-15259
		5	5020-15158	5020-15208	5020-15258
	0.1	3	5020-15309	5020-15359	5020-15409
		5	5020-15308	5020-15358	5020-15408
	0.2	3	5020-15459	5020-15509	5020-15559
		5	5020-15458	5020-15508	5020-15558
	0.3	3	5020-11509	5020-11559	–
		5	5020-11508	5020-11558	–
	0.5	3	5020-11609	5020-11659	–
		5	5020-11608	5020-11658	–
	0.7	3	5020-11709	5020-11759	–
		5	5020-11708	5020-11758	–
Inertsil ODS-EP	0.05	5	5020-15010	5020-15060	5020-15110
	0.075	5	5020-15160	5020-15210	5020-15260
	0.1	5	5020-15310	5020-15360	5020-15410
	0.2	5	5020-15460	5020-15510	5020-15560
	0.3	5	5020-11510	5020-11560	–
	0.5	5	5020-11610	5020-11660	–
	0.7	5	5020-11710	5020-11760	–
InertSustain C8	0.05	3	5020-16191	5020-16192	5020-16193
		5	5020-16090	5020-16091	5020-16092
	0.075	3	5020-16194	5020-16195	5020-16196
		5	5020-16093	5020-16094	5020-16095
	0.1	3	5020-16197	5020-16198	5020-16199
		5	5020-16096	5020-16097	5020-16098
	0.2	3	5020-16200	5020-16201	5020-16202
		5	5020-16099	5020-16100	5020-16101
	0.3	3	5020-16184	5020-16185	–
		5	5020-16082	5020-16083	–
	0.5	3	5020-16186	5020-16187	–
		5	5020-16084	5020-16085	–
	0.7	3	5020-16188	5020-16189	–
		5	5020-16086	5020-16087	–
Inertsil C8-4	0.05	3	5020-15036	5020-15086	5020-15136
		5	5020-15035	5020-15085	5020-15135
	0.075	3	5020-15186	5020-15236	5020-15286
		5	5020-15185	5020-15235	5020-15285
	0.1	3	5020-15336	5020-15386	5020-15436
		5	5020-15335	5020-15385	5020-15435
	0.2	3	5020-15486	5020-15536	5020-15586
		5	5020-15485	5020-15535	5020-15585
	0.3	3	5020-11536	5020-11586	–
		5	5020-11535	5020-11585	–
	0.5	3	5020-11636	5020-11686	–
		5	5020-11635	5020-11685	–
	0.7	3	5020-11736	5020-11786	–
		5	5020-11735	5020-11785	–

* End-fittings are Valco 1/16" (10-32 UNF).
* Valco 1/32" (6-40 UNF) end-fittings can also be arranged upon request, indicate "1/32" when ordering.
* The maximum operating pressure of 0.05 to 0.2 mm I.D. columns are 15 MPa, 150 Bar.
* The maximum operating pressure of 0.3 to 0.7 mm I.D. columns are 20 MPa, 200 Bar.

Phase	I.D. (mm)	Particle Size (μm)	Length 50 mm	Length 150 mm	Length 250 mm
			Cat.No.	Cat.No.	Cat.No.
Inertsil C8-3	0.05	3	5020-15015	5020-15065	5020-15115
		5	5020-15014	5020-15064	5020-15114
	0.075	3	5020-15165	5020-15215	5020-15265
		5	5020-15164	5020-15214	5020-15264
	0.1	3	5020-15315	5020-15365	5020-15415
		5	5020-15314	5020-15364	5020-15414
	0.2	3	5020-15465	5020-15515	5020-15565
		5	5020-15464	5020-15514	5020-15564
	0.3	3	5020-11515	5020-11565	–
		5	5020-11514	5020-11564	–
	0.5	3	5020-11615	5020-11665	–
		5	5020-11614	5020-11664	–
	0.7	3	5020-11715	5020-11765	–
		5	5020-11714	5020-11764	–
Inertsil WP300 C18	0.05	5	5020-15028	5020-15078	5020-15128
	0.075	5	5020-15178	5020-15228	5020-15278
	0.1	5	5020-15328	5020-15378	5020-15428
	0.2	5	5020-15478	5020-15528	5020-15578
	0.3	5	5020-11528	5020-11578	–
	0.5	5	5020-11628	5020-11678	–
	0.7	5	5020-11728	5020-11778	–
Inertsil WP300 C8	0.05	5	5020-15029	5020-15079	5020-15129
	0.075	5	5020-15179	5020-15229	5020-15279
	0.1	5	5020-15329	5020-15379	5020-15429
	0.2	5	5020-15479	5020-15529	5020-15579
	0.3	5	5020-11529	5020-11579	–
	0.5	5	5020-11629	5020-11679	–
	0.7	5	5020-11729	5020-11779	–
Inertsil WP300 C4	0.05	5	5020-15030	5020-15080	5020-15130
	0.075	5	5020-15180	5020-15230	5020-15280
	0.1	5	5020-15330	5020-15380	5020-15430
	0.2	5	5020-15480	5020-15530	5020-15580
	0.3	5	5020-11530	5020-11580	–
	0.5	5	5020-11630	5020-11680	–
	0.7	5	5020-11730	5020-11780	–
InertSustain Phenyl	0.05	3	5020-16491	5020-16492	5020-16493
		5	5020-16390	5020-16391	5020-16392
	0.075	3	5020-16494	5020-16495	5020-16496
		5	5020-16393	5020-16394	5020-16395
	0.1	3	5020-16497	5020-16498	5020-16499
		5	5020-16396	5020-16397	5020-16398
	0.2	3	5020-16500	5020-16501	5020-16502
		5	5020-16399	5020-16400	5020-16401
	0.3	3	5020-16484	5020-16485	–
		5	5020-16382	5020-16383	–
	0.5	3	5020-16486	5020-16487	–
		5	5020-16384	5020-16385	–
	0.7	3	5020-16488	5020-16489	–
		5	5020-16386	5020-16387	–
Inertsil Ph-3	0.05	3	5020-15017	5020-15067	5020-15117
		5	5020-15016	5020-15066	5020-15116
	0.075	3	5020-15167	5020-15217	5020-15267
		5	5020-15166	5020-15216	5020-15266
	0.1	3	5020-15317	5020-15367	5020-15417
		5	5020-15316	5020-15366	5020-15416
	0.2	3	5020-15467	5020-15517	5020-15567
		5	5020-15466	5020-15516	5020-15566
	0.3	3	5020-11517	5020-11567	–
		5	5020-11516	5020-11566	–
	0.5	3	5020-11617	5020-11667	–
		5	5020-11616	5020-11666	–
	0.7	3	5020-11717	5020-11767	–
		5	5020-11716	5020-11766	–

