2012-2013

Thermo Scientific
Chromatography Columns
and Consumables

Trusted solutions

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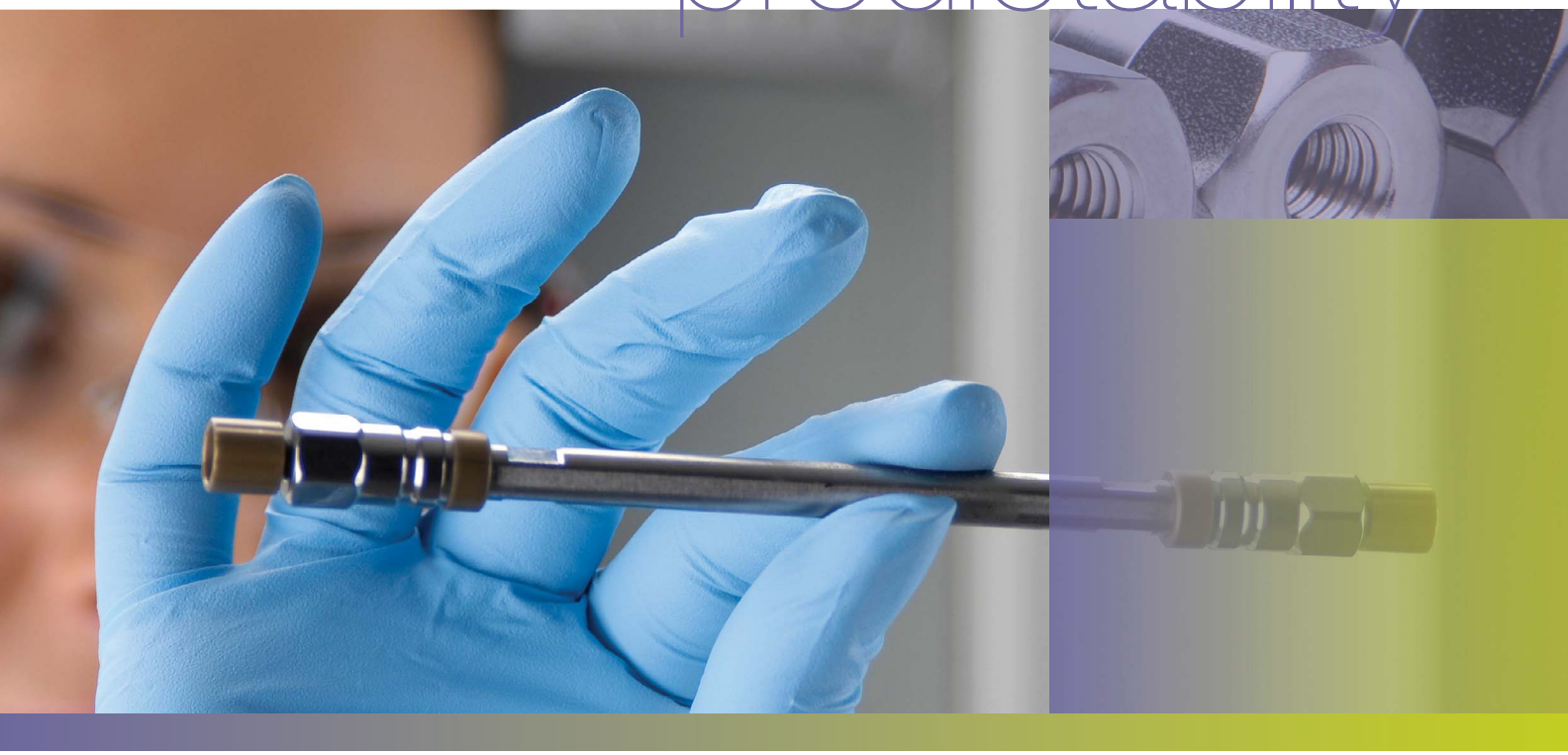
predictability



LC Columns and Accessories

As a leader in LC column technology including silica manufacturing, bonded phase production and column packing for over 35 years, you can rely on the quality of Thermo Scientific HPLC products. Here we showcase our latest and most comprehensive range of innovative columns, accessories and equipment for fast LC, analytical HPLC and biomolecule separations.

Section Contents

Featured Products

Accucore Columns

The ultimate core performance to maximize your investment

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Syncronis Columns

Consistent, reproducible separations, column after column, time after time

PAGE 4-040, 4-086

Hypersil GOLD Columns

Unleash the productivity of your HPLC

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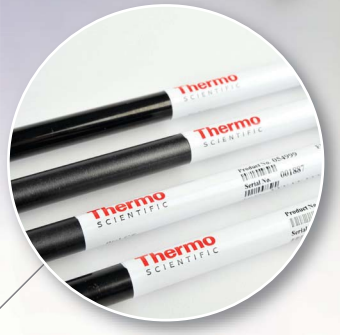

ProPac Columns

Unrivalled resolution and efficiency in the analysis of protein variants

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Acclaim PepMap Columns

The standard for peptide separations in proteomics

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Viper Connectors

Simple, dead volume free plumbing of HPLC and UHPLC systems

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LC Column Selection

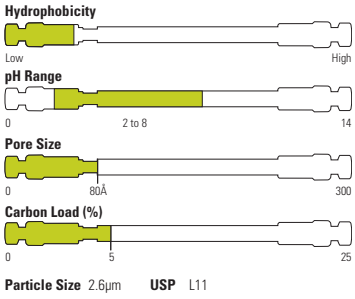
Information in the following section will help you make an informed decision on the appropriate HPLC column for your application, based on stationary phase use, analyte properties, LC/MS requirements or USP specifications. You will also find a useful table of Thermo Scientific phases with specifications, as well as recommended Thermo Scientific alternatives for other popular columns.

Refer to the **Advanced User Graphic** (AUG) on the corresponding product page (illustrated to the right) for more help and information on column selection.

The AUG will show you Hydrophobicity which gives the relative retention on the column. Generally, the higher the hydrophobicity, the greater the retention of neutral compounds and the higher the organic content in the mobile phase. A lower value indicates a need for higher aqueous mobile phases to achieve comparable retention and resolution. The recommended pH Range for the column is illustrated, outside of which column lifetimes will diminish.

The Pore Size is shown, with larger pore size columns being more applicable to larger analytes such as proteins or peptides. The percentage Carbon Load is related to the hydrophobicity. Below the icon, you will see the particle sizes available, as well as the USP code. These graphics are designed to allow you to quickly compare the main characteristics of multiple stationary phases, allowing you to choose quickly the most appropriate stationary phase for your analysis.

For additional help in column selection, please see the back cover to contact our expert Technical Support and tap our expertise to help make the best choice for your application.



Advanced User Graphic (AUG)

Common HPLC Phases and Their Uses

Common Name	Alternative Name	Functional Group	Normal Phase	Reverse Phase	Ion Exchange	HILIC	Application
Silica	Silica	-OH	•			•	Non-polar and moderately polar organic compounds.
C1	SAS	$-(CH_3)_3$		•			Least retentive of all alkyl group bonded phases for non-polar solutes. Typically used zfor moderately polar and multi-functional compounds.
C4	Butyl	$-C_4H_9$		•			Shorter retention than C8, C18. Separation of peptides and proteins.
C8	MOS	$-C_8H_{17}$		•			Less retentive than C18; normally used for small peptides and proteins, pharmaceuticals, steroids, environmental samples.
C18	ODS	$-C_{18}H_{37}$		•			Most retentive of the alkyl-bonded phases. Used widely for pharmaceuticals, steroids, fatty acids, phthalates, environmental etc.
Cyano	CPS, CN	$-(CH_2)_3CN$	•	•			Unique selectivity for polar compounds, more suitable than base silica for normal phase gradient separations. When used in reversed phase, the selectivity is different to that of the C8 and C18 phases. Useful for a wide range of pharmaceutical applications and for mixtures of very different solutes.
Amino	APS	$-(CH_2)_3NH_2$	•	•	•	•	**HILIC:** Carbohydrate analysis and other polar compounds. **Weak anion exchange:** anions and organic acids. **Normal Phase:** Alternative selectivity to silica. Good for aromatics.
Phenyl		$-(CH_3)C_6H_5$		•			Aromatic compounds and moderately polar compounds.
Pentafluo-rophenyl	PFP	$-C_6F_5$		•			Extra selectivity and retention for halogenated, polar compounds and isomers.
Diol		$-(CH_2)_{20}CH_2(CH_2OH)_2$	•	•		•	**Reversed Phase:** Proteins, peptides. **Normal Phase:** Similar selectivity to silica, but less polar.
SCX	Strong Cation Exchanger	$-RSO_3H-$			•		Organic bases.
SAX	Strong Anion Exchanger	$-RN+(CH_3)_3$			•		Organic acids, nucleotides and nucleosides.
AX	Anion Exchanger Polyethleneimine (PEI)	$-(CH_2CH_2NH-)_n$			•		Organic acids, nucleotides and oligonucleotides.
Porous graphitic carbon	PGC	100% carbon	•	•			Particularly useful for the separation of highly polar compounds that carbon are difficult to retain using conventional silica based columns; separation of structurally similar compounds (e.g., isomers, diastereoisomers).

HPLC Stationary Phase Column Selection

Before beginning a new analysis, consider the physical and chemical properties of the analyte(s), the mode of analysis and how the analyte(s) will interact with the surface of the chromatographic phase. To aid column selection, the following guide may be useful.

Analyte solubilty	Analyte chemical properties		Mode of analysis	Recommended phase	
Polar Solvents	Acidic	$pK_a < 2$	Anion exchange	Hypersil GOLD AX	4-067
				Hypersil GOLD SAX	4-068
			Polar retention effect on graphite	Hypercarb	4-094
		$pK_a > 2$	Anion Exchange / Reversed-phase mixed mode	Acclaim™ Mixed-Mode WAX-1	4-082
				Acclaim Trinity™ P1	4-083
	Neutral	Non-polar	Reversed phase	Accucore C18	4-034
				Accucore RP-MS	4-033
				Accucore Phenyl-Hexyl	4-036
				Acclaim 120 C18	4-073
				Acclaim 120 C8	4-074
				Acclaim C30	4-076
				Acclaim Phenyl-1	4-075
				Hypersil GOLD	4-056
				Hypersil GOLD C8	4-058
				Hypersil GOLD C4	4-059
				Syncronis C18	4-087
				Syncronis C8	4-088
		Moderately polar	Reversed phase	Accucore aQ	4-035
				Accucore PFP	4-037
				Acclaim PolarAdvantage	4-077
				Acclaim PolarAdvantage II	4-078
				Hypersil GOLD aQ	4-060
				Hypersil GOLD PFP	4-062
				Hypersil GOLD Phenyl	4-064
				Syncronis aQ	4-089
				Syncronis Phenyl	4-090
		Highly polar	Polar retention effect on graphite	Hypercarb	4-094
			HILIC	Accucore HILIC	4-038
				Acclaim Mixed-Mode HILIC-1	4-080
				Acclaim HILIC-10	4-079
				Acclaim Trinity P1	4-083
				Acclaim Mixed-Mode WAX-1	4-081
				Acclaim Mixed-Mode WCX-1	4-082
				Hypersil GOLD Amino	4-066
				Hypersil GOLD HILIC	4-070
				Syncronis Amino	4-091
				Syncronis HILIC	4-093
	Basic	$pK_a > 10$	Cation exchange	Acclaim Mixed-Mode WCX-1	4-082
				Acclaim Trinity P1	4-083
			Polar retention effect on graphite	Hypercarb	4-094
		$pK_a < 10$	Reversed phase	Accucore C18	4-034
				Accucore RP-MS	4-033
				Accucore Phenyl-Hexyl	4-036
				Acclaim 120 C18	4-073
				Acclaim 120 C8	4-074
				Acclaim C30	4-076
				Acclaim Phenyl-1	4-075
				Hypersil GOLD	4-056
				Hypersil GOLD C8	4-058
				Hypersil GOLD C4	4-059
				Syncronis C18	4-087
				Syncronis C8	4-088
Non-polar solvents			Normal phase	Hypersil GOLD Amino	4-066
				Hypersil GOLD CN	4-065
				Hypersil GOLD Silica	4-069
				Syncronis Amino	4-091
				Syncronis Silica	4-092

Column Selection for LC/MS

The Thermo Scientific range offers a broad array of column designs and stationary phases optimized for LC/MS applications. Use the following diagram to help you choose your column format to best meet your application needs. A variety of HPLC column hardware configurations are available, designed to give superior results for high speed, high sensitivity, high efficiency and convenience. A wide range of particle and monolithic stationary phases allows choices for optimized selectivity.

Column Hardware Selection for LC/MS

LC/MS Application	Column Hardware Design	Description
High throughput analysis	DASH™ HTS columns	Short, fast columns 20mm x 2.1mm Labelled and serialized, Economical multi-packs
	Javelin™ HTS columns	Direct-connection columns Slim design, 20mm length, 1mm to 4.6mm ID
High sensitivity analysis	KAPPA™ capillary columns	Capillary columns 75µm to 500µm ID, 30mm to 250mm lengths
	Acclaim PepMap™ nano, capillary and micro columns	Nano, capillary and micro columns 0.075mm to 1mm ID; 50 to 250mm length nanoViper™ format offers fingertight dead volume free connection to 1000 bar
Proteomics analysis	Acclaim PepMap nano columns, nanoViper	nanoViper offers fingertight dead volume free connection to 1000 bar Flexible silica columns 50µm and 75µm ID; 50 to 500mm length Trap column 20mm x 100µm ID
	Acclaim PepMap nano columns, classic	Flexible silica columns 50µm and 75µm ID; 50 to 500mm length Trap column 20mm x 100µm ID
	EASY-Column	Flexible silica columns 100mm x 75µm Trap column 20mm x 100µm ID
	PicoFrit™ and IntegraFrit™ columns	Flexible silica columns 75µm to 150µm ID PicoFrit columns spray direct from tip
	PepSwift™ monolithic columns	Flexible fused silica columns, nanoViper connections 100µm to 500µm ID, 50 to 250mm length Trap columns 5mm x 200µm ID

Various HPLC columns, throughout this LC section, in 2.1mm column dimensions can also be used for LC/MS application.

Packed column selection for LC/MS

Analyte Molecular Weight	Sample Polarity	Interface Ionization	Relative Sensitivity	Column ID (mm)	Flow Rate (µL/min)	Column Hardware
< 1000 Da	Low	APCI	Low	4.6, 4.0, 3.0	2000 – 200	Javelin HTS, Analytical
			High	2.1, 1.0	200 – 50	DASH HTS, Analytical, Javelin HTS
	Medium	APCI	Low	4.6, 4.0, 3.0	2000 – 200	Javelin HTS, Analytical
			High	2.1, 1.0	200 – 50	DASH HTS, Analytical, Javelin HTS
		ESI	Low	2.1, 1.0	200 – 50	DASH HTS, Analytical, Javelin HTS
			High	1.0 – 0.3	50 – 5	KAPPA, Acclaim PepMap (RSLC) capillary and micro
				0.2 – 0.05	2 – 0.2	KAPPA, PicoFrit, IntegraFrit, EASY-Column, Acclaim PepMap (RSLC) nano
	High (or ionizable)	ESI	Low	2.1, 1.0	200 – 50	DASH HTS, Analytical, Javelin HTS
			High	1.0 – 0.3	50 – 5	KAPPA, Acclaim PepMap (RSLC) capillary and micro
				0.2 – 0.05	2 – 0.2	KAPPA, PicoFrit, IntegraFrit, EASY-Column, Acclaim PepMap (RSLC) nano
> 1000 Da		ESI	Low	2.1, 1.0	200 – 50	DASH HTS, Analytical, Javelin HTS
			High	1.0 – 0.3	50 – 5	KAPPA, Acclaim PepMap (RSLC) capillary and micro
				0.2 – 0.05	2 – 0.2	KAPPA, PicoFrit, IntegraFrit, EASY-Column, Acclaim PepMap (RSLC) nano

Monolith columns for LC/MS

Analyte Molecular Weight	Column ID (mm)	Flow Rate (µL/min)	Column Hardware
< 1000 Da	0.1, 0.2, 0.5	0.7 – 25	PepSwift Monolith
> 1000 Da	1.0	40 – 60	ProSwift™ Monolith

ProSwift is also available in larger IDs for high throughput applications.

HPLC Column Selection by U.S. Pharmacopeia Specifications*

USP Code	Description	Recommended Phase	Page
L1	Octadecyl silane (C18) chemically bonded to porous or ceramic microparticles, 1.5-10µm in diameter, or a monolithic rod	Acclaim 120 C18	**4-073**
		Acclaim 300 C18	**4-141**
		Accucore C18	**4-034**
		Accucore aQ	**4-035**
		BioBasic 18	**4-138**
		Hypersil GOLD	**4-056**
		Hypersil GOLD aQ	**4-060**
		Acclaim PepMap 100 C18	**4-142**
		Syncronis C18	**4-087**
		Syncronis aQ	**4-089**
L3	Porous silica microparticles, 5-10µm in diameter	Accucore HILIC	**4-038**
		Hypersil GOLD Silica	**4-069**
		Syncronis Silica	**4-092**
L7	Octyl silane (C8) chemically bonded to totally porous silica particles, 1.5-10µm in diameter	Acclaim 120 C8	**4-074**
		BioBasic 8	**4-139**
		Hypersil GOLD C8	**4-058**
		Acclaim PepMap 100 C8	**4-144**
		Syncronis C8	**4-088**
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 3-10µm in diameter	Hypersil GOLD Amino	**4-066**
		Syncronis Amino	**4-091**
L10	Nitrile groups (CN) chemically bonded to porous silica particles, 3-10µm in diameter	Hypersil GOLD CN	**4-065**
L11	Phenyl groups chemically bonded to porous silica particles, 1.5-10µm in diameter	Accucore Phenyl-Hexyl	**4-036**
		Hypersil GOLD Phenyl	**4-064**
		Syncronis Phenyl	**4-090**
L13	Trimethylsilane chemically bonded to porous silica particles, 3-10µm in diameter	BETASIL C1	**4-113**
		Hypersil SAS	**4-109**
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion exchange (SAX) coating, 5-10µm in diameter	Hypersil GOLD SAX	**4-068**
		Hypersil SAX	**4-111**
L15	Hexylsilane (C6) chemically bonded to totally porous silica particles, 3-10µm in diameter	BETASIL C6	**4-113**

USP Code	Description	Recommended Phase	Page
L17	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7-11µm in diameter	HyperREZ XP Carbohydrate H^+	**4-152**
		HyperREZ XP Organic Acids	**4-152**
L19	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, about 9µm diameter	HyperREZ XP Carbohydrate Ca^{2+}	**4-152**
		HyperREZ XP Sugar Alcohols	**4-152**
L20	Dihydroxypropane groups chemically bonded to porous silica particles, 5-10µm in diameter	BETASIL Diol	**4-114**
L26	Butyl silane (C4) chemically bonded to totally porous silica particles, 3-10µm in diameter	BioBasic 4	**4-140**
		Hypersil GOLD C4	**4-059**
		Acclaim PepMap 300 C4	**4-144**
L33	Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 daltons. It is spherical, silica-based, and processed to provide pH stability	BioBasic SEC 120	**4-135**
		BioBasic SEC 300	**4-135**
		BioBasic SEC 1000	**4-135**
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, about 9µm in diameter	HyperREZ XP Carbohydrate Pb^{2+}	**4-152**
L43	Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 5-10µm in diameter	Accucore PFP	**4-037**
		Hypersil GOLD PFP	**4-062**
L52	A strong cation exchange resin made of porous silica with sulfopropyl groups by a propyl spacer, 5-10µm in diameter	BioBasic SCX	**4-137**
L58	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 7-11µm in diameter	HyperREZ XP Carbohydrate Na^+	**4-152**
L59	Packing having the capacity to separate proteins by molecular weight over the range of 10 to 500 kDa. It is spherical (10µm), silica-based, and processed to provide hydrophilic characteristics and pH stability	BioBasic SEC 300 (5µm)	**4-135**
		MAbPac™ SEC-1	**4-131**
L60	Spherical, porous silica gel, 10µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped	HyPURITY ADVANCE	Inquire
		Acclaim PolarAdvantage II	**4-078**
L62	C30 silane bonded phase on a fully porous spherical silica, 3 to 15µm in diameter	Acclaim C30	**4-076**

*These are the recommended Thermo Scientific HPLC columns for various USP categories although other columns for each category are also available.

Thermo Scientific HPLC Phases

The tables below list Thermo Scientific HPLC sorbents offered.
Please also refer to the Advanced User Graphic (AUG) for each HPLC phase on the pages indicated.

Phase	Particle Type	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	% Carbon	Endcapping	USP Code	Phase Code	**Page**
AQUASIL									
C18	spherical, fully porous silica	3, 5	100	310	12	polar	L1	775	**4-111**
Acclaim									
120 C18	spherical, fully porous silica	2.2, 3, 5	120	300	18	Yes	L1	–	**4-073**
300 C18	spherical, fully porous silica	2.2, 3, 5	300	100	8	Yes	L1	–	**4-141**
120 C8	spherical, fully porous silica	2.2, 3, 5	120	300	11	Yes	L7	–	**4-074**
Phenyl-1	spherical, fully porous silica	3	120	300	13	Yes	L11	–	**4-075**
C30	spherical, fully porous silica	3, 5	200	200	13	Proprietary	L62	–	**4-076**
PA	spherical, fully porous silica	2.2, 3, 5	120	300	16	Yes	L1	–	**4-077**
PA II	spherical, fully porous silica	2.2, 3, 5	120	300	16	Yes	L60	–	**4-078**
HILIC-10	spherical, fully porous silica	3	120	300	8	Yes	–	–	**4-079**
Trinity P1	nano polymer silica hybrid	3	300	100	–	Proprietary	–	–	**4-083**
Mixed Mode HILIC-1	spherical, fully porous silica	3	120	300	–	Proprietary	–	–	**4-080**
Mixed Mode WAX-1	spherical, fully porous silica	3, 5	120	300	–	Proprietary	–	–	**4-081**
Mixed Mode WCX-1	spherical, fully porous silica	3, 5	120	300	–	Proprietary	–	–	**4-082**
Organic Acid	spherical, fully porous silica	3, 5	120	300	–	Yes	–	–	**4-099**
Surfactant	spherical, fully porous silica	3, 5	120	300	–	Yes	–	–	**4-100**
Explosives	spherical, fully porous silica	3, 5	120	300	–	Yes	–	–	**4-101**
Carbamate	spherical, fully porous silica	3, 5	120	300	–	Yes	–	–	**4-103**
Carbonyl	spherical, fully porous silica	2.2	120	300	–	Yes	–	–	**4-104**
Accucore									
RP-MS	spherical, solid core silica	2.6	80	130	7	Yes	–	176	**4-033**
C18	spherical, solid core silica	2.6	80	130	9	Yes	L1	171	**4-034**
aQ	spherical, solid core silica	2.6	80	130	9	Polar	L1	173	**4-035**
PFP	spherical, solid core silica	2.6	80	130	5	Yes	L43	174	**4-037**
Phenyl-Hexyl	spherical, solid core silica	2.6	80	130	5	Yes	–	179	**4-036**
HILIC	spherical, solid core silica	2.6	80	130	–	–	L3	175	**4-038**
BetaBasic									
18	spherical, fully porous silica	3, 5	150	200	13	Yes	L1	715	**4-112**
8	spherical, fully porous silica	3, 5	150	200	7	Yes	L7	714	**4-112**
4	spherical, fully porous silica	3, 5	150	200	6	Yes	L26	716	Inquire
Phenyl	spherical, fully porous silica	5	150	200	7	Yes	L11	718	**4-112**
CN	spherical, fully porous silica	5	150	200	5	Yes	L10	717	**4-112**
BETASIL									
C18	spherical, fully porous silica	3, 5	100	310	20	Yes	L1	701	**4-113**
C8	spherical, fully porous silica	3, 5	100	310	12	Yes	L7	702	**4-113**
C6	spherical, fully porous silica	3, 5	100	310	11	Yes	L15	703	Inquire
Phenyl	spherical, fully porous silica	3, 5	100	310	11	Yes	L11	706	**4-113**
Phenyl-Hexyl	spherical, fully porous silica	3, 5	100	310	11	Yes	L11	730	**4-113**
CN	spherical, fully porous silica	5	100	310	6	Yes	L10	708	**4-114**
Silica 100	spherical, fully porous silica	5	100	310	–	–	L3	700	**4-114**
Diol 100	spherical, fully porous silica	5	100	310	6	–	L20	726	**4-114**

Phase	Particle Type	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	% Carbon	Endcapping	USP Code	Phase Code	Page
Hypercarb									
Hypercarb	spherical, porous graphitic carbon	3, 5, 7	250	120	100	–	–	350	**4-094**
Hypersil									
ODS (C18)	spherical, fully porous silica	3, 5	120	170	10	Yes	L1	301	**4-108**
ODS-2 (C18)	spherical, fully porous silica	3, 5	80	220	11	Yes	L1	316	**4-109**
MOS (C8)	spherical, fully porous silica	3, 5	120	170	6.5	No	L7	302	**4-109**
MOS-2 (C8)	spherical, fully porous silica	5	120	170	6.5	Yes	L7	303	**4-109**
SAS (C1)	spherical, fully porous silica	5	120	170	2.5	Yes	L13	305	**4-109**
Phenyl	spherical, fully porous silica	5	120	170	5	No	L11	309	**4-110**
Phenyl-2	spherical, fully porous silica	5	120	170	5	Yes	L11	319	**4-110**
CPS	spherical, fully porous silica	3, 5	120	170	4	No	L10	308	**4-110**
CPS-2	spherical, fully porous silica	5	120	170	4	Yes	L10	318	**4-110**
APS-2	spherical, fully porous silica	3, 5	120	170	1.9	No	L8	307	**4-110**
Silica	spherical, fully porous silica	3, 5	120	170	–	–	L3	300	**4-111**
SAX	spherical, fully porous silica	5	120	170	2.5	Yes	L14	341	**4-111**
Hypersil BDS									
C18	spherical, fully porous silica	2.4, 3, 5	130	170	11	Yes	L1	281	**4-106**
C8	spherical, fully porous silica	2.4, 3, 5	130	170	7	Yes	L7	282	**4-107**
Phenyl	spherical, fully porous silica	3, 5	130	170	5	Yes	L11	289	**4-107**
Cyano	spherical, fully porous silica	3, 5	130	170	4	Yes	L10	288	**4-107**
Hypersil GOLD									
C18 selectivity	spherical, fully porous silica	1.9, 3, 5, 12	175	220	10	Yes	L1	250	**4-056**
C8	spherical, fully porous silica	1.9, 3, 5	175	220	8	Yes	L7	252	**4-058**
C4	spherical, fully porous silica	1.9, 3, 5	175	220	5	Yes	L26	255	**4-059**
aQ	spherical, fully porous silica	1.9, 3, 5	175	220	12	Polar	L1	253	**4-060**
PFP	spherical, fully porous silica	1.9, 3, 5	175	220	8	Yes	L43	254	**4-062**
Phenyl	spherical, fully porous silica	1.9, 3, 5	175	220	8.5	Yes	L11	259	**4-064**
CN (Cyano)	spherical, fully porous silica	1.9, 3, 5	175	220	4	Yes	L10	258	**4-065**
Amino	spherical, fully porous silica	1.9, 3, 5	175	220	2	Yes	L8	257	**4-066**
AX	spherical, fully porous silica	1.9, 3, 5	175	220	6	No	-	261	**4-067**
SAX	spherical, fully porous silica	1.9, 3, 5	175	220	2.5	Yes	L14	263	**4-068**
Silica	spherical, fully porous silica	1.9, 3, 5	175	220	–	–	L3	251	**4-069**
HILIC	spherical, fully porous silica	1.9, 3, 5	175	220	6	No	–	265	**4-070**
Hypersil Green									
PAH	spherical, fully porous silica	3, 5	120	170	13.5	Yes	–	311	**4-105**
HyPURITY™									
C18	spherical, fully porous silica	3, 5	190	200	13	Yes	L1	221	**4-115**
C8	spherical, fully porous silica	5	190	200	8	Yes	L7	222	**4-115**
AQUASTAR	spherical, fully porous silica	3, 5	190	200	10	Polar	L1	225	**4-115**
Syncronis									
C18	spherical, fully porous silica	1.7, 5	100	320	16	Yes	L1	971	**4-087**
C8	spherical, fully porous silica	1.7, 5	100	320	10	Yes	L7	972	**4-088**
aQ	spherical, fully porous silica	1.7, 5	100	320	19	Polar	L1	973	**4-089**
Phenyl	spherical, fully porous silica	1.7, 5	100	320	11	Yes	L11	979	**4-090**
Amino	spherical, fully porous silica	1.7, 5	100	320	4	Yes	L8	977	**4-091**
Silica	spherical, fully porous silica	1.7, 5	100	320	–	–	L3	970	**4-092**
HILIC	spherical, fully porous silica	1.7, 5	100	320	5	–	–	975	**4-093**

HPLC Column Selection by Manufacturer

To find a suitable Thermo Scientific alternative to another manufacturer's columns, refer to the selection guide below. The Thermo Scientific alternative phases are selected based on a combination of physical and chemical similarities as well as mode of retention. These alternatives are not guaranteed to provide the same retention or selectivity, but should be suitably similar in character to allow a similar or improved separation to be achieved with some method optimization. The user should refer to the individual phase information to ensure that the characteristics of the alternative match the requirements of their separation.

The following table is not complete in terms of manufacturer or products offered. Although every effort is made to ensure that the product information provided is as accurate as possible, some errors may occur in collation and transcription. We cannot accept any responsibility for the use of the following information.

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% Carbon	Recommended Thermo Scientific Alternative	**Page**
ACE C18	ACT	100	300	15.5	Syncronis C18	**4-087**
ACE C8	ACT	100	300	9	Syncronis C8	**4-088**
ACE Phenyl	ACT	100	300	9.5	Syncronis Phenyl	**4-090**
ACE AQ	ACT	100	300	14	Syncronis aQ	**4-089**
ACE C18-300	ACT	300	100	9	BioBasic 18	**4-138**
ACE C8-300	ACT	300	100	5	BioBasic 8	**4-139**
ACE C4-300	ACT	300	100	2.6	BioBasic 4	**4-140**
AQUITY UPLC™ BEH HILIC	Waters	130	185	–	Hypersil GOLD Silica (1.9µm)	**4-031**
ACQUITY UPLC HSS C18	Waters	100	230	15	Hypersil GOLD (1.9µm)	**4-023**
ACQUITY UPLC BEH C18	Waters	130	185	18	Hypersil GOLD (1.9µm)	**4-023**
ACQUITY UPLC BEH C8	Waters	130	185	13	Hypersil GOLD C8 (1.9µm)	**4-024**
ACQUITY UPLC BEH Phenyl	Waters	130	185	15	Hypersil GOLD Phenyl (1.9µm)	**4-028**
ACQUITY UPLC HSS T3	Waters	100	230	11	Hypersil GOLD aQ (1.9µm)	**4-026**
Alltima™ HP C18	Grace	190	200	12	Hypersil GOLD	**4-056**
Alltima HP C18 AQ	Grace	100	450	20	Hypersil GOLD aQ	**4-060**
Alltima HP C18 HiLoad	Grace	100	450	24	Syncronis C18	**4-087**
Alltima HP C8	Grace	190	200	8	Hypersil GOLD C8	**4-058**
Alltima HP CN	Grace	190	200	4	Hypersil GOLD CN	**4-065**
Alltima HP Silica	Grace	190	200	–	Hypersil GOLD Silica	**4-069**
Aminex™ HPX42C	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Ca^{2+}	**4-152**
Aminex HPX72S	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate H^{+}	**4-152**
Aminex HPX87C	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Ca^{2+}	**4-152**
Aminex HPX87H	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate H^{+}	**4-152**
Aminex HPX87N	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Na^{+}	**4-152**
Aminex HPX87P	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Pb^{2+}	**4-152**
AQUA™ C18	Phenomenex	125	320	15	Hypersil GOLD aQ	**4-060**
Ascentis C18	Supelco	100	450	25	Syncronis C18	**4-087**
Ascentis C8	Supelco	100	450	15	Syncronis C8	**4-088**
Ascentis Express C18	Supelco	90	150	–	Accucore C18	**4-034**
Ascentis Express C8	Supelco	90	150	–	Accucore RP-MS	**4-033**
Ascentis Express F5	Supelco	90	150	–	Accucore PFP	**4-037**
Ascentis Express HILIC	Supelco	90	150	–	Accucore HILIC	**4-038**
Ascentis Express Phenyl-Hexyl	Supelco	90	150	–	Accucore Phenyl-Hexyl	**4-036**
Ascentis Phenyl	Supelco	100	450	19	Syncronis Phenyl	**4-090**
Atlantis™ dC18	Waters	100	330	12	Acclaim Polar Advantage II	**4-078**
Atlantis T3	Waters	100	300	14	Hypersil GOLD	**4-056**
Atlantis HILIC Silica	Waters	100	300	–	Hypersil GOLD Silica	**4-069**
Atlantis dC18	Waters	100	330	12	Hypersil GOLD aQ	**4-060**
Capcell C18 AQ	Shiseido	120	300	11	Acclaim Polar Advantage II	**4-078**
Columbus™ C18	Phenomenex	110	375	19	Syncronis C18	**4-087**
Columbus C8	Phenomenex	110	375	13	Syncronis C8	**4-088**

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% Carbon	Recommended Thermo Scientific Alternative	Page
Discovery BIO Wide Pore C18	Supelco	300	–	–	BioBasic 18	**4-138**
Discovery BIO Wide Pore C8	Supelco	300	–	–	BioBasic 8	**4-139**
Discovery C18	Supelco	180	200	14	Hypersil GOLD	**4-056**
Discovery C8	Supelco	180	200	–	Hypersil GOLD C8	**4-058**
Discovery Cyano	Supelco	180	200	–	Hypersil GOLD CN	**4-065**
Gemini™ C18	Phenomenex	110	375	14	Hypersil GOLD	**4-056**
Genesis™ AQ	Grace	120	300	–	Hypersil GOLD aQ	**4-060**
Genesis C4	Grace	120	300	–	Hypersil GOLD C4	**4-059**
Genesis C8	Grace	120	300	–	Hypersil GOLD C8	**4-058**
Genesis CN	Grace	120	300	7	Hypersil GOLD CN	**4-065**
Genesis MOS	Grace	120	300	11	Hypersil GOLD C8	**4-058**
Genesis ODS	Grace	120	300	18	Hypersil GOLD	**4-056**
Genesis Phenyl	Grace	120	300	–	Hypersil GOLD Phenyl	**4-064**
Genesis Silica	Grace	120	300	–	Hypersil GOLD Silica	**4-069**
Halo C18	AMT	90	150	–	Accucore C18	**4-034**
Halo C8	AMT	90	150	–	Accucore RP-MS	**4-033**
Halo HILIC	AMT	90	150	–	Accucore HILIC	**4-038**
Halo PFP	AMT	90	150	–	Accucore PFP	**4-037**
Halo Phenyl-Hexyl	AMT	90	150	–	Accucore Phenyl-Hexyl	**4-036**
Inertsil™ C4	GL Sciences	150	320	8	Hypersil GOLD C4	**4-059**
Inertsil C8	GL Sciences	150	320	11	Hypersil GOLD C8	**4-058**
Inertsil ODS3V	GL Sciences	100	450	15	Hypersil GOLD	**4-056**
Inertsil Phenyl	GL Sciences	150	320	10	Hypersil GOLD Phenyl	**4-064**
Inertsil Silica	GL Sciences	150	320	–	BETASIL Silica	**4-114**
Jsphere M80	YMC	80	–	14	Acclaim PolarAdvantage II	**4-078**
Jupiter™ C18	Phenomenex	300	170	13	BioBasic 18	**4-138**
Jupiter C4	Phenomenex	300	170	5	BioBasic C4	**4-140**
Kinetex C18	Phenomenex	100	–	12	Accucore C18	**4-034**
Kinetex C8	Phenomenex	100	–	10	Accucore RP-MS	**4-033**
Kinetex HILIC	Phenomenex	100	–	–	Accucore HILIC	**4-038**
Kinetex PFP	Phenomenex	100	–	9	Accucore PFP	**4-037**
Kinetex XB-C18	Phenomenex	100	–	12	Accucore C18	**4-034**
Kromasil™ C1	Akzo-Nobel	100	340	5	BETASIL C1	Inquire
Kromasil C18	Akzo-Nobel	100	340	19	Syncronis C18	**4-087**
					BETASIL C18	**4-113**
Kromasil C4	Akzo-Nobel	100	340	8	Hypersil GOLD C4	**4-059**
Kromasil Silica	Akzo-Nobel	100	340	–	Syncronis Silica	**4-065**
LiChrospher™ CN	Merck	100	350	7	Hypersil GOLD CN	**4-065**
LiChrospher Diol	Merck	100	350	–	BETASIL Diol	**4-114**
LiChrospher NH_2	Merck	100	350	5	Hypersil GOLD Amino	**4-066**
LiChrospher RP 18	Merck	100	350	21	Hypersil GOLD	**4-056**
					BETASIL C18	**4-113**
LiChrospher RP-18e	Merck	100	350	22	Hypersil GOLD	**4-056**
					BETASIL C18	**4-113**
LiChrospher RP-8	Merck	100	350	13	Hypersil GOLD C8	**4-058**
LiChrospher RP-8e	Merck	100	350	13	Hypersil GOLD C8	**4-058**
Luna™ C18 (2)	Phenomenex	100	400	18	Syncronis C18	**4-087**
Luna C8 (2)	Phenomenex	100	400	14	Syncronis C8	**4-088**
Luna CN	Phenomenex	100	400	–	Hypersil GOLD CN	**4-065**
Luna HILIC	Phenomenex	200	200	5.7	BETASIL Diol	**4-114**
Luna NH2	Phenomenex	100	400	10	Hypersil GOLD Amino	**4-066**
Luna PFP (2)	Phenomenex	100	400	5.7	Hypersil GOLD PFP	**4-062**
Luna SCX	Phenomenex	100	400	–	BioBasic SCX	**4-137**
Luna Silica (2)	Phenomenex	100	400	–	Syncronis Silica	**4-092**

HPLC Column Selection by Manufacturer (continued)

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% Carbon	Recommended Thermo Scientific Alternative	Page
µBondapak™ C18	Waters	125	330	10	Hypersil GOLD	**4-056**
µBondapak CN	Waters	125	330	–	Hypersil GOLD CN	**4-065**
µBondapak NH_2	Waters	125	330	4	Hypersil APS-2	**4-110**
µBondapak Phenyl	Waters	125	330	–	Hypersil GOLD Phenyl-2	**4-110**
Nova-Pak™ (HR) C18	Waters	60	120	7	Hypersil GOLD	**4-056**
Nova-Pak C8	Waters	60	120	–	Hypersil GOLD C8	**4-058**
Nova-Pak CN	Waters	60	120	–	Hypersil GOLD CN	**4-065**
Nova-Pak Phenyl	Waters	60	120	5	Hypersil GOLD Phenyl	**4-064**
Nova-Pak Silica	Waters	60	120	–	Hypersil GOLD Silica	**4-069**
NUCLEODUR™ C18 EC	Macherey-Nagel	110	340	18	Syncronis C18	**4-087**
NUCLEODUR C18 Gravity	Macherey-Nagel	110	340	18	Syncronis C18	**4-087**
NUCLEODUR CN	Macherey-Nagel	110	340	7	Hypersil GOLD CN	**4-065**
NUCLEODUR Pyramid	Macherey-Nagel	110	340	14	Syncronis aQ	**4-089**
Nucleosil™ 100 C18	Macherey-Nagel	100	350	17	Syncronis C18	**4-087**
Nucleosil 100 C18 AB	Macherey-Nagel	100	350	24	Syncronis C18	**4-087**
Nucleosil 100 C_6H_5	Macherey-Nagel	100	350	–	Syncronis Phenyl	**4-090**
Nucleosil 100 C8	Macherey-Nagel	100	350	9	Syncronis C8	**4-088**
Nucleosil 100 CN	Macherey-Nagel	100	350	–	Hypersil GOLD CN	**4-065**
Nucleosil 100 $N(CH_3)_2$	Macherey-Nagel	100	350	–	Hypersil SAX	**4-111**
Nucleosil 100 NH_2	Macherey-Nagel	100	350	4	Syncronis Amino	**4-091**
Nucleosil 100 OH	Macherey-Nagel	100	350	–	BETASIL Diol	**4-114**
Nucleosil 100 SA	Macherey-Nagel	100	350	7	BioBasic SCX	**4-137**
Nucleosil 100 SB	Macherey-Nagel	100	350	10	Hypersil GOLD SAX	**4-068**
Nucleosil 300 C18	Macherey-Nagel	300	100	7	BioBasic 18	**4-138**
Nucleosil 300 C4	Macherey-Nagel	300	100	–	BioBasic 4	**4-140**
Nucleosil 300 C_6H_5	Macherey-Nagel	300	100	–	BioBasic Phenyl	Inquire
Nucleosil 300 C8	Macherey-Nagel	300	100	–	BioBasic 8	**4-139**
Nucleosil 300 CN	Macherey-Nagel	300	100	–	BioBasic CN	Inquire
Pinnacle™ C1	Restek	120	170	2	Hypersil SAS	**4-109**
Pinnacle C18	Restek	120	170	10	Hypersil GOLD	**4-056**
Pinnacle C4	Restek	120	170	4	Hypersil GOLD C4	**4-059**
Pinnacle CN	Restek	120	170	5	Hypersil GOLD CN	**4-065**
Pinnacle DB C18	Restek	140	–	11	Hypersil GOLD	**4-056**
Pinnacle DB C18 1.9µm	Restek	140	–	11	Hypersil GOLD (1.9µm)	**4-023**
Pinnacle DB C8	Restek	140	–	6	Hypersil GOLD C8	**4-058**
Pinnacle DB Cyano	Restek	140	–	4	Hypersil GOLD CN	**4-065**
Pinnacle DB Phenyl	Restek	140	–	5	Hypersil GOLD Phenyl	**4-064**
Pinnacle IBD	Restek	120	170	–	Hypersil GOLD	**4-056**
Pinnacle NH_2	Restek	120	170	2	Hypersil GOLD Amino	**4-066**
Pinnacle Phenyl	Restek	120	170	5	Hypersil GOLD Phenyl	**4-064**
Pinnacle SAX	Restek	120	170	3	Hypersil GOLD SAX	**4-068**
Pinnacle Silica	Restek	120	170	–	Hypersil GOLD Silica	**4-069**
Pinnacle Ultra C18	Restek	100	–	20	Syncronis C18	**4-087**
Pinnacle Wide Pore C4	Restek	300	–	2	BioBasic 4	**4-140**
Polaris NH_2	Agilent	–	–	–	Hypersil GOLD Amino	**4-066**
Poroshell 120 EC-C18	Agilent	120	120	8	Accucore C18	**4-034**
Poroshell 120 EC-C8	Agilent	120	120	5	Accucore RP-MS	**4-033**
Poroshell 120 SB-C18	Agilent	120	120	7.5	Accucore C18	**4-034**
Primesep	SieLC	–	–	–	Acclaim Mixed-Mode Columns	**4-080**
Prodigy™ C8	Phenomenex	150	310	13	Syncronis C8	**4-088**
Prodigy ODS2	Phenomenex	150	310	18	Syncronis C18	**4-087**
Prodigy ODS-3	Phenomenex	100	450	16	Syncronis C18	**4-087**
Prodigy ODS-3V	Phenomenex	100	450	16	Hypersil GOLD	**4-056**
Prodigy Phenyl-3	Phenomenex	100	450	10	Syncronis Phenyl	**4-090**

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% Carbon	Recommended Thermo Scientific Alternative	Page
Purospher™ RP-18	Merck	60	500	–	Hypersil GOLD	**4-056**
Purospher STAR-8e	Merck	120	300	–	Hypersil GOLD C8	**4-058**
Purospher STAR RP-18e	Merck	120	300	–	Hypersil GOLD	**4-056**
Pursuit™ C18	Agilent	–	–	–	Hypersil GOLD	**4-056**
Pursuit C8	Agilent	–	–	–	Hypersil GOLD C8	**4-058**
Pursuit Diphenyl	Agilent	–	–	–	BetaBasic Phenyl	Inquire
Pursuit PFP	Agilent	–	–	–	Hypersil GOLD PFP	**4-062**
Shodex PH	Showa Denko	100	–	–	Hypersil GOLD Phenyl	**4-064**
Shodex SIL	Showa Denko	100	–	–	BETASIL Silica	**4-114**
Shodex TMS	Showa Denko	100	–	–	Hypersil SAS	**4-109**
Waters™ Spherisorb™ C1	Waters	80	200	2	Hypersil SAS	**4-109**
Waters Spherisorb C6	Waters	80	200	5	BETASIL C6	**4-113**
Waters Spherisorb C8	Waters	80	200	6	Hypersil GOLD C8	**4-058**
Waters Spherisorb CN	Waters	80	200	3	Hypersil GOLD CN	**4-065**
Waters Spherisorb NH_2	Waters	80	200	2	Hypersil APS-2	**4-110**
Waters Spherisorb ODS1	Waters	80	200	6	Hypersil GOLD	**4-056**
Waters Spherisorb ODS2	Waters	80	200	12	Hypersil GOLD	**4-056**
Waters Spherisorb ODSB	Waters	80	200	12	Hypersil GOLD	**4-056**
Waters Spherisorb Phenyl	Waters	80	200	3	Hypersil GOLD Phenyl	**4-064**
Waters Spherisorb SAX	Waters	80	200	–	Hypersil SAX	**4-111**
Waters Spherisorb SCX	Waters	80	200	–	BioBasic SCX	**4-137**
Waters Spherisorb W (silica)	Waters	80	200	–	BETASIL Silica	**4-114**
SunFire™ C18	Waters	90	340	16	Syncronis C18	**4-087**
SunFire C8	Waters	90	340	16	Syncronis C8	**4-088**
Supelcosil LC-1	Supelco	120	170	–	Hypersil SAS	**4-109**
Supelcosil LC-18	Supelco	120	170	11	Hypersil GOLD	**4-056**
Supelcosil LC-18DB	Supelco	120	170	11	Hypersil GOLD	**4-056**
Supelcosil LC-8	Supelco	120	170	–	Hypersil GOLD C8	**4-058**
Supelcosil LC-CN	Supelco	120	170	–	Hypersil GOLD CN	**4-065**
Supelcosil LC-NH_2	Supelco	120	170	–	Hypersil GOLD Amino	**4-066**
Supelcosil LC-Si	Supelco	120	170	–	Hypersil GOLD Silica	**4-069**
Symmetry C18	Waters	100	335	19	Syncronis C18	**4-087**
Symmetry C8	Waters	100	335	12	Syncronis C8	**4-088**
Synergi Hydro-RP	Phenomenex	80	475	19	Syncronis aQ	**4-089**
TSKgel™ G2000SW (incl XL)	Tosoh	125	–	–	BioBasic SEC 120	**4-135**
TSKgel Octyl-80TS	Tosoh	80	200	11	Hypersil GOLD C8	**4-058**
TSKgel ODS-120A	Tosoh	120	200	22	Hypersil GOLD	**4-056**
TSKgel ODS-120T	Tosoh	120	200	22	Syncronis C18	**4-087**
TSKgel ODS-80TM	Tosoh	80	200	15	Hypersil GOLD	**4-056**
TSKgel Super Octyl	Tosoh	110	–	5	Hypersil GOLD C8	**4-058**
TSKgel Super ODS	Tosoh	110	–	8	Hypersil GOLD	**4-056**
TSKgel Super Phenyl	Tosoh	110	–	3	Hypersil GOLD Phenyl	**4-064**
TSKgel SuperSW3000	Tosoh	250	–	–	BioBasic SEC 300	**4-135**
Viva™ C18	Restek	300	–	9	BioBasic 18	**4-138**
Viva C4	Restek	300	–	4	BioBasic 4	**4-140**
Viva C8	Restek	300	–	5	BioBasic 8	**4-139**

HPLC Column Selection by Manufacturer (continued)

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% Carbon	Recommended Thermo Scientific Alternative	Page
Vydac™ 201SP C18	Grace	90	–	–	Hypersil GOLD	**4-056**
Vydac 201SP Selectapore 90M C18	Grace	90	250	–	Hypersil GOLD	**4-056**
Vydac 201TP C18	Grace	300	–	–	BioBasic 18	**4-138**
Vydac 202TP C18	Grace	300	–	–	BioBasic 18	**4-138**
Vydac 208TP C8	Grace	300	–	–	BioBasic 8	**4-139**
Vydac 214TP	Grace	300	–	–	BioBasic 4	**4-140**
Vydac 218TP	Grace	300	–	–	BioBasic 18	**4-138**
Vydac 218WP Selectapore 300M C18	Grace	300	70	–	BioBasic 18	**4-138**
XBridge™ C18	Waters	–	–	–	Hypersil GOLD	**4-056**
XBridge C8	Waters	–	–	–	Hypersil GOLD C8	**4-058**
Xbridge HILIC	Waters	130	185	–	Hypersil GOLD Silica (1.9µm)	**4-031**
XBridge Phenyl	Waters	–	–	–	Hypersil GOLD Phenyl	**4-064**
XTerra™ MS C18	Waters	125	180	16	Hypersil GOLD	**4-056**
XTerra MS C8	Waters	125	180	12	Hypersil GOLD C8	**4-058**
YMCbasic™	YMC	–	–	–	Hypersil GOLD C8	**4-058**
YMC-Pack™ C4	YMC	120	300	7	HyPURITY C4	**4-115**
YMC-Pack C8	YMC	120	300	10	Acclaim C8	**4-047**
YMC-Pack CN	YMC	120	300	7	Hypersil GOLD CN	**4-065**
YMC-Pack Diol	YMC	120	300	–	BETASIL Diol	**4-114**
YMC-Pack NH_2	YMC	120	–	–	Hypersil GOLD Amino	**4-066**
YMC-Pack ODS AQ	YMC	120	300	16	Syncronis aQ	**4-089**
YMC-Pack ODS-A	YMC	120	300	17	Syncronis C18	**4-087**
YMC-Pack ODS-A	YMC	300	150	6	BioBasic 18	**4-138**
YMC-Pack Phenyl	YMC	120	300	9	Syncronis Phenyl	**4-090**
YMC-Pack Pro C18	YMC	120	350	16	Syncronis C18	**4-087**
YMC-Pack Silica	YMC	120	–	–	Syncronis Silica	**4-092**
YMC-Pack TMS (C1)	YMC	120	300	4	BETASIL C1	Inquire
Zorbax Eclipse XDB C18	Agilent	80	180	10	Hypersil GOLD	**4-056**
Zorbax Eclipse XDB C8	Agilent	80	180	8	Hypersil GOLD C8	**4-058**
Zorbax Eclipse XDB Phenyl	Agilent	80	180	8	Hypersil GOLD Phenyl	**4-064**
Zorbax Eclipse Plus C18	Agilent	95	160	8	Hypersil GOLD	**4-056**
Zorbax Eclipse Plus C8	Agilent	95	160	6	Hypersil GOLD C8	**4-058**
Zorbax RRHT Eclipse Plus C18	Agilent	95	160	8	Hypersil GOLD (1.9µm)	**4-023**
Zorbax RRHT Eclipse Plus C8	Agilent	95	160	6	Hypersil GOLD C8 (1.9µm)	**4-024**
Zorbax RRHT Eclipse XDB-C18	Agilent	80	180	10	Hypersil GOLD (1.9µm)	**4-023**
Zorbax RRHT Eclipse XDB-C8	Agilent	80	180	7.5	Hypersil GOLD C8 (1.9µm)	**4-024**
Zorbax RRHT SB-CN	Agilent	80	180	4	Hypersil GOLD CN (1.9µm)	**4-029**
Zorbax SB Aq	Agilent	80	180	–	Hypersil GOLD aQ	**4-060**
Zorbax SB C18	Agilent	80	180	10	Hypersil GOLD	**4-056**
Zorbax SB C18	Agilent	300	45	3	BioBasic 18	**4-138**
Zorbax SB C8	Agilent	80	180	6	Hypersil GOLD C8	**4-058**
Zorbax SB C8	Agilent	300	45	2	BioBasic 8	**4-139**
Zorbax SB CN	Agilent	80	180	4	Hypersil GOLD CN	**4-065**
Zorbax SB Phenyl	Agilent	80	180	6	Hypersil GOLD Phenyl	**4-064**

Notes

Thermo Scientific LC Columns

Column Protection

Extend column lifetime and improve performance

- Guards and filters to protect your analytical column
- Economical extension of column lifetime
- Multiple formats for optimum performance and efficiency
- Drop-in designs for quick and easy guard and filter replacement
- UHPLC Filter cartridges and holder to protect Hypersil GOLD 1.9µm columns

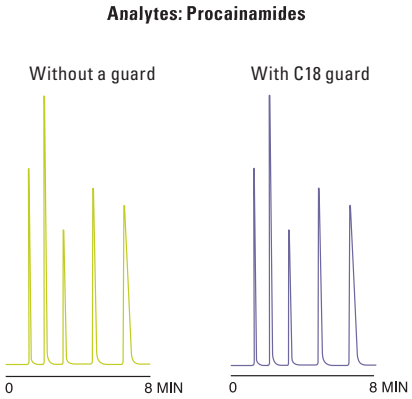
To extend the lifetime and performance of your analytical and preparative columns, we recommend that they be protected from contamination by sample and solvent debris and interferences from the sample matrix. The most cost-effective and efficient way of trapping these unwanted system components is by use of filter or packed guards. Column performance should not be affected by adding a guard or filter unit to the HPLC system. The chromatogram shown demonstrates how the column's chromatographic performance is unaffected by the addition of a guard unit during the analysis of procainamides.

Guard and Filter Selection

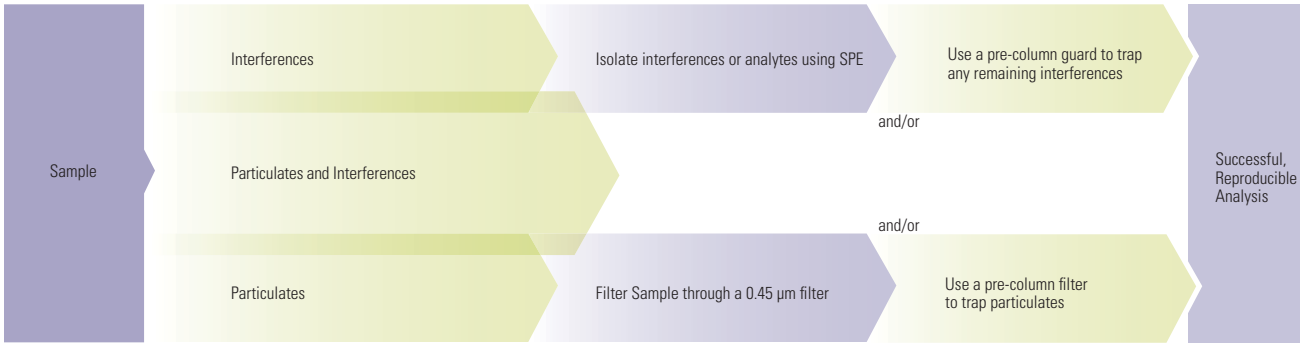
Guard columns are positioned between the injector and the analytical column, removing strongly adsorbed sample components before the sample reaches the analytical column. The simple rule of thumb in guard selection is to choose one that matches your analytical column. The internal diameters should match as closely as possible, and the packing material should be the same particle size and chemistry as the analytical column. If a guard cartridge system is used, the replacement of the packed cartridges should be simple and fast.

Pre-column filters are positioned between the solvent inlet filter and the column inlet. They are designed to trap particulate matter from the fluid path. They do not remove sample interferences or contaminants that are dissolved in the fluid path. These units are designed to be wholly disposable or have replaceable filters in a re-useable holder.

Replaceable 0.2µm Thermo Scientific UHLPC filter cartridges protect Hypersil GOLD 1.9µm columns against particles, enhancing column lifetime. Its low dead volume design maintains chromatographic performance without degrading peak shape and causes minimal efficiency loss through dispersion. The UHPLC filter adds a minimal increase in backpressure, so can be fitted to any length column.



Peak resolution and shape unaffected by the addition of a guard column



Choosing a guard or filter based on sample make-up

Drop-in Guard Cartridges

Drop-in guard cartridges offer convenience, economy and effective protection for extending column lifetime

- The 10mm design offers maximum protection with minimal increase in retention
- Fit Thermo Scientific UNIGUARD direct connection and stand alone holders

Hypersil GOLD Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6/4.0mm ID	Quantity
Hypersil GOLD						
3.0	10	**25003-011001**	**25003-012101**	**25003-013001**	**25003-014001**	4 Pack
5.0	10	**25005-011001**	**25005-012101**	**25005-013001**	**25005-014001**	4 Pack
Hypersil GOLD C8						
3.0	10	**25203-011001**	**25203-012101**	**25203-013001**	**25203-014001**	4 Pack
5.0	10	**25205-011001**	**25205-012101**	**25205-013001**	**25205-014001**	4 Pack
Hypersil GOLD aQ						
3.0	10	**25303-011001**	**25303-012101**	**25303-013001**	**25303-014001**	4 Pack
5.0	10	**25305-011001**	**25305-012101**	**25305-013001**	**25305-014001**	4 Pack
Hypersil GOLD PFP						
3.0	10	**25403-011001**	**25403-012101**	**25403-013001**	**25403-014001**	4 Pack
5.0	10	**25405-011001**	**25405-012101**	**25405-013001**	**25405-014001**	4 Pack
Hypersil GOLD CN						
3.0	10	**25803-011001**	**25803-012101**	**25803-013001**	**25803-014001**	4 Pack
5.0	10	**25805-011001**	**25805-012101**	**25805-013001**	**25805-014001**	4 Pack
Hypersil GOLD Phenyl						
3.0	10	**25903-011001**	**25903-012101**	**25903-013001**	**25903-014001**	4 Pack
5.0	10	**25905-011001**	**25905-012101**	**25905-013001**	**25905-014001**	4 Pack
Syncronis C18 Drop-in Guard Cartridges						
5.0	10	**97105-011001**	**97105-012101**	**97105-013001**	**97105-014001**	4 Pack
Syncronis C8 Drop-in Guard Cartridges						
5.0	10	**97205-011001**	**97205-012101**	**97205-013001**	**97205-014001**	4 Pack
Syncronis aQ Drop-in Guard Cartridges						
5.0	10	**97305-011001**	**97305-012101**	**97305-013001**	**97305-014001**	4 Pack
Syncronis Phenyl Drop-in Guard Cartridges						
5.0	10	**97905-011001**	**97905-012101**	**97905-013001**	**97905-014001**	4 Pack
Hypercarb Drop-in Guard Cartridges						
3.0	10	**35003-011001**	**35003-012101**	**35003-013001**	**35003-014001**	2 Pack
5.0	10	**35005-011001**	**35005-012101**	**35005-013001**	**35005-014001**	2 Pack

This table provides a sample of the guard cartridges for the most popular Thermo Scientific HPLC stationary phases. Drop-in guard cartridges are available in other Thermo Scientific phases. For information on guard cartridges for other Thermo Scientific phases, please consult the appropriate section of the catalogue or contact Customer Services for more information.

Defender Guard™ Cartridges

Thermo Scientific Defender Guard Cartridges have been designed specifically to work with high speed, high efficiency separations.

Accucore Defender Guard Columns

Description	Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
Accucore RP-MS	2.6	10	**17626-012105**	**17626-013005**	**17626-014005**	4 Pack
Accucore C18	2.6	10	**17126-012105**	**17126-013005**	**17126-014005**	4 Pack
Accucore aQ	2.6	10	**17326-012105**	**17326-013005**	**17326-014005**	4 Pack
Accucore Phenyl-Hexyl	2.6	10	**17926-012105**	**17926-013005**	**17926-014005**	4 Pack
Accucore PFP	2.6	10	**17426-012105**	**17426-013005**	**17426-014005**	4 Pack
Accucore HILIC	2.6	10	**17526-012105**	**17526-013005**	**17526-014005**	4 Pack

UNIGUARD Direct-Connection Guard Cartridge Holders

Reusable, stainless steel guard cartridge holders that match directly to the analytical column inlet – eliminating requirement for extra fittings

- With PEEK 1/16in male outlet that fits most columns
- 1/16in female inlet can be used with various standard fittings

UNIGUARD Direct-Connection Guard Cartridge Holders

Description	1.0mm ID	2.1mm ID	3.0mm ID	4.6/4.0mm ID	Quantity
UNIGUARD Drop-In /Defender Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each
Standard Replacement Tip	**850-RT**	**850-RT**	**850-RT**	**850-RT**	1 Each
Waters Columns Replacement Tip	**850-WT**	**850-WT**	**850-WT**	**850-WT**	1 Each

Acclaim Column Line Guards

The Acclaim Guard Cartridges are available in the same packing and internal diameters as the Acclaim Analytical column chemistry. A re-usable holder allows for easy cartridge replacement; extending the life of the analytical column.

Acclaim Guard Holder

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

Description	Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
Acclaim 120 C18 HPLC Guards	5.0	10	**069689**	**071981**	**069695**
Acclaim 120 C8 HPLC Guards	5.0	10	**069688**	**071979**	**069696**
Acclaim Polar Advantage (PA) HPLC Guards	5.0	10	**069691**	**071983**	**069698**
Acclaim Polar Advantage II (PA2) HPLC Guards	5.0	10	**069692**	**071985**	**069699**
Acclaim Phenyl-1 HPLC Guards	3.0	10	**071975**	**071974**	**071973**
Acclaim C30 HPLC Guards	3.0	10	**075722**	**075721**	**075720**
Acclaim Organic Acid HPLC Guards	5.0	10	–	**071987**	**069700**
Acclaim Surfactant HPLC Guards	5.0	10	**069693**	**071991**	**069701**
Acclaim Explosives E1 HPLC Guards	5.0	10	–	–	**069702**
Acclaim Explosives E2 HPLC Guards	5.0	10	–	**071989**	**069703**
Acclaim Carbamate HPLC Guards	5.0	10	**072930**	**072929**	**072928**
Acclaim Mixed-Mode WAX-1 HPLC Guards	5.0	10	**069686**	**071909**	**069704**
Acclaim Mixed-Mode WCX-1 HPLC Guards	5.0	10	–	**071911**	**069705**
Acclaim Mixed-Mode HILIC-1 HPLC Guards	5.0	10	**069694**	**071913**	**069706**
Acclaim 300 C18 HPLC Guards	5.0	10	**069690**	–	**069697**

Javelin Direct-Connection Column Filters

One-piece filter protects HPLC systems

- Direct-connection design for maximum efficiency
- Replace entire disposable filter unit for easy changes
- Recommended for use as dedicated filters for a column rather than the HPLC system
- 1/16in CPI tip attaches directly to HPLC column inlet without tubing or wrenches
- 0.5µm porosity

Javelin Direct-Connection Column Filter

Description	2.1mm ID	3.0mm ID	4.6mm/4.0mm ID	Quantity
Javelin Column Filter	**88200**	**88700**	**88400**	4 Pack

ColumnSaver Precolumn Filters

Filter mesh size 0.2µm

ColumnSaver Precolumn Filters

Filter mesh Size (µm)	Cat. No	Quantity
0.2	**60140-412**	10 Pack

UNIFILTER Direct-Connection HPLC Filter Systems

Quickly replaced for minimal down time

- Replaceable 0.5µm drop-in filter enhances column lifetime and improved performance
- Holder attached directly to the inlet of your analytical system for maximum convenience

UNIFILTER Direct-Connection HPLC Filter Systems

Description	2.1mm/ 3.0mm ID	4.0mm/4.6mm ID	Quantity
UNIFILTER Direct Connection Holder	**27002**	**27000**	1 Each
Replacement Filter, 0.5µm	**22016**	**22150**	1 Each
Replacement Filter, 0.5µm	**22017**	**22155**	5 Pack
Replacement Tip, CPI, Standard	**850-WT**	**850-WT**	1 Each
Replacement Tip, Waters End-fitting	**850-RT**	**850-RT**	1 Each

UHPLC Filter

Column protection for Hypersil GOLD 1.9µm and Syncronis 1.7µm columns without compromising performance

- Low volume filter cartridge design
- Maintain peak shape
- Minimal efficiency loss through dispersion

UNIFILTER Direct-Connection HPLC Filter Systems

Description	Cat. No.	Quantity
UHPLC Direct Connect Filter Holder	**27006**	1 Each
2.1mm ID Replacement Filter Cartridge, 0.2µm	**22180**	5 Pack
1.0mm ID Replacement Filter Cartridge, 0.2µm	**22185**	5 Pack

Thermo Scientific Columns for Fast LC

There are a number of excellent options in the Thermo Scientific column portfolio for fast LC

Hypersil GOLD 1.9µm

Based on improved, highly pure silica and a novel proprietary derivatization and endcapping procedure using alkyl chemistry, Hypersil GOLD columns offer next generation silica-based columns with enhanced performance.

PAGE 4-022

Accucore

The Core Enhanced Technology used in Accucore provides better speed, sensitivity and resolving power than 5µm and 3µm columns without the higher backpressures associated with sub-2µm materials.

PAGE 4-032

Syncronis 1.7µm

Extensive testing and strong quality control procedures ensure the consistency of Syncronis HPLC columns - column after column, time after time.

PAGE 4-040

Acclaim RSLC 2.2µm

Rugged, reproducible, and reliable chromatographic performance make Acclaim HPLC columns appropriate for pharmaceutical, environmental, food, and other industrial chromatographic separations.

PAGE 4-046

Fast LC Selection Guide

Instrument pressure limit	Stationary Phase Hydrophobicity	Recommended Fast LC Option
400 bar		Accucore
600 bar	Low	Accucore
	High	Acclaim RSLC 2.2µm
> 600 bar	Low	Hypersil GOLD 1.9µm
	High	Syncronis 1.7µm

Principles of Fast LC

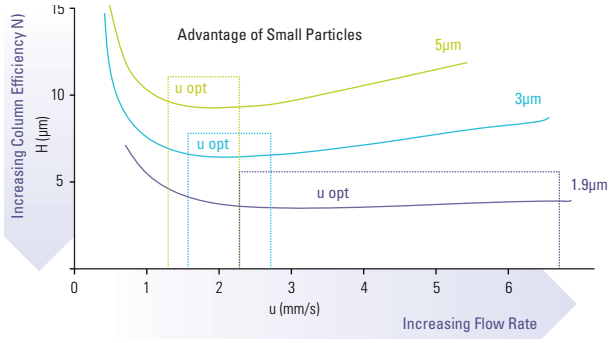
Effect of particle size and type

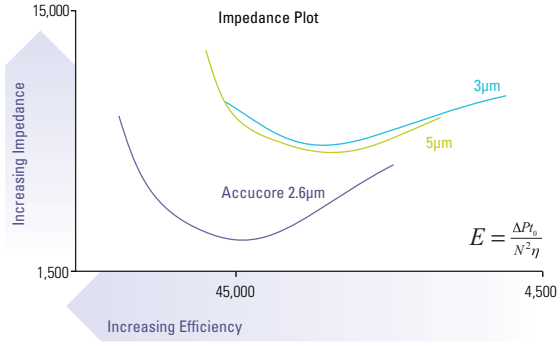
It is now well established that columns packed with smaller diameter particles generate higher efficiencies over a wider range of flow rates than larger particle columns – as shown in the plot below.

An alternative to small diameter particles is the Core Enhanced Technology used in Accucore HPLC columns. As shown in the impedance plot below, Accucore generates higher efficiencies in shorter times than columns packed with 5µm or 3µm particles and does so at low backpressures.

$$E = \frac{\Delta P t_0}{N^2 \eta}$$

E Impedance
ΔP Backpressure
t_0 Retention time of unretained peak
N Efficiency
η Mobile phase viscosity





Speed and Resolution

The general chromatographic resolution equation shows that resolution is directly proportional to efficiency. High efficiencies across a wider range of linear velocities mean that shorter columns and/or faster flow rates can be used to increase the speed of separations without sacrificing resolution.

The resolution equation also shows that a wide range of different bonded phases, each offering a different selectivity, is a useful way to improve resolution.

$$R_S = \frac{1}{4} \frac{(\alpha - 1)}{\alpha} \sqrt{N} \frac{k'}{1 + k'}$$

α Selectivity
N Efficiency
k' Capacity factor

Peak Capacity

As an alternative to speeding up analysis the excellent resolution offered by high efficiency columns can also be used to improve complex separations through an increase in peak capacity – the number of peaks that can be separated in a given gradient time.

$$n_c = 1 + \left(\frac{t_g}{W}\right)$$

n_c Peak capacity
t_g Gradient time
W Peak width (10% height)

Sensitivity

According to the formula shown below, sensitivity is increased in high efficiency separations by increasing the concentration of the peak and thus the detector signal to noise ratio.

$$c_{max} \propto \frac{\sqrt{N}\, V_i}{L\, d_c^2 (1 + k')}$$

c_{max} Concentration at peak apex
N Efficiency
V_i Injection volume
L Column length
d_c Column internal diameter
k' Capacity factor

Miniaturization

The sensitivity formula also shows that peak concentration can be increased through the use of shorter columns and more importantly, with narrower column internal diameters.

When transferring a method to a different column geometry adjustments must be made to the following parameters:

- Flow Rate
- Injection Volume
- Gradient Profile

A convenient method transfer tool is available at the Chromatography Resource Center (www.thermoscientific.com/chromatography).

Optimization

In order to preserve high efficiency, and therefore resolution and sensitivity, the HPLC system in use should be optimized to reduce any potential causes of peak broadening.
See page **4-225** for details of this optimization.

Thermo Scientific Hypersil GOLD 1.9µm

Small particles to improve speed and efficiency

Outstanding Peak Shape

Based on improved, highly pure silica and a novel proprietary derivatization and endcapping procedure using alkyl chemistry, Hypersil GOLD columns offer next generation silica-based columns with enhanced performance. The manufacturing process was designed to create an even surface which reduces the unwanted secondary and tertiary interactions that can occur between analytes and the acidic silanols of the silica support. This significantly reduces peak tailing and results in improved resolution, efficiency, sensitivity, and confidence in the accuracy and quality of your analytical data.

For further details on Hypersil GOLD refer to page 4-**054**.

The Power of 1.9µm Particles

1.9µm particles give higher efficiency than 3µm or 5µm particles and this efficiency is delivered over a greater range of optimum linear velocity. This makes it possible to operate at higher flow rates without losing performance. Because shorter columns packed with 1.9µm particles give equivalent efficiency to longer columns packed with 5µm particles faster analysis and solvent savings for the chromatographer become a reality.

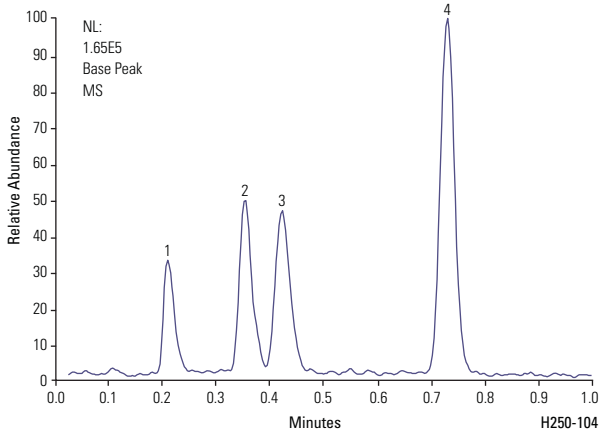
Which 1.9µm Column?

We offer an extensive range of columns packed with 1.9µm particles to suit the full variety of application needs.

The choice of column will depend upon the requirement of the analysis.

- **Speed** – Choose from 20, 30 or 50mm long columns
- **Efficiency** – Choose a longer column, for example 150 or 200mm
- **Low backpressure** – Choose a 50mm x 4.6mm ID column. Traditionally, a 1.9µm column is used on UHPLC instruments. However, by producing less backpressure, this short, wider column is suitable for users of conventional systems where pressure limits are often in the 6000 psi/400 bar region, ensuring fast chromatography without the need for extensive instrument optimization.

Sulphonamides on 1.9µm GOLD



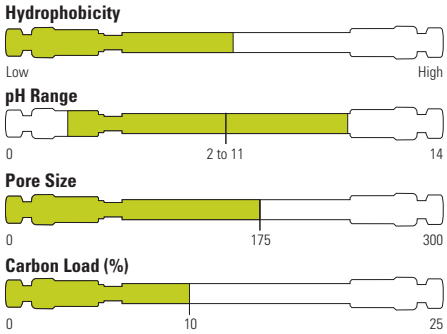
Column: Hypersil GOLD™ 1.9µm, 20x2.1mm
Part number: 25002-022130

Mobile phase:	A – H_2O+0.1%formic acid
	B – MeCN+0.1%formic acid
Gradient:	15 to 100% B in 1min
Flow rate:	0.5ml/min
Temperature:	40°C
Detection:	+ESI
System:	Surveyor with MS Pump + Navigator
Analytes:	1. Sulfaguanidine 2. Sulfathiazole 3. Sulfamerazine 4. Sulfamonomethoxine

Hypersil GOLD HPLC Columns

Endcapped, ultrapure, silica-based columns with exceptional peak shape and resolution for HPLC and LC/MS

- Significant reduction in peak tailing while retaining C18 selectivity
- Excellent resolution, efficiency and sensitivity
- Confidence in the accuracy and quality of analytical data
- 1.9µm particle size columns improve speed and efficiency

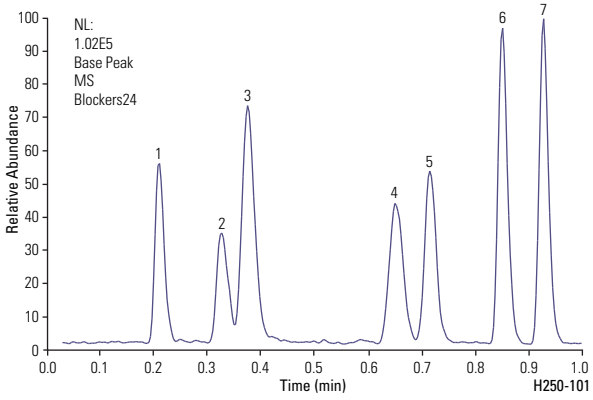


Particle Size 1.9µm **USP** L1

Hypersil GOLD Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25002-021030**	**25002-022130**	**25002-023030**	–
	30	**25002-031030**	**25002-032130**	**25002-033030**	–
	50	**25002-051030**	**25002-052130**	**25002-053030**	**25002-054630**
	100	**25002-101030**	**25002-102130**	**25002-103030**	–
	150	–	**25002-152130**	–	–
	200	–	**25002-202130**	–	–

Seven β-Blockers in 1 minute

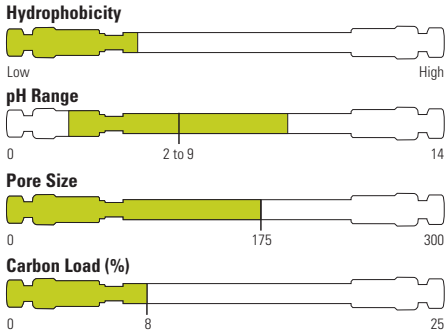


Column: 1.9µm Hypersil™ GOLD 20x2.1mm
Part number: 25002-022130

Mobile phase:	A – H_2O+0.1%formic acid
	B – MeCN+0.1%formic acid
Gradient:	15 to 100% B in 1min
Flow rate:	0.5ml/min
Temperature:	30°C
Detection:	+ESI
System:	Surveyor™ MSQ
Analytes:	1. Atenolol 2. Nadolol 3. Pindolol 4. Timolol 5. Metoprolol 6. Oxprenolol 7. Propanolol

Hypersil GOLD C8 HPLC Columns

Recommended for analytes with medium hydrophobicity or when a less hydrophobic phase is required to obtain optimum retention



Particle Size 1.9µm **USP** L7

- Similar selectivity to C18 columns but with reduced retention
- Lower hydrophobicity, allowing compounds to elute quicker
- Faster separations
- Excellent peak shape
- High efficiency
- Outstanding sensitivity
- 1.9µm particle size columns improve speed and efficiency

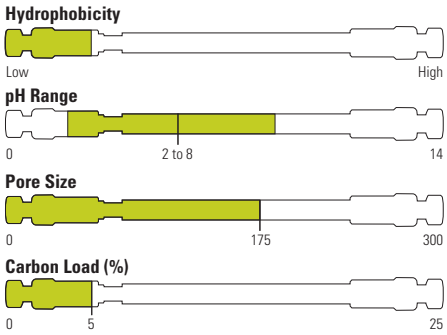
Hypersil GOLD C8 Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25202-021030**	**25202-022130**	**25202-023030**	–
	30	**25202-031030**	**25202-032130**	**25202-033030**	–
	50	**25202-051030**	**25202-052130**	**25202-053030**	**25202-054630**
	100	**25202-101030**	**25202-102130**	**25202-103030**	–
	150	–	**25202-152130**	–	–
	200	–	**25202-202130**	–	–

Hypersil GOLD C4 HPLC Columns

Lower hydrophobicity than C18 or C8 recommended for very hydrophobic analytes

- Lower hydrophobicity
- Faster separations
- Excellent peak shape
- High efficiency
- Outstanding sensitivity
- 1.9µm particle size columns improve speed and efficiency

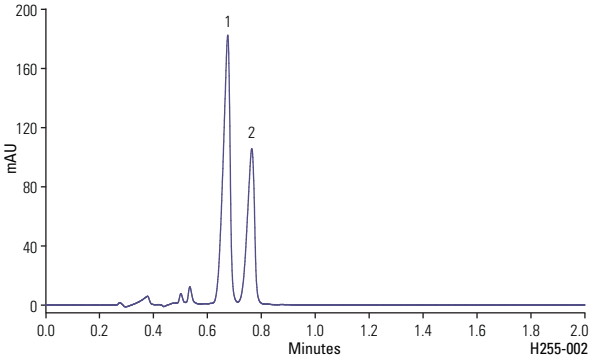


Particle Size 1.9µm **USP** L26

Hypersil GOLD C4 Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	30	**25502-031030**	**25502-032130**	**25502-033030**	–
	50	**25502-051030**	**25502-052130**	**25502-053030**	**25502-054630**
	100	**25502-101030**	**25502-102130**	**25502-103030**	–
	150	–	**25502-152130**	–	–
	200	–	**25502-202130**	–	–

Fatty Acids



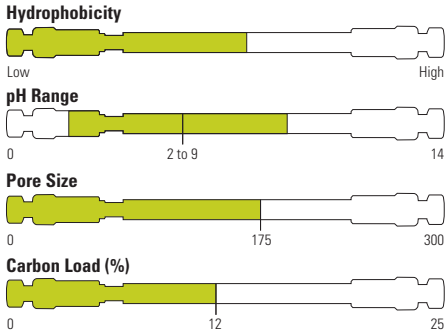
Column: Hypersil GOLD C4 1.9µm, 100x2.1mm
Part number: 25502-102130

Mobile phase:	H_2O / MeCN (20:80)
Flow rate:	0.55mL/min
Temperature:	30°C
Detection:	200 nm
Injection volume:	1µL
Sample:	1. Linolenic acid 2. Linoleic acid

Hypersil GOLD aQ HPLC Columns

Hypersil GOLD aQ polar endcapped C18 columns provide a controlled interaction mechanism by which polar analytes can be retained and resolved

- Polar endcapped C18 phase for alternative selectivity
- Retention and resolution of polar analytes
- Excellent peak shape
- Stable in 100% aqueous mobile phases
- 1.9µm particle size columns improve speed and efficiency



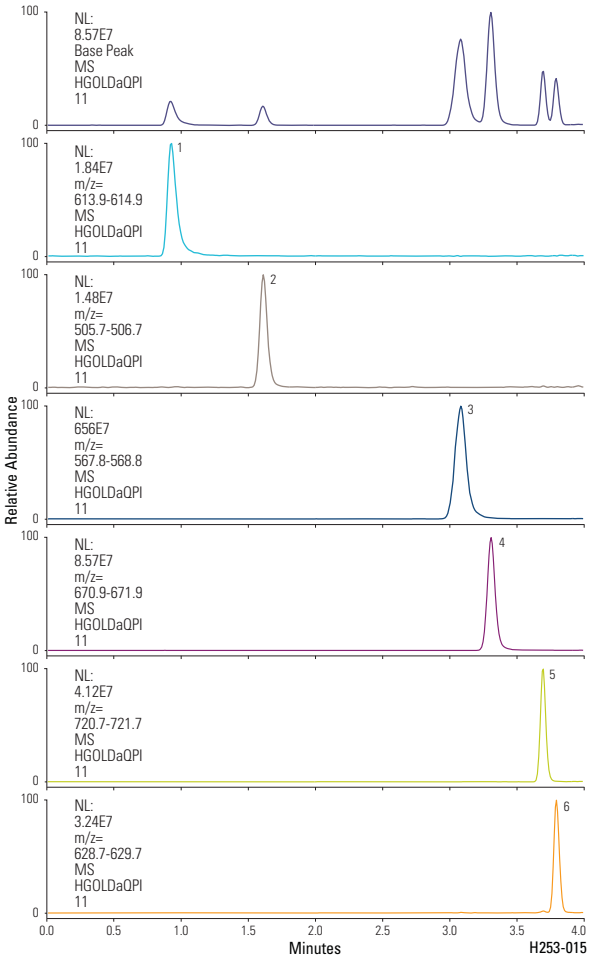
Particle Size 1.9µm **USP** L1

Hypersil GOLD aQ Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25302-021030**	**25302-022130**	**25302-023030**	–
	30	**25302-031030**	**25302-032130**	**25302-033030**	–
	50	**25302-051030**	**25302-052130**	**25302-053030**	**25302-054630**
	100	**25302-101030**	**25302-102130**	**25302-103030**	–
	150	–	**25302-152130**	–	–
	200	–	**25302-202130**	–	–

Other custom column dimensions are available. Please call your local Customer Service for more information.

