



Higgins  
Analytical

TARGA C18-5µm  
250 x 0.075mm  
PIN:TC-2507-C185  
S/N 166435



2019

Higgins Analytical is a quality oriented company, dedicated to providing high performance products, expert support, and rapid delivery to research and quality control laboratories worldwide.

Higgins Analytical on kromatografiakolonneja valmistava yritys, joka tarjoaa laadukkaita tuotteita, asiantuntevaa palvelua ja nopeat toimitukset tutkimus- ja laadunvalvontalaboratoriolle maailmanlaajuisesti.

हिगिन्स विश्लेषणशाला एक गुणप्रधान कम्पनी है जो समस्त विश्व की शोधन एवं गुण-निर्माण प्रयोगशालाओं को क्रियात्मक उत्पादन, विशेषज्ञ-सहायता तथा द्रुत निगमन को विश्वस्त सेवामें प्रदान करती है।

היגינס אנליטיקל הינה חברה שדוגלת באיכות, מחויבת למוצרים בעלי ביצועים גבוהים, תמיכה מעולה ואספקה מהירה למעבדות מחקר ובקרת איכות, בעולם כולו.

La Higgins Analytical é una società orientata verso l'alta qualità, dedicata a fornire ai laboratori di ricerca e controllo qualità nel mondo prodotti ad alto livello, supporto di esperti e rapide consegne.

希度分析儀器公司是一個高品質走向的公司，致力於生產高效能產品、提供專業技術服務、並且交貨迅速、以供應全球的品管和研究機構。

Higgins Analytical est une société ayant pour objectif la qualité et de proposer des produits performants, un support expert, des livraisons rapides pour les laboratoires de recherches et de contrôle qualité à travers le monde.

Higgins Analytical 은 세계각국의 품질관리 연구소에 고품질 제품의 제공과 전문가 지원 그리고 빠른 전송에 공헌해온 품질지향적 회사입니다.

I Higgins Analytical iyinkampani engusaziwayo kwezobuchwepheshe. Izinikele ekuthini ikhiqize umkhiqizo oseqophelweni eliphezulu. Izebenzisa uxhaso oluphambili ukukhipha imiphumela ecutshungwe kahle nangokushesha kanye nezindawo zokucubungula eziseqophelweni eliphezulu emhlabeni jikelele.

Higgins Analytical es una compañía dedicada a proveer productos de óptima calidad, excelente rendimiento, experto soporte técnico y entrega inmediata a los laboratorios de investigación y de control de calidad del mundo entero.

هيجينا اناليتكال مفرقة تعنيها الجودة في المقام الأول و هدفها تقديم منتجات التحليل الكروماتوجرافي عال الأداء وضمان توفير الدعم الفني و سرعة تقديم الخدمة الى معامل الأبحاث ورقابة الجودة في أنحاء العالم.

Higgins Analytical ist eine Qualitäts orientierte Firma, welche sich der Lieferung von leistungsfähigen Produkten widmet, Kundenunterstützung durch Experten, sowie rasche Lieferung an Forschungs und Qualitätskontrollenrichtungen ist weltweit unser Ziel.

Higgins Analytical er fyrirtæki sem leggur áherslu á gæði, býður hágæða vöru og sérfræðipjónustu með stuttum afgreiðslufresti, fyrir fyrirtæki á sviði rannsóknna og matvælaeftirlits.

Higgins Analytical ایک معیاری کمپنی ہے جو کہ اعلیٰ مصنوعات، ماہرانہ صدد اور تیز ڈیوری بین العوامی کوالٹی کنٹرول اور تحقیق لیباریٹری کو فراہم کرتی ہے۔

Higgins Analytical は質の高い仕事をめざす会社です。

お客様の満足を求めて、高品質製品の提供、専門家によるサポート、また各国の研究室や品質管理ラボへの迅速なデリバリーに専心しています。













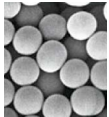





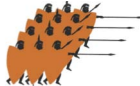








Higgins Analytical, hedefi yüksek performanslı ürünler sağlamak olan, dünya genelinde araştırma ve kalite kontrol laboratuvarlarına expert destek veren ve hızlı dağıtım yapan kalite odaklı bir şirkettir.