* End-fittings are Valco 1/16" (10-32 UNF).
* Valco 1/32" (6-40 UNF) end-fittings can also be arranged upon request, indicate "1/32" when ordering.
* The maximum operating pressure of 0.05 to 0.2 mm I.D. columns are 15 MPa, 150 Bar.
* The maximum operating pressure of 0.3 to 0.7 mm I.D. columns are 20 MPa, 200 Bar.

Totally Porous Particle type Capillary HPLC Columns

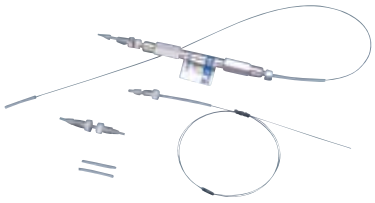
Phase	I.D. (mm)	Particle Size (μm)	Length 50 mm	Length 150 mm	Length 250 mm
			Cat.No.	Cat.No.	Cat.No.
Inertsil Amide	0.05	3	5020-15040	5020-15090	5020-15140
		5	5020-15039	5020-15089	5020-15139
	0.075	3	5020-15190	5020-15240	5020-15290
		5	5020-15189	5020-15239	5020-15289
	0.1	3	5020-15340	5020-15390	5020-15440
		5	5020-15339	5020-15389	5020-15439
	0.2	3	5020-15490	5020-15540	5020-15590
		5	5020-15489	5020-15539	5020-15589
	0.3	3	5020-11541	5020-11591	–
		5	5020-11540	5020-11590	–
	0.5	3	5020-11641	5020-11691	–
		5	5020-11640	5020-11690	–
	0.7	3	5020-11741	5020-11791	–
		5	5020-11740	5020-11790	–
Inertsil HILIC	0.05	3	5020-15025	5020-15075	5020-15125
		5	5020-15024	5020-15074	5020-15124
	0.075	3	5020-15175	5020-15225	5020-15275
		5	5020-15174	5020-15224	5020-15274
	0.1	3	5020-15325	5020-15375	5020-15425
		5	5020-15324	5020-15374	5020-15424
	0.2	3	5020-15475	5020-15525	5020-15575
		5	5020-15474	5020-15524	5020-15574
	0.3	3	5020-11525	5020-11575	–
		5	5020-11524	5020-11574	–
	0.5	3	5020-11625	5020-11675	–
		5	5020-11624	5020-11674	–
	0.7	3	5020-11725	5020-11775	–
		5	5020-11724	5020-11774	–
InertSustain NH2	0.05	3	5020-16791	5020-16792	5020-16793
		5	5020-16690	5020-16691	5020-16692
	0.075	3	5020-16794	5020-16795	5020-16796
		5	5020-16693	5020-16694	5020-16695
	0.1	3	5020-16797	5020-16798	5020-16799
		5	5020-16696	5020-16697	5020-16698
	0.2	3	5020-16800	5020-16801	5020-16802
		5	5020-16699	5020-16700	5020-16701
	0.3	3	5020-16784	5020-16785	–
		5	5020-16682	5020-16683	–
	0.5	3	5020-16786	5020-16787	–
		5	5020-16684	5020-16685	–
	0.7	3	5020-16788	5020-16789	–
		5	5020-16686	5020-16687	–
Inertsil NH2	0.05	3	5020-15021	5020-15071	5020-15121
		5	5020-15020	5020-15070	5020-15120
	0.075	3	5020-15171	5020-15221	5020-15271
		5	5020-15170	5020-15220	5020-15270
	0.1	3	5020-15321	5020-15371	5020-15421
		5	5020-15320	5020-15370	5020-15420
	0.2	3	5020-15471	5020-15521	5020-15571
		5	5020-15470	5020-15520	5020-15570
	0.3	3	5020-11521	5020-11571	–
		5	5020-11520	5020-11570	–
	0.5	3	5020-11621	5020-11671	–
		5	5020-11620	5020-11670	–
	0.7	3	5020-11721	5020-11771	–
		5	5020-11720	5020-11770	–

* End-fittings are Valco 1/16” (10-32 UNF).
* Valco 1/32” (6-40 UNF) end-fittings can also be arranged upon request, indicate “1/32” when ordering.
* The maximum operating pressure of 0.05 to 0.2 mm I.D. columns are 15 MPa, 150 Bar.
* The maximum operating pressure of 0.3 to 0.7 mm I.D. columns are 20 MPa, 200 Bar.