Protease Inhibitors



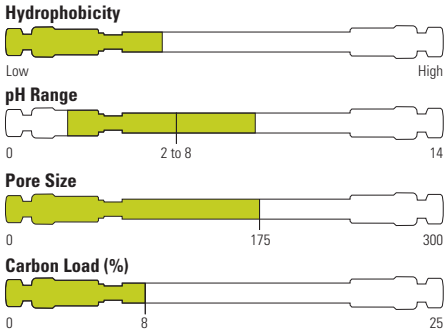
Column: Hypersil GOLD™ aQ 1.9µm, 50 x 2.1mm
Part number: 25302-052130

Mobile phase:	A – H_2O+0.1% Formic Acid
	B – ACN+ 0.1% formic acid
Gradient:	0 – 2.2mins at 35% then to 100% at 4mins
Flow rate:	0.5mL/min
Temperature:	30°C
Detection:	+ ESI-MS
Instrumentation:	Finnigan™ Surveyor™ and Finnigan LCQ™ Deca
Sample:	1. Indinavir 2. Nelfinavir 3. Saquinavir 4. Amprenavir 5. Ritonavir 6. Lopinavir

Hypersil GOLD PFP HPLC Columns

Introduction of a fluorine group into the stationary phase causes significant changes in solute-stationary phase interaction

- The fluorine atoms around the phenyl ring enhance pi-pi interactions with aromatic molecules
- Alternative selectivity to C18
- Extra retention for halogenated species
- Selectivity for non-halogenated polar compounds
- Excellent peak shape and sensitivity
- 1.9µm particle size columns improve speed and efficiency



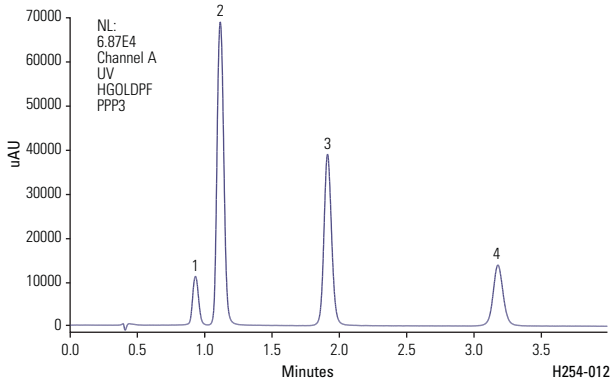
Particle Size 1.9µm **USP** L43

Hypersil GOLD PFP HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25402-021030**	**25402-022130**	**25402-023030**	–
	30	**25402-031030**	**25402-032130**	**25402-033030**	–
	50	**25402-051030**	**25402-052130**	**25402-053030**	**25402-054630**
	100	**25402-101030**	**25402-102130**	**25402-103030**	–
	150	–	**25402-152130**	–	–
	200	–	**25402-202130**	–	–

Other custom column dimensions are available. Please call your local Customer Service for more information.

Polyphenols



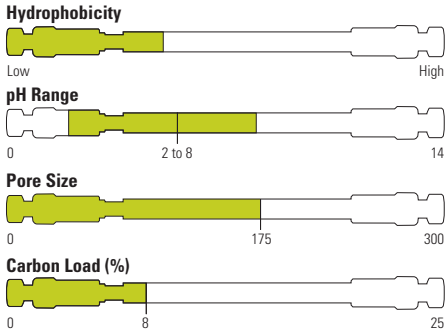
Column: Hypersil GOLD™ PFP 1.9µm, 50 x 2.1mm
Part number: 25402-052130

Mobile phase:	0.1% Acetic Acid
Flow rate:	0.5mL/min
Temperature:	25°C
Detection:	UV @ 280nm (2µL Flow Cell)
Injection Volume:	0.5µL
Sample:	1. Pyrogallol 2. Hydroquinone 3. Resorcinol 4. Phenol

Hypersil GOLD Phenyl HPLC Columns

Contains a C4 linker which allows for superior alignment of the phenyl ring with aromatic molecules

- Enhanced pi-pi interactions with aromatics
- Moderate hydrophobicity
- Outstanding peak shape and sensitivity
- 1.9µm particle size columns improve speed and efficiency



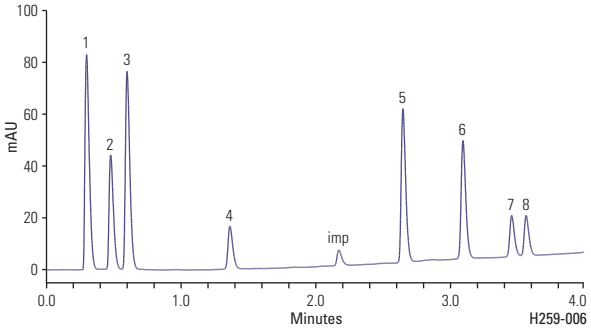
Particle Size 1.9µm **USP** L11

Hypersil GOLD Phenyl Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25902-021030**	**25902-022130**	**25902-023030**	–
	30	**25902-031030**	**25902-032130**	**25902-033030**	–
	50	**25902-051030**	**25902-052130**	**25902-053030**	**25902-054630**
	100	**25902-101030**	**25902-102130**	**25902-103030**	–
	150	–	**25902-152130**	–	–
	200	–	**25902-202130**	–	–

Other custom column dimensions are available. Please call your local Customer Service for more information.

Antidepressants



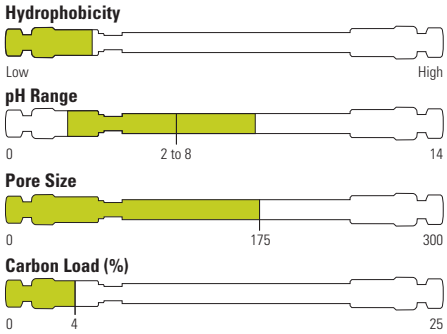
Column: Hypersil GOLD Phenyl 1.9µm, 50 x 2.1mm

Part Number: 25902-052130

Mobile phase:	A – 0.1% Formic acid
	B – 0.1% Formic acid in MeCN
Gradient: 10 – 60% B in 3.4mins, 60 - 90% B in 0.24 min	
Flow rate:	0.5mL/min
Temperature:	60°C
Injection Volume:	0.7µL
Detection:	UV @ 225 and 254 nm
Analytes:	1. Uracil 2. Acetaminophen 3. p-Hydroxybenzoic acid 4. o-Hydroxybenzoic acid 5. Oxazepam 6. Diazepam 7. Di-isopropyl phthalate 8. Di-n-propyl phthalate

Hypersil GOLD CN HPLC Columns

Hypersil GOLD CN columns can be used for both normal phase and reversed phase separations



Particle Size 1.9µm **USP** L10

- Hypersil GOLD CN columns provide alternative selectivity with lower hydrophobicity
- Excellent peak shape
- Outstanding sensitivity
- Less retention for faster analysis
- 1.9µm particle size columns improve speed and efficiency

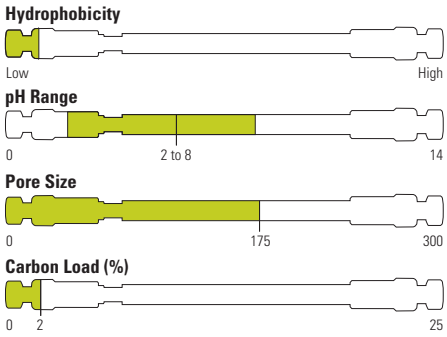
Hypersil GOLD CN Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25802-021030**	**25802-022130**	**25802-023030**	–
	30	**25802-031030**	**25802-032130**	**25802-033030**	–
	50	**25802-051030**	**25802-052130**	**25802-053030**	**25802-054630**
	100	**25802-101030**	**25802-102130**	**25802-103030**	–
	150	–	**25802-152130**	–	–
	250	–	**25802-202130**	–	–

Other custom column dimensions are available. Please call your local Customer Service for more information. Please note that Hypersil GOLD CN columns are shipped in iso-octane:ethanol. For reversed phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil GOLD Amino HPLC Columns

A high performance aminopropyl phase that gives excellent chromatographic properties in three modes: weak anion exchange, reversed phase and normal phase



Particle Size 1.9µm, 3µm, 5µm **USP** L8

- Retains anions and organic acids in weak anion exchange
- Excellent for carbohydrate analysis in reversed phase
- Alternative selectivity to silica columns in normal phase chromatography
- Outstanding peak shape and sensitivity
- 1.9µm particle size columns improve speed and efficiency

Hypersil GOLD Amino HPLC Columns

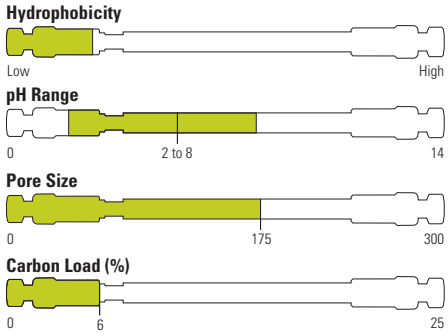
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25702-021030**	**25702-022130**	**25702-023030**	–
	30	**25702-031030**	**25702-032130**	**25702-033030**	–
	50	**25702-051030**	**25702-052130**	**25702-053030**	**25702-054630**
	100	**25702-101030**	**25702-102130**	**25702-103030**	–
	150	–	**25702-152130**	–	–
	250	–	**25702-202130**	–	–

Other custom column dimensions are available. Please call your local Customer Service for more information. Please note that Hypersil GOLD Amino columns are shipped in iso-octane:ethanol. For reversed phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil GOLD AX HPLC Columns

A novel polymeric amine ligand bonded to highly pure base deactivated silica

- Weak anion exchange phase for multiple charged species
- Suitable for HILIC retention and separation of highly polar molecules
- Higher efficiency than polymer based ion exchange columns
- Outstanding peak shape and selectivity
- 1.9µm particle size columns improve speed and efficiency



Particle Size 1.9µm

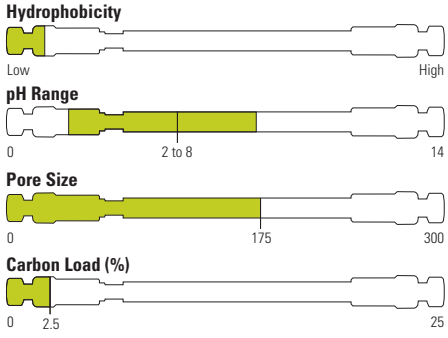
Hypersil GOLD AX HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**26102-021030**	**26102-022130**	**26102-023030**	–
	30	**26102-031030**	**26102-032130**	**26102-033030**	–
	50	**26102-051030**	**26102-052130**	**26102-053030**	**26102-054630**
	100	**26102-101030**	**26102-102130**	**26102-103030**	–
	150	–	**26102-152130**	–	–
	250	–	**26102-202130**	–	–

Hypersil GOLD SAX HPLC Columns

A highly stable quaternary amine strong anion exchange column for aqueous and low pH mobile phases

- High stability to aqueous and low pH mobile phases
- Ideally suited to the analysis of smaller organic molecules including nucleotides and organic acids
- Outstanding peak shape and sensitivity
- 1.9µm particle size columns improve speed and efficiency



Particle Size 1.9µm **USP** L14

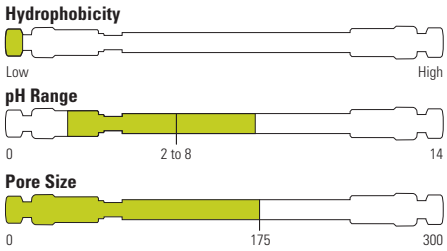
Hypersil GOLD AX HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**26302-021030**	**26302-022130**	**26302-023030**	–
	30	**26302-031030**	**26302-032130**	**26302-033030**	–
	50	**26302-051030**	**26302-052130**	**26302-053030**	**26302-054630**
	100	**26302-101030**	**26302-102130**	**26302-103030**	–
	150	–	**26302-152130**	–	–
	250	–	**26302-202130**	–	–

Hypersil GOLD Silica HPLC Columns

Unbonded, highly pure base deactivated silica media that is the backbone of the Hypersil GOLD range of columns

- Highly pure base deactivated silica media
- Outstanding peak shape and sensitivity
- 1.9µm particle size columns improve speed and efficiency



Particle Size 1.9µm **USP** L3

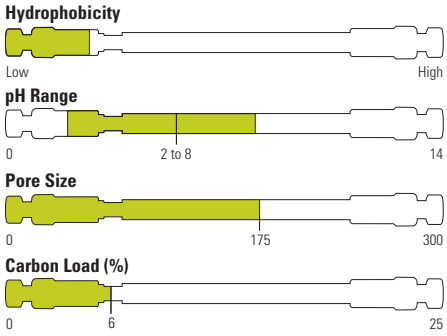
Hypersil GOLD Silica HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**25102-021030**	**25102-022130**	**25102-023030**	–
	30	**25102-031030**	**25102-032130**	**25102-033030**	–
	50	**25102-051030**	**25102-052130**	**25102-053030**	**25102-054630**
	100	**25102-101030**	**25102-102130**	**25102-101030**	–
	150	–	**25102-152130**	–	–
	250	–	**25102-202130**	–	–

Hypersil GOLD HILIC HPLC Columns

Thermo Scientific Hypersil GOLD HILIC HPLC Columns provide enhanced retention of polar and hydrophilic analytes

- Alternative selectivity to C18
- Improved sensitivity with MS detection
- Retains polar analytes with no need for ion-pair or derivatization
- Outstanding peak shape and sensitivity
- 1.9µm particle size columns improve speed and efficiency



Particle Size 1.9µm

Hypersil GOLD HILIC HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
1.9	20	**26502-021030**	**26502-022130**	**26502-023030**	–
	30	**26502-031030**	**26502-032130**	**26502-033030**	–
	50	**26502-051030**	**26502-052130**	**26502-053030**	**26502-054630**
	100	**26502-101030**	**26502-102130**	**26502-103030**	–
	150	–	**26502-152130**	–	–
	250	–	**26502-202130**	–	–

Thermo Scientific Accucore HPLC Columns

Ultimate Core Performance to Maximize Your Investment

Based on Core Enhanced Technology™, a unique combination of Thermo Fisher Scientific's state-of-the art particle technology and vast experience in phase bonding and packing, Accucore™ HPLC columns provide ultimate chromatographic performance without any restriction on the kind of HPLC instrument that can be used.The elements of Core Enhanced Technology are solid core particles, tight control of particle diameter, advanced bonding technology and automated packing processes.

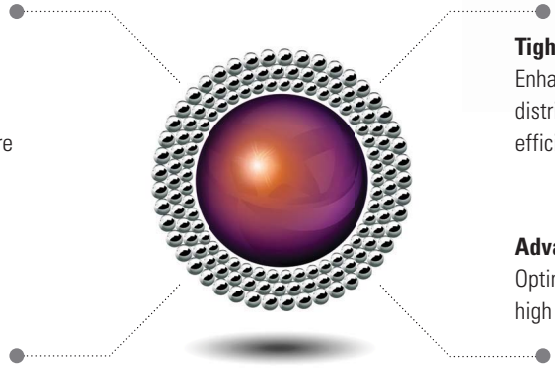
Solid core particles with a tightly controlled diameter of 2.6µm allow high speed, superb resolution separations to be achieved without the backpressures associated with UHPLC columns.

Six different stationary phases bonded using advanced technology and packed with highly controlled automated processes result in highly reproducible, rugged columns that offer a wide range of selectivity to meet all your separation needs.

The key components of Core Enhanced Technology

Solid Core Particles
2.6µm diameter particles with a solid core generate high speed, high resolution separations without excessive backpressure

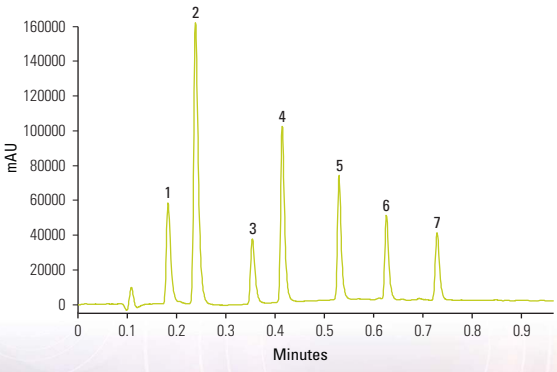
Automated Packing Process
Enhanced automated procedures ensure that all columns are packed with the highest quality



Tight Control of Particle Diameter
Enhanced selection process keeps particle size distribution to a minimum and produces high efficiency columns

Advanced Bonding Technology
Optimized phase bonding creates a series of high coverage, robust phases

High Throughput Ketones



Accucore C18 2.6µm, 50mm x 2.1mm

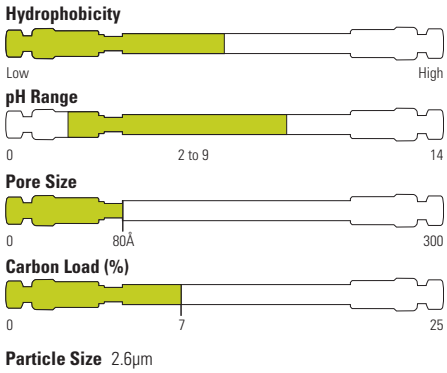
Mobile phase:	A – Water; B – Acetonitrile
Gradient:	Min % B 0 40 0.4 95 0.80 95
Flow rate:	1.0mL /min
Temperature:	45°C
Detection:	UV at λ = 258nm
Injection volume:	1µL
Backpressure:	113 bar
Analytes:	1. 2-Pentanone 2. Acetophenone 3. 2-Heptanone 4. Butyrophenone 5. Hexanophenone 6. Octanophenne 7. Decanophenone

Find out more at: www.thermoscientific.com/accucore

Accucore RP-MS HPLC Columns

Optimized for MS detection, excellent combination of speed and quality of separation

- Optimized alkyl chain length
- Very low peak tailing
- Phase of choice for use with MS detection



Particle Size 2.6µm

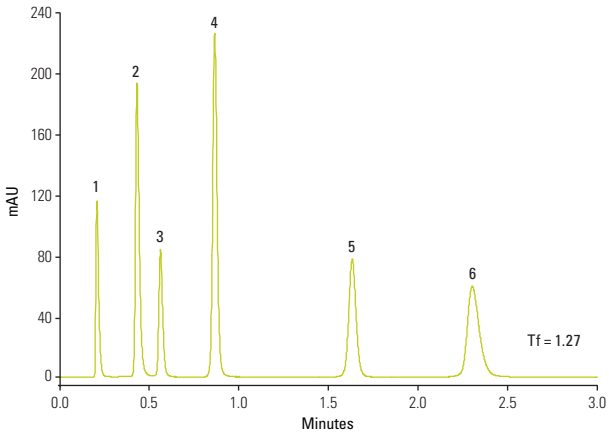
Accucore RP-MS HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	30	**17626-032130**	**17626-033030**	**17626-034630**
	50	**17626-052130**	**17626-053030**	**17626-054630**
	100	**17626-102130**	**17626-103030**	**17626-104630**
	150	**17626-152130**	**17626-153030**	**17626-154630**

Accucore RP-MS Defender Guard Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
2.6	10	**17626-012105**	**17626-013005**	**17626-014005**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Bases



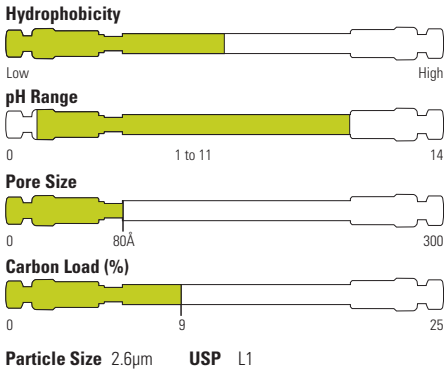
Accucore RP-MS 2.6µm, 50mm x 2.1mm

Mobile phase:	65% Methanol / 35% 25mM Potassium Phosphate pH7.0
Flow rate:	500µL/min
Temperature:	30°C
Detection:	UV at 215nm
Injection volume:	1µL
Back pressure:	232 bar
Analytes:	1.Uracil 2. Propranolol 3. Butylparaben 4. Naphthalene 5. Acenaphthene 6. Amitriptyline

Accucore C18 HPLC Columns

Optimum retention for non-polar analytes

- Hydrophobic interaction mechanism
- Ideal for separating a broad range of analytes



Particle Size 2.6µm **USP** L1

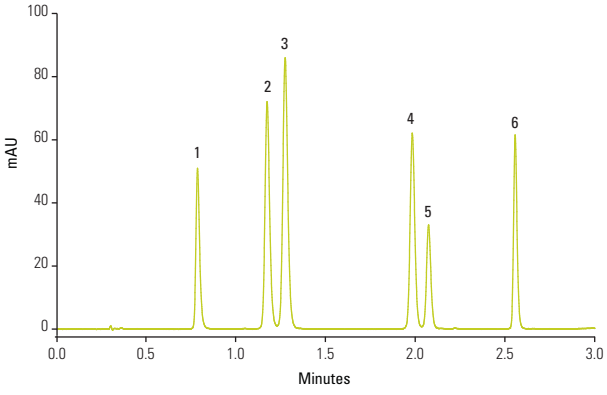
Accucore C18 HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	30	**17126-032130**	**17126-033030**	**17126-034630**
	50	**17126-052130**	**17126-053030**	**17126-054630**
	100	**17126-102130**	**17126-103030**	**17126-104630**
	150	**17126-152130**	**17126-153030**	**17126-154630**

Accucore C18 Defender Guard Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
2.6	10	**17126-012105**	**17126-013005**	**17126-014005**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Triazines



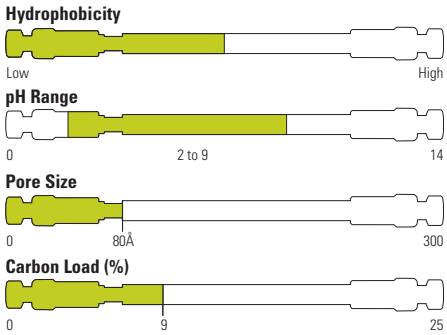
Accucore C18 2.6µm, 50mm x 2.1mm

Mobile phase:	A – Water ; B – Acetonitrile
Gradient:	Time (min) %B 1.0 35 2.5 70
Flow rate:	600µL/min
Temperature:	25°C
Detection:	UV at 280nm
Injection volume:	2µL
Backpressure:	298 bar
Analytes:	1. Simazine 2. Simetryn 3. Atrazine 4. Ametryn 5. Propazine 6. Prometryn

Accucore aQ HPLC Columns

Compatible with 100% aqueous mobile phases, special selectivity for polar analytes

- Retention and resolution of polar analytes
- Polar endcapped C18 stationary phase for alternative selectivity
- Ideal for highly aqueous mobile phases



Particle Size 2.6µm **USP** L1

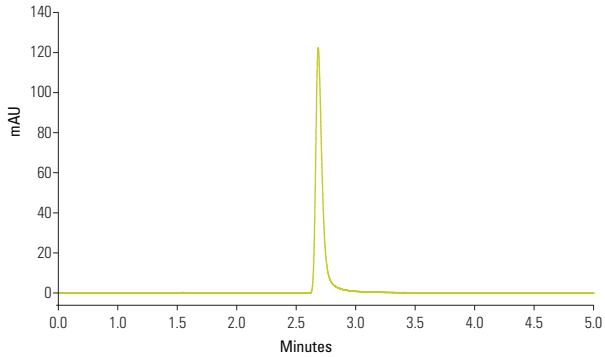
Accucore aQ HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	30	**17326-032130**	**17326-033030**	**17326-034630**
	50	**17326-052130**	**17326-053030**	**17326-054630**
	100	**17326-102130**	**17326-103030**	**17326-104630**
	150	**17326-152130**	**17326-153030**	**17326-154630**

Accucore aQ Defender Guard Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
2.6	10	**17326-012105**	**17326-013005**	**17326-014005**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Lamivudine (USP)



Accucore aQ 2.6µm, 50mm x 2.1mm

Mobile phase:	95:5 (v/v) Ammonium Acetate, pH 3.80 / Methanol
Flow rate:	200µL/min
Temperature:	35°C
Detection:	UV at 277nm
Injection volume:	1µL
Analytes:	Lamivudine
Asymmetry	1.36
%RSD t_r	0.00
%RSD Peak area	1.72

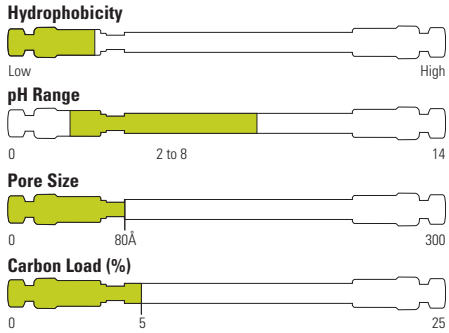
(%RSD calculated from 6 replicate injections)

USP acceptance criteria: % RSD (t_r, Peak Area) <2.0

Accucore Phenyl-Hexyl HPLC Columns

Unique selectivity for aromatic and moderately polar analytes

- Classical RP and special selectivity, while Enhanced Pi-pi interactions with aromatics
- Moderate hydrophobicity



Particle Size 2.6µm **USP** L11

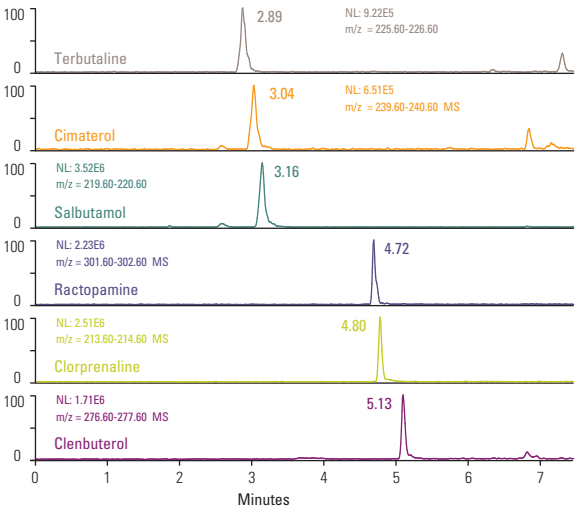
Accucore Phenyl-Hexyl HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	30	**17926-032130**	**17926-033030**	**17926-034630**
	50	**17926-052130**	**17926-053030**	**17926-054630**
	100	**17926-102130**	**17926-103030**	**17926-104630**
	150	**17926-152130**	**17926-153030**	**17926-154630**

Accucore Phenyl-Hexyl Defender Guard Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
2.6	10	**17926-012105**	**17926-013005**	**17926-014005**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Beta-agonists



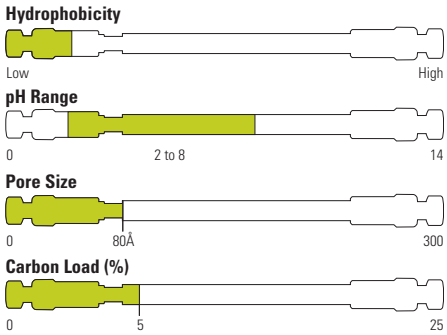
Accucore Phenyl-Hexyl 2.6µm, 100mm x 2.1mm

Mobile phase:	A – Ammonium acetate 5mM, pH 4
	B – Acetonitrile
Gradient:	Time (min) %B
	0 5
	1 5
	10 100
Flow rate:	0.25mL/min
Temperature:	40°C
Detection:	+ESI-MS (45°C, 4.5kV, 60V, scan 150 – 350)
Injection volume:	1µL
Backpressure:	120 bar (at t0)

Accucore PFP HPLC Columns

Alternative selectivity to C18, particularly for halogenated analytes

- Extra retention for halogenated species
- Unique selectivity for non-halogenated compounds



Particle Size 2.6µm **USP** L43

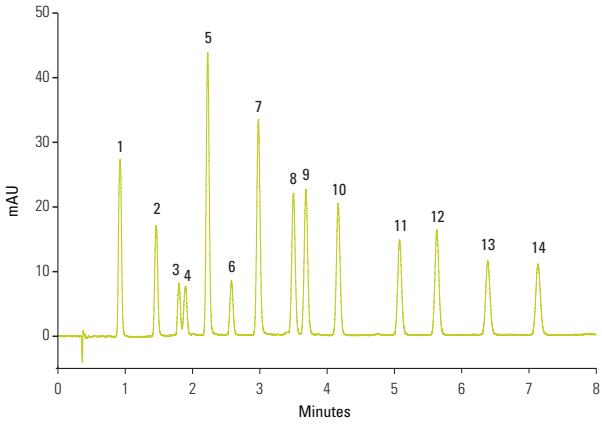
Accucore PFP HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	30	**17426-032130**	**17426-033030**	**17426-034630**
	50	**17426-052130**	**17426-053030**	**17426-054630**
	100	**17426-102130**	**17426-103030**	**17426-104630**
	150	**17426-152130**	**17426-153030**	**17426-154630**

Accucore PFP Defender Guard Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
2.6	10	**17426-012105**	**17426-013005**	**17426-014005**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Positional Isomers



Accucore PFP 2.6µm, 50mm x 2.1mm

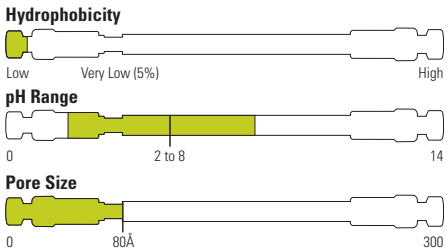
Mobile phase:	A – 0.1% Formic Acid in Water
Mobile phase:	A – 0.1% Formic Acid in Acetonitrile
Gradient:	15-30%B in 7 minutes
Flow rate:	600µL/min
Temperature:	50°C
Detection:	UV at 270nm
Injection volume:	2µL

1. 3,4 – Dimethoxyphenol
2. 2,6 – Dimethoxyphenol
3. 2,6 – Difluorophenol
4. 3,5 – Dimethoxyphenol
5. 2,4 – Difluorophenol
6. 2,3 – Difluorophenol
7. 3,4 – Difluorophenol
8. 3,5 – Dimethylphenol
9. 2,6 – Dimethylphenol
10. 2,6 – Dichlorophenol
11. 4 – Chloro-3-Methylphenol
12. 4 – Chloro-2-Methylphenol
13. 3,4 – Dichlorophenol
14. 3,5 – Dichlorophenol

Accucore HILIC HPLC Columns

Enhanced Retention of polar and hydrophilic analytes

- Alternative selectivity to C18 without ion-pair or derivatization
- Improved sensitivity for MS detection



Particle Size 2.6µm **USP** L3

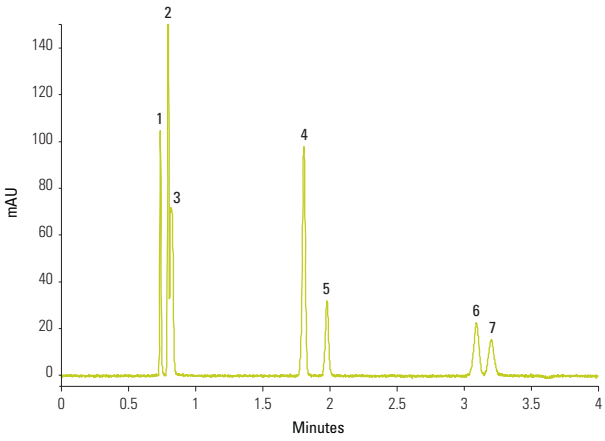
Accucore HILIC HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.6	30	**17526-032130**	**17526-033030**	**17526-034630**
	50	**17526-052130**	**17526-053030**	**17526-054630**
	100	**17526-102130**	**17526-103030**	**17526-104630**
	150	**17526-152130**	**17526-153030**	**17526-154630**

Accucore RP-MS Defender Guard Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
2.6	10	**17526-012105**	**17526-013005**	**17526-014005**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Catecholamines



Accucore HILIC 2.6µm, 50mm x 2.1mm

Mobile phase:	85:15 Acetonitrile:100mM Ammonium Formate, pH 3.2
Flow rate:	2mL/min
Temperature:	40°C
Detection:	UV at 280nm
Injection volume:	5µL
Backpressure:	157 bar
Analytes:	1. Catechol 2. 5-HIAA 3. DOPAC 4. Serotonin 5. L-tyrosine 6. Dopamine 7. L-DOPA

Accucore method development and validation kits

In addition to individual columns a number of Accucore kits are also available. These kits allow validation of the performance of Accucore HPLC columns or verification of the optimum Accucore phase to use for a separation.

Accucore Validation Kit

Validate the reproducibility of Accucore. Contains 3 Accucore C18 columns.

Accucore Validation Kit

Particle size (µm)	Length (mm)	2.1mm ID
2.6	50	**17126-052130-3V**
	100	**17126-102130-3V**
	150	**17126-152130-3V**

Accucore Narrow Selectivity Kit

Verify optimum selectivity over a narrow range. Contains 1 each of Accucore C18, RP-MS and aQ columns.

Accucore Validation Kit

Particle size (µm)	Length (mm)	2.1mm ID
2.6	50	**17X26-052130-3VA**
	100	**17X26-102130-3VA**
	150	**17X26-152130-3VA**

Accucore Wide Selectivity Kit

Verify selectivity over a wide range. Contains 1 each of Accucore C18, Phenyl-Hexyl and PFP columns.

Accucore Validation Kit

Particle size (µm)	Length (mm)	2.1mm ID
2.6	50	**17X26-052130-3VB**
	100	**17X26-102130-3VB**
	150	**17X26-152130-3VB**

Accucore Polar Selectivity Kit

Verify selectivity for polar analytes. Contains 1 each of Accucore aQ, PFP and HILIC columns.

Accucore Validation Kit

Particle size (µm)	Length (mm)	2.1mm ID
2.6	50	**17X26-052130-3VC**
	100	**17X26-102130-3VC**
	150	**17X26-152130-3VC**

Thermo Scientific Syncronis HPLC Columns

Consistent Reproducible Separations, Column after Column, Time after Time

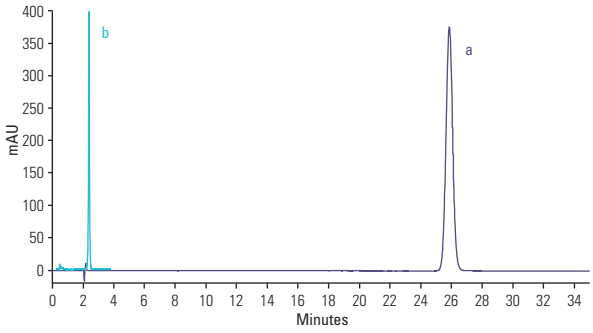
1.7µm Particles for UHPLC Applications

With higher efficiency than 3µm or 5µm particles, 1.7µm particles deliver a greater range of optimum linear velocity and make it possible to operate at higher flow rate without losing performance. In addition, shorter columns packed with 1.7µm particles provide the same efficiency as longer columns packed with 5µm particles, resulting in faster analysis and solvent savings for chromatographers.

With 1.7µm particles, analyses can be performed with a high linear velocity through the column without loss in performance, provided the LC system is optimized to operate under these conditions. In order to produce fast, efficient chromatography, all system components for the assay should also be considered. Modern ultra high pressure liquid chromatography (UHPLC) instruments, including the Thermo Scientific Accela High Speed LC, take these factors into account.

For full details on the Syncronis column range, please refer request or view a copy of our Syncronis technical guide – **www.thermoscientific.com/syncronis**

Zidovudine

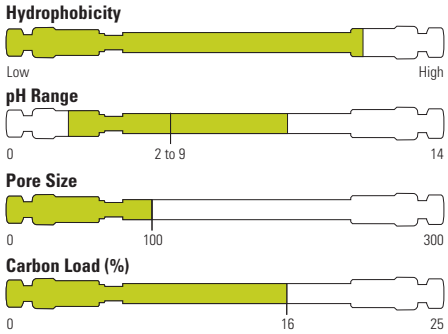


Column:	**Syncronis C18** **a) 5.0µm, 250 x 4.0mm** **b) 1.7µm, 50 x 2.1mm**
Chromatographic conditions:	
Mobile phase:	1:4 (v/v) MeOH-Water
Flow rate:	a) 1ml min-1 b) 0.8ml min-1
Temperature:	25°C
Detection:	UV at 265nm
Injection volume:	a) 10µl b) 0.5µl

1.7µm Syncronis C18 HPLC Columns

Syncronis C18 columns deliver consistent predictable separations, column after column, time after time

- Highly pure, high surface area silica
- High carbon load for increased retention
- Double endcapped for extra surface coverage
- Highly inert towards basic compounds
- Rigorously tested to ensure quality

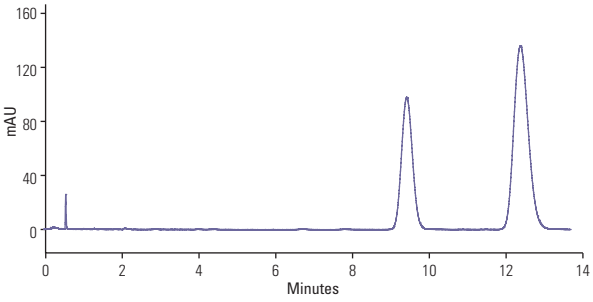


Particle Size 1.7µm **USP** L1

Syncronis C18 HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97102-032130**	–	–
	50	**97102-052130**	**97102-053030**	**97102-054630**
	100	**97102-102130**	**97102-103030**	–

Ibuprofen



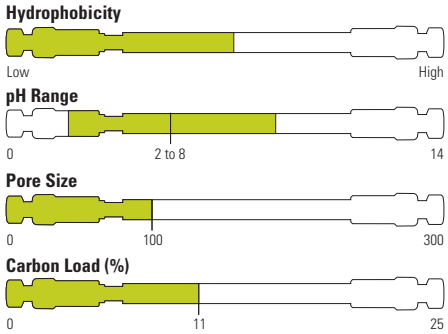
Column: Syncronis C18, 1.7µm, 50 x 2.1mm

Mobile phase:	Water phosphoric acid (pH 2.5): Acetonitrile (66.3:33.7)
Flow rate:	0.8mL/min
Temperature:	30°C
Detection:	214nm
Injection volume:	0.5µL
Sample:	1. Valerophenone 2. Ibuprofen

We offer a convenient HPLC method transfer calculator at the Chromatography Resource Center
www.thermoscientific.com/chromatography

1.7µm Syncronis C8 HPLC Columns

Reduces hydrophobic interactions, allowing compounds to elute quicker from the column. Recommended for analytes with medium hydrophobicity or when a less hydrophobic phase is required to obtain optimum retention



Particle Size 1.7µm **USP** L7

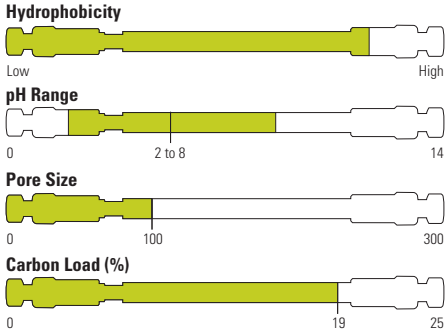
- Highly pure, high surface area silica
- Less hydrophobic than Syncronis C18
- Double endcapped for extra surface coverage
- Rigorously tested to ensure quality

Syncronis C8 HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97202-032130**	–	–
	50	**97202-052130**	**97202-053030**	**97202-054630**
	100	**97202-102130**	**97202-103030**	–

1.7µm Syncronis aQ HPLC Columns

Polar endcapped Syncronis aQ columns provide a controlled interaction mechanism that retains and resolves polar analytes. Stable in 100% aqueous mobile phase



Particle Size 1.7µm **USP** L1

- Stable in 100% aqueous mobile phase
- Enhanced retention of polar compounds
- Rigorously tested to ensure quality

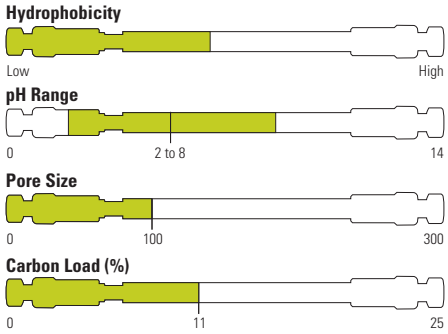
Syncronis aQ HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97302-032130**	–	–
	50	**97302-052130**	**97302-053030**	**97302-054630**
	100	**97302-102130**	**97302-103030**	–

1.7µm Syncronis Phenyl HPLC Columns

Syncronis C18 columns deliver consistent predictable separations, column after column, time after time

- Alternative selectivity to Syncronis C18
- Double endcapped for extra surface coverage
- Highly inert towards basic compounds
- Rigorously tested to ensure quality



Particle Size 1.7µm **USP** L11

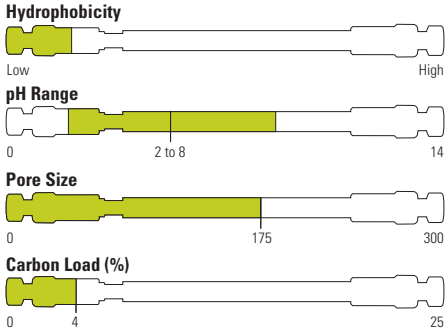
Syncronis Phenyl HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97902-032130**	–	–
	50	**97902-052130**	**97902-053030**	**97902-054630**
	100	**97902-102130**	**97902-103030**	–

1.7µm Syncronis Amino HPLC Columns

Provides a versatile aminopropyl phase that gives excellent chromatographic properties in four modes: weak anion exchange, reversed phase, normal phase and HILIC

- Highly pure, high surface area silica
- Double endcapped for extra surface coverage
- Rigorously tested to ensure quality



Particle Size 1.7µm **USP** L8

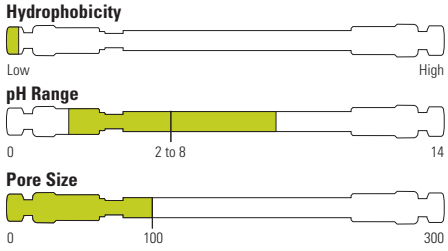
Syncronis Amino HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97702-032130**	–	–
	50	**97702-052130**	**97702-053030**	**97702-054630**
	100	**97702-102130**	**97702-103030**	–

1.7µm Syncronis Silica HPLC Columns

Serves as a powerful and efficient tool for the chromatography of moderately polar organic compounds by normal phase chromatography

- Highly pure, high surface area silica
- Excellent reproducibility for normal phase chromatography
- Rigorously tested to ensure quality



Particle Size 1.7µm **USP** L3

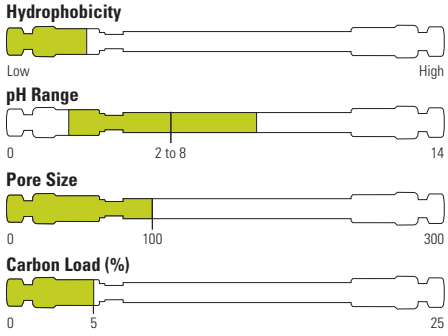
Syncronis Silica HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97002-032130**	–	–
	50	**97002-052130**	**97002-053030**	**97002-054630**
	100	**97002-102130**	**97002-103030**	–

1.7µm Syncronis HILIC HPLC Columns

Provides enhanced retention of polar and hydrophilic analytes

- Alternative selectivity to Syncronis C18
- Improved sensitivity with MS detection
- No need for ion-pair or derivatisation
- Outstanding peak shape and sensitivity
- Highly pure, high surface area silica particles
- Neutral (uncharged), highly polar surface



Particle Size 1.7µm

Syncronis HILIC HPLC columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
1.7	30	**97502-032130**	–	–
	50	**97502-052130**	**97502-053030**	**97502-054630**
	100	**97502-102130**	**97502-101030**	–

Notes

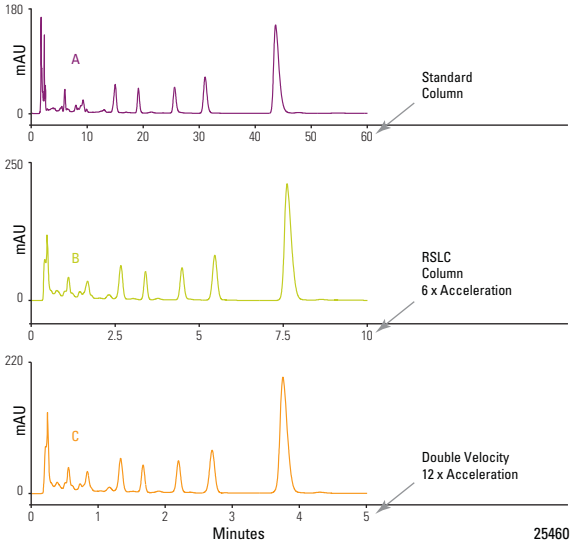
Thermo Scientific Acclaim RSLC Columns

High-throughput, cost-effective and environment friendly Fast HPLC solution

- High throughput with uncompromised chromatographic performance and reduced solvent consumption
- Accelerate separations up to fifteen-fold compared to conventional LC
- Save up to 92% of solvent with 2.2µm columns
- More resistant to column fouling compared to smaller particle (eg. sub 2µm) columns
- Compatible with both standard HPLC (400 bar) and UHPLC (800 bar) systems
- RSLC Compatible

The Acclaim RSLC 2.2µm columns for Rapid Separation Liquid Chromatography (RSLC) feature a well-balanced integration of high column efficiency, excellent performance, complementary selectivity, as well as stable and rugged column packing. These columns generate 25 to 50% less backpressure compared to sub-2µm particle columns, and are more resistant to column fouling, making them compatible with both standard and ultrahigh pressure LC (UHPLC) instrumentation

Accelerated Assay of Vanilla Extract

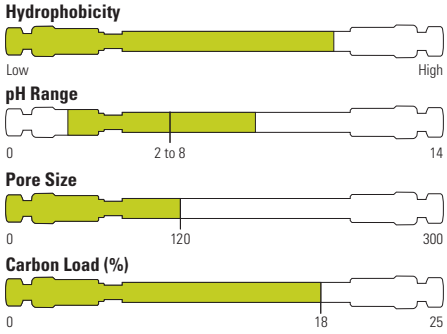


LC System:	**Thermo Scientific Dionex UltiMate 3000 RSLC**
Column:	**Acclaim 120 C18**
Dimensions:	A) 5µm, 4.6 x 150mm B, C) 2µm, 2.1 x 50mm RSLC
Mobile Phase:	200mM HOAc in 10% (v/v) MeOH
Flow Rate:	A) 1.0mL/min B) 0.41mL/min C) 0.82mL/min
Temperature:	20°C
Injection:	A) 10µL B, C) 1.2µL
Detector:	UV at 254nm, A) 1Hz data rate B) 5Hz data rate C) 10Hz data rate
Sample:	Commercial vanilla extract in 40% CH_3OH, filtered
Reference:	AOAC Official Method 990.25
Peaks:	1. p-Hydroxybenzoic acid 2. p-Hydroxybenzaldehyde 3. Vanillin acid 4. Vanillin

Acclaim RSLC 120 C18 Columns

High performance reversed-phase columns for the separation of small molecules

- Low silanol activity for excellent peak shapes for basic analytes
- High hydrophobic retention
- Available in 2.2µm particle size
- Very high efficiencies for maximum resolution
- Reproducible manufacturing practices for reproducible column-to-column performance
- LC/MS compatible
- High surface coverage, resulting in high-capacity columns



Particle Size 2.2µm **USP** L1

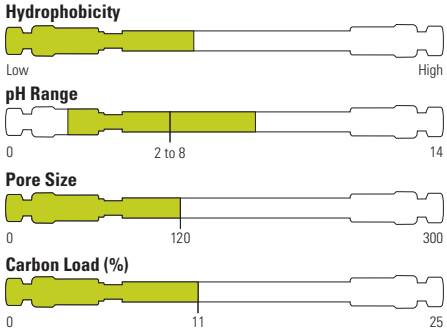
Acclaim RSLC 120 C18 Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.2	30	**071400**	**071606**	–
	50	**068981**	**071605**	–
	75	–	**075697**	–
	100	**068982**	**071604**	–
	150	**071399**	–	–
	250	**074812**	–	–

Acclaim RSLC 120 C8 Columns

High performance reversed-phase columns for the separation of more hydrophobic small molecules

- Low silanol activity for excellent peak shapes for basic analytes
- Excellent column efficiencies
- LC/MS compatible
- Reproducible manufacturing practices for reproducible column-to-column performance



Particle Size 2.2µm **USP** L7

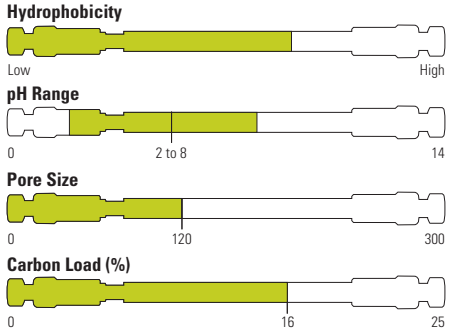
Acclaim RSLC 120 C8 Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.2	30	**072614**	**072618**	–
	50	**072615**	**072619**	–
	75	–	**075696**	–
	100	**072616**	**072620**	–
	150	**072617**	–	–
	250	**074811**	–	–

Acclaim RSLC PolarAdvantage (PA) Columns

Novel polar-embedded reversed-phase columns with unique selectivity

- Selectivity complementary to the C18 column
- Low silanol activity for excellent peak shape with basic compounds
- Compatible with mobile phases from 100% aqueous to 100% organic solvent
- High selectivity for hydrophobic aromatic molecules
- Wide range of applications
- Available in 2.2µm particle size

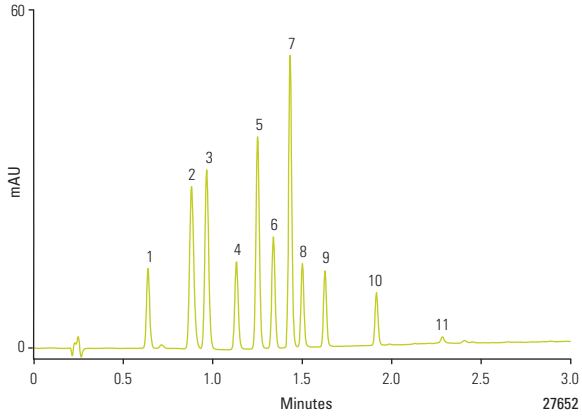


Particle Size 2.2µm **USP** L1

Acclaim RSLC PolarAdvantage (PA) Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.2	30	**072621**	**072625**	–
	50	**072622**	**072626**	–
	75	–	**075698**	–
	100	**072623**	**072627**	–
	150	**072624**	–	–
	250	**074813**	–	–

Phenols EPA 604 fast analysis



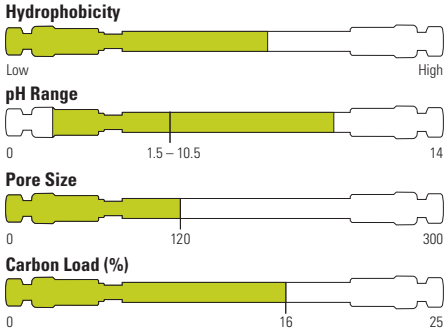
Column: Acclaim® RSLC PolarAdvantage, 2.2µm

Dimensions:	3.0 × 50mm
System:	UltiMate® 3000 RSLC
Mobile Phases:	A: 10mM formic acid + 10mM ammonium formate, pH 3.75 ± 0.05 B: Acetonitrile
Gradient Time (min):	-1.5 0.0 0.3 2.6 3.0 %A 70 70 70 10 10 %B 30 30 30 90 90
Flow Rate:	1.25mL/min
Injection Volume:	0.5µL
Temperature:	30°C
Detection:	UV at 280nm, 10Hz, 0.5s resp. time
Samples:	Calibration mixes, 50µg/mL in water
Peaks:	1. Phenol 2. 2,4-Dinitrophenol 3. 4-Nitrophenol 4. 2-Chlorophenol 5. 2-Nitrophenol 6. 2,4-Dimethylphenol 7. 4,6-Dinitro-2-methylphenol 8. 4-Chloro-3-methylphenol 9. 2,4-Dichlorophenol 10. 2,4,6-Trichlorophenol 11. Pentachlorophenol

Acclaim RSLC PolarAdvantage II (PA2) Columns

For the separation of hydrophilic drugs and drug metabolites

- Unique selectivity, complementary to reversed-phase columns
- Hydrolytically stable
- Rugged column packing
- Broad application range

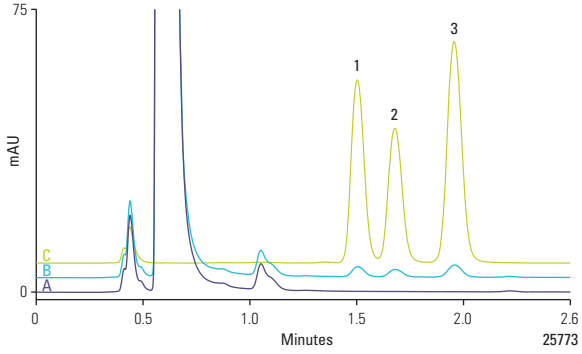


Particle Size 2.2µm **USP** L60

Acclaim RSLC PolarAdvantage II (PA2) Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.2	30	**071402**	**071609**	–
	50	**068989**	**071608**	–
	75	–	**075699**	–
	100	**068990**	**071607**	–
	150	**071401**	–	–
	250	**074814**	–	–

Fast Diisocyanates by OSHA Method 42 on Acclaim RSLC PolarAdvantage II

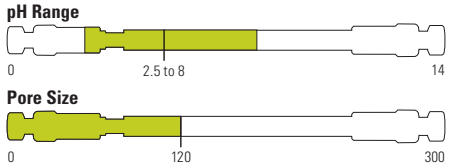


Column: Acclaim RSLC PolarAdvantage II, 2.2µm, 2.1 × 100mm

Mobile Phase:	293g acetonitrile, 625g water, 0.77g NH_4OAc (10mmol), adj. to pH 6.0–6.2 with acetic acid Isocratic
Temperature: 60°C	
Flow: 0.50mL/min (210 bar)	
Injection: 2µL	
Detector: UV at 254nm (313nm optional)	
Peaks	1. 2,6-Toluenediisocyanate 2. 1,6-Hexamethylenediisocyanate 3. 2,4-Toluenediisocyanate Derivatives with 1-(2-pyridyl)piperazine, prepared according to OSHA method
Samples:	A. Reagent blank B. 0.16µg/mL in matrix C. 8.0µg/mL each in acetonitrile

Acclaim RSLC Explosives E2 Columns

Acclaim Explosives columns: a total solution for explosives analysis (EPA Method 8330)



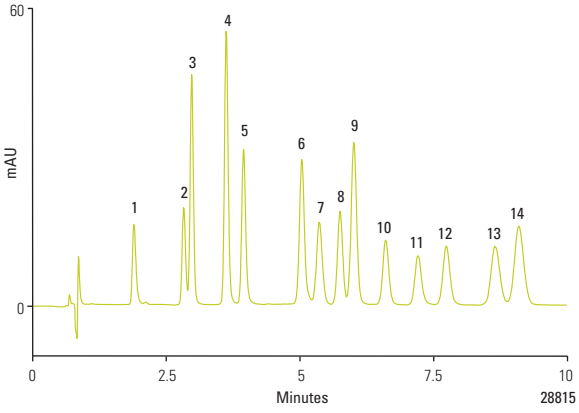
Particle Size 2.2µm

- Achieve baseline resolution of all 14 compounds targeted by EPA Method 8330
- Simple isocratic elution conditions
- Rugged columns with good lot-to-lot reproducibility
- Unique selectivities for separating other nitro-aromatic molecules

Acclaim RSLC Explosives E2 Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.2	100	**076225**	**076227**	–
	150	**076226**	–	–

Rapid Determination of EPA 8330A Explosives Using the Acclaim RSLC E2 Column

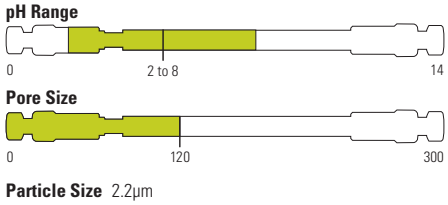


Column: Acclaim RSLC Explosives E2, 2.2µm

Dimension:	2.1 × 100mm	
HPLC System:	UltiMate 3000 RSLC HPG	
Mobile Phases:	Methanol:water 48:52 (v/v)	
Flow Rate:	0.34mL/min (293 bar)	
Injection Vol.:	1µL	
Temperature:	31°C	
Detection:	UV at 254nm, 10 Hz, 0.4 s resp. time	
Sample:	Calibration mix, 25µg/mL in 50% acetontrile	
Peaks:	1. HMX	8. 2,6-DNT
	2. RDX	9. 2,4-DNT
	3. 1,3,5-TNB	10. 2-NT
	4. 3,5-DNB	11. 4-NT
	5. NB	12. 3-NT
	6. 2,4,6-TNT	13. 4-Am-2,6-DNT
	7. Tetryl	14. 2-Am-4,6-DNT

Acclaim RSLC Carbamate Columns

Designed for baseline separation of carbamate pesticides specified in US EPA Method 531.2



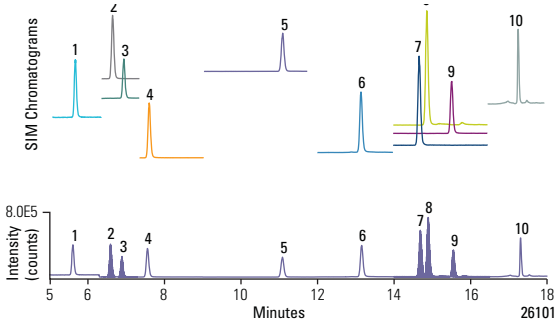
Particle Size 2.2µm

- Baseline separation of carbamate pesticides specified in US EPA Method 531.2
- Use with either LC/postcolumn derivatization/fluorescence or LC/MS detection
- Compatible with both binary (methanol/water) and ternary (acetonitrile/methanol/water) mobile phase gradients
- High-efficiency, extremely low column bleed, and rugged column packing
- Excellent column efficiency and peak shapes for organic acids

Acclaim RSLC Carbamate Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
2.2	100	**075597**	–	–
	150	**075596**	–	–

Carbamate pesticides by LC-MS



System: UltiMate 3000 HPLC system
Column: Acclaim RSLC Carbamate column (2.1 × 150mm, 3µm)

Mobile Phase: A) Methanol
B) 1.0mM Ammonium formate
C) Water

Time (min)	A%	B%	C%
–4.0	10	5	85
0.0	10	5	85
2.0	10	5	85
15.0	65	5	30
15.1	90	5	5
20.0	90	5	5

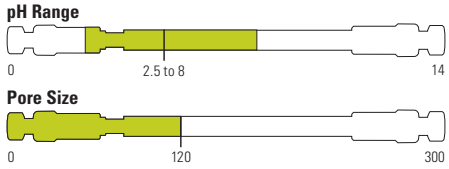
Flow Rate: 300µL/min
Inj. Volume: 20µL
Detector: MSQ Plus™ single quadrupole mass spectrometer

Mass Spectrometric Conditions

Ionization interface: Electrospray Ionization (ESI) positive mode
Detection mode: Selected Ion Monitoring (SIM)

Acclaim RSLC Carbonyl Columns

A silica-based, reversed-phase column designed specifically for separating DNPH derivatives of aldehydes and ketones



Particle Size 2.2µm

- Ideal selectivity for baseline resolution of DNPH derivatives of aldehydes and ketones regulated by various official methods, including EPA 554, EPA 8315, EPA 1667, EPA TO-11, and CARB 1004
- High efficiency for UHPLC performance
- Rugged columns with good lot-to-lot reproducibility
- Proven robust methods

The Acclaim Carbonyl columns are silica-based reversed phase columns designed specifically for separating DNPH derivatives of aldehydes and ketones. They exhibit superior resolution compared with other commercially available columns.

Aldehydes and ketones are common pollutants in air and water. The analytical difficulties that need to be overcome include their volatility, their reactivity, and their modest UV absorption. The reaction with dinitrophenylhydrazine (DNPH) is a convenient means of trapping, stabilizing, and tagging these substances. Several standard methods have been developed to apply this chemistry to various environmental situations. Some of the better known ones include CARB 1004 for vehicle exhaust, EPA 554 for drinking water, EPA 1667 for pharmaceutical wastewater, and EPA 8315 for general wastewater.

Acclaim RSLC Carbonyl Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID
2.2	100	**077972**	**077974**
	150	**077973**	–

Thermo Scientific Analytical HPLC Columns

We have been at the forefront of chromatography technology for over 35-years. The broad selection of Thermo Scientific HPLC phases coupled with expertise and technical support make us the ideal worldwide source for HPLC columns

Hypersil GOLD
Based on improved, highly pure silica and a novel proprietary derivatization and endcapping procedure using alkyl chemistry, Hypersil GOLD columns offer next generation silica-based columns with enhanced performance.

PAGE 4-054

Syncronis
Extensive testing and strong quality control procedures ensure the consistency of Syncronis HPLC columns – column after column, time after time.

PAGE 4-086

Hypercarb
A unique porous graphitized carbon phase that provides exceptional retention of very polar analytes, true orthoganality to C18 and separation of structurally related substances. Hypercarb is pH stable form 0 to 14 and is ideal for high temperature applications.

PAGE 4-094

Acclaim
Rugged, reproducible, and reliable chromatographic performance make Acclaim HPLC columns appropriate for pharmaceutical, environmental, food, and other industrial chromatographic separations.

PAGE 4-072

Other Columns
Our older product lines, including Hypersil BDS, Hypersil, Aquasil, Betabasic and Betasil.

PAGE 4-106

Application Specific
A range of columns designed for specific applications, including organic acids, surfactants, explosives residues, carbamate and PAH analysis

PAGE 4-098

Thermo Scientific Hypersil GOLD HPLC Columns

Excellent peak shape for all analyte types

- Excellent peak symmetry
- Narrow peaks for outstanding efficiency
- Increased sensitivity and improved resolution
- Variety of chemistries
- 1.9 to 12µm particles

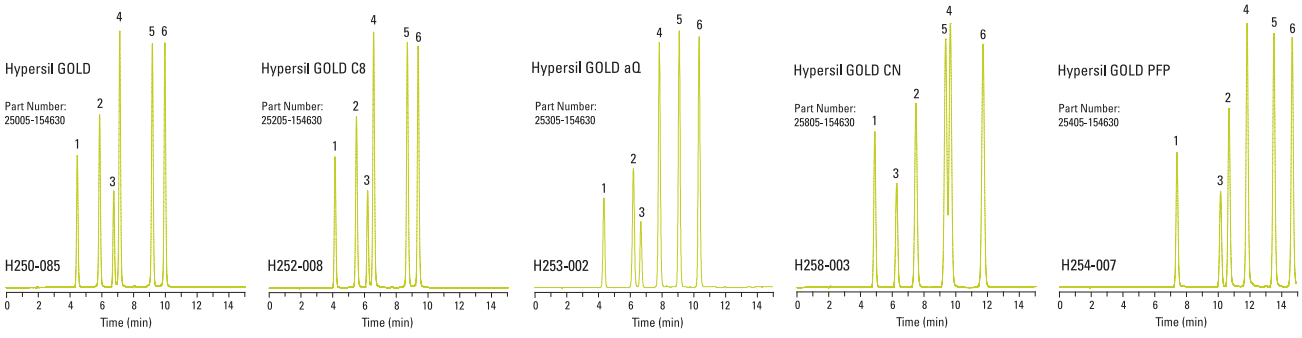
Thermo Scientific Hypersil GOLD columns are exceptionally reproducible for reliable chromatography, column after column. This allows the user to be confident that assays developed with Hypersil GOLD columns will be robust and stable for the life of the assay, making them an ideal choice for new method development. Built on more than 35 years of experience in product development and manufacturing of HPLC media and columns, we successfully continue to extend the capabilities of this state-of-the-art family of columns, designed for improved chromatography. Hypersil GOLD columns are manufactured in ISO 9001:2008 accredited laboratories under strict protocols using a robust manufacturing procedure and extensive quality control testing.

Improved Selectivity, Resolution and Productivity

Hypersil GOLD columns are available in an array of chemistries to optimize separations and maximize productivity:

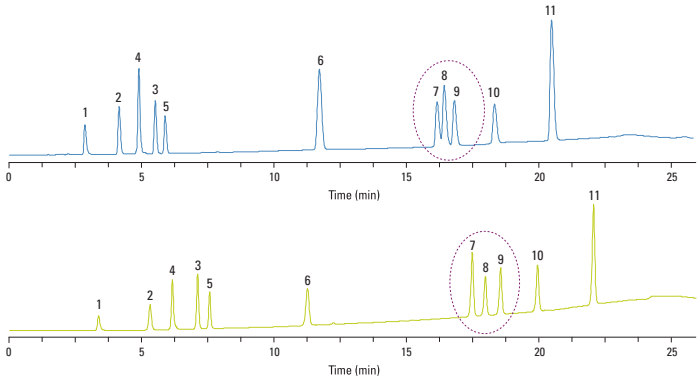
- **Hypersil GOLD** offers outstanding peak shape using generic gradients with C18 selectivity
- **Hypersil GOLD C8** offers similar selectivity but with less retention
- **Hypersil GOLD aQ** can be used for challenging reverse phase separations employing highly aqueous mobile phases
- **Hypersil GOLD PFP** can offer alternative selectivity in reverse phase applications
- **Hypersil GOLD Phenyl** offers alternative selectivity and is particularly suitable for aromatic and moderately polar compounds
- **Hypersil GOLD CN** can be used for both reversed and normal phase separations
- **Hypersil GOLD C4** has short alkyl chain length, low hydrophobicity column for less retention
- **Hypersil GOLD Amino** demonstrates excellent chromatographic properties in three modes: weak anion exchange, reversed phase and normal phase.
- **Hypersil GOLD AX** can be used to separate proteins, peptides, other anionic species and polar molecules
- **Hypersil GOLD SAX** is a highly stable silica-based quarternary amine strong anion exchange column, designed for aqueous mobile phase
- **Hypersil GOLD Silica** is a powerful and efficient tool in the chromatography of non-polar and moderately polar organic compounds by normal phase
- **Hypersil GOLD HILIC** columns retain polar analytes that are problematic using reversed phase columns

These chemistries offer alternative selectivities in the same column family, providing enhanced retention or changes in elution order for flexibility in method development. Each phase is made with the same care and attention to quality that defines all Thermo Scientific columns.



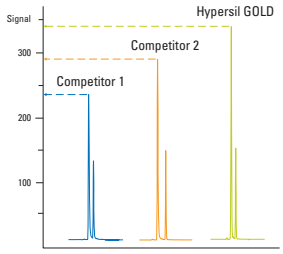
Hypersil GOLD, 5µm, 150 x 4.6mm

Mobile Phase:	A: H2O + 0.1% Formic acid B: MeOH + 0.1% Formic acid
Gradient:	20 to 50% B in 15 min
Flow Rate:	1mL/min
Detection:	UV at 280nm
Temperature:	25°C
Sample:	1. Catechin 2. Epigallocatechin Gallate 3. Epicatechin 4. Gallocatechin Gallate 5. Epicatechin Gallate 6. Catechin Gallate



Resolution of analytes is improved using a Hypersil GOLD column.

Data courtesy of M. Euerby, AstraZeneca, Charnwood, UK.



The improved peak symmetry provides additional peak height to increase sensitivity of analysis of trace components.

Solutions for High Throughput Screening, Capillary to Preparative Analysis

Hypersil GOLD columns are available in particle sizes and column designs to meet all separation needs, including improved resolution, enhanced sensitivity and faster analyses. From 1.9µm to 12µm particles, Hypersil GOLD columns offer chromatographic solutions with consistent separations and performance. Specialized hardware includes KAPPA™ capillary columns, PicoFrit™ and IntegraFrit nanobore columns, Javelin™ HTS direct-connection columns and DASH™ HTS columns, designed for high throughput screening.

Improved Sensitivity

Good peak shape means greater sensitivity. When peaks exhibit tailing, peak height is reduced causing the sensitivity of the analysis to be compromised. The more symmetrical the chromatographic peaks, the more confidence you derive from your data. Using Hypersil GOLD, peak height is enhanced and peak integration calculations are optimized.

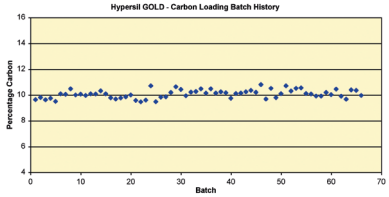
Enhanced peak height can be particularly critical when low concentrations of an analyte are present, for example in an impurity assay. The increase in sensitivity gained with the Hypersil GOLD columns over competitor C18 columns is illustrated above.

Enhanced Resolution

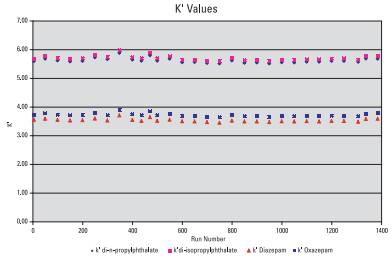
Robust assay development requires a clear definition of resolution expectations. Narrow symmetrical chromatographic peaks ensure that optimum resolution is achieved. Obtaining narrow peak widths is especially challenging for basic pharmaceutical compounds. The figure above shows how Hypersil GOLD columns provide excellent resolution between critical pairs, aiding in separation of closely related species.

pH Stability

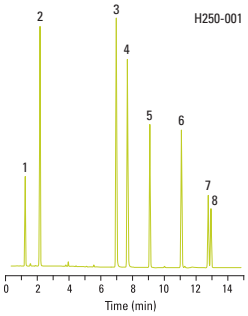
Hypersil GOLD columns are well suited to extended pH applications. Hypersil GOLD columns have been shown to produce robust assays at high pH. At low pH, excellent column stability and reproducibility are illustrated.



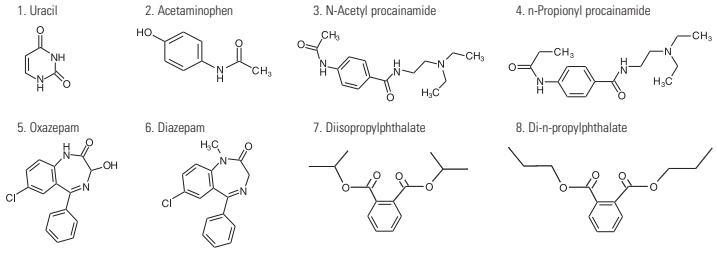
Excellent reproducibility is illustrated with the percent carbon on the Hypersil GOLD media



Stability of Hypersil GOLD columns at low pH. No loss of retention after 28L of mobile phase in 19.5 days of analysis.



Dimensions:	5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% ammonia pH 10.6 B: MeOH + 0.1% ammonia
Gradient:	5 – 100% B in 15 min
Flow:	1.0mL/min
Injection:	10µL
Detection:	UV at 254nm
Temperature:	30°C

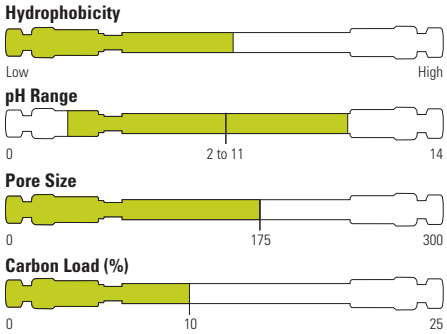


High pH stability assay (pH 10.6) of Hypersil GOLD columns

Hypersil GOLD HPLC Columns

Endcapped, ultrapure, silica-based columns with exceptional peak shape and resolution for HPLC and LC/MS

- Significant reduction in peak tailing while retaining C18 selectivity
- Excellent resolution, efficiency and sensitvity
- Confidence in the accuracy and quality of analytical data



Particle Size 3µm, 5µm, 12µm **USP** L1

Hypersil GOLD Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25003-031030**	**25003-032130**	**25003-033030**	**25003-034030**	**25003-034630**
	50	**25003-051030**	**25003-052130**	**25003-053030**	**25003-054030**	**25003-054630**
	100	**25003-101030**	**25003-102130**	**25003-103030**	**25003-104030**	**25003-104630**
	150	**25003-151030**	**25003-152130**	**25003-153030**	**25003-154030**	**25003-154630**
5.0	30	**25005-031030**	**25005-032130**	**25005-033030**	**25005-034030**	**25005-034630**
	50	**25005-051030**	**25005-052130**	**25005-053030**	**25005-054030**	**25005-054630**
	100	**25005-101030**	**25005-102130**	**25005-103030**	**25005-104030**	**25005-104630**
	150	**25005-151030**	**25005-152130**	**25005-153030**	**25005-154030**	**25005-154630**
	250	**25005-251030**	**25005-252130**	**25005-253030**	**25005-254030**	**25005-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD Drop-in Guard Cartriges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25003-011001**	**25003-012101**	**25003-013001**	**25003-014001**	**4 Pack**
5.0	10	**25005-011001**	**25005-012101**	**25005-013001**	**25005-014001**	**4 Pack**
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	**1 Each**

For ordering information about 1.9µm Hypersil GOLD columns, please see the Fast LC section of the catalogue

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Hypersil GOLD Javelin HTS HPLC Columns

Particle size (µm)	20 x 4.0mm	20 x 2.1mm	10 x 2.1mm	Quantity
1.9	–	–	**25002-012135**	3 Pack
5.0	**25005-024035**	**25005-022135**	–	3 Pack
5.0	**25005-024036**	**25005-022136**	–	10 Pack

Hypersil GOLD DASH HTS HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	Quantity
5.0	20	**25005-022151**	3 Pack

Hypersil GOLD Preparative HPLC Columns

Particle size (µm)	Length (mm)	10mm ID	21mm ID	30mm ID	50mm ID
5.0	50	**25005-059070**	**25005-059270**	**25005-059370**	**25005-059570**
	100	**25005-109070**	**25005-109270**	**25005-109370**	**25005-109570**
	150	**25005-159070**	**25005-159270**	**25005-159370**	**25005-159570**
	250	**25005-259070**	**25005-259270**	**25005-259370**	**25005-259570**
12.0	50	**25012-059070**	**25012-059270**	**25012-059370**	**25012-059570**
	100	**25012-109070**	**25012-109270**	**25012-109370**	**25012-109570**
	150	**25012-159070**	**25012-159270**	**25012-159370**	**25012-159570**
	250	**25012-259070**	**25012-259270**	**25012-259370**	**25012-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information. Stainless steel internal reducing unions to connect 30 to 50mm ID preparative columns to 1/16in tubing are available.