Higgins Analities is 'n kwaliteits-georiënteerde maatskappy wat toegewyd is om produkte van hoogstaande gehalte, kundige ondersteuning en snelle lewering van produkte vir navorsings-en gehalte-beheer laboratoria wereldwyd te voorsien.

Представленная во всем мире компания Джереми Хиггинса, посвящает свою работу представлению высококачественной продукции, консультацию и поддержку опытными специалистами, и быстрой доставке всех требуемых материалов для исследовательских лабораторий и лабораторий занимающихся вопросами качественного контроля.

Công ty Higgins Analytical chú trọng đến chất lượng, chuyên cung ứng các sản phẩm đem lại hiệu quả cao. Là chuyên gia trong ngành hóa phân tích, công ty luôn bảo đảm việc cố vấn, bảo hành sản phẩm chu đáo và giao hàng nhanh chóng đến các phòng thí nghiệm kiểm định chất lượng cùng các phòng thí nghiệm nghiên cứu ở mọi nơi trên toàn thế giới.

CONTENTS

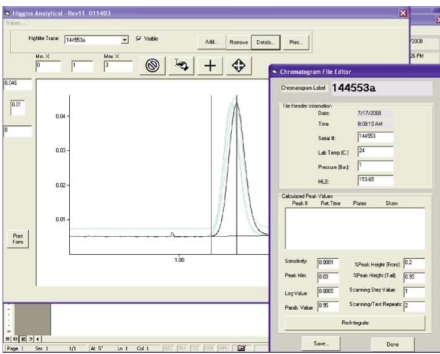
	HIGGINS ANALYTICAL	2 - 3		MICROBORE COLUMNS	30 - 35
	CLIPEUS™	4 - 5		SEMI-PREP Columns and PREP Columns	36 - 39
	HAISIL 100™	6 - 7		<b>Capillary™</b> 75µm and 150µm Columns	40 - 41
	HAISIL 300™	8 - 9		Capellini™ 6-32 Capellini™ 10-32	42 - 49
	HAISIL HL™	10 - 11		SPRITE™	50 - 51
	HAISIL PTH™ Columns for Protein Sequencing	12		PICCOLO™	52 - 53
	Some Interesting Facts	13		s.s. Analytical Cartridges	54 - 57
	PROTO™ 200	14 - 15		PEEK/Titanium Cartridges	58 - 59
	PROTO™ 300	16 - 17		10mm Cartridge Columns	60 - 61
	PHALANX™	18 - 19		Analytical Guard Cartridges	62 - 63
	TARGA®	20 - 21		Prep Guard Cartridges	64 - 65
	Specialty Columns and Services	22		Cartridge Holders	66 - 67
	Part Number Guide XX-■XX-XXX XX-XX■-XXXX XX-XXXX-■XX	23		<b>HAIFILTER</b> Parts and Accessories	68 - 69
	HPLC COLUMNS	24 - 29		Ordering, Warranty, Trademarks	70 - 71

**Experience, Expertise, Continuity**

Higgins Analytical was founded in early 1994, but that is less than half of the story. The two founders had already been packing commercial HPLC columns for more than fifteen years before that. Besides a lot of expertise, our experience brings an unrivaled continuity to the field.

**Total Quality Approach to all Aspects of Design, Manufacturing and Testing**

Each HPLC column and analytical cartridge from Higgins Analytical is evaluated by a computerized performance test prior to receiving a quality



control approval. This testing protocol involves a highly accurate statistical moments determination of the column's performance characteristics. These sensitive peak shape and column efficiency measurements can only be made by computerized data logging methods. The raw digital chromatogram for every column we have manufactured since March 1994 is retrievable from our archives.

**Product Traceability**

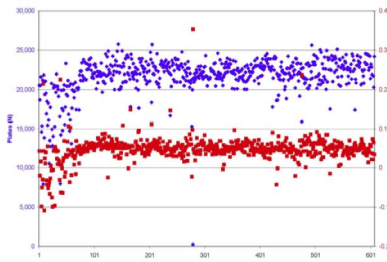
The test data for these serialized columns include sorbent properties and lot number as well as complete description of the test conditions. We are able to trace the serial number of every



column to the customer that originally purchased the column.