Phase	I.D. (mm)	Particle Size (μm)	Length 50 mm	Length 150 mm	Length 250 mm
			Cat.No.	Cat.No.	Cat.No.
Inertsil CN-3	0.05	3	5020-15019	5020-15069	5020-15119
		5	5020-15018	5020-15068	5020-15118
	0.075	3	5020-15169	5020-15219	5020-15269
		5	5020-15168	5020-15218	5020-15268
	0.1	3	5020-15319	5020-15369	5020-15419
		5	5020-15318	5020-15368	5020-15418
	0.2	3	5020-15469	5020-15519	5020-15569
		5	5020-15468	5020-15518	5020-15568
	0.3	3	5020-11519	5020-11569	–
		5	5020-11518	5020-11568	–
	0.5	3	5020-11619	5020-11669	–
		5	5020-11618	5020-11668	–
	0.7	3	5020-11719	5020-11769	–
		5	5020-11718	5020-11768	–
Inertsil Diol	0.05	3	5020-15023	5020-15073	5020-15123
		5	5020-15022	5020-15072	5020-15122
	0.075	3	5020-15173	5020-15223	5020-15273
		5	5020-15172	5020-15222	5020-15272
	0.1	3	5020-15323	5020-15373	5020-15423
		5	5020-15322	5020-15372	5020-15422
	0.2	3	5020-15473	5020-15523	5020-15573
		5	5020-15472	5020-15522	5020-15572
	0.3	3	5020-11523	5020-11573	–
		5	5020-11522	5020-11572	–
	0.5	3	5020-11623	5020-11673	–
		5	5020-11622	5020-11672	–
	0.7	3	5020-11723	5020-11773	–
		5	5020-11722	5020-11772	–
Inertsil SIL-100A	0.05	3	5020-15027	5020-15077	5020-15127
		5	5020-15026	5020-15076	5020-15126
	0.075	3	5020-15177	5020-15227	5020-15277
		5	5020-15176	5020-15226	5020-15276
	0.1	3	5020-15327	5020-15377	5020-15427
		5	5020-15326	5020-15376	5020-15426
	0.2	3	5020-15477	5020-15527	5020-15577
		5	5020-15476	5020-15526	5020-15576
	0.3	3	5020-11527	5020-11577	–
		5	5020-11526	5020-11576	–
	0.5	3	5020-11627	5020-11677	–
		5	5020-11626	5020-11676	–
	0.7	3	5020-11727	5020-11777	–
		5	5020-11726	5020-11776	–
Inertsil AX	0.05	5	5020-15033	5020-15083	5020-15133
	0.075	5	5020-15183	5020-15233	5020-15283
	0.1	5	5020-15333	5020-15383	5020-15433
	0.2	5	5020-15483	5020-15533	5020-15583
	0.3	5	5020-11533	5020-11583	–
	0.5	5	5020-11633	5020-11683	–
	0.7	5	5020-11733	5020-11783	–
Inertsil CX	0.05	5	5020-15034	5020-15084	5020-15134
	0.075	5	5020-15184	5020-15234	5020-15284
	0.1	5	5020-15334	5020-15384	5020-15434
	0.2	5	5020-15484	5020-15534	5020-15584
	0.3	5	5020-11534	5020-11584	–
	0.5	5	5020-11634	5020-11684	–
	0.7	5	5020-11734	5020-11784	–
Titansphere TiO	0.3	5	5020-11537	5020-11587	–
	0.5	5	5020-11637	5020-11687	–
	0.7	5	5020-11737	5020-11787	–

* End-fittings are Valco 1/16" (10-32 UNF).
* Valco 1/32" (6-40 UNF) end-fittings can also be arranged upon request, indicate "1/32" when ordering.
* The maximum operating pressure of 0.05 to 0.2 mm I.D. columns are 15 MPa, 150 Bar.
* The maximum operating pressure of 0.3 to 0.7 mm I.D. columns are 20 MPa, 200 Bar.

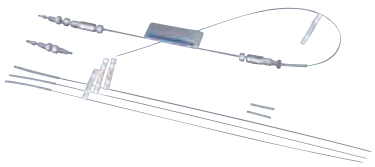
Connection Kits for Totally Porous Particle type Capillary Columns



Connection Kit for Capillary EX Columns
(Top Image: Installed view, Bottom Image: Contents of Kit)

Connection Kit for Capillary EX Columns (0.3, 0.5, 0.7 I.D. mm)

Contents of Kit	Cat.No.
·Column Coupler ·40 × 0.1 mm I.D. 1/16” O.D.Tubing (Both ends with male nuts including PEEK ferrules)	5020-01880
·Capillary Tubing Connector ·500 × 0.075 mm I.D. 0.375 mm O.D. Tubing (Male nut, PEEK ferrule, 1/16” O.D. PTFE with sleeve)	
·PTFE Tubing 20 mm 2 pcs 1/16” O.D. (O.D. 0.375 mm Connection for Capillary Tubing)	