Hypersil GOLD Preparative Guard Cartridge Systems

Particle size (µm)	10 x 10mm (ID x L)	20 x 20mm (ID x L)	Quantity
5.0	**25005-019023**	**25005-029223**	3 Pack
12.0	**25012-019023**	**25012-029223**	3 Pack
Preparative Guard Holder	**C-1000**	**F1403**	1 Each

Hypersil GOLD Preparative HPLC Guard Columns

Particle size (µm)	10mm ID	21mm ID	Quantity
5.0	**25005-039022**	**25005-039222**	1 Each
12.0	**25012-039022**	**25012-039222**	1 Each

See our range of certified vials

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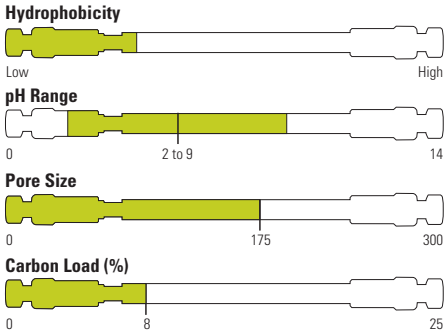
Hypersil GOLD C8 HPLC Columns

Recommended for analytes with medium hydrophobicity or when a less hydrophobic phase is required to obtain optimum retention

- Similar selectivity to C18 columns but with reduced retention
- Lower hydrophobicity, allowing compounds to elute quicker
- Faster separations
- Excellent peak shape
- High efficiency
- Outstanding sensitivity



Particle Size 3µm, 5µm **USP** L7

Hypersil GOLD C8 HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25203-031030**	**25203-032130**	**25203-033030**	**25203-034030**	**25203-034630**
	50	**25203-051030**	**25203-052130**	**25203-053030**	**25203-054030**	**25203-054630**
	100	**25203-101030**	**25203-102130**	**25203-103030**	**25203-104030**	**25203-104630**
	150	**25203-151030**	**25203-152130**	**25203-153030**	**25203-154030**	**25203-154630**
5.0	30	**25205-031030**	**25205-032130**	**25205-033030**	**25205-034030**	**25205-034630**
	50	**25205-051030**	**25205-052130**	**25205-053030**	**25205-054030**	**25205-054630**
	100	**25205-101030**	**25205-102130**	**25205-103030**	**25205-104030**	**25205-104630**
	150	**25205-151030**	**25205-152130**	**25205-153030**	**25205-154030**	**25205-154630**
	250	**25205-251030**	**25205-252130**	**25205-253030**	**25205-254030**	**25205-254630**

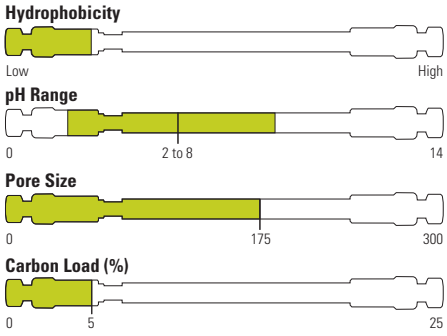
Hypersil GOLD C8 Drop-in Guard Cartridges Guard Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25203-011001**	**25203-012101**	**25203-013001**	**25203-014001**	4 Pack
5.0	10	**25205-011001**	**25205-012101**	**25205-013001**	**25205-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD C4 HPLC Columns

Lower hydrophobicity than C18 or C8 recommended for very hydrophobic analytes

- Lower hydrophobicity
- Faster separations
- Excellent peak shape
- High efficiency
- Outstanding sensitivity



Particle Size 3µm, 5µm **USP** L26

Hypersil GOLD C4 Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25503-031030**	**25503-032130**	**25503-033030**	**25503-034030**	**25503-034630**
	50	**25503-051030**	**25503-052130**	**25503-053030**	**25503-054030**	**25503-054630**
	100	**25503-101030**	**25503-102130**	**25503-103030**	**25503-104030**	**25503-104630**
	150	**25503-151030**	**25503-152130**	**25503-153030**	**25503-154030**	**25503-154630**
5.0	30	**25505-031030**	**25505-032130**	**25505-033030**	**25505-034030**	**25505-034630**
	50	**25505-051030**	**25505-052130**	**25505-053030**	**25505-054030**	**25505-054630**
	100	**25505-101030**	**25505-102130**	**25505-103030**	**25505-104030**	**25505-104630**
	150	**25505-151030**	**25505-152130**	**25505-153030**	**25505-154030**	**25505-154630**
	250	**25505-251030**	**25505-252130**	**25505-253030**	**25505-254030**	**25505-254630**

Hypersil GOLD C4 Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25503-011001**	**25503-012101**	**25503-013001**	**25503-014001**	4 Pack
5.0	10	**25505-011001**	**25505-012101**	**25505-013001**	**25505-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD C4 columns provide similar selectivity to C18 and C8 columns but with reduced retention.

For ordering information about 1.9µm Hypersil GOLD columns, please see the Fast LC section of the catalogue

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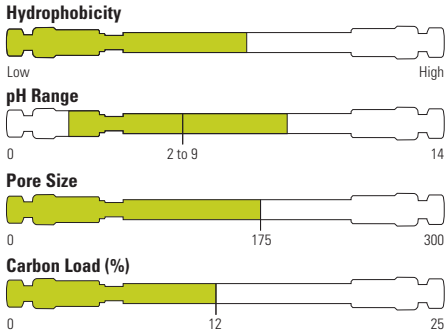
Hypersil GOLD aQ HPLC Columns

Hypersil GOLD aQ polar endcapped C18 columns provide a controlled interaction mechanism by which polar analytes can be retained and resolved

- Polar endcapped C18 phase for alternative selectivity
- Retention and resolution of polar analytes
- Excellent peak shape
- Stable in 100% aqueous mobile phases



Particle Size 3µm, 5µm **USP** L1

Hypersil GOLD aQ Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25303-031030**	**25303-032130**	**25303-033030**	**25303-034030**	**25303-034630**
	50	**25303-051030**	**25303-052130**	**25303-053030**	**25303-054030**	**25303-054630**
	100	**25303-101030**	**25303-102130**	**25303-103030**	**25303-104030**	**25303-104630**
	150	**25303-151030**	**25303-152130**	**25303-153030**	**25303-154030**	**25303-154630**
5.0	30	**25305-031030**	**25305-032130**	**25305-033030**	**25305-034030**	**25305-034630**
	50	**25305-051030**	**25305-052130**	**25305-053030**	**25305-054030**	**25305-054630**
	100	**25305-101030**	**25305-102130**	**25305-103030**	**25305-104030**	**25305-104630**
	150	**25305-151030**	**25305-152130**	**25305-153030**	**25305-154030**	**25305-154630**
	250	**25305-251030**	**25305-252130**	**25305-253030**	**25305-254030**	**25305-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD aQ Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25303-011001**	**25303-012101**	**25303-013001**	**25303-014001**	4 Pack
5.0	10	**25305-011001**	**25305-012101**	**25305-013001**	**25305-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD aQ columns provide enhanced retention and resolution of polar analytes.

Hypersil GOLD aQ Preparative HPLC Columns

Particle Size (µm)	Length (mm)	10mm ID	21mm ID	30mm ID	50mm ID
5.0	50	**25305-059070**	**25305-059270**	**25305-059370**	**25305-059570**
	100	**25305-109070**	**25305-109270**	**25305-109370**	**25305-109570**
	150	**25305-159070**	**25305-159270**	**25305-159370**	**25305-159570**
	250	**25305-259070**	**25305-259270**	**25305-259370**	**25305-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information.
Stainless steel internal reducing unions to connect 30 to 50mm ID preparative columns to 1/16in tubing are available.

Hypersil GOLD aQ Preparative Guard Cartridge Systems

Particle Size (µm)	10 x 10mm	20 x 20mm	Quantity
5.0	**25305-019023**	**25305-029223**	3 Pack
Preparative Guard Holder	**C-1000**	**F1403**	1 Each

Hypersil GOLD aQ Preparative Guard HPLC Columns

Particle Size (µm)	Length (mm)	10mm ID	21mm ID	Quantity
5.0	30	**25305-039022**	**25305-039222**	1 Each

For ordering information about 1.9µm Hypersil GOLD columns, please see the Fast LC section of the catalogue

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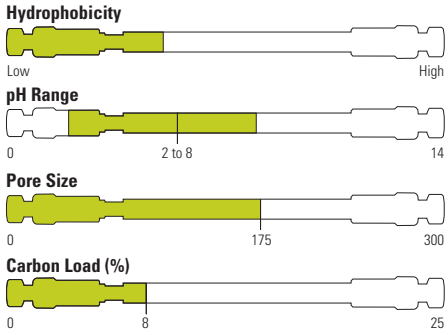
Hypersil GOLD PFP HPLC Columns

Introduction of a fluorine group into the stationary phase causes significant changes in solute-stationary phase interaction

- The fluorine atoms around the phenyl ring enhance pi-pi interactions with aromatic molecules
- Alternative selectivity to C18
- Extra retention for halogenated species
- Selectivity for non-halogenated polar compounds
- Excellent peak shape and sensitivity



Particle Size 3µm, 5µm **USP** L43

Hypersil GOLD PFP HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25403-031030**	**25403-032130**	**25403-033030**	**25403-034030**	**25403-034630**
	50	**25403-051030**	**25403-052130**	**25403-053030**	**25403-054030**	**25403-054630**
	100	**25403-101030**	**25403-102130**	**25403-103030**	**25403-104030**	**25403-104630**
	150	**25403-151030**	**25403-152130**	**25403-153030**	**25403-154030**	**25403-154630**
5.0	30	**25405-031030**	**25405-032130**	**25405-033030**	**25405-034030**	**25405-034630**
	50	**25405-051030**	**25405-052130**	**25405-053030**	**25405-054030**	**25405-054630**
	100	**25405-101030**	**25405-102130**	**25405-103030**	**25405-104030**	**25405-104630**
	150	**25405-151030**	**25405-152130**	**25405-153030**	**25405-154030**	**25405-154630**
	250	**25405-251030**	**25405-252130**	**25405-253030**	**25405-254030**	**25405-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD PFP Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25403-011001**	**25403-012101**	**25403-013001**	**25403-014001**	4 Pack
5.0	10	**25405-011001**	**25405-012101**	**25405-013001**	**25405-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

For ordering information about 1.9µm Hypersil GOLD columns, please see the Fast LC section of the catalogue

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Hypersil GOLD PFP Preparative HPLC Columns

Particle Size (µm)	Length (mm)	10mm ID	21mm ID	30mm ID	50mm ID
5.0	50	**25405-059070**	**25405-059270**	**25405-059370**	**25405-059570**
	100	**25405-109070**	**25405-109270**	**25405-109370**	**25405-109570**
	150	**25405-159070**	**25405-159270**	**25405-159370**	**25405-159570**
	250	**25405-259070**	**25405-259270**	**25405-259370**	**25405-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information.
Stainless steel internal reducing unions to connect 30 to 50mm ID preparative columns to 1/16in tubing are available.

Hypersil GOLD PFP Preparative Guard Cartridges

Particle Size (µm)	10 x 10mm	20 x 20mm	Quantity
5.0	**25405-019023**	**25405-029223**	3 Pack
Preparative Guard Holder	**C-1000**	**F1403**	1 Each

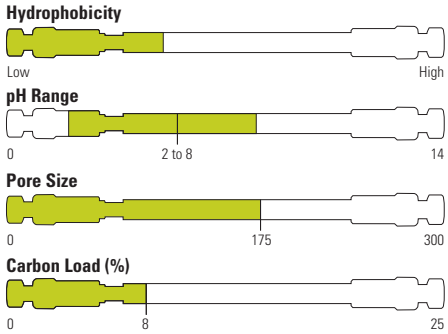
Hypersil GOLD PFP Preparative HPLC Guard Columns

Particle Size (µm)	Length (mm)	10mm ID	21mm ID	Quantity
5.0	30	**25405-039022**	**25405-039222**	1 Each

Hypersil GOLD Phenyl HPLC Columns

Contain a C4 linker which allows for superior alignment of the phenyl ring with aromatic molecules

- Enhanced pi-pi interactions with aromatics
- Moderate hydrophobicity
- Outstanding peak shape and sensitivity



Particle Size 3µm, 5µm **USP** L11

Hypersil GOLD Phenyl Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25903-031030**	**25903-032130**	**25903-033030**	**25903-034030**	**25903-034630**
	50	**25903-051030**	**25903-052130**	**25903-053030**	**25903-054030**	**25903-054630**
	100	**25903-101030**	**25903-102130**	**25903-103030**	**25903-104030**	**25903-104630**
	150	**25903-151030**	**25903-152130**	**25903-153030**	**25903-154030**	**25903-154630**
5.0	30	**25905-031030**	**25905-032130**	**25905-033030**	**25905-034030**	**25905-034630**
	50	**25905-051030**	**25905-052130**	**25905-053030**	**25905-054030**	**25905-054630**
	100	**25905-101030**	**25905-102130**	**25905-103030**	**25905-104030**	**25905-104630**
	150	**25905-151030**	**25905-152130**	**25905-153030**	**25905-154030**	**25905-154630**
	250	**25905-251030**	**25905-252130**	**25905-253030**	**25905-254030**	**25905-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

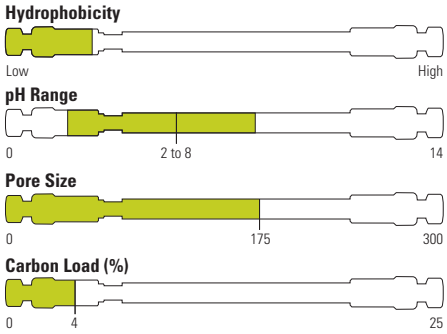
Hypersil GOLD Phenyl Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25905-011001**	**25903-012101**	**25903-013001**	**25903-014001**	4 Pack
5.0	10	**25903-011001**	**25905-012101**	**25905-013001**	**25905-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD CN HPLC Columns

Hypersil GOLD CN columns can be used for both normal phase and reversed phase separations

- Provide alternative selectivity with lower hydrophobicity
- Excellent peak shape
- Outstanding senstivity
- Less retention for faster analysis



Particle Size 3µm, 5µm **USP** L10

Hypersil GOLD CN Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25803-031030**	**25803-032130**	**25803-033030**	**25803-034030**	**25803-034630**
	50	**25803-051030**	**25803-052130**	**25803-053030**	**25803-054030**	**25803-054630**
	100	**25803-101030**	**25803-102130**	**25803-103030**	**25803-104030**	**25803-104630**
	150	**25803-151030**	**25803-152130**	**25803-153030**	**25803-154030**	**25803-154630**
5.0	30	**25805-031030**	**25805-032130**	**25805-033030**	**25805-034030**	**25805-034630**
	50	**25805-051030**	**25805-052130**	**25805-053030**	**25805-054030**	**25805-054630**
	100	**25805-101030**	**25805-102130**	**25805-103030**	**25805-104030**	**25805-104630**
	150	**25805-151030**	**25805-152130**	**25805-153030**	**25805-154030**	**25805-154630**
	250	**25805-251030**	**25805-252130**	**25805-253030**	**25805-254030**	**25805-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information. Please note that Hypersil GOLD CN columns are shipped in iso-octane:ethanol. For reversed phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil GOLD CN Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25803-011001**	**25803-012101**	**25803-013001**	**25803-014001**	4 Pack
5.0	10	**25805-011001**	**25805-012101**	**25805-013001**	**25805-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

For ordering information about 1.9µm Hypersil GOLD columns, please see the Fast LC section of the catalogue

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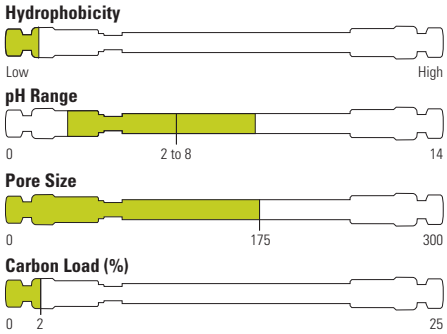
Hypersil GOLD Amino HPLC Columns

A high performance aminopropyl phase that gives excellent chromatographic properties in three modes: weak anion exchange, reversed phase and normal phase

- Retains anions and organic acids in weak anion exchange
- Excellent for carbohydrate analysis in reversed phase
- Alternative selectivity to silica columns in normal phase chromatography
- Outstanding peak shape and sensitivity



Particle Size 3µm, 5µm **USP** L8

Hypersil GOLD Amino HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25703-031030**	**25703-032130**	**25703-033030**	**25703-034030**	**25703-034630**
	50	**25703-051030**	**25703-052130**	**25703-053030**	**25703-054030**	**25703-054630**
	100	**25703-101030**	**25703-102130**	**25703-103030**	**25703-104030**	**25703-104630**
	150	**25703-151030**	**25703-152130**	**25703-153030**	**25703-154030**	**25703-154630**
5.0	30	**25705-031030**	**25705-032130**	**25705-033030**	**25705-034030**	**25705-034630**
	50	**25705-051030**	**25705-052130**	**25705-053030**	**25705-054030**	**25705-054630**
	100	**25705-101030**	**25705-102130**	**25705-103030**	**25705-104030**	**25705-104630**
	150	**25705-151030**	**25705-152130**	**25705-153030**	**25705-154030**	**25705-154630**
	250	**25705-251030**	**25705-252130**	**25705-253030**	**25705-254030**	**25705-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information. Please note that Hypersil GOLD CN columns are shipped in iso-octane:ethanol. For reversed phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil GOLD Amino Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25703-011001**	**25703-012101**	**25703-013001**	**25703-014001**	4 Pack
5.0	10	**25705-011001**	**25705-012101**	**25705-013001**	**25705-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD Amino columns have an aminopropyl ligand bonded to highly pure base deactivated silica.

For ordering information about 1.9µm Hypersil GOLD columns, please see the Fast LC section of the catalogue

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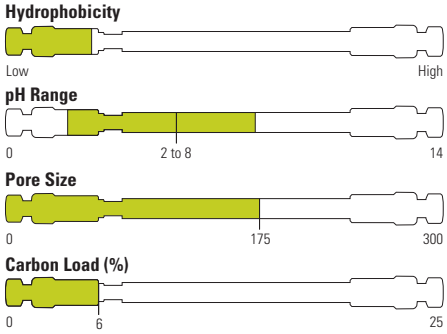
Hypersil GOLD AX HPLC Columns

A novel polymeric amine ligand bonded to highly pure base deactivated silica

- Weak anion exchange phase for multiple charged species
- Suitable for HILIC retention and separation of highly polar molecules
- Higher efficiency than polymer based ion exchange columns
- Outstanding peak shape and selectivity



Particle Size 3µm, 5µm

Hypersil GOLD AX HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**26103-031030**	**26103-032130**	**26103-033030**	**26103-034030**	**26103-034630**
	50	**26103-051030**	**26103-052130**	**26103-053030**	**26103-054030**	**26103-054630**
	100	**26103-101030**	**26103-102130**	**26103-103030**	**26103-104030**	**26103-104630**
	150	**26103-151030**	**26103-152130**	**26103-153030**	**26103-154030**	**26103-154630**
5.0	30	**26105-031030**	**26105-032130**	**26105-033030**	**26105-034030**	**26105-034630**
	50	**26105-051030**	**26105-052130**	**26105-053030**	**26105-054030**	**26105-054630**
	100	**26105-101030**	**26105-102130**	**26105-103030**	**26105-104030**	**26105-104630**
	150	**26105-151030**	**26105-152130**	**26105-153030**	**26105-154030**	**26105-154630**
	250	**26105-251030**	**26105-252130**	**26105-253030**	**26105-254030**	**26105-254630**

Hypersil GOLD AX Drop-In Guard Cartridges

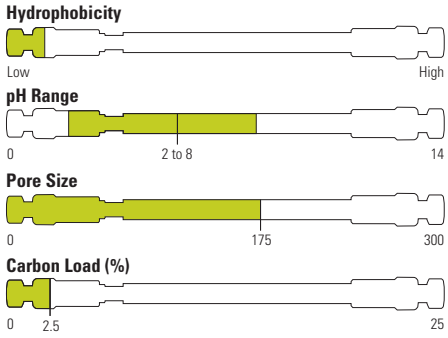
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**26103-011001**	**26103-012101**	**26103-013001**	**26103-014001**	4 Pack
5.0	10	**26105-011001**	**26105-012101**	**26105-013001**	**26105-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD AX provides separation of smaller proteins, peptides, anionic species and polar molecules.

Hypersil GOLD SAX HPLC Columns

A highly stable quaternary amine strong anion exchange column for aqueous and low pH mobile phases

- High stability to aqueous and low pH mobile phases
- Ideally suited to the analysis of smaller organic molecules including nucleotides and organic acids
- Outstanding peak shape and sensitivity



Particle Size 3µm, 5µm **USP** L14

Hypersil GOLD AX HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**26303-031030**	**26303-032130**	**26303-033030**	**26303-034030**	**26303-034630**
	50	**26303-051030**	**26303-052130**	**26303-053030**	**26303-054030**	**26303-054630**
	100	**26303-101030**	**26303-102130**	**26303-103030**	**26303-104030**	**26303-104630**
	150	**26303-151030**	**26303-152130**	**26303-153030**	**26303-154030**	**26303-154630**
5.0	30	**26305-031030**	**26305-032130**	**26305-033030**	**26305-034030**	**26305-034630**
	50	**26305-051030**	**26305-052130**	**26305-053030**	**26305-054030**	**26305-054630**
	100	**26305-101030**	**26305-102130**	**26305-103030**	**26305-104030**	**26305-104630**
	150	**26305-151030**	**26305-152130**	**26305-153030**	**26305-154030**	**26305-154630**
	250	**26305-251030**	**26305-252130**	**26305-253030**	**26305-254030**	**26305-254630**

Hypersil GOLD AX Drop-In Guard Cartridges

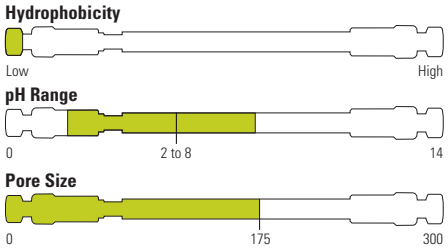
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**26303-011001**	**26303-012101**	**26303-013001**	**26303-014001**	4 Pack
5.0	10	**26305-011001**	**26305-012101**	**26305-013001**	**26305-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD SAX columns have a quarternary amine ion exchange ligand bonded to highly pure silica.

Hypersil GOLD Silica HPLC Columns

Unbonded, highly pure base deactivated silica media that is the backbone of the Hypersil GOLD range of columns

- Highly pure base deactivated silica media
- Outstanding peak shape and senstivity



Particle Size 3µm, 5µm **USP** L3

Hypersil GOLD Silica HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**25103-031030**	**25103-032130**	**25103-033030**	**25103-034030**	**25103-034630**
	50	**25103-051030**	**25103-052130**	**25103-053030**	**25103-054030**	**25103-054630**
	100	**25103-101030**	**25103-102130**	**25103-103030**	**25103-104030**	**25103-104630**
	150	**25103-151030**	**25103-152130**	**25103-153030**	**25103-154030**	**25103-154630**
5.0	30	**25105-031030**	**25105-032130**	**25105-033030**	**25105-034030**	**25105-034630**
	50	**25105-051030**	**25105-052130**	**25105-053030**	**25105-054030**	**25105-054630**
	100	**25105-101030**	**25105-102130**	**25105-103030**	**25105-104030**	**25105-104630**
	150	**25105-151030**	**25105-152130**	**25105-153030**	**25105-154030**	**25105-154630**
	250	**25105-251030**	**25105-252130**	**25105-253030**	**25105-254030**	**25105-254630**

Hypersil GOLD Silica Drop-In Guard Cartridges

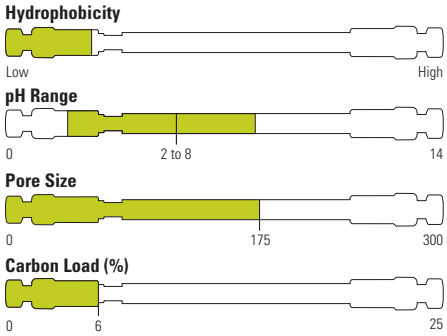
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**25103-011001**	**25103-012101**	**25103-013001**	**25103-014001**	4 Pack
5.0	10	**25105-011001**	**25105-012101**	**25105-013001**	**25105-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD Silica columns are a powerful and efficient tool for the chromatography of nonpolar and moderately polar organic compounds by normal phase chromatography.

Hypersil GOLD HILIC HPLC Columns

Hypersil GOLD HILIC retains and separates polar analytes that are problematic using reversed phase columns

- Alternative selectivity to C18
- Improved sensitivity for MS detection
- Alternative to ion-pair or derivatisation
- Outstanding peak shape and selectivity



Particle Size 3µm, 5µm

Hypersil GOLD HILIC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
3.0	30	**26503-031030**	**26503-032130**	**26503-033030**	**26503-034030**	**26503-034630**
	50	**26503-051030**	**26503-052130**	**26503-053030**	**26503-054030**	**26503-054630**
	100	**26503-101030**	**26503-102130**	**26503-103030**	**26503-104030**	**26503-104630**
	150	**26503-151030**	**26503-152130**	**26503-153030**	**26503-154030**	**26503-154630**
5.0	30	**26505-031030**	**26505-032130**	**26505-033030**	**26505-034030**	**26505-034630**
	50	**26505-051030**	**26505-052130**	**26505-053030**	**26505-054030**	**26505-054630**
	100	**26505-101030**	**26505-102130**	**26505-103030**	**26505-104030**	**26505-104630**
	150	**26505-151030**	**26505-152130**	**26505-153030**	**26505-154030**	**26505-154630**
	250	**26505-251030**	**26505-252130**	**26505-253030**	**26505-254030**	**26505-254630**

Hypersil GOLD HILIC Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
3.0	10	**26503-011001**	**26503-012101**	**26503-013001**	**26503-014001**	4 pack
5.0	10	**26505-011001**	**26505-012101**	**26505-013001**	**26505-014001**	4 pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Notes

Thermo Scientific Acclaim HPLC Columns

Optimal selectivity through innovative chemistry

- Ultrapure, porous, spherical silica
- Novel and proprietary surface chemistries for diversified selectivities
- High efficiencies with symmetrical peak shapes
- Low silanol activity for good basic analyte peak shapes
- Reliable manufacturing process with thorough testing for reproducibility
- LC/MS compatible

Acclaim columns are based on high-purity, porous silica particles, with advanced and innovative column bonding technologies. This provides complementary selectivity, high column efficiencies, and symmetrical peaks. Acclaim columns meet the high standards set by modern HPLC and LC/MS methods and are used in such applications as pharmaceutical, environmental, food and beverage, chemical, and consumer products. General reversed-phase, HILIC phases and Specialty phases are available.

Reliability and Durability

Quality and reliability are essential to a successful analysis. The Acclaim columns are thoroughly tested individually, so that chromatographers can have full confidence in them. Manufacturing starts with an ultrapure silica substrate, using only carefully selected lots with narrow ranges of physical parameters. By design, the bonding processes are clean and repeatable with no unexpected changes in performance. Each batch of bonded silica receives a full suite of validation tests appropriate to its intended use. The bonded silica is packed in precision-polished 316 stainless steel hardware using highly reliable processes. Each packed column is tested to ensure the same great performance every time.

The quality assurance reports for silica lot validation and column performance explain the test protocols, list the specifications, and show the actual chromatograms.

Performance Indicators

Acclaim columns have been designed to meet the high quality standard needed in laboratories today. The innovative surface chemistries deliver exceptional peak efficiencies for a broad range of analytes. To ensure optimal performance, all Acclaim products are thoroughly characterized using a number of performance indicators, including surface coverage of the bonded phase, metal contamination, steric selectivity, column polarity, column hydrophobicity, and low silanol activity for bases. The specialty columns are also application-tested for their specific analysis, to ensure that each lot of bonded silica provides high-performance separations.

Reversed-phase Columns

Acclaim 120 C18: High-density, monolayer C18 reversed-phase columns for exceptional resolution in a variety of applications.

Acclaim 120 C8: High-density monolayer C8 reversed-phase column.

Acclaim Phenyl-1: A unique reversed-phase column for the superior separation of aromatic compounds with enhanced hydrolytic stability.

Acclaim C30: Designed to provide high shape selectivity for separation of hydrophobic structurally related isomers.

Acclaim PolarAdvantage: Sulfonamide-embedded column for separating a wide variety of analytes.

Acclaim PolarAdvantage II: Amide-embedded reversed-phase columns with enhanced hydrolytic stability.

Hydrophilic Interaction Columns

Acclaim HILIC-10: Designed for separating hydrophilic compounds

Mixed-Mode Columns

Mixed-mode columns provide a unique, adjustable selectivity tool, using variation in pH, ionic strength, or organic modifier to influence the separation selectivity of acids, bases, zwitterions and neutral molecules.

Acclaim Mixed-Mode WAX-1: High-density monolayer that incorporates both reversed-phase and weak anion exchange properties.

Acclaim Mixed-Mode WCX-1: Reversed-phase and cation exchange combined in a single column.

Acclaim Mixed-Mode HILIC-1: Combines both reversed-phase and hydrophilic interaction liquid chromatography (HILIC) properties.

Acclaim Rapid Separation LC (RSLC) 2.2µm and 3.0µm columns of various surface chemistries for high-throughput, high-resolution analysis with reduced solvent consumption

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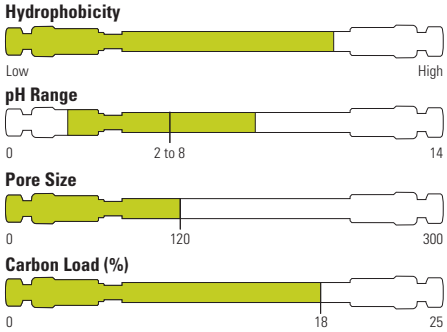
Acclaim 120 C18 HPLC Columns

High performance reversed-phase columns for reproducible results

- Low silanol activity for excellent peak shapes for basic analytes
- High hydrophobic retention
- Excellent efficiencies for maximum resolution
- Reproducible manufacturing practices for reproducible column-to-column performance
- Extremely low bleed, fully compatible with MS



Particle Size 3.0, 5.0µm **USP** L1

The Acclaim 120 columns are for high resolution reversed-phase separations. The very high surface coverage and very low metal content together result in columns with excellent efficiencies. These columns provide exceptional performance for a variety of applications in the pharmaceutical, chemical, environmental, and food separations areas.

Acclaim 120 C18 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	33	–	**066272**	–
	50	**059128**	**068971**	**059131**
	75	–	**066273**	–
	100	**059129**	**076186**	**059132**
	150	**059130**	**063691**	**059133**
	250	**076187**	**070077**	–
5.0	50	**059142**	–	**059146**
	100	**059143**	–	**059147**
	150	**059144**	–	**059148**
	250	**059145**	–	**059149**

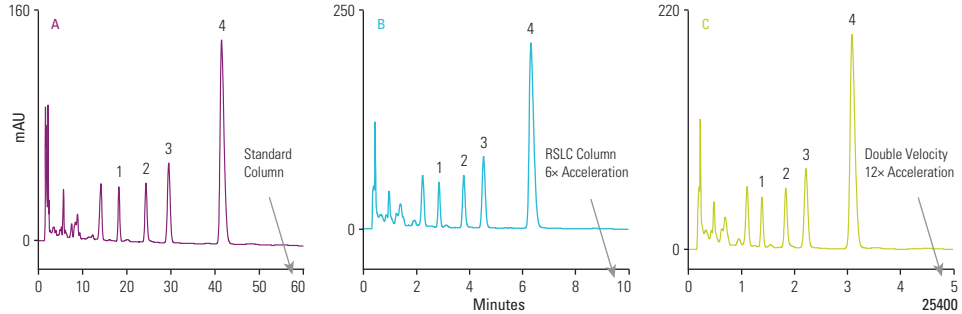
Rapid Separation 2.2µm columns are available, see Fast LC section.

Acclaim 120 C18 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069689**	**071981**	**069695**

Acclaim 120 C18 HPLC Guard Holder

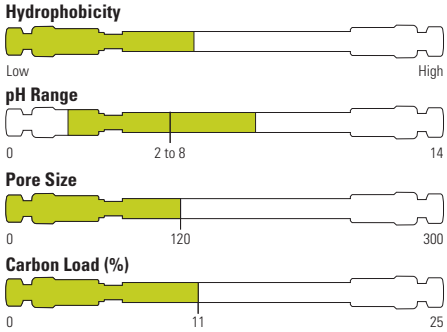
Description	Cat. No.
Acclaim SST Guard Cartridge Holder V-2	**069580**
Acclaim Guard Kit (Holder and coupler) V-2	**069707**
Guard to Analytical Column Coupler V-2	**074188**



Column:	**A: Acclaim 120 C18, 5µm, 4.6 × 150mm** **B, C: Acclaim RSLC C18, 2µm, 2.1 × 50mm**
Mobile Phase:	200mM HOAc in 10% (v/v) MeOH
Flow:	A: 1.00mL/min B: 0.41mL/min C: 0.82mL/min
Temperature:	20°C
Injection:	A: 10µL B: 1.2µL C: 1.2µL
Detector:	UV, 254 nm, A: 1 Hz data rate B: 5 Hz data rate C: 10 Hz data rate
Peaks:	1. p-Hydroxybenzoic acid 2. p-Hydroxybenzaldehyde 3. Vanillic acid 4. Vanillin
Sample:	Commercial vanilla extract in 40% ethanol, filtered
Reference:	AOAC Official Method 990.25

Acclaim 120 C8 HPLC Columns

High performance reversed-phase columns for with intermediate hydrophobic retention



Particle Size 3.0, 5.0µm **USP** L7

- Low silanol activity for excellent peak shapes for basic analytes
- Excellent column efficiencies
- LC/MS compatible
- Reproducible manufacturing practices for reproducible column-to-column performance

Acclaim 120 C8 reversed-phase columns feature a densely bonded monolayer C8 ligands on a pure, spherical porous silica substrate. The columns are a well-characterized line of LC/MS compatible C8 phases with very high surface coverage and extremely low silanol activity. These columns provide exceptional performance for a variety of applications in the pharmaceutical, environmental, food and many other industrial sectors.

Acclaim 120 C8 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	50	**59122**	–	**59125**
	100	**59123**	**076184**	**59126**
	150	**59124**	**68970**	**59127**
	250	**076185**	**70078**	–
5.0	50	**59134**	–	**59138**
	100	**59135**	–	**59139**
	150	**59136**	–	**59140**
	250	**59137**	–	**59141**

Acclaim 120 C8 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069688**	**071979**	**069696**

Acclaim 120 C8 HPLC Guard Holder

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

For ordering information about 2.2µm Acclaim C8 columns, please see the Fast LC section of the catalogue

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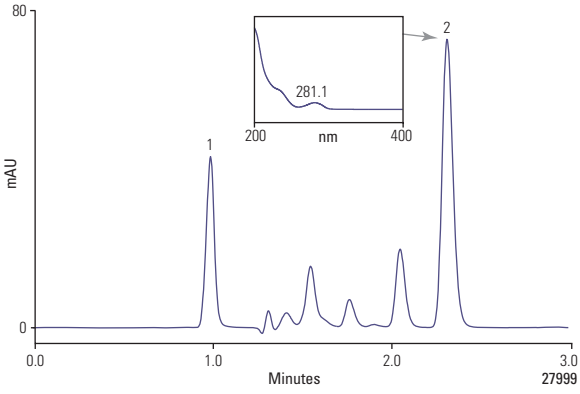
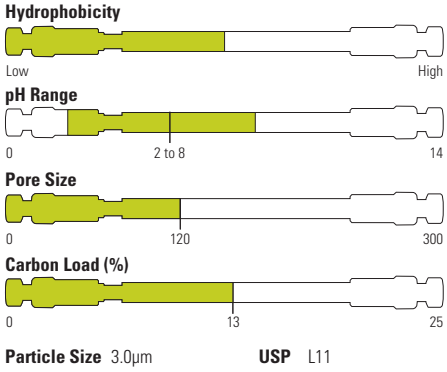
Triclosan in Toothpaste



Column:	Acclaim RSLC C8, 2.2µm
Dimension:	2.1 × 100mm
HPLC System:	UltiMate 3000 RSLC
Buffer:	2mM Ammonium acetate pH 5
Mobile Phase:	Isocratic, 15% buffer, 85% methanol (v/v)
Flow Rate:	0.200mL/min
Inj. Volume:	1.0µL
Temperature:	50°C
Detection:	Diode array detector, 281nm, 10Hz, 0.1 s resp. time and spectra 200–400 nm
Samples:	Toothpaste containing 0.3% triclosan
Preparation:	1.0g Toothpaste + 1.0mL of 7.5mg/mL magnesium sulfate + methanol to make 25mL. Sonicate and filter.
Peaks:	1. Saccharin 2. Triclosan

Acclaim Phenyl-1 HPLC Columns

A unique reversed-phase column with high aromatic selectivity



Particle Size 3.0µm **USP** L11

- High aromatic selectivity
- High hydrophobic retention
- Unique and complementary selectivity compared to any other phenyl type column
- Compatibility with highly aqueous mobile phase
- High efficiency and rugged packing

Acclaim Phenyl-1 columns provide unique selectivity of aromatic compounds for superior chromatographic performance.

This column has higher π-π interaction than other phenyl phases.

The Acclaim Phenyl-1 column can be used in a wide range of application in pharmaceutical, environmental, food testing and product-quality testing. This column is ideally suited for the analysis of aromatic analytes some examples include glucocorticosteroids, estrogens, fat-soluble vitamins and phospholipids.

Acclaim Phenyl-1 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	50	**078016**	**071972**	**078018**
	100	**078015**	**074693**	**078017**
	150	**071971**	**071970**	**071969**
	250	**078014**	**074694**	–

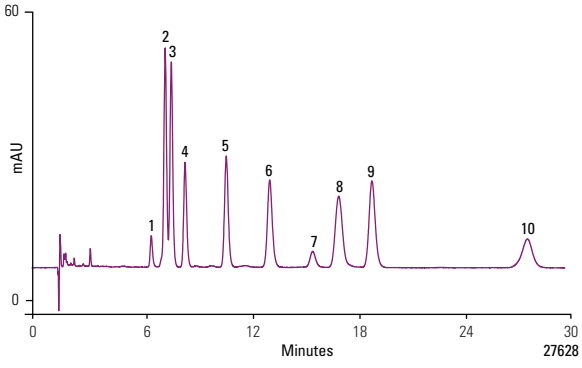
Acclaim Phenyl-1 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	10	**071975**	**071974**	**071973**

Acclaim Phenyl-1 HPLC Guard Holder

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

Separation of fat-soluble vitamins

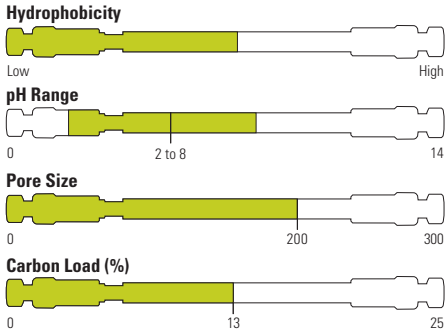


Column: Acclaim Phenyl-1, 3µm

Dimension:	3.0 × 150mm
Mobile Phase:	Methanol/water v/v 90/10
Temperature:	30°C
Flow Rate:	0.5mL/min
Inj. Volume:	2µL
Detection:	UV at 220nm
Peaks:	(100 ppm each) 1. Retinol acetate (vitamin A acetate) 2. Vitamin D2 3. Vitamin D3 4. -Tocopherol 5. -Tocopherol 6. -Tocopherol (vitamin E) 7. Impurity (unknown) 8. Vitamin E acetate 9. Vitamin K2 10. Vitamin K1

Acclaim C30 HPLC Columns

Columns for separating structurally related isomers



Particle Size 3.0, 5.0µm **USP** L62

- High shape selectivity
- Unique selectivity complementary to other reversed-phase columns
- Compatibility with highly aqueous mobile phase
- High-quality columns – low column bleed, high efficiency and rugged packing

The Acclaim C30 is designed to provide high shape selectivity for separating hydrophobic structural related isomers and unique selectivity complementary to other reversed-phase columns (e.g. C18).

Acclaim C30 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	150	**075725**	**075724**	**075723**
	250	–	**075726**	–
5.0	150	–	–	**075719**
	250	–	–	**075718**

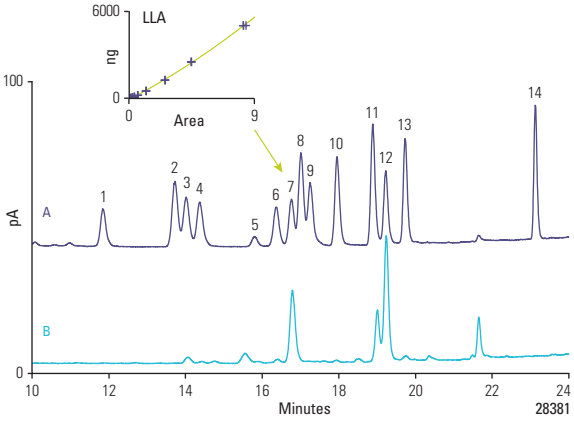
Acclaim C30 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	10	**075722**	**075721**	**075720**

Acclaim C30 HPLC Guard Holder

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

Separation of Omega fatty acids



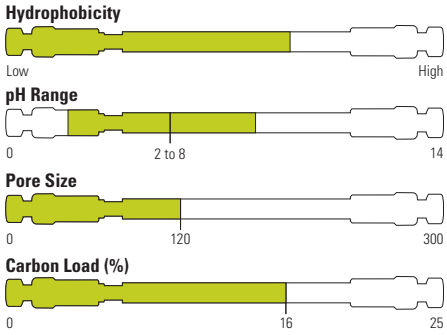
Column: Acclaim C30, 5µm (4.6 × 150mm)

LC System:	UltiMate 3000 RS, Dual Gradient
Mobile Phases:	A. Water:formic acid:mobile phase B 900:3.6:100 (v/v) B. Acetone:acetonitrile:THF:formic acid 675:225:100:4(v/v)
Gradient:	Time (min) %A %B 0 100 0 1 40 60 13 30 70 22 5 95 24 5 95 29 100 0 32 100 0
Flow Rate:	1.00mL/min
Temperature:	30°C
Inj. Volume:	2µL
Detection:	Corona ultra, nebulizer 15°C, filter high
Samples:	A. Standards in isopropanol B. Saponified chicken fat
Peaks:	1. SDA 2. EPA 3. ALA 4. GLA 5. DHA 6. Arach. 7. LLA

Acclaim PolarAdvantage HPLC Columns

Novel polar-embedded reversed-phase columns with unique selectivity

- Selectivity complementary to the C18 column
- Low silanol activity for excellent peak shape with basic compounds
- Compatible with 100% aqueous mobile phase
- High selectivity for hydrophobic aromatic molecules
- Wide range of applications



Particle Size 3.0, 5.0µm **USP** L1

Acclaim Polar Advantage (PA) HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	33	–	**066274**	
	50	**063174**	**068972**	–
	75	–	**066275**	–
	100	**061316**	**076214**	**076216**
	150	**061317**	**063693**	**061318**
	250	**076215**	**070079**	–
5.0	50	–	–	**061319**
	150	–	–	**061320**
	250	–	–	**061321**

Rapid Separation 2.2µm columns are available, see Fast LC section.

Acclaim Polar Advantage (PA) HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069691**	**071983**	**069698**

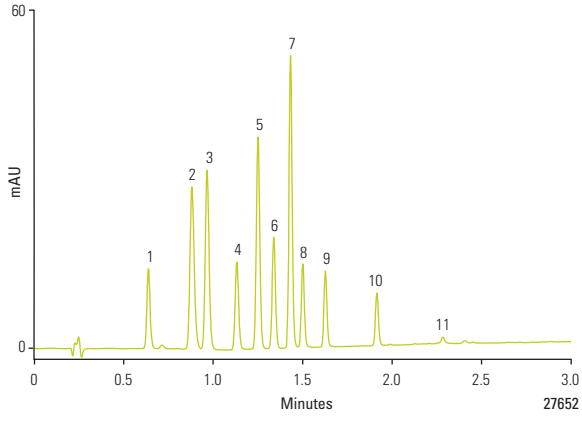
Acclaim Polar Advantage (PA) HPLC Guard Holder

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

Acclaim Polar Advantage (PA) columns feature a patented bonding column chemistry that incorporates a polar sulfonamide group with an ether linkage near the silica surface. This unique chemistry provides low silanol activity, compatibility with 100% aqueous mobile phase. The Acclaim PA column offers great separation power to resolve a wide variety of polar and nonpolar analytes and supports LC/MS analysis.

Acclaim PA columns provide unique selectivity, good peak shape for acidic, basic, and neutral analytes, and full compatibility with 100% aqueous conditions. Applications include pharmaceutical, environmental, life science, food testing, and product-quality testing.

EPA 604 Phenols Separated Using the Acclaim RSLC PolarAdvantage Column



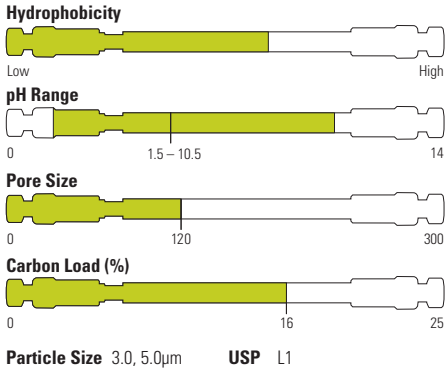
Column: Acclaim® RSLC PolarAdvantage, 2.2µm

Dimensions:	3.0 × 50mm
System:	UltiMate® 3000 RSLC
Mobile Phases:	A: 10mM formic acid + 10mM ammonium formate, pH 3.75 ± 0.05 B: Acetonitrile
Gradient Time (min):	-1.5 0.0 0.3 2.6 3.0 %A 70 70 70 10 10 %B 30 30 30 90 90
Flow Rate:	1.25mL/min
Temperature:	30°C
Injection Volume:	0.5µL
Detection:	UV at 280nm, 10Hz, 0.5s resp. time
Sample:	Calibration mix, 50µg/mL in water
Peaks:	1. Phenol 2. 2,4-Dinitrophenol 3. 4-Nitrophenol 4. 2-Chlorophenol 5. 2-Nitrophenol 6. 2,4-Dimethylphenol 7. 4,6-Dinitro-2-methylphenol 8. 4-Chloro-3-methylphenol 9. 2,4-Dichlorophenol 10. 2,4,6-Trichlorophenol 11. Pentachlorophenol

Acclaim PolarAdvantage II HPLC Columns

Complementary selectivity and enhanced hydrolytic stability

- Novel polar-embedded column chemistry
- Unique selectivity complementary to the C18 column
- Compatible with 100% aqueous mobile phase
- Low bleed for MS compatibility
- Wide range of applications



Particle Size 3.0, 5.0µm **USP** L1

Acclaim Polar Advantage II (PA2) columns feature a patented surface chemistry that incorporates amide-embedded polar group and multi-point attachment between the ligands and the silica surface. This unique chemistry provides enhanced hydrolytic stability from pH 1.5-10 with 100% aqueous mobile phases and exhibits high reversed-phase capacity, with selectivity complementary to conventional C18 columns.

The Acclaim PA2 column is specifically designed to withstand high pH conditions, making it a good choice for the separation of both basic and acidic analytes.

Acclaim Polar Advantage II (PA2) HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	33	–	**066276**	–
	50	**077999**	**068973**	**063189**
	75	–	**066277**	–
	100	**077998**	**078000**	**078001**
	150	**063187**	**063705**	**063191**
	250	**077997**	**070080**	–
5.0	150	–	–	**063197**
	250	–	–	**063199**

Acclaim Polar Advantage II (PA2) HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069692**	**071985**	**069699**

Acclaim Polar Advantage II (PA2) HPLC Guard Holder

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

For ordering information about 2.2µm Acclaim PA2 columns, please see the Fast LC section of the catalogue

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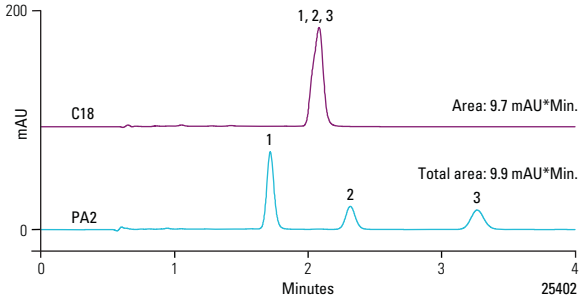
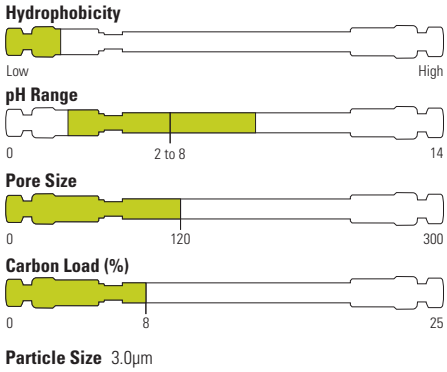
The Acclaim PA2 column provides greater selectivity in this separation of turmeric



Columns:	**Acclaim RSLC 120 C18** **Acclaim RSLC PA2**
Dimensions:	2µm, 2.1 × 100mm
Mobile Phase:	A: 15mM H_3PO_4 B: Methanol
Isocratic:	C18: 70% B (v/v) PA2: 80% B (v/v)
Flow:	0.41mL/min
Temperature:	30°C
Detector:	UV, 428nm
Sample:	Turmeric extract
Peaks:	1. Curcumin 2. Demethoxycurcumin 3. Bis-demethoxycurcumin

Acclaim HILIC-10 HPLC Columns

Designed for unique selectivity for hydrophobic molecules



Particle Size 3.0µm

- Retains highly polar molecules that are not retained by reversed-phase chromatography
- Unique selectivity, complementary to reversed-phase columns
- Hydrolytically stable
- Rugged column packing
- Broad application range

The Acclaim HILIC-10 column is designed for separating highly hydrophilic molecules by Hydrophilic Interaction Liquid Chromatography (HILIC). This column is based on high-purity spherical porous silica covalently modified with a proprietary hydrophilic layer.

The advantage of the Acclaim HILIC-10 phase is its compatibility with up to 20% aqueous mobile phase, while maintaining affinity for polar analytes.

Acclaim HILIC-10 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	150	**074259**	**074258**	**074257**

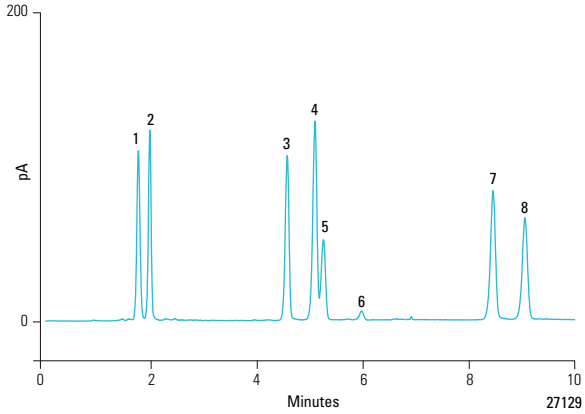
Acclaim HILIC-10 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	10	**074263**	**074261**	**074262**

Acclaim HILIC-10 HPLC Guard Holder

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

Class Separation of Glycerides



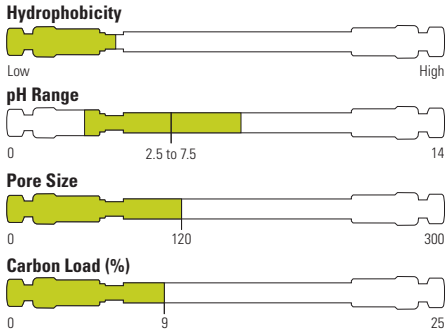
Column: Acclaim HILIC-10, 3µm

Dimensions:	3.0 × 150mm
Mobile Phase:	A: Heptane B: 2-Propanol/acetic acid 99.5:0.5
Step Elution (min):	–6.0 0.0 0.5 4.0 10.0 %A 99 99 96 87 87 %B 1 1 4 13 13
Flow Rate:	0.50mL/min
Temperature:	25°C
Inj. Volume:	4µL
Detector:	Corona ultra, nebulizer 15°C
Peaks:	1. Tristearin 2. Trilaurin 3. Distearin isomer 1 4. Dilaurin isomer 1 5. Distearin isomer 2 6. Dilaurin isomer 2 7. Monostearin 8. Monolaurin

Acclaim Mixed-Mode HILIC-1 HPLC Columns

Uniquely designed for both reversed-phase and HILIC operations

- Can operate in both RP and HILIC modes
- Retains highly polar molecules
- Unique selectivity complementary to RP columns
- Broader application range compared to conventional diol-based columns
- High-efficiency column for high-resolution separations



Particle Size 3.0, 5.0µm

Acclaim Mixed-Mode HILIC-1 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	50	–	**071912**	–
	150	**070091**	**070090**	–
5.0	150	**066847**	–	**066843**
	250	–	–	**066844**

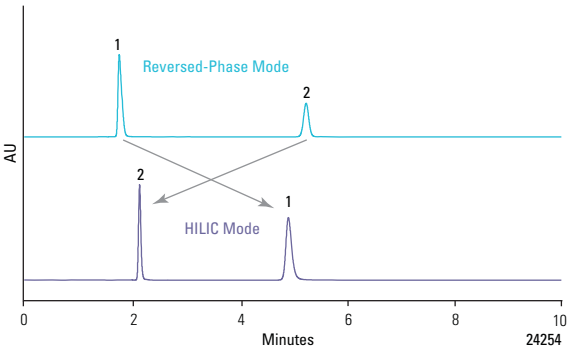
Acclaim Mixed-Mode HILIC-1 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069694**	**071913**	**069706**

Acclaim Mixed-Mode HILIC-1 HPLC Guard Holder

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

All the advantages of reversed-phase and HILIC compatibilities in one column



Column: Acclaim Mixed-Mode HILIC-1, 5µm

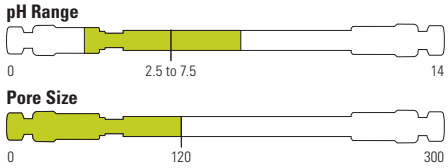
Dimensions:	4.6 × 150mm
Mobile Phase:	CH_3CN/0.1 M NH_4OAc, pH 5.2 v/v 52/48 for RP mode v/v 92/8 for HILIC mode
Temperature:	30°C
Flow Rate:	1mL/min
Inj. Volume:	10µL
Detection:	UV at 254nm
Peaks:	1. Cytosine (100 ppm) 2. Naphthalene (100 ppm)

The Acclaim Mixed-Mode HILIC-1 column features a unique, high-efficiency, silica-based HPLC mixed-mode stationary phase that combines both reversed-phase (RP) and hydrophilic interaction liquid chromatography (HILIC) properties. This combination allows both hydrophobic interaction and hydrophilic interaction to be utilized to optimize separations.

The Acclaim Mixed-Mode HILIC-1 stationary phase consists of a hydrophobic alkyl chain with a diol group at the terminus. The hydrophobic moiety provides reversed-phase retention and the terminal diol group facilitates hydrophilic interactions. This unique combination results in the adjustable selectivity, making Acclaim Mixed-Mode HILIC-1 separate mixtures that would be impossible for a C18 column. This column is suitable for a broad range of applications, including nonionic ethoxylated surfactants, drug metabolites, lipids, polyethylene glycols (PEGs), ethoxylated surfactants, and more.

Acclaim Mixed-Mode WAX-1 HPLC Columns

Designed for separating anionic molecules; with powerful adjustable selectivity control



Particle Size 3.0, 5.0µm

- Adjustable selectivity
- Selectivity orthogonal to reversed-phase (RP) columns
- Ideal selectivity for anionic molecules
- Excellent column efficiency and peak asymmetry
- Multimode retention mechanisms: reversed-phase, weak anion exchange, cation-exclusion, and HILIC modes

The Acclaim Mixed-Mode WAX-1 is a novel, high-efficiency silica HPLC column that combines hydrophobic and weak anion exchange characteristics. Its unique chemistry results in a multimode separation mechanism that includes reversed-phase, anion exchange, cation-exclusion, and HILIC interactions. Selectivity can be adjusted by changing ionic strength, pH, or organic solvent content.

The Acclaim Mixed-Mode WAX-1 surface consists of a hydrophobic alkyl chain with a tertiary amine group at the terminus. The hydrophobic moiety provides reversed-phase retention and the terminal amino group facilitates electro-static interactions.

Acclaim Mixed-Mode WAX-1 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	50	–	**071908**	–
	150	**070089**	**070088**	
5.0	150	**067084**	–	**064984**
	250	–	–	**064985**

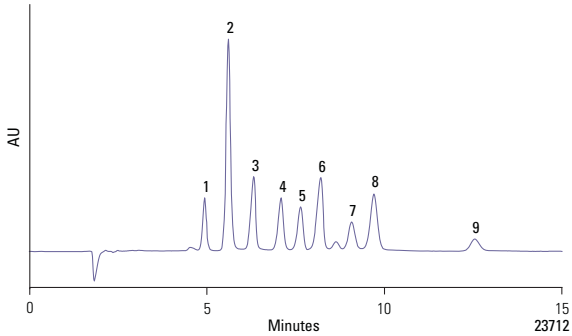
Acclaim Mixed-Mode WAX-1 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069686**	**071909**	**069704**

Acclaim Mixed-Mode WAX-1 HPLC Guard Holder

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

Separation of monocarboxylic acids

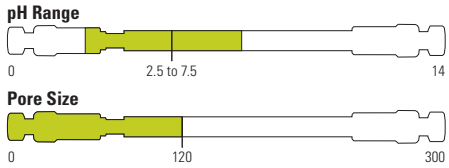


Column: Acclaim Mixed-Mode WAX-1, 5µm

Dimensions:	4.6 × 150mm
Mobile Phase:	25mM phosphate buffer, pH 6
Temperature:	30°C
Flow Rate:	0.8mL/min
Inj. Volume:	10µL
Detection:	UV, 210nm
Peaks:	1. Quinic acid 2. Shikimic acid 3. Glycolic acid 4. Lactic acid 5. Acetic acid 6. Formic acid 7. Ascorbic acid (Vitamin C) 8. Iso-ascorbic acid 9. Propionic acid

Acclaim Mixed-Mode WCX-1 HPLC Columns

Designed for separating cationic molecules with adjustable selectivity control



Particle Size 3.0, 5.0µm

- Adjustable selectivity
- Ideal selectivity for separating basic molecules
- Selectivity complementary to C18 RP columns
- Multimode separation mechanism: reversed-phase, weak cation exchange, anion-exclusion and HILIC

Acclaim Mixed-Mode WCX-1 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	50	–	**071910**	–
	150	**070093**	**070092**	–
5.0	150	**068371**	–	**068353**
	250	–	–	**068352**

Acclaim Mixed-Mode WCX-1 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	–	**071911**	**069705**

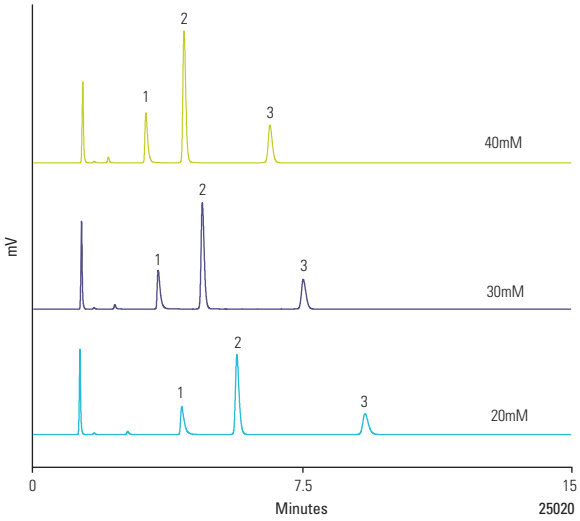
Acclaim Mixed-Mode WCX-1 HPLC Guard Holder

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

The Acclaim Mixed-Mode WCX-1 is a novel, high-efficiency, silica-based column, manufactured by bonding a specially designed proprietary ligand with both hydrophobic and weak cation exchange properties. Selectivity of ionizable and neutral compounds can be controlled independently or simultaneously by tuning mobile phase ionic strength, pH or organic modifier. This column therefore can separate using multiple separation modes: reversed-phase, cation exchange, and normal-phase/ HILIC.

Basic compounds are important in a variety of industrial applications, including pharmaceutical, chemical, consumer products, foods and beverages, and more. The Acclaim Mixed-Mode WCX-1 not only retains basic molecules (from highly hydrophilic to highly hydrophobic), but also separates them with symmetrical peak shapes and excellent efficiency.

Simultaneous separation of pharmaceutical counterions

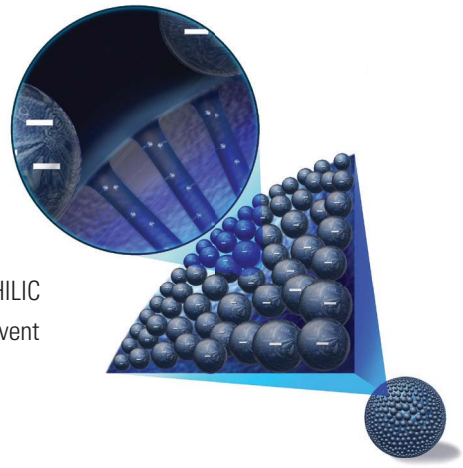


Column: Acclaim Mixed-Mode WCX-1, 5.0µm
Dimension: 4.6 × 150mm

Mobile Phase:	50/50 v/v CH_3CN/NH_4OAc, pH 5.2
Temperature:	30°C
Flow Rate:	1mL/min
Inj. Volume:	5µL
Detection:	ELS detector
Peaks:	(300 ppm each) 1. $(CH_3CH_2CH_2)_4N^+$ 2. $(CH_3CH_2CH_2CH_2)_4N^+$ 3. $(CH_3CH_2CH_2CH_2CH_2)_4N^+$

Acclaim Trinity P1 HPLC Columns

Most innovative advancement in mixed mode column technology:
reverse-phase, anion- and cation exchange functionality on a single support



- Multiple retention mechanisms: anion exchange, cation exchange, reversed-phase, and HILIC
- Adjustable selectivity by mobile phase ionic strength, electrolyte type, pH, and organic solvent
- Ideal selectivity for simultaneous separation of API and counteriion
- Low bleed and MS compatible
- Selectivity orthogonal to reversed-phase columns
- Retention of ionic and ionizable analytes without ion-pairing reagents
- Greater flexibility in method development: each retention mechanisms can be controlled independently

Acclaim Trinity HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID
3.0	50	**075565**	**071388**
	100	**071389**	**071387**
	150	**075564**	**075563**

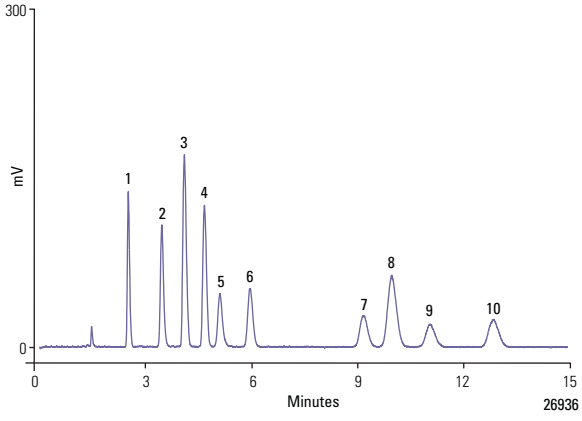
Acclaim Trinity HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID
3.0	10	**071391**	**071390**

Acclaim Trinity HPLC Guard Holder

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

Simultaneous separation of pharmaceutical counterions



Column: Acclaim Trinity P1, 3µm

Dimensions:	3.0 × 100mm
Mobile Phase:	60/40 v/v CH_3CN/20mM (total) NH_4OAc, pH 5
Temperature:	30°C
Flow Rate:	0.5mL/min
Inj. Volume:	2µL
Detection:	Corona ultra (Gain = 100 pA; Filter = med; Neb Temp = 30°C)

Peaks: (50 to 100ppm)

1. Choline
2. Tromethamine
3. Sodium
4. Potassium
5. Meglumine
6. Mesylate
7. Nitrate
8. Chloride
9. Bromide
10. Iodide

The Acclaim Trinity P1 HPLC column is designed with unique multimode surface chemistry ideal for the simultaneous separation of drugs and their counterions. The surface chemistry concurrently provides reversed-phase, cation exchange, and anion exchange functionalities. The result is maximum flexibility in method development. Separations can be optimized easily by adjusting the chromatographic parameters (mobile phase pH, ionic strength, and organic strength).

The Acclaim Trinity P1 stationary phase, based on this Nanopolymer Silica Hybrid (NSH) technology, consists of high-purity porous, spherical 3µm silica particles, coated with charged nanopolymer beads. The unique surface chemistry includes an inner-pore area modified with an organic layer that provides both reversed phase and anion exchange properties. The outer-pore surface, conversely, is modified with cation exchange functionality.

Separates Drugs and Counterions

The Acclaim Trinity P1 retains both cations and anions at the same time. Acclaim Trinity P1 can baseline separate both ions and the drug. The adjustable selectivity also allows for separation optimization with increased resolution. This can result in faster separations and higher throughput.

Dionex OmniPac HPLC Columns

DBV polymer columns for combined ion exchange and reversed-phase separations

- Acid-, base-, and solvent-compatible, pH 0 to 14
- Ideal for the separation of high-molecular-weight organic acids
- Delivers optimal separation of very hydrophobic anions
- Delivers optimal separation of halogenated anions
- Provides simultaneous separation of neutral and ionic species
- Unique selectivity for polar and ionic organic analytes
- Delivers optimal separation of organic, hydrophobic, and halogenated cations

The Thermo Scientific Dionex OmniPac™ PAX-100 column is used to separate hydrophobic anionic analytes such as larger organic acids. The Dionex OmniPac PAX-500 column simultaneously separates anionic and neutral species. The Dionex OmniPac PCX-100 column separates low-molecular-weight hydrophobic cations. The Dionex OmniPac PCX-500 column simultaneously separates cationic and neutral species in a single run.

The Dionex OmniPac PAX- and PCX-100 and 500 are latex-based columns. Both PAX columns have an ion exchange capacity of about 40 µeq per column, providing equivalent anion exchange separations. The PCX columns have a capacity of approximately 120 µeq per column. The PAX- and PCX-500 columns separate analytes through both ion exchange and reversed-phase mechanisms, due to their higher reversed-phase capacity relative to the PAX- and PCX-100 columns.

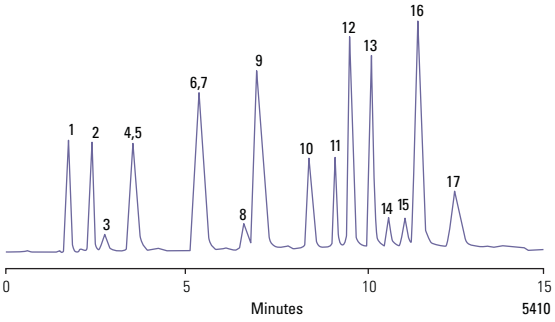
Dionex OmniPac Anion Exchange HPLC Columns

Description	Porosity	Length (mm)	4.0mm ID
PAX-500	macroporous	50	**042153**
		250	**042152**
PAX-100	microporous	50	**042151**
		250	**042150**

Dionex OmniPac Cation Exchange-HPLC Columns

Description	Porosity	Length (mm)	4.0mm ID
PCX-500	macroporous	50	**042195**
		250	**042191**
PCX-100	microporous	50	**042193**
		250	**042189**

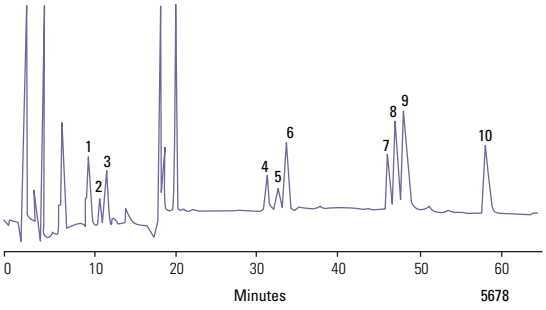
Gradient separation of N-containing compounds



Column: Dionex OmniPac PCX-500 (4 × 250mm)

Eluent: Acetonitrile/Sodium Chloride/Hydrochloric Acid Gradient	
Flow Rate:	1.0mL/min
Detection:	UV, 254nm
Peaks:	1. Orotic Acid 2. 4-Hydroxybenzamide 3. Luminol Impurity 4. Luminol 5. Pyridine 6. PABA 7. 2,2′-Bipyridine 8. p-Phenylenediamine 9. Naphthylamine 10. Nitrobenzoic Acid 11. Tribenzylamine 12. p-Nitroaniline 13. 2,4-Dinitroaniline 14. Dibenzylamine 15. N-Methyl-N-nitrosoaniline 16. 4-Chloro-2-nitroaniline 17. 2,6-Dichloro-4-nitroaniline

Gradient separation of inositol mono-, di-, tri-, and tetraphosphates



Column: Dionex OmniPac PAX-100 (4 x 250mm)

Eluent: Isopropanol / Sodium Hydroxide Gradient	
Flow Rate:	1.0mL/min
Detection:	Suppressed Conductivity (Baseline Subtracted)
Peaks:	1. Ins (2) P 2. Ins (1) P 3. Ins (4) P 4. Ins (1,4) P2 5. Ins (2,4) P2 6. Ins (4,5) P2 7. Ins (1,3,4) P3 8. Ins (1,4,5) P3 9. Ins (2,4,5) P3 10. Ins (1,4,5,6) P4

Dionex IonPac NS1 HPLC Columns

Polymeric Reversed-Phase Column Ideal for the Separation of Hydrophobic, Ionizable Compounds

- Ideal for separation of large molecules that carry localized charges, such as surfactants
- Compatible with acids, bases, and solvent from pH 0 to 14
- Can also be used for traditional polymeric reversed-phase applications
- Utilize ion-pair chromatography for difficult separations

The Thermo Scientific Dionex IonPac™ NS1-10µm and NS1-5µm columns are packed with a neutral, macroporous, high-surface-area, ethylvinylbenzene polymer crosslinked with 55% divinylbenzene. This resin makes the NS1 resistant to solvents, acids, and bases, and permits the use of eluent from pH 0 to 14. The Dionex IonPac NS1 column is the column of choice for routine ion pair chromatography.

Dionex IonPac Polymeric Reversed-Phase HPLC Columns

Description	Particle Size (µm)	Length (mm)	4.0mm ID
NS1	10.0	35	**039567**
NS1	10.0	250	**035321**
NS1	5.0	150	**039568**

Thermo Scientific Syncronis HPLC Columns

Consistent Reproducible Separations, Column after Column, Time after Time.
Extensive testing and strong quality control procedures ensure the consistency of Syncronis HPLC columns – column after column.

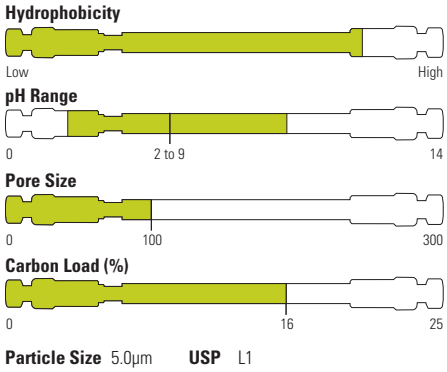
- Syncronis HPLC columns are manufactured, packed and tested in ISO9000 accredited facilities. Each lot of silica is tested for the physical properties of the silica support and only released for production if it meets the stringent test specifications.
- Syncronis columns are based on highly pure 100Å silica, with a surface area of 320m^2/g, compared to 200m^2/g for typical silica based material. This greater surface area ensures good retention of analytes having a range of hydrophobicity, away from the solvent front.
- Available in two particle sizes are: 1.7µm for rapid UHPLC separations and 5µm for the more traditional HPLC analysis.
- Syncronis reversed phase columns are densely bonded and double endcapped to minimize the number of residual silanols available to interact with basic analytes.
- Each batch of chromatographic media packed into Syncronis columns is put through a series of diagnostic chromatographic tests, based on those developed by Tanaka[1] to ensure consistent, predictable separations. These tests rigorously probe interactions between analytes and stationary phase, measuring hydrophobicity, shape selectivity and secondary interactions with bases, acids and chelators.
- New, enhanced, automated packing methods drive consistency even further and every column is individually tested to ensure that it meets the required quality.

For full details on the Syncronis column range, please request or view a copy of our Syncronis technical guide
www.thermoscientific.com/syncronis

Syncronis C18 HPLC Columns

Syncronis C18 columns deliver consistent predictable separations, column after column, time after time

- Highly pure, high surface area silica
- High carbon load for increased retention
- Double endcapped for extra surface coverage
- Highly inert towards basic compounds
- Rigorously tested to ensure quality



Particle Size 5.0µm **USP** L1

When developing a new method, one of the most important goals for the chromatographer is to achieve a consistent, reproducible separation. The selection of a highly reproducible HPLC column is essential to attaining this goal.

Syncronis C18 columns show excellent column to column reproducibility, as illustrated here by the analysis of zidovudine using five separate columns. The reproducibility in terms of retention time and peak area is less than or equal to 0.5%, column to column.

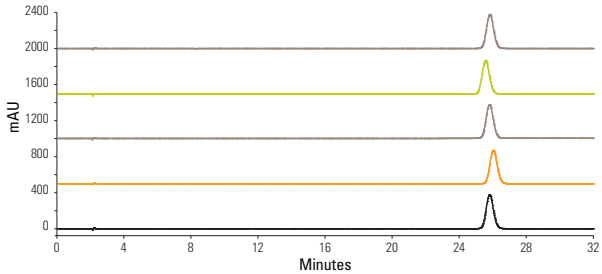
Syncronis C18 HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97105-032130**	**97105-033030**	**97105-034030**	**97105-034630**
	50	**97105-052130**	**97105-053030**	**97105-054030**	**97105-054630**
	100	**97105-102130**	**97105-103030**	**97105-104030**	**97105-104630**
	150	**97105-152130**	**97105-153030**	**97105-154030**	**97105-154630**
	250	**97105-252130**	**97105-253030**	**97105-254030**	**97105-254630**

Syncronis C18 Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97105-012101**	**97105-013001**	**97105-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Ziovudine



Column: Syncronis C18, 5µm, 150mm x 4.6mm

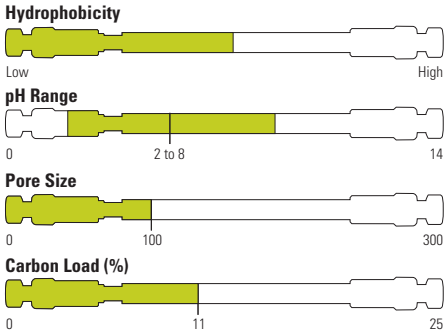
Mobile phase:	Water:Methanol (4:1)
Flow rate:	1.0mL min-1
Temperature:	25°C
Detection:	265nm
Injection volume:	10µL

1. Zidovudine

Syncronis C8 HPLC Columns

Reduces hydrophobic interactions allowing compounds to elute quicker from the column. Recommended for analytes with medium hydrophobicity or when a less hydrophobic phase is required to obtain optimum retention

- Highly pure, high surface area silica
- Less hydrophobic than Syncronis C18
- Double endcapped for extra surface coverage
- Rigorously tested to ensure quality



Particle Size 5.0µm **USP** L7

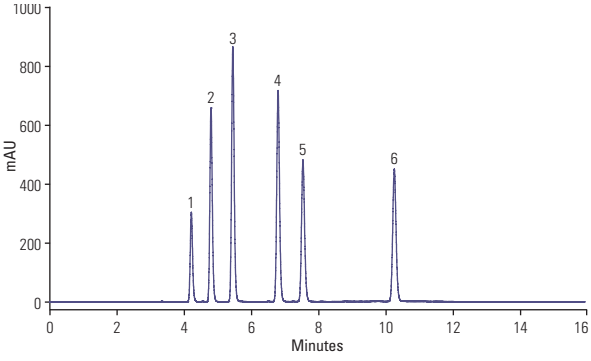
Syncronis C8 HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97205-032130**	**97205-033030**	**97205-034030**	**97205-034630**
	50	**97205-052130**	**97205-053030**	**97205-054030**	**97205-054630**
	100	**97205-102130**	**97205-103030**	**97205-104030**	**97205-104630**
	150	**97205-152130**	**97205-153030**	**97205-154030**	**97205-154630**
	250	**97205-252130**	**97205-253030**	**97205-254030**	**97205-254630**

Syncronis C8 Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97205-012101**	**97205-013001**	**97205-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Uron Herbicides



Column: Syncronis C8, 5µm, 150mm x 4.6mm

Mobile phase:	A: Water B: Acetonitrile
Gradient:	35 to 60% B in 10 minutes
Flow rate:	1.0mL/min
Temperature:	30°C
Detection:	240nm
Injection volume.:	20µL
	1. Tebuthiuron 2. Metoxuron 3. Monuron 4. Chlorotoluron 5. Diuron 6. Linuron

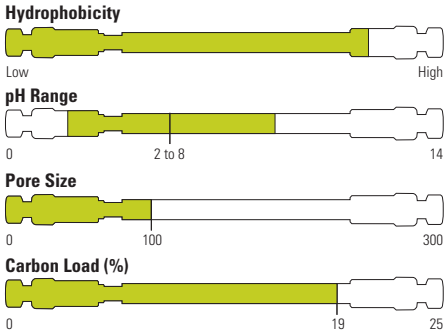
For ordering information about 1.7µm Syncronis columns, please see the Fast LC section of the catalogue

PAGE 4-040

Syncronis aQ HPLC Columns

Polar endcapped Syncronis aQ columns provide a controlled interaction mechanism that retains and resolves polar analytes. Stable in 100% aqueous mobile phase

- Stable in 100% aqueous mobile phase
- Enhanced retention of polar compounds
- Rigorously tested to ensure quality



Particle Size 5.0µm **USP** L1

In comparison to a conventionally endcapped C18, the Syncronis aQ polar end-capped C18 stationary phase exhibits superior stability towards aqueous mobile phase. Syncronis aQ shows no degradation in performance after 100 injections in a buffered 100% aqueous eluent.