**Comprehensive Record Keeping and Statistical Quality Control**

Raw digital test data is automatically archived for every column and analytical cartridge we manufacture. As a result, it is a simple matter for us to retrieve comprehensive quality control information and routinely apply it to our statistical process control activities. This



commitment to quality manufacturing and comprehensive record keeping permits us to produce replacement Certificates of Analysis when requested by laboratories complying with their internal GLP needs. And, most

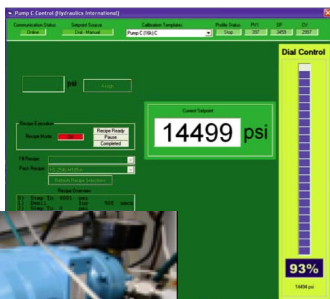
importantly, we are able to assist customers during the lengthy process beginning with method development and optimization to validation and NDA filing by providing comprehensive serial number, manufacturing date, sorbent lot, and performance data for every column they ever purchased.

**Expert Manufacturing and State-of-the-Art Equipment**

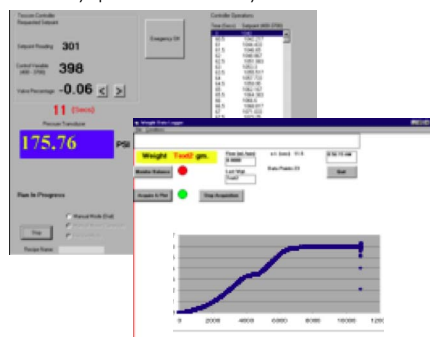
Two of Higgins Analytical's staff have been involved with the chemical separations business for over 30 years, others for only 10 or 15. By focusing this expertise exclusively on the separations consumables business, high quality products as well as high quality processes are assured. A key element of this expertise is the electronic manufacturing

lab book that we have developed. All of our column packing equipment is controlled by this electronic book, and all methods are electronically stored. It is impossible to pack a column without the electronic lab book being completely documented. Processes cannot be

changed without an expert supervisor's intervention. When new processes for new products are developed or optimization is required for an existing method, a complete audit trail is created for every condition change that is made. The packing pumps operate with PID (proportional integral/derivative) controllers allowing for control flow rate,



rather than pressure, throughout the packing process. This is a very important point. Common folklore is that it takes high pressure to pack an HPLC column. Actually, pressure is only the result of a



complex two phase (liquid/solid) flow. This flow, not pressure, is what produces a packed bed. The "pressures" used by many column manufacturers are the result of flow rates that approach the velocities that will produce a "fluidized bed" during certain phases of the packing process, not exactly a condition that will produce a stable, optimally packed column. In addition to being able to control our equipment digitally, we are able to data log the actual conditions as well.

Our unique and highly automated column packing process is based on a closed, continuous flow system employing recoverable, unreactive, and safe fluids. And the best part about it is that it enables Higgins Analytical to manufacture a wide variety of HPLC columns with unrivaled efficiency.

### Quality and Environmental Aspects of Process Solvents

Proper composition of slurry and packing solvents is vital to the whole process. Our solvent purification equipment and procedures allow us to address all of the solvent requirements for production and quality control. Not only does this investment permit us to use the highest purity solvents available, it also eliminates much of the expensive and environment-polluting solvent disposal practice characteristically found in today's chemical industry.

### Unique Bonded Phase Synthesis

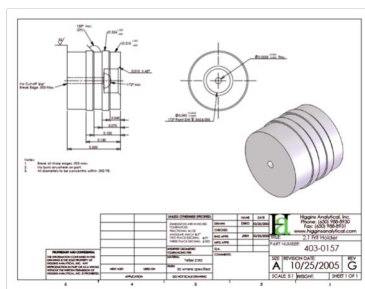
Chemists at Higgins Analytical have been producing bonded phases since 1979. During this long experience, we have pioneered many technologies long before they were "discovered" by others with a bigger marketing clout. Higgins Analytical's introduction of a "No



Requirement for TFA" HPLC column in early 1997 is just one example of our vanguard approach to this field.