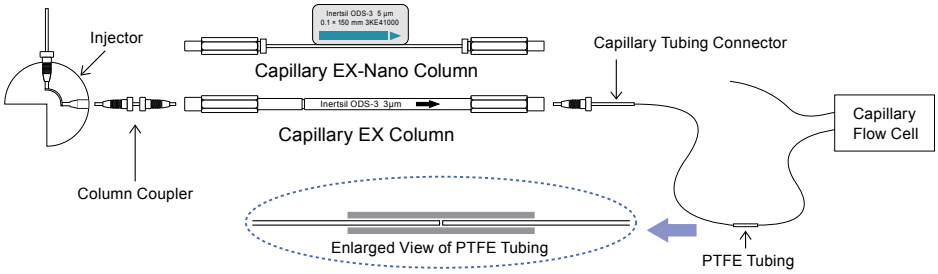


Connection Kit for Capillary EX-Nano Columns
(Top Image: Installed view, Bottom Image: Contents of Kit)

Connection Kit for Capillary EX-Nano Columns (0.05, 0.075, 0.1, 0.2 I.D. mm)

Contents of Kit	Cat.No.
·Column Coupler ·40 × 0.05 mm I.D. 1/16” O.D. Tubing (Both ends with male nuts including PEEK ferrules)	5020-01881
·Capillary Tubing Connector ·300 × 0.05 mm I.D. 0.375 mm O.D. Tubing ·300 × 0.03 mm I.D. 0.375 mm O.D. Tubing ·300 × 0.02 mm I.D. 0.375 mm O.D. Tubing (Male nut, PEEK ferrule, 1/16” O.D. PTFE with sleeve)	
·PTFE Tubing 20 mm 2 pcs 1/16” O.D. (O.D. 0.375 mm Connection for Capillary Tubing)	

How To Connect



Totally Porous Particle type Capillary Micro Guard Columns

Capillary EX Micro Guard Columns

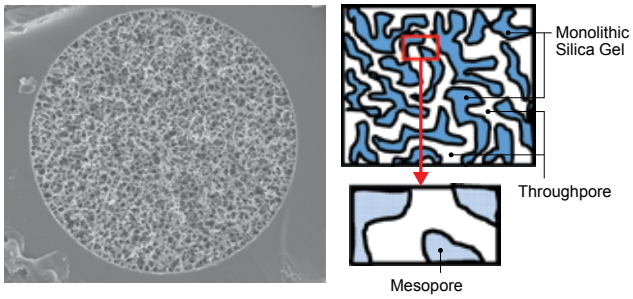
Capillary EX Micro Guard columns are available in 2 mm length which are ideal for the use of sample preconcentration and sample cleanup. Non-metal hardwares are also available to eliminate metal contamination from the column hardware.

Phase	I.D. (mm)	Particle Size (µm)	Length (mm)	Wetted Part	
				Metal	Non-Metal
				Cat.No.	Cat.No.
InertSustain C18	0.3	3	2	5020-11847	–
		5	2	5020-11846	5020-11896
Inertsil ODS-4	0.3	3	2	5020-11802	–
		5	2	5020-11801	5020-11851
Inertsil ODS-3	0.3	3	2	5020-11805	–
		5	2	5020-11803	5020-11853
Inertsil ODS-SP	0.3	3	2	5020-11807	–
		5	2	5020-11806	5020-11856
Inertsil ODS-P	0.3	3	2	5020-11809	–
		5	2	5020-11808	5020-11858
Inertsil ODS-EP	0.3	5	2	5020-11810	5020-11860
InertSustain C8	0.3	3	2	5020-16190	–
		5	2	5020-16088	5020-16089
Inertsil C8-4	0.3	3	2	5020-11836	–
		5	2	5020-11835	5020-11885
Inertsil C8-3	0.3	3	2	5020-11815	–
		5	2	5020-11814	5020-11864
Inertsil WP300 C18	0.3	5	2	5020-11828	5020-11878
Inertsil WP300 C8	0.3	5	2	5020-11829	5020-11879
Inertsil WP300 C4	0.3	5	2	5020-11830	5020-11880
InertSustain Phenyl	0.3	3	2	5020-16490	–
		5	2	5020-16388	5020-16389
Inertsil Ph-3	0.3	3	2	5020-11817	–
		5	2	5020-11816	5020-11866
Inertsil WP300 C18	0.3	5	2	5020-11828	5020-11878
Inertsil WP300 C8	0.3	5	2	5020-11829	5020-11879
Inertsil WP300 C4	0.3	5	2	5020-11830	5020-11880
Inertsil Amide	0.3	3	2	5020-11849	–
		5	2	5020-11848	5020-11897
Inertsil HILIC	0.3	3	2	5020-11825	–
		5	2	5020-11824	5020-11874
InertSustain NH2	0.3	3	2	5020-16790	–
		5	2	5020-16688	5020-16689
Inertsil NH2	0.3	3	2	5020-11821	–
		5	2	5020-11820	5020-11870
Inertsil CN-3	0.3	3	2	5020-11819	–
		5	2	5020-11818	5020-11868
Inertsil Diol	0.3	3	2	5020-11823	–
		5	2	5020-11822	5020-11872
Inertsil SIL 100A	0.3	3	2	5020-11827	–
		5	2	5020-11826	5020-11876
Inertsil AX	0.3	5	2	5020-11833	5020-11883
Inertsil CX	0.3	5	2	5020-11834	5020-11884
Titanspher TiO	0.3	5	2	5020-11845	5020-11895

* End-fittings are 1/16" Waters-compatible.
* The maximum operating pressure is 20 MPa, 200 Bar.