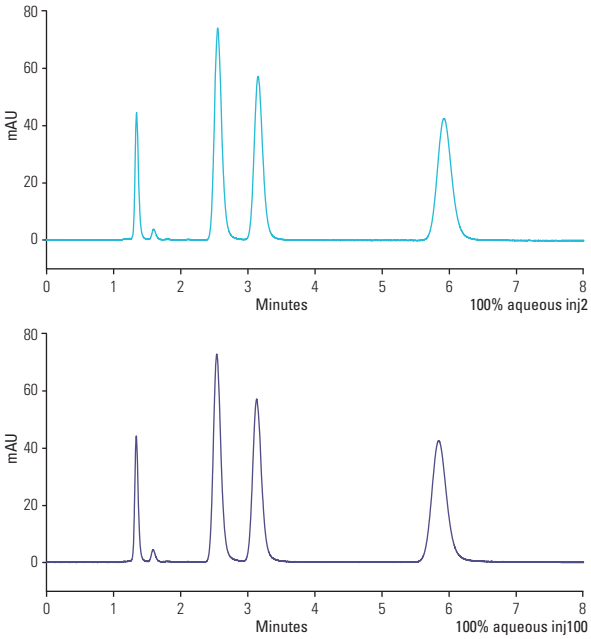
Syncronis aQ HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97305-032130**	**97305-033030**	**97305-034030**	**97305-034630**
	50	**97305-052130**	**97305-053030**	**97305-054030**	**97305-054630**
	100	**97305-102130**	**97305-103030**	**97305-104030**	**97305-104630**
	150	**97305-152130**	**97305-153030**	**97305-154030**	**97305-154630**
	250	**97305-252130**	**97305-253030**	**97305-254030**	**97305-254630**

Syncronis aQ Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97305-012101**	**97305-013001**	**97305-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Stability of Syncronis aQ in 100% aqueous mobile phase



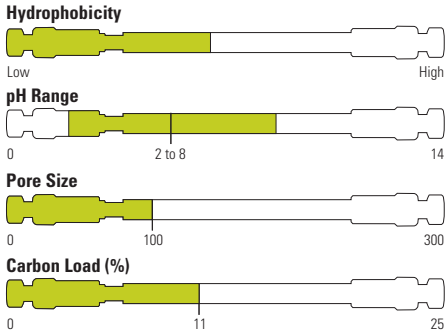
Column: Syncronis aQ, 5µm, 100mm x 4.6mm

Mobile phase:	50mM Aqueous K_2HPO_4 (pH 6)
Flow rate:	0.7mL/min
Temperature:	30°C
Detection:	260nm
Injection volume:	2µL
1. Cytidine-5′-diphosphate	
2. Adenosine-5′-triphosphate	
3. Adenosine-5′-diphosphate	
4. Adenosine-5′-monophosphate	

Syncronis Phenyl HPLC Columns

Provides an alternative to to Syncronis C18 and are particularly useful for retention of aromatic compounds

- Alternative selectivity to Syncronis C18
- Double endcapped for extra surface coverage
- Highly inert towards basic compounds
- Rigorously tested to ensure quality



Particle Size 5.0µm **USP** L11

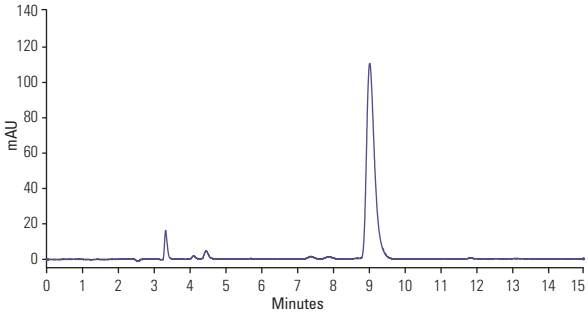
Syncronis Phenyl HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97905-032130**	**97905-033030**	**97905-034030**	**97905-034630**
	50	**97905-052130**	**97905-053030**	**97905-054030**	**97905-054630**
	100	**97905-102130**	**97905-103030**	**97905-104030**	**97905-104630**
	150	**97905-152130**	**97905-153030**	**97905-154030**	**97905-154630**
	250	**97905-252130**	**97905-253030**	**97905-254030**	**97905-254630**

Syncronis Phenyl Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97905-012101**	**97905-013001**	**97905-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Oxacillin Sodium (USP)

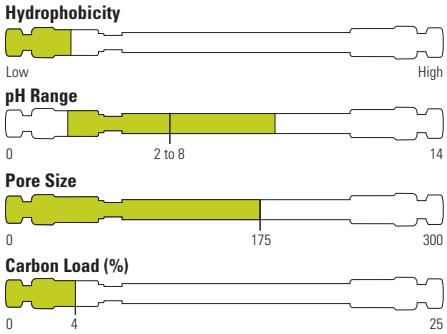


Column: Syncronis Phenyl, 5µm, 300mm x 4.0mm
Mobile phase: Phosphate Buffer: MeCN:MeOH (70:30:10)
Flow rate: 1.0mL/min (2mL/min in USP method)
Temperature: 25°C
Detection: 225nm
Injection volume: 10µL
1. Oxacillin Sodium (0.11mg/mL)

Syncronis Amino HPLC Columns

Provides a versatile aminopropyl phase that gives excellent chromatographic properties in four modes: weak anion exchange, reversed phase, normal phase and HILIC

- Highly pure, high surface area silica
- Double endcapped for extra surface coverage
- Rigorously tested to ensure quality



Particle Size 5.0µm **USP** L8

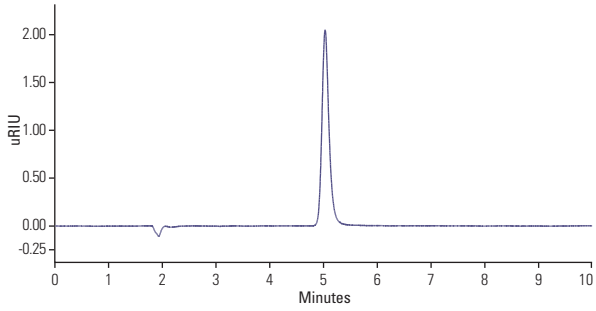
Syncronis Amino HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97705-032130**	**97705-033030**	**97705-034030**	**97705-034630**
	50	**97705-052130**	**97705-053030**	**97705-054030**	**97705-054630**
	100	**97705-102130**	**97705-103030**	**97705-104030**	**97705-104630**
	150	**97705-152130**	**97705-153030**	**97705-154030**	**97705-154630**
	250	**97705-252130**	**97705-253030**	**97705-254030**	**97705-254630**

Syncronis Amino Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97705-012101**	**97705-013001**	**97705-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Lactulose



Column: Syncronis Amino 5µm, 150mm x 4.6mm
Mobile phase: Water: MeCN (30:70)
Flow rate: 1.0mL/min
Temperature: 35°C
Detection: RI
Injection volume: 5µL
1. Lactulose

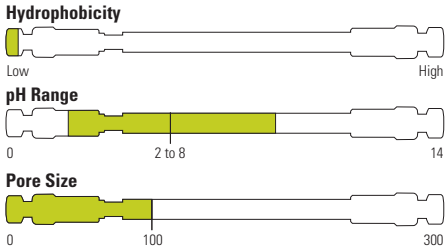
For ordering information about 1.7µm Syncronis columns, please see the Fast LC section of the catalogue

PAGE 4-040

Syncronis Silica HPLC Columns

Serves as a powerful and efficient tool for the chromatography of moderately polar organic compounds by normal phase chromatography

- Highly pure, high surface area silica
- Excellent reproducibility for normal phase chromatography
- Rigorously tested to ensure quality



Particle Size 5.0µm **USP** L3

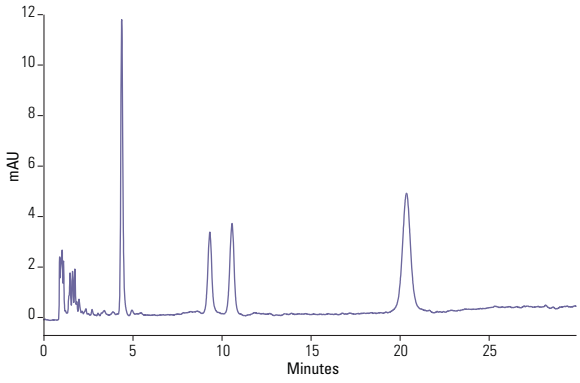
Syncronis Silica HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97005-032130**	**97005-033030**	**97005-034030**	**97005-034630**
	50	**97005-052130**	**97005-053030**	**97005-054030**	**97005-054630**
	100	**97005-102130**	**97005-103030**	**97005-104030**	**97005-104630**
	150	**97005-152130**	**97005-153030**	**97005-154030**	**97005-154630**
	250	**97005-252130**	**97005-253030**	**97005-254030**	**97005-254630**

Syncronis Silica Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97005-012101**	**97005-013001**	**97005-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Tocopherols



Column: Syncronis Silica 5µm, 150x4.6mm
Part number: 97005-154630

Mobile phase:	Hexane +0.2% propan-2-ol (IPA)
Flow rate:	2.0mL/min
Temperature:	40°C
Detection:	254nm
Injection volume:	10µL

Sample:
Mixture of standards (200-1000 ug/ml) of the following:
α-tocopherol
β -tocopherol
γ -tocopherol
δ-tocophe

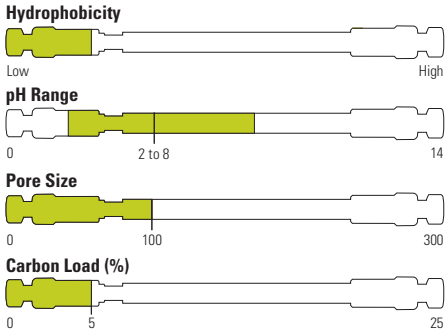
For ordering information about 1.7µm Syncronis columns, please see the Fast LC section of the catalogue

PAGE 4-040

Syncronis HILIC HPLC Columns

Provides enhanced retention of polar and hydrophilic analytes

- Alternative selectivity to Syncronis C18
- Improved sensitivity with MS detection
- No need for ion-pair or derivatisation
- Outstanding peak shape and sensitivity
- Highly pure, high surface area silica particles
- Neutral (uncharged), highly polar surface



Particle Size 5.0µm

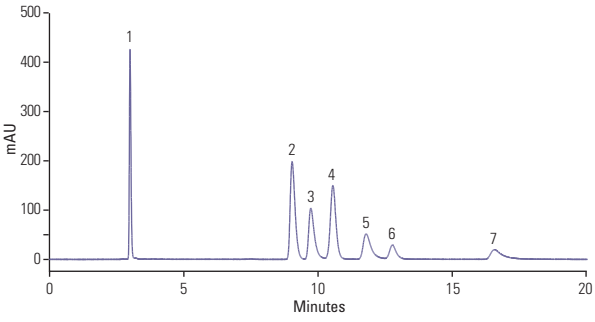
Syncronis HILIC HPLC Columns

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	30	**97505-032130**	**97505-033030**	**97505-034030**	**97505-034630**
	50	**97505-052130**	**97505-053030**	**97505-054030**	**97505-054630**
	100	**97505-102130**	**97505-103030**	**97505-104030**	**97505-104630**
	150	**97505-152130**	**97505-153030**	**97505-154030**	**97505-154630**
	250	**97505-252130**	**97505-253030**	**97505-254030**	**97505-254630**

Syncronis HILIC Drop-in guard cartridges (4 pack)

Particle size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**97505-012101**	**97505-013001**	**97505-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**852-00**	**852-00**	**850-00**	1 Each

Catecholamines



Column: Syncronis HILIC, 5µm, 250x4.6mm
Part number: 97505-254630

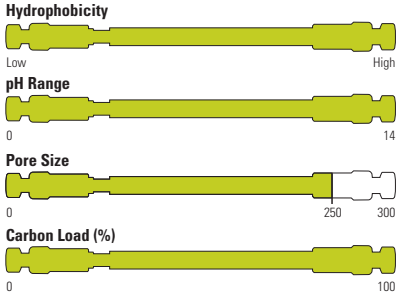
Mobile phase: water : acetonitrile : 200mM ammonium formate (10.5 : 84.5 : 5)

Flow rate:	1.0mL/min
Temperature:	40°C
Detection:	280nm
Injection volume:	5µL
Sample:	1. catechol 2. 5-HIAA 3. DOPAC 4. serotonin 5. tyrosine 6. dopamine 7. L-DOPA

Thermo Scientific Hypercarb HPLC Columns

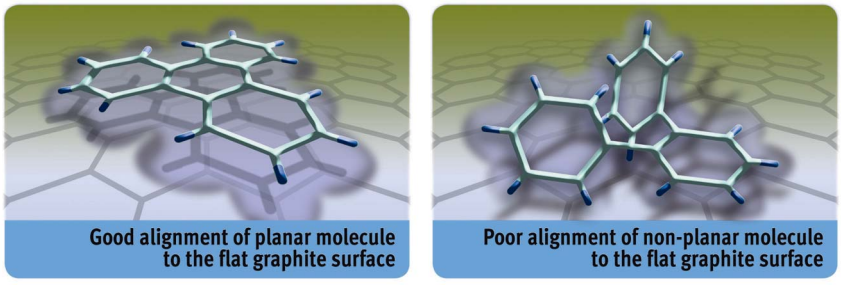
100% porous graphitic carbon for extended separation capabilities

- Exceptional retention of very polar analytes
- Separates structurally related substances
- pH stable from 0 to 14
- Ideal for high temperature applications

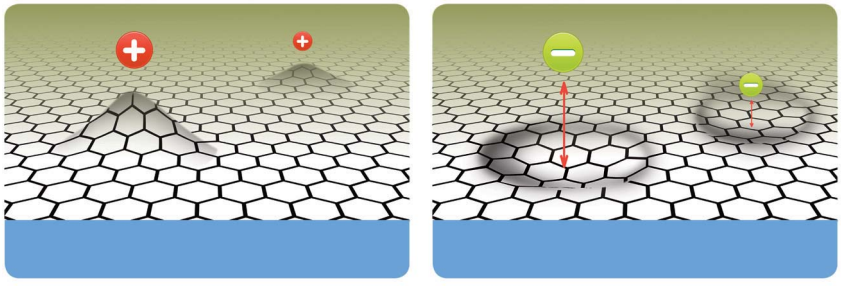


Particle Size 3µm, 5µm, 7µm **USP** N/A

Porous Graphitic Carbon (PGC) is a unique stationary phase composed of flat sheets of hexagonally arranged carbon atoms with a satisfied valence, as in a very large polynuclear aromatic molecule. Hypercarb is unlike traditional silica bonded phases in both its structure and retentive properties, allowing for total pH stability and the retention and separation of highly polar species. Hypercarb columns are ideally suited to solve "problem" separations, in both reversed phase and normal phase HPLC and LC/MS applications.



Schematic representation of molecular area of a planar and non-planar molecule interacting with the Hypercarb surface



Schematic representation of a point charge approaching the Hypercarb surface

Retention and Resolution

The mechanism of interaction is very dependent upon both the polarity and planarity (shape) of the solute. These specific interaction mechanisms allow the successful retention and resolution of analytes that cannot be separated by typical reversed phase HPLC. Removal of complex buffering systems or ion-pair reagents, and use of increased organic modifier concentration for polar analytes allows greater compatibility with detection techniques such as MS.

The overall retention on Hypercarb columns is a combination of two mechanisms:

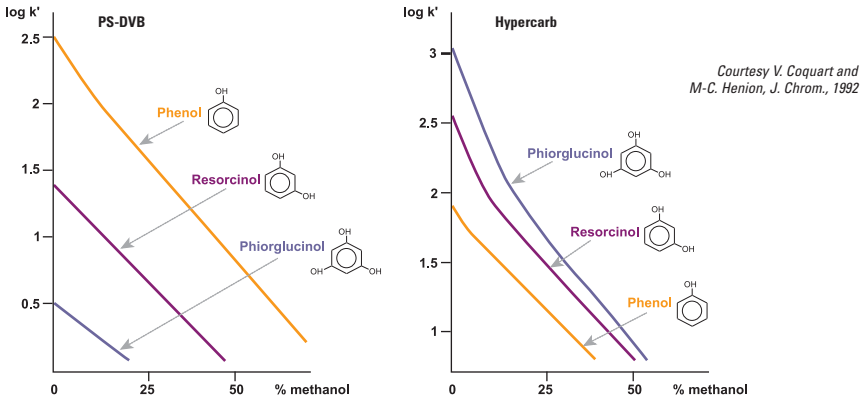
1) Adsorption: The strength of analyte interactions with Hypercarb is largely dependent on the molecular area in contact with the graphite surface, and also on the type and positioning of the functional groups in relation to the graphite surface at the points of contact. The approach of a planar and a non-planar molecule to the Hypercarb surface is shown. The strength of the interaction depends upon the size and orientation of the molecular area that is able to come in contact with the flat graphite surface. More planar molecules will show more retention than rigid molecules with a 3-dimensional spatial arrangement.

2) Charge induced interactions of a polar analyte with the polarizable surface of graphite: The second mechanism, charge-induced dipole, is illustrated above and accounts for the strong retention exhibited by polar analytes. As the polar group with a permanent dipole approaches the surface, an induced dipole is formed, increasing the attraction between the analyte and graphite surface. These charges should not be confused with the overall ionic charge of the molecule, such as a basic compound ionized in acidic pH conditions. The charge-induced dipole mechanism is strictly due to the interaction of the electrostatic charge of the polar molecule with the graphite surface.

The strong mechanisms of interaction with Hypercarb usually allow for shorter columns to be used during the method development process. In most cases, 100mm length columns or shorter are sufficient for a separation.

Increased Retention of Polar Analytes

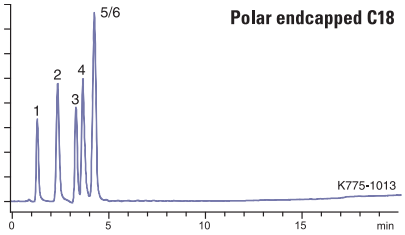
In typical reversed phase chromatography, the retention of an analyte is directly related to its hydrophobicity: the more hydrophobic the analyte, the longer its retention. Conversely, as the polarity of the analyte increases, analyte-solvent interactions begin to dominate and retention is reduced. This observation holds true for the majority of reversed phase systems. An exception to this rule is Hypercarb, for which retention may in some cases increase as the polarity of the analyte increases, illustrated to the right. This phenomenon is referred to as the "polar retention effect on graphite" (PREG). This property makes Hypercarb columns particularly useful for the separation of highly polar compounds (with logP as low as -4) that are normally difficult to retain and resolve on silica-based alkyl chain phases. The retention of very polar solutes on Hypercarb can be achieved without ion pair reagents or complex mobile phase conditions, as illustrated in the chromatogram below.



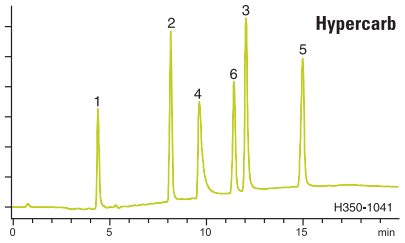
Retention on Hypercarb increases as polarity of the analyte increases, which is the opposite of typical reversed phase materials such as PS-DVB

Extended pH Range

One of the other key benefits of Hypercarb columns is the extreme stability of the phase to chemical or physical attack. Due to the unique characteristics of the media, it can withstand chemical attack across the entire pH range of 0 to 14, allowing applications to be run at pH levels that are incompatible with typical silica-based columns. Hypercarb columns offer more choice in buffer selection while handling both high temperature and high pressure.

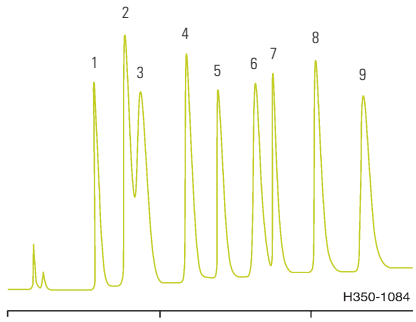


Hypercarb, 5µm, 100 x 0.32mm
Part Number: 35005-100365



Mobile Phase:	A: H_2O + 0.1% formic acid
	B: ACN + 0.1% formic acid
Gradient:	0 to 25% B in 15 minutes
Flow Rate:	8µL/min
Temperature:	25°C
Detection:	UV at 254nm
Analytes:	1. Cytosine
	2. Uracil
	3. Guanine
	4. Adenine
	5. Xanthine
	6. Thymine

Additional retention is achieved for polar compounds using a Hypercarb column compared to a polar endcapped C18. Note also the change in elution order.

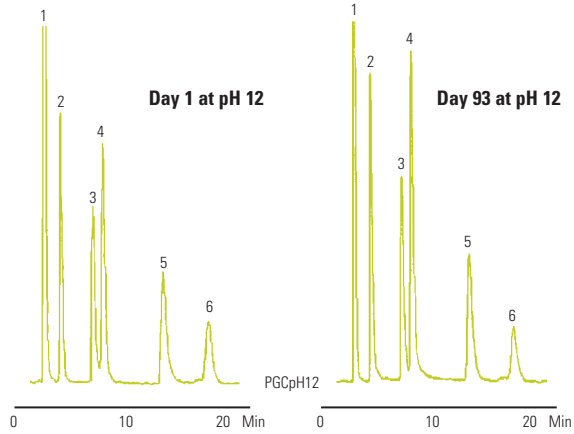


Ref: S.Kitahata et al, Biotechnol. Biochem., 56 (1992) 1386; reproduced with permission

Hypercarb, 7µm, 100 x 4.6mm

Part Number:	35007-104630
Mobile Phase:	A: 1mM NaOH containing 5% ACN
	B: 1mM NaOH containing 1.5% ACN
Gradient:	30 to 100% A in 15 min
Flow rate:	1.0mL/min
Detection:	PAD 2
Analytes:	1. Trehalose, 2. Nigerose, 3. Isomaltose, 4. Maltose, 5. Kojibiose, 6. Laminaribiose, 7. Gentiobiose, 8. Cellobiose, 9. Sophorose

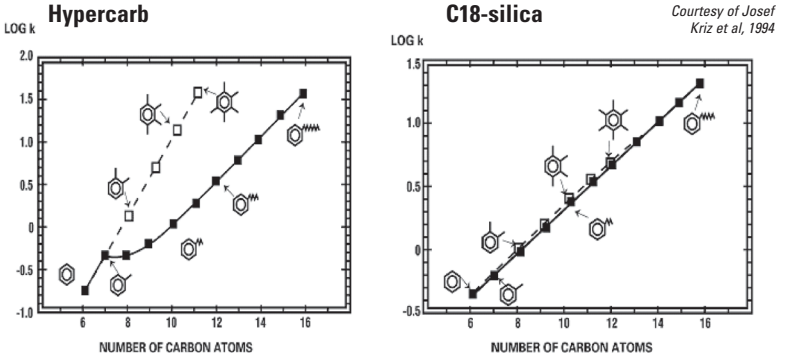
Glucobioses analysis with a mobile phase of NaOH at pH 11



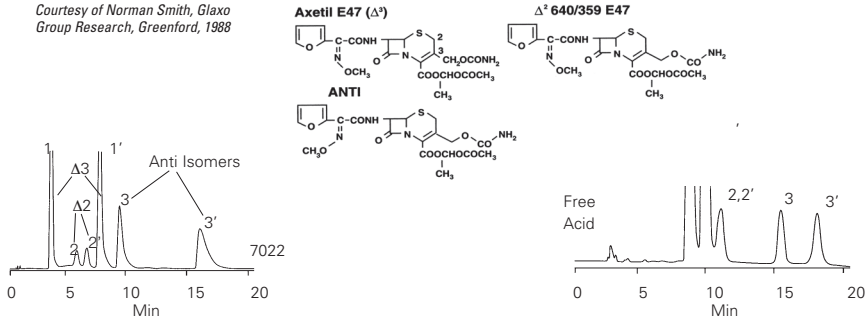
Hypercarb, 5µm, 100 x 4.6mm

Part Number:	35005-104630
Mobile Phase:	MeOH:H_2O
Isocratic:	70:30
Flow Rate:	0.7mL/min
Detection:	UV at 254nm
Sample:	1. Acetone, 2. Phenol, 3. p-Cresol, 4. Anisol, 5. Phenetole, 6. 3,5 -Xylenol

Hypercarb stability at pH 12: retention and selectivity do not change even after 93 days of storage in 0.1M NaOH/MeOH



Comparison of methyl and methylene group selectivity on C18 and Hypercarb columns



Hypercarb, 5µm, 100 x 4.6mm

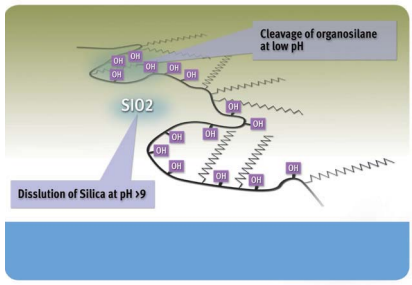
Part Number:	35005-104630
Mobile Phase:	ACN:H_2O:MeOH:Dioxan
Isocratic:	38:20:35:10
Flow Rate:	1mL/min
Detector:	UV at 254nm

Hypersil SAS, 5µm, 200 x 4.6mm

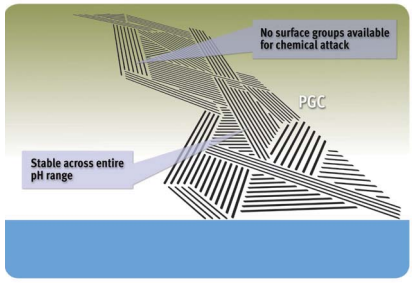
Part Number:	30505-204630
Mobile Phase:	MeOH:0.05M $NH_4H_2PO_4$
Isocratic:	38:62
Flow Rate:	1mL/min
Detector:	UV at 254nm

Separation of geometric isomers of Axetil: comparison of a Hypercarb and bonded silica column

Typical C18 silica



Hypercarb



Surface comparison between C18 bonded silica and Hypercarb porous graphitic carbon

Resolution of Structurally Related Compounds

By virtue of the nature of the surface and the way solute shape affects retention, Hypercarb columns can differentiate between closely related analytes such as isomers and homologous series. Where no discrimination between methylene and methyl groups is observed using a traditional C18 column, considerable resolving power is observed with Hypercarb columns, on this page. The differentiation of analytes is based on their fit to the graphite surface, allowing for the chromatographic resolution of compounds that are very similar in structure as shown with the resolution of diastereomers of the antibiotic Axetil. The Hypercarb column provides both a significant improvement in separation over the silica-based column originally used, as well as a change in elution order.

Ideal for Reversed Phase LC/MS of Polar Compounds

Reversed phase-LC/MS analysis of very polar compounds is challenging because the typical hydrophobic stationary phases when combined with the most suitable mobile phases for MS detection do not provide the necessary retention to resolve and quantitfy these compounds.

Hypercarb overcomes these challenges because it:

- Retains and separates very polar compounds using "MS friendly" mobile phases such as 0.1% formic or acetic acid and low concentrations of volatile buffers such as ammonium acetate or ammonium formate
- Can be used with high concentrations of organic modifiers in the mobile phase, which improves nebulization in atmospheric pressure ionization techniques, improving the sensitivity of the analysis
- Allows shorter column lengths and smaller diameters to be used without compromising peak capacity, often with increased sensitivity. The flow rates used with narrowbore and capillary columns are more compatible with MS techniques.
- Is stable with any mobile phase and produces no phase bleed issues because Hypercarb's porous graphitic surface is not modified.

Hypercarb HPLC Columns

Particle size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
3.0	30	**35003-031030**	**35003-032130**	**35003-033030**	**35003-034630**
	50	**35003-051030**	**35003-052130**	**35003-053030**	**35003-054630**
	100	**35003-101030**	**35003-102130**	**35003-103030**	**35003-104630**
	150	–	**35003-152130**	**35003-153030**	**35003-154630**
5.0	30	**35005-031030**	**35005-032130**	**35005-033030**	**35005-034630**
	50	**35005-051030**	**35005-052130**	**35005-053030**	**35005-054630**
	100	**35005-101030**	**35005-102130**	**35005-103030**	**35005-104630**
	150	**35005-151030**	**35005-152130**	**35005-153030**	**35005-154630**

Other column dimensions are also available. Please call Customer Service for more information.

Hypercarb Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
3.0	10	**35003-011001**	**35003-012101**	**35003-013001**	**35003-014001**	2 Pack
5.0	10	**35005-011001**	**35005-012101**	**35005-013001**	**35005-014001**	2 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypercarb Javelin HTS HPLC Columns

Particle size (µm)	1.0mm ID	2.1mm ID	4.0mm ID	Quantity
5.0	**35005-021035**	**35005-022135**	**35005-024035**	3 Pack

Hypercarb DASH HTS HPLC Columns

Particle size (µm)	2.1mm ID	Quantity
5.0	**35005-022151**	3 Pack

Hypercarb Preparative HPLC Columns

Particle size (µm)	Length (mm)	10mm ID	21.2mm ID	30mm ID	50mm ID
5.0	50	**35005-059070**	**35005-059270**	**35005-059370**	**35005-059570**
	100	**35005-109070**	**35005-109270**	**35005-109370**	**35005-109570**
	150	**35005-159070**	**35005-159270**	–	–
	50	**35007-059070**	**35007-059270**	**35007-059370**	**35007-059570**

Hypercarb High Temperature HPLC Columns

Particle size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID
3.0	30	**35003-031046**	**35003-032146**	**35003-033046**	**35003-034646**
	50	**35003-051046**	**35003-052146**	**35003-053046**	**35003-054646**
	100	**35003-101046**	**35003-102146**	**35003-103046**	**35003-104646**
5.0	30	**35005-031046**	**35005-032146**	**35005-033046**	**35005-034646**
	50	**35005-051046**	**35005-052146**	**35005-053046**	**35005-054646**
	100	**35005-101046**	**35005-102146**	**35005-103046**	**35005-104646**

Please note that these columns are for use with elevated temperatures. For other dimensions, please inquire.

Thermo Scientific Application Specific LC Columns

Columns designed and tested for specific applications

- Acclaim Organic Acid column for fast organic acid analysis
- Acclaim Surfactant column for separation of surfactants
- Acclaim Explosives column for separation of explosive residues
- Acclaim Carbamate column for the separation of carbamates
- Acclaim Carbonyl column for aldehyde and ketone separation
- Hypersil Green PAH for polyaromatic hydrocarbon analysis

Thermo Scientific specialty columns are based on novel and unique chemistries and provide superior resolution with ease-of-use.

Acclaim Organic Acid

Designed for separation of hydrophilic, aliphatic, and aromatic organic acids.

Acclaim Surfactant

The most versatile commercially-available column specifically for the separation of all classes of surfactants.

Acclaim Explosives

Optimized column chemistry for baseline separation of all 14 explosives in EPA Method 8330, with complementary selectivity.

Acclaim Carbamate

A Specialty column for the separation of carbamate pesticide specified in US EPA Method 531.2.

Acclaim Carbonyl Column

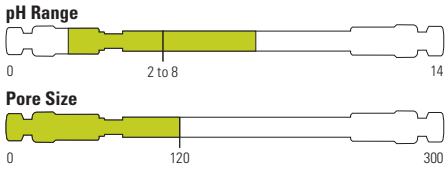
Designed for separating DNPH derivatives of aldehyds and ketones in air, water and soil.

Hypersil Green PAH

Specially tailored alkyl bonded silica with a high carbon loading, designed specifically for the analysis of polyaromatic hydrocarbons (PAHs).

Acclaim Organic Acid HPLC Columns

Optimized and application-tested for the analysis of hydrophilic organic acids



Particle Size 3.0, 5.0µm

- Use-tested to guarantee consistent hydrophilic organic acid separations
- Compatible with 100% aqueous mobile phases
- Hydrolytic stability at low-pH conditions, optimum for reversed-phase retention of organic acids
- Ideal selectivity for separating a wide spectrum of organic acids
- Excellent column efficiency and peak shapes for organic acids

The Acclaim Organic Acid (OA) is a silica-based reversed-phase column designed for high-efficiency, high-throughput organic acids analysis. It offers unparalleled performance for separating hydroxyl aliphatic and aromatic organic acids.

The Acclaim OA is the recommended column for determining small hydrophilic organic acids, C1 to C7 aliphatic acids, and hydrophilic aromatic acid and is also valuable for the analysis and quality assurance of food and beverage products, pharmaceutical preparations, plating baths, and manufacturing chemicals, chemical intermediates, and environmental samples.

Acclaim Organic Acid HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.0mm ID
3.0	150	**070087**	**070086**	–
5.0	150	–	–	**062903**
	250	–	–	**062902**

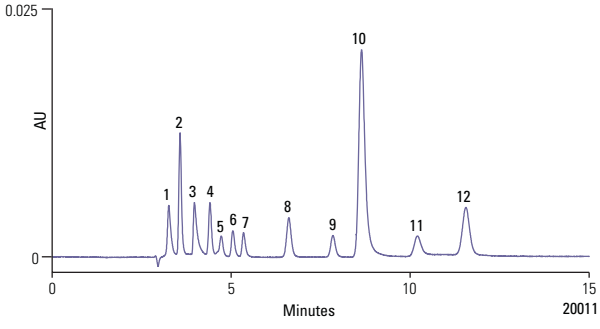
Acclaim Organic Acid HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	–	**071987**	**069700**

Acclaim Guard Holder

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

Analysis of organic acids in soft drink



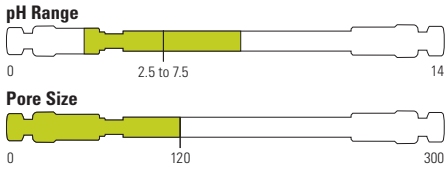
Column: Acclaim OA, 5µm, 4 × 250mm

Mobile phase:	100mM Na_2SO_4, pH 2.65 (adjusted with methanesulfonic acid)
Temperature:	30°C
Flow rate:	0.6mL/min
Injection volume:	5µL
Detection:	UV, 210nm
Peaks:	1. Oxalic acid 15mg/L (ppm) 2. Tartaric acid 120 3. Formic acid 180 4. Malic acid 120 5. iso-Citric acid 120 6. Lactic acid 180 7. Acetic acid 120 8. Citric acid 120 9. Succinic acid 120 10. Fumaric acid 7 11. cis-Aconitic acid * 12. trans-Aconitic acid *

* 7ppm total for cis and trans isomers

Acclaim Surfactant HPLC Columns

Unmatched Performance for separating all classes of surfactants



Particle Size 3.0, 5.0µm

- Ideal selectivity for separation of anionic, nonionic, cationic and amphoteric surfactants
- Excellent peak shapes, especially for cationic surfactants
- Compatible with highly aqueous mobile phases
- Improved resolution for ethoxylated surfactants
- Rugged separations under a variety of conditions

Acclaim Surfactant HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	150	**070085**	**070084**	–
5.0	150	**068123**	–	**063201**
	250	–	–	**063203**

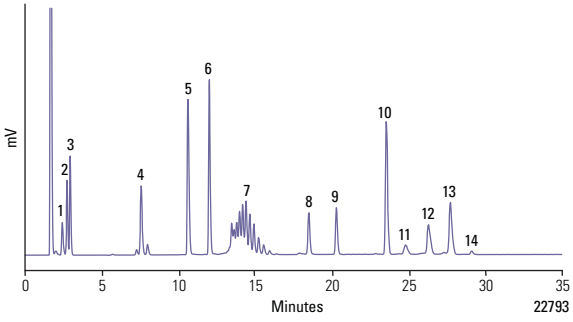
Acclaim Surfactant HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069693**	**071991**	**069701**

Acclaim Surfactant HPLC Guard Holder

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

Inorganic anion, hydrotropes, cationic, nonionic, amphoteric, and anionic surfactants



Column:	**Acclaim Surfactant, 5.0µm**
Dimensions:	4.6 × 150mm
Mobile Phase:	(A) CH_3CN, (B) 0.1 M NH_4OAc, pH 5.4
Gradient:	25% to 85% A in 25min, then hold 85% A for 10min
Temperature:	30°C
Flow Rate:	1mL/min
Inj. Volume:	25µL
Detection:	ELS detector

Peaks:
1. Chloride
2. Bromide
3. Nitrate
4. Xylene sulfonate
5. Laurylpyridinium chloride
6. Lauryldimethylbenzyl-ammonium chloride
7. Triton X-100
8. Cetyl betaine
9. Decyl sulfate
10. Dodecyl sulfate
11. C_{10}-LAS
12. C_{11}-LAS
13. C_{12}-LAS
14. C_{13}-LAS

The Acclaim Surfactant column is a high-efficiency, silica-based column designed specifically for separating a wide variety of surfactants, including anionic, cationic, nonionic, and amphoteric surfactants. As a consequence of its novel chemistry, this column exhibits a unique polarity that provides significantly improved resolution for individual oligomers of ethoxylated surfactants compared with conventional C18 columns.

The Acclaim Surfactant is also resistant to dewetting under highly aqueous mobile phase conditions, and thus can be used to provide excellent resolution between strongly hydrophilic compounds, such as isomers of xylene sulfonate.

Surfactants are widely used in industrial, agricultural, and pharmaceutical markets, in products as diverse as pesticides, detergents powders, petroleum products, cosmetics, and pharmaceuticals. The Acclaim Surfactant column was designed specifically for HPLC separation of these surfactants.

Acclaim Explosives Columns

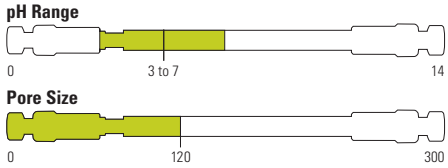
The best solution for explosives analysis (EPA Method 8330)

- Both Acclaim E1 and E2 columns provide baseline resolution of all 14 compounds targeted by EPA Method 8330
- The E1 and E2 columns have mutually complementary selectivity
- Simple isocratic elution conditions
- Rugged columns with good lot-to-lot reproducibility

The Acclaim Explosives E1 and E2 columns are specifically designed to resolve all 14 explosives listed in EPA SW-846 Method 8330: Nitroaromatics and Nitramines by HPLC. The novel and unique chemistries of these columns provide superior resolution with complementary selectivities.

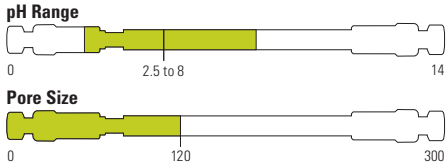
The Acclaim Explosives E1 is recommended for use as a direct replacement for ODS columns for the primary analysis. The Acclaim Explosives E2 may be used as either a primary or a confirmatory column. The unique selectivity and versatility of Acclaim Explosives E2 column provides a wider application range, including the analysis of explosives beyond U.S. EPA Method 8330 (ISO22478).

Acclaim Explosives E1



Particle Size 5.0µm

Acclaim Explosives E2



Particle Size 3.0, 5.0µm

Acclaim Explosives E1 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	250	–	–	**064305**

Acclaim Explosives E2 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	150	**070083**	**070082**	–
	250	–	**070081**	–
5.0	250	–	–	**064309**

Acclaim Explosives E1 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	–	–	**069702**

Acclaim Explosives E2 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	–	**071989**	**069703**

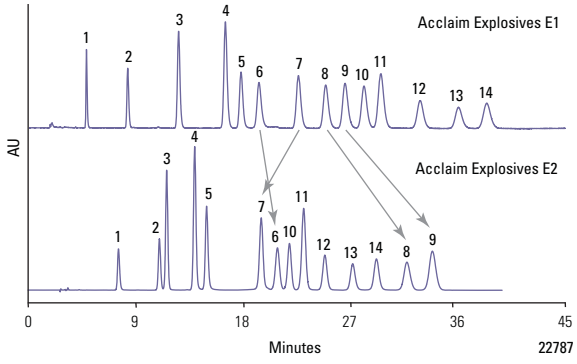
Acclaim Explosives E1 & E2 HPLC Guard Holder

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

Acclaim Explosives Kit

Description	Cat. No.
E1 and E2 Analytical Columns (4.6 x 250mm) E1 and E2 Guard Columns (4.3 x 10mm), pkg of 2	**064312**
Requires: Acclaim SST Guard Cartridge Holder V-1 Acclaim SST Guard Cartridge Holder V-1	**059456**

Complimentary baseline separation of 14 target compounds listed in EPA SW-846 Method 8330



Peaks:

1. HMX
2. RDX
3. 1,3,5-Trinitrobenzene
4. 1,3-Dinitrobenzene
5. Nitrobenzene
6. Tetryl
7. 2,4,6-Trinitrotoluene
8. 4-Amino-2,6-Dinitrotoluene
9. 2-Amino-4,6-Dinitrotoluene
0. 2,6-Dinitrotoluene
11. 2,4-Dinitrotoluene
12. 2-Nitrotoluene
13. 4-Nitrotoluene
14. 3-Nitrotoluene

For ordering information about 2.2µm Acclaim Explosives E2 columns, please see the Fast LC section of the catalogue.

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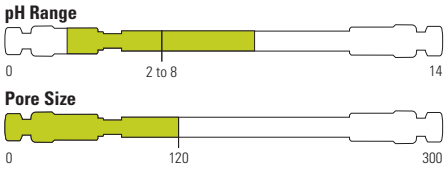
Acclaim Carbamate HPLC Columns

Designed for baseline separation of carbamate pesticides specified in US EPA Method 531.2



Particle Size 3.0, 5.0µm

- Baseline separation of carbamate pesticides specified in US EPA Method 531.2
- Use with either LC/postcolumn derivatization/fluorescence or LC/MS detection
- Compatible with both binary (methanol/water) and ternary (acetonitrile/methanol/water) mobile phase gradients
- High-efficiency, extremely low column bleed, and rugged column packing

Acclaim Carbamate HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	150	**072927**	**072926**	**072925**
5.0	250	–	–	**072924**

Acclaim Carbamate HPLC Guards

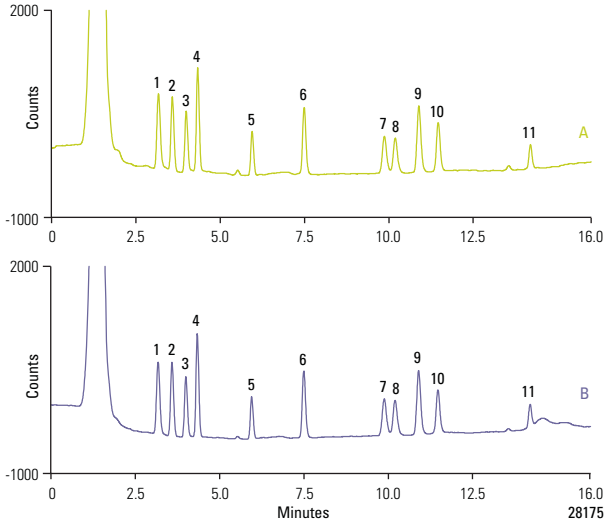
Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**072930**	**072929**	**072928**

Acclaim Carbamate HPLC Guard Holder

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

The Acclaim Carbamate column is designed for baseline separation of carbamates (*N*-methylcarbamate and *N*-methylcarbamoyloxime pesticides) specified in US EPA Method 531.2. Carbamate pesticides are widely used throughout the world. Drinking water and raw surface water is monitored for the presence of carbamate pesticides and related compounds using an established EPA Method 531.2 that uses HPLC with postcolumn derivatization. LC-MS is the method of choice for the ultimate sensitivity.

Complimentary baseline separation of 14 target compounds listed in EPA SW-846 Method 8330



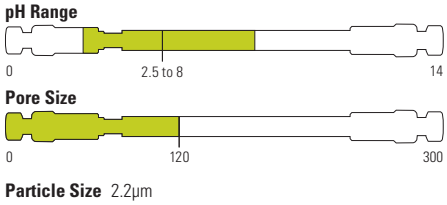
Guard Column: Acclaim Carbamate, 3.0 × 10mm, 3µm

Analytical Column: Acclaim Carbamate, 3.0 × 150mm, 3µm

Mobile Phase:	Methanol - H_2O, in Gradient: Methanol, -4.0–0.0 min, 14%; 2.0 min, 20%; 8.0 min, 40%; 13.6–16 min, 70%
Column Temperature:	50°C
Flow Rate:	0.9mL/min
Injection Volume:	50µ
Post Column Reagent 1: 0.2% NaOH, first reaction coil at 100°C	
Post Column Reagent 2: OPA regent, second reaction coil at room temperature	
Flow Rate of Reagent 1 and 2: 0.3mL/min	
Fluorescence Detection: Excitation, 330nm; emission, 465nm	
Chromatograms:	(A) without dSPE; and (B) with dSPE using PSA
Peaks:	1. Aldicarb sulfoxide 2. Aldicarb sulfone 3. Oxamyl 4. Methomyl 5. 3-Hydroxy carbofuran 6. Aldicarb 7. Propoxur 8. Carbofuran 9. Carbaryl 10. 1-Naphthol 11. Methiocarb

Acclaim Carbonyl Column

A silica-based, reversed-phase column designed specifically for separating DNPH derivatives of aldehydes and ketones



Particle Size 2.2µm

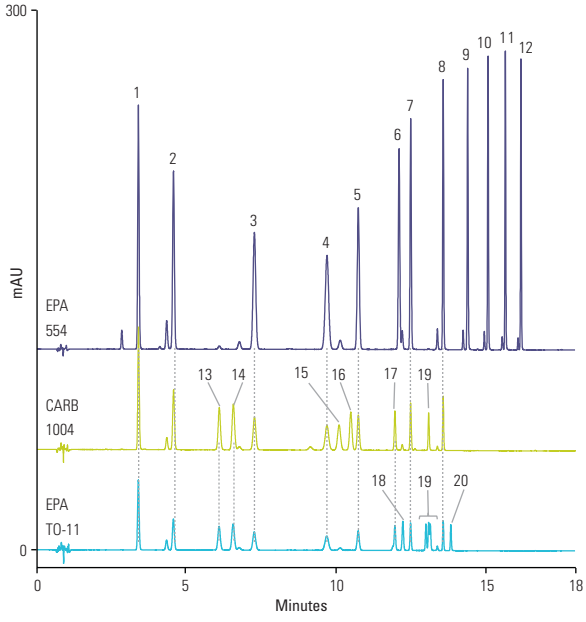
- Ideal selectivity for baseline resolution of DNPH derivatives of aldehydes and ketones regulated by various official methods, including EPA 554, EPA 8315, EPA 1667, EPA TO-11, and CARB 1004
- High efficiency for UHPLC performance
- Rugged columns with good lot-to-lot reproducibility
- Proven robust methods

The Acclaim Carbonyl columns are silica-based reversed phase columns designed specifically for separating DNPH derivatives of aldehydes and ketones. They exhibit superior resolution compared with other commercially available columns.

Aldehydes and ketones are common pollutants in air and water. The analytical difficulties that need to be overcome include their volatility, their reactivity, and their modest UV absorption. The reaction with dinitrophenylhydrazine (DNPH) is a convenient means of trapping, stabilizing, and tagging these substances. Several standard methods have been developed to apply this chemistry to various environmental situations. Some of the better known ones include CARB 1004 for vehicle exhaust, EPA 554 for drinking water, EPA 1667 for pharmaceutical wastewater, and EPA 8315 for general wastewater.

Acclaim Carbonyl Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID
2.2	100	**077972**	**077974**
	150	**077973**	–



Column: Acclaim Carbonyl RSLC, 2.2µm
Dimension: 2.1 × 150mm

Mobile Phases: A: D.I. water
B: Acetonitrile

Gradient (min):	-4.5 0.0 8.3 15.0 18.0 %A 48 48 48 0 0 %B 52 52 52 100 100
Flow Rate:	0.400mL/min
Injection:	1µL
Temperature:	28°C
Detection:	UV at 360nm (data collection rate at 25Hz)
Samples:	Calibration mixes diluted in methanol
Peaks:	1. Formaldehyde DNPH 2. Acetaldehyde DNPH 3. Propionaldehyde DNPH 4. Crotonaldehyde DNPH 5. Butyraldehyde DNPH 6. Cyclohexanone DNPH 7. Valeraldehyde DNPH 8. Hexanal DNPH 9. Heptanal DNPH 10. Octanal DNPH 11. Nonanal DNPH 12. Decanal DNPH 13. Acetone DNPH 14. Acrolein DNPH 15. Butanone DNPH 16. Methacrolein DNPH 17. Benzaldehyde DNPH 18. Isovaleraldehyde DNPH 19. Tolualdehyde DNPH 20. Xylylaldehyde DNPH

For ordering information about 2.2µm Acclaim C18 columns, please see the Fast LC section of the catalogue

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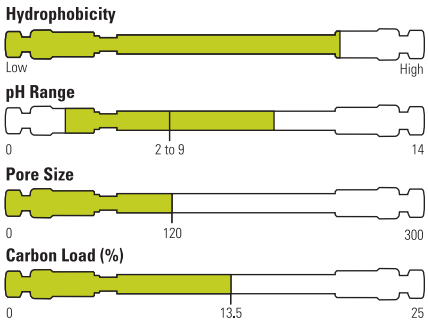
Hypersil Green PAH Columns

Specially tailored alkyl bonded silica with a high carbon loading, designed specifically for the analysis of polyaromatic hydrocarbons (PAHs)

- Optimized for EPA Method 610
- Rapid analysis of 16 PAHs in 4 minutes using short, fast columns
- Available in 3µm and 5µm particle size and variety of column dimensions



Particle Size 3.0, 5.0µm

Hypersil Green PAH Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**31103-012101**
	10	3.0	Guard cartridge	**31103-013001**
	10	4.6	Guard cartridge	**31103-014001**
	100	2.1	Analytical	**31103-102130**
	100	3.0	Analytical	**31103-103030**
	100	4.6	Analytical	**31103-104630**
	150	2.1	Analytical	**31103-152130**
	150	4.6	Analytical	**31103-154630**
5.0	10	4.6	Guard cartridge	**31105-014001**
	100	4.6	Analytical	**31105-104630**
	150	4.6	Analytical	**31105-154630**
	250	4.6	Analytical	**31105-254630**

Hypersil BDS C18 HPLC Columns

A good choice for QA/QC labs as a robust, general-purpose column in applications where reproducibility and long column lifetimes are required

Hypersil BDS C18 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
2.4	10	2.1	Guard cartridge	**28102-012101**
		4.6	Guard cartridge	**28102-014001**
	30	2.1	Analytical UHPLC	**28102-032130**
		4.6	Analytical UHPLC	**28102-034630**
	50	2.1	Analytical UHPLC	**28102-052130**
		4.6	Analytical UHPLC	**28102-054630**
	100	2.1	Analytical UHPLC	**28102-102130**
		4.6	Analytical UHPLC	**28102-104630**
	150	2.1	Analytical UHPLC	**28102-152130**
		2.1	Analytical UHPLC	**28102-154630**
3.0	10	2.1	Guard cartridge	**28103-012101**
		3.0	Guard cartridge	**28103-013001**
		4.0 / 4.6	Guard cartridge	**28103-014001**
	30	2.1	Analytical	**28103-032130**
	50	2.1	Analytical	**28103-052130**
		3.0	Analytical	**28103-053030**
		4.6	Analytical	**28103-054630**
	100	2.1	Analytical	**28103-102130**
		3.0	Analytical	**28103-103030**
		4.0	Analytical	**28103-104030**
		4.6	Analytical	**28103-104630**
	150	2.1	Analytical	**28103-152130**
		3.0	Analytical	**28103-153030**
		4.0	Analytical	**28103-154030**
		4.6	Analytical	**28103-154630**

Other column dimensions are available.
Please contact Customer Service for more details.

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	2.1	Guard cartridge	**28105-012101**
		3.0	Guard cartridge	**28105-013001**
		4.0 / 4.6	Guard cartridge	**28105-014001**
	50	2.1	Analytical	**28105-052130**
		3.0	Analytical	**28105-053030**
		4.0	Analytical	**28105-054030**
		4.6	Analytical	**28105-054630**
	100	2.1	Analytical	**28105-102130**
		3.0	Analytical	**28105-103030**
		4.0	Analytical	**28105-104030**
		4.6	Analytical	**28105-104630**
	125	3.0	Analytical	**28105-123030**
		4.0	Analytical	**28105-124030**
		4.6	Analytical	**28105-124630**
	150	2.1	Analytical	**28105-152130**
		3.0	Analytical	**28105-153030**
		4.0	Analytical	**28105-154030**
		4.6	Analytical	**28105-154630**
	200	4.0	Analytical	**28105-204030**
		4.6	Analytical	**28105-204630**
	250	2.1	Analytical	**28105-252130**
		3.0	Analytical	**28105-253030**
		4.0	Analytical	**28105-254030**
		4.6	Analytical	**28105-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil BDS C8 HPLC Columns

High quality base-deactivated, fully endcapped phase with similar selectivity to C18 but slightly less retention

Hypersil BDS C8 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
2.4	10	2.1	Guard cartridge	**28202-012101**
		4.0 / 4.6	Guard cartridge	**28202-014001**
	50	2.1	Analytical UHPLC	**28202-052130**
		4.6	Analytical UHPLC	**28202-054630**
	100	2.1	Analytical UHPLC	**28202-102130**
		4.6	Analytical UHPLC	**28202-104630**
	150	2.1	Analytical UHPLC	**28202-152130**
		2.1	Analytical UHPLC	**28202-154630**
3.0	10	2.1	Guard cartridge	**28203-012101**
		3.0	Guard cartridge	**28203-013001**
		4.0 / 4.6	Guard cartridge	**28203-014001**
	50	2.1	Analytical	**28203-052130**
		4.6	Analytical	**28203-054630**
	100	4.6	Analytical	**28203-104630**
	150	3.0	Analytical	**28203-153030**
		4.6	Analytical	**28203-154630**
5.0	10	2.1	Guard cartridge	**28205-012101**
		3.0	Guard cartridge	**28205-013001**
		4.0 / 4.6	Guard cartridge	**28205-014001**
	50	2.1	Analytical	**28205-052130**
		3.0	Analytical	**28205-053030**
		4.6	Analytical	**28205-054630**
	100	2.1	Analytical	**28205-102130**
		4.6	Analytical	**28205-104630**
	150	4.0	Analytical	**28205-154030**
		4.6	Analytical	**28205-154630**
	250	4.0	Analytical	**28205-254030**
		4.6	Analytical	**28205-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil BDS Phenyl HPLC Columns

Exceptional stability and alternative selectivity to C18 and C8 columns

Hypersil BDS Phenyl HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**28903-012101**
		4.0 / 4.6	Guard cartridge	**28903-014001**
	50	2.1	Analytical	**28903-052130**
	150	4.6	Analytical	**28903-154630**
5.0	10	4.0 / 4.6	Guard cartridge	**28905-014001**
	150	4.6	Analytical	**28905-154630**
	250	4.0	Analytical	**28905-254030**
		4.6	Analytical	**28905-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

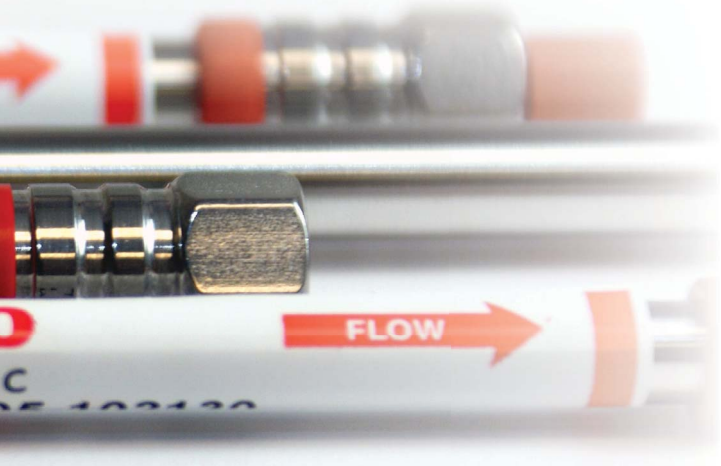
Hypersil BDS Cyano HPLC Columns

May be used for reversed or normal phase applications

Hypersil BDS Cyano HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**28803-012101**
		4.0 / 4.6	Guard cartridge	**28803-014001**
	50	2.1	Analytical	**28803-052130**
		4.6	Analytical	**28803-054630**
	150	4.6	Analytical	**28803-154630**
5.0	10	4.0 / 4.6	Guard cartridge	**28805-014001**
	150	4.6	Analytical	**28805-154630**
	250	4.6	Analytical	**28805-254630**

Other column dimensions are available.
Please contact Customer Service for more details.



Hypersil ODS (C18) HPLC Columns

Provide an excellent C18 phase for a broad range of applications and global standard for many existing methods

Hypersil ODS (C18) HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**30103-012101**
		3.0	Guard cartridge	**30103-013001**
		4.0/4.6	Guard cartridge	**30103-014001**
	50	2.1	Analytical Column	**30103-052130**
		3.0	Analytical Column	**30103-053030**
		4.0	Analytical Column	**30103-054030**
		4.6	Analytical Column	**30103-054630**
	100	2.1	Analytical Column	**30103-102130**
		3.0	Analytical Column	**30103-103030**
		4.0	Analytical Column	**30103-104030**
		4.6	Analytical Column	**30103-104630**
	125	2.1	Analytical Column	**30103-122130**
		3.0	Analytical Column	**30103-123030**
		4.0	Analytical Column	**30103-124030**
		4.6	Analytical Column	**30103-124630**
	150	2.1	Analytical Column	**30103-152130**
		3.0	Analytical Column	**30103-153030**
		4.0	Analytical Column	**30103-154030**
		4.6	Analytical Column	**30103-154630**
	250	2.1	Analytical Column	**30103-252130**
		3.0	Analytical Column	**30103-253030**
		4.0	Analytical Column	**30103-254030**
		4.6	Analytical Column	**30103-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	2.1	Guard cartridge	**30105-012101**
		3.0	Guard cartridge	**30105-013001**
		4.0/4.6	Guard cartridge	**30105-014001**
	50	2.1	Analytical Column	**30105-052130**
		3.0	Analytical Column	**30105-053030**
		4.0	Analytical Column	**30105-054030**
		4.6	Analytical Column	**30105-054630**
	100	2.1	Analytical Column	**30105-102130**
		3.0	Analytical Column	**30105-103030**
		4.0	Analytical Column	**30105-104030**
		4.6	Analytical Column	**30105-104630**
	125	2.1	Analytical Column	**30105-122130**
		3.0	Analytical Column	**30105-123030**
		4.0	Analytical Column	**30105-124030**
		4.6	Analytical Column	**30105-124630**
	150	2.1	Analytical Column	**30105-152130**
		3.0	Analytical Column	**30105-153030**
		4.0	Analytical Column	**30105-154030**
		4.6	Analytical Column	**30105-154630**
	200	2.1	Analytical Column	**30105-202130**
		3.0	Analytical Column	**30105-203030**
		4.0	Analytical Column	**30105-204030**
		4.6	Analytical Column	**30105-204630**
	250	2.1	Analytical Column	**30105-252130**
		3.0	Analytical Column	**30105-253030**
		4.0	Analytical Column	**30105-254030**
		4.6	Analytical Column	**30105-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil ODS-2 (C18) HPLC Columns

Offer a well tested, dependable L1 alternative to many older column brands commonly referenced in validated methods

Hypersil ODS-2 (C18) HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**31603-012101**
		3.0	Guard cartridge	**31603-013001**
		4.0/4.6	Guard cartridge	**31603-014001**
	50	2.1	Analytical Column	**31603-052130**
		3.0	Analytical Column	**31603-053030**
		4.0	Analytical Column	**31603-054030**
		4.6	Analytical Column	**31603-054630**
	100	2.1	Analytical Column	**31603-102130**
		3.0	Analytical Column	**31603-103030**
		4.0	Analytical Column	**31603-104030**
		4.6	Analytical Column	**31603-104630**
	150	2.1	Analytical Column	**31603-152130**
		3.0	Analytical Column	**31603-153030**
		4.0	Analytical Column	**31603-154030**
		4.6	Analytical Column	**31603-154630**
5.0	10	2.1	Guard cartridge	**31605-012101**
		3.0	Guard cartridge	**31605-013001**
		4.0/4.6	Guard cartridge	**31605-014001**
	50	2.1	Analytical Column	**31605-052130**
		3.0	Analytical Column	**31605-053030**
		4.0	Analytical Column	**31605-054030**
		4.6	Analytical Column	**31605-054630**
	100	2.1	Analytical Column	**31605-102130**
		3.0	Analytical Column	**31605-103030**
		4.0	Analytical Column	**31605-104030**
		4.6	Analytical Column	**31605-104630**
	150	2.1	Analytical Column	**31605-152130**
		3.0	Analytical Column	**31605-153030**
		4.0	Analytical Column	**31605-154030**
		4.6	Analytical Column	**31605-154630**
	250	2.1	Analytical Column	**31605-252130**
		3.0	Analytical Column	**31605-253030**
		4.0	Analytical Column	**31605-254030**
		4.6	Analytical Column	**31605-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil MOS (C8) HPLC Columns

Have a monolayer coverage of C8 alkyl chain chemically bonded onto the silica surface for a reproducible and efficient stationary phase

Hypersil ODS-2 (C18) HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	4.0/4.6	Guard cartridge	**30203-014001**
	150	4.6	Analytical Column	**30203-154630**
5.0	10	4.0/4.6	Guard cartridge	**30205-014001**
	50	4.6	Analytical Column	**30205-054630**
	100	4.6	Analytical Column	**30205-104630**
	150	4.0	Analytical Column	**30205-154030**
		4.6	Analytical Column	**30205-154630**
	250	4.0	Analytical Column	**30205-254030**
		4.6	Analytical Column	**30205-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil MOS-2 (C8) HPLC Columns

Have a monolayer coverage of C8 alkyl chain chemically bonded onto the silica surface for a reproducible and efficient stationary phase. Hypersil MOS-2 is endcapped

Hypersil MOS-2 (C8) HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**30305-014001**
	150	4.6	Analytical Column	**30305-154630**
	250	4.0	Analytical Column	**30305-254030**
		4.6	Analytical Column	**30305-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil SAS (C1) HPLC Columns

The least retentive of the Hypersil alkyl bonded phases

Hypersil SAS (C1) HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**30505-014001**
	150	4.6	Analytical Column	**30505-154630**
	250	4.6	Analytical Column	**30505-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil Phenyl HPLC Columns

Reversed phase materials with alternative selectivity for the analysis of aromatic and moderately polar compounds

Hypersil Phenyl HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**30905-014001**
	50	4.6	Analytical Column	**30905-054630**
	100	4.6	Analytical Column	**30905-104630**
	150	4.6	Analytical Column	**30905-154630**
	250	4.0	Analytical Column	**30905-254030**
		4.6	Analytical Column	**30905-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil Phenyl-2 HPLC Columns

Reversed phase materials with alternative selectivity for the analysis of aromatic and moderately polar compounds. Hypersil Phenyl-2 is endcapped

Hypersil Phenyl-2 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**31905-014001**
	150	4.6	Analytical Column	**31905-154630**
	250	4.6	Analytical Column	**31905-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil CPS HPLC Columns

A cyanopropyl phase for both normal and reversed phase HPLC

Hypersil CPS HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	4.0/4.6	Guard cartridge	**30803-014001**
	100	4.6	Analytical Column	**30803-104630**
	150	4.6	Analytical Column	**30803-154630**
5.0	10	4.0/4.6	Guard cartridge	**30805-014001**
	150	4.6	Analytical Column	**30805-154630**
	250	4.0	Analytical Column	**30805-254030**
		4.6	Analytical Column	**30805-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil CPS-2 HPLC Columns

A cyanopropyl phase for both normal and reversed phase HPLC. Hypersil CPS-2 is endcapped

Hypersil CPS-2 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**31805-014001**
	150	4.6	Analytical Column	**31805-154630**
	250	4.6	Analytical Column	**31805-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil APS-2 HPLC Columns

Versatile amino propyl phase.
Excellent for carbohydrate analysis

Hypersil APS-2 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**30703-012101**
		4.0/4.6	Guard cartridge	**30703-014001**
	50	2.1	Analytical Column	**30703-052130**
		4.6	Analytical Column	**30703-054630**
	100	2.1	Analytical Column	**30703-102130**
	150	2.1	Analytical Column	**30703-152130**
		4.6	Analytical Column	**30703-154630**
5.0	10	2.1	Guard cartridge	**30705-012101**
		3.0	Guard cartridge	**30705-013001**
		4.0/4.6	Guard cartridge	**30705-014001**
	100	2.1	Analytical Column	**30705-102130**
		3.0	Analytical Column	**30705-103030**
		4.6	Analytical Column	**30705-104630**
	150	2.1	Analytical Column	**30705-152130**
		4.0	Analytical Column	**30705-154030**
		4.6	Analytical Column	**30705-154630**
	250	2.1	Analytical Column	**30705-252130**
		3.0	Analytical Column	**30705-253030**
		4.0	Analytical Column	**30705-254030**
		4.6	Analytical Column	**30705-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil Silica HPLC Columns

An unbonded media for normal phase chromatography of nonpolar and moderately polar organic compounds

Hypersil Silica HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**30003-012101**
		3.0	Guard cartridge	**30003-013001**
		4.0/4.6	Guard cartridge	**30003-014001**
	50	2.1	Analytical Column	**30003-052130**
		3.0	Analytical Column	**30003-053030**
		4.0	Analytical Column	**30003-054030**
		4.6	Analytical Column	**30003-054630**
	100	4.6	Analytical Column	**30003-104630**
	150	4.0	Analytical Column	**30003-154030**
		4.6	Analytical Column	**30003-154630**
5.0	10	4.0/4.6	Guard cartridge	**30005-014001**
	50	4.6	Analytical Column	**30005-054630**
	100	2.1	Analytical Column	**30005-102130**
		4.6	Analytical Column	**30005-104630**
	150	4.0	Analytical Column	**30005-154030**
		4.6	Analytical Column	**30005-154630**
	250	4.0	Analytical Column	**30005-254030**
		4.6	Analytical Column	**30005-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Hypersil SAX HPLC Columns

Highly stable silica-based quarternary amine strong anion exchange columns, designed for aqueous and low pH mobile phases

Hypersil SAX HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	2.1	Guard cartridge	**34105-012101**
		3.0	Guard cartridge	**34105-013001**
		4.0/4.6	Guard cartridge	**34105-014001**
	50	2.1	Analytical Column	**34105-052130**
	150	4.6	Analytical Column	**34105-154630**
	250	3.0	Analytical Column	**34105-253030**
		4.6	Analytical Column	**34105-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Aquasil C18 HPLC columns

Polar endcapped C18 that gives greater retention for polar molecules

Aquasil C18 HPLC columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**77503-012101**
		3	Guard cartridge	**77503-013001**
		4.0/4.6	Guard cartridge	**77503-014001**
	30	2.1	Analytical Column	**77503-032130**
	50	2.1	Analytical Column	**77503-052130**
		4.6	Analytical Column	**77503-054630**
	100	2.1	Analytical Column	**77503-102130**
		4.6	Analytical Column	**77503-104630**
	150	2.1	Analytical Column	**77503-152130**
		3.0	Analytical Column	**77503-153030**
		4.0	Analytical Column	**77503-154030**
		4.6	Analytical Column	**77503-154630**
5.0	10	2.1	Guard cartridge	**77505-012101**
		3.0	Guard cartridge	**77505-013001**
		4.0/4.6	Guard cartridge	**77505-014001**
	50	2.1	Analytical Column	**77505-052130**
		3.0	Analytical Column	**77505-053030**
		4.6	Analytical Column	**77505-054630**
	100	2.1	Analytical Column	**77505-102130**
		3.0	Analytical Column	**77505-103030**
		4.6	Analytical Column	**77505-104630**
	150	2.1	Analytical Column	**77505-152130**
		3.0	Analytical Column	**77505-153030**
		4.0	Analytical Column	**77505-154030**
		4.6	Analytical Column	**77505-154630**
	250	2.1	Analytical Column	**77505-252130**
		4.0	Analytical Column	**77505-254030**
		4.6	Analytical Column	**77505-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BetaBasic HPLC columns

BetaBasic C18 HPLC columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**71503-012101**
		3.0	Guard cartridge	**71503-013001**
		4.0/4.6	Guard cartridge	**71503-014001**
	30	4.6	Analytical	**71503-034630**
	50	2.1	Analytical	**71503-052130**
		3.0	Analytical	**71503-053030**
		4.0	Analytical	**71503-054030**
		4.6	Analytical	**71503-054630**
	100	2.1	Analytical	**71503-102130**
		4.6	Analytical	**71503-104630**
	150	2.1	Analytical	**71503-152130**
		4.6	Analytical	**71503-154630**
5.0	10	2.1	Guard cartridge	**71505-012101**
		3.0	Guard cartridge	**71505-013001**
		4.0/4.6	Guard cartridge	**71505-014001**
	30	2.1	Analytical	**71505-032130**
	50	2.1	Analytical	**71505-052130**
		3.0	Analytical	**71505-053030**
		4.6	Analytical	**71505-054630**
	100	2.1	Analytical	**71505-102130**
		4.6	Analytical	**71505-104630**
	150	2.1	Analytical	**71505-152130**
		3.0	Analytical	**71505-153030**
		4.0	Analytical	**71505-154030**
		4.6	Analytical	**71505-154630**
	250	2.1	Analytical	**71505-252130**
		3.0	Analytical	**71505-253030**
		4.0	Analytical	**71505-254030**
		4.6	Analytical	**71505-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BetaBasic C8 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	50	2.1	Analytical	**71403-052130**
		4.6	Analytical	**71403-054630**
	150	4.6	Analytical	**71403-154630**
5.0	10	2.1	Guard cartridge	**71405-012101**
		4.0/4.6	Guard cartridge	**71405-014001**
	50	2.1	Analytical	**71405-052130**
		4.6	Analytical	**71405-054630**
	100	4.6	Analytical	**71405-104630**
	150	4.6	Analytical	**71405-154630**

Other column dimensions are available.
Please contact Customer Service for more details.

BetaBasic CN HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	2.1	Guard cartridge	**71705-012101**
		4.0/4.6	Guard cartridge	**71705-014001**
	50	2.1	Analytical	**71705-052130**
	100	2.1	Analytical	**71705-102130**
	150	4.6	Analytical	**71705-154630**
	250	4.6	Analytical	**71705-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BetaBasic Phenyl HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**71805-014001**
	150	4.6	Analytical	**71805-154630**
	250	4.6	Analytical	**71805-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL C18 HPLC columns

BETASIL C18 HPLC columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**71503-012101**
		3	Guard cartridge	**71503-013001**
		4.0/4.6	Guard cartridge	**71503-014001**
	30	4.6	Analytical	**71503-034630**
	50	2.1	Analytical	**71503-052130**
		3.0	Analytical	**71503-053030**
		4.0	Analytical	**71503-054030**
		4.6	Analytical	**71503-054630**
	100	2.1	Analytical	**71503-102130**
		4.6	Analytical	**71503-104630**
	150	2.1	Analytical	**71503-152130**
		4.6	Analytical	**71503-154630**
5.0	10	2.1	Guard cartridge	**71505-012101**
		3.0	Guard cartridge	**71505-013001**
		4.0/4.6	Guard cartridge	**71505-014001**
	30	2.1	Analytical	**71505-032130**
	50	2.1	Analytical	**71505-052130**
		3.0	Analytical	**71505-053030**
		4.6	Analytical	**71505-054630**
	100	2.1	Analytical	**71505-102130**
		4.6	Analytical	**71505-104630**
	150	2.1	Analytical	**71505-152130**
		3.0	Analytical	**71505-153030**
		4.0	Analytical	**71505-154030**
		4.6	Analytical	**71505-154630**
	250	2.1	Analytical	**71505-252130**
		3.0	Analytical	**71505-253030**
		4.0	Analytical	**71505-254030**
		4.6	Analytical	**71505-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL C8 HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**70203-012101**
		4.0/4.6	Guard cartridge	**70203-014001**
	50	2.1	Analytical	**70203-052130**
		4.6	Analytical	**70203-054630**
	150	4.6	Analytical	**70203-154630**
5.0	50	2.1	Analytical	**70205-052130**
		3.0	Analytical	**70205-053030**
	100	2.1	Analytical	**70205-102130**
	150	4.6	Analytical	**70205-154630**
	250	4.6	Analytical	**70205-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL Phenyl HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	50	3.0	Analytical	**70603-053030**
	150	2.1	Analytical	**70603-152130**
5.0	10	2.1	Guard cartridge	**70605-012101**
		4.0/4.6	Guard cartridge	**70605-014001**
	50	2.1	Analytical	**70605-052130**
		4.6	Analytical	**70605-054630**
	100	2.1	Analytical	**70605-102130**
		4.6	Analytical	**70605-104630**
	150	4.6	Analytical	**70605-154630**
	250	4.6	Analytical	**70605-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL Phenyl-Hexyl HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**73003-012101**
		3.0	Guard cartridge	**73003-013001**
		4.0/4.6	Guard cartridge	**73003-014001**
	50	2.1	Analytical	**73003-052130**
		3.0	Analytical	**73003-053030**
	100	2.1	Analytical	**73003-102130**
		3.0	Analytical	**73003-103030**
		4.6	Analytical	**73003-104630**
	150	2.1	Analytical	**73003-152130**
		4.6	Analytical	**73003-154630**
5.0	10	4.0/4.6	Guard cartridge	**73005-014001**
	150	4.6	Analytical	**73005-154630**
	250	4.6	Analytical	**73005-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL CN HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	2.1	Guard cartridge	**70805-012101**
		3.0	Guard cartridge	**70805-013001**
		4.0/4.6	Guard cartridge	**70805-014001**
	100	2.1	Analytical	**70805-102130**
		3.0	Analytical	**70805-103030**
	150	2.1	Analytical	**70805-152130**
		3.0	Analytical	**70805-153030**
		4.6	Analytical	**70805-154630**
	250	4.6	Analytical	**70805-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL Silica HPLC Columns

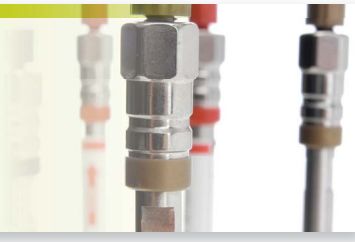
Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	2.1	Guard cartridge	**70005-012101**
		3	Guard cartridge	**70005-013001**
		4.0/4.6	Guard cartridge	**70005-014001**
	100	2.1	Analytical	**70005-102130**
		3	Analytical	**70005-103030**
	150	2.1	Analytical	**70005-152130**
		3	Analytical	**70005-153030**
		4.6	Analytical	**70005-154630**
	250	4.6	Analytical	**70005-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

BETASIL Diol HPLC Columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	4.0/4.6	Guard cartridge	**72605-014001**
	150	4.6	Analytical	**72605-154630**
	250	4.6	Analytical	**72605-254630**

Other column dimensions are available.
Please contact Customer Service for more details.



HyPURITY HPLC columns

HyPURITY C18 HPLC columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**22103-012101**
		3.0	Guard cartridge	**22103-013001**
		4.0/4.6	Guard cartridge	**22103-014001**
	50	2.1	Analytical	**22103-052130**
		3.0	Analytical	**22103-053030**
		4.6	Analytical	**22103-054630**
	100	2.1	Analytical	**22103-102130**
		3.0	Analytical	**22103-103030**
		4.6	Analytical	**22103-104630**
	150	2.1	Analytical	**22103-152130**
		3.0	Analytical	**22103-153030**
		4.6	Analytical	**22103-154630**
5.0	10	2.1	Guard cartridge	**22105-012101**
		3.0	Guard cartridge	**22105-013001**
		4.0/4.6	Guard cartridge	**22105-014001**
	30	2.1	Analytical	**22105-032130**
	50	2.1	Analytical	**22105-052130**
		3.0	Analytical	**22105-053030**
		4.0	Analytical	**22105-054030**
		4.6	Analytical	**22105-054630**
	100	2.1	Analytical	**22105-102130**
		4.0	Analytical	**22105-104030**
		4.6	Analytical	**22105-104630**
	150	2.1	Analytical	**22105-152130**
		3.0	Analytical	**22105-153030**
		4.0	Analytical	**22105-154030**
		4.6	Analytical	**22105-154630**
	250	2.1	Analytical	**22105-252130**
		4.0	Analytical	**22105-254030**
		4.6	Analytical	**22105-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

HyPURITY C8 HPLC columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
5.0	10	3.0	Guard cartridge	**22205-013001**
		4.0/4.6	Guard cartridge	**22205-014001**
	50	3.0	Analytical	**22205-053030**
		4.6	Analytical	**22205-054630**
	100	4.6	Analytical	**22205-104630**
	150	3.0	Analytical	**22205-153030**
		4.6	Analytical	**22205-154630**
	250	4.6	Analytical	**22205-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

HyPURITY Aquastar HPLC columns

Particle Size (µm)	Length (mm)	ID (mm)	Format	Cat. No.
3.0	10	2.1	Guard cartridge	**22503-012101**
		4.0/4.6	Guard cartridge	**22503-014001**
	50	2.1	Analytical	**22503-052130**
	100	2.1	Analytical	**22503-102130**
	150	2.1	Analytical	**22503-152130**
		4.6	Analytical	**22503-154630**
5.0	10	2.1	Guard cartridge	**22505-012101**
		4.0/4.6	Guard cartridge	**22505-014001**
	50	2.1	Analytical	**22505-052130**
	100	2.1	Analytical	**22505-102130**
	150	4.6	Analytical	**22505-154630**
	250	4.0	Analytical	**22505-254030**
		4.6	Analytical	**22505-254630**

Other column dimensions are available.
Please contact Customer Service for more details.

Thermo Scientific LC Columns for Biomolecules

The diversity of biological samples in terms of compound structure and properties coupled with matrix complexity demands a range of sample separation modes, column chemistries, column configurations and detection techniques for their effective characterization. Thermo Scientific addresses these needs with a range of silica and polymeric columns specifically designed to handle the unique rigors of the analysis of proteins, peptides, oligonucleotides and other biomolecules.

Columns for proteins

Reversed Phase

BioBasic reversed-phase columns provide superior chromatography because the extra dense bonding chemistry used for these packings produce a highly stable, reproducible surface for reliable results. BioBasic reversed phase packings are available in C18, C8 and C4, chemistries.

Acclaim 300 features 3µm silica particles for rapid analysis of complex protein digests. Compared to 5µm column packings, the smaller particles support increased flow rates and shallower gradients on shorter columns, for faster separation analysis.

ProSwift RP monolith columns uniquely provide the advantages of high resolution at exceptionally high flow rates for fast protein separation analysis.

Ion Exchange

ProPac™ and MAbPac ion exchange columns are based on a pellicular nonporous core particles providing exceptionally high resolution and efficiency for separations of protein variants, resolving isoforms that differ by a single charged residue. A hydrophilic layer prevents unwanted secondary interactions, and a grafted cation exchange surface provides pH-based selectivity control and fast mass transfer for high-efficiency separation and moderate capacity. Applications include analysis of protein variants of monoclonal antibodies, blood and dairy proteins.

BioBasic AX and BioBasic SCX ion exchange columns demonstrate superior reproducibility, both column-to-column and batch-to-batch because the 5µm, 300Å silica provides very efficiency. Both phases provide superior performance for proteins, peptides and nucleic acids using protein friendly ion exchange conditions.

ProSwift IEX monoliths provide the outstanding resolving power of nonporous analytical media combined with fast analysis performance.

Size Exclusion

BioBasic SEC columns, based on silica with a proprietary polymeric coating, offer the mechanical stability of silica-based size exclusion columns with higher efficiencies than that of polymer-based columns. Four pore sizes (60Å, 120Å, 300Å, 1000Å) are available, making them ideal for molecular weight determination of peptides, proteins and water soluble polymers. They can also be used for sample clean-up prior to other analyses.

MAbPac SEC-1 (300Å 5µm silica) is a size exclusion chromatography (SEC) column specifically designed for separation and characterization of monoclonal antibodies (MAb) and their aggregates, as well as the analysis of Fab and Fc fragments resulting from proteolysis.

Hydrophobic Interaction

The ProPac HIC-10 column is a high-resolution, high-capacity, 300Å, 5µm silica-based HIC column that provides excellent high resolution separations of proteins and variants for analytical and preparative applications. ProPac HIC columns provide exceptional hydrolytic stability under the highly aqueous conditions used in HIC.

Affinity

The ProPac IMAC-10 is a high-resolution analytical and semipreparative column for separation of proteins and peptides by immobilized metal affinity chromatography. It is packed with 10µm, nonporous, polymeric beads coated with a hydrophilic layer, then grafted with poly(IDA) chains. The poly(IDA) grafts are converted to metal-containing nanoparticles when the column is charged with metal. These nanoparticles act as IMAC interaction sites for individual proteins and provide the ProPac IMAC-10 with its high resolving power and elution peaks of high concentration and low volume.

The ProSwift ConA-1S affinity monolith column is unsurpassed for fast, highly efficient enrichment and purification of Concanavalin A (Con A) binding glycans, glycopeptides, and glycoproteins.

Columns for oligonucleotides

DNAPac™ strong anion exchange columns provide unsurpassed high-resolution analysis and purification of synthetic oligonucleotides. DNAPac columns can resolve full length oligonucletotides from n–1, n+1, and other failure sequences not possible with other columns.

DNASwift™ a strong anion exchange monolith column that provides exceptionally high purity and yield of oligonucleotides. This semipreparative column incorporates the high resolution and selectivity of the DNAPac column, providing unsurpassed purity and yields.

Columns for proteomics

Nano, capillary and micro columns

Acclaim PepMap and Acclaim PepMap RSLC columns are specially designed for high-resolution analyses of tryptic, natural, and synthetic peptides. The columns are often applied for LC-MS/MS peptide mapping for protein identification, biomarker discovery,and systems biology. Due to their high loading capacity, the columns are exceptionally suitable for the analysis of low abundant peptides in complex proteomics samples. Acclaim PepMap Trap columns are typically applied for the desalting and preconcentration of peptides before LC separation with MS detection. The columns are designed to provide the highest efficiencies for one dimensional peptide mapping experiments and 2D-LC analyses. PepSwift monolithic columns are specially designed for fast separation and identification of proteins and peptides using nano and capillary LC coupled to MS.

Using highly pure chromatographic media and biocompatible, metal-free fused silica capillaries, EASY-Column™ capillary LC columns are produced with a focus on design simplicity and strict quality control. As a result, they deliver outstanding chromatographic performance on any nano LC system.

The BioBasic KAPPA line meets all the sensitivity needs of demanding LC/MS separations. High efficiency capillaries are available in internal diameters ranging from 500µm all the way down to 75µm ID, and lengths of 50mm to 250mm. The BioBasic KAPPA line is ideal for all LC/MS analyses, especially proteomics separations of typically small sample concentrations. BioBasic 18, 8, 4 and SCX columns are also available in nanobore formats for nanospray LC/MS applications, particularly proteomics. At flow rates of nL/min versus mL/min, nanobore columns offer higher sensitivity with greater signal-to-noise ratio than traditional electrospray.

IntegraFrit columns have an integral high porosity frit, behind which is the packed chromatography bed. The frit end of the fused silica column is polished flat to ensure a clean connection to the emitter of choice. PicoFrit columns eliminate post-column performance losses by spraying directly from the column, boosting MS performance compared to that provided by a column attached to a tip.

Columns for Carbohydrates

HyperREZ XP Carbohydrate columns are based on a monodisperse resin with a 4 or 8% divinylbenzene content, and provide an ideal medium for the analysis of carbohydrates and organic acids. Unlike silica based columns they are stable at low pH, allowing the use of dilute acid as a mobile phase.

Bio Columns Selection Guide

Analyte	Mode of analysis	Recommended column	
Proteins	Size Exclusion	BioBasic SEC	4-135
		MAbPac SEC-1	4-131
	Ion Exchange	BioBasic AX	4-136
		ProPac SCX-10, WCX-10, SAX-10, WAX-10	4-121
		MAbPac SCX-10	4-130
		ProSwift IEX	4-127
	Reversed Phase	BioBasic 18, 8, 4	4-138
		Acclaim 300 C18	4-141
		ProSwift RP	4-128
	Hydrophobic Interaction	ProPac HIC-10	4-125
	Affinity	ProPac IMAC-10	4-126
		ProSwift ConA-1S	4-129
Peptides	Proteomics	Acclaim PepMap	4-142
		PepSwift	4-145
		EASY-Column	4-146
		PicoFrit, IntegraFrit	4-147
		KAPPA	4-148
	Analytical	BioBasic 18, 8, 4	4-138
		Acclaim 300	4-056
	Preparative	BioBasic	Inquire
Amino Acids (derivatized)	Ion Exchange	AminoPac PA10	Inquire
	Reversed phase	Hypersil GOLD	4-056
Amino Acids (underivatized)	Ion Exchange	AminoPac PA10	Inquire
	Reversed phase	Hypercarb	4-097
Nucleotides	Anion Exchange	BioBasic AX	4-136
	Polar retention	Hypercarb	4-097
Oligonucleotides	Ion Exchange	BioBasic AX	4-136
		DNAPac PA100, PA200	4-132
		DNASwift	4-134
Carbohydrates	Ligand Exchange	HyperREZ XP	4-153
	Ion Exchange	CarboPac	Inquire
	HILIC	Acclaim HILIC	4-079
		Hypersil GOLD HILIC	4-070
		Syncronis HILIC	4-093
	Polar retention	Hypercarb	4-097

HPLC Phases for Biomolecules

Phase	Particle Type	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	% Carbon	Endcapping	USP Code	Phase Code	Page
Acclaim PepMap									
100 C18	Spherical, fully porous silica	2, 3, 5	100	300	15	Yes	L1	–	**4-142**
300 C18	Spherical, fully porous silica	5	300	100	9	Yes	L1	–	**4-143**
100 C8	Spherical, fully porous silica	3, 5	100	300	9	Yes	L7	–	**4-144**
300 C4	Spherical, fully porous silica	5	300	300	3	Yes	L26	–	**4-144**
BioBasic									
18	Spherical, fully porous silica	5	300	100	9	Yes	L1	721	**4-138**
8	Spherical, fully porous silica	5	300	100	5	Yes	L7	722	**4-139**
4	Spherical, fully porous silica	5	300	100	4	Yes	L26	723	**4-140**
AX	Spherical, fully porous silica	5	300	100	3	No	–	731	**4-136**
SCX	Spherical, fully porous silica	5	300	100	3	No	L52	733	**4-137**

Columns for Protein Separations

Silica Size Exclusion Chromatography Phases

Phase	SEC Type	Particle Type	Particle Size (µm)	Pore Size (Å)	Exclusion limit operating range (kDa)	USP Code	Phase Code	Page
BioBasic								
SEC 60	Aqueous	Spherical, fully porous silica	5	60	0.1 - 6	–	733	**4-135**
SEC 120	Aqueous	Spherical, fully porous silica	5	120	0.1 - 50	L33	734	**4-135**
SEC 300	Aqueous	Spherical, fully porous silica	5	300	1 - 500	L33, L59	735	**4-135**
SEC 1000	Aqueous	Spherical, fully porous silica	5	1000	20 - 4000	L33	736	**4-135**
MAbPac								
SEC-1	Aqueous	Spherical, fully porous silica	5	300	1 - 500	L33, L59		**4-131**

Silica Hydrophobic Interaction Chromatography Phases

Column	Phase	Target Applications	Base Matrix Material	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	Capacity	Solvent Compatibility	pH Range
ProPac HIC-10	Hydrophobic Interaction	High resolution separations of proteins and protein variants	Spherical, porous ultrapure silica with amide/ethyl surface chemistry	5	300	100	340mg lysozyme per 7.8 x 75mm column	2M Ammonium sulfate/ phosphate salts, organic solvent for cleanup	2.5-7.5

Polymeric Ion Exchange, Reversed Phase and Affinity Columns

Column	Phase	Target Applications	Base Matrix Material	Functional Groups	Capacity	Recommended Flow Rate	Solvent Compatibility	Maximum Backpressure	pH Range
MAbPac SCX-10	Strong Cation Exchange	High Resolution separation of monoclonal antibody variants	Highly crosslinked divinlybenzene 10µm nonporous particles	Sulfonic	30µg/mL	0.2-2.0 mL/min	50% acetonitrile	3000psi (21 MPa)	2.0-12
ProPac WCX-10	Weak Cation Exchange	High resolution separations of proteins and protein variants	Ethylvinylbenzene cross linked with 55% divinlybenzene 10µm nonporous particles	Carboxylate	6mg/mL lysozyme	0.2-2.0 mL/min	80% ACN, acetone. Incompatable with alcohols and MeOH	3000psi (21 MPa)	2.0-12
ProPac SCX-10	Strong Cation Exchange	High resolution separations of proteins and protein variants	Ethylvinylbenzene cross linked with 55% divinlybenzene 10µm nonporous particles	Sulfonate	3mg/mL lysozyme	0.2-2.0 mL/min	80% ACN, acetone, MeOH	3000psi (21 MPa)	2.0-12
ProPac SCX-20	Strong Cation Exchange	High Resolution separations of proteins and protein variants	Divinlybenzene 10µm nonporous particles	Sulfonic	30µg/mL	0.2-2.0 mL/min	50% acetonitrile	3000psi (21 MPa)	2.0-12
ProPac WAX-10	Weak Anion Exchange	High resolution separations of proteins and protein variants	Ethylvinylbenzene cross linked with 55% divinlybenzene 10µm nonporous particles	Tertiary amine	5mg/mL BSA	0.2-2.0 mL/min	80% ACN, acetone, MeOH,	3000psi (21 MPa)	2.0-12
ProPac SAX-10	Strong Anion Exchange	High resolution separations of proteins and protein variants	Ethylvinylbenzene cross linked with 55% divinlybenzene 10µm nonporous particles	Quaternary ammonium	15mg/mL BSA	0.2-2.0 mL/min	80% ACN, acetone, MeOH	3000psi (21 MPa)	2.0-12
ProSwift RP-1S	Reversed Phase	Fast protein analysis with high resolution	Monolith; polystyrene-divinylbenzene	Phenyl	5.5mg/mL Insulin	2.0-4 .0 mL/min	Most common organic solvents	2800psi (19.2 Mpa)	1.0-14
ProSwift RP-2H	Reversed Phase	Fast protein analysis with high resolution	Monolith; polystyrene-divinylbenzene	Phenyl	1.0mg/mL Lysozyme	1.0-10 mL/min	Most common organic solvents	2800psi (19.3 Mpa)	1.0-14
ProSwift RP-3U	Reversed Phase	Fast protein analysis with high resolution	Monolith; polystyrene-divinylbenzene	Phenyl	0.5mg/mL Lysozyme	1.0-16 mL/min	Most common organic solvents	2800psi (19.3 Mpa)	1.0-14
ProSwift RP-4H	Reversed Phase	Fast protein analysis with high resolution	Monolith; polystyrene-divinylbenzene	Phenyl	2.3mg/mL Lysozyme	0.1-0.3 mL/min	Most common organic Solvents	1500psi	1.0-14
ProSwift SAX-1S	Strong Anion Exchange	Fast protein analysis with high resolution	Monolith; polymethacrylate	Quaternary amine	18mg/mL BSA	0.5-1.5 (4.6mm)	Most common organic solvents	1000psi (4.6mm) 2000psi (1.0mm)	2.0-12
ProSwift SCX-1S	Strong Cation Exchange	Fast protein analysis with high resolution	Monolith; polymethacrylate	Sulfonic acid	30mg/mL Lysozyme	0.5-1.5 mL/min (4.6mm)	Most common organic solvents	1000psi (4.6mm)	2.0-12
ProSwift WAX-1S	Weak Anion Exchange	Fast protein analysis with high resolution	Monolith; polymethacrylate	Tertiary amine (DEAE)	18mg/mL BSA	0.5-1.5 mL/min (4.6mm)	Most common organic solvents	1000psi (4.6mm) 2000psi (1.0mm)	2.0-12
ProSwift WCX-1S	Weak Cation Exchange	Fast protein analysis with high resolution	Monolith; polymethacrylate	Carboxylic acid	23mg/mL Lysozyme	0.5-1.5mL/min (4.6mm), 0.05-0.20	Most common organic solvents	1000psi (4.6mm) 2000psi (1.0mm)	2.0-12
ProPac IMAC-10	Immobilized Metal Affinity	High resolution separation of certain metal-binding proteins and peptides	Polystyrene divinylbenzene 10µm nonporous particles	Poly (IDA) grafts	>60mg lysozyme/ mL gel (4x250mm)	1.0mL/min	EtOH, urea, NaCl, non-ionic detergents, glycerol, acetic acid, guanidine HCl	3000psi (21MPa)	2.0-12
ProSwift ConA-1S	Affinity	Concanavalin A binding glycans, glycopeptides and proteins	Monolith; polymethacrylate	Concanavalin A ligands	12-16mg of protein	0-1.0mL/min	Up to 10% methanol	2000psi	5.0-8

Columns for Carbohydrate Separations

Phase	Particle Type	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	% Carbon	Endcapping	USP Code	Phase Code	Page
HyperREZ XP									
Carbohydrate H^+	spherical, polymer	8.0	–	–	–	–	L17	690	**4-152**
Carbohydrate Pb^{2+}	spherical, polymer	8.0	–	–	–	–	L34	691	**4-152**
Carbohydrate Ca^{2+}	spherical, polymer	8.0	–	–	–	–	L19	692	**4-152**
Carbohydrate Na^+	spherical, polymer	10.0	–	–	–	–	–	693	**4-152**
Organic Acid	spherical, polymer	8.0	–	–	–	–	L17	696	**4-152**
Sugar Alcohol	spherical, polymer	8.0	–	–	–	–	L19	697	**4-152**

Columns for Oligonucleotide Separations

Column	Target Applications	Base Matrix Material	Substrate Crosslinking	Latex Crosslinking	Capacity	Recommended Eluents	Recommended Flow Rate	Solvent Compatibility	Maximum Backpressure	pH Range
DNAPac PA100	High resolution separations of single and double stranded DNA or RNA oligonucleotides	13µm diameter nonporous substrate agglomerated with alkyl quaternary ammonium functionalized latex 100nm MicroBeads	55%	5%	40µeq	Hydroxide	1.5mL/min	0-100%	4000psi (28MPa)	2-12.5
DNAPac PA200	High resolution separations of single and double stranded DNA or RNA oligonucleotides	8µm diameter nonporous substrate agglomerated with alkyl quaternary ammonium functionalized latex 130nm MicroBeads	55%	5%	40µeq	Hydroxide, acetate/ hydroxide	1.2mL/min	0-100%	4000psi (28MPa)	2-12.5
DNASwift	High resolution separations for purification of oligonucleotides	Monolith; polymethacrylate substrate agglomerated with quaternary amine functionalized latex	N/A	N/A	50mg, of a 20 mer oligonucleotide	$NaClO_4$ and NaCl	0.5-2.5mL	Most Common Organic Solvents	1500psi	6.0-12.4

ProPac SCX-10 and WCX-10

Strong and weak cation exchange columns are based on a nonporous core particle providing exceptionally high resolution and efficiency for separations of protein variants

- Characterization and quality control assessment of monoclonal antibodies and other proteins
- Unequalled high resolution separations
- High-efficiency peaks
- Unmatched column-to-column and lot-to-lot reproducibility
- Useful for characterization of related protein variants including deamidation and MAb lysine truncation variants
- ProPac SCX-10 is a strong cation exchange column with sulfonate functional groups
- ProPac WCX-10 is a weak cation exchanger with a carboxylate functional groups

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

ProPac WCX-10 Ion Exchange HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10.0	50	–	**074600**	–	–
	100	–	**SP5829**	–	–
	150	–	**SP6703**	–	–
	250	**063472**	**054993**	**063474**	**SP5482**

ProPac WCX-10 Ion Exchange HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
10.0	50	**063480**	**054994**

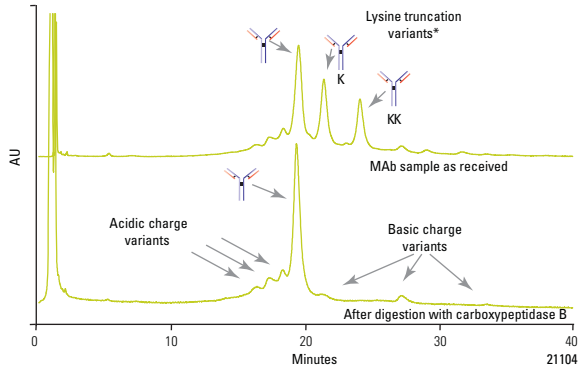
ProPac SCX-10 Ion Exchange HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10.0	250	**063456**	**054995**	**063700**	**SP5522**

ProPac SCX-10 Ion Exchange HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
10.0	50	**063462**	**054996**

MAb separation on ProPac WCX-10 column: characterization of lysine truncation variants



Column: ProPac WCX-10 (4 × 250mm)

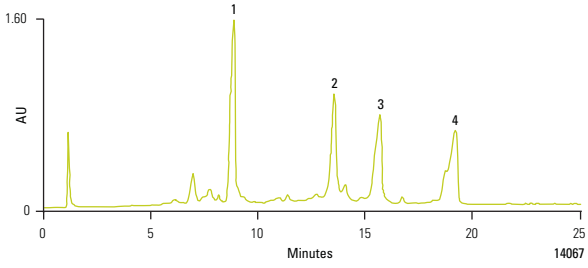
Eluents:	(E1) 20mM MES + 115mM NaCl + 1mM EDTA, pH 5.5 (E2) 20mM MES + 145mM NaCl + 1mM EDTA, pH 5.5

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

Sample:	MAb PDL
Flow Rate:	1.0mL/min
λ:	280nm

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

Separation of hemoglobin variants



Column: ProPac SCX-10, 4 × 250mm

Eluent:	A) 20mM Sodium phosphate, 4mM Potassium cyanide, pH 6 B) 1 M Sodium chloride in water C) Water

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

Flow Rate:	1mL/min
Inj. Vol.:	10µL
Detection:	220nm
Sample:	1. Fetal hemoglobin 2. Hemoglobin 3. Sickle cell hemoglobin 4. Hemoglobin C

ProPac Kits

Part number	Phase Description	Set Contents	Column dimensions
SP5731	ProPac WAX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4mm
SP5732	ProPac WAX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4mm
SP5729	ProPac SAX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4mm
SP5730	ProPac SAX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4mm
SP5512	ProPac WCX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4mm
SP5513	ProPac WCX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4mm
SP5727	ProPac SCX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4mm
SP5728	ProPac SCX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4mm

ProPac SAX-10 and WAX-10

Strong and weak anion exchange columns are based on a nonporous core particle providing unequalled high resolution and efficiency in the separations of protein variants

- Unequalled resolution
- High-efficiency peaks
- Useful for characterization and quality control assessment of closely-related protein variants
- Supports separation of proteins that differ by as little as one amino acid residue
- Neutral hydrophilic coat that eliminates protein-resin hydrophobic interactions
- Superior lot-to-lot and column-to-column reproducibility
- ProPac SAX-10 is a strong anion exchange column with quaternary amine functional group
- ProPac WAX-10 column is a weak anion exchanger with a tertiary amine functional group

These columns can resolve protein isoforms that differ by as little as one charged residue. A hydrophilic layer prevents unwanted secondary interactions and a grafted anion exchange surface provides pH based selectivity control and fast mass transfer for high peak efficiency and resolution separations.

ProPac WAX-10 Ion Exchange HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10.0	250	**063464**	**054999**	**063707**	**SP5598**

ProPac WAX-10 Ion Exchange HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
10.0	50	**063470**	**055150**

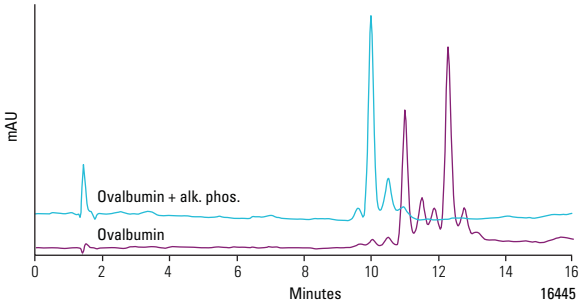
ProPac SAX-10 Ion Exchange HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10.0	250	**063448**	**054997**	**063703**	**SP5594**

ProPac SAX-10 Ion Exchange HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
10.0	50	**063454**	**054998**

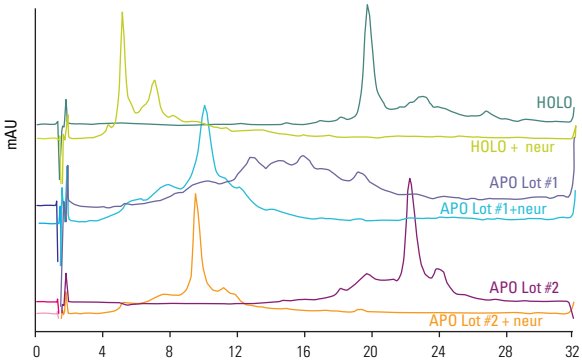
Resolution of phosphorylation variants of ovalbumin



Column: ProPac SAX-10, 4 x 250mm

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

Effect of sialylation on transferrin chromatography



Columns: ProPac SAX-10, 4 x 250mm

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

ProPac PA1

For hydrophilic anionic protein separations

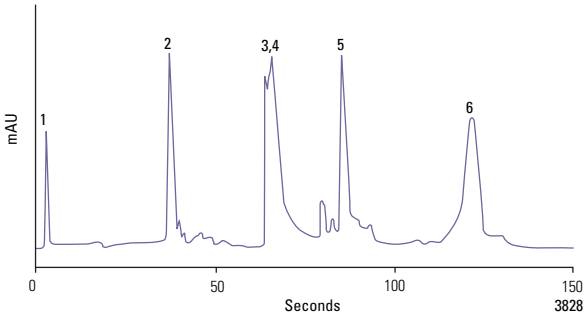
- Good for hydrophilic anionic proteins and peptides
- Ideal for high-resolution separations of proteins with pI values from 3 to 11
- Available in semipreparative format
- Pellicular packing ensures high-efficiency and fast mass transport

The ProPac PA1 column supports the analysis and purification of hydrophilic anionic proteins and peptides.

ProPac PA1 Ion Exchange HPLC Columns

Particle Size (µm)	Length (mm)	4.0mm ID	9.0mm ID
10.0	50	**039657**	–
	250	**039658**	**040137**

Gradient separation of protein standards



Column: ProPac PA1 (4 x 50mm)

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

ProPac HIC-10

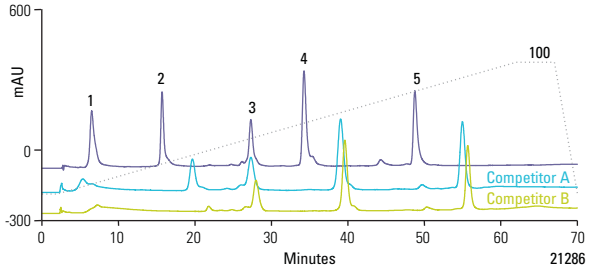
Hydrophobic Interaction Chromatography columns for the high resolution separation of proteins and peptides

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

The ProPac HIC-10 column is a high-resolution, high-capacity, silica-based HIC column that provides excellent separations of proteins and variants for analytical and preparative applications. ProPac HIC columns provide exceptional hydrolytic stability under the highly aqueous conditions used in HIC.

ProPac PA1 Ion Exchange HPLC Columns

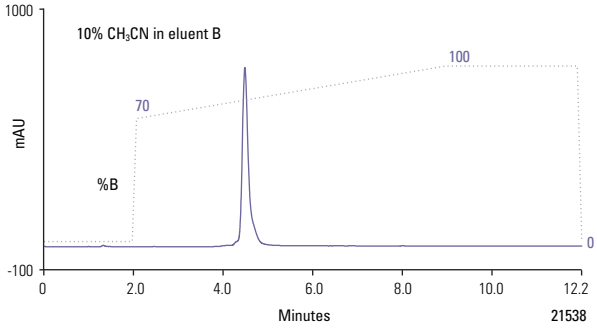
Particle Size (µm)	Length (mm)	2.1mm ID	4.6mm ID	7.8mm ID
10.0	75	–	–	**063665**
	100	**063653**	**063655**	–
	250	–	**074197**	–



Column: 7.5 × 75mm (Competitors A and B); 7.8 × 75mm (ProPac HIC-10)

Flow:	1.0mL/min
WVL:	214nm
Eluents:	(A) 2 M $(NH_4)2\,SO_4$ in 0.1 M NaH_2PO_4 (pH 7.0) (B) 0.1 M NaH_2PO_4 (pH 7.0)
Sample: (1mg/mL each final after 1:1 dilution with eluent A)	Mixture of proteins
Inj. Volume:	20µL
Order of elution:	1. Cytochrome c 2. Myoglobin 3. Ribonuclease A 4. Lysozyme 5. Chymotrypsinogen

Separation of a mixture of proteins using the ProPac HIC-10, compared to the same separation on two competitor columns



Column: ProPac® HIC-10, 4.6 × 100mm

Eluents:	(A) 0.5 M $(NH_4)_2\,SO_4$ in 0.1M NaH_2PO_4 (pH 7.0) (B) 0.1 M NaH_2PO_4 (pH 7.0)
Gradient:	70–100% B in 15 min
Flow:	1mL/min
Inj. Volume:	5µL (25µg)
Detection:	UV, 214nm
Sample:	MAb 50µL (50mg/mL) + 450µL Eluent B

Gradient separation of a monoclonal antibody using the ProPac HIC-10

ProPac IMAC-10

IMAC column for analytical and semipreparative protein and peptide applications

- High-purity separations of metal-binding proteins
- State-of-the-art technology for reusable columns with metal tailored specificity
- Resolve target proteins using a single column in a high-resolution gradient run
- Retention control by imidazole concentration or pH gradient
- High loading capacity for protein purification applications
- Wide range of metal-specific applications

The ProPac IMAC-10 is a high-resolution analytical and semipreparative column for separation of proteins and peptides by immobilized metal affinity chromatography

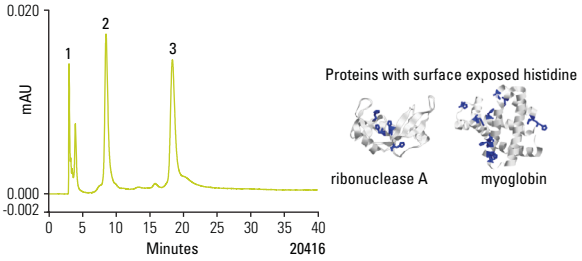
ProPac IMAC-10 Immobilized Metal Affinity HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10.0	50	**063617**	**063272**	**063276**	**063615**	–
	250	–	**063274**	**063278**	**063280**	**063282**

Accssesories for the ProPac IMAC-10 column

Description	Cat.No.
IMAC Loading Column (4 x 50mm)	**063667**
IMAC Loading Column (9 x 50mm)	**063710**
IMAC Loading Column (9 x 250mm)	**063718**

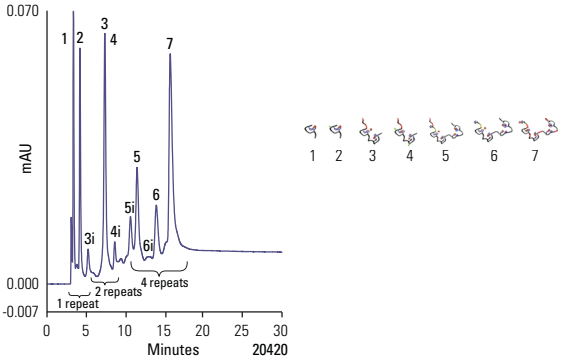
Separation of standard proteins with surface-exposed histidines



Column: ProPac IMAC-10 (4mm x 250mm)

E1: 20mM MES + 0.5 M NaCl, pH = 7.5		
E2: E1 + 100mM imidazole, pH = 7.5		
Gradient:	t (min)	%E1
	0	96
	15	0 curve 7
	40	0
Inject Vol:	15µL	
Sample:	1. 0.25mg/mL ribonuclease A 2. 1.00mg/mL myoglobin 3. 1.50mg/mL carbonic anhydrase	
Flow Rate:	0.5mL/min	
Wavelength:	280nm	

Separation of prion-related peptides using the ProPac IMAC-10



Column: ProPac IMAC-10 (4 × 250mm)

Eluent:	(E1) 20mM HEPES + 0.5 M NaCl, pH = 7.5 (E2) E1 + 50mM imidazole, pH = 7.5	
Gradient:	t (min)	%A
	0	95
	10	0 curve 7
	30	0
Inj. Volume:	15µL	
Sample:	Prion-derived peptides	
Flow Rate:	0.5mL/min	
Wavelength:	280nm	
Peak	# Sequence	
1	PHGGGWGQ	
2	PHGXGWGQ	
3	$KKRPKP(PHGGGWGQ)_2$	
4	$KKRP(PHGXGWGQ)_2$	
5	$KKRPKPWGQ(PHGGGWGQ)_4$	
6	$WGQ(PHGGGWGQ)_4$	
7	$WGA(PHGGGWGA)_4$	
X = sarcosine (N-methyglycine)		

ProSwift IEX

Monolith IEX columns for high-resolution and fast protein analysis

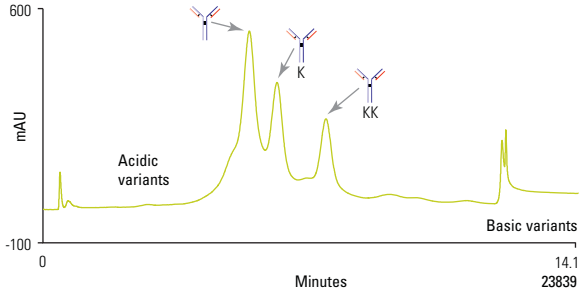
- High resolution
- High loading capacity
- Fast analysis
- Wide range of operational flow rates
- Excellent stability over a wide pH range
- Outstanding reproducibility and ruggedness
- Optimal performance in a broad variety of applications
- High throughput and improved productivity

ProSwift IEX monoliths provide the outstanding resolving power of nonporous analytical media combined with fast separation analysis

ProSwift Ion Exchange Monolith HPLC Columns

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

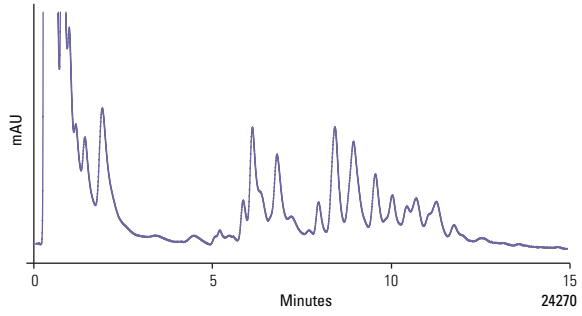
Separation of monoclonal antibody variants



Column: ProSwift WCX-1S (4.6 × 50mm)

Flow rate:	1mL/min
Eluents:	A. 10mM Sodium phosphate (pH 7.6) B. 1 M Sodium chloride in eluent A
Detection:	UV, 214nm
Sample:	MAb 5mg/mL
Inj. Volume:	10µL
Gradient:	5–10% B in 10 min, 100% B for 4 min

Protein separation on the ProSwift WAX-1S column



Column: ProSwift WAX-1S (1 × 50mm)

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

ProSwift RP Columns

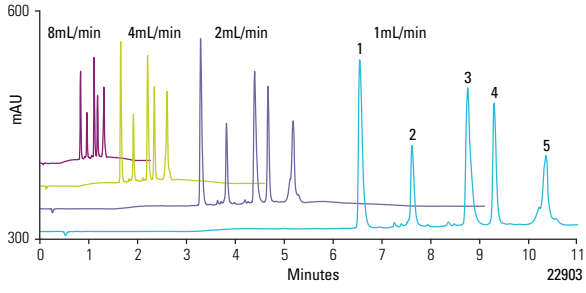
Reversed-phase monolith columns that uniquely provide the advantages of high resolution at exceptionally high flow rates for fast protein separations and analysis

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

Deliver the outstanding resolving power of nonporous analytical media combined with faster separations and analysis than any bead based columns available.

ProSwift Reversed-Phase Monolith HPLC Columns

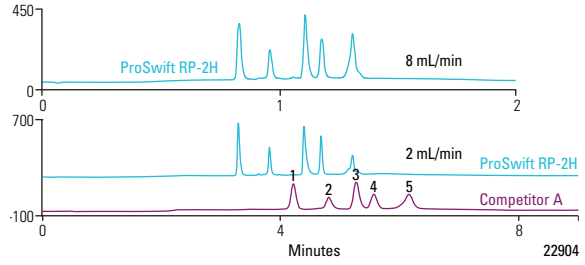
Packing	Functional Group	Length (mm)	1.0mm ID	4.6mm ID
monolith	RP-1S	50	–	**064297**
monolith	RP-2H	50	–	**064296**
monolith	RP-3U	50	–	**064298**
monolith	RP-4H	50	**069477**	–
monolith	RP-4H	250	**066640**	–



Column: ProSwift RP-2H (4.6 × 50mm)

Flow Rate:	1, 2, 4, or 8mL/min
Eluents:	(A) DI H_2O/CH_3CN (95:5; V/V) + 0.1% TFA (B) DI H_2O/CH_3CN (5:95; V/V) + 0.1% TFA
Gradient:	1mL/min: 1-75% B in 12 min 2mL/min: 1-75% B in 6 min 4mL/min: 1-75% B in 3 min 8mL/min: 1-75% B in 1.5 min
UV Detection:	214nm
Sample:	Mixture of five proteins
Inj. Volume:	5µL
Order of Elution:	1. Ribonuclease A 1.5mg/mL 2. Cytochrome C 0.5 3. BSA 1.5 4. Carbonic anhydrase 0.9 5. Ovalbumin 1.5

Separation of proteins at a variety of flow rates



Columns:	**1. ProSwift RP-2H, 4.6 × 50mm** **2. Competitor A, 4.6 × 100mm, 15µm**
Eluents:	(A) DI H_2O/CH_3CN (95:5; V/V) + 0.1% TFA (B) DI H_2O/CH_3CN (5:95; V/V) + 0.1% TFA
Gradient:	2mL/min: 1-75% B in 6 min 8mL/min: 1-75% B in 1. min
Flow Rate:	2 or 8mL/min
Inj. Volume:	5µL
Temperature:	30°C
Detection:	UV, 214nm
Sample:	Mixture of five proteins
Peaks:	1. Ribonuclease A 1.5mg/mL 2. Cytochrome C 0.5 3. BSA 1.5 4. Carbonic anhydrase 0.9 5. Ovalbumin 1.5

Comparison of ProSwift RP-2H with porous bead-based column of leading competitor A

ProSwift ConA-1S

For the highly efficient enrichment and purification of Con A binding glycans and glycoconjugates

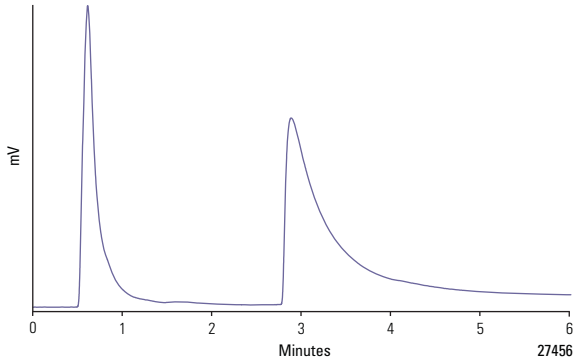
- Highly efficient enrichment and purification
- Highly purified glycan and glycoconjugate products
- High capacity and ligand density
- High sample recovery
- Low elution volumes
- Fast separations
- HPLC compatible
- Reusable for over one hundred purifications

The ProSwift ConA-1S affinity monolith column is unsurpassed for fast, highly efficient enrichment and purification of Concanavalin A (Con A) binding glycans, glycopeptides, and glycoproteins.

ProSwift Affinity Monolith HPLC Columns

Packing	Functional Group	Length (mm)	5.0mm ID
monolith	ConA-1S	50	**074148**

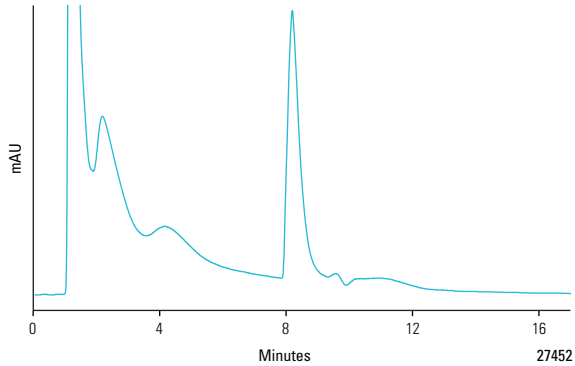
Fast, highly efficient enrichment and purification of a group of fluorescently labeled glycans in under 6 min using the ProSwift ConA-1S column



Column: ProSwift ConA-1S

Flow rate:	1.0mL/min
Eluent A:	50mM NaOAc, 0.2M NaCl, pH 5.3, with 1mM $CaCl_2$ and 1mM $MnCl_2$
Eluent B:	100mM α-methyl mannoside in eluent A
Gradient:	0% B for 2 min, 0-100% B in 0.5 min, 100% B for 3.5 min
Temperature:	25°C
Sample:	2-AB labeled serum protein N-glycans
Detection:	Fluorescence, EM at 420nm

Glycopeptide enrichment using the ProSwift ConA-1S column



Column: ProSwift ConA (5 × 50mm)

Eluent A:	50mM NaOAc, 0.2 M NaCl, pH 5.3, with 1mM $CaCl_2$, 1mM $MgCl_2$
Eluent B:	100mM α-methyl-mannopyranoside in eluent A
Flow Rate:	0.5mL/min
Temperature:	25°C
Detection:	UV 214nm
Sample:	Trypsin digested HRP peptides
Inj. Volume:	40µL
Gradient:	100% A from 0–5 min, 100% B from 6–15 min, 100% A from 16–25 min

MAbPac SCX-10

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

- Exceptionally high resolution for monoclonal antibody variants
- High efficiency
- Ideal for characterization and quality control assessment of monoclonal antibodies
- Unmatched column-to-column and lot-to-lot reproducibility
- Hydrophobic interactions essentially eliminated
- Ideal for stability studies
- Meets the regulatory requirements for biopharmaceutical characterization

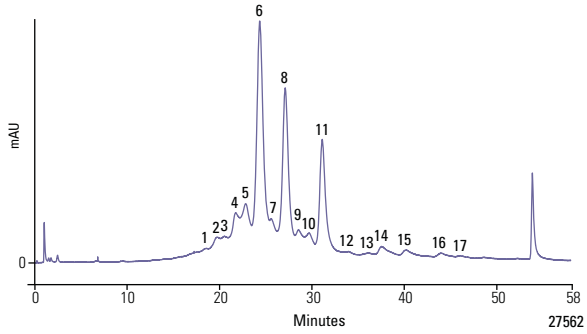
MAbPac SCX-10 Ion Exchange HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
3.0	50		**077907**
5.0	50	–	**078656**
	250	–	**078655**
10.0	50	–	**075603**
	150	–	**075602**
	250	**075604**	**074625**

MAbPac SCX-10 Ion Exchange HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
10.0	50	**075749**	**074631**

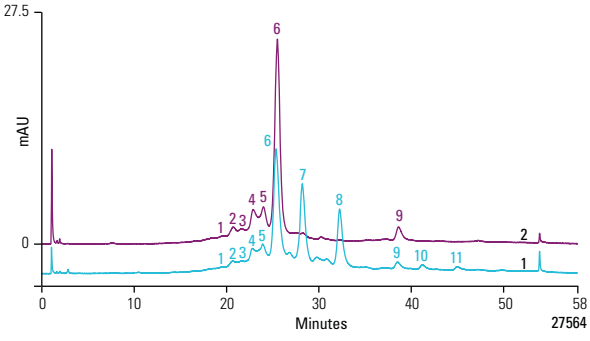
The unique nonporous pellicular resin provides exceptionally high resolving power, permitting the separation of monoclonal antibody variants that differ by as little as one charged residue. Hydrophobic interactions with the resin are essentially eliminated for very efficient peaks.



Column: MAbPac SCX-10 (4 × 250mm)

Eluents:	A. 20mM MES (pH 5.6) + 60mM NaCl B. 20mM MES (pH 5.6) + 300mM NaCl
Gradient:	15–36% B in 50 min
Flow Rate:	1mL/min
Temperature:	30°C
Inj. Volume:	10µL
Detection:	UV at 280nm
Sample:	MAb B, 5mg/mL
Peaks 1–5:	Acidic variants
Peaks 6, 8, 11:	C-Terminal Lys variants
Peaks 12–17:	Basic variants

The MAbPac SCX-10 column provides high resolution separations of monoclonal antibody variants



Column:	**MAbPac SCX-10 (4 × 250mm)**
Eluents:	A. 20mM MES (pH 5.6) + 60mM NaCl B. 20mM MES (pH 5.6) + 300mM NaCl
Gradient:	15–36% B in 50 min
Flow Rate:	1mL/min
Temperature:	30°C
Inj. Volume:	5µL
Detection:	UV at 280nm
Samples:	1. MAb B, 900µg in 100µL (no carboxypeptidase) 2. MAb B, 900µg in 100µL + carboxypeptidase, 50µg, incubation at 37°C for 3 h
Both Chromatograms:	Peaks 1–5: Acidic variants
Sample 1:	Peaks 6-8: C-Terminal lysine truncation variants of main peak Peaks 9–11: C-Terminal lysine truncation variants of minor variant peak
Sample 2:	Peak 6 results from peaks 6, 7, and 8 after CBP treatment. Peak 9 results from peaks 9, 10, and 11 afer CBP treatment

Baseline Resolution of C-terminal lysine variants of a monoclonal antibody sample is verified by a second chromatogram after treatment with Carboxypeptidase B

MAbPac SEC-1

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

- Anaylsis of monoclonal antibodies (MAb) and their aggregates
- Analysis of MAb Fab and Fc fragments.
- Hydrophilic bonded layer for minimal nondesired interactions between the biomolecules and the stationary phase
- Nonmetallic and Biocompatible PEEK housing eliminates metal contamination from the column hardware
- Stable surface bonding leads to low column bleed and compatibility with MS, ELSD and Corona CAD detection
- Reproducible and rugged
- Superior performance for the analysis of monoclonal antibodies, even using high and low-salt concentrations

The stationary phase is designed for different eluent conditions containing both high and low concentration of salt mobile phases, as well as operates in mass spectrometry friendly volatile eluents.

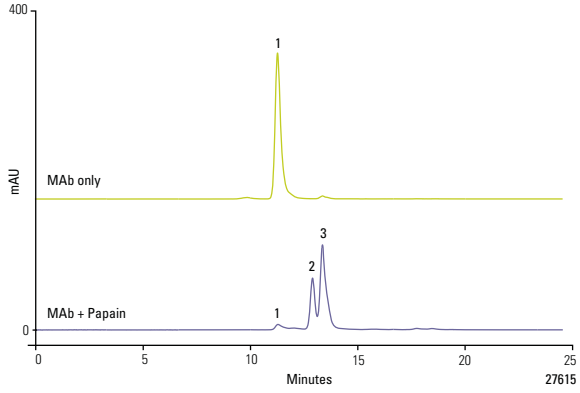
MAbPac SEC-1 Size Exclusion HPLC Columns

Particle Size (µm)	Length (mm)	4.0mm ID
10.0	150	**075592**
	300	**074696**

MAbPac SEC-1 Size Exclusion HPLC Guards

Particle Size (µm)	Length (mm)	4.0mm ID
10.0	50	**074697**

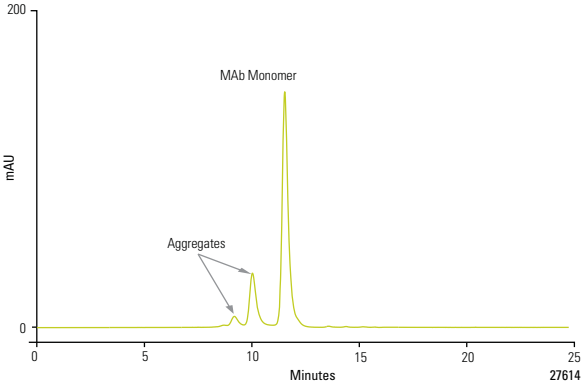
Monoclonal Antibody (MAb) fragment analysis



Column: MAbPac SEC-1, 5µm

Dimension:	4.0 × 300mm
Mobile Phase:	0.3 M NaCl in 50mM phosphate buffer pH 6.8
Temperature:	30°C
Flow Rate:	0.20mL/min
Inj. Volume:	1µL
Detection:	UV, 280nm
Samples:	1. MAb (5mg/mL) 2. MAb (5mg/mL) + Papain (10µL/300µL incubation 37°C for 3h)
Peaks:	1. MAb 2. $F(ab')_2$ 3. Fc

Size exclusion chromatography column for monoclonal antibodies and aggregates



Column: MAbPac SEC-1, 5µm

Dimension:	4.0 × 300mm (PEEK)
Mobile Phase:	0.3 M NaCl in 50mM phosphate buffer pH 6.8
Temperature:	30°C
Flow Rate:	0.20mL/min
Inj. Volume:	2µL
Detection:	UV, 280nm
Sample:	MAb (10mg/mL)

DNAPac PA100

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

- Ultrahigh-resolution separations of oligonucleotides
- Capable of n, n-1 resolution for oligonucleotides
- Resolves oligonucleotides with secondary structures
- Compatible with solvent, high pH, and high temperatures
- Analyzes phosphorothioate-based clinical samples
- Provides easy scale-up

DNAPac PA100 can resolve full length from n–1, n+1, and other failure sequences.

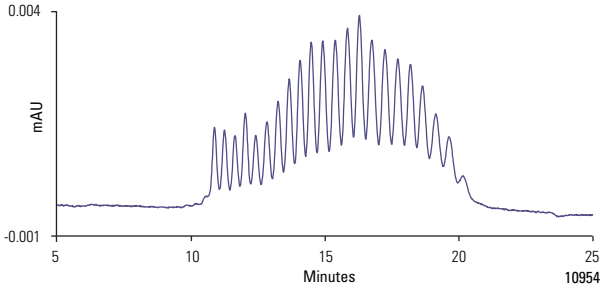
DNAPac PA100 HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
13.0	250	**SP3686**	**043010**	**043011**	**SP2091**

DNAPac PA100 HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID
13.0	50	**SP4016**	**043018**

Separation of oligonucleotides using the DNAPac PA100 column



Column: DNAPac PA100

Eluent:	410-510mM NaCl in 25mM Tris-Cl, pH 8.0
Flow Rate:	1.5mL/min
Detection:	UV, 260nm
Sample:	$pd(A)_{40-60}$

DNAPac PA200

The DNAPac PA200 is a strong anion exchange column developed to provide unsurpassed high-resolution analysis and purification of synthetic oligonucleotides

- Ultrahigh-resolution separations of oligonucleotides
- Achieve n, n-1 resolution for oligonucleotides
- Resolve oligonucleotides with secondary structures
- Assay phosphorothioate purity
- Selectivity control with eluent pH, salt, and solvent
- Resolve RNA with aberrant (2in–5in) links from normal SS-RNA

DNAPac PA200 can resolve full length from n–1, n+1, and other failure sequences not possible with other columns.

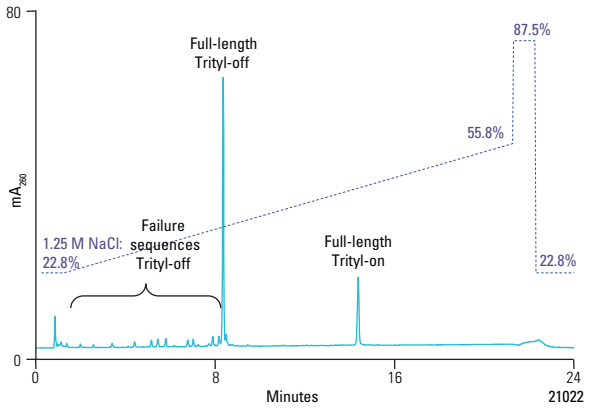
DNAPac PA200 HPLC Columns

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
8	250	**063425**	**063000**	**063421**	**SP6734**

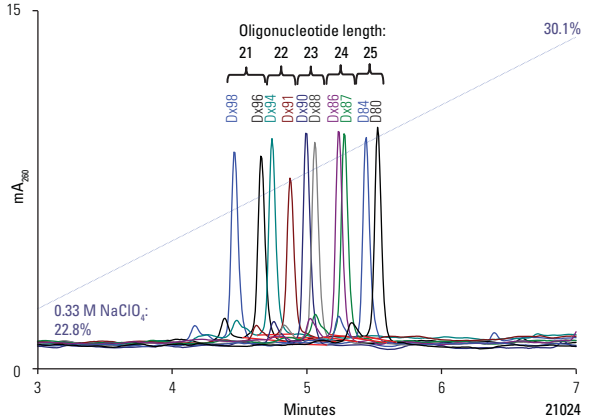
DNAPac PA200 HPLC Guards

Particle Size (µm)	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
8	50	**063423**	**062998**	**063419**	**SP6731**

Resolution of oligonucleotides



Separation of oligonucleotides by length



Column:	**DNAPac® PA200**
Eluent:	$NaClO_4$, pH 6.5 with 20% CH_3CN
Flow Rate:	1.2mL/min
Inj. Volume:	8µL
Detection:	UV, 260nm

DNASwift SAX-1S

A strong anion exchange monolith column that provides exceptionally high purity and yield of oligonucleotides

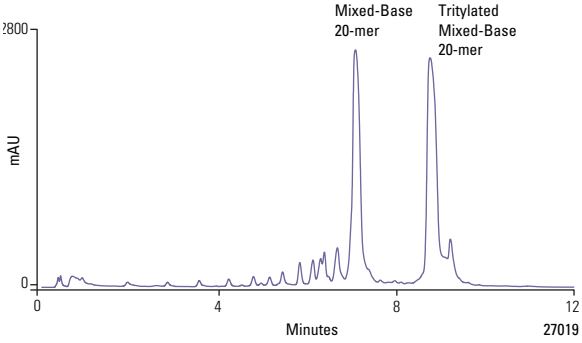
- Highest resolution for oligonucleotide purification available, providing high purity and yields
- Exceptionally high capacity
- Refined selectivity, as with the DNAPac column, for high resolution
- Compatible with high pH mobile phases, solvents, and high temperatures
- Ideal for therapeutic and diagnostic research
- Purify difficult oligonucleotide products

This semipreparative column incorporates the high resolution and selectivity of the DNAPac column, providing unsurpassed purity and yields.

DNASwift Columns

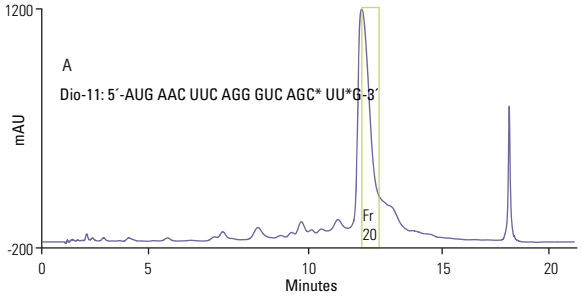
Functional Group	Length (mm)	5.0mm ID
SAX-1S	150	**066766**

Purification of tritylated oligonucleotide using the DNASwift SAX-1S column



Column:	**DNASwift SAX-1S, 5 × 150mm**
Mobile Phases:	A: 15mM Tris, pH 8
	B: 15mM Tris, pH 8, 1.25 M NaCl
Gradient:	8–64% B in 10 min
Flow Rate:	1.5mL/min
Inj. Volume:	20µL
Detection:	UV at 260nm
	Prep Cell (2mm path length)
Sample:	Derivatized mixed-base 20mer, 20mg/mL

Purification of a 21-base RNA Sample with Aberrant 2′ -5″ Linkages at the 1 and 3 Positions from the 3″ End



Column:	DNASwift SAX-1S, 5 × 150mm
Eluents:	A. 40mM Tris, pH 7
	B. 40mM Tris, pH 7 + 1.25 M NaCl
Gradient:	26–42% B in 10 column volumes
Flow Rate:	1.5mL/min
Inj. Amount:	125µg
Temperature:	30°C
Detection:	UV at 260nm

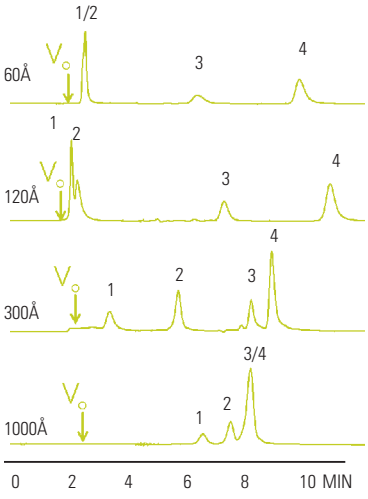
BioBasic SEC Columns

Superior separation of water soluble compounds

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

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

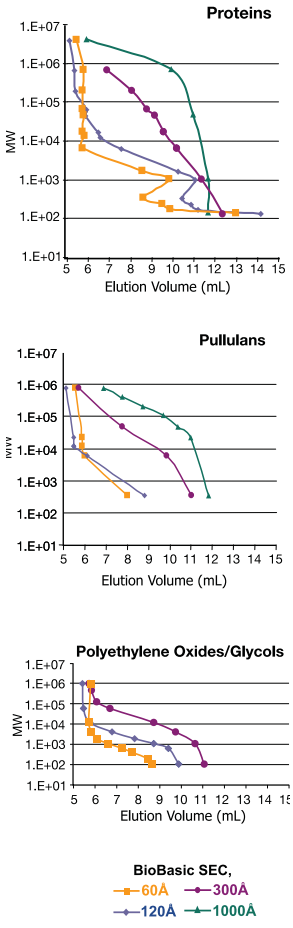
For information on bulk quantities, please inquire.



Columns: BioBasic SEC, 5µm, 300 x 7.8mm

Eluent:	0.1M KH_2PO_4 pH 7
Flow:	1.0mL/min
Detector:	UV at 254nm
Injection:	20µL
Sample:	1. Thyroglobulin (MW669,00) 2. Ovalbumin (MW 45,000) 3. Angiotensin II (MW 1,046) 4. PABA (V_m) (MW 137)

Effect of pore size on SEC resolution

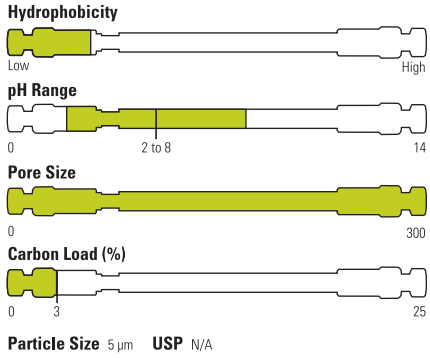


Molecular weight calibration curves

BioBasic AX HPLC Columns

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

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



Particle Size 5 µm **USP** N/A

BioBasic AX HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	50	**73105-051030**	**73105-052130**	**73105-053030**	**73105-054030**	**73105-054630**
	100	**73105-101030**	**73105-102130**	**73105-103030**	**73105-104030**	**73105-104630**
	150	**73105-151030**	**73105-152130**	**73105-153030**	**73105-154030**	**73105-154630**
	250	**73105-251030**	**73105-252130**	**73105-253030**	**73105-254030**	**73105-254630**

Other column dimensions are available, including preparative columns. Please call Customer Service for more information.

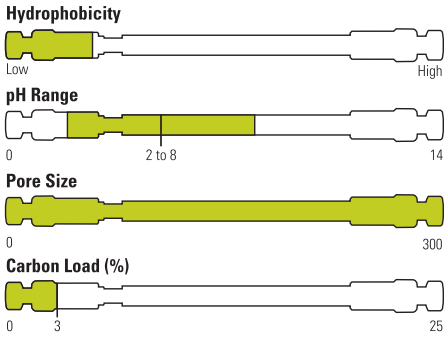
BioBasic AX Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**73105-011001**	**73105-012101**	**73105-013001**	**73105-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

BioBasic SCX Columns

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

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



Particle Size 5 µm **USP** L52

BioBasic SCX HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	50	**73205-051030**	**73205-052130**	**73205-053030**	**73205-054030**	**73205-054630**
	100	**73205-101030**	**73205-102130**	**73205-103030**	**73205-104030**	**73205-104630**
	150	**73205-151030**	**73205-152130**	**73205-153030**	**73205-154030**	**73205-154630**
	250	**73205-251030**	**73205-252130**	**73205-253030**	**73205-254030**	**73205-254630**

Other column dimensions are available, including preparative columns. Please call Customer Service for more information.

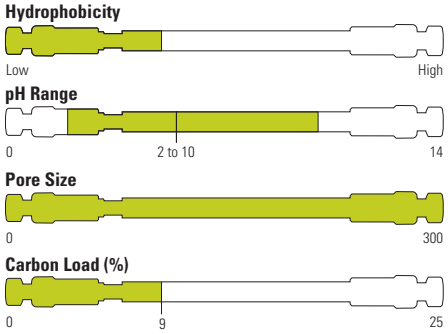
BioBasic SCX Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	Quantity
5.0	10	**73205-011001**	**73205-012101**	**73205-013001**	**73205-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

BioBasic 18 HPLC Columns

Outstanding separation of small to medium peptides

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



Particle Size 5µm, 10µm **USP** L1

BioBasic 18 HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	50	**72105-051030**	**72105-052130**	**72105-053030**	**72105-054030**	**72105-054630**
	100	**72105-101030**	**72105-102130**	**72105-103030**	**72105-104030**	**72105-104630**
	150	**72105-151030**	**72105-152130**	**72105-153030**	**72105-154030**	**72105-154630**
	250	**72105-251030**	**72105-252130**	**72105-253030**	**72105-254030**	**72105-254630**

Other column dimensions are available including preparative columns. Please call Customer Service for more information.

BioBasic 18 Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**72105-011001**	**72105-012101**	**72105-013001**	**72105-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

BioBasic 18 PEEK Bio-Inert HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
	100	–	**72105-102168**	–	–	**72105-104668**
	150	–	**72105-152168**	–	–	**72105-154668**
	250	–	**72105-252168**	–	–	**72105-254668**

BioBasic 18 PEEK Guard Cartridges

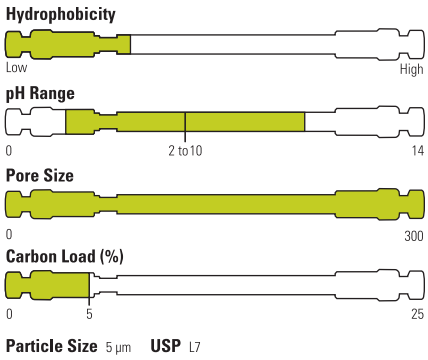
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
5.0	10	–	**72105-012103**	–	**72105-014003**	3 Pack
Bio-inert Guard Holder		–	**Inquire**	–	**C270-01**	1 Each

Other column dimensions are available in bio-inert column hardware. Please call Customer Service for more information.

BioBasic 8 HPLC Columns

Optimized for the separation of a wide range of peptides

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



Particle Size 5 µm **USP** L7

BioBasic 8 Analytical HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	50	**72205-051030**	**72205-052130**	**72205-053030**	**72205-054030**	**72205-054630**
	100	**72205-101030**	**72205-102130**	**72205-103030**	**72205-104030**	**72205-104630**
	150	**72205-151030**	**72205-152130**	**72205-153030**	**72205-154030**	**72205-154630**
	250	**72205-251030**	**72205-252130**	**72205-253030**	**72205-254030**	**72205-254630**

Other column dimensions are available, including preparative columns. Please call Customer Service for more information.

BioBasic 8 Drop-in Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm/4.6mm ID	Quantity
5.0	10	**72205-011001**	**72205-012101**	**72205-013001**	**72205-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

BioBasic 8 PEEK Bio-Inert Columns

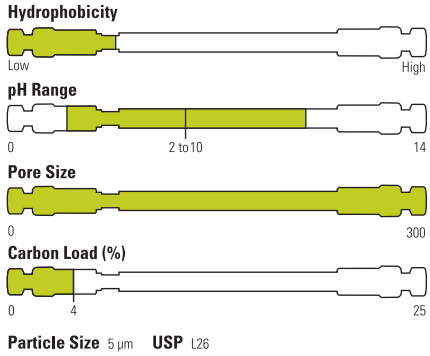
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	100	–	**72205-102168**	–	–	**72205-104668**
	150	–	**72205-152168**	–	–	**72205-154668**
	250	–	**72205-252168**	–	–	**72205-254668**

BioBasic 8 PEEK Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.6mm ID	Quantity
5.0	10	–	**72205-012103**	–	**72205-014003**	3 Pack
Bio-inert Guard Holder		–	**Inquire**	–	**C270-01**	1 Each

BioBasic 4 HPLC Columns

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



Particle Size 5 µm **USP** L26

BioBasic 4 HPLC Columns

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	50	**72305-051030**	**72305-052130**	**72305-053030**	**72305-054030**	**72305-054630**
	100	**72305-101030**	**72305-102130**	**72305-103030**	**72305-104030**	**72305-104630**
	150	**72305-151030**	**72305-152130**	**72305-153030**	**72305-154030**	**72305-154630**
	250	**72305-251030**	**72305-252130**	**72305-253030**	**72305-254030**	**72305-254630**

Other column dimensions are available, including preparative columns. Please call Customer Service for more information.

BioBasic 4 Drop-In Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	10	**72305-011001**	**72305-012101**	**72305-013001**	**72305-014001**	**72305-014003**
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	**850-00**

BioBasic 4 PEEK Bio-Inert HPLC Columns

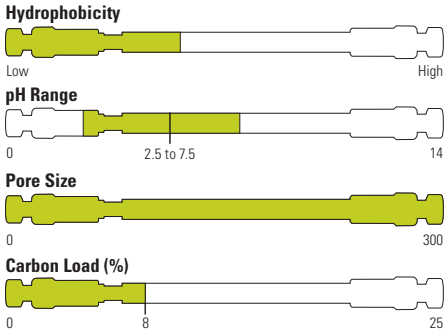
Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
5.0	100	–	**72305-102168**	–	–	**72305-104668**
	150	–	**72305-152168**	–	–	**72305-154668**
	250	–	**72305-252168**	–	–	**72305-254668**

BioBasic 4 PEEK Guard Cartridges

Particle Size (µm)	Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0/4.6mm ID	Quantity
5.0	10	–	**72305-012103**	–	**72305-014003**	3 Pack
Bio-inert Guard Holder		–	–	–	**C270-01**	1 Each

Acclaim 300 C18

High-resolution reversed-phase separation of proteins and peptides



Particle Size 3.0µm **USP** L1

- Designed for high-resolution peptide mapping and protein separations
- High-efficiency 3µm spherical silica substrate
- High-performance bonding chemistry on 300Å pore silica
- Application tested for suitability in peptide mapping
- Reproducible for dependable results
- LC/MS compatible
- Ultrapure silica with low metal content and exhaustive bonding and endcapping

Acclaim 300 C18 HPLC Columns

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
3.0	50	**060263**	–	**060265**
	150	**060264**	**063684**	**060266**

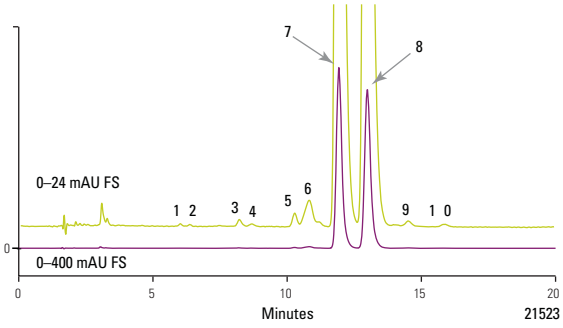
Acclaim 300 C18 HPLC Guards

Particle Size (µm)	Length (mm)	2.1mm ID	3.0mm ID	4.6mm ID
5.0	10	**069690**	**075721**	**069697**

Acclaim 300 C18 HPLC Guard Holder

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

Budesonide and Related Substances



Column: Acclaim 300 C18 3.0µm, 4.6 x 150mm

Pump:	Summit P580 HPG/4
Mobile Phase:	(A) Acetonitrile:ethanol 15:1 (B) 0.1% phosphoric acid Isocratic 66% B
Flow:	1.0mL/min
Temperature:	30°C
Injection:	ASI-100 autosampler, 15µL
Detector:	UVD 340U; UV at 240nm
Sample:	Budesonide, 500µg/mL after three days
Peaks:	7, 8. Budesonide epimers, 99%

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

Acclaim PepMap RSLC C18 & Acclaim PepMap C18, 100Å HPLC Columns, nanoViper and Classic Column Format

- High resolution in protein identification, biomarker discovery, and systems biology
- Highest sensitivity in LC/MS due to unique loadability
- Designed for TFA-free LC-MS, minimizing ion-suppression effects
- Ideally suited for coupling to ESI/MS and MALDI-MS
- Highest column-to-column reproducibility
- Easy-to-use, cutting-edge miniaturized HPLC
- nanoViper™ fingertight connections for easy column installation

nanoViper

- Easy to use
- Universally applicable to current, legacy and third party common 1/16in hardware
- No column damage by overtightening
- No experimental failure due to bad connections

The Acclaim PepMap stationary phase has become the standard for peptide separations in proteomics and can be used with all modern nano LC systems available in the market.

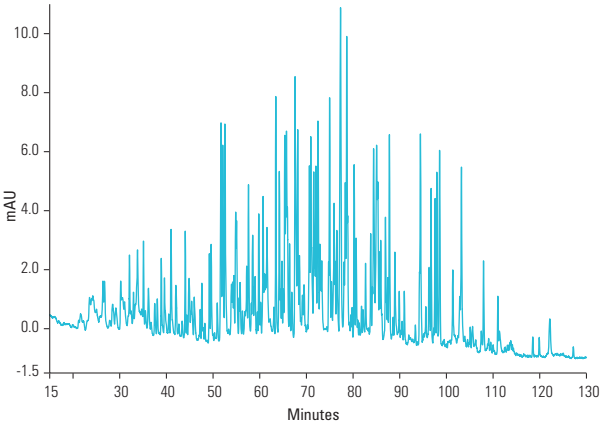
Building on this success, the 2µm Acclaim PepMap RSLC stationary phase has been developed for ultrahigh-resolution peptide separations.

The nanoViper connections pre-installed on these columns eliminate troublesome connections in nano LC. nanoViper is a fingertight, dead volume free connection that holds up to 1000 bar.

Acclaim PepMap and Acclaim PepMap RSLC columns are specially designed for high-resolution analyses of tryptic, natural, and synthetic peptides. The columns are often applied for LC-MS/MS peptide mapping for protein identification, biomarker discovery,and systems biology. Due to their high loading capacity, the columns are exceptionally suitable for the analysis of low abundant peptides in complex proteomics samples.

Acclaim PepMap Trap columns are typically applied for the desalting of peptides before LC separation with MS detection, thus allowing fast sample preconcentration and clean-up of large volume injections.The columns are designed to provide the highest efficiencies for one-dimensional peptide mapping experiments and 2D-LC analyses. Trap columns are available in two formats:

- Fused silica nano trap columns to provide the highest chromatographic performance.
- Stainless steel cartridges to provide maximum robustness.



Column: Acclaim PepMap C18 3µm (75um ID x 50cm)

Flow Rate:	300 nL/min
Mobile Phase:	A: water + 0.1% formic acid B: water/acetonitrile 20/80 v/v% + 0.08% formic acid
Gradient:	4–55% B in 120min, 5 min wash
Detection:	UV, 214nm
Sample:	Protein mixture digest (P/N 161088)
Temperature:	35°C

Acclaim PepMap C18, 100Å HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	50µm ID	75µm ID	100µm ID	300µm ID	1.0mm ID
2.0	50	**164561**	**164563**	–	**164560**	**164454**
	150	**164562**	**164534**	–	**164537**	**164711**
	250	**164709**	**164536**	–	–	–
	500	**164710**	**164540**	–	–	–
3.0	20 (Trap)	–	**164535**	–	–	–
	50	**164712**	**164567**	–	**164716**	**164717**
	150	**164713**	**164568**	–	**164571**	**164572**
	250	**164714**	**164569**	–	–	–
	500	**164715**	**164570**	–	–	–
5.0	20 (Trap)	–	–	**164564**	–	–

Acclaim PepMap Trap Column Holders, nanoViper

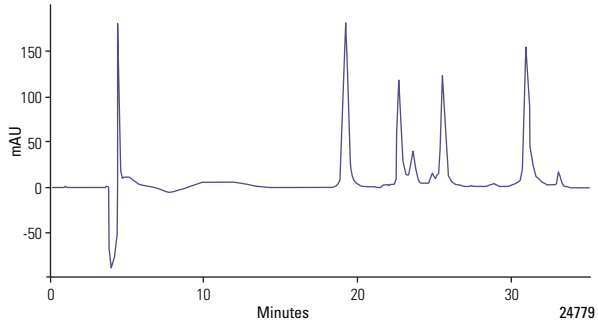
Description	Cat. No.
µ-Precolumn holder, 5mm, with 30µm ID connecting tubing, nanoViper fittings	**164649**
µ-Precolumn holder, 15mm, with 75µm ID connecting tubing, nanoViper fittings	**164650**

Acclaim PepMap C18, 100Å HPLC Columns, Classic

Particle Size (µm)	Length (mm)	50µm ID	75µm ID	100µm ID	200µm ID	300µm ID	500µm ID	800µm ID	1.0mm ID
3.0	50	**161563**	**160316**	–	–	**160290**	–	–	**160277**
	150	**161574**	**160321**	–	–	**160295**	–	–	**160282**
	250	–	**164261**	–	–	–	–	–	–
	500	–	**164451**	–	–	–	–	–	–
5.0	1 (Trap)	–	–	–	–	**160428**	–	–	–
	2 (Trap)	–	–	–	–	–	–	**160424**	–
	5 (Trap)	–	–	–	–	**160454**	**160446**	–	**160434**
	10 (Trap)	–	–	**164197**	**164212**	–	–	–	–
	15 (Trap)	–	–	–	–	–	**160450**	–	**160438**
	20 (Trap)	–	–	**164199**	**164213**	–	–	–	–
	50	–	**160318**	–	–	**160292**	–	–	**160279**
	150	–	**160323**	–	–	**160297**	–	–	**160284**
	250	–	**160326**	–	–	**160300**	–	–	**160287**

Acclaim PepMap C18, 300Å HPLC Columns, Classic

Particle Size (µm)	Length (mm)	50µm ID	75µm ID	100µm ID	200µm ID	300µm ID	500µm ID	800µm ID	1.0mm ID
5.0	1 (Trap)	–	–	–	–	**163938**	–	–	–
	2 (Trap)	–	–	–	–	–	–	**163942**	–
	5 (Trap)	–	–	–	–	**163589**	**163945**	–	**163592**
	15 (Trap)	–	–	–	–	–	**163946**	–	**163593**
	50	–	**163577**	–	–	**163580**	–	–	**163584**
	150	–	**163574**	–	–	**163581**	–	–	**163585**



Column: 300µm i.d. x 15cm, PepMap300, C18, 5µm 300Å,

Temperature:	40°C
Flow Rate:	4µL/min
Mobile Phase:	A: H_2O/acetonitrile (90/10 v/v), 0.1% TFA B: H_2O/acetonitrile (10/90 v/v), 0.08% TFA
Gradient:	5–55% B in 30 min
Detection:	UV, 214nm
Sample:	Ribonuclease, insulin, cytochrome c, myoglobin, lysosyme, 40ng/protein

Acclaim PepMap C8 100Å HPLC Columns

Acclaim PepMap100 C8 is a excellent alternative for the Acclaim PepMap100 C18, when separating very hydrophobic peptides (e.g., non-tryptic peptides). It is available with 3 or 5µm particles, with 100Å pore sizes, and in nano, capillary and micro formats.