Monolithic Capillary HPLC Columns

MonoCap Series



Structure of Monolithic Silica

GL Sciences' MonoCap series, created synthetically via sol-gel method, and an octadecyl silane chemically bonded, has a very uniform three dimensional structure that shows excellent reproducibility from batch-to-batch. The solid structure of GL Sciences' monolithic silica eliminates the need for frits or filters at the ends of the column, thereby reducing dead volume that might otherwise lead to band broadening or sample recovery. The high porosity of our monolithic silica allows high flow rates to be used without loss of resolutionor creation of high operating pressure. An optimized balance of throughpores and mesopores provides the critically importantcombination of efficiency, separation speed, large volume sample-loading, and small volume sample-recovery.

MonoCap High Resolution provide extremely high efficiency, delivering over 200,000 plates for a 2,000 mm length column. The High Resolution Ultra type deliver over 300,000 plates. The Fast-flow type is compatible with high flow rate analysis due to its' low flow resistance. In addition, the equilibration time can be minimized further by setting the flow rate high. MonoCap Nano-flow is a high-density monolithic capillary column offering extremely high sensitivity in LC/MS due to the optimization of mesopore and throughpore sizes.
MonoCap Trap columns have a relatively big throughpore, which are available for on-line preconcentration or desalting of protein and peptide samples prior to HPLC separation with mass spectrometry detection.

Physical Properties of MonoCap Series

Description	Monolithic Silica	Skeleton	Throughpore	Mesopore	Porosity	Bonded Phase	End-capping	Max. Operating Pressure
MonoCap C18 High Resolution 750	High Purity Silica Gel	1 µm	2 µm	15 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 High Resolution 2000		1 µm	2 µm	15 nm	85 %	Octadecyl Groups	Yes	35 MPa
MonoCap C18 High Resolution Ultra 2000		1 µm	2 µm	11 nm	85 %	Octadecyl Groups	Yes	35 MPa
MonoCap C18 Fast-flow		1 µm	2 µm	15 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 Nano-flow		1 µm	1 µm	11 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 WideBore		1 µm	2 µm	11 nm	85 %	Octadecyl Groups	Yes	22 MPa
MonoCap C18 Trap Column		2 µm	5 µm	11 nm	85 %	Octadecyl Groups	Yes	20 MPa
MonoCap Amide		1 µm	2 µm	15 nm	85 %	Carbamoyl Groups	None	22 MPa
MonoCap SCX		2 µm	5 µm	11 nm	85 %	Benzenesulfonyl Groups	None	20 MPa

* Based on monolithic technology, Merck KGaA, Darmstadt, Germany.

End-fittings of MonoCap Monolithic Capillary HPLC Columns

MonoCap C18 High Resolution 750
MonoCap C18 fast-flow
MonoCap Nano-flow
MonoCap C18 WideBore
MonoCap Amide
MonoCap SCX

→

1. Metal Hardwares
   End-fittings are Valco 1/16" (10-32 UNF).
   Valco 1/32" (6-40 UNF) end-fittings can also be arranged upon request, indicate "1/32" when ordering.

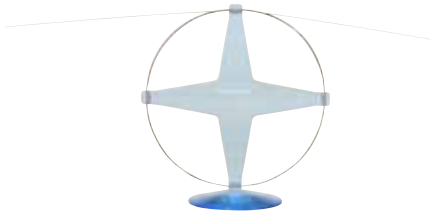
2. PEEK Hardwares
   1/16" male nut, ferrule and PTFE sleeve are included.

MonoCap C18 High Resolution 2000
MonoCap C18 High Resolution Ultra 2000
MonoCap HILIC-UP High Resolution 2000

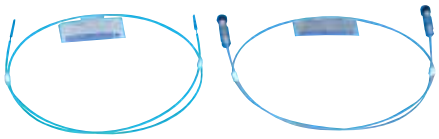
→

End-fittings are not included.
The connection kits shown at page 132 must be purchased separately once.

MonoCap™ C18 High Resolution/MonoCap™ C18 High Resolution Ultra



MonoCap High Resolution 2000

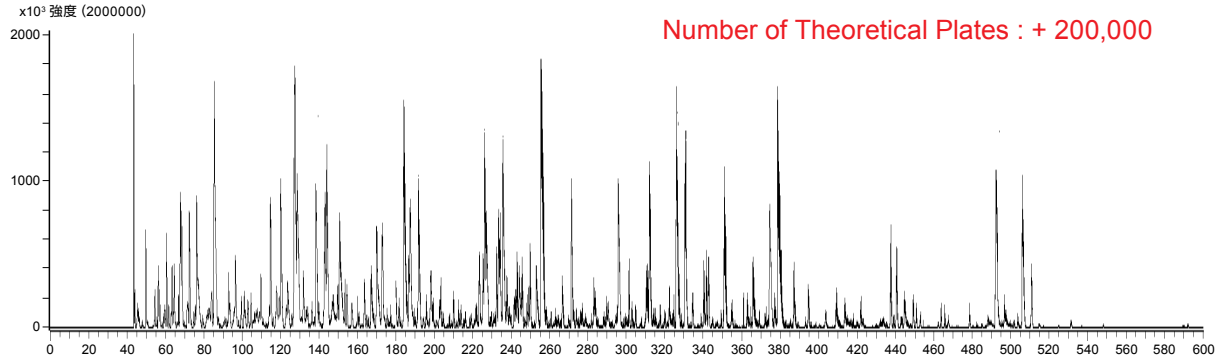


PEEK Metal

MonoCap High Resolution 750

Maximizing all the benefits and advantages of monolithic technology, MonoCap High Resolution and High Resolution Ultra are appropriate for the efficient separation of peptides and protein digests.
The newly-introduced High Resolution Ultra type deliver over 300,000 plates.