Acclaim PepMap C8, 100Å HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	75µm ID	300µm ID	500µm ID	800µm ID	1.0mm ID
3.0	150	**164706**	**164722**	–	–	**164723**

Acclaim PepMap C8, 100Å HPLC Columns, Classic

Particle Size (µm)	Length (mm)	75µm ID	300µm ID	500µm ID	800µm ID	1.0mm ID
3.0	50	**161184**	**161181**	–	–	**160240**
	150	**161185**	**161182**	–	–	**161179**
5.0	1 (Trap)	–	**161188**	–	–	–
	2 (Trap)	–	–	–	**161187**	–
	5 (Trap)	–	**161194**	**161192**		**161189**
	15 (Trap)	–	–	**161193**	–	**161190**
	50	**161555**	**161547**	–	–	**161539**
	150	**161553**	**161545**	–	–	**161537**
	250	**161186**	–	–	–	–

Acclaim PepMap C4 300Å HPLC Columns

Acclaim PepMap300 C4 is used for the separation of larger hydrophobic peptides and proteins, providing higher recoveries. It is available in 5µm particle size, with 300Å pore size, and in nano, capillary, and micro formats.

Acclaim PepMap C4, 300Å HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	75µm ID	300µm ID	500µm ID	800µm ID	1.0mm ID
5	150	**164707**	**164720**	–	–	**164721**

Acclaim PepMap C4, 300Å HPLC Columns, Classic

Particle Size (µm)	Length (mm)	75µm ID	300µm ID	500µm ID	800µm ID	1.0mm ID
5.0	1 (Trap)	–	**163937**	–	–	–
	2 (Trap)	–	–	–	**163941**	–
	5 (Trap)	–	**163591**	–	–	**163594**
	15 (Trap)	–	–	**163944**	–	**163595**
	50	**163578**	**163582**	–	–	**163586**
	150	**163579**	**163583**	–	–	**163587**

PepSwift and ProSwift (PS-DVB) Capillary and Micro HPLC Columns

- High-resolution for protein identification, biomarker discovery,and systems biology
- High-speed peptide and protein separations (<15 min)
- Highest sensitivity for LC/MS
- Highest column-to-column reproducibility
- Wide range of column IDs and lengths available
- Superior lifetime
- nanoViper fittings for easy column installation

PepSwift and ProSwift monolithic columns are specially designed for fast and high-resolution LC/MS analysis in protein identification, biomarker discovery, and systems biology. Based on a polystyrene divinylbenzene copolymer, the monolithic structure offers a high-quality alternative to traditional microparticulate sorbents, providing important advantages to the chromatographic separation. High-sensitivity proteomics and biotech applications are easily performed using these columns.

PepSwift Precolumns can be used for preconcentration and desalting of samples consisting of peptides and proteins without negative impact on the chromatographic performance or recovery of the compounds. Various ion-pairing agents can be used in the loading solvent and/or mobile phases to change the selectivity of the separation or improve the trapping efficiency.

PepSwift (PS-DVB) HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	100µm ID	200µm ID	500µm ID
–	5 (Trap)	–	**164558**	–
	50	**164584**	**164557**	**164585**
	250	**164543**	**164542**	–

PepSwift (PS-DVB) HPLC Columns, Classic

Particle Size (µm)	Length (mm)	100µm ID	200µm ID	500µm ID
–	5 (Trap)	–	**163972**	–
	50	**162348**	**161409**	**164087**

ProSwift RP-10R (PS-DVB) HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	100µm ID	200µm ID	1.0mm ID
–	50	–	–	**164586**

ProSwift RP-10R (PS-DVB) HPLC Columns, Classic

Particle Size (µm)	Length (mm)	100µm ID	200µm ID	1.0mm ID
–	50	–	–	**164397**

EASY-Columns

Excellence in nanoscale separations

- Compatible with any nanoscale HPLC system
- Optimized for online LC-MS
- Quality control on every column
- Simple, flexible design

Using highly pure chromatographic media and biocompatible, metal-free fused silica capillaries, Thermo Scientific EASY-Column™ capillary LC columns are produced with a focus on design simplicity and strict quality control. As a result, EASY-Column capillary LC columns deliver outstanding chromatographic performance on any nano LC system.

EASY-Columns

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

IntegraFrit and PicoFrit nano columns

Flexible silica packed columns for nanospray LC/MS applications

- 360µm OD fused silica nanobore columns
- IntegrFrit columns polished flat to ensure a clean connection to the emitter
- PicoFrit columns spray directly from the column

Hypersil GOLD Nanobore HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
1.9	10	**25002-017563**	**25002-017564**	4 Pack	**25002-011563**	**25002-011564**	4 Pack
	50	**25002-057563**	**25002-057564**	3 Pack	**25002-051563**	**25002-051564**	3 Pack
	100	**25002-107563**	**25002-107564**	3 Pack	–	–	–
5.0	50	**25005-057563**	**25005-057564**	3 Pack	**25005-051563**	**25005-051564**	3 Pack
	100	**25005-107563**	**25005-107564**	3 Pack	**25005-101563**	**25005-101564**	3 Pack
PicoFrit, 15µm Tip							
1.9	10	**25002-017581**	**25002-017583**	4 Pack	–	–	–
	50	**25002-057581**	**25002-057582**	3 Pack	–	–	–
	100	**25002-107581**	**25002-107582**	3 Pack	–	–	–
5.0	50	**25005-017581**	**25005-017583**	4 Pack	–	–	–
	100	**25005-057581**	**25005-057582**	3 Pack	–	–	–
	150	**25005-107581**	**25005-107582**	3 Pack	–	–	–

BioBasic 18 Nanobore HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
5.0	50	**72105-057563**	**72105-057564**	3 Pack	**72105-051563**	**72105-051564**	3 Pack
	100	**72105-107563**	**72105-107564**	3 Pack	**72105-101563**	**72105-101564**	3 Pack
PicoFrit, 15µm Tip							
5.0	50	**72105-057581**	**72105-057582**	3 Pack	–	–	–
	100	**72105-107581**	**72105-107582**	3 Pack	–	–	–

BioBasic 8 Nanobore HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
5.0	50	**72205-057563**	**72205-057564**	3 Pack	**72205-051563**	**72205-051564**	3 Pack
	100	**72205-107563**	**72205-107564**	3 Pack	**72205-101563**	**72205-101564**	3 Pack
PicoFrit, 15µm Tip							
5.0	50	**72205-057581**	**72205-057582**	3 Pack	–	–	–
	100	**72205-107581**	**72205-107582**	3 Pack	–	–	–

Hypercarb Nanobore HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
5.0	10	**35005-017563**	**35005-057564**	3 Pack	**35005-011563**	**35005-011564**	4 Pack
	50	**35005-057563**	**35005-017564**	4 Pack	**35005-051563**	**35005-051564**	3 Pack
PicoFrit, 15µm Tip							
5.0	10	**35005-017581**	**35005-017583**	4 Pack	–	–	–
	50	**35005-057581**	**35005-057582**	3 Pack	–	–	–

Unless otherwise specified, IntegraFrit and PicoFrit are sold in single-column units

KAPPA Capillary columns

High efficiency capillary and nanobore columns for high performance and sensitivity

- 75 to 500µm columns for reduced sample amounts
- Rugged sleeved design for robustness
- Available in a range of Thermo Scientific phases
- Ideal for LC/MS applications

Hypersil GOLD KAPPA Capillary HPLC Columns

Particle Size (µm)	Length (mm)	100µm ID	2.1mm ID	180µm ID	320µm ID	500µm ID
1.9	50	–	–	–	**25002-050365**	–
	100	–	–	–	**25002-100365**	–
3.0	50	–	–	**25003-050265**	**25003-050365**	**25003-050565**
	100	–	–	**25003-100265**	**25003-100365**	**25003-100565**
	150	–	–	**25003-150265**	**25003-150365**	**25003-150565**
5.0	50	**25005-050065**	**25005-050165**	**25005-050265**	**25005-050365**	**25005-050565**
	100	**25005-100065**	**25005-100165**	**25005-100265**	**25005-100365**	**25005-100565**
	150	**25005-150065**	**25005-150165**	**25005-150265**	**25005-150365**	**25005-150565**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD KAPPA Capillary Guard Columns

Particle Size (µm)	Length (mm)	100µm ID	2.1mm ID	180µm ID	320µm ID	500µm ID
3.0	30	–	–	**25003-030215**	**25003-030315**	**25003-030515**
5.0	30	–	–	**25005-030215**	**25005-030315**	**25005-03051**

BioBasic 18 KAPPA Capillary HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	100µm ID	180µm ID	320µm ID	500µm ID
	50	**72105-050065**	**72105-050165**	**72105-050265**	**72105-050365**	**72105-050565**
	100	**72105-100065**	**72105-100165**	**72105-100265**	**72105-100365**	**72105-100565**
	150	**72105-150065**	**72105-150165**	**72105-150265**	**72105-150365**	**72105-150565**
	250	–	–	**72105-250265**	**72105-250365**	**72105-250565**

BioBasic 18 KAPPA Capillary Guard Columns

Particle Size (µm)	Length (mm)	75µm ID	100µm ID	180µm ID	320µm ID	500µm ID
5.0	30	–	–	**72105-030215**	**72105-030315**	**72105-030515**

BioBasic 8 KAPPA Capillary HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	180µm ID	320µm ID	500µm ID
5.0	50	**72205-050065**	**72205-050265**	**72205-050365**	**72205-050565**
	100	**72205-100065**	**72205-100265**	**72205-100365**	**72205-100565**

BioBasic 8 KAPPA Capillary Guard Columns

Particle Size (µm)	Length (mm)	75µm ID	180µm ID	320µm ID	500µm ID
5.0	30	–	**72205-030215**	**72205-030315**	**72205-030515**

BioBasic 4 KAPPA Capillary HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	180µm ID	320µm ID	500µm ID
5.0	100	**72305-050065**	**72305-050265**	**72305-050365**	**72305-050565**
	150	**72305-100065**	**72305-100265**	**72305-100365**	**72305-100565**
	250	**72305-150065**	**72305-150265**	**72305-150365**	**72305-150565**

BioBasic 4 KAPPA Guard Columns

Particle Size (µm)	Length (mm)	75µm ID	180µm ID	320µm ID	500µm ID
5.0	30	–	**72305-030215**	**72305-030315**	**72305-030515**

BioBasic SCX KAPPA HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	180µm ID	320µm ID	500µm ID
5.0	50	**73205-050065**	**73205-050265**	**73205-050365**	**73205-050565**
	100	**73205-100065**	**73205-100265**	**73205-100365**	**73205-100565**
	150	**73205-150065**	**73205-150265**	**73205-150365**	**73205-150565**

BioBasic SCX KAPPA Guard Columns

Particle Size (µm)	Length (mm)	75µm ID	180µm ID	320µm ID	500µm ID
5.0	30	–	**73205-030215**	**73205-030315**	**73205-030515**

BioBasic AX KAPPA Capillary HPLC Columns

Particle Size (µm)	Length (mm)	75µm ID	100µm ID	180µm ID	320µm ID	500µm ID
5.0	100	**73105-100065**	**73105-100165**	**73105-100265**	**73105-100365**	**73105-100565**
	150	**73105-150065**	**73105-150165**	**73105-150265**	**73105-150365**	**73105-150565**

Hypercarb KAPPA capillary columns

Particle Size (µm)	Length (mm)	75µm ID	100µm ID	180µm ID	320µm ID	500µm ID
5.0	100	**35005-050065**	**35005-050165**	**35005-050265**	**35005-050365**	**35005-050565**
	150	**35005-100065**	**35005-100165**	**35005-100265**	**35005-100365**	**35005-100565**

Capillary and Micro SCX HPLC Columns

- High resolution in protein identification, biomarker discovery, and systems biology
- Highest sensitivity in LC/MS due to unique loadability
- Highest column-to-column reproducibility
- nanoViper™ fingertight connections for easy column installation

For very complex proteomics samples, two-dimensional LC is a powerful tool.

In the first dimension a capillary or Micro SCX column is often used in off-line and on-line 2D-LC separations. These columns are selected to establish a good top down proteomics work flow in combination with the Acclaim PepMap and Acclaim PepMap RSLC columns. Pre-installed nanoViper connection tubings allow for easy installation.

Polysulfoethyl-Aspartamide 300Å HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	300µm ID	1.0mm ID
3.0	150	**164701**	**164702**
	250	–	**164703**
5.0	150	**164599**	**164566**

Polysulfoethyl-Aspartamide 300Å HPLC Columns, Classic

Particle Size (µm)	Length (mm)	300µm ID	1.0mm ID
5.0	100	**164264**	–
	150	**164263**	**164262**

Poros 10S HPLC Columns, nanoViper

Particle Size (µm)	Length (mm)	300µm ID	1.0mm ID
10.0	100	**164565**	–

Poros 10S HPLC Columns, Classic

Particle Size (µm)	Length (mm)	300µm ID	1.0mm ID
10.0	100	**162152**	**163030**
	150	**162122**	**163031**

Titanium-Dioxide Nano-Trap Columns

Titanium-Dioxide Nano-Trap columns support the enrichment of phosphopeptides. They are available in 100µm and 200µm i.d. format, and are packed with 5µm particle size. In addition, a biphasic combination of Titanium-Dioxide and Acclaim PepMap100 C18 is also available.

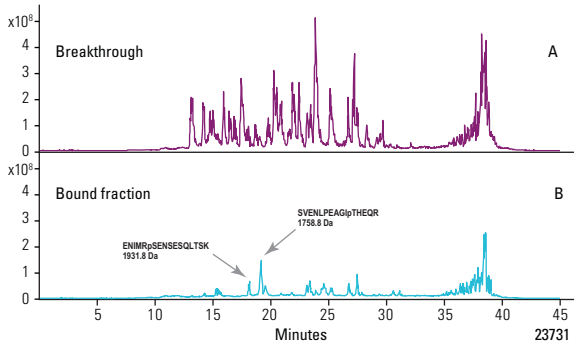
Titanium-dioxide / Acclaim PepMap C18 Biphasic Nano-Trap column

Particle Size (µm)	Length (mm)	100µm ID	200µm ID
5.0	20 (Trap)	**164216**	**164217**

Titanium-dioxide Nano-Trap column, classic

Particle Size (µm)	Length (mm)	100µm ID	200µm ID
5.0	10 (Trap)	**164205**	**164215**
	20 (Trap)	**164214**	**164206**

Isolation of Two Synthethic Phosphopeptides from a BSA Tryptic Digest on a TiO_2 Column

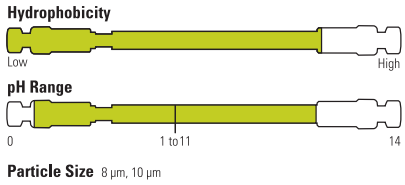


Column: 200µm ID x 1cm, packed with TiO_2, 5µm
100µm ID x 1cm, packed with Acclaim® PepMap C18 PM100, 5µm

Analytical Column:	Acclaim PepMap C18 PM100, 3µm
Dimensions:	75µm x 15cm
Loading Solvent:	0.05% HFBA in DI H_2O
Wash Solvent:	0.01% HFBA in DI H_2O
Mobile Phases:	(A) 0.05% TFA in DI H_2O (B) 0.04% TFA in acetronitrile/ DI H_2O (80:20 v/v)
Gradient:	3–40% acetronitrile in 30 min
TiO_2 Trap Eluent:	250mM NH_4HCO_3 in DI H_2O, pH 9.0
Flow Rate:	300nL/min
Loading Flow:	8µL/min
Inj. Volume:	5µL
Detection:	MS

HyperREZ XP HPLC Columns

Polymer-based columns for carbohydrate analysis



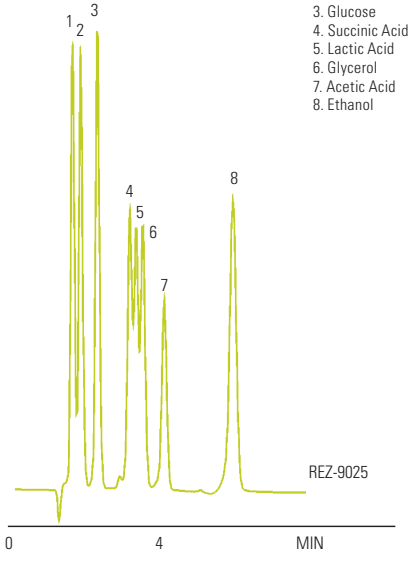
Particle Size 8 µm, 10 µm

- Designed for the determination of carbohydrates, saccharides, organic acids, and alcohols
- Efficient and reproducible monodisperse particles
- Stable for long column lifetimes even at low pH and high temperatures

HyperREZ XP Carbohydrate columns are based on a monodisperse resin with a 4 or 8% divinylbenzene content, and provide an ideal medium for the analysis of carbohydrates and organic acids. Unlike silica based columns they are stable at low pH, allowing the use of dilute acid as a mobile phase. The columns can also be run at elevated temperatures, for faster analysis and improved resolution of some closely eluting analytes. The columns can easily be regenerated for increased column lifetime. Control of the degree of cross-linking of the gel provides a size exclusion mode of operation in addition to the ligand exchange interactions with the metal ion associated with the sulfonated resin. Selectivity differences arise from the interactions of the different counter-ion forms with the hydroxyl groups on the analyte molecules. HyperREZ XP columns are available in H^+, Ca^{2+}, Pb^{2+}, and Na^+ forms, enabling you to choose the appropriate counter-ion to meet your application requirements. Refer to the tables below to help choose the best column based on application area or retention times. HyperREZ XP columns are also available in dedicated organic acid and sugar alcohol forms.

HyperREZ XP Organic Acids, 8µm, 100 x 7.7mm

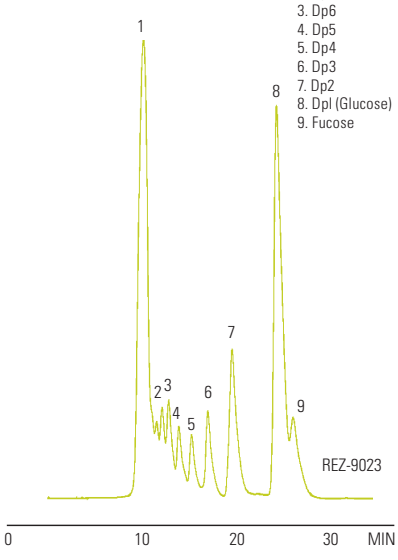
Part Number:	69608-107780
Eluent:	0.0001mM H_2SO_4
Flow Rate:	0.7mL/min
Temperature:	57°C
Detector:	RI
Sample:	1. Maltotriose 2. Maltose 3. Glucose 4. Succinic Acid 5. Lactic Acid 6. Glycerol 7. Acetic Acid 8. Ethanol



Products of fermentation, including organic acids, sugars and alcohols, can be separated using a HyperREZ XP Organic Acids column

HyperREZ XP Carbohydrate Na^+, 10µm, 300 x 7.7mm

Part Number:	69310-307780
Eluent:	H_2O
Flow Rate:	0.3mL/min
Temperature:	80°C
Detector:	RI
Sample:	1. Dp8 2. Dp7 3. Dp6 4. Dp5 5. Dp4 6. Dp3 7. Dp2 8. Dpl (Glucose) 9. Fucose



Analysis of sports drink using a HyperREZ XP Carbohydrate Na^+ column

Phase	Particle Size (µm)	Porosity
HyperREZ XP Carbohydrate H^+ Counter-ion	8	8% cross linkage
HyperREZ XP Carbohydrate Pb^{2+} Counter-ion	8	8% cross linkage
HyperREZ XP Carbohydrate Ca^{2+} Counter-ion	8	8% cross linkage
HyperREZ XP Carbohydrate Na^+ Counter-ion	10	4% cross linkage
HyperREZ XP Organic Acids	8	8% cross linkage
HyperREZ XP Sugar Alcohols	8	8% cross linkage

Column Type	Application Areas
HyperREZ XP Ca^{2+}	Adulteration of food & beverages, confectionary, disaccharides, food additives
	Alcohols, dairy products, fermentation, wine
	Anomer separation
HyperREZ XP Pb^{2+}	Fruit juice, monosaccharides
HyperREZ XP H^+	Alcohols, dairy products, fermentation, wine
	Oligosaccharides, glycoprotein constituents, organic acids, fermentation products
HyperREZ XP Na^+	Corn syrup

HyperREZ XP HPLC Columns

Particle Size (µm)	Description	ID (mm)	Length (mm)	Cat. No.
HyperREZ XP Carbohydrate H^+				
8.0	Analytical	7.7	300	**69008-307780**
	Guard	7.7	50	**69008-057726**
	Guard Catridge (2 pk)	3.0	5	**69008-903027**
HyperREZ XP Carbohydrate Ca^{2+}				
8.0	Analytical	7.7	300	**69208-307780**
	Guard	7.7	50	**69208-057726**
	Guard Catridge (2 pk)	3.0	5	**69208-903027**
HyperREZ XP Carbohydrate Pb^{2+}				
8.0	Analytical	7.7	300	**69108-307780**
	Guard	7.7	50	**69108-057726**
	Guard Catridge (2 pk)	3.0	5	**69108-903027**
HyperREZ XP Carbohydrate Na^+				
10.0	Analytical	7.7	300	**69310-307780**
	Guard	7.7	50	**69310-057726**
	Guard Catridge (2 pk)	3.0	5	**69310-903027**
HyperREZ XP Organic Acids				
8.0	Analytical	7.7	100	**69608-107780**
	Guard	–	–	**Inquire**
	Guard Catridge (2 pk)	–	–	**Inquire**
HyperREZ XP Sugar Alcohols				
8.0	Analytical	4.0	250	**69708-254080**
	Guard	–	–	–
	Guard Catridge (2 pk)	3.0	5	**69208-903027**
Guard Cartridge Holder for HyperREZ XP 3.0 × 5.0mm Guard Cartridges				**60002-354**

Retention Times of Common Saccharides (min)

Saccharide	H^+	Ca^{2+}	Pb^{2+}
Adonitol	11.5	14.9	20.4
Arabinose	11.4	13.6	19.4
Erythritol	12.7	15.6	20.3
Fructose	10.6	13.5	19.3
Fucose	12.2	13.7	17.1
Galactose	1.07	12.2	15.6
Glucose	9.9	11.1	13.9
Glycerol	14.1	16.1	19.5
Lactose	8.6	9.7	12.8
Maltose	8.4	9.5	12.5
Maltotriose	7.7	8.7	11.9
Mannitol	11.0	17.3	28.9
Mannose	1.5	12.5	16.7
Raffinose	8.2	8.6	11.4
Sorbitol	11.1	20.7	N/A
Sucrose	9.8	9.4	11.9
Xylose	10.6	12.0	15.0

Conditions:	**Column: 300 x 7.7mm**
Mobile Phase:	H_2O
Flow Rate:	0.6mL/min
Detection:	RI
Temperature:	75°C (H^+)
	85°C (Ca^{2+})
	80°C (Pb^{2+})

Note: partial hydrolysis may occur with some saccharides using H^+.

Thermo Scientific LC Accessories

Viper Fingertight Fittings

Provides ease of use and dead-volume free plumbing of every conventional HPLC and UHPLC system

- Provides zero-dead volume fingertight connections
- Supports operating pressures up to 1200 bar (17,400 psi)
- Available in different lengths: 65mm and from 150 to 950mm in 100mm steps
- Available in different inner diameters: 0.13mm (0.005in) or 0.18mm (0.007in)
- Easy to use due to stainless steel capillaries (1/32in OD) and fingertight design
- Works with virtually any valve and column from any manufacturer
- Fits narrow connections such as 10-port valves and enables mixed use with different designs

The Viper™ fingertight fitting system provides ease of use and dead-volume free plumbing of every conventional HPLC and modern UHPLC system. Together with flexible stainless steel capillaries, it opens a new dimension in liquid chromatography. The Viper system improves chromatographic results, independent of various different connection geometries and system backpressures. Connecting LC modules, valves, and columns quickly and easily without tools is simple with the Viper system.

Extra column volumes in HPLC have the most detrimental effects on the separational performance of an LC system and must be minimized. Conventional fittings tightened by hand or using tools have considerable drawbacks which can compromise efficiency. The Viper fitting system overcomes these drawbacks by design, working without ferrules to reduce the dead volume of any fluidic connection to zero. The Viper system unifies robust performance, ease of use, acceptable lifetime, and universal compatibility with virtually all different valves and columns for HPLC system users. Viper is included in shipments of all UltiMate 3000 UHPLC+ Systems.

Viper Fingertight Fitting Systems

Length (mm)	0.13mm ID	0.18mm ID
65	**6040.2307**	**6040.2357**
150	**6040.2315**	**6040.2360**
250	**6040.2325**	**6040.2385**
350	**6040.2335**	**6040.2375**
450	**6040.2345**	**6040.2365**
550	**6040.2305**	**6040.2355**
650	**6040.2310**	**6040.2395**
750	**6040.2320**	**6040.2370**
850	**6040.2330**	**6040.2380**
950	**6040.2340**	**6040.2390**

Viper Fingertight Fittings Kits for UltiMate 3000 UHPLC+ Systems

Description	Analytical and Standard (SD) System Variants	Micro and Rapid Separation (RS) System Variants
Viper Capillary Kit, SD or RS System, LPG, DGP or ISO pump	**6040.2302**	**6040.2301**
Viper Capillary Kit, SD or RS System, HPG pump	**6040.2309**	**6040.2308**
On-line Sample Preparation, x2 Dual SD or RS Systems	**6040.2802**	**6040.2801**
Tandem Operation, x2 Dual SD or RS Systems	**6040.2804**	**6040.2803**
Application Switching, x2 Dual SD or RS Systems	**6040.2806**	**6040.2805**
Parallel Analyses, x2 Dual SD or RS Systems	**6040.2810**	**6040.2809**
Automated Method Scouting, SD or RS Systems	**6040.2808**	**6040.2807**

SLIPFREE HPLC Column Connectors

Universal self-adjusting connections

- Unique self-adjusting design for void-free and leak-free connections
- Universal connectors compatible with all column end-fittings
- Stainless steel threads eliminate particle generation from PEEK™ fittings
- Fingertight connections to 10,000 psi – excellent for SFC
- Convenient SLIPFREE™ sample loop design

Unique Self-Adjusting Design

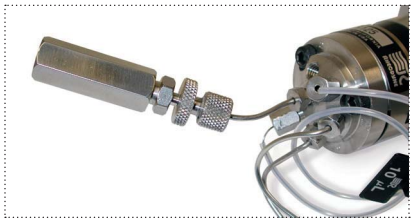
Thermo Scientific SLIPFREE connectors offer a rugged and easy way to ensure good column connections. The SLIPFREE connector design provides a void-free connection because it actually pushes the tubing and ferrule into the end-fitting. The separate tube holding and connection-sealing functions provide a better connection and better hardware lifetime. Because pressure is applied to the tubing rather than the ferrule, when the SLIPFREE connector is removed, the ferrule will not become lodged in the end-fitting. The movable Vespel™ front ferrule allows the SLIPFREE connector to easily adjust to any commercially available HPLC or SFC column end-fitting. Used over and over again, the SLIPFREE connector readjusts to fit each new column connection. Even when different column brands are used on a single HPLC system, SLIPFREE connectors provide all the same benefits.

Choice of Configurations

The SLIPFREE connector is available in both single and double configurations. The double SLIPFREE is useful when frequent connections and disconnections will be made between HPLC columns and injectors or detectors. The single SLIPFREE connector is useful when only the column is changed. SLIPFREE connectors are available in flexible 1/32in OD tubing as well as standard 1/16in OD tubing, in various lengths. SLIPFREE connectors come in 0.010in ID for routine work, 0.005in ID for use with small-bore and microbore columns, and 0.020in ID for semi preparative and preparative connections, or for connections ahead of the injector. PEEK-collared SLIPFREE connectors are ideal for higher temperature applications such as SFC. Long-neck SLIPFREE connectors have an extra long nut on the end which allows improved reach into tight spaces. SLIPFREE connectors come standard with Vespel ferrules. SLIPFREE sample loops are compatible with Rheodyne™ and Valco™ injectors. PEEK and Kel-F ferrules are available for applications where Vespel is not suitable, such as with strong acids or bases.

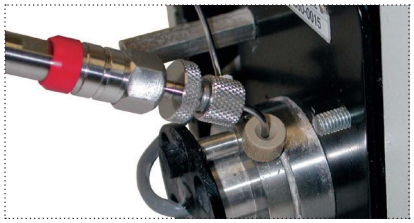
Where to use a SLIPFREE Connector

Between Guard and Injector



Between Guard and Column

Between Column and Detector



Between Injector and Column

SLIPFREE Connectors

Universal self-adjusting connections

- Void-free and leak-free by pushing tubing and ferrule into the end-fitting
- Compatible with all column end-fittings
- Stainless-steel threads
- Fingertight connections to 10,000 psi

SLIPFREE Connectors, Single

	Length (cm)	0.005in ID	0.010in ID	0.020in ID
Single				
	6	**30106**	**31106**	**32106**
	10	**30110**	**31110**	**32110**
	20	**30120**	**31120**	**32120**
	30	**30130**	**31130**	**32130**
	50	**30150**	–	–
Single Flexible				
	10.5	**30111-FLEX**	**39111-FLEX**	–
	15	**30115-FLEX**	**39115-FLEX**	–
	28	**30128-FLEX**	**39128-FLEX**	–
	40	**30140-FLEX**	**39140-FLEX**	–
	50	**30150-FLEX**	–	–
	60	**30160-FLEX**	–	–
Single PEEK Collared				
	6	**30306**	**31306**	**32306**
	10	**30310**	**31310**	**32310**
	20	**30320**	**31320**	**32320**
Single Long-neck				
	10	**30510**	**31510**	–
	20	**30520**	**31520**	**32520**

SLIPFREE Connectors, Double

	Length (cm)	0.005in ID	0.010in ID	0.020in ID
Double				
	6	**30206**	**31206**	**32206**
	10	**30210**	**31210**	**32210**
	20	**30220**	**31220**	**32220**
	30	**30230**	**31230**	**32230**
	40	**30240**	–	–
Double Flexible				
	10.5	**30211-FLEX**	**39211-FLEX**	–
	15	**30215-FLEX**	**39215-FLEX**	–
	28	**30228-FLEX**	**39228-FLEX**	–
	40	**30240-FLEX**	**39240-FLEX**	–
Double PEEK Collared				
	6	**30406**	**31406**	**32406**
	10	**30410**	**31410**	**32410**
	20	**30420**	**31420**	**32420**
Double Long-neck				
	10	**31710**	**32710**	–
	20	**31720**	**32720**	–

SLIPFREE Sample Loops

Feature a self-adjusting, leak-free design

- Compatible with Rheodyne™ and Valco™ injectors
- Long-neck design

SLIPFREE Sample Loops

Description	Length (cm)	ID (in)	**Cat. No.**	Quantity
10µL, Long-neck	20	0.10	**31620**	1 Each
20µL, Long-neck	40	0.10	**31640**	1 Each
50µL, Long-neck	25	0.20	**32625**	1 Each
100µL, Long-neck	50	0.20	**32650**	1 Each
250µL, Long-neck	125	0.20	**32699**	1 Each

SLIPFREE Ferrules

For use with SLIPFREE connectors for HPLC columns

- Vespel ferrules replace the standard Vespel ferrules supplied with SLIPFREE column connectors
- Kel-F and PEEK are offered for applications in which Vespel is not suitable

SLIPFREE Ferrules

Material	**Cat. No.**	Quantity
PEEK	**36023**	1 Each
Vespel	**36024**	1 Each
Kel-F	**36025**	1 Each

PTFE One-Piece Column Connector

Excellent for high-throughput screening and quick connection

- Fingertight, leak-free connection of analytical and guard columns with 10-32 threads
- Minimizes dead volume
- Inert and biocompatible material

PEEK One-Piece Column Connector

Description	Cat. No.	Quantity
One Piece Coupler	**60170-370**	1 Each

Solvent Inlet Filters

Feature a large surface area for a long lifetime

- Stainless steel 10µm inlet filters for longer lifetime
- No tools required for replacement

Bottom-of-the-Bottle solvent filters:

- Efficient draw
- 100% PTFE polymer, including 2µm filters
- Built-in helium sparge port and frit

Solvent Inlet Filters for HPLC Systems

	Type	For use with	Cat. No.	Quantity
	Stainless Steel	Fit 1/16in OD tube to 1/8in OD plastic tubing	**A-302**	1 Each
	Stainless Steel	Fit to 1/8in OD plastic tubing using 1/8in PP nut	**A-302A**	1 Each
	Bottom-of-the-Bottle	3/16in OD plastic tubing	**A-436**	1 Each
	Bottom-of-the-Bottle	1/8in OD tubing	**A-437**	1 Each

High Pressure Stainless Steel Nuts and Ferrules

Accommodate a wide range of configurations

- Designed for 10-32 port configurations
- Burr and contaminant free

Thermo Scientific High Pressure Stainless Steel Nuts and Ferrules

	Type	Cat. No.	Quantity
	10-32 thread nut with ferrule	**F-190**	1 Each
	Replacement PEEK Ferrules	**F-192x**	10 Pack
	Male hex nut	**U-400x**	10 Pack
	Universal ferrules, 0.625in	**U-401x**	10 Pack
	Valco male hex nut, 10-32 thread	**U-320x**	10 Pack
	Valco ferrules, 0.625in	**U-321x**	10 Pack
	Male hex nut, Waters compatible	**U-410X**	10 Pack

Reducing Union for Preparative Columns

Connects 30 to 50mm ID preparative columns to $^{1}/_{16}$in tubing

- Stainless steel construction
- 1.0mm bore
- Without frit

Reducing Union for Preparative Column

Description	Cat. No.	Quantity
1/8in to 1/16in Reducing Union for Preparative Column	**60182-357**	1 Each

PEEK Fingertight Fittings

Machined for reliability and ease of use

- Resist cracking, breaking, thread stripping and leaking in both low and high pressure applications
- Biocompatible for a broad range of applications

PEEK Fingertight Fittings

	Type	Cat. No.	Quantity
	One-piece Fingertight Fitting, 1/16in, 0.37in head	**F-120x**	10 Pack
	One-Piece Long Fingertight Fitting, 1/16in, 0.37in head	**F-130x**	10 Pack
	One-Piece PEEK Fingertight Fitting, 1/32in, 0.25in head	**M-645x**	10 Pack
	Two-Piece Fingertight Wing Nut with Ferrule, 1/16in	**F-300x**	10 Pack
	Replacement PEEK Ferrules	**F-142x**	10 Pack
	Column End Plugs, 1/16in, 10-32 coned, Delrin, Black	**U-467BLKx**	10 Pack
	Column End Plugs, 1/16in, 10-32 coned, Delrin, Red	**U-467Rx**	10 Pack

Stainless Steel Unions, Tees and Crosses

Well-suited to high pressure applications

- Absolute zero or low dead volume formats
- Includes two stainless steel nuts and ferrules

Stainless Steel Unions, Tees and Crosses

	Description	Through Hole (in)	Swept Volume (µL)	Cat. No.	Quantity
	Union, stainless steel, Upchurch Scientific/Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.010	0.025	**U-435**	1 Each
	Union, stainless steel, Upchurch Scientific/Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.020	0.134	**U-402**	1 Each
	Union, stainless steel, Upchurch Scientific/Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.050	0.836	**U-437**	1 Each
	Union, stainless steel, Upchurch Scientific/Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.062	~0.0	**U-438**	1 Each
	Union, stainless steel, Waters fittings compatible, includes 2 stainless steel nuts and ferrules	0.020	0.129	**U-412**	1 Each
	Union, stainless steel, Valco fittings compatible, includes 2 stainless steel nuts and ferrules	0.020	0.103	**U-322**	1 Each
	Tee, stainless steel, 10-32 fittings for use with 1/16in OD tubing	0.020	0.57	**U-428**	1 Each
	Cross, stainless steel, 10-32 fittings for use with 1/16in OD tubing	0.020	P0.72	**U-430**	1 Each

PEEK Unions, Tees and Crosses

Well-suited to high pressure applications

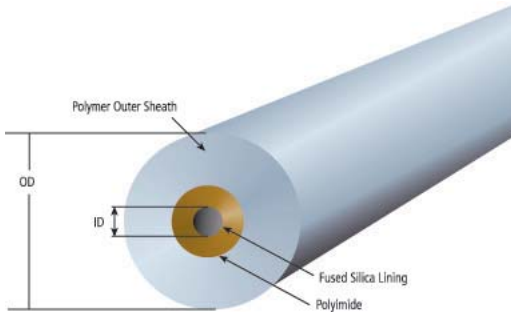
- Absolute zero or low dead volume formats
- Biocompatible

PEEK and PEEK Lined Unions, Tees and Crosses

	Description	Through Hole (in)	Swept Volume (µL)	Cat. No.	Quantity
	Union, PEEK polymer, includes two PEEK 2-piece fittings	0.010	0.070	**P-742**	1 Each
	Union, PEEK polymer, includes two PEEK 2-piece fittings	0.020	0.28	**P-704**	1 Each
	Tee, PEEK, 10-32 fittings for use with 1/16in OD tubing, includes three 10-32 PEEK double-winged nuts	0.020	P0.57	**P-727**	1 Each
	PEEK, 10-32 fittings for use with 1/16in OD tubing, includes four 10-32 PEEK double-winged nuts	0.020	P0.72	**P-729**	1 Each

PEEKsil Capillary Tubing

Excellent chemical compatibility and very low carryover



- Precision-bore fused silica tubing coated with 1/16in OD PEEK covering
- Usable in most standard chromatography systems
- Withstands high pressures
- Smooth internal surface for excellent flow characteristics
- Tubing is stiff: not recommended for uses requiring tubing bends
- Precut lengths only: cutting in the lab may damage tubing

PEEKsil Capillary Tubing

ID (in)	Length (cm)	Cat. No.	Quantity
0.002	10	**60182-500**	5 Pack
	20	**60182-501**	5 Pack
	50	**60182-502**	2 Pack
0.004	10	**60182-503**	5 Pack
	20	**60182-504**	5 Pack
	50	**60182-505**	2 Pack
0.007	10	**60182-506**	5 Pack
	20	**60182-507**	5 Pack
	50	**60182-508**	2 Pack

Applications:

- HPLC
- LC/MS

PEEK Sleeves for Fused Silica Capillary Tubing

Withstands high pressures

1/16in OD PEEK Sleeves for Fused Silica Capillary Tubing

ID (in)	Color	Cat. No.	Quantity
0.008	Yellow	**F-227**	1 Each
0.010	Blue	**F-228**	1 Each
0.012	Natural	**F-229**	1 Each
0.015	Orange	**F-230**	1 Each
0.021	Natural	**F-231**	1 Each
0.030	Natural	**F-232**	1 Each

316 Stainless Steel Capillary Tubing

Cleaned, polished, passivated and ready-to-use

- Suitable for ultra high pressure applications
- Wide chemical compatibilty
- Prefinished, square, burr-free ends and interiors to minimize dead volume connections
- Not recommended for biological samples
- Rough internal surface may lead to sample carryover

316 Stainless Steel Capillary Tubing

ID (in)	Length (cm)	Colour	Cat. No.	Quantity
1/16in OD Precut Tubing				
0.005	5	Red	**U-152**	1 Each
	10	Red	**U-153**	1 Each
	20	Red	**U-154**	1 Each
	30	Red	**U-155**	1 Each
	50	Red	**U-156**	1 Each
	100	Red	**U-157**	1 Each
0.007	5	Black	**U-126**	1 Each
	10	Black	**U-127**	1 Each
	20	Black	**U-128**	1 Each
	30	Black	**U-129**	1 Each
	50	Black	**U-130**	1 Each
	100	Black	**U-131**	1 Each
0.010	5	Blue	**U-111**	1 Each
	10	Blue	**U-112**	1 Each
	20	Blue	**U-113**	1 Each
	30	Blue	**U-114**	1 Each
	50	Blue	**U-132**	1 Each
	100	Blue	**U-133**	1 Each
1/32in OD Precut Tubing with 1/16in Sleeves				
0.005	10.5	Red	**30011-FLEX**	1 Each
	15	Red	**30015-FLEX**	1 Each
	28	Red	**30028-FLEX**	1 Each
	40	Red	**30040-FLEX**	1 Each
0.007	10.5	Yellow	**39011-FLEX**	1 Each
	15	Yellow	**39015-FLEX**	1 Each
	28	Yellow	**39028-FLEX**	1 Each
	40	Yellow	**39040-FLEX**	1 Each

1/16in 316 Stainless Steel Tubing, 5-Foot Coil

ID (in)	Cat. No.	Quantity
0.005	**U-158**	1 Each
0.007	**U-108**	1 Each
0.010	**U-106**	1 Each
0.020	**U-105**	1 Each
0.030	**U-107**	1 Each
0.040	**U-144**	1 Each
0.046	**U-151**	1 Each

PEEK Capillary Tubing

Pre-cut and color-coded for easy identification and use

- Broad chemical compatibility
- Biocompatible
- Easily cut to desired length
- Appropriate for many HPLC applications
- Resistant to most organic solvents, but nitric acid, sulfuric acid, dichloromethane, THF and DMSO are not recommended

1/16in OD Precut PEEK Tubing

ID (in)	Length (cm)	Colour	**Cat. No.**	Quantity
0.003	5	Natural	**37003-5**	1 Each
	10	Natural	**37003-10**	1 Each
	20	Natural	**37003-20**	1 Each
	30	Natural	**37003-30**	1 Each
	50	Natural	**37003-50**	1 Each
	100	Natural	**37003-100**	1 Each
0.005	5	Red	**37005-5**	1 Each
	10	Red	**37005-10**	1 Each
	20	Red	**37005-20**	1 Each
	30	Red	**37005-30**	1 Each
	50	Red	**37005-50**	1 Each
	100	Red	**37005-100**	1 Each
0.007	5	Yellow	**37007-5**	1 Each
	10	Yellow	**37007-10**	1 Each
	20	Yellow	**37007-20**	1 Each
	30	Yellow	**37007-30**	1 Each
	50	Yellow	**37007-50**	1 Each
	100	Yellow	**37007-100**	1 Each
0.010	5	Blue	**37010-5**	1 Each
	10	Blue	**37010-10**	1 Each
	20	Blue	**37010-20**	1 Each
	30	Blue	**37010-30**	1 Each
	50	Blue	**37010-50**	1 Each
	100	Blue	**37010-100**	1 Each
0.020	5	Orange	**37020-5**	1 Each
	10	Orange	**37020-10**	1 Each
	20	Orange	**37020-20**	1 Each
	30	Orange	**37020-30**	1 Each
	50	Orange	**37020-50**	1 Each
	100	Orange	**37020-100**	1 Each

1/16in OD PEEK Tubing, 5-Foot Coil

ID (in)	**Cat. No.**	Quantity
0.003	**37003**	1 Each
0.005	**37005**	1 Each
0.007	**37007**	1 Each
0.010	**37010**	1 Each
0.020	**37020**	1 Each
0.030	**37030**	1 Each
0.040	**37040**	1 Each

Polymer Tubing Cutter

Produces a flat, 90°, burr-free end

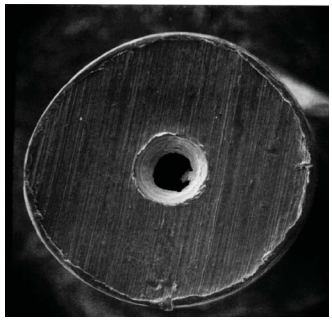
- Compatible with rigid polymeric tubing
- Guide holes for 1/16in and 1/8in tubing

Polymer Tubing Cutter

Description	Cat. No.	Quantity
Polymeric Tubing Cutter	**A-327**	1 Each
Replacement blades	**A-328**	5 Pack

Terry Tool Tubing Cutters

Produce clean, 90° cuts of stainless steel tubing



Terry Tool Tubing Cutters

Description	Cat. No.	Quantity
1/16in stainless steel tubing	**60182-509**	1 Each
1/8in stainless steel tubing	**60182-510**	1 Each

Rheodyne 7725 and 7725i Sample Injectors

Allow continuous flow between the load and inject positions to protect against pressure shock

- Stainless steel construction
- Make-Before-Break (MBB) design
- Can use partial filling for zero sample waste or complete filling for better reproducibility
- Inject 1µL to 5mL with high accuracy and precision
- 7725i features a position sensing switch for a reproducible start signal

Rheodyne 7725 and 7725i Sample Injectors

Model	Mode	Features	**Cat. No.**	Quantity
7725	Dual	Continuous flow	**7725**	1 Each
7725i	Dual	Continuous flow, position sensing switch	**7725i**	1 Each

Rheodyne 9725 and 9725i Sample Injectors

Allow continuous flow between the load and inject positions to protect against pressure shock

- Biocompatible PEEK construction
- Make-Before-Break (MBB) design
- Can use partial filling for zero sample waste or complete filling for better reproducibility
- Inject 1µL to 5mL with high accuracy and precision
- 9725i features a position sensing switch for a reproducible start signal

Rheodyne 9725 and 9725i Sample Injectors

Model	Mode	Features	**Cat. No.**	Quantity
9725	Dual	Continuous flow	**9725**	1 Each
9725i	Dual	Continuous flow, Position Sensing Switch	**9725i**	1 Each

Rheodyne 8125 Low-dispersion Microscale Injector

Designed for use with 1 and 2mm ID HPLC columns

- Can use partial filling for zero sample waste or complete filling for better reproducibility
- Position sensing switch provides reproducible start signal
- Suitable for use with 5 to 50µL sample loops

Rheodyne 8125 Low-dispersion Microscale Injector

Model	Mode	Features	**Cat. No.**	Quantity
8125	Dual	Continuous flow	**8125**	1 Each

Rheodyne 7010 Sample Injector

Single-mode sample injector designed for the complete filling method

Compatible with:

sample loop sizes 5µL to 20mL

Rheodyne 7010 Sample Injector

Model	Mode	Features	Cat. No.	Quantity
7010	Single	Complete filling method	**7010**	1 Each

Rheodyne 9010 Sample Injector

Single-mode sample injector designed for the complete filling method

- Compatible with sample loop sizes 5µL to 10mL
- PEEK stator
- Position sensing switch provides a reproducible start signal

Rheodyne 9010 Sample Injector

Model	Mode	Features	Cat. No.	Quantity
9010	Single	Continuous flow, Position sensing switch	**9010**	1 Each

Rheodyne Ports for Injectors

Suitable for popular Rheodyne injector models

Rheodyne Ports for Rheodyne Injectors Models 7010 and 9010

For Use with Rheodyne Model	Cat. No.	Quantity
7010 Filler Port, Stainless Steel	**7012**	1 Each
9010 Filler Port, PEEK	**9012**	1 Each
9010 Needle Port, PEEK	**9013**	1 Each

Rheodyne Sample Loops

For Rheodyne sample injectors in stainless steel or biocompatible PEEK

1/16in OD Precut PEEK Tubing

Description	Volume	ID (mm / in)	Cat. No.	Quantity
Sample loops for 7010 and 7125 injectors	5µL	0.18 / 0.007	**7020**	1 Each
	10µL	0.30 / 0.012	**7021**	1 Each
	20µL	0.30 / 0.012	**7022**	1 Each
	50µL	0.51 / 0.020	**7023**	1 Each
	100µL	0.51 / 0.020	**7024**	1 Each
	200µL	0.76 / 0.030	**7025**	1 Each
	500µL	0.76 / 0.030	**7026**	1 Each
	1mL	0.76 / 0.030	**7027**	1 Each
	5mL	1.0 / 0.040	**7029**	1 Each
Sample loops for 7725 and 7725i injectors	5µL	0.18 / 0.007	**7755-020**	1 Each
	10µL	0.30 / 0.012	**7755-021**	1 Each
	20µL	0.30 / 0.012	**7755-022**	1 Each
	50µL	0.51 / 0.020	**7755-023**	1 Each
Sample loops for 8125 injectors	5µL	0.20 / 0.008	**8020**	1 Each
	10µL	0.20 / 0.008	**8021**	1 Each
	20µL	0.25 / 0.010	**8022**	1 Each
	50µL	0.30 / 0.012	**8023**	1 Each
Sample loops for 9010 and 9725 injectors	100µL	0.51 / 0.020	**9055-024**	1 Each
	200µL	0.51 / 0.020	**9055-025**	1 Each
	500µL	0.76 / 0.030	**9055-026**	1 Each
	1mL	0.76 / 0.030	**9055-027**	1 Each
	5mL	0.76 / 0.030	**9055-029**	1 Each
	2µL	Internal	**7755-015**	1 Each
	5µL	0.18 / 0.007	**9055-020**	1 Each
	10µL	0.25 / 0.010	**9055-021**	1 Each
	20µL	0.25 / 0.010	**9055-022**	1 Each
Sample loops for 9725 and 9725i injectors	50µL	0.51 / 0.020	**9055-023**	1 Each
	5µL	0.18 / 0.007	**9055-020**	1 Each
	10µL	0.25 / 0.010	**9055-021**	1 Each
	20µL	0.25 / 0.010	**9055-022**	1 Each
	50µL	0.51 / 0.020	**9055-023**	1 Each

RheBuild Kits

Maintain Rheodyne valves and injectors

RheBuild Kits

For Use with Rheodyne Models	Cat. No.	Quantity
3725/3725i/3725-038/3725i-038	**3725-999**	1 Each
7010/7000	**7010-999**	1 Each
7125/7126	**7125-999**	1 Each
7410	**7410-999**	1 Each
7520/7526	**7520-999**	1 Each
7725/7725i/7726	**7725-999**	1 Each
8125/8126	**8125-999**	1 Each
9125/9126	**9125-999**	1 Each

Rheodyne Suction Needle Adapter

For use with Rheodyne sample injectors

Rheodyne Suction Needle Adapter

For Use with	Cat. No.	Quantity
Rheodyne Injector Models 9725 and 9725i	**9125-076**	1 Each

Rheodyne Replacement Rotor Seals for Injectors

Suitable for popular Rheodyne injector models

Rheodyne Replacement Rotor Seals for Injectors

For Use with Rheodyne Models	Cat. No.	Quantity
Vespel Seals		
7000/7010/7040/7067	**7010-039**	1 Each
7030	**7030-003**	1 Each
7060/7066	**7060-070**	1 Each
7125/7126	**7125-047**	1 Each
7410	**7410-038**	1 Each
7413	**7413-013**	1 Each
8125/8126	**8125-038**	1 Each
Tefzel Seals		
7000/7010/7040	**7010-071**	1 Each
7030	**7030-015**	1 Each
7060/7066/9060	**7060-074**	1 Each
7410	**7410-075**	1 Each
7125/7126	**7125-079**	1 Each
8125	**8125-097**	1 Each
9010	**9010-051**	1 Each
9125	**9125-082**	1 Each
PEEK Seals		
3725/3725i/3725-038/3725i-038	**3725-018**	1 Each

Rheodyne Stators

Suitable for popular Rheodyne injector models

Rheodyne Stators

For Use with Rheodyne Models	Cat. No.	Quantity
7000/7010/7030/7040/7125	**7010-040**	1 Each
7010-087/7125-081	**7010-066**	1 Each
7060/7066	**7060-039**	1 Each
7410/7413	**7410-041**	1 Each
9010/9030/9125	**9125-043**	1 Each
9060	**9060-016**	1 Each
7725	**7725-010**	1 Each
8125/8126	**8125-098**	1 Each

Rheodyne Stator Face Assemblies

For Use with Rheodyne Models	Cat. No.	Quantity
3725/3725i/3725-038/3725i-038	**3725-039**	1 Each
7125	**7125-067**	1 Each
8125	**8125-074**	1 Each
9125/9010/9030	**8125-094**	1 Each
9060	**9060-015**	1 Each
9725	**7725-026**	1 Each

Rheodyne Injection Port Needle Cleaner

For use with Rheodyne sample injectors

Rheodyne Injection Port Needle Cleaner

For Use with	Cat. No.	Quantity
Rheodyne injectors	**7125-054**	1 Each

Rheodyne Valve Mounting Brackets

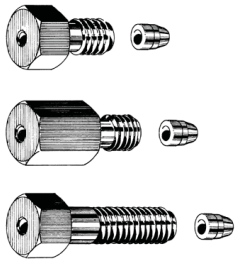
For use with Rheodyne sample injectors

Rheodyne Injection Port Needle Cleaner

For Use with	Cat. No.	Quantity
Angle bracket	**7160-010**	1 Each
Mouting panel	**7160**	1 Each

RheFlex High Pressure Fittings

Precision machined from 316 stainless steel

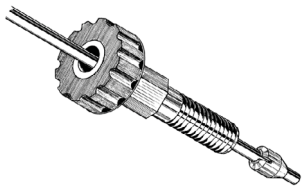


RheFlex High Pressure Fittings

	Type	Cat. No.	Quantity
	Short Fittings Set	**6000-109**	5 Pack
	Short Fittings Set	**6000-209**	10 Pack
	Long Fittings Set	**6000-111**	5 Pack
	Long Fittings Set	**6000-211**	10 Pack
	Extra Long Fittings Set	**6000-162**	5 Pack
	Extra Long Fittings Set	**6000-262**	10 Pack
	1/16in Ferrule	**6000-110**	5 Pack
	1/16in Ferrule	**6000-210**	10 Pack
	0.5mm Ferrule for Model 8125	**8125-084**	1 Each

RheFlex Two-Piece PEEK Fittings

Provide inert, metal-free connections

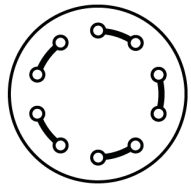


- Slotted back-side of the ferrule is squeezed down onto the tube by the mating conical surface of the nut
- May be used on 1/16in metal or plastic tubing reliably up to 5000 psi
- Reusable ferrule and nut

RheFlex Two-Piece PEEK Fittings

Type	Cat. No.	Quantity
Fitting set, standard length	**6000-054**	5 Pack
Fitting set, short	**6000-055**	5 Pack
Fitting set, X-long	**6000-066**	1 Each
Replacement ferrules	**6000-051**	5 Pack

Cheminert Model C2 Microbore Injector



Can be used as an injector or switching valve

- 1/16in fittings
- 0.010in ports
- Available in 6-port or 10-port configurations
- Available with manual or microelectric actuator

Cheminert Model C2 Microbore Injector

Description	Sample Volume	Cat. No.	Quantity
Model C2 injector, N60 stainless stator, 5µLloop, manual	6 ports	**C2-1006**	1 Each
	10 ports	**C2-1000**	1 Each
Model C2 injector, N60 stainless stator, 5µL loop, microelectric actuator	6 ports	**C2-1006EH**	1 Each
	10 ports	**C2-1000EP**	1 Each
Sample injector loops, stainless steel	2µL	**CSL2**	1 Each
	5µL	**CSL5**	1 Each
	10µL	**CSL10**	1 Each
	20µL	**CSL20**	1 Each
	50µL	**CSL50**	1 Each
	100µL	**CSL100**	1 Each
Model C4 injector, PAEK stator, 5µL loop, microelectric actuator	6 ports	**C2-1346EH**	1 Each
	10 ports	**C2-1340EP**	1 Each
Sample injector loops, PAEK	5µL	**CZSL5PK**	1 Each
	10µL	**CZSL10PK**	1 Each
	50µL	**CZSL50PK**	1 Each
	100µL	**CZSL100PK**	1 Each

Valco Injector Model C6W

Description	Volume	Cat. No.	Quantity
Model C6W injector, six 0.016in ports, manual	20µL loop	**C6W**	1 Each
Model EPC6W injector, six 0.016in ports, microelectric actuator	20µL loop	**EPC6W**	1 Each
Replacement rotor	–	**SSAC6W**	1 Each
Sample injector loops, stainless steel	2µL	**SL2CW**	1 Each
Sample injector loop, stainless steel	5µL	**SL5CW**	1 Each
Sample injector loop, stainless steel	10µL	**SL10CW**	1 Each
Sample injector loop, stainless steel	20µL	**SL20CW**	1 Each
Sample injector loop, stainless steel	50µL	**SL50CW**	1 Each
Sample injector loop, stainless steel	100µL	**SL100CW**	1 Each

Valco Accessories

Description	Volume	Cat. No.	Quantity
Valco syringe ports	22 ga. needles; 1/16in fittings	**VISF-1**	1 Each
Valco syringe ports	22 ga. 2in needles	**VISF-2**	1 Each
Valco Nuts and Ferrules	1/16in standard nut	**ZN1-10**	10 Pack
Valco Nuts and Ferrules	1/16in long nut	**LZN1-10**	10 Pack
Valco Nuts and Ferrules	1/16in SS ferrule	**ZF1-10**	10 Pack

HPLC Syringes

Easy, accurate and reproducible manual injection

- Square tip to prevent damage to the injector
- Wide range of volumes
- Precision made from borosilicate glass and stainless steel
- Robust design and easy-to-read markings

Standard Fixed Needle Syringes for Rheodyne/Valco Injectors

Volume (µL)	Needle Length (in)	Needle Gauge	**Cat. No.**	Quantity
5	2	22	**365CL221**	1 Each
10	2	22	**365DL231**	1 Each
25	2	22	**365FL241**	1 Each
50	2	22	**365GL251**	1 Each
100	2	22	**365HL261**	1 Each
250	2	22	**365IL271**	1 Each
500	2	22	**365JL281**	1 Each

Standard PTFE Tipped Removable Needle HPLC Syringes

Volume (µL)	Needle Length (in)	Needle Gauge	**Cat. No.**	Quantity
10	2	22	**365DLG21**	1 Each
25	2	22	**365FLG31**	1 Each
50	2	22	**365GLG41**	1 Each
100	2	22	**365HLG51**	1 Each
250	2	22	**365ILG61**	1 Each
500	2	22	**365JLG71**	1 Each

Syringes for Thermo Scientific HPLC Instruments

Volume (µL)	Needle Length (in)	Needle Gauge	Needle Type	Thermo Scientific HPLC Instruments	Thermo Scientific Instrument Part No.	**Cat. No.**	Quantity
250	2	22	Removable	LCQ	00301-19015	**365ILT21**	1 Each
500	2	22	Removable	LCQ	00301-19016	**365JLT41**	1 Each
500	–	–	–	AS1000, AS3000	A3588-010	**365JLT61**	1 Each
2.5	–	–	–	AS3000, AS3500	A3587-020	**365LLT81**	1 Each
250	–	–	–	AS1000, AS3000	A3588-020	**365ILT91**	1 Each

Syringes for CTC Instruments

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity
10	51	22	Fixed	**365DL710**	1 Each
25	51	22	Fixed	**365FL984**	1 Each
Gas Tight					
10	51	22	Fixed	**365DL991**	1 Each
25	51	22	Fixed	**365FL715**	1 Each
50	51	22	Fixed	**365GL810**	1 Each
100	51	22	Fixed	**365HL331**	1 Each
25	51	22	Removable	**365FL985**	1 Each
100	51	22	Removable	**365HL330**	1 Each
250	51	22	Removable	**365IL330**	1 Each
Gas Tight (0.41)					
100	51	22	Fixed	**365HL720**	1 Each
250	51	22	Fixed	**365IL720**	1 Each
500	51	22	Fixed	**365JL720**	1 Each

Replacement Needles for LC Syringes

Available for syringes with removable needles

Replacement Needles for LC Syringes

Replacement for	Needle Length (in)	Needle Gauge	Cat. No.	Quantity
PTFE-tipped needle for Mfr. No. 365DLG21	2	22	**365RNL15**	5 Pack
25 to 500µL PTFE tipped needles; 365FL985, 365HL330, 365IL330	2	22	**365RNL25**	5 Pack

Needles for Luer-LOK Priming Syringes

Replacement for	Needle Length (in)	Needle Gauge	Cat. No.	Quantity
All Thermo Scientific Luer-LOK Priming Syringes	2	22	**365RNL22**	2 Pack

Mass Spectrometry Replacement ESI Probe Needles

For Instrument	Thermo Scientific Instrument Part No.	Cat. No.	Quantity
Thermo Scientific LCQ XP, DECA, Advantage	00950-00990	**365RNLT1**	1 Each
Thermo Scientific LCQ MS	00950-00951	**365RNLT2**	1 Each
Thermo Scientific LCQ XSQ	00950-00975	**365RNLT3**	1 Each

Replacement Plungers for CTC Syringes

For Use with	Cat. No.	Quantity
365DL991	**365RP532**	1 Each
365FL715	**365RP922**	1 Each
365GL810	**365RP821**	1 Each
365HL331, 365HL720 & 365IL330	**365RP471**	1 Each
365IL720	**365RP926**	1 Each
365JL720	**365RP928**	1 Each
365FL985	**365RP816**	1 Each

National Target Precision Glass Syringes and Replacement Needles

Configurations to fit every autosampler

Glass Syringes

Designed for accurate sampling of very small volumes of liquid; ideal for measuring sensitive biological samples

- Precision-bored Duran® borosilicate-glass syringes
- Chromium-plated stainless-steel plungers eliminate leaching of metal ions into the sample solutions
- Syringes with microvolume Zero Dead Volume (ZDV) plunger in needle offer minimal sample waste

National Target Precision Glass Syringes

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity
1	70	26s	Bevel	**NS200101**	1 Each
1	70	26s	90° Blunt End	**NS200102**	1 Each
2	80	22s	Bevel	**NS200201**	1 Each
2	80	22s	90° Blunt End	**NS200202**	1 Each
5	70	25s	Bevel	**NS200301**	1 Each
5	70	25s	90° Blunt End	**NS200302**	1 Each

Extended Handle Syringes for Waters Manual Injection Valves

Extended handle prevents heat transfer from hands to syringe barrel

- 50mm needle length provides accurate injections without damage to valve rotor

National Target Precision Glass Extended Handle Syringes for Waters® Manual Injection Valves

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity	**Replacement Needle**	Quantity
5	50	25	90° Blunt End	**NS50230**	1 Each	**NS832306**	3 Pack
10	50	25	90° Blunt End	**NS50240**	1 Each	**NS832406**	3 Pack
25	50	25	90° Blunt End	**NS50250**	1 Each	**NS832506**	3 Pack
50	50	25	90° Blunt End	**NS50260**	1 Each	**NS832506**	3 Pack
100	50	25	90° Blunt End	**NS50270**	1 Each	**NS832506**	3 Pack
250	50	25	90° Blunt End	**NS50280**	1 Each	**NS832506**	3 Pack

Extended Handle Syringes

Gas- and liquid-tight syringes for micro volume sampling

- Extended metal handle prevents sensitive samples from thermal transfer from operator to syringe; also protects precision-machined plunger from bending
- PTFE-tipped to prevent plunger freeze-up for longer syringe life
- Removable needle syringes permit easy removal of bent needles for replacement; same syringe can be used with different gauge needles to meet specific application needs

National Target Precision Glass Extended Handle Syringes

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	Cat. No.	Quantity	Replacement Needle	Quantity
5	51	26s	Bevel	**NS506305**	1 Each	**NS832301**	3 Pack
	51	26s	90° Blunt End	**NS506306**	1 Each	**NS832302**	3 Pack
10	51	26s	Bevel	**NS506405**	1 Each	**NS832401**	3 Pack
	51	26s	90° Blunt End	**NS506406**	1 Each	**NS832402**	3 Pack
25	51	22s	Bevel	**NS506505**	1 Each	**NS832501**	3 Pack
	51	22s	90° Blunt End	**NS506506**	1 Each	**NS832502**	3 Pack
50	51	22s	Bevel	**NS506605**	1 Each	**NS832501**	3 Pack
	51	22s	90° Blunt End	**NS506606**	1 Each	**NS832502**	3 Pack

LC Syringes for Agilent Technologies

Use with 1090A or 1100 autosamplers

National Target Precision Glass LC Syringes for Agilent Technologies

Volume (µL)	Agilent No.	**Cat. No.**	Quantity
25	9301-0633	**NS606500**	1 Each
250	9301-0678	**NS606800**	1 Each

LC Syringe for PerkinElmer

Use with PerkinElmer Series 200 autosamplers

National Target Precision Glass LC Syringe for PerkinElmer

Volume	PerkinElmer No.	**Cat. No.**	Quantity
25µL	09923304	**NS606615**	1 Each
250µL	09923270	**NS606815**	1 Each
500µL	09923306	**NS606915**	1 Each
1mL	09923307	**NS606015**	1 Each
2.5mL	09923219	**NS606035**	1 Each

LC Syringe for Thermo Scientific

Use with SpectraSYSTEM AS-100/300/1000/3000/3500 autosamplers

National Target Precision Glass LC Syringe for Thermo Scientific

Volume	Thermo Scientific No.	**Cat. No.**	Quantity
250µL	A3587-020	**NS606814**	1 Each
500µL	A3588-010	**NS606914**	1 Each
1mL	A3587-030	**NS606015**	1 Each
2.5mL	A3588-020	**NS606035**	1 Each

LC Syringes for CTC/Leap

Use with A200LC, HTS, and HTC PAL autosampler models

- For use with CTC/Leap autosamplers
- Fixed needle syringes feature a proprietary process that eliminates cement or epoxy for error-free injections
- PTFE-tip on stainless-steel plungers prevent plunger freeze-up for longer syringe life
- 22 gauge needle, 51mm length with 90° blunt end point style

National Target Precision Glass LC Syringes for CTC/Leap

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity
25	51	22s	90° Blunt End	**NS620502**	1 Each
50	51	22s	90° Blunt End	**NS620605**	1 Each
100	51	22s	90° Blunt End	**NS620702**	1 Each
250	51	22s	90° Blunt End	**NS620805**	1 Each

LC Syringes for Waters WISP

Use with 710, 712, and 715 autosampler models

- 1/4-28UNF front-fitting syringe for use with Waters WISP needle assemblies.

National Target Precision Glass LC Syringes for Waters WISP

Volume (µL)	Waters No.	**Cat. No.**	Quantity
25	9301-0633	**NS663514**	1 Each
250	9301-0678	**NS663814**	1 Each

LC Syringes for Water's Injection Valves – Removable Needle

- 25s Gauge needles
- PTFE-tipped stainless-steel plungers
- Use with U6K manual injector

National Target Precision Glass LC Syringes for Water's Injection Valves – Removable Needle

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity
10	51	25s	90° Blunt End	**NS602406**	1 Each
25	51	25s	90° Blunt End	**NS602506**	1 Each
50	51	25s	90° Blunt End	**NS602606**	1 Each
100	51	25s	90° Blunt End	**NS602706**	1 Each
250	51	25s	90° Blunt End	**NS602806**	1 Each

LC Syringes for Manual Injection Valves

- 22s Gauge fixed needles
- Stainless-steel plungers
- Use with Rheodyne, Altex, Valco, SSI, Knauer

National Target LC Syringes for Manual Injection Valves

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	Cat. No.	Quantity
5	51	22s	90° Blunt End	**NS101302**	1 Each
10	51	22s	90° Blunt End	**NS101402**	1 Each
25	51	22s	90° Blunt End	**NS101502**	1 Each
50	51	22s	90° Blunt End	**NS101602**	1 Each
100	51	22s	90° Blunt End	**NS101702**	1 Each
250	51	22s	90° Blunt End	**NS101802**	1 Each
500	51	22s	90° Blunt End	**NS101902**	1 Each

LC Syringes for Rheodyne Style Valves

Gas tight with fixed needles

National Target LC Syringes for Rheodyne Style Valves

Volume (µL)	Needle Length (mm)	Needle Type	Cat. No.	Quantity
5	51	90° Blunt End	**NS601302**	1 Each
10	51	90° Blunt End	**NS601402**	1 Each
25	51	90° Blunt End	**NS601502**	1 Each
50	51	90° Blunt End	**NS601602**	1 Each
100	51	90° Blunt End	**NS601702**	1 Each
250	51	90° Blunt End	**NS601802**	1 Each
500	51	90° Blunt End	**NS601902**	1 Each

LC Syringes for Manual Injection Valves – Super Elastic Plunger

- 22s Gauge fixed needles
- Super Elastic plunger
- Use with Rheodyne, Altex, Valco, SSI, Knauer

National Target LC Syringes for Manual Injection Valves – Super Elastic Plunger

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	Cat. No.	Quantity
5	51	22s	90° Blunt End	**NS161302**	1 Each
10	51	22s	90° Blunt End	**NS161402**	1 Each

LC Syringes for Manual Injection Valves

- 22s Gauge removable needles
- PTFE-tipped stainless-steel plungers
- Use with Rheodyne, Altex, Valco, SSI, Knauer

National Target LC Syringes for Manual Injection Valves

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity	**Replacement Needle**	Quantity
5	51	22s	90° Blunt End	**NS601306**	1 Each	**NS831305**	3 Pack
10	51	22s	90° Blunt End	**NS601406**	1 Each	**NS831405**	3 Pack
25	51	22s	90° Blunt End	**NS601506**	1 Each	**NS831505**	3 Pack
50	51	22s	90° Blunt End	**NS601606**	1 Each	**NS832602**	3 Pack
100	51	22s	90° Blunt End	**NS601706**	1 Each	**NS832602**	3 Pack
250	51	22s	90° Blunt End	**NS601806**	1 Each	**NS832602**	3 Pack
500	51	22s	90° Blunt End	**NS601906**	1 Each	**NS832602**	3 Pack

LC Syringes for Macro Volume Sampling

22s Gauge needles with PTFE tipped stainless-steel plungers

National Target Precision Glass Large Volume Syringe

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity
Fixed Needle					
1.0	51	22s	Bevel	**NS600000**	1 Each
2.5	51	22s	Bevel	**NS600020**	1 Each
5.0	51	22s	Bevel	**NS600040**	1 Each
10.0	51	22s	Bevel	**NS600060**	1 Each
Removable Needle					
1.0	51	22s	Bevel	**NS600005**	1 Each
2.5	51	22s	Bevel	**NS600025**	1 Each
5.0	51	22s	Bevel	**NS600045**	1 Each
10.0	51	22s	Bevel	**NS600065**	1 Each

National Target Precision Glass Large Volume Syringe – PTFE Luer-Lok

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	**Cat. No.**	Quantity
1.0	–	–	–	**NS607011**	1 Each
2.5	–	–	–	**NS607031**	1 Each
2.5	–	–	–	**NS607051**	1 Each
10	–	–	–	**NS607071**	1 Each
25	–	–	–	**NS607091**	1 Each

Gas Tight Syringes for Macro Volume Sampling Replacement Needles

Suitable for liquid or gas samples

- PTFE-tipped stainless-steel plunger tip prevents plunger freeze-up for longer syringe life

National Target Gas Tight Syringe Replacement Needles

Volume (µL)	Needle Length (mm)	Needle Gauge	Needle Type	Cat. No.	Quantity
For Removable Needle Syringe					
250-10	51	22s	90° Blunt End	**NS841014**	3 Pack
250-10	51	22s	Side Hole	**NS841015**	2 Pack
250-10	51	22s	Bevel	**NS841013**	3 Pack
Metal Luer-Screw for PTFE Luer-Lok					
–	51	26s	90° Blunt End	**NS842047**	3 Pack
–	51	26s	Bevel	**NS840047**	3 Pack
–	51	22s	90° Blunt End	**NS842070**	3 Pack
–	51	22s	Bevel	**NS840070**	3 Pack

Syringe Accessories

Syringe storage, cleaning, and dispensing aids

- *Syringe Rack* holds up to three glass syringes, 500µL or smaller to prevent breakage and contact with lab surfaces; made of anodized aluminium
- *Needle Cleaning Wires* remove blockages from syringe needle; promote longer syringe life and prevent contamination in subsequent syringe use
- *Syringe Guide Chaney Adapter* is fitted to manually operated syringes 100uL or smaller to increase precision and reproducibility; made of stainless steel and anodized aluminium

National Target Syringe Accessories

Type	Cat. No.	Quantity
Three-position Syringe Rack	**NS700002**	1 Each
Needle Cleaning Wire for 26s gauge needles	**NS1018300**	12 Pack
Needle Cleaning Wire for 22s and 25s gauge needles	**NS1018301**	12 Pack
Syringe Guide Chaney Adapter	**NS700001**	1 Each

Detector Lamps

Detector Lamps for Thermo Scientific Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	SP8400/SP8430/SP8440/SP8450/SP8480/SP8490	**DSP-901**	1 Each
	SP8480XR/SP8773XR	**DSP-907**	1 Each
	Linear UV100/UV200/UV1000/UV2000/UV3000/ Focus/Spectrochrom	**DSP-908**	1 Each

Detector Lamps for Agilent Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	Agilent HP1040/HP1050 (G1306A) DAD/HP 1050 DA (1050 MWD)/ HP MW (79854A) / HP 1090 (75880A) DAD	**DHP-901**	1 Each
	HP 1080/HP 1081/HP1081B/HP1082B/HP1084/HP1084B	**DHP-902**	1 Each
	HP 1050 VW (79853C)	**DHP-903**	1 Each
	HP 8450/8450A	**DHP-909**	1 Each
	HP 1100 (G1314) VW	**DHP-910**	1 Each
	HP 1100 (G1315A) DAD	**DHP-911**	1 Each
	HP 8453	**DHP-912**	1 Each
	HP 8452 A DAD/HP 8452A Opt 002	**DHP-913**	1 Each
Xenon Lamp	HP 1046/HP1046A	**DHP-906**	1 Each
LL Deuterium Lamp	Agilent 1100 VWD long life	**DHP-910LL**	1 Each
	Agilent 1100 DAD long life	**DHP-911LL**	1 Each

Detector Lamps for Merck-Hitachi Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	101/102/111	**DHI-901**	1 Each
	100-10/100-40/100-50/100-60	**DHI-902**	1 Each
	150-20/200/220/300/330/340/2000/3000/4000/ L2500/L3000/L4000/L-4500	**DHI-903**	1 Each
	L4200/L4250/L4500	**DHI-908**	1 Each
	LaChrom L4720/L4520/L7400/L450	**DHI-910**	1 Each
Xenon Lamp	Hitachi fluorescence detectors F1000/2000/4000 Series	**DHI-911**	1 Each

Our applications team is regularly presenting at key events, download one of our recent posters.
www.thermoscientific.com/chromatography

Detector Lamps for PerkinElmer Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	Lambda 3/7/9	**DPE-903**	1 Each
	360/460/560	**DPE-906**	1 Each
	Integral 2000/Integral 4000/LC55/LC65/LC85/LC95	**DPE-911**	1 Each
	LC-90/LC-290	**DPE-913**	1 Each
	Lambda 2/2S/10/11 and others	**DPE-914**	1 Each
	Series 200 DAD	**DPE-915**	1 Each
Tungsten Lamp	Lambda 2/2S/10/11 and others	**DPE-908**	1 Each

Detector Lamps for Shimadzu Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	UV120/UV160/UV160A/UV240/UV260/UV265	**DSH-901**	1 Each
	SPD-2A/SPD-3/SPD-4	**DSH-902**	1 Each
	D300L/UV200S	**DSH-903**	1 Each
	SPD 6A/SPD-6AV	**DSH-916**	1 Each
	SPD 10A/SPD 10AS/SPD-10AV/SPD-10AVP	**DSH-917**	1 Each
	SPD-M10AVP PDA	**DSH-918**	1 Each
Xenon Lamp	Shimadzu RF530/RF510	**DSH-912**	1 Each
	Shimadzu RF540/RF535/RF551/RF500	**DSH-913**	1 Each
	Shimadzu RF1501.5301/5000	**DSH-914**	1 Each
	RF10A RF10AX	**DSH-915**	1 Each
LL Deuterium Lamp	Shimadzu SPD-10 Series long life	**DSH-918LL**	1 Each

Detector Lamps for Varian Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	UV 2050	**DVA-901**	1 Each
	UV 50/Varichrom	**DVA-903**	1 Each
	UV100/UV200	**DVA-904**	1 Each
	UV5/2550	**DVA-905**	1 Each
	LC5000/LC5500	**DVA-906**	1 Each
	Star 9050	**DVA-907**	1 Each
	ProStar 340/345 UV/Vis	**DVA-909**	1 Each

Detector Lamps for Waters Instruments

Description	Model	Cat. No.	Quantity
Mercury Lamp	440/441/490	**DWA-901**	1 Each
Deuterium Lamp	480/481/480LC/481LC/Lambda Max/LC1	**DWA-910**	1 Each
	484	**DWA-915**	1 Each
	486	**DWA-918**	1 Each
	2486	**DWA-918LC**	1 Each
	996 PDA/2996	**DWA-921**	1 Each
	990/991/994 PDA	**DWA-926**	1 Each
	2487 Dual Wavelength/2488	**DWA-930**	1 Each
Tungsten Lamp	RI/R401/R403/R404	**DWA-911**	1 Each
Cadmium Lamp	440/441/490	**DWA-912**	1 Each
Zinc Lamp	440/441/490	**DWA-913**	1 Each
Xenon Lamp	470/475/2475 Lamp only	**DWA-923**	1 Each
	474	**DWA-929**	1 Each
LL Deuterium Lamp	Waters 996	**DWA-921LL**	1 Each
	Waters Alliance 2487/2488	**DWA-930LL**	1 Each

Pump Spares

Pump Spares for Thermo Scientific Instruments

Description	Model	Cat. No.	Quantity
Piston Seal			
Piston Seal Black	Surveyor LC	**SFS-220**	1 Each
Piston Seal Yellow	Surveyor LC	**SFS-220G**	1 Each
Wash Seal White	Surveyor LC	**SFS-230**	1 Each
Piston Seal Black	Surveyor MS	**SFS-320**	1 Each
Piston Seal Clear	Surveyor MS	**SFS-320U**	1 Each
Wash Seal clear	Surveyor MS	**SFS-330**	1 Each
Check Valves			
Inlet Check Valve Assembly – Cartridge Type	Surveyor LC	**SFS-3001**	1 Each
Outlet Check Valve Assembly – Cartridge Type	Surveyor LC	**SFS-3002**	1 Each
Inlet/Outlet Check Valve Cartridge	Surveyor MS	**SFS-6001C**	1 Each

Pump Spares for Agilent Instruments

Description	Model	Cat. No.	Quantity
Pistons			
Piston Assembly Sapphire	1090	**SHP-200**	1 Each
Piston Assembly Sapphire	1050 and 1100	**SHP-400**	1 Each
Piston Seals			
Piston Seal Yellow	1050, 1090 and 1100	**SHP-220G**	1 Each
Piston Seal Black	1050 and 1100	**SHP-420K**	1 Each
Check Valves and Spares			
Replacement Inlet/Outlet Check Valve Cartridge	1090	**SHP-5002**	1 Each
Inlet/Outlet Check Valve Assembly	1090	**SHP-5001**	1 Each

Pump Spares for PerkinElmer Instruments

Description	Model	Cat. No.	Quantity
Pistons			
HP Piston Assembly Sapphire	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE600**	1 Each
HP Piston Assembly Sapphire	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE500**	1 Each
Piston Seals			
HP Piston Seal Grey	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE220**	1 Each
HP Piston Seal Yellow	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE220G**	1 Each
LP Piston Seal Black	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE320**	1 Each
LP Piston Seal Yellow	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE320G**	1 Each
Check Valves and Spares			
Inlet/Intermediate Check Valve Assembly	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE3001**	1 Each
Outlet Check Valve Assembly	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE3002**	1 Each

Pump Spares for Varian Instruments

Description	Model	Cat. No.	Quantity
Pistons			
Piston Assembly Sapphire	5000, 5500, 5600	**SOT-VA200**	1 Each
Piston Assembly Sapphire	2010, 2210, 2510	**SOT-VA400**	1 Each
Piston Seals			
Piston Seal Black	5000, 5500, 5600	**SOT-VA220**	1 Each
Piston Seal Black	2010, 2210, 2510	**SOT-VA320**	1 Each
Piston Seal Yellow	2010, 2210, 2510	**SOT-VA320G**	1 Each
Check Valves and Spares			
Inlet Check Valve Assembly	2010, 2210, 2510	**SVA-3001**	1 Each
Outlet Check Valve Assembly	2010, 2210, 2510	**SVA-3002**	1 Each

Pump Spares for Shimadzu Instruments

Description	Model	Cat. No.	Quantity
Pistons			
Piston Assembly Sapphire	LC-10 AS, LC-6, LC-6A	**SOT-SH200**	1 Each
Piston Assembly Sapphire	LC-9, LC-10AD, LC-600	**SOT-SH202**	1 Each
Piston Seals			
Piston Seal Yellow	LC-10 AT	**SOT-SH-100-01**	1 Each
Wash Seal White	LC-10 AT	**SOT-SH-100-02**	1 Each
Piston Seal Grey	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SH220**	1 Each
Wash Seal White	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SH220G**	1 Each
Piston Seal Yellow	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SH520G**	1 Each
Piston Seal Grey	LC-9, LC-10AD, LC-600	**SOT-SH420**	1 Each
Piston Seal Black	LC-10 ATvp	**SOT-SH520**	1 Each
Check Valves and Spares			
Inlet Check Valve Assembly	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SSH3001**	1 Each
Outlet Check Valve Assembly	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SSH3002**	1 Each
Inlet Check Valve Assembly – Cartridge Type	LC-9, LC-10AD, LC-600	**SSH-6001**	1 Each
Outlet Check Valve Assembly – Cartridge Type	LC-9, LC-10AD, LC-600	**SSH-6002**	1 Each

Pump Spares for Waters Instruments

Description	Model	Cat. No.	Quantity
Pistons			
Piston Assembly Sapphire	M510, M590, M600, M610 M6000	**SWA-WA200**	1 Each
Piston Assembly Ruby	M510, M590, M600, M610 M6000	**SWA-WA200R**	1 Each
Piston Assembly Sapphire	M45, M501	**SWA-WA205**	1 Each
Piston Assembly Sapphire	M515	**SWA-WA800**	1 Each
Piston Assembly Sapphire	Alliance 2690	**SWA-WA900**	1 Each
Piston Seals			
Piston Seal Black	M45, M501, M510, M590, M600, M610 M6000	**SWA-WA220**	1 Each
Piston Seal Yellow	M45, M501, M510, M590, M600, M610 M6000	**SWA-WA220G**	1 Each
Piston Seal Grey	M510EF, M590EF, M600EF, M610EF, M6000EF	**SWA-WA600S**	1 Each
Piston Seal Black	M515	**SWA-WA820**	1 Each
Piston Seal Yellow	M515	**SWA-WA820G**	1 Each
Piston Seal Black	Alliance 2690	**SWA-WA920**	1 Each
Piston Seal Yellow	Alliance 2690	**SWA-WA920G**	1 Each
Check Valves and Spares			
Inlet Check Valve Assembly	M45, M501, M510, M590, M600, M610 M6000	**SWA-3201**	1 Each
Outlet Check Valve Assembly Actuator Type	M45, M501, M510, M590, M600, M610 M6000	**SWA-3202**	1 Each
Outlet Check Valve	M45, M501, M510, M590, M600, M610 M6000	**SWA-3202B**	1 Each
Inlet Check Valve Repair Kit	M510, M590, M600, M610 M6000	**SWA-3212**	1 Each
Outlet Check Valve Assembly Actuator Type	M45, M501, M510, M590, M600, M610 M6000	**SWA-3402**	1 Each
Outlet Check Valve Assembly Ball & Seat Type	M45, M501, M510, M590, M600, M610 M6000	**SWA-3402B**	1 Each
Inlet Check Valve Assembly	M510EF, M590EF, M600EF, M610EF, M6000EF	**SWA-4107**	1 Each
Inlet Check Valve Repair Kit	M510EF, M590EF, M600EF, M610EF, M6000EF	**SWA-4123**	1 Each
Inlet Check Valve Assembly	M515	**SWA-8001**	1 Each
Outlet Check Valve Assembly	M515	**SWA-8002**	1 Each
Check Valve Cartridge	Alliance 2690	**SWA-9001**	1 Each

Dionex ICS-900 Ion Chromatography Systems

Routinely Analyze Multiple Anions or Cations in 10-15 Minutes

- Sensitive, stable, heated conductivity detection for precise results
- Compatibility with a broad range of polymeric separation columns for unparalleled application flexibility and reliability
- Thermo Scientific Dionex Chromeleon™ SE allows control of a single Dionex ICS-900 with an autosampler

The Dionex ICS-900 is an integrated, single-channel ion chromatography system designed to run specific isocratic anion and cation applications. The system uses Thermo Scientific Dionex MMS™ 300 membrane suppression with Displacement Chemical Regeneration (DCR) technology for low noise and stable baselines. Each ICS-900 system has an all-polymeric flow path with a reliable dual piston pump, high-pressure pulse damper, electrically actuated PEEK™ valve, and a temperature-controlled conductivity cell.