Figure 1 : Analysis of Tryptic Digests



Number of Theoretical Plates : + 200,000

Conditions

Column : MonoCap C18 High Resolution 2000 (2000 mm × 0.1 mm I.D)
Trap column : MonoCap C18 Trap Column (50 mm × 0.075 mm I.D.)
Eluent : A) 0.1 % HCOOH in CH_3CN
B) 0.1 % HCOOH in H_2O
A/B = 10/90 - 600 min - 45/55, v/v

Flow Rate : 0.5 µL/min
Injection Vol : 5 µL
Detection : MS (TIC m/z 500 - 1500)
Sample : Tryptic digest of proteins

MonoCap™ C18 High Resolution Ultra 2000

I.D.(mm)	Length(mm)	Cat.No.
0.1	2000	5020-10018

* A column stand is included.
* End-fittings are not included.
* The connection kits shown at page 132 must be purchased separately once.

MonoCap™ C18 High Resolution 2000

I.D.(mm)	Length(mm)	Cat.No.
0.1	2000	5020-10015

* A column stand is included.
* End-fittings are not included.
* The connection kits shown at page 132 must be purchased separately once.

MonoCap™ HILIC-UP High Resolution 2000

I.D.(mm)	Length(mm)	Cat.No.
0.1	2000	5020-10019

* A column stand is included.
* End-fittings are not included.
* The connection kits shown at page 132 must be purchased separately once.

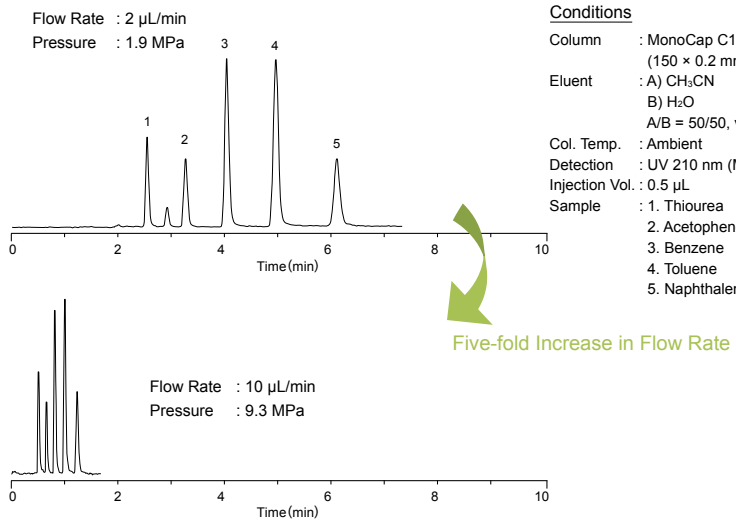
MonoCap HILIC-UP is an important addition to the MonoCap C18 High Resolution 2000 column series. MonoCap HILIC-UP can retain highly hydrophilic peptides/proteins which may lead to discovering new peptides/proteins where a C18 phase couldn't identify.
In HILIC, the higher the organic concentration, the greater the retention of more polar analytes. One of the biggest benefit of HILIC mode is, a high organic solvent concentration of the mobile phase will lead to a high sensitivity LC-MS/MS analysis.

Reference:
Hydrophilic Interaction Chromatography Using a Meter-Scale Monolithic silica capillary Column for Proteomics LC-MS,
K Horie et al. Anal. Chem. 2014, 86, 3817-3824

Monolithic Capillary HPLC Columns

MonoCap™ C18 Fast-flow

Figure 1 : Workable at High Flow Rates without Sacrificing Efficiency

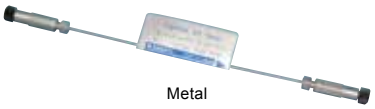


Conditions

Column : MonoCap C18 for Fast-flow (150 × 0.2 mm I.D.)
Eluent : A) CH_3CN
B) H_2O
A/B = 50/50, v/v
Col. Temp. : Ambient
Detection : UV 210 nm (MU701, Cell Volume 18 nL)
Injection Vol. : 0.5 µL
Sample : 1. Thiourea
2. Acetophenone
3. Benzene
4. Toluene
5. Naphthalene

Workable at a broad range of linear velocity from 0.5 to 5 mm/s without sacrificing efficiency and separation at high speed. The number of theoretical plates produced by MonoCap C18 Fast-flow is nearly equivalent to a totally porous particle type capillary column packed with a 5 µm packing material. Columns are protected by either metal or PEEK hardwares.


PEEK


Metal

I.D.(mm)	Length(mm)	50	150	250
	Material of Hardware	Cat.No.	Cat.No.	Cat.No.
0.05	Metal	5020-10102	5020-10101	5020-10100
	PEEK*	5020-10002	5020-10001	5020-10000
0.075	Metal	5020-10211	5020-10212	5020-10213
	PEEK*	5020-10221	5020-10222	5020-10223
0.1	Metal	5020-10112	5020-10111	5020-10110
	PEEK*	5020-10012	5020-10011	5020-10010
0.2	Metal	5020-10122	5020-10121	5020-10120
	PEEK*	5020-10022	5020-10021	5020-10020

* For end-fittings information, please refer to page 128.
* For maximum operating pressure information, please refer to page 128.
* All 50 mm length PEEK columns does not come with a hardware and will be supplied with 3 pcs of columns only.

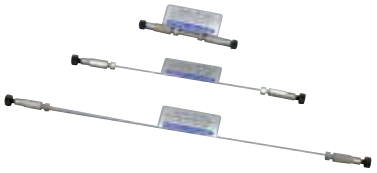
MonoCap™ C18 Nano-flow

MonoCap C18 Nano-flow produces higher number of theoretical plates compared to a totally porous particle type capillary column packed with a 3 µm packing material. It can be operated at a wide range of flow rate with low back pressure and achieve very high sensitive results in Nano-LC-ESI/MS applictions. Columns are protected by either metal or PEEK hardwares.

I.D.(mm)	Length(mm)	50	150
	Material of Hardware	Cat.No.	Cat.No.
0.05	Metal	5020-10143	5020-10141
	PEEK*	5020-10043	5020-10041
0.075	Metal	5020-10231	5020-10232
	PEEK*	5020-10241	5020-10242
0.1	Metal	5020-10153	5020-10151
	PEEK*	5020-10053	5020-10051
0.2	Metal	5020-10163	5020-10161
	PEEK*	5020-10063	5020-10061

* For end-fittings information, please refer to page 128.
* For maximum operating pressure information, please refer to page 128.
* All 50 mm length PEEK columns does not come with a hardware and will be supplied with 3 pcs of columns only.

MonoCap™ C18 WideBore



The MonoCap C18 Fast-flow is also available in 0.5 mm I.D. size, which can be used at a wide range of flow rate from 6 to 100 µL/min without sacrificing efficiency. The number of theoretical plates produced by MonoCap C18 WideBore is nearly equivalent to a totally porous particle type capillary column packed with a 5 µm packing material. Columns are protected by metal hardwares.

I.D.(mm)	Length(mm)	50	150	250
	Material of Hardware	Cat.No.	Cat.No.	Cat.No.
0.5	Metal	5020-10202	5020-10201	5020-10200

* For end-fittings information, please refer to page 128.
* For maximum operating pressure information, please refer to page 128.

MonoCap™ C18 Trap Column

MonoCap C18 Trap Column with Hardware
(Top Image: 1/16" End-fittings, Bottom Image: 1/32" End-fittings)

MonoCap Trap columns have a relatively big throughpore and workable at a high flow rate such as 10 µL/min. This benefit makes MonoCap Trap columns to be appropriate for on-line preconcentration or desalting of protein and peptide samples prior to HPLC separation with mass spectrometry detection.
End-fittings are 1/16" (10-32 UNF). 1/32" end-fittings are also available upon request.

I.D.(mm)	Length(mm)	50	100	150
	Hardware	Cat.No.	Cat.No.	Cat.No.
0.05	With Hardware	5020-10026	5020-10038	–
	Without Hardware	5020-10027	5020-10039	
0.075	With Hardware	5020-10028	5020-10036	
	Without Hardware	5020-10029	5020-10037	
0.2	With Hardware	5020-10033	–	
	Without Hardware	5020-10034		5020-10031

MonoCap™ Amide

Amide groups are chemically bonded to the monolithic silica and makes it suitable for the analysis of sugars via HILIC mode. As the back pressure is significantly low, a 500 mm length MonoCap Amide column deliver over 40,000 plates offering high efficiency. Generally, HILIC mode uses acetonitrile at a concentration between 65-95 % in an aqueous buffer such as ammonium acetate or ammonium formate, which have high solubility in organic solvents. Columns are protected by either metal or PEEK hardwares.

I.D.(mm)	Length(mm)	150	250	500
	Hardware	Cat.No.	Cat.No.	Cat.No.
0.075	Metal	5020-10191	5020-10192	5020-10193
	PEEK	5020-10091	5020-10092	5020-10093
0.1	Metal	5020-10181	5020-10182	5020-10183
	PEEK	5020-10081	5020-10082	5020-10083
0.2	Metal	5020-10171	5020-10172	5020-10173
	PEEK	5020-10071	5020-10072	5020-10073

* For end-fittings information, please refer to page 128.
* For maximum operating pressure information, please refer to page 128.

MonoCap™ SCX

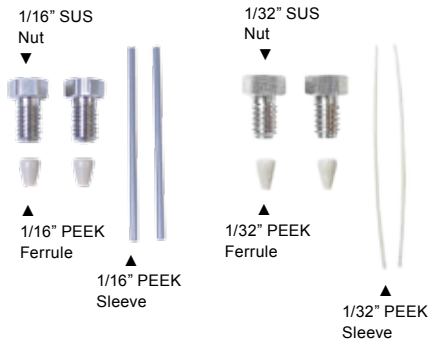
MonoCap SCX is bonded with benzene sulfonic acid groups (strong cation exchange) and appropriate for 2D LC applications for the separation of biomolecules such as peptides and proteins.

I.D.(mm)	Length(mm)	50	150	250	500
	Material of Hardware	Cat.No.	Cat.No.	Cat.No.	Cat.No.
0.2	Metal	5020-10174	5020-10175	5020-10176	5020-10177
	PEEK	5020-10074	5020-10075	5020-10076	5020-10077

* For end-fittings information, please refer to page 128.
* For maximum operating pressure information, please refer to page 128.