Dionex ICS-900 Key Features:

- Dionex MMS 300 membrane suppression with DCR technology for drift-free baseline and ease-of-use
- Wide pump flow rate range to support 2, 3, and 4mm isocratic anion and cation columns
- Dual-piston, serial-pumping system with PEEK™ flow path for low maintenance costs and maximum up-time
- All-polymeric flow pathway to eliminate contamination and corrosion
- Chromeleon Chromatography Data System software for full control, quality integration, and versatile reports to exceed all your data processing needs
- USB connectivity for fast, trouble-free instrument connection and configuration

Dionex ICS-900 Physical Specifications

Dimensions (h × w × d):
33 × 24 × 40cm (13 × 9.5 × 15.75in)

Weight 10kg (22lbs)

Power Requirements:
100–240V ac, 50–60Hz, autoranging

The AS-DV autosampler is a low-cost, metal-free, rugged, automated sample loading device designed especially for ion chromatography applications. The random access and sample preparation capabilities provide easily automated sample introduction to the chromatograph. Its new software control provides high flexibility to select the optimum injection parameters for filling injection loops or loading concentrator columns.

AS-DV Key Features:

- Full loop and concentrator loading
- Optional 6-port or 10-port valve for automated sample preparation or sample injection
- Random access
- Chromeleon control provides high flexibility to select the optimum injection parameters
- 5.0mL and 0.5mL polymeric vials with optional filter caps
- Automatic switching power supply for universal input voltage
- Sample Overlap injections for increased productivity

AS-DV Autosampler Specifications

Dimensions (h × w × d):
23 × 45 × 56cm (9 × 17.5 × 22in)

Weight: 16 kg (35 lbs)

Power Requirements:
100–240V ac, 50–60Hz, autoranging

Dionex ICS-900 Ion Chromatography System Bundles

Description	Cat. No.
Dionex ICS-900 IC System for Anions with AS-DV Autosampler and Chromeleon Software	**078028**
Dionex ICS-900 IC System for Cations with AS-DV Autosampler and Chromeleon Software	**078029**

Contact Customer Service for details of replacement columns and reagents for the Dionex ICS-900

The Anion Bundle includes:

- Dionex ICS-900 Ion Chromatography System
- AS-DV Autosampler
- Chromeleon 7 SE Software
- AS22 4mm Consumables Bundle:
  - 1- Dionex IonPac AS22 4mm, 064141
  - 1- Dionex IonPac AG22 4mm, 064139
  - 1- Dionex AMMS™ 300 4mm, 064558
  - 1- Dionex AMMS III Regenerant Concentrate, 4 pack, 057555
  - 1- Dionex ICS-900 DCR Anion Regenerant 2L Bottle, 057712
  - 1- AS22 Eluent Concentrate, 0670

The Cation Bundle includes:

- Dionex ICS-900 Ion Chromatography System
- AS-DV Autosampler
- Chromeleon 7 SE Software
- CS12A 4mm Consumables Bundle:
  - 1- Dionex IonPac CS12A 4mm, 046073
  - 1- Dionex IonPac CG12A 4mm, 046074
  - 1- Dionex CMMS™ 300 4mm, 064560
  - 1- Dionex CMMS III Regenerant Concentrate, 4 pack, 057556
  - 1- Dionex ICS-900 DCR Cation Regenerant 2L Bottle, 057713
  - 1- CS12A Eluent Concentrate, 057562

HOT POCKET and COOL POCKET Column Temperature Controllers

Wrap-around column temperature control systems

- Easy to install and use with a variety of column lengths
- Dual display of both actual and set point temperature
- HOT POCKET™ range from just above ambient to 85°C
- COOL POCKET™ range from 5°C to 55°C
- Explore sample selectivity and stability on both sides of ambient

Column Heating and Cooling in an Efficient, Compact Design

The HOT POCKET and COOL POCKET Column Temperature Controllers have a unique, space saving design for the efficient control of HPLC column temperature using a novel, soft, wrap-around sealing mantle. The mantle is wrapped directly onto the column, in situ, in horizontal, vertical, or slant position. The standard size accepts column lengths up to 300mm, and columns up to 150mm can be used with the short HOT POCKET model. The inserts also allow the use of guard columns or the optional eluent pre-heater. The inserts are modular, allowing them to be easily removed or rearranged for your specific column configuration. Special inserts are available for larger or smaller diameter columns. The temperature is set on the Temperature Controller Unit, which is permanently attached to the heater/cooler. Both the actual temperature and the user selected set point are simultaneously displayed on the LED controller display.

HOT POCKET Column Heater

The HOT POCKET Column Heater has a temperature range of just above ambient to 85°C with excellent control, allowing validation of HPLC methods at accurate temperatures. HPLC method ruggedness can be investigated by exploring the sensitivity of a separation to temperature changes. The HOT POCKET is available in a standard size to accommodate column combinations up to 300mm in length, and a short version for columns up to 150mm.

It is easy to install a column into the HOT POCKET or COOL POCKET. Depending upon column length and auxiliary fixtures such as a guard column or eluent pre-heater, some of the inserts may have to be rearranged or removed through the special slot at one end. Rotate the inserts so that the groove in each is positioned in the open part of the channel. Columns are simply placed into the inserts, which are then rotated to lock the column into the channel. The insulated mantle is wrapped around the column with a Velcro™ closure.

COOL POCKET Temperature Controller

The COOL POCKET Temperature Controller provides efficient control of the temperature of HPLC columns both above and below ambient, with an operational temperature range of 5°C to 55°C. The COOL POCKET Temperature Controller is ideal for chiral applications where a lower temperature may give better separation of enantiomers or other closely related compounds. It also allows you to validate HPLC methods at accurate temperatures near ambient and check HPLC method ruggedness by exploring the sensitivity of your separation to temperature changes on both sides of ambient.

HOT POCKET Column Heaters, Eluent Preheater/Precooler and COOL POCKET Chiller

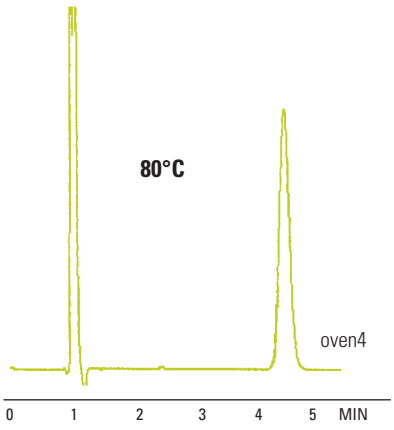
Column heating or cooling in a compact, efficient design

- The Eluent Pre-Heater provides a dramatic improvement in chromatography as demonstrated by the USP method for enalapril maleate at 80°C
- For preheating or precooling Mobile Phase before it enters column
- Use in temperatures above 50°C or below 15°C
- 0.005in ID

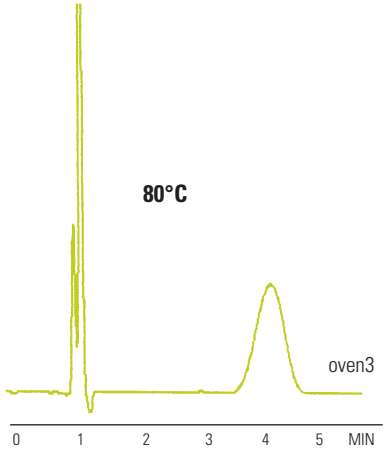
Product Specifications

	HOTPOCKET	COOL POCKET
Operating Range	5°C above ambient to 85°C	5°C to 55°C
Display	Dual LED displays of actual and set point temperatures in °C	
Temperature Accuracy	± 2°C over entire range	± 2°C over entire range
Temperature Repeatability	± 1°C	± 1°C
Temperature Stability	± 0.1°C	± 0.1°C
Time to Stabilization (from ambient)	85°C in less than 30 minutes	55°C in 25 minutes, 5°C in 20 minutes
Column Capacity	Standard: up to 3/8in OD and up to 300mm in length and end-fittings up to 19mm OD (250mm length column with guard or eluent pre-heater in addition to column) Short (HOT POCKET only): up to 150mm total length (100mm column plus guard or pre-heater)	
Controller Dimensions	2.8 x 4.0 x 6.5in	2.8 x 4.0 x 6.5in
Mantle Dimensions	Standard: 1.5 x 1.5 x 17in	Standard: 1.5 x 4.0 x 17in Short: 1.5 x 1.5 x 12in
Power Cord	3 foot retractable coil cord	3 foot retractable coil cord
Weight	1lb enclosure (3lb total with power supply)	2lb enclosure (4lb total with power supply)
Power	24VAC, 25 Watts maximum	15VDC, 20 Watts maximum

With Eluent Pre-heater



Without Eluent Pre-heater



Effect of eluent pre-heater on efficiency

Data courtesy of Dr. Richard F. Myer, Quantitative Technologies, Inc., Whitehouse, NJ

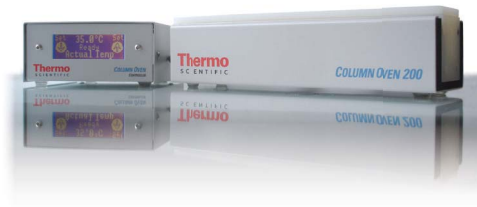
HOT POCKET Column Heaters, Eluent Preheater/Precooler and COOL POCKET Chiller

Description	Cat. No.	Quantity
HOT POCKET Column Heater	**92016**	1 Each
HOT POCKET Column Heater	**92016-150**	1 Each
COOL POCKET Column Chiller	**92017**	1 Each
Eluent Preheater/Precooler	**92018**	1 Each

Column Oven

Exact temperature control for LC columns

- Temperature control from ambient to 90°C
- Fits up to four columns in one compartment
- Compatible with CTC autosamplers and Thermo Scientific Mass Spectrometer ion sources



Product Description

The Thermo Scientific Column Oven delivers efficient temperature control of HPLC columns. With exact temperature control to +/- 0.1°C, ColumnOven provides the highest levels of reproducibility and stability. Temperatures up to 90°C can significantly reduce backpressure when using columns packed with sub 2µm particle sizes, allowing the use of higher flow rates to accelerate the chromatography. ColumnOven 200 can accommodate up to 4 analytical HPLC columns with lengths up to 150mm while ColumnOven 300 can accommodate up to 4 analytical columns with lengths up to 250mm.

Options

Optional mounts allow ColumnOven to be secured to a CTC PAL® autosampler and many Thermo Scientific Mass Spectrometer ion sources.

The optional software package includes a standalone version (Windows™ compatible) and drivers for XCalibur™ and other instrument control software.

An optional heat exchanger can be used as a connection / transfer line between injection port and column.

Product Specifications

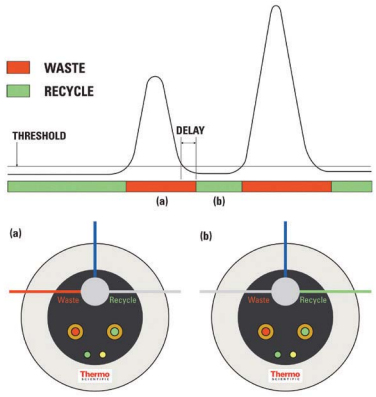
Description	ColumnOven 200	ColumnOven 300
Column oven dimensions:	212mm x 40mm x 46mm	312mm x 40mm x 46mm
Column oven dimensions (with mounted heat shield):	212mm x 62mm x 52mm	312mm x 62mm x 52mm
Thermostated column compartment:	200mm x 21mm x 21mm	300mm x 21mm x 21mm
Remote control	LAN or serial port	LAN or serial port
Power supply	110 VAC to 240 VAC	110 VAC to 240 VAC
Temperature control:	Ambient to 90°C in 0.1°C increments	Ambient to 90°C in 0.1°C increments
Temperature stability:	+/- 0.1°C	+/- 0.1°C

Thermo Scientific Column Oven

Description	Cat. No.
ColumnOven 200	**66001-020**
CTC Mount	**66001-021**
Thermo MS Mount	**66001-022**
ABI MS Mount	**66001-023**
Heat Exchanger	**66001-024**
Heat Exchanger (low volume)	**66001-025**
Software drivers	**66001-026**
ColumnOven 300	**66001-030**

SRS Pro Solvent Recycling System

Reduce mobile phase consumption by up to 90%



- Continuously monitors the output signal of the chromatographic detector, recycling the mobile phase to the solvent reservoir when the baseline is below a certain preset threshold
- Easy-to-use software is provided to configure system parameters, perform on-line monitoring and audit trail facilities
- No power adapter is required as the solvent saver is powered directly from the chromatography data system PC through a USB connection
- Recycles the mobile phase only if switched on: in case of power failure the valve remains in the waste position and the mobile phase in the reservoir remains uncontaminated
- Analog input allows unipolar or bipolar operation of the device within a range of ±1V with an analog-to-digital converter
- TTL/contact closure for the device can be configured as start, auto-zero or valve position control input

Operational Principle

- If the input signal level exceeds this threshold value, the SRS Pro redirects the eluent flow to waste (1), taking account of the transport time from the detector to the switching valve
- When the signal returns below the threshold (2), the SRS Pro again waits for the transport delay and then switches the mobile phase back to the reservoir
- Autosampler injection marker connected to the SRS Pro zeroes signal input at the moment of injection

Compatible with:

Any HPLC detector

Product Specifications

Data Rate	1Hz
Wetted Material	PEEK
Power Source	USB port of PC
Max. Pressure	30psi/0.2MPa
Requires	1 free USB port, MS-Windows XP/2000/Vista

SRS Pro Solvent Recycling System

Description	Cat. No.	Quantity
SRS Pro solvent recycling system	**66001-001**	1 Each

SDG Pro Solvent Degasser

For gas-free HPLC Solvents

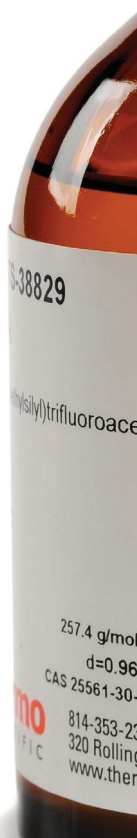
- High efficiency in-line system
- Reliable, continuous operation
- Quick equilibration and short startup times
- Removes dissolved gases from solvents
- Used to degas the mobile phase for HPLC and can be employed in other applications where gases may interfere with the use of the system (such as an autotitrator)

Product Specifications

General	
Channels	4 independent
Mode of Degassing	Gas permeation through a fluoropolymer tube
Maximum Flow Rate	10mL/min
Degassing Capacity	~2ppm at 1mL/min
Dead Volume	~480µL per channel for standard channel
Materials Contacting Solvents	PEEK™, Glass-filled PTFE, Teflon AF
Power	
Power Requirement if using supplied AC Adapter	100 to 240 VAC (±10%), 1A, 50 to 60Hz (±3Hz)
Power Requirement if not using supplied AC Adapter	15 to 24 VDC at 0.85 A maximum (0.5 A typical)
Wall Sockets	4 supplied with AC adapter, interchangeable: North America/Japan, U.K., Continental Europe, Australia
Installation Over-Voltage Category	II
Validation Output	
Signal	5mVDC / 1mm Hg absolute from 20 to 800mm Hg (0.100 VDC at 20mm Hg; 4.000 VDC at 800mm Hg)
Accuracy	±1.0% of reading ±0.010 VDC from 20 to 800mm Hg
Operating Conditions	
Ambient Temperature	10 to 35°C
Ambient Relative Humidity (RH)	20 to 80 % RH (without condensation)
Altitude	0 to 2000 Meters
Indoor vs. Outdoor Use	Indoor
Pollution Degree	2
Storage Conditions	
Ambient Temperature	-20 to +60°C
Ambient Relative Humidity	20 to 80% RH (without condensation)
Altitude	0 to 12000M
Physical	
Dimensions	Height: 127mm (5.0in) Width: 73mm (2.8in) Depth: 250mm (9.8in)
Weight	2.7kg (6lb).

SDG Pro

Description	Cat. No.	Quantity
SDG Pro degasser	**66001-010**	1 Each



Thermo Scientific
Liquid Chromatography Reagents

Derivatization

The chemical literature contains an abundance of data on derivatization, most of which is relevant to particular compounds, classes of compounds and derivatization reagents. Two books are recognized as standards in the field of analytical derivatization. The first book, Handbook of Analytical Derivatization Reactions by Daniel R. Knapp[1], provides a general collection of analytical derivatization methods for chromatography and mass spectroscopy (MS) that involves formation of covalent derivatives prior to analysis. The second book, Silylation of Organic Compounds by Alan F. Pierce,[2] " was a significant factor in the transfer of silylation reactions from the relatively esoteric field of organosilicon chemistry to the status of perhaps the most widely practiced of derivatization methods."[3]

Compounds or compound mixtures are derivatized before analysis for the following reasons:

1. To make a compound that otherwise could not be analyzed by a particular method suitable for analysis[4]
2. To improve the analytical efficiency of the compound[5,6]
3. To improve the detectability of the compound[7]

Suitability

Often compounds cannot be analyzed because they are not in a form that is suitable for the particular analytical technique. Examples include nonvolatile compounds for GC analysis,[8,9,10] insoluble compounds for HPLC analysis and materials that are not stable using the conditions of the technique.[11] The derivatization procedure modifies the chemical structure of the compounds, allowing analysis by a desired technique.[12]

Efficiency

Direct analysis can be difficult when compounds interact with each other or with the column. These interactions can lead to poor peak resolution and/or asymmetrical peaks that make proper peak integration difficult or impractical. This interference can be reduced with conversion to derivatized products.[13,14] Compounds that exhibit co-elution can often be separated by using the appropriate derivatization methods.

Detectability

As demand increases for the analysis of increasingly smaller amounts of materials, it becomes important to extend the detectability range of the materials in question. This increased sensitivity can be accomplished by improved detector design that is directed toward specific atoms or functional groups.

Another popular approach to increase detectability is the use of derivatization. Enhanced detectability can be achieved by increasing the bulk of the compound, or by introducing atoms or functional groups that strongly interact with the detector.[16,17] This technique is performed in gas chromatographic applications, with the addition of halogen atoms for electron capture detectors,[18,19] and with the formation of TMS derivatives to produce readily identifiable fragmentation patterns and mass ions.[20]

Types of Derivatization

Compounds containing functional groups with active hydrogens (-COOH, -OH, -NH and -SH) are usually derivatized prior to analysis by gas chromatography. These functional groups have a tendency to form intermolecular hydrogen bonds that affect the volatility, their tendency to interact deleteriously with column packing materials and their thermal stability. Silylation, acylation and alkylation are derivatization techniques used to alter these functional groups to improve their thermal and chromatographic character.

The ideal derivatization procedure will:

1. Accomplish the desired modification.
2. Proceed quantitatively, or at least reproducibly.
3. Produce products that are readily distinguishable and separable from the starting materials.
4. Proceed rapidly with simple and straight-forward laboratory techniques that will be both selective and applicable to a number of similar compounds.
5. Involve reagents and reactions that present no unusual hazards.

Introduction to HPLC Ion Pair Reagents

High-purity reagents with the selectivity needed for good separation.

In the past, reverse-phase HPLC analysis of highly charged acidic and basic compounds was frustrating and resulted in poor resolution. Important biomolecules such as amino acids, peptides, organic acids, polyamines and catecholamines had to be separated by ion exchange or by suppression techniques.

Thermo Scientific Ion Pair Reagents enable you to quickly and efficiently analyze charged compounds using reverse-phase techniques. Our ion pair reagents are simply dissolved in the HPLC solvent system, resulting in the formation of stable chromatographic complexes that can be separated using reverse-phase columns.

By using the correct ion pair reagents, you achieve:

- Increased or decreased retention, permitting controlled selectivity
- Resolution of complex ionic mixtures without using ion exchange columns
- Improved peak symmetry

Reverse-phase ion pair chromatography theories

Two principal theories have been proposed to explain reverse-phase ion pair chromatography. In the first theory, small polar ion pair reagents react with the ionized solute, forming neutral ion pairs. The second theorizes that an active ion exchange surface is produced in which long chain, nonpolar anions and cations are absorbed by the hydrophobic stationary phase.

To optimize chromatographic separations in ion pair elution systems, high-purity reagents of exceptional optical transparency are needed. Ion Pair Reagents are specially purified for ion pair chromatography and provide the selectivity needed for good separations.

Derivatization and Visualization Reagents for HPLC

Designed to provide selectivity and improve sensitivity.

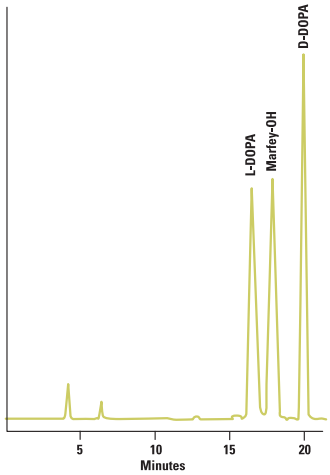
The lack of a universal HPLC detector that provides high sensitivity (as well as some degree of selectivity) established the need for suitable derivatization procedures. Derivatization is the chemical modification of an existing compound, producing a new compound that has properties more suitable for a specific analytical procedure. It is an analytical tool that can be used to provide both selectivity and improved sensitivity.

There are several requirements for derivatization protocol:

1. At least one acidic, polar functional group must be available for reaction on the parent compound.
2. A single derivative should be formed per parent compound.
3. The reaction should be reproducible under the given time and reaction conditions.
4. The reaction should proceed quickly and easily under mild conditions.
5. The reaction byproducts (if any) should not interfere with the chromatography, or with detection of the sample.

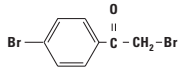
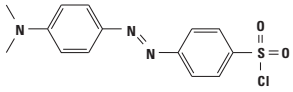
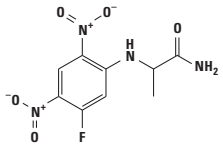
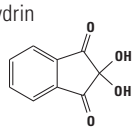
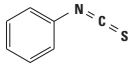
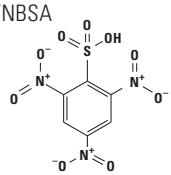
Pre- and post-chromatographic techniques are both used in HPLC derivatization. In addition, off-line and on-line reactions have been employed with both techniques. Pre-chromatographic (or pre-column techniques) offer more than greater selectivity and sensitivity in detection. Pre-column techniques can be used to enhance stability, improve resolution, improve peak symmetry and increase or decrease retention of solutes. FDAA (Marfey's Reagent) allows separation and quantification of optical isomers of amino acids (Figure 2). Post-chromatographic (or post-column) techniques are used primarily to provide selectivity and improve sensitivity.

We offer a variety of HPLC detection reagents for pre- and post-chromatographic techniques. All compounds and formulations are purified for chromatography, minimizing artifact formation.



Separation of D- and L-DOPA on 100mm x 4.6mm C18
Conditions: A – 0.05 M triethylamine phosphate, pH 3.0;
B – acetonitrile.
Linear gradient: 10 to 40% B in 45 minutes, 2.0mL/minute, 25˚C, 340nm

Derivatization Reagents for HPLC

Functional Group	Description	Detection*	Page	Comments
Carboxylic Acid 	*p*-Bromophenacylate 	UV	**4-XXX**	Formulation of 1.0mmol/ml p-bromophenacyl bromide and 0.005mmol/ml crown ether in acetonitrile; pre-column; nanomole detection levels: λ_{max} = 260nm[1-7]
Primary Amine 	Dabsyl Chloride 	Vis		4-N, N-dimethylaminoazobenzene-4'-sulfonyl chloride (dabsyl chloride); pre-column; nanomole detection levels: λ_{max} = 436nm[8-14]
	FDAA, Marfey's Reagent 	UV		1-fluoro-2,4-dinitrophenyl-5-L-alanine amide (FDAA); pre-column; nanomole detection levels: λ_{max} = 340nm. For chiral separations of amino acids.[15, 28-29]
	Ninhydrin 	Vis		Post-column; nanomole detection levels: λ_{max} = 570nm[22]
	PITC 	UV		Phenylisothiocyanate (PITC); pre-column; picomole detection levels: λ_{max} = 254nm[23-24]
	TNBSA  **TNBSA** MW 293.17	EC, UV		2,4,6-Trinitrobenzene-sulfonic acid (TNBSA); pre- or post-column; nanomole detection levels with EC and UV, GC - 0.85V; λ_{max} = 250nm[25-26]
Secondary Amine	Ninhydrin (see structure above)	Vis		Post-column; nanomole detection levels: λ_{max} = 440nm[22]
	PITC (see structure above)	UV		Phenylisothiocyanate (PITC); pre-column; picomole detection levels: λ_{max} = 254nm[23-24]

*EC = electrochemical; F = fluorescence; UV = ultraviolet; Vis = visible.

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Developments in Amino Acid Analysis

Improvements in amino acid analysis by ion exchange chromatography have involved the analytical system, as well as the instrumentation. Systems have been developed (by varying buffer pH or ionic strength) that work to displace the amino acids into discrete bands. The buffer systems are compatible with single- or two-column analysis of amino acids found in protein hydrolyzates or physiological fluids. Buffer systems are determined by the counter ion used (sodium or lithium) and by the method of buffer changes introduced to the resin (step changes or gradient elution).9-15 The most commonly used buffering component, citrate, is suitable for solutions below pH 7.16 Buffers are prepared either with citric acid or an alkali salt, and citrate concentrations of 0.05 to 0.06 7M are common.

Unfortunately, for high-sensitivity work, citric acid is a significant contributor to amino acid contamination. Therefore, to achieve consistent analyses, it is essential to use high-purity reagents for buffer preparation.

Alternatives to ion exchange are available for the separation of amino acids. Because amino acid analysis is one of the basic protein chemistry tools available, more rapid and sensitive methods for separation and quantitation are desirable.17 Several pre-column derivatization methods using reverse-phase HPLC have been developed.

Two of the most widely used of these methods involve the formation of dansyl18-19 or o-phthalaldehyde (OPA)20-24 derivatives of amino acids prior to HPLC analysis. Both methods offer greater sensitivity and shorter analysis time than post-column derivatization techniques. Other methods include the quantitative derivatization of amino acids with phenylisothiocyanate (PITC) and the separation and quantitation of the resulting phenylthiocarbonyl derivatives via HPLC. These derivatives are stable enough to eliminate in-line derivatization.

Sample Preparation and Hydrolysis

The extraction and purification of proteins play an important role in determining amino acid content. These methods are based on one or more of their physical characteristics (e.g., solubility, molecular size, charge, polarity and specific covalent or noncovalent inter-actions).

The techniques commonly used to separate proteins and peptides include:

- Reverse-phase HPLC
- Polyacrylamide gel electrophoresis
- Gel filtration
- Ion exchange chromatography
- Affinity chromatography
- Table 1 provides a more detailed list of methods for fractionating peptide mixtures.[25]

Hydrolysis

Most protein samples require some form of chemical treatment before their component amino acids are suitable for analysis. Protein and peptide samples must be hydrolyzed to free amino acids from peptide linkages. Acids (usually HCl) are the most widely used agents for hydrolyzing proteins.

A simplified hydrolysis procedure involves refluxing the protein with excess HCl, then removing the excess acid in vacuum.[26] The lyophilized protein then is suspended in constant boiling 6 N HCl and introduced into the hydrolysis tube. The sample is frozen by immersing the tube in dry ice and acetone. Before sealing, the tube is evacuated to avoid formation of cysteic acid, methionine sulfoxide and chlorotyrosine.[27] This procedure minimizes decomposition of reduced S-carboxymethylcysteine and analyzes S-carboxymethylated proteins. Hydrolysis is conducted at 110°C (with the temperature accurately controlled) for 20-70 hours by Moore and Stein's method.[28] After hydrolysis, residual HCl is removed in a rotary evaporator. The residue is dissolved in water and brought to the appropriate pH for addition to the analyzer column.[28]

Methods for the fractionation of peptide mixtures.

Technique	Properties of Peptide Molecules Exploited
Centrifugation	Solubility
Size exclusion chromatography	Size
Ion exchange chromatography	Charge, with some influence of polarity
Paper electrophoresis	Charge and size
Paper chromatography	Polarity
Thin layer electrophoresis	Charge and size
Thin layer chromatography	Polarity
Polyacrylamide gel electrophoresis	Charge and size
High-performance liquid chromatography (HPLC)	Polarity
Gas chromatography	Volatility of derivatives
Counter-current extraction	Polarity; sometimes specific interactions
Affinity chromatography	Specific interactions
Covalent chromatography or irreversible binding	Disulfide bond formation; reactivity of homoserine lactone

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27. Eveleigh, J.W. and Winter, G.D. (1970). Protein Sequence Determination, S.B. Needleman, Ed., Springer-Verlag, pp. 92-95.
28. Moore and Stein, *op. cit.*

HPLC Ion Pair Reagents

Heptafluorobutyric Acid

Ion-pair reagent for the reverse-phase HPLC separation of proteins and peptides

- Typical purity is 99.7% by GC; <0.1% water
- Sequencing reagent for classical and automated Edman degradation of peptides and proteins
- Density: 1.645
- B.P. 120°C
- Packaged under nitrogen in amber glass ampules or bottles
- Clear, colorless liquid

Heptafluorobutyric Acid

Description	Quantity		Cat. No.	Quantity
Heptafluorobutyric Acid, Sequencing Grade	100mL	X	**TS-25003**	1 Each
Heptafluorobutyric Acid, HPLC Grade	10 x 1mL ampules	X	**TS-53104**	1 Pack

1. Hearn, M.T.W. and Hancock, W.S. (1979). *Trends Biochem. Sci.* **4,** N58-N62.
2. Bennett, H.P.J., et al. (1980). *J. Liquid Chromatogr.* **3,** 1353-1366.
3. Bennett, H.P., et al. (1981). *Biochemistry.* **20,** 4530-4538.

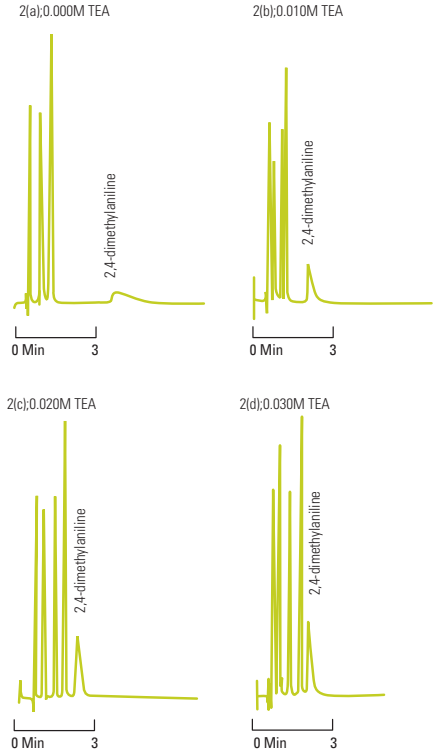
X in the ordering table indicates that hazardous shipping charges apply.

Triethylamine (TEA)

Ideal for HPLC separation and analysis of peptides

Triethylamine is an ion-pairing reagent that alters selectivity in reverse-phase HPLC separations. By pairing with peptides, it effectively sharpens peaks, resulting in improved peak resolution.

- 99.5% triethylamine purity, allowing sensitive peptide detection at low UV wavelengths in reverse-phase HPLC peptide separation systems
- Packaged in amber glass bottles with protective PTFE-lined fluorocarbon caps for reagent integrity
- Has a low UV absorbance to provide the most sensitive detection across all wavelengths



Properties of Triethylamine

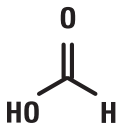
- Alternate names TEA, Diethylethanamine
- Molecular formula C6H15N
- Molecular weight 101.19
- Density 0.726g/mL

Triethylamine (TEA)

Description	Quantity	Cat. No.	Quantity
Triethylamine, HPLC Grade	25g	**TS-53101**	1 Each
Triethylamine, Sequencing Grade	100g	**TS-25108**	1 Each

Formic Acid Ampules

Well-suited for HPLC and mass spectrometry applications



Formic Acid
MW 46.03

Formic acid is a component found in reverse-phase mobile phases to provide protons for LC/MS analysis. The presence of a low concentration of formic acid in the mobile phase is also know to improve the peak shapes of the resulting separation. Unlike trifluoroacetic acid (TFA), formic acid is not an ion-pairing reagent, and it does not suppress MS ionization of polypeptides when used as a mobile phase component.

- Prescored, nitrogen-flushed, amber glass to protect formic acid from light and moisture
- 99% purity for consistent LC baselines and no interference introduced into LC and mass spectrometry applications
- Convenient format simplifies preparation of gradient and isocratic mobile phases containing 0.1% (v/v) formic acid in water or acetonitrile
- Contents of a single vial in a final volume of 1L solvent yields a mobile phase of the most common formic acid concentration

Formic Acid Ampules

Description	Quantity		Cat. No.	Quantity
Formic Acid 99+%	10 x 1mL ampules	X	**TS-28905**	1 Each

For complex peptide separations, the key to success can be to vary selectivity. Varying mobile phase composition on the same column can change selectivity enough to resolve peptide that would otherwise overlap. The TFA concentration is usually specified as 0.1% for reverse-phase HPLC of peptides. For reproducible separations from run-to-run or from lab-to-lab, it is essential to make concentrations the same.

X in the ordering table indicates that hazardous shipping charges apply.

Derivation and Visualization Reagents for HPLC

Trifluoracetic Acid (TFA)

Routinely used ion-pairing agent in reversed-phase peptide separations

- Purity: >99.5% TFA and exceptional clarity allows sensitive, nondestructive peptide detection at low UV wavelengths
- High-performance packaging: Packaged under nitrogen in amber glass with protective TFE-lined fluorocarbon caps to ensure TFA integrity
- Choice of formats for convenience: 1mL ampules can prepare 1L of 0.1% v/v TFA solution for the mobile phase in reverse-phase chromatography in moments

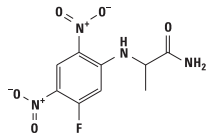
Trifluoracetic Acid (TFA)

Description	Quantity		Cat. No.	Quantity
Trifluoracetic Acid, Sequencing Grade	500mL	X	**TS-28901**	1 Each
Trifluoracetic Acid, Sequencing Grade	100g	X	**TS-28903**	1 Each
Trifluoracetic Acid, Sequencing Grade	10 × 1mL	X	**TS-28904**	1 Pack
Trifluoracetic Acid, Sequencing Grade	1g	X	**TS-28902**	1 Each

X in the ordering table indicates that hazardous shipping charges apply.

FDAA, Marfey's Reagent

Makes separation and quantitation of optical isomers of amino acids by reverse-phase chromatography quick and easy

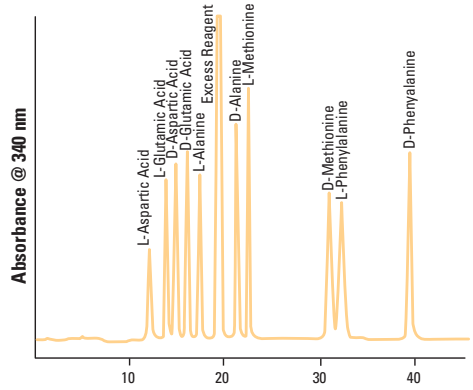


FDAA
(Marfey's Reagent)
MW 272.19

- Optical isomers of amino acids derivatization complete in just 90 minutes
- Derivatives have an absorption coefficient of ~3 x 104
- Derivatives can be detected by UV at 340nm with picomole sensitivity

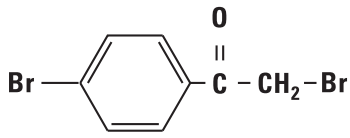
FDAA, Marfey's Reagent

Description	Quantity	Cat. No.	Quantity
FDAA, Marfey's Reagent	50mg	**TS-48895**	1 Each



p-Bromophenacylate Reagent

Gives quantitative yields with few or no side reactions



***p*-Bromophenacylate**
MW 277.94

- Premixing of phenacylbromide and crown ether is not necessary
- Derivatization is both rapid and quantitative, with yields of >95% in 15 to 20 minutes at 80°C
- Excess reactants do not interfere
- Large excess of alkylating reagent is not necessary
- Small amounts of water or alcohol do not interfere
- If isolation is desired, products are usually crystalline

p-Bromophenacylate Reagent

Description	Quantity	**Cat. No.**	Quantity
p-Bromophenacylate Reagent	10mL	**TS-48891**	1 Each

1. Durst, H.D., et al. (1975). *Anal. Chem.* **47**, 1797.
2. Borch, R.F., et al. 1975). *Anal. Chem.* **47**, 2437.
3. Grushka, E., et al. (1975). *J. Chromatogr.* **112**, 673.
4. Fitzpatrick, F.A., et al. (1976). *Anal. Chem.* **48**, 499.

TNBSA (Trinitrobenzene Sulfonic Acid)

An excellent choice for spectrophotometric detection

- Couples with primary amines, sulfhydryls and hydrazides in aqueous solution at pH 8, without undesirable side reactions
- Excellent for solution or solid phase analysis
- Suitable for qualitative and quantitative estimation of biomolecules; including amino acids, eptides or proteins
- Chromogenic, Omax = 335nm
- Reacts readily with primary amino groups of amino acids in aqueous format at pH 8 to form yellow adducts
- No colored derivatives are formed with secondary amino acids proline and hydroxyproline
- Colored derivatives are monitored at 345nm and have extinction coefficients in range of 1-1.5 x 104

TNBSA

Description	Quantity	**Cat. No.**	Quantity
TNBSA	100mL	**TS-28997**	1 Each

1. Goodwin, J.F. and Choi, S-Y. (1970). *Clinical Chemistry.* **16**, 24-31.
2. Snyder, S.L. and Sobocinski, P.Z. *(1975). Anal. Biochem.* **64**, 284-288.
3. Drozdovskaya, N.R., et. al. (1982). *FEBS Lett.* **150**, 385.
4. Takahashi, S., et al. (1984). *Chem. Lett. (Jpn).* **1**, 127

Hydrolysis Reagents

Constant Boiling (6N) Hydrochloric Acid

Sequencing-grade reagent for total protein hydrolysis

- Hydrolyzes peptides in 6 hours at 150°C
- Specially purified to give ninhydrin-negative blank on hydrolysis
- Packaged in prescored ampules to eliminate contamination and ensure product integrity

Constant Boiling (6N) Hydrochloric Acid

Description	Quantity		Cat. No.	Quantity
Hydrochloric Acid 6N	10 × 1mL	X	**TS-24308**	1 Each

1. **Eveleigh, J.W. and Winter, G.D. (1970).** *Protein Sequence Determination, Ed Needleham, S.B., Springer-Verlag,* **pp. 92-95.**
2. **Blankenship, et al. (1989).** *High-sensitivity amino acid analysis by derivatization with o-Phthaldialdehyde and 9-Fluorescence detection: applications in protein structure determination. Anal. Biochem.* **178,** 227-232.
3. **Hurley, J.B., et al. (1984).** *Isolation and characterization of a cDNA clone for the subunit of bovine retinal transducin. Proc. Natl. Acad. Sci. USA.* **81,** 6948-6952.
4. **Lee, K. et al. (1979).** *Derivatization of cysteine and cystine for fluorescence amino acid analysis with the o-Phthaldialdehyde/2-mercaptoethanol reagent. J. Biol. Chem.* **July 25,** 6248-6251.

X in the ordering table indicates that hazardous shipping charges apply.

Amino Acid Standard H

High-purity calibration standard for protein hydrolysates

- Uses L-form configuration to permit standardization of microbial and other assays
- Molar concentration verified by conventional amino acid analysis methods
- With the exception of cystine, each amino acid is supplied at a concentration of 2.5µmoles/mL in 0.1N HCl

The following amino acids are included in Amino Acid Standard H:

L-alanine, Ammonia [(NH4)2SO4], L-Arginine, L-Aspartic Acid, L-Cystine, L-Glutamic Acid, Glycine, L-Histidine, L-Isoleucine, L-Leucine, L-Lysine•HCl, L-Methionine, L-Phenylalanine, L-Proline, L-Serine, L-Threonine, L-Tyrosine, L-Valine.

Amino Acid Standard H

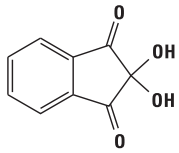
Description	Quantity	Cat. No.	Quantity
Amino Acid Standard H	10 × 1mL	**TS-20088**	1 Each

When kept frozen, an unopened vial has an indefinite storage life. Once the seal is broken, the reagent has a maximum storage life of six months. Store frozen between uses.

Amino Acid Detection Reagents

Ninhydrin

The reagent of choice for detection of amino acids



Ninhydrin
MW 178.14

- Used in amino acid chromatography
- Offers superb color response and low blank
- Indefinitely stable and requires no refrigeration

Ninhydrin

Description	Quantity	**Cat. No.**	Quantity
Ninhydrin	500g	**TS-21003**	1 Each

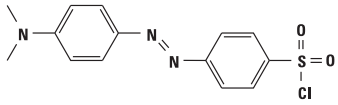
1. Stein, W.H. and Moore, S. (1949). *Cold Spring Harbor Symp. Quant. Biol.* **14**, 179.
2. Moore, S. (1968). *Amino acid analysis: aqueous dimethyl sulfoxide as solvent for the ninhydrin reaction. J. Biol. Chem.* **243(23)**, 6281-6283.
3. James, L.B. (1978). *Amino acid analysis: ninhydrin reaction with titanous chloride. J. Chromatogr.* **152**, 298-300.

Indefinitely stable. No refrigeration required. Keep bottle tightly sealed. Avoid exposure to direct sunlight and ammonia.

High-Purity Pre-Column Derivatization Reagents

Dabsyl Chloride

Recrystallized twice



Dabsyl Chloride
MW 323.80

- For the precolumn derivatization and detection of amino acids in visible light down to sub-picomolar levels
- Analysis of 10-30ng of protein hydrolysates
- Analysis of peptides and determination of C-terminal sequence of polypeptides
- Analysis of phosphoamino and amino acid amides
- Analysis of amino acid neurotransmitters in mouse brain

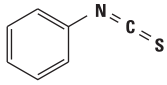
Dabsyl Chloride

Description	Quantity	Cat. No.	Quantity
Dabsyl Chloride (4-N,N Dimethylaminoazobenzene-4-sulfonyl chloride)	500g	**TS-21720**	1 Each

1. Chang, J.Y., et al. (1981). *Biochem. J.* **199**, *547-555.*
2. Chang, J.Y., et al. (1982). *Biochem. J.* **199**, *803-806.*
3. Chang, J.Y. (1984). *J. Chromatogr.* **295**, *193-200.*
4. Chang, J.Y., et al. (1981). *FEBS Lett.* **132**, *117-120.*
5. Vendrell, J. et al. (1986). *J. Chromatogr.* **358**, *401-413.*
6. Lin, J.K., et al. (1980). *Clin. Chem.* **26**, *579-583.*
7. Chang, J.Y., et al. (1983). *Methods. Enzymol.* **92**, *41-48.*
8. Stocchi, V., et al. (1985). *J. Chromatogr.* **349**, *77-82.*

PITC (Phenylisothiocyanate)

High-purity reagent for pre-column quantitative derivatization of amino acids by reverse-phase HPLC



PITC
Edman's Reagent
MW 135.19

- Also known as Edman's Reagent
- Reacts readily with amino acids in 5 to 10 minutes at room temperature
- Resulting phenylthiocarbamyl derivatives can be separated and quantified in 30 minutes using reverse-phase HPLC to produce stable products with all amino acids including proline

PITC (Phenylisothiocyanate)

Description	Quantity	Cat. No.	Quantity
PITC (Edman's Reagent)	10 × 1mL	**TS-26922**	1 Each

1. Heinrikson, R.L. and Meridith, S.C. (1984). *Anal. Biochem.* **136**, 65-74.
2. Scholze, H. (1985). *J. Chromatogr.* **350**, 453-460.
3. Janssen, et al. (1986). *Chromatogr.* **22(7-12)**.
   Evert, R.F. (1986). *Anal. Biochem.* **154**, 431-435.

X in the ordering table indicates that hazardous shipping charges apply.

HPLC and Spectrophotometric Grade Solvents

Ultrapure solvents are carefully packed for thorough protection

- Distilled in glass, filtered through 0.2µm TFE membranes and packed in solvent-rinsed, amber glass bottles
- TFE-lined screw caps seal bottles

Acetonitrile, HPLC Grade, Physical Properties

- UV Cutoff: 190nm
- Optical Absorbance: <0.02 at 220nm
- Refractive Index at 25°C: 1.342

Water, HPLC Grade, Physical Properties

- UV Cutoff: 190nm
- Optical Absorbance: <0.005 at 220nm
- Refractive Index at 25°C: 1.332

Dimethylformamide (DMF), Sequencing Grade, Physical Properties

- $HCON(CH_3)_2$
- Purity (GC): ≥99%
- MW: 73.09
- Density: 0.944
- B.P. 153°C
- Water: 0.1%

Dimethylsulfoxide (DMSO), Sequencing Grade, Physical Properties

- C_2H_6OS
- Purity (GC): >99.5%
- MW: 78.13
- Density: 1.101
- Water: ≤0.2%

Pyridine

- C_5H_5N
- Purity (GC): ≥99%
- MW: 79.10
- Density: 0.978
- B.P. 115°C

HPLC and Spectrophotometric Grade Solvents

Description	Quantity		Cat. No.	Quantity
Acetonitrile	1L	X	**TS-51101**	1 Each
Water	1L		**TS-51140**	1 Each
Dimethylformamide	50mL	X	**TS-20673**	1 Each
Dimethyl sulfoxide	950mL		**TS-20688**	1 Each
Pyridine	100g	X	**TS-25104**	1 Each

X in the ordering table indicates that hazardous shipping charges apply.

Peptide Standards

Peptide Retention Standard

Allows accurate prediction of elution time for peptides of known amino acid composition up to 20 residues in length

- Save time in peptide purification
- Simplify identification of specific peptides in a complex mixture
- Increase the efficiency of predicting peptide elution profiles
- Determine the relative order of peptide elution of a complex mixture
- Predict the HPLC retention time for peptides of known amino acid composition on reverse phase HPLC columns
- Monitor column performance: efficiency, selectivity and resolution during column aging
- Compare reverse-phase columns from different manufacturers
- Evaluate reverse-phase supports of varying n-alkyl chain lengths and ligand densities

Retention times are predicted by totaling the values that represent the contribution in minutes of each amino acid residue and the peptide terminal groups. Retention time is dependent upon the molecular weight of the peptide. The effect on retention is relatively unimportant with a small peptide, but it increases with the size of the molecule. The accuracy of predicting peptide retention time significantly decreases beyond 20 residues. To ensure accuracy, a peptide standard is used to correct for instrument variation, column aging, n-alkyl chain length variation and ligand density.

Peptide Retention Standard

Description	Quantity	Cat. No.	Quantity
Peptide Retention Standard, S1-S5	1 vial	**TS-31700**	1 Each

1. Guo, D., et al. (1985). *P*roceedings of the Ninth American Peptide Symposium, Published by Thermo Fisher Scientific, Rockford, Illinois, page 23.
2. Guo, D., et al. (1986). *J. Chromatogr.* **359**, 499-517.
3. Guo, D., et al. (1986). *J. Chromatogr.* **359**, 519-532.
4. Mant, C.T. and Hodges, R.S. (1986). *L.C. Magazine Liq. Chrom. and HPLC* **4(3)**, 250.
5. Guo, D., et al. (1987). *J. Chromatogr.* **386**, 205-222.

Peptide Retention Time Calibration Mixture

Heavy peptide mixture for column assessment and prediction of peptide retention times

- Assessment of chromatography and MS instrument performance
- Prediction of peptide retention across multiple instrument platforms
- Prediction of peptide retention time from sequence using calculated hydrophobicity factor
- Optimization of scheduled MS acquisition windows for improving quantification and increased multiplexing
- Internal standard to normalise for variation in retention times and peak intensities between runs

Thermo Scientific Peptide Retention Time Calibration Mixture

Description	Quantity	Cat. No.	Quantity
Peptide Retention Time Calibration Mixture, 0.5pmol/µL	50µL	**TS-88320**	1 Each
Peptide Retention Time Calibration Mixture, 5pmol/µL	200µL	**TS-88321**	1 Each

Dionex Ion Standard Concentrates

- The Dionex IonPac ready-to-use ion standards are designed for routine anion or cation determinations
- All standards are traceable to NIST Standard Reference Materials
- Shipped with a Certificate of Analysis verifying the concentration

Description	Volume (mL)	**Cat. No.**
Combined Five Anion Standard	100	**037157**
Combined Seven Anion Standard I	50	**056933**
Combined Seven Anion Standard II	100	**057590**
Fluoride Standard (1000mg/L)	100	**037158**
Chloride Standard (1000mg/L)	100	**037159**
Sulfate Standard (1000mg/L)	100	**037160**
Combined Six Cation Standard-I	50	**040187**
Combined Six Cation Standard-II	50	**046070**

MS Standard Concentrates

- MS standards for validation and calibration of the MSQ System

Description	**Cat. No.**
Kit of 2 standards for performance validation in ESI and APCI modes	**061496**
Standard for Mass Calibration (All MSQ Models)	**062917**

Perchlorate Internal Standard

- For the quantification of perchlorate at low parts-per-trillion levels using mass spectrometric detection. Contains stable-labeled perchlorate (1mg/L).

Description	**Cat. No.**
Perchlorate-ISTD. ^{18}O Internal Standard for Perchlorate	**062923**

Haloacetic Acid Internal Standards

- Ready-to-use internal standards for haloacetic acid analysis using electrospray-mass spectrometric detection
- Stable-labeled internal standards prepared in MTBE (methyl-t-butyl ether), 1mL ampule plus empty vial

Description	Volume (mL)	Cat. No.
Monochloroacetic Acid -2-13C Internal Standard, 1000mg/L in MtBE	1	**069406**
Monobromoacetic Acid -1-13C Internal Standard, 1000mg/L in MtBE	1	**069407**
Dichloroacetic Acid -2-13C Internal Standard, 1000mg/L in MtBE	1	**069408**
Trichloroacetic Acid -2-13C Internal Standard, 1000mg/L in MtBE	1	**069409**

Ion Pairing Reagents

- Highly purified ion-pairing reagents are used in mobile phase ion chromatography (MPIC), combining reversed-phase ion-pair chromatography with chemical suppression

Description	Volume (mL)	Cat. No.
Tetrabutylammonium hydroxide (TBAOH)	500	**035360**
Tetrapropylammonium hydroxide (TPAOH)	500	**035363**
Hexanesulfonic acid (HSA)	500	**035361**
Octanesulfonic acid (OSA)	500	**035362**

LC Instrument Spare Parts

Our HPLC and GC chromatography and mass spectrometry instruments offer solutions to life science, laboratory, and industrial customers to advance scientific knowledge, enable drug discovery improve manufacturing processes, and protect people and the environment. When your instrument is tuned for peak performance with parts, you can expect the best results and highest level of productivity to keep your research or processes moving smoothly.

Surveyor Plus HPLC

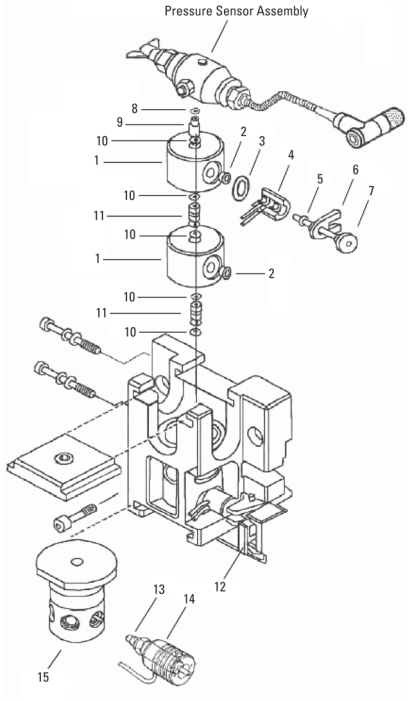
- Precise quaternary gradients
- High throughput analysis and sample capacity
- Patented LightPipe technology provides 5x the sensitivity

Surveyor Plus Kits

Description	Quantity	Cat. No.
Surveyor LC Pump Plus accessory kit	1	**60053-62003**
Solvent Interconnect kit	1	**F5050-010**
MS Pump Plus accessory kit	1	**72011-62001**
Surveyor Autosampler Plus accessory kit	1	**60053-62041**
Surveyor PDA Plus accessory kit	1	**F3070-010**
Surveyor FL Plus accessory kit	1	**60153-62001**

Surveyor MS Pump Plus Liquid Displacement Assembly (LDA) Parts

Item	Description	Quantity	Material	Cat. No.
1	Displacement chamber (piston chamber)	2	Ti	**00109-03-00001**
2	Primary piston seal	2	PTFE/GFP/Ti	**00107-18100**
3	Seal ring, piston chamber	2	PTFE	**60053-01020**
4	Piston guide bushing	2	SS/ruby	**00201-11330**
5	Secondary piston seal	2	PE/SS	**00107-18114**
6	Backing ring	2	SS	**00109-03-00002**
7	Piston unit	2	Zirconia	**00201-11324**
8	Outlet cartridge film seal	1	PEEK	**00107-18112**
9	Outlet cartridge	1	SS	**00109-03-00003**
10	Film sealing, check valve	5	PEEK	**00107-01-10013**
11	Check valve cartridge	2	Ti/ruby	**00110-05110**
12	Retaining clip	2	SS	**00201-11328**
13	Proportioning valve	4	Ti/ruby/sapphire	**00110-01-00007**
14	Coil unit for proportioning valve	4	SS/PEEK	**00201-11344**
15	Sealing ring, proportioning valve	4	PTFE	**00201-11320**



Surveyor PDA Plus Accessories

Description	Quantity	Cat. No.
Filter Wheel for linearity calibration, (5 position; 1 cuvette with perchloric acid blank and 4 cuvettes with different concentrations of potassium dichromate in perchloric acid solution, NIST traceable)	1	**803264**
10mm flowcell assembly (1cm LightPipe)	1	**803265S**
Backpressure regulator	1	**802259**
Flowcell Assembly, with inlet/outlet tubing and fittings (5cm Lightpipe)	1	**803237**

Surveyor RI Plus Accessories

Description	Quantity	Cat. No.
Interconnect cable, 7- connector	1	**60053-63034**
Fuses, T3.15AL250V, 5 x 20mm (for 110 V operation)	1	**00006-02-00010**
Fuses, T1.6AL250V, 5 x 20mm (for 230 V operation)	1	**00006-02-00011**
Inlet tubing, 1/16in OD, stainless steel	1	**00950-01-00133**
Outlet tubing, 0.060in ID x 1/16in OD, Teflon	1	**00950-01-00134**
Fitting, Luer, 10-32, 1/16in PEEK, syringe adapter	1	**00109-02-00014**

Customizable HPLC for a diverse range of applications

The Thermo Scientific Surveyor Plus HPLC is a robust modular system with a suite of integrated features to increase application flexibility and efficiency, permitting full customization for any laboratory. From routine industrial QA/QC to advanced drug discovery, the Surveyor Plus HPLC system is designed for maximum performance and reliability.

Surveyor Autosampler Plus Consumables

Description	Quantity	Cat. No.
Assembly, needle	1	**60053-60013**
Assembly, needle tubing	1	**60053-60102**
Assembly, wash bottle kit	1	**60053-60041**
Assembly, syringe valve	1	**A3692-010**
Assembly, transfer tube, 0.012in ID	1	**60053-60014**
Cooling Adapter, 96 well	1	**60053-20002**
Filter, flush solvent	1	**A4258-010**
Grease, Silicon/Teflon (for lead screw)	1	**00301-01910**
Kit, maintenance Surveyor AS Plus	1	**60053-62044**
Kit, needle tubing	1	**60053-62043**
Lubricant, Triflow	1	**1611-0030**
Port, needle	1	**60053-20031**
Syringe, concentric, 100µL	1	**F1100-010**
Syringe, concentric, 250µL	1	**F1100-020**
Syringe, concentric, 500µL	1	**F1100-030**
Plunger, replacement, concentric, 100µL	1	**F1123-010**
Plunger, replacement, concentric, 250µL	1	**F1123-020**
Plunger, replacement, concentric, 500µL	1	**F1123-030**
Reservoir vials, 16mL	1	**00301-07527**
Retainer, needle port (injection port)	1	**60053-10035**
Syringe, standard, 2500 ÌL (with needle tubing extension)	1	**60053-62002**
Syringe, 2.5mL	1	**60053-60006**
Sample Loop, 5µL	1	**00109-99-00007**
Sample Loop, 10µL	1	**00109-99-00008**
Sample Loop, 20µL	1	**00109-99-00009**
Sample Loop, 25µL	1	**00109-99-00010**
Sample Loop, 50µL	1	**00109-99-00011**
Sample Loop, 100µL	1	**00109-99-00012**
Sample Loop, 500µL	1	**00109-99-00013**
Sample Loop, 1000µL	1	**00109-99-00014**
Stripper	1	**F1034-010**
Valve, injector	1	**60053-30002**
Seal, Rotor, PPS	1	**00109-03-00007**
Tubing assembly, 2.5mL syringe	1	**60053-60005**

Surveyor FL Plus Consumables

Description	Quantity	Cat. No.
Assembly, mercury lamp with holder	1	**00950-01-00135**
Kit, xenon lamp replacement	1	**60153-62002**
Xenon lamp	1	**00950-01-00009**
Video, xenon lamp replacement	1	**60153-64002**
Guide, xenon lamp replacement	1	**60153-97001**
Surveyor Plus documentation CD	1	**60053-64200**
Puncture resistant nitrile gloves, size small, box	1	**00301-01-00005**
Puncture resistant nitrile gloves, size large, box	1	**00301-01-00006**
Xenon Lamp Replacement Guide	1	**60153-97001**

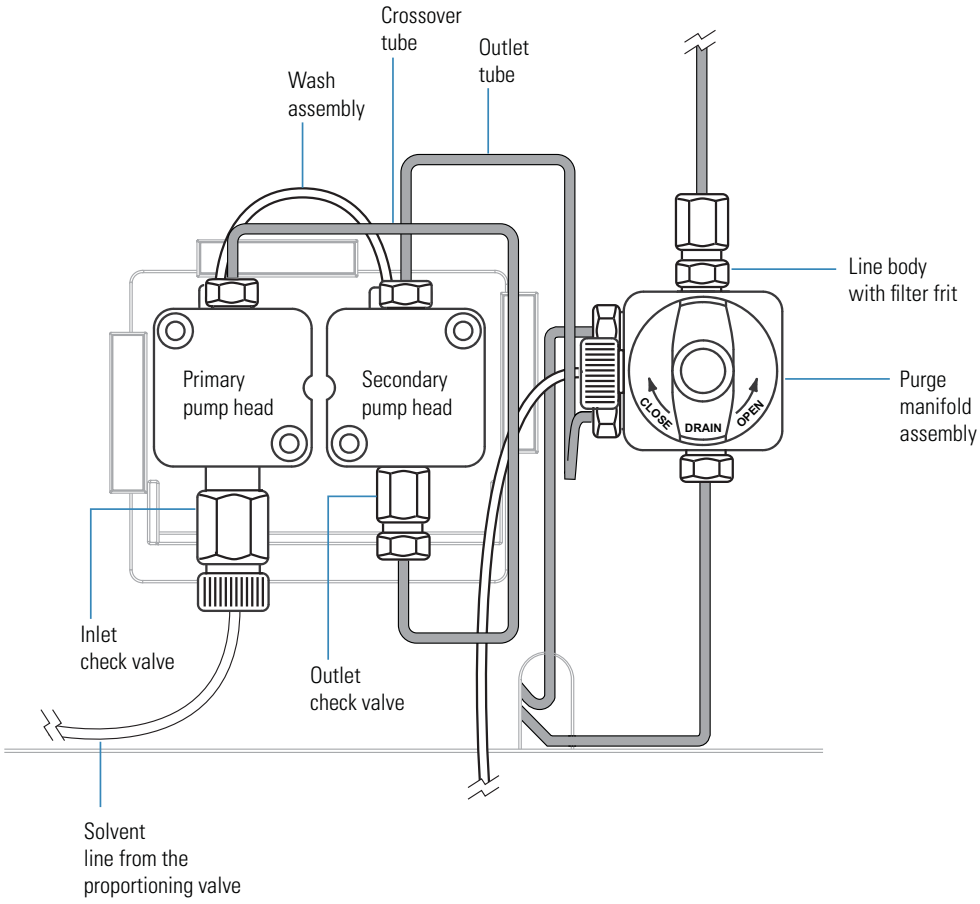
Surveyor LC Pump Plus Consumables

Description	Quantity	Cat. No.
Rinse tube assembly	1	**00950-30001**
Seal, polyethylene, high pressure, piston	1	**00950-30004**
Seal, GFP, high pressure, piston	1	**00107-18008**
Line filter frit	1	**00950-30009**
Wash tube fitting	1	**00950-30018**
Wash tube assembly	1	**00950-30019**
Piston assembly, TZP	1	**00950-30020**
Check valve assembly, outlet	1	**00950-30021**
Tubing assembly, pump inlet	1	**00950-30022**
Spacer, Teflon, large, 3.2mm x 7.7mm	1	**00950-30023**
Spacer, Teflon, small, 3.2mm x 6.3mm	1	**00950-30024**
Seal, wash	1	**00950-30025**
Check valve assembly, Inlet	1	**00950-30026**
O-ring, drain valve	1	**00950-30029**
Solvent reservoir filter, Teflon	1	**A4258-010**
Solvent reservoir filter, stainless steel	1	**A4929-010**
Kit, seal	1	**60053-62020**
Kit, maintenance	1	**60053-62021**

Surveyor UV/Vis Plus Flow Cells

Description	Quantity	Cat. No.
Kel-F Bio Cell	1	**9550-0103S**
3mm Semi-Prep	1	**9550-0101S**
6mm Analytical	1	**9550-0100S**
High pressure microbore	1	**9550-0150-01S**
Titanium Bio Cell	1	**9550-0197S**
3mm microbore	1	**9550-053S**
10mm analytical (standard on Surveyor-UV1)	1	**9550-0234S**
6mm microbore	1	**9550-0265S**
Cuvette Holder	1	**9550-0263S**
High pressure standard	1	**9550-0267S**
50mm LightPipe (Requires F3005-010 LightPipe Mount)	1	**803237**

Most of the above cells require flow cell cover P/N 60053-40005. The 50mm LightPipe (P/N 803237) requires flow cell cover P/N 60053-40041. The High Pressure Microbore flow cell requires flow cell cover P/N 60053-40006.



Surveyor L Pump and L Pump Plus (10AT Model)

Description	Quantity	Cat. No.
Rinse Tube assembly		**00950-30001**
Seal, Polyethylene, High Pressure, Piston		**00950-30004**
Seal, GFP, High Pressure, Piston		**00107-18008**
Line Filter Frit		**00950-30009**
Wash Tube Fitting		**00950-30018**
Wash Tube Assembly		**00950-30019**
Piston assembly, TZP		**00950-30020**
Check Valve assembly, Outlet		**00950-30021**
Tubing assembly, pump inlet		**00950-30022**
Spacer, Teflon, large, 3.2mm × 7.7mm		**00950-30023**
Spacer, Teflon, small, 3.2mm × 6.3mm		**00950-30024**
Seal, wash		**00950-30025**
Check Valve assembly, Inlet		**00950-30026**
O-ring, Drain Valve		**00950-30029**
Solvent Reservoir Filter, Teflon		**A4258-010**
Solvent Reservoir Filter, stainless steel		**A4929-010**
Kit, Seal		**60053-62020**
Kit, Maintenance		**60053-62021**

Surveyor L Pump Plus (20AT Model)

Description	Quantity	Cat. No.
Check valve assembly, inlet		**00950-01-00085**
Check valve assembly, outlet		**00950-01-00086**
Kit, Seal		**60053-62050**
Kit, Maintenance		**60053-62051**
Line filter frit		**00950-30009**
O-ring, drain valve		**00950-30029**
Piston assembly, sapphire		**00950-01-00087**
Rinse tube assembly		**00950-30001**
Seal, GFP, high- pressure, piston		**00107-18008**
Seal, polyethylene, high-pressure, piston		**00950-30004**
Seal, wash		**00950-01-00084**
Solvent reservoir filter, Teflon		**A4258-010**
Solvent reservoir filter, stainless steel		**A4929-010**
Spacer, Teflon, 4.5mm × 6.3mm		**00950-01-00101**
Tubing, pump inlet		**00950-30022**
Wash tube fitting		**00950-30018**
Wash tube assembly		**00950-30019**

Accela High Speed LC

- Conventional HPLC and U-HPLC up to 15,000psi
- Optimizes the performance of sub-2 micron particle columns
- 65µL delay volume with quaternary capability

Accela Accessory Kits

Description	Quantity	Cat. No.
Accela Pump accessory kit	1	**60157-62001**
LC/MS system solvent interconnect kit	1	**F5050-010**
Kit, maintenance, Accela Pump	1	**60157-62002**
Kit, Seal, Accela Pump	1	**60157-62003**
Accela Autosampler Accessory Kit	1	**60357-62001**
Accela PDA Detector accessory kit	1	**60257-62001**

Accela Autosampler Consumables

Description	Quantity	Cat. No.
Assembly, needle, inert	1	**60357-60017**
Assembly, needle tubing	1	**60053-60102**
Assembly, wash bottle kit	1	**60053-60041**
Assembly, syringe valve	1	**A3692-010**
Assembly, transfer tube, 0.012in ID	1	**60053-60014**
Cooling Adapter, 96 well	1	**60053-20002**
Filter, flush solvent	1	**A4258-010**
Grease, Silicon/Teflon (for lead screw)	1	**00301-01910**
Kit, maintenance Accela Autosampler	1	**60357-62002**
Kit, needle tubing	1	**60053-62043**
Kit, wash bottle	1	**60053-62009**
Ferrule Front, Swagelok	1	**00101-08-00001**
Ferrule Back, Swagelok	1	**00101-08-00002**
Lubricant, Triflow	1	**1611-0030**
Nut, compression, long, 10-32, 1/16in OD tube	1	**00101-07-00001**
Port, needle	1	**60053-20031**
Syringe, concentric, 100µL	1	**F1100-010**
Syringe, concentric, 250µL	1	**F1100-020**
Syringe, concentric, 500µL	1	**F1100-030**
Plunger, replacement, concentric, 100µL	1	**F1123-010**
Plunger, replacement, concentric, 250µL	1	**F1123-020**
Plunger, replacement, concentric, 500µL	1	**F1123-030**
Reservoir vials, 16mL	1	**00301-07527**
Retainer, needle port (injection port)	1	**60053-10035**
Syringe, standard, 2500µL (with needle tubing ext)	1	**60053-62002**
Syringe, 2.5mL	1	**60053-60006**
Sample Loop, 5µL	1	**00109-99-00007**
Sample Loop, 10µL	1	**00109-99-00008**
Sample Loop, 20µL	1	**00109-99-00009**
Sample Loop, 25µL	1	**00109-99-00010**
Sample Loop, 50µL	1	**00109-99-00011**
Sample Loop, 100µL	1	**00109-99-00012**
Sample Loop, 500µL	1	**00109-99-00013**
Sample Loop, 1000µL	1	**00109-99-00014**
Stripper	1	**F1034-010**
Valve, injector	1	**00110-03-00013**
Seal, Rotor	1	**00109-99-00021**
Rotor, Valco injection valve	1	**00110-03-00019**
Tubing assembly, 2.5mL syringe	1	**60053-60005**

Two systems in one – Conventional analytical HPLC and U-HPLC at 15,0000psi

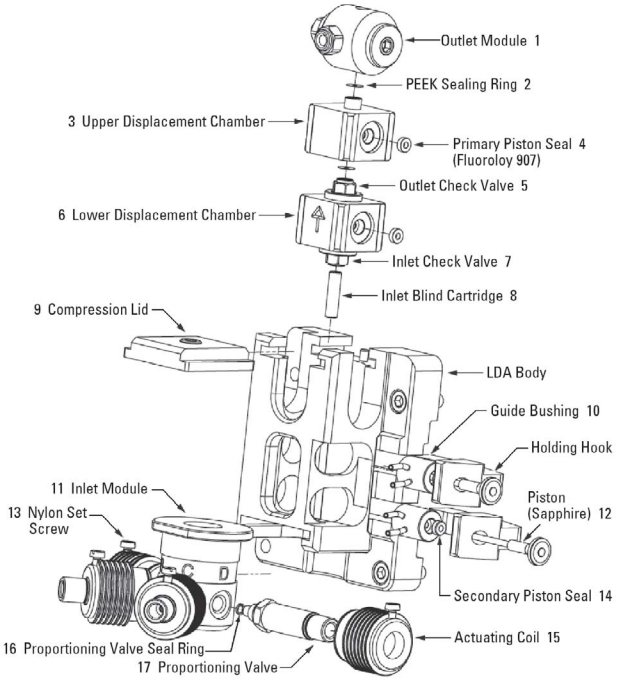
Sample analysis is now faster, easier, and more reliable. The innovative Thermo Scientific Accela LC system performs separations over an expansive range of flow rates and pressures – all with a single instrument.