Consumables and Accessories for Monolithic Capillary HPLC Columns

Connection Kit for MonoCap™ C18 High Resolution



Connection Kit for MonoCap™ C18 High Resolution 2000

A dedicated connection kit for MonoCap C18 High Resolution 2000.
Use this connection kit when connecting the column directly to the system.

Description	Contents of Kit	Cat.No.
Connection Kit for MonoCap C18 High Resolution 2000	1/16" PEEK Ferrule, SUS Nut, Sleeve 2 pcs each 1/32" PEEK Ferrule, SUS Nut, Sleeve 2 pcs each	5020-10017

Zero Dead Volume Union

Connect the tubing from the system to this union and install the column to achieve zero dead volume.

Description	P/N	Orifice	Remarks	Cat.No.
Zero Dead Volume Union	U-435	0.25 mm	1/16"Tubing SUS Male Nut, Ferrule 2 pcs each	6010-72352
	U-411	178 µm		6010-72351

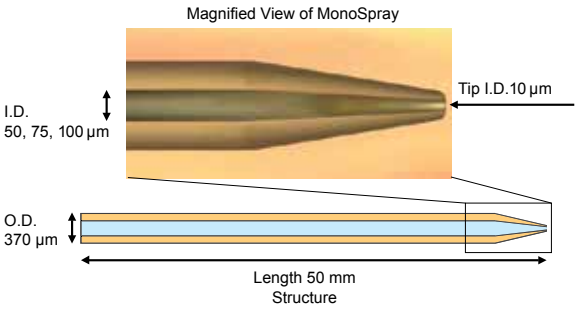
Connection Kit for MonoCap™ C18 Trap Column

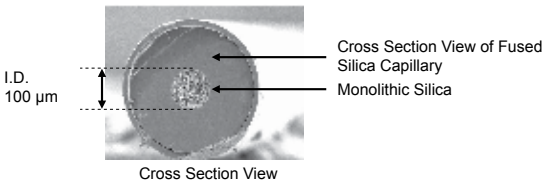
MonoCap C18 Trap Column Connection Kit 1/16"

Description	Cat.No.
MonoCap C18 Trap Column Connection Kit 1/16" (Union·Sleeve·Capillary Tubing 2 pcs each Nut·Ferrule4 pcs each)	5020-10044
MonoCap C18 Trap Column Connection Kit 1/32" (Union·Sleeve·Capillary Tubing 2 pcs each Nut·Ferrule4 pcs each)	5020-10045
MonoCap C18 Trap Column Assembly Parts 1/16" (Nut·Ferrule4 pcs each)	5020-10046
MonoCap C18 Trap Column Assembly Parts 1/32" (Nut·Ferrule4 pcs each)	5020-10047

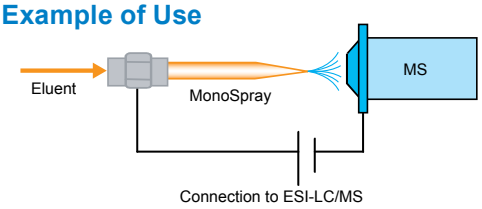
MonoSpray™

MonoSpray is an electrospray emitter for ESI-LC/MS which a monolithic packing is packed into a fused silica sprayer offering numbers of benefits compared to those traditional sprayers packed with particle based packings.





Example of Use



- **Benefits**

High Sensitivity Analysis

The introduction of a monolithic packing into the sprayer deliver minimized sample diffusion resulting in high sensitivity.

High Chemical Stability

The optimized surface treatment to the silica monolith eliminates non-specific adsorption issues.

High Physical Stability

Frits are not installed in MonoSpray to keep the monolithic packing in place, which results in offering simply longer lifetime and avoiding bed splitting problems compared to those traditional sprayers packed with particle based packings.

Wide Range of Operational Flow Rates

The very high porosity of monolithic packing allows a wide range of operational flow rates, even at high flow rates.

Change in Spray Shape at Different Flow Rates

- **Ordering Information**

MonoSpray™ FS

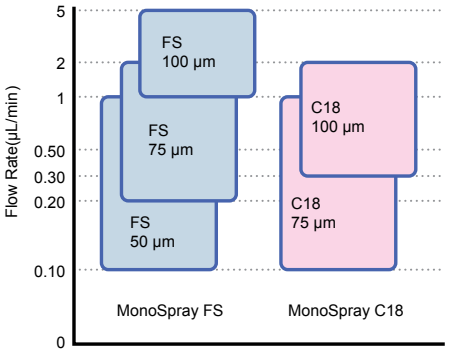
For online Nano-ESI-LC/MS.

I.D. : 50, 75, 100 µm

MonoSpray™ C18

Nano sprayer packed with octadecylated silica monolith offering reversed phased separation.

I.D. : 75 ,100 µm



Optimal Flow Rate against Each Column I.D. Size

MonoSpray™ FS

Description	Length (mm)	O.D. (µm)	I.D. (µm)	Qty (pcs)	Cat.No.
Mono Spray FS	50	370	50	5	5010-20001
				20	5010-20006
			75	5	5010-20002
				20	5010-20007
			100	5	5010-20003
				20	5010-20008

* Please inquire for other sizes.

MonoSpray™ C18

Description	Length (mm)	O.D. (µm)	I.D. (µm)	Qty (pcs)	Cat.No.
Mono Spray C18 Nano	50	370	75	1	5010-20012
				4	5010-20017
			100	1	5010-20013
				4	5010-20018

* Please inquire for other sizes.

Based on monolithic technology, Merck KGaA, Darmstadt, Germany.