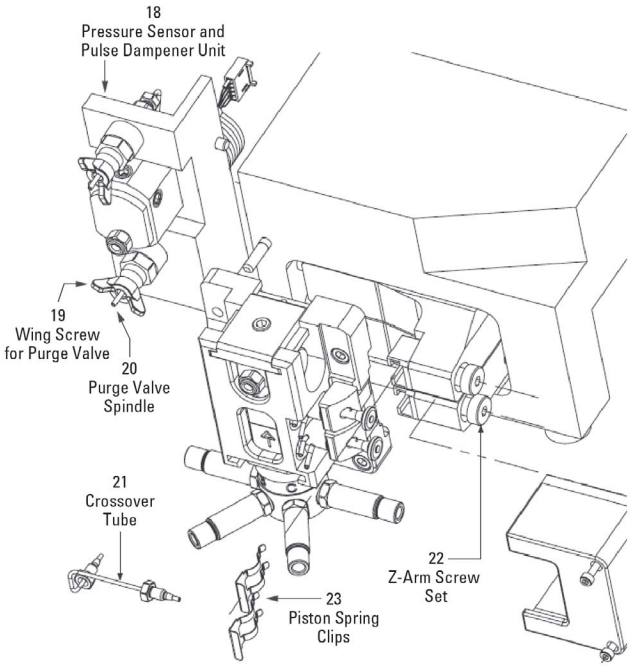
Accela Open Autosampler Consumables

Kit Description	Cat. No.
Kit, asp tube, Accela Open A/S, RoHS PAL DilAspKit	**00950-01-00311**
Loop, hldg, dlw, Accela Open A/S, RoHS PAL DLWLoop	**00950-01-00317**
Screw, syringe, Accela Open A/S, RoHS PAL DLW Screw	**00950-01-00322**
Tool, needle, Accela Open A/S, RoHS PAL DLW NdTool	**00950-01-00323**
Holder, needle, dlw, Accela Open A/S, RoHS PAL DLWNHA	**00950-01-00324**
Syringe, dlw, Accela Open A/S, RoHS SyrC DLW 100-R	**00950-01-00325**
Plunger, syringe, dlw, Accela Open A/S, RoHS PLG DLW 100	**00950-01-00326**
Holder, needle, dlw, Accela Open A/S, RoHS PAL DLWPlg	**00950-01-00327**
Needle kit, dlw, 3PK, Accela Open A/S, RoHS PAL DLWNdl	**00950-01-00328**
Kit, dlw replament, Accela Open A/S, RoHS PAL DLW Option	**00950-01-00330**
Kit, insert, dlw, Accela Open A/S, RoHS PAL DLW Insert	**00950-01-00334**
Tube, waste, dlw, Accela Open A/S, RoHS PAL TubeWaste	**00950-01-00335**
Valve, inject, 18K, Accela Open A/S, RoH N/A	**00950-01-00336**
Rotor, Inj Valve, VALCO 18KPSI, RoHS C72-16R6	**00110-03-00019**
Stator Inj Valve, VALCO 18KPSI, RoHS C72V-6C96	**00950-01-00337**

Accela PDA Accessories

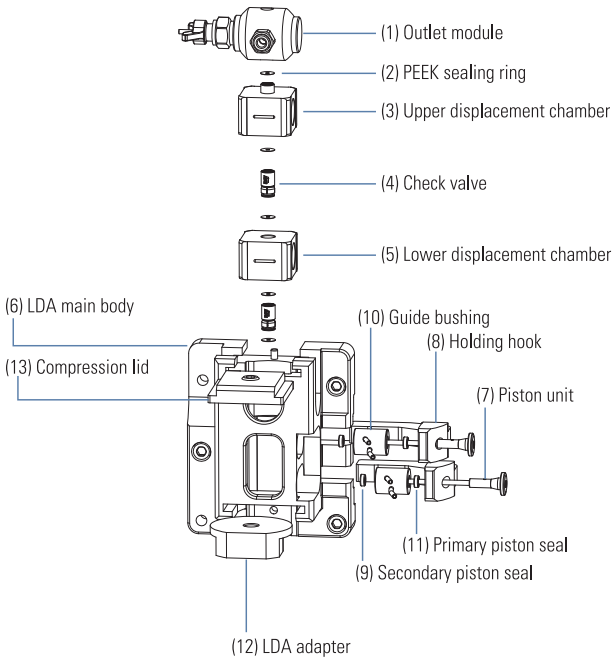
Description	Quantity	Cat. No.
Filter Wheel for linearity calibration, (5 position; 1 cuvette with perchloric acid blank and 4 cuvettes with different concentrations of potassium dichromate in perchloric acid solution, NIST traceable)	1	**803264**
10mm flowcell assembly, with inlet/outlet tubing and fittings (1cm LightPipe)	1	**803265-01**
Flowcell Assembly, with inlet/outlet tubing and fittings (5cm Lightpipe)	1	**803237-01**
Backpressure regulator	1	**802259**
FingerTight PEEK Ferrule Nuts	1	**2522-0285**
Inlet tubing, with insulation, PEEK 1/16 x 0.005in ID (red)	1	**803260**
Outlet tubing, PEEK 1/16 x 0.01in ID (blue)	1	**703950**





Accela Pump Liquid Displacement Assembly Parts

Item	Description	Quantity	Material	Cat. No.
1	Outlet module, Accela pump	1	Ti	**00950-01-00124**
2	Seal, film, PEEK, Accela pump	4	PEEK	**00950-01-00122**
3	Chamber, displacement, upper, Accela pump	1	Ti	**00950-01-00123**
4	Seal, high pressure, GFP, Accela pump	2	PTFE/GFP/Ti	**00950-01-00129**
5	Valve, check, outlet, Accela pump	1	Ti/ruby/sapphire	**00950-01-00131**
6	Chamber, displacement, lower, Accela pump	I	Ti	**00950-01-00121**
7	Valve, check, inlet, Accela pump	1	Ti/ruby/sapphire	**00950-01-00130**
8	Cartridge, blind, inlet, Accela pump	1	PEEK	**00950-01-00120**
9	Lid, compression, with set screw, Accela pump	1	Ti	**00950-01-00125**
10	Piston guide bushing	1	Ti/zirconia	**00950-01-00127**
11	Inlet module	2	Ti	**00950-01-00119**
12	Piston, sapphire	2	Sapphire	**00950-01-00126**
13	Nylon screw (for actuating coil)	2	Nylon	**00109-04-00005**
14	Secondary piston seal (wash seal)	2	PE/SS	**00950-01-00128**
15	Coil unit for proportioning valve	4	SS/PEEK	**00201-11344**
16	Proportioning valve	4	Ti/ruby/sapphire/zirconia	**00110-01-00007**
17	Sealing ring, proportioning valve	2	PTFE	**00201-11320**
18	Pressure sensor and pulse dampener unit	1	Ti	**00201-00112**
19	Wing screw for purge valve	2	Ti	**00950-01-00117**
20	Purge valve spindle	2	Ti/ruby	**00950-01-00118**
21	Crossover tubing	1	Ti	**00950-01-00113**
22	Z-arm screw set	2	Ti	**00950-01-00115**
23	Piston	2	SS	**00201-11328**



Accela 1250 Pump Liquid Displacement Assembly (LDA)

Item	Description	Quantity	Cat. No.
1	Outlet module, complete (Accela 600)	1	**00950-01-00284**
2	UHP PEEK sealing ring	5	**00950-01-10013**
3	Displacement chamber, upper	1	**00950-01-00123**
4	Check valve, titanium and ruby	2	**00110-05110**
5	Displacement chamber, lower	1	**00950-01-00121**
6	UHP LDA main body	1	**N/A**
7	Piston unit, sapphire	2	**00950-01-00126**
8	Holding hook	2	**N/A**
9	Secondary piston seal, (GFP)	2	**00950-01-00129**
10	Guide bushing	2	**00950-01-00283**
11	Primary piston seal, (GFP)	2	**00950-01-00129**
12	Adapter, LDA (Accela 600)	1	**N/A**
13	Compression lid including set screw	1	**00950-01-00125**

Accela 600 Pump Spare Parts

Description	Quantity	Cat. No.
Chamber, disp, lower, Accela 600 pump	1	**00950-01-00281**
Chamber, disp, upper, Accela 600 pump	1	**00950-01-00282**
Bushing, guide, Accela 600 pump	2	**00950-01-00283**
Module, outlet, Accela 600 pump	1	**00950-01-00284**
Valve, proportioning, Accela pump	4	**00950-01-00285**
O-ring, 2.69mm x 1.14mm, perfluor	1	**00950-01-00286**
Brake, flow, inlet mod, Accela 600 pump	1	**00950-01-00287**
Kit, prop valve mtg, Accela 600 pump	4	**00950-01-00288**
Fuseholder, drawer; 5x20mm, 2pole, safe, RoHS	1	**2109-0740**
Fuse, IEC, 2.0A, 250V, SLO-BLO, 5x20mm, RoHS	2	**5120-0025**
Kit, inlet tubing, Accela 600 pump	1	**60157-62008**
Mixer, static, 65 uL, Accela 600 pump, RoHS	1	**00950-01-00292**
Placeholder, DM, Accela pump, RoHS	1	**00950-01-00293**
Assy, LDA, Accela 600 pump, RoHS	1	**00950-01-00294**
Seal, H/P	2	**00107-18110**
Piston, 1/8", TZP	2	**00201-11324**
Valve, check	2	**00110-05110**
Seal, face, Peek, check valve	5	**00950-01-10013**
Spring, piston retaining	2	**00201-11328**
Seal, piston, secondary	2	**00107-18114**

Accela 600 Pump Accessory Kit

Description	Quantity	Cat. No.
Adapter, luer	1	**A0796-010**
Wrench, 1/4x8/19, Super Krome, RoHS	2	**5120-0025**
Tubing, convoluted, pump waste	1	**5401-0400**
Syringe, luer lok, 10cc	1	**F5034-040**
Screwdriver, Balldriver, HEX, 4mm, Rohs	1	**3301-0151**
Conn, clb, plug, 8P, 3.81mm, Phoenix, RoHS	1	**00725-00032**
Cable, USB, A to B, 3.0m, shielded, RoHS	1	**00004-02511**
Wrench, L HEX, 4mm, RoHS	1	**00302-99-00014**
Tool, Balldriver, 2.5mm	1	**00725-00034**
Seal, H/P, Surveyor MS pump	1	**00725-01-00002**
Tool, fitting extender, Accela 600 pump	2	**00107-18110**
Tool, Fitting extender, Accela 600 PUMP	1	**00725-01-00023**

Accela 600 Pump Accessory Kit

Description	Quantity	Cat. No.
Tubing, FEP, 1/16in ID x 1/8in OD	288in *	**3219-2004**
Filter, Solvent INLET, SS, 20µM, RoHS	4	**00109-02-00022**
FTG, Ferrule, 1/8in, SHORT, TEFZEL	4	**00101-18223**
FTG, Nut, 1/8in, 1/4-28, PEEK, BLU, RoHS	1	**00109-02-00023**
FTG, Nut, 1/8in, 1/4-28, PEEK, YEL, RoHS	1	**00109-02-00024**
FTG, Nut, 1/8in 1/4-28, PEEK, GRN, RoHS	1	**00109-02-00025**
FTG, Nut, 1/8in 1/4-28, PEEK, ORN, RoHS	1	**00109-02-00026**

* Cut into 6' lengths

Accela 600 Pump Tools

Description	Cat. No.
Tool, Fitting Extender, Accela 600 Pump	**00725-01-00023**
Screwdriver, Ball driver, HEX, 4mm, RoHS	**00725-00032**
Wrench L HEX 4mmM, RoHS	**00725-00034**
Tool, Ball driver 2.5mm	**00725-01-00002**
Wrench 1/4-5/16,Super Krome,RoHS	**5401-0400**

MSQ Plus Single Quadrupole LC/MS

- Fastest scanning mass detector for high speed LCMS applications
- Patented ConeWash™ technology for rugged interfaces
- Accurate trace level quantitation

The Thermo Scientific MSQ Plus single quadrupole mass spectrometer provides mass confirmation as an LC detector with high sensitivity, fast scan speed and a small footprint. It can analyze a wide range of samples, and is particularly suited for "walk up" environments, high throughput screening, and fast LC applications.

MSQ Plus Kits

Description	Quantity	Cat. No.
Annual Maintenance Kit*	1	**60111-62014**
Probe Heater Repair Kit – insulating teflon parts	1	**60111-62010**
Surveyor MSQ Test Kit	1	**FM104284**

*The Consumables Kit contains the non-liquid parts required for the upkeep of your MSQ Plus MS Detector including source O-rings, entrance cones, esi/apci capillaries, cone wash assembly, esi probe repair supplies, turbo oil wick

Consumables and General Spares

Description	Quantity	Cat. No.
Probe repair supplies: APCI probe capillary	1	**FM102594**
ESI probe capillary	1	**FM102598**
PEEK tube insert For API probe	1 pk (12)	**FM102591**
Graphite 1/16in Vespel ferrule	1 pk (10)	**6070119**
ESI ceramic sleeve	1	**FM103394**
Calibration solution MSQ version 1.4 and higher	1	**60111-01001**
Calibration solution MSQ classic version 1.0	1	**FM104285**
Titanium entrance cone complete with O-ring	1	**60111-60049**
Cone wash nozzle assembly	1	**FM102521**
Cone wash nozzle O-ring	1pk (10)	**FM101464**
Entrance cone spare O-ring	1pk (10)	**5711000**
Exit (Extraction) cone	1	**FM102263**
Swage connector for 6mm nitrogen tubing	1	**00101-02-00006**
6mm x 1/4in NPT nitrogen fitting	1	**00103-02-00001**
6mm Teflon tubing for nitrogen supply	Per foot	**00109-99-00004**
Pfeiffer turbo replacement oil wick	1	**00950-01116**
Edwards vacuum pump oil	1 liter	**00301-15102**
ESI probe complete	1	**FM102595**
APCI probe complete	1	**FM102587**
Probe heater assembly	1	**60111-60023**
Vacuum exhaust hose, blue, 1in ID	Per foot	**00301-08301**
Hexapole screws – 3 required	1	**60111-20055**
USB cable 2m	1	**00302-99-00008**
APCI corona pin needle	1	**70005-98033**

Software

Description	Cat. No.
Upgrade to MSQ 2.0 with Xcalibur 2.0 includes LC Devices 2.02	**OPTON-20432**
Validation MSQ Plus on Xcalibur 2.0 – MS only	**OPTON-09015**

TSQ Series Triple Quadrupole LC/MS

Quantum Access, Quantum Access MAX, Quantum Discovery, Quantum Discovery Max, Quantum Ultra, Quantum Ultra AM, Quantum Ultra EMR, Vantage

- H-SRM dwell time of 2 ms for quantitation of hundreds of compounds in a single run
- Mass range up to m/z 3000 supports a wide array of applications
- QED-MS/MS facilitates simultaneous quantitation and structural confirmation

The Thermo Scientific TSQ Series of triple quadrupole LC/MS systems are designed for use in both research and routine applications such as proteomics, drug discovery, and analytical quantitation. The TSQ Quantum Access MAX™ offers versatility with its best in class mass range (m/z 10-3000), Quantitation-Enhanced Data-Dependent MS/MS structural quantitation scan mode, and H-SRM capability.

The TSQ Quantum Ultra™ is the best available technology to provide ultimate productivity for a variety of quantitative applications. The TSQ Vantage™ is crafted with Generation Two ion optics, which includes the innovative S-Lens and zero cross-talk collision cell, making it the most sensitive, high-precision triple quad available on the market today.

Chemicals

Description	Quantity	Cat. No.
Cesium iodide	1 x 1g vial	**HAZMAT-01-00004**
TSQ Quantum AM calibration kit	1	**70111-62029S**
Reserpine	1 x 1g vial	**00301-12901**
Polytyrosine-1,3,6 calibration solution (liquid)	1 x 20mL	**00301-22924**
Polytyrosine-1,3,6 calibration standard (solid)	1	**00301-22925**
FC43 calibration liquid	1 vial	**50010-30059**

Ion Transfer Tubes and Graphite Vespel O-ring

Description	Quantity	Cat. No.
TSQ Quantum Access	1	**70111-20972**
TSQ Quantum Ultra, Ultra AM & Ultra EMR	1	**97055-20199**
TSQ Quantum Discovery Max	1	**70111-20396**
TSQ Quantum, Quantum AM & Quantum Discovery	1	**70111-20100**
TSQ Vantage, Vantage AM & Vantage EMR	1	**70005-20423**
Graphite vespel o-ring (all models)	1	**97055-20442**

MS Maintenance Kit

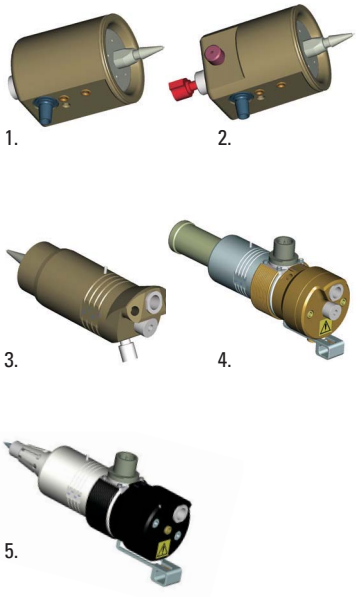
Description	Quantity	Cat. No.
MS maintenance kit	1	**70111-62032**
Ferrule, 0.008 ID, Kel-F (for fused silica sample tube)	2	**00101-18114**
Tubing, fused-silica, 0.10 ID x 0.19 OD (fused silica sample tube)	6ft	**00106-10499**
O-ring, Viton, 0.125 ID x 1/16 (for source mount assembly gas connections)	2	**00107-02550**
Fitting, HPLC, 10-32, short one-piece, 10/pk, RoHS	3	**00109-99-00016**
Oil, forepump, inland 19, 1µL	3	**00301-15101**
Syringe, 500µL, Gastight	1	**00301-19016**
Tubing, PEEK, 0.005in ID x 1/16in OD, red	3ft	**00301-22912**
Tube, Teflon, 0.03in ID x 1/16in OD (for syringe adapter)	0.1ft	**00301-22915**
Polytyrosine-1,3,6 calibration standard (liquid)	1	**00301-22924**
Screw, 6-32 x 3/8 (used to secure front panels to chassis)	2	**00405-63266**
Screw, 6-32 x 5/16 (used to secure side panels and EMI shield to chassis)	2	**00407-63205**
Screw, 4 x 6mm (used to secure PS2 and PS3 to chassis)	2	**00407-90000**
Screw, 8-32 x 3/8 (used to secure top cover to chassis)	2	**00415-83206**
O-ring, graphite Vespel (for ion transfer tube)	1	**97055-20442**

Metal Needle Kits *(Note the compatibility numbers refer to the images at right)*

Compatibility Number	Description	Quantity	Cat. No.
1	High flow metal needle kit	1	**OPTON-20004**
1	Low flow metal needle kit	1	**OPTON-20005**
2	High flow metal needle kit	1	**OPTON-20016**
2	Low flow metal needle kit	1	**OPTON-20017**
3	High flow metal needle kit	1	**OPTON-53003**
3	Low flow metal needle kit	1	**OPTON-30004**
4	H-ESI metal needle kit	1	**OPTON-20034**
5	32-Gauge Metal Needle Insert LC Flow rates between 5µL/min to 2000µL/min Contains Metal Needle PN 70005-20434	1	**OPTON-53010**
5	34-Gauge Metal Needle Insert LC Flow rates between 1µL/min to 10µL/min Contains Metal Needle PN 70005-20483	1	**OPTON-53011**

ESI Needles and Needle Seal *(Note the compatibility numbers refer to the images at right)*

Compatibility Number	Description	Quantity	Cat. No.
1,2,3	ESI needle	1	**00950-00990**
1,2,3	ESI needle seal	1	**00950-00952**
4	H-ESI needle	1	**97055-20273**
4	H-ESI needle seal	1	**97055-20271**



For use with the metal needle kits and ESI needle & needle seal tables.

Ion Trap Series and Orbitrap Series

LCQ Fleet, LTQ XL, LTQ Velos, LTQ Orbitrap Discovery, LTQ Orbitrap XL, LTQ Orbitrap Velos, and LTQ FT Ultra

Whether your application is as straightforward as routine HPLC detection and compound identification or as difficult as identification and characterization of low-abundance proteins in complex biological matrices, there is a Thermo Scientific ion trap or ion trap hybrid mass spectrometer to meet your analytical challenge.

LCQ Fleet

Exceptional Analytical Value

- Excellent full-scan MSn sensitivity
- Rugged and reliable
- Cost effective

The Thermo Scientific LCQ Fleet ion trap delivers rich information for routine analysis of complex samples and integrates seamlessly with fast HPLC systems under an easy-to-use single point of control.

LTQ XL

Exceptional Sensitivity and Flexibility

- Multiple fragmentation modes provide more structural information
- Upgradeable to Orbitrap or FT technology

The Thermo Scientific LTQ XL linear ion trap combines exceptional sensitivity with tremendous flexibility. It applies multistage activation, CID, PQD, and optional ETD to generate extensive structural information for the most demanding applications. Available FAIMS offers greater specificity for complex samples, while the optional MALDI source promises speed and simplicity.

LTQ Velos

Exceptional Sensitivity and Flexibility

- Dual-pressure linear ion trap for improved scan speed and mass resolution
- S-Lens ion optics for better ion transmission and lower limits of detection
- Upgradeable to Orbitrap technology

With new S-Lens ion guide technology, a revolutionary dual-pressure linear ion trap, and predictive automatic gain control, the Thermo Scientific LTQ Velos is the fastest, most-sensitive ion trap available today. It enables the identification and quantification of low-abundance compounds in half the time.

Exactive™ High Performance Benchtop LC-MS System

Powered by Orbitrap™ Technology

- High throughput screening with high resolution mass accuracy
- Quantification with superior specificity
- Up to 100,000 resolution for high confidence compound identification
- Walk-up analysis

Powered by patented Thermo Scientific Orbitrap technology, the Exactive provides fast, sensitive, reliable, and confident detection and identification of compounds in complex mixtures while maintaining full compatibility with U-HPLC and fast chromatography. The Exactive supports screening applications, from routine compound identification to the most demanding analysis of trace levels components in complex mixtures. In addition, the Exactive allows an alternate positive-negative scan mode of operation. The optional HCD collision cell adds more functionality to the bench-top system by providing 'All Ion Fragmentation' while maintaining high resolution, accurate mass and high sensitivity.

LTQ Orbitrap Velos Hybrid FTMS

Ultra-high resolution and accurate mass for confident structural elucidation

- More unique proteins identified in a single experiment
- Multiple fragmentation techniques deliver optimal structural characterization
- Rapid quantitation of low level isobarically labeled peptides
- Precise intact protein analysis

The Thermo Scientific LTQ Orbitrap Velos blends the unsurpassed speed and sensitivity of the LTQ Velos ion trap with the ultra-high resolution and outstanding mass accuracy of Orbitrap technology. The LTQ Orbitrap Velos elevates protein sequencing and the analysis of complex mixtures to previously unseen levels, and delivers results with absolute confidence.

LTQ FT Ultra

Unprecedented Analytical Power

- Attomole sensitivity, ppb mass accuracy to eliminate false positive identifications
- Parallel acquisition of MSn and high-resolution, full-scan MS spectra
- Widest dynamic range and ultra high resolution for complex sample analysis

The Thermo Scientific LTQ FT Ultra merges advanced ion trap and FT-ICR technologies into a single instrument with unprecedented analytical power. Ultra-high resolution and sensitivity, coupled with sub-ppm mass accuracy and ECD and IRMPD fragmentation capabilities, are available for applications demanding ultimate performance and flexibility, such as top-down protein analysis, PTM analysis, and metabolomics.

Ion Traps and Orbitrap Series

API Source Components

Description	Cat. No.
USI ESI probe	**OPTON-20011**
USI APCI probe	**OPTON-20012**
C apillary heater cage assembly, for LTQ & LTQ XL	**97055-60040**
Capillary heater cage assembly, for the LXQ & LCQ Fleet	**97055-60181**

Accessory Kits

Description	Cat. No.
TSQ Quantum forepump kit (used with LTQ series)	**70111-62014**
Hose and accessories kit, LTQ & LTQ XL	**97055-62007**
Hose, single mechanical pump accessory, LXQ & LCQ Fleet	**97055-60135**
LTQ series ship kit	**70111-62033**
Accessory Kit, LTQ/LTQ XL	**97055-62044**
Accessory Kit, LXQ & LCQ Fleet	**97055-62045**

Chemicals

Description	Cat. No.
LCQ chemicals kit, for LTQ & LCQ series	**97000-62042**
Met-Arg-Phe-Ala, 20mg	**00301-07709**
Ultramark 1621	**00301-12200**
Caffeine, 1mg/mL	**00301-12310**
Reserpine, 1g	**00301-12901**

Pressure Gauges

Description	Cat. No.
Ion gauge	**00105-01525**
Ion gauge o-ring, 0.737id 3/32 THK Viton	**00107-10056**

Metal Needle Kits

Description	Cat. No.
32-Gauge metal needle kit for high flow LC flow rates between 5µL/min to 400µL/min Uses 32-gauge needle, (P/N 00950-00954)	**OPTON-53003**
34-Gauge metal needle kit for low flow LC flow rates between 500nL/min to 10µL/min Uses 34-gauge needle, (P/N 97144-20040)	**OPTON-30004**

Fittings, Ferrules, Sample Loops and Tubing

Description	Cat. No.
Fitting, HPLC, adaptor 10-32 x 1/4 PEEK	**00101-18080**
Fitting, nut, fingertight, HPLC, 10-32, PEEK	**00101-18081**
Fitting, fingertight, 2, Upchurch	**00101-18195**
Fitting, flangeless, 1/8in, Delrin, green	**00101-18198**
Fitting, flangeless, 1/8in, Delrin, blue	**00101-18200**
Fitting, plug, 1/4-28, Tefzel	**00101-18075**
Nut, LC, 1/16in, ss, Rheodyne	**2522-0066**
Ferrule, LC, 1/16in, ss, Rheodyne	**2522-3830**
Ferrule, 0.008in ID, Kel-F HPLC	**00101-18114**
Ferrule, 0.012in ID, Kel-F HPLC	**00101-18116**
Ferrule, 0.016in ID, PEEK, HPLC	**00101-18120**
Ferrule, Fingertight 2, Upchurch	**00101-18196**
Ferrule, 1/8in, Tefzel	**00101-18199**
Fitting, grounding union, 1/16, ss	**00101-18182**
Fitting, LC union, 0.010in orifice, PEEK	**00101-18202**
Fitting, LC TEE union, 0.020in orifice, PEEK	**00101-18204**
5µL sample loop, ss	**00110-22026**
10µL sample loop, ss	**00110-22012**
20µL sample loop, ss	**00110-22028**
50µL sample loop, ss	**207180**
100µL sample loop, ss	**00110-22018**
500µL sample loop, ss	**00110-22020**
1mL sample loop, ss	**00110-22022**
Tubing, 0.15mm ID x 0.39mm OD fused-silica capillary for APCI sample tube	**00106-10498**
Tubing, 0.10mm ID x 0.19mm OD fused-silica capillary for ESI sample tube	**00106-10499**
Tubing, 0.05mm ID x 0.19mm OD fused-silica capillary for ESI sample tube for low flow up to 200µL/min	**00106-10502**
Tubing, 0.1mm ID x 0.363mm OD fused-silica capillary for infusion line	**00106-10504**
Tubing, 0.075mm ID x 0.3193mm OD fused-silica capillary for low flow applications instead of metal needle	**00106-10511**
Teflon tube, .03in ID x 1/16in OD for syringe adapter assembly	**00301-22915**
Tubing, 1in ID x 3/16in, Tygon	**00301-22922**
Hose, 1.5in ID, PVC reinforced	**00301-24163**

Method Transfer to Sub-2µm Columns

The use of sub-2µm particles is becoming increasingly popular for applications in either High Throughput Screening (HTS) assays or in Ultra-High Pressure Liquid Chromatography (U-HPLC). Hypersil GOLD columns packed with 1.9µm particles offer advantages over the more traditional systems containing 3 and 5µm particles by allowing operation at higher flow rates without compromising efficiency. This results in shorter analysis times and improvements in resolving power, sensitivity and peak capacity.

When transferring methods from HPLC to U-HPLC several approaches can be taken, depending on the analytical needs. If column dimensions are maintained and only particle size is reduced then an improvement in efficiency and, therefore, resolution and peak capacity is obtained. A second approach is to reduce not only particle size but also column dimensions, which has the benefit of further reducing analysis time.

An understanding of some practical calculations can help to achieve the correct scaling and maintain a consistent assay profile between the original and transferred method.

There are three main considerations when transferring a method to a shorter column using small particles: Scaling the flow rate, adjusting the injection volume and adjusting the gradient profile. These are discussed in more detail below.*

1. Scale the Flow Rate

To maintain an equivalent separation when transferring a method it is important to keep the linear velocity constant between the original and new method. The linear velocity is related to the flow rate, internal diameter of the column and particle size. A simple equation can be derived to calculate the flow rate (F_2) required for the new method. This is shown below, normalized for particle size.

$$F_2 = F_1 \times (d_{c2}^2 / d_{c1}^2) \times (d_{p1} / d_{p2})$$

F_1 – original flow rate (mL/min)
d_{c1} – original column internal diameter (mm)
d_{p1} – original column particle size (µm)
d_{c2} – new column internal diameter (mm)
d_{p2} – new column particle size (µm)

2. Adjust the Injection Volume

Because sub-2µm-based methods are most often transferred to smaller volume columns, the same injection volume will take up a larger proportion of the new column, possibly leading to band broadening or potentially overloading the column. It is therefore important to scale down the injection volume to match the change in column volume. Once again, a simple equation can be used to calculate the injection volume (V_{i2}) required for the new method.

$$V_{i2} = V_{i1} \times (d_{c2}^2 \times L_2 / d_{c1}^2 \times L_1)$$

V_{i1} – original injection volume (µL)
d_{c1} – original column internal diameter (mm)
L_1 – original column length (mm)
V_{i2} – new injection volume (µL)
d_{c2} – new column internal diameter (mm)
L_2 – new column length (mm)

3. Adjust the Gradient Profile

Geometrical transfer of the gradient requires calculation of the number of column volumes of mobile phase in each segment (time interval) of the gradient in the original method to ensure that the new calculated gradient takes place over the same number of column volumes, for the new column.

The following calculation should be performed for each time segment of the gradient, including column re-equilibration. It takes into consideration the void volume of each column (V_c, calculation described below), the flow rate in the original method and the flow rate in the new method (calculated in step 1 above) and the time segment in the original method.

$$t_{g2} = t_{g1} \times (V_{c2}/V_{c1}) \times (F_1/F_2)$$

t_{g1} – Time segment in original gradient (min)
t_{g2} – Time segment in new gradient (min)
V_{c1} – Original column void volume (mL)
V_{c2} – New column void volume (mL)
F_1 – Original flow rate (mL/min)
F_2 – New flow rate (mL/min)

The void volume of the column is the volume that is not taken up by the stationary phase (approximately 68% of the column volume):

$$V_c = 0.68 \times \pi \times r^2 \times L$$

V_c – column volume (mL)
L – column length (cm)
r – column radius (cm)

An example of a method transferred following steps 1 to 3 above is illustrated in the following table:

Original method Column I: 150 x 4.6mm, 5µm Flow rate – 1mL/min (Column volume – 1.7mL) Injection volume – 10µL		**U-HPLC** Column II: 100 x 2.1mm, 1.9µm Flow rate – 0.55mL/min (Column volume – 0.24mL) Injection volume – 1.4µL		**U-HPLC** Column III: 50 x 2.1mm, 1.9µm Flow rate – 0.55mL/min (Column volume – 0.12mL) Injection volume – 0.7µL	
Gradient time (min)	%B	Gradient time (min)	%B	Gradient time (min)	%B
0	0	0	0	0	0
25	0	6.4	0	3.2	0
55	85	14.1	85	7.1	85
70	85	17.9	85	8.9	85

Method transfer conditions from HPLC (150 x 4.6mm, 5µm columns) to U-HPLC (100 x 2.1mm, 1.9µm and 50 x 2.1mm, 1.9µm columns).
*We also offer a convenient method transfer calculator at the Chromatography Resource Center (www.thermo.com/columns)

Optimized Method Transfer

The table above lists the equivalent 1.9µm particle packed columns for the most commonly encountered columns packed with 5 and 3µm particles. Perhaps the most significant advantage of 1.9µm particle packed columns is that they allow the chromatographer not only to select the equivalent column for direct method transfer, but also to optimize the column length and flow rate to achieve increased efficiency and speed of separation.

If the analyte peaks are well separated and high throughput is the most important consideration for a method, it is possible to increase the chromatographic speed by further reducing the column length and increasing the flow rate. On the other hand, if it is necessary to further increase resolution for difficult separations in complex matrices, a longer column can be used to increase the efficiency of the separation.

System Considerations

To obtain the best data using fast chromatography it is critical that the LC instrument system is optimized to operate under these conditions. All system components for the assay should be considered. System volume (connecting tubing ID and length, injection volume, flow cell volume in UV) must be minimized, detector time constant and sampling rate need to be carefully selected, and when running fast gradients pump dwell volume needs to be minimal.

Minimizing System Volume

Excess system volume gives rise to band broadening, which has a detrimental effect on the chromatographic performance. This can arise from the column, the autosampler, the tubing connecting the column to injector and detector and in the detector flow cell. The extra column effects become more significant for scaled down separations because of the smaller column volumes and for less retained peaks which have a lower peak volume making it even more critical to minimize extra column dispersion.

Detector Sampling Rate

With 1.9µm particles, operating parameters can be optimized to give fast analysis. This results in narrow chromatographic peaks which may be of the order of 1-2 seconds or less in width. It is important to scan the detector (whether it is UV or MS) fast enough to achieve optimum peak definition, otherwise resolution, efficiency and analytical accuracy will be compromised.

Dwell Volume

The HPLC pump dwell volume is particularly important when running high speed applications using fast gradients, typical of high throughput separations on small particle packed columns. This is because the pump dwell volume affects the time it takes for the gradient to reach the head of the column. If we consider a method using a flow rate of 0.4mL/min and a fast gradient of 1 minute, the theoretical gradient reaches the column immediately. A pump with a 65µL dwell volume (such as used in the Thermo Scientific Accela™ HPLC high speed LC system) will get the gradient onto the column in 9.75 seconds. A traditional quaternary pump with a dwell volume of 800µL will take 2 minutes to get the gradient to the column. When running rapid gradients this is too slow and it may become necessary to introduce an isocratic hold at the end of the gradient to allow elution of the analytes.

Further details on method optimization using 1.9µm Hypersil GOLD columns can be found in Technical Guide TG20338. We also offer a convenient method transfer calculator at the Chromatography Resource Center (*www.thermoscientific.com/chromatography*)

Column Length (mm)

Particle Size (µm)	Conventional Hypersil GOLD	1.9µm Hypersil GOLD
5.0	250	100
	150	50
	100	30
	50	20
3.0	250	150
	150	100
	100	50
	50	30
	30	20

Column length equivalency to maintain resolution (match column chemistry and transfer method geometrically)

Scaling Down a Method

Reasons to Scale Down a HPLC or LC/MS Method

There are applications where it is desirable to scale down a method without transferring the method to U-HPLC. These reasons may be to:

- Maximize sensitivity when small amounts of sample are available
- Make flow rate compatible with ionization technique in MS detection
- Reduce costs by reducing solvent consumption

Transfer Method to a Narrower Column

Reducing the scale of a separation by reducing the column internal diameter may be necessary when transferring a method from UV to MS detection, or when only very small amounts of sample are available, such as in drug discovery or proteomics. In the first case ionization technique or source design determines the best flow rate range (see table above) and in the latter case, method sensitivity is maximized because solutes elute in more concentrated chromatographic bands.

If all other method parameters (column length and particle size, column chemistry, mobile phase composition, gradient range and time, separation temperature) are kept unchanged, the change to a narrower column only requires adjustment of the flow rate.

$$F_2 = F_1 \times (d_{c2}/d_{c1})^2$$

F_1 – original flow rate (to be reduced)
F_2 – new flow rate
d_{c1} – original column internal diameter
d_{c2} – new column internal diameter

This is applicable to both isocratic and gradient methods. The new method should produce a chromatogram with identical resolution and identical run time. If small changes in retention times and resolution are observed this is generally caused by system dwell volume (discussed below).

Typical Flow Rates for Analytical, Narrowbore, Capillary and Nanobore Columns (5µm Particles)

Column ID (mm)	Flow Rate Range (µL/min)	Optimum Flow Rate[1] (µL/min)	Recommended Injection Volume[2] (µL)	API Source
4.6	1000 – 1500	1250	30	APCI or High flow ESI
3.0	400 – 600	500	10	APCI or High flow ESI
2.1	200 – 300	250	5	APCI or Micro-ESI
1.0	40 – 60	50	1	Micro-ESI
0.5	10 – 25	12	0.35	Micro-ESI
0.32	4 – 10	5	0.15	Micro-ESI
0.18	1 – 3	2	0.05	Micro-ESI
0.1	0.4 – 1	0.5	0.015	Nanospray
0.075	0.2 – 0.5	0.3	0.01	Nanospray

1. Recommended for good efficiency and moderate pressure. Higher flow rates may lead to column voids. Lower flow rates are recommended for washing column bed or changing solvents.
2. Estimates based on negligible loss of efficiency and isocratic elution with sample solvent identical to mobile phase. Larger volumes can be introduced under gradient conditions or using weaker sample solvent.

Transfer Method to a Shorter Column

In gradient elution, the simplest way to reduce the method cycle time is to reduce the column length. If all other method parameters (column ID and particle size, column chemistry, mobile phase composition, gradient range, flow rate, separation temperature) are kept unchanged the only requirement is to change the gradient time using the equation below, where gradient time is reduced by the same factor as the reduction in column volume.

$$t_{g1}/V_{c1} = t_{g2}/V_{c2}$$

t_{g1} – gradient time in original method (min)
t_{g2} – gradient time in new method (min)
V_{c1} – original column volume (mL)
V_{c2} – new column volume (mL)

Column volume V_c (mL) can be estimated using:

$$V_c = 0.68 \times \pi \times r^2 \times L$$

V_c – column volume (mL)
L – column length (cm)
r – column radius (cm)

Dwell Volume

Dwell volume is just as important when scaling down a method as for method transfer to U-HPLC. The effect of dwell volume on the separation is more significant when narrow columns are used at low flow rates. For instance, if the system has a dwell volume of 2.0mL and a 4.6mm ID column is run at 1mL/min, it takes 2 minutes for the gradient to reach the head of the column; however, if a 2.1mm ID column is used with a 0.4mL/min flow rate it will take 5 minutes for the gradient to reach the column. In high throughput gradient separations using small volume columns, dwell volume causes an increase in run times and longer re-equilibration time between runs.

Several approaches can be taken to minimize these effects:

- Select a pump with a small gradient delay volume (e.g., Thermo Scientific Accela high speed LC system has a delay volume of only 65µL);
- Delay sample injection until gradient has reached the head of the column;
- Set the pump at a higher flow rate and split the flow before the column.

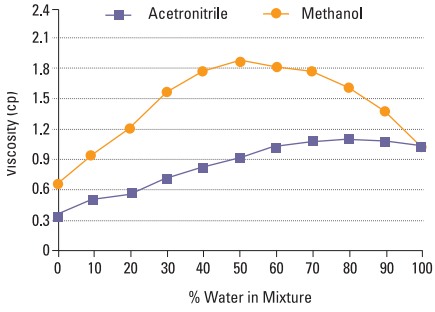
Scaling Up a Method

Reasons to Scale Up an HPLC Method

- Increase method capacity
- Isolation and purification of target compounds
- Increase sample throughput

Analytical methods may require scale up to preparative sizes to isolate and purify compounds from mixtures. In choosing the best column and packing material for your preparative application, consider the selectivity and loadability of the media as well as column dimensions, to give the results you need most quickly or economically. We have established a strong reputation for the manufacture and supply of high quality preparative silicas and bonded phases, designed to give the same levels of performance and reproducibility as our popular analytical silica ranges such as the Thermo Scientific Hypersil phases.

Scale up is easiest when starting from an analytical column packed with smaller particle size media offering the same selectivity as the larger particle size preparative media. The leading families of Thermo Scientific phases are offered in various sizes to complement lab scale operations and facilitate the scale up to preparative chromatography. Scout columns, typically 250 x 4.6mm packed with the media of interest can also be used to develop the separation. Once the method is finalized on the smaller column, a scaling factor can be applied.



Mobile phase viscosity changes with composition

Scaling Up to a Preparative Column

Flow rate and column load scaling are only required when changing the internal diameter of the column. The scaling of flow rates allows peak retention times to remain relatively constant between columns with different internal diameters. The typical solvent flow rate through a column is dependent on its internal diameter and the particle size of the column packing material. This scaling factor can also be used to estimate the loading capacity of a given column. Assuming column length is a constant, the scale factor can be calculated using the following formula:

Scale Factor = d_{c2}^2/d_{c1}^2

d_{c1} – original column internal diameter (mm)
d_{c2} – new column internal diameter (mm)

The column loading capacity and flow rate required for the new larger ID columns can be calculated using this factor.

Column Backpressure

Column operating backpressure is affected by column length, internal diameter, media particle size, temperature, solvent properties and solvent flow rate. It can also be affected by the use of gradients, where the pressure may vary with solvent composition. Typical operating backpressure for columns or cartridges can be calculated using the following equation:

$$\textbf{Pressure (atm)} = \frac{2.1 \times \Phi \times L \times \eta}{d_p^2 \times d^2}$$

Φ = column impedance
(1000 for 4.6mm ID columns)
L = column length (mm)
d_p = particle diameter (µm)
d = column diameter (mm)
η = mobile phase viscosity (centipoises)

The mobile phase viscosity varies with composition. As an example, the figure above shows how water viscosity varies with the addition of methanol or acetonitrile. This variability is a critical component in maximizing throughput with respect to the chromatography instrumentation being used.

Discover eVol for precise and accurate dispensing

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Selecting the Media

Media selection for your preparative separation is important. Choose media that has a narrow particle size distribution which will provide high efficiency columns with a low back pressure, since there are no 'fines' to block frits or impede flow. The uniformly spherical particles, with narrow pore size distribution, apparent in Thermo Scientific preparative columns, provide reproducible performance and a longer column life. Media that is available in a range of particle sizes offers choice for scale up applications with controlled selectivity. We offers a range of choices for preparative media in several particle sizes to tailor the media to your application.

High Load and High Retention – HyperPrep HS

Materials with higher surface area can offer increased loadability. This drive to maximize surface area must be undertaken in a considered manner particularly with regard to particle pore diameter and pore volume. Too high a pore volume will compromise stability and robustness of the bed and too small a pore diameter will influence mass transfer at the expense of efficiency. The high surface area provides enhanced retention of polar compounds. A high carbon loading gives a robust, stable phase. Please contact Technical Support for more information on Thermo Scientific HyperPrep columns and media.

Peak Shape – Hypersil GOLD

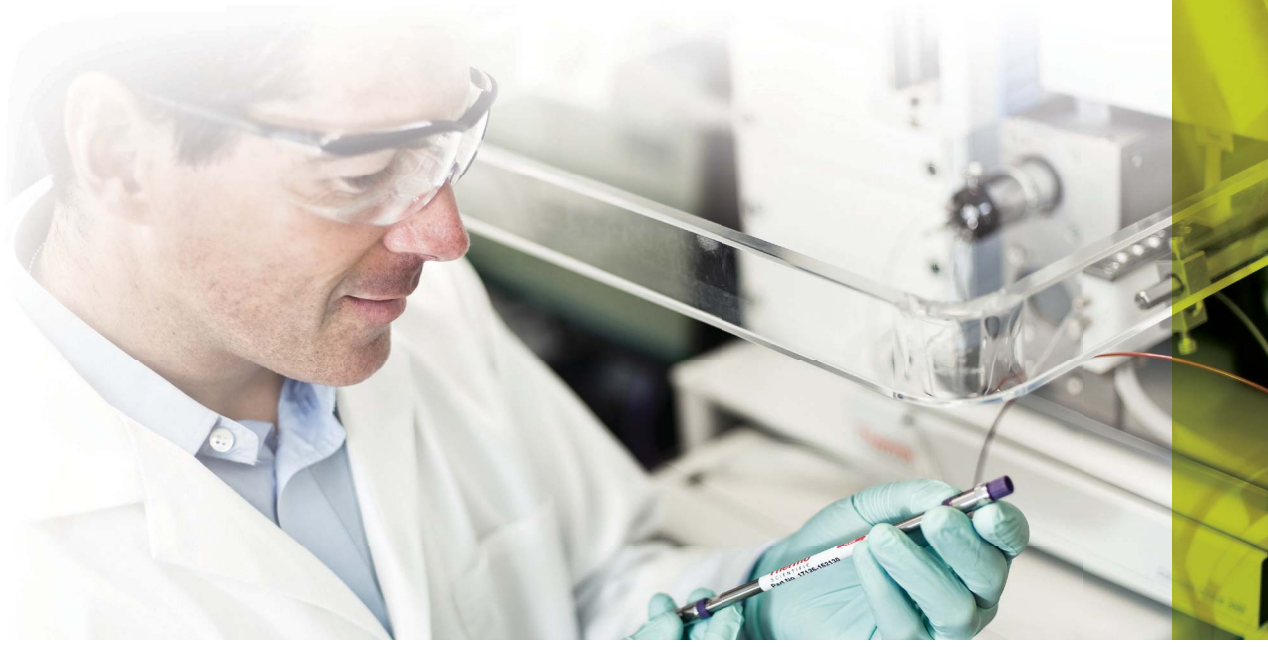
In analytical HPLC, the use of packings based on highly pure silica has been shown to improve peak shape. Our highly developed and reproducible manufacturing processes ensure that our leading analytical brand of Hypersil GOLD media is also available in a range of particle sizes suitable for preparative LC without compromise on performance.

Polar Compounds and Isomers – Hypercarb, Hypersil GOLD aQ

Often when dealing with very polar compounds, achieving sufficient retention can be a challenge. We are able to offer a variety of choices to overcome this common problem: The polar endcapping on Hypersil GOLD aQ provides a controlled interaction mechanism by which moderately polar compounds can be retained. Hypersil GOLD AX can be used in HILIC mode to provide retention of polar compounds. Hypercarb offers truly orthogonal selectivity to C18 in reversed phase LC and can be used to retain highly polar compounds. Hypercarb columns can also be used to differentiate between very closely related compounds including geometric and positional isomers.

Peptides and Proteins – BioBasic, Hypersil GOLD

When it comes to the analysis of peptides, the correct selection of packing material becomes ever more important. When deciding on which pore size of packing material to use in the analysis of a polypeptide mix, molecular weight and hydrophobicity of the peptides must be taken into account. Our breadth of silica offerings allow the chromatographer to obtain the best resolution using materials with pore diameters in the 100 to 300Å range. A general rule is that hydrophilic peptides with a molecular weight of less than 2000 daltons can be analyzed using a lower pore volume media, such as Hypersil GOLD media. Above this molecular weight, access to small pores is restricted, and separations tend to be inefficient. For hydrophobic peptides with a molecular weight greater than 2000, a 300Å media such as Thermo Scientific BioBasic is recommended. For the separation of small or hydrophilic peptides, a 100Å material such as HyperPrep HS may give better resolution.



HPLC Troubleshooting

Before you start any troubleshooting, it is essential to observe safe laboratory practices. Know the chemical and physical properties of any solvents used and have the appropriate Material Safety Data Sheets (MSDSs) readily available. All electrically powered instruments should be shut down and unplugged before starting. Eye protection should also be worn.

The following table lists common HPLC problems encountered, the possible causes and solutions for your quick reference.

Symptom	Cause	Action
Pressure Related Problems		
Low Pressure	Low viscosity mobile phase.	Confirm expected pressure using the Kozeny-Carmen or similar equation.
	Piston seals leaking.	Check for evidence of leaking or wear and replace where necessary.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Air in solvent lines or pump.	Ensure that the reservoirs and solvent lines are fully primed and the purge valve is fully closed.
High Pressure	High viscosity mobile phase.	Confirm expected pressure using the Kozeny-Carmen or similar equation.
	Pump flow-rate malfunction.	Contact manufacturer.
	Tubing blocked.	Working backwards from detector outlet, check source of blockage and replace item as necessary.
	Guard blocked.	Replace guard cartridge.
	Sample precipitation.	Consider sample clarification steps such as filtration or SPE.
	Detector blockage.	Clean the flow cell according to the manufacturer's instructions.
Baseline Related Problems		
Fluctuating Baseline	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Bubbles in flow cell.	Degas the mobile phase and pass degassed solvent through the flow-cell. Do not exceed the cell's pressure limit.
	Contaminated guard.	Replace the guard cartridge.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Detector contamination.	Clean the flow cell according to the manufacturer's instructions.
	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
Sloping Baseline	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Gradient mobile phase.	Consider purer solvents or higher wavelengths. Otherwise, this is normal.
	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Temperature fluctuations.	Use a thermostatically controlled column oven.
	Contaminated column.	Wash the column using an appropriate solvent. Ensure that a gradient method has a wash period at the end.
	Pump not mixing solvents properly.	Where being used, ensure that the proportioning valve is mixing the solvents correctly. If the method is isocratic, blend the solvents manually.
	Blocked solvent reservoir frits.	Ultrasonicate the reservoir frits in water and then methanol.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
Peak Shape Problems		
Broad Peaks	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Injection solvent too strong.	Ensure that the injection solvent is the same or weaker strength than the mobile phase.
	Injection volume too high.	Reduce the injection volume to avoid overload. Typically injection volumes of < 40% of the expected peak width should be used.
	Injected mass too high.	Reduce the sample concentration to avoid mass overload.
	Extra column volume too high.	Reduce diameter and length of connecting tubing. Reduce the volume of the flow cell where possible.
	Temperature fluctuations.	Use a thermostatically controlled column oven. Higher temperatures will produce sharper peaks.
	Old guard cartridge.	Replace the guard cartridge.
	Old column.	Do not use columns that have been used with ion-pair reagents for reverse-phase methods. Old columns give much lower efficiencies than new columns. Replace the column if necessary.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Voided column.	Replace the column. Do not use outside the recommended pH range.
Double Peaks	Old guard cartridge.	Replace the guard cartridge.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Voided column.	Replace the column. Do not use outside the recommended pH range.
Negative Peaks	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Wrongly wired detector.	Check the signal polarity from the detector to the recording device.
	Unbalanced RI detector optics.	Refer to manufacturer's instructions.
	Ion pair method.	Inject the sample in the mobile phase.

Symptom	Cause	Action
Peak Shape Problems		
Flat topped Peaks	Detector overload.	Reduce the sample concentration.
	Detector set-up.	Check the detector attenuation and re-zero.
Tailing Peaks	Old guard cartridge.	Replace the guard cartridge.
	Injection solvent too strong.	Ensure that the injection solvent is the same or weaker strength than the mobile phase.
	Injection volume too high.	Reduce the injection volume to avoid overload. Typically injection volumes of < 40% of the expected peak width should be used.
	Injected mass too high.	Reduce the sample concentration to avoid mass overload.
	Old column.	Do not use columns that have been used with ion-pair reagents for reversed phase methods. Old columns give much lower efficiencies than new columns. Replace the column if necessary.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Voided column.	Replace the column. Do not use outside the recommended pH range.
Fronting Peaks	Old or damaged column.	Replace the column.
Peak Size and Retention Problems		
Small Peaks	Degraded sample.	Inject a fresh sample.
	Low analyte concentration.	Increase the analyte concentration.
	Detector set-up.	Check the detector attenuation and re-zero.
	No wash solvent.	Check that the solvent wash reservoir is filled with a miscible solvent and that the injector is set to wash between injections.
	Damaged or blocked syringe.	Replace the syringe.
	Incorrect amount injected.	Check injector loop size and that no more than 50% of this volume is used for partial loop injections.
	Viscous injection solvent.	Reduce syringe draw-time.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
No Peaks	Sample vial empty.	Fill sample vial.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Pump not mixing solvents properly.	Where being used, ensure that the proportioning valve is mixing the solvents correctly. If the method is isocratic, blend the solvents manually.
	Damaged or blocked syringe.	Replace the syringe.
	Different dwell volume.	For gradient methods, check that the dwell volume of any new system is not very different from any previous system. Apply a final hold time if necessary.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
Missing Peaks	Degraded sample.	Inject a fresh sample.
	Immiscible mobile phase.	Check that any solvent already in the column is miscible with the mobile phase. Flush with propan-2-ol or ethanol where necessary.
	Fluctuations in pH.	Buffer the mobile phase so that retention of ionizable compounds is controlled.
Extra Peaks	Degraded sample.	Inject a fresh sample.
	Contaminated solvents.	Use freshly prepared solvents of HPLC grade. Gradient methods often show 'ghost-peaks'.
	Immiscible mobile phase.	Check that any solvent already in the column is miscible with the mobile phase. Flush with propan-2-ol or ethanol where necessary.
	Fluctuations in pH.	Buffer the mobile phase so that retention of ionizable compounds is controlled.
	Contaminated guard cartridge.	Replace the guard cartridge.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem , replace the column.
Varying Retention	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Temperature fluctuations.	Use a thermostatically controlled column oven.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Blocked solvent reservoir frits.	Ultrasonicate the reservoir frits in water and then methanol.
	Pump not mixing solvents properly.	Where being used, ensure that the proportioning valve is mixing the solvents correctly. If the method is isocratic, blend the solvents manually.
	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Different dwell volume.	For gradient methods, check that the dwell volume of any new system is not very different from any previous system. Apply a final hold time if necessary.
	Piston seals leaking.	Check for evidence of leaking or wear and replace where necessary.
	Air in solvent lines or pump.	Ensure that the reservoirs and solvent lines are fully primed and that the purge valve is fully closed.

For more information, please request Successful HPLC Operation – A Troubleshooting Guide, TG20094.

HPLC Definitions and Equations

Backpressure

The pressure required to pump the mobile phase through the column. It is related to mobile phase viscosity (η), flow rate (F), column length (L) and diameter (d_c), and particle size (d_p) by the following equation:

$$\text{Pressure Drop (psi)} = \frac{250\, L \eta F}{d_p^2 d_c^2}$$

L = column length (cm)
η = viscosity
F = flow rate (mL/min)
d_p = particle diameter (µm)
d_c = column internal diameter (cm)

Capacity Factor (k)

Expression that measures the degree of retention of an analyte relative to an unretained peak, where t_R is the retention time for the sample peak and t_0 is the retention time for an unretained peak. A measurement of capacity will help determine whether retention shifts are due to the column (capacity factor is changing with retention time changes) or the system (capacity factor remains constant with retention time changes).

$$k = \frac{t_R - t_0}{t_0}$$

Efficiency *(N)*

Also number of theoretical plates. A measure of peak band spreading determined by various methods, some of which are sensitive to peak asymmetry. The most common are shown here, with the ones most sensitive to peak shape shown first:

5-Sigma $N = 25(t_R/W)^2$
W = peak width at 4.4% peak height

4-Sigma or Tangential $N = 16(t_R/W)^2$
W = tangential peak width or 13.4% peak height

Half-Height $N = 5.54(t_R/W)^2$
W = peak width at 50% peak height

Elution Volume *(V_R)*

Refers to the volume of mobile phase required to elute a solute from the column at maximum concentration (apex).

$$V_R = F \cdot t_R$$

where F is flow rate in volume/time and t_R is the retention time for the peak of interest.

HETP

Height equivalent to a theoretical plate. A carryover from distillation theory: a measure of a column's efficiency. For a typical well-packed HPLC column with 5µm particles, HETP (or *H*) values are usually between 0.01 and 0.03mm.

$$\text{HETP} = L/N$$

where L is column length in millimeters and *N* is the number of theoretical plates.

Linear Velocity

The flow rate normalized by the column cross section. This effects column performance and is directly related to column pressure. Linear velocity is given by the following equation where L is column length and t_0 is the breakthrough time of an unretained peak:

$$\mu = \frac{L}{t_0}$$

Resolution *(R_s)*

The ability of a column to separate chromatographic peaks. Resolution can be improved by increasing column length, decreasing particle size, changing temperature, changing the eluent or stationary phase.

$$R_s = \frac{1}{4}\sqrt{N}\left(\frac{k}{1+k}\right)\left(\frac{\alpha - 1}{\alpha}\right)$$

It can also be expressed in terms of the separation of the apex of two peaks divided by the tangential width average of the peaks:

$$R_s = \frac{(t_2 - t_1)}{0.5(W_1 + W_2)}$$

Selectivity (α)

A thermodynamic factor that is a measure of relative retention of two substances, fixed by a certain stationary phase and mobile phase composition. Where k_1 and k_2 are the respective capacity factors.

$$\alpha = \frac{k_2}{k_1}$$

Tailing Factor (T)

A measure of the symmetry of a peak, given by the following equation where $W_{0.05}$ is the peak width at 5% height and f is the distance from peak front to apex point at 5% height. Ideally, peaks should be Gaussian in shape or totally symmetrical.

$$T = W_{0.05}/2f$$

van Deemter Equation

An equation used to explain band broadening in chromatography. The equation represents the height equivalent of a theoretical plate (H) and has three terms. The A term is used to describe eddy diffusion, which allows for the different paths a solute may follow when passing over particles of different sizes.

The B term is for the contribution caused by molecular diffusion or longitudinal diffusion of the solute while passing through the column. The C term is the contribution of mass transfer and allows for the finite rate of transfer of the solute between the stationary phase and mobile phase. u is the linear velocity of the mobile phase as it passes through the column.

$$H = A + \frac{B}{u} + Cu$$

Selecting the Right Buffer

A partial list of common buffers and their corresponding pH values is shown in the Common Buffer Systems table. Perhaps the most common HPLC buffer is some form of phosphoric acid. Remember that a true buffer should have the ability to resist pH change when a sample is introduced at a different pH, and that buffer capacity is only 100% at the pK value of the acid or base. At pH 4, phosphate is a poor buffer and would change rapidly toward one of its pK_a values if a more acidic or basic sample were introduced.

As a rule, one should work within ±1pH unit of the buffer pK_a value for good pH control of the mobile phase. Adequate buffer concentrations for HPLC tend to be in the 10-100 millimolar level depending on the size and nature of the sample, as well as the column packing material. Phases based on highly pure silica with robust bondings such as the Hypersil GOLD range, are often more compatible with dilute buffers than traditional packings.

When control at a lower pH (2-3) is desired, phosphate, or stronger organic acids such as TFA or acetic acid, are commonly used. If control at pH 4-5 is desired, an organic acid buffer such as acetate or citrate should be considered in place of phosphate.

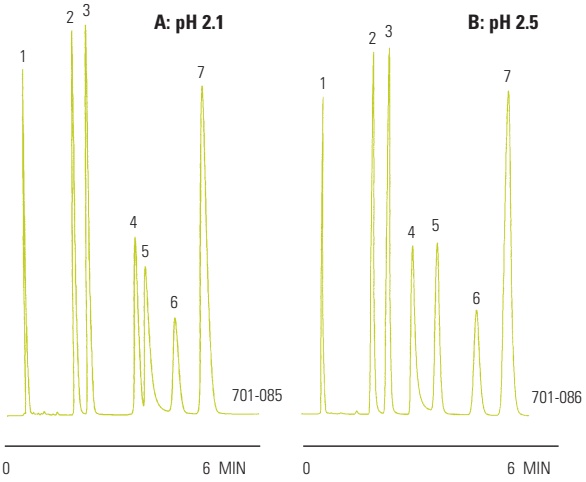
The figure to the right shows the importance of choosing the correct pH for a separation. Even slight changes in pH, either from measuring errors, mixing complications with the pump, or atmospheric water adsorption into the mobile phase, can alter any method if not properly buffered.

Care should be taken when choosing a buffer and organic modifier mixture to ensure that a solution of the two does not produce a solid salt which could cause blockages and system contamination.

Buffers should always be flushed from the analytical column and instrument after use to avoid salts being deposited on delicate frits etc.

Common Buffer Systems

Buffer		pK_a	Useful pH Range	MS-Compatible
TFA		0.30		Yes
Phosphate	pK_1	2.1	1.1 – 3.1	No
	pK_2	7.2	6.2 – 8.2	No
	pK_3	12.3	11.3 – 13.3	No
Citrate	pK_1	3.1	2.1 – 4.1	No
	pK_2	4.7	3.7 – 5.7	No
	pK_3	5.4	4.4 – 6.4	No
Formate		3.8	2.8 – 4.8	Yes
Acetate		4.8	3.8 – 5.8	Yes
Tris Base (Trizma, THAM)		8.3	7.3 – 9.3	Yes
Ammonia		9.2	8.2 – 10.2	Yes
Borate		9.2	8.2 – 10.2	No
Diethylamine		10.5	9.5 – 11.5	Yes
Carbonate	pK_1	6.4	5.4 – 7.4	Yes
	pK_2	10.3	9.3 – 11.3	Yes
Triethanolamine		7.80		Yes



BETASIL™ C18, 5µm, 50 x 4.6mm

Part Number:	70105-054630
Eluent:	50% ACN / 50% 25mM KH_2PO_4 at pH indicated
Flow Rate:	0.8mL/min
Detector:	UV @ 220nm
Sample:	1. Uracil 2. Tolmetin 3. Naproxin 4. Fenoprofen 5. Diflunisal 6. Indometacin 7. Ibruprofen

Effect of small changes in pH on the separation of mildly ionizable compounds

Buffer Selection for LC/MS

Buffer choice will be very dependent on the analyte and the instrumentation used. Ideally, LC/MS applications should use a volatile buffer as this will not form a contaminating deposit on the source. Inorganic acids, involatile buffers and ion-pair reagents should all be avoided. Typical LC/MS buffers include:

- Ammonium acetate/formate/hydrogen carbonate (< 50mM)
- Formic/acetic acid (0.01 – 1% v/v)
- Trifluoroacetic acid (< 0.1% v/v)
- Trialkylamine (< 0.1% v/v) and aqueous ammonia type bases
- TRIS
- BIS-TRIS propane

Note: There are LC/MS instruments available, for example the Thermo Scientific Surveyor MSQ LC/MS, which incorporate a self-cleaning mechanism to reduce the build up of inorganic buffers on the source during routine use. Care should still be taken not to purposefully over-contaminate the instrument source as this will lead to operating difficulties.

Preparation of Mobile Phases

Correct solvent preparation is very important. It can save vast amounts of time spent troubleshooting spurious peaks, baseline noise etc.

Quality

All reagents and solvents should be of the highest quality. HPLC grade reagents may cost slightly more than lower grade reagents, but the difference in purity is marked. HPLC grade reagents contain no impurities to produce spurious peaks in a chromatogram baseline whereas lower grade reagents do contain trace levels of impurities, which may produce spurious baseline peaks.

Ensure that any water used in buffer preparation is of the highest purity. Deionized water often contains trace levels of organic compounds and therefore is not recommended for HPLC use. Ultra pure HPLC water (18mΩ resistivity) is generated by passing deionized water through an ion exchange bed. Modern water purification instruments use this mechanism to produce water of suitable quality in high volumes. Preferably, HPLC grade water can be purchased from solvent suppliers.

Important: Do not store HPLC grade water in plastic containers. Additives in the plastic may leach into the water and contaminate it. Always store HPLC grade water in glass containers.

Buffers

All buffers should be prepared freshly on the day required. This practice ensures that the buffer pH is unaffected by prolonged storage and that there is no microbial growth present. Changes in pH and microbial growth will affect chromatography.

If buffer solutions are stored, be aware that they have a finite lifetime. Refer to pharmacopoeia monographs or similar for further guidance on buffer shelf life.

Buffer reagents can contain a stabilizing agent, for example, sodium metabisulphite. These stabilizing agents often affect the optical and chromatographic behavior of buffer solutions, so it is often worth buying reagents that contain no stabilizer. Containers of solid reagent are easily contaminated by repeated use. For this reason, we recommend that reagents be purchased in low container weights.

Filtration

Ideally, all HPLC solvents should be filtered through a 0.45µm filter before use This removes any particulate matter that may cause blockages. After filtration, the solvents should be stored in a covered reservoir to prevent re-contamination with dust etc.

Filtering HPLC solvents will benefit both your chromatography and the wear and tear of the HPLC system. Pump plungers, seals and check valves will perform better and lifetimes will be maximized.

Degassing

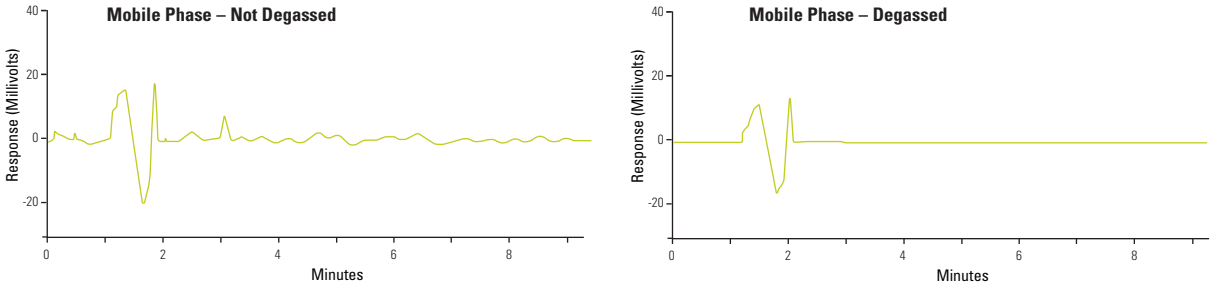
Before the freshly prepared mobile phase is pumped around the HPLC system, it should be thoroughly degassed to remove all dissolved gasses. Dissolved gas can be removed from solution by:

- Bubbling with helium
- Sonication
- Vacuum filtration

If the mobile phase is not degassed, air bubbles can form in the low pressure of the detector cell resulting in problems with system instability, spurious baseline peaks etc.

The most efficient form of degassing is bubbling with helium or another low solubility gas. If this method is available, we recommend that the mobile phase is continually degassed at very low levels throughout the analysis. This will inhibit the re-adsorption of gases over the analysis time.

Note: Ensure that the solvent reservoir has a vent to the atmosphere to prevent the build up of pressure inside the reservoir.



Baseline noise from gas in mobile phase

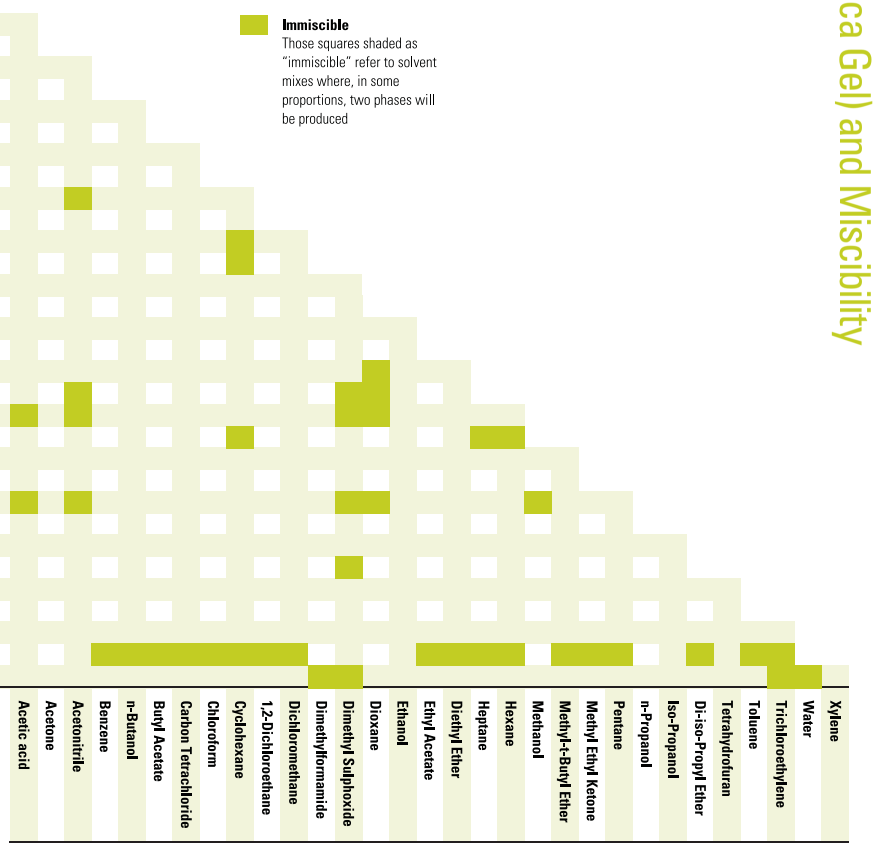
Solvent Properties and Miscibility

Solvent Strength	Polarity Index	UV Cutoff (nm)	Refractive index	Viscosity (cP, 20°C)	Boiling point (°C)	Water solubility (W/W%)	Solvent
0.01	0.1	215	1.391	0.50	99	0.0002	**Isooctane**
0.04	0.0	200	1.410	0.92	174	0.01	**n-Decane**
0.05	0.1	200	1.407	0.44	49	0.01	**Cyclopentane**
0.1	1.0	220	1.402	0.45	78	0.11	**1-Chlorobutane**
0.21	2.1	220	1.397	0.64	142	0.19	**n-Butyl Ether**
0.28	2.4	220	1.368	0.37	68	0.62	**Isopropyl Ether**
0.42	3.1	233	1.424	0.44	40	1.6	**Methylene Chloride**
0.43	4.2	334	1.396	0.51	117	-	**Methyl Butyl Ketone**
0.47	4.7	320	1.451	2.00	156	-	**Cyclohexanone**
0.55	5.5	210	1.402	1.72	125	Miscible	**Methoxyethanol**
0.6	4.5	260	1.362	0.37	57	-	**Methyl Acetate**
0.64	6.0	380	1.344	0.67	101	2.1	**Nitromethane**
0.65	6.5	268	1.438	0.84	166	Miscible	**N,N'-Dimethylacetamide**
0.69	6.0	265	1.447	1.65	182	-	**N-Methylformamide**
1.11	6.9	210	1.432	19.9	198	Miscible	**Ethylene Glycol**
2	6.0	260	1.372	1.26	118	Miscible	**Acetic acid**
0.56	5.1	330	1.359	0.36	56	Miscible	**Acetone**
0.65	5.8	190	1.344	0.38	82	Miscible	**Acetonitrile**
-	2.7	238	1.501	0.65	80	0.18	**Benzene**
0.39	3.9	215	1.399	2.98	117	7.8	**n-Butanol**
-	4.0	254	1.394	0.73	126	0.43	**Butyl Acetate**
-	1.6	263	1.460	0.97	77	0.08	**Carbon Tetrachloride**
0.4	4.1	245	1.446	0.57	61	0.815	**Chloroform**
0.04	0.2	200	1.427	1.00	81	0.01	**Cyclohexane**
-	3.5	228	1.445	0.79	83	0.81	**1,2-Dichloroethane**
-	3.1	233	1.424	0.44	40	1.3	**Dichloromethane**
0.64	6.4	268	1.431	0.92	153	Miscible	**N-N' Dimethylformamide**
0.62	7.2	268	1.478	2.24	189	Miscible	**Dimethyl Sulphoxide**
0.56	4.8	215	1.422	1.37	101	Miscible	**Dioxane**
0.88	4.3	210	1.361	1.20	79	Miscible	**Ethanol**
0.58	4.4	256	1.372	0.45	77	8.7	**Ethyl Acetate**
-	2.8	218	1.352	0.23	35	6.89	**Diethyl Ether**
0.01	0.1	200	1.388	0.40	98	0.0004	**n-Heptane**
0.01	0.1	200	1.375	0.31	69	0.0012	**n-Hexane**
0.95	5.1	205	1.329	0.55	65	Miscible	**Methanol**
0.35	2.5	210	1.369	0.27	55	4.8	**Methyl-t-Butyl Ether**
0.51	4.7	329	1.379	0.43	80	24	**Methyl Ethyl Ketone**
-	0.0	190	1.358	0.23	36	0.004	**Pentane**
0.82	4.0	210	1.385	2.30	97	Miscible	**n-Propanol**
0.82	3.9	205	1.378	2.40	82	Miscible	**Iso-Propanol**
-	2.2	220	1.368	0.37	68	-	**Di-iso-Propyl Ether**
0.45	4.0	212	1.407	0.55	66	Miscible	**Tetrahydrofuran**
0.29	2.4	284	1.496	0.59	111	0.05	**Toluene**
-	1.0	273	1.477	0.57	87	0.11	**Trichloroethylene**
2	10.2	190	1.000	1.00	100	-	**Water**
0.26	2.5	288	1.506	0.81	144	0.018	**o-Xylene**

Solvent Properties (vs Silica Gel) and Miscibility

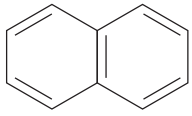
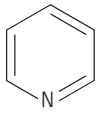
Data Sourced from: CRC Handbook of Chemistry and Physics - 73rd Edition
The Merck Index - 12th Edition
High Purity Solvent Guide, Burdick & Jackson Laboratories, Inc.
The HPLC Solvent Guide, 2nd Edition, Paul C Sadek
HPLC Columns, Theory, Technology & Practice, Uwe D Neue
Fisher Solvent Table

Immiscible
Those squares shaded as "immiscible" refer to solvent mixes where, in some proportions, two phases will be produced



Chromophore Detection Wavelengths

Chromophores are light absorbing groups. Their behavior is used to allow the detection of analytes. They have one or more detection wavelengths, each of which has a molar adsorbtivity associated with it. The information contained in the following table is intended as a guide to common chromophores. It is not an exhaustive list.

Chromophore		λmax (nm)	εmax (L/m/cm)
Acetylide	-C==C-	175 – 180	6,000
Aldehyde	-CHO	210	Strong
		280 – 300	11 – 18
Amine	$-NH_2$	195	2,800
Azidin	> C=N-	190	5,000
Azo	-N=N-	285 – 400	3 – 25
Benzene		184	46,700
		202	6,900
		255	170
Carboxyl	-COOH	200 – 210	50 – 70
Ester	-COOR	205	50
Ether	-O-	185	1,000
Ethylene	-C=C-	190	8,000
Ketone	> C=O	195	1,000
		270 – 285	18 – 30
Napthalene		220	112,000
		275	175
		312	5,600
Nitrate	$-ONO_2$	270	12
	$-(C=C)-_2$ acyclic	210 – 230	21,000
	$-(C=C)_3$	260	35,000
	C=C-C=C	219	6,500
	C=C-C=N	220	23,000
	C=C-C=O	210 – 250	10,000 – 20,000
	$C=C-NO_2$	300 – 350	Weak
Nitrile	-C==N	160	–
	-ONO	220 – 230	1,000 – 2,000
		300 – 400	10
Nitro	$-NO_2$	210	Strong
Nitroso	-N=O	302	100
Oxime	-NOH	190	5,000
Pyridine		174	80,000
		195	6,000
		251	1,700
Sulfone	$-SO_2-$	180	Very strong
Sulfoxide	> S-O	210	1,500
Thioether	-S-	194	4,600
	215	1,600	
Thiol	-SH	195	1,400

Column Cleaning and Regeneration

Testing of column performance can be undertaken using the experimental conditions in the test certificate provided with the column. The column efficiency, capacity factor, etc. should be measured at the start and end of the clean-up procedure to ensure that it has been performed successfully and has improved the column performance.

In all instances, the volume of solvent used is 40 – 60 column volumes unless otherwise stated. Ensure that no buffers or samples are present on the column and that the solvent used prior to the clean up is miscible with the first wash solvent. After the clean up, ensure that the test mobile phase is miscible with the last solvent in the column.

Normal Phase Media

1. Flush with tetrahydrofuran
2. Flush with methanol
3. Flush with tetrahydrofuran
4. Flush with methylene chloride
5. Flush with benzene-free n-hexane

Reversed Phase Media

1. Flush with HPLC grade water; inject 4 aliquots of 200µL DMSO during this flush
2. Flush with methanol
3. Flush with chloroform
4. Flush with methanol

Anion Exchange Media

1. Flush with HPLC grade water
2. Flush with gradient of 50mM to 1M appropriate buffer solution
3. Flush with HPLC grade water
4. Flush with methanol
5. Flush with chloroform

Cation Exchange Media

1. Flush with HPLC grade water; inject 4 aliquots of 200µL DMSO during this flush
2. Flush with tetrahydrofuran

Protein Size Exclusion Media

There are two wash/regeneration procedures associated with the removal of contaminants from protein size exclusion media.

Weakly Retained Proteins

1. Flush with 30mL 0.1M pH 3.0 phosphate buffer

Strongly Retained Proteins

1. Flush for 60 minutes using a 100% water to 100% acetonitrile gradient

Porous Graphitic Carbon

There are four wash or regeneration procedures associated with porous graphitic carbon. The one(s) used will depend on the analytes and solvents that have been used with the column

Acid/Base Regeneration

Suitable for ionized species analyzed in strongly aqueous mobile phases.

1. Invert the column
2. Flush with 50mL tetrahydrofuran:water (1:1) containing 0.1% trifluoroacetic acid
3. Flush with 50mL tetrahydrofuran:water (1:1) containing 0.1% triethylamine or sodium hydroxide
4. Flush with 50mL tetrahydrofuran:water (1:1) containing 0.1% trifluoroacetic acid
5. Flush column with 70 column volumes of THF
6. Flush with methanol/water (95:5) to re-equilibrate
7. Re-invert the column

Author: R. Plumb – Glaxo, UK

Strong Organic Regeneration

Suitable for applications involving polar and/ or ionized species analyzed in aqueous mobile phases.

1. Flush with 50mL acetone
2. Flush with 120mL dibutylether
3. Flush with 50mL acetone
4. Flush with aqueous mobile phase until equilibrated

Normal Phase Regeneration

Suitable for applications running predominantly in normal phase mobile phases.

1. Flush with 50mL dichloromethane
2. Flush with 50mL methanol
3. Flush with 50mL water
4. Flush with 50mL 0.1M hydrochloric acid
5. Flush with 50mL water
6. Flush with 50mL methanol
7. Flush with 50mL dichloromethane
8. Flush with mobile phase until equilibrated

Author: A. Karlsson – Uppsala, Sweden

Removal of TFA and DEA

TFA and DEA have the potential to adsorb to the surface of porous graphitic carbon; after using these additives in the mobile phase, regeneration of the column should be undertaken to ensure the original Hypercarb selectivity and optimum performance will always be achieved. The regeneration is as follows:

1. Removal of TFA: Flush column with 70 column volumes of THF.
2. Removal of DEA: Set column oven to 75°C and flush column with 120 column volumes of ACN.

Polymeric Media with Metallic Counter Ions

There are three types of regeneration available for polymeric columns with metal counter ion. Details of each procedure are listed in the following table.

Column Type	Metal Contamination	Organic Contamination	Column Cleaning
Hydrogen Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M H_2SO_4 @ 25°C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: H_2O @ 25°C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: 0.01M H_2SO_4 @ 65°C for 4 hr
Calcium Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M $Ca(NO_3)_2$ @ pH 6.3 and 85°C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25°C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25°C for 4 hr
Sodium Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M $NaNO_3$ @ 85°C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25°C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25°C for 4 hr
Lead Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M $Pb(NO_3)_2$ @ pH 5.3 and 85°C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: H_2O @ 25°C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: H_2O @ 25°C for 4 hr