### Computer Aided Drawings and Numerical Control Machinery

Key to reinforcing our ability to provide the highest performance-to-price ratio products available in the separations consumables industry has been our investment in computer aided design (CAD) technology and computer numerically controlled (CNC) machinery. SolidWorks™ software is used by our engineers which permits us to design HPLC hardware and see it in its

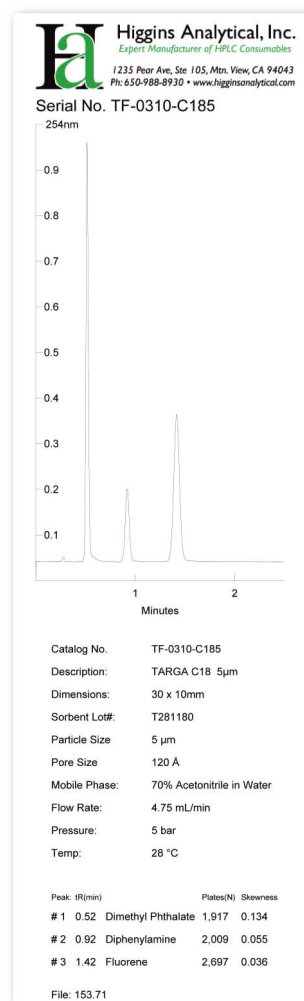


assembled 3D form before we manufacture it. Dedicated tooling and secure backups of machine code assure fast setups and consistent high quality production of all the stainless steel and plastic components in each product line.

Our product development, manufacturing, and testing processes strictly follow a systematic and well documented cycle.

*A Certificate of Analysis, like the one below for a 3cm x 10mm cartridge, accompanies each HPLC Column and Cartridge we manufacture*

*Note: This high performance cartridge is typically used as a guard column.*



## CLIQUEUS A "Small Shield" for a Big Job



Phases	Silica, C8, C18, Cyano, Phenyl
Particle Sizes	4.5 and 10µm
Pore Size	120Å
Pore Volume	0.8mL/gm
Surface Area	330m <sup>2</sup> /gm
Carbon%(w/w)	C18 = 18%
Phase type	Extremely well end-capped monofunctional phases
Silica Class	Type B
USP Class	L3 (CLIQUEUS Silica) L7 (CLIQUEUS C8) L1 (CLIQUEUS C18) L10 (CLIQUEUS Cyano) L11 (CLIQUEUS Phenyl)

### Guide to CLIQUEUS Part Numbers

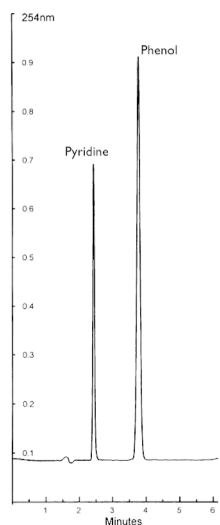
Cx-xxxx-SIL5	CLIQUEUS Silica 5µm
Cx-xxxx-C085	CLIQUEUS C8 5µm
Cx-xxxx-C185	CLIQUEUS C18 5µm
Cx-xxxx-CNP5	CLIQUEUS Cyano 5µm
Cx-xxxx-PHN5	CLIQUEUS Phenyl 5µm

See Page 23 for complete Part Number information

### Applications

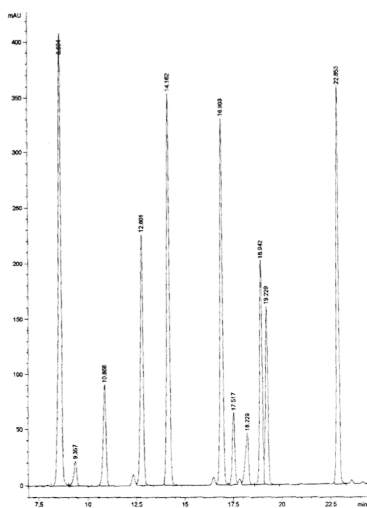
The high purity base silica and thoroughly end capped bonded phases insure that CLIQUEUS columns and cartridges will perform well in demanding situations where many other column brands fail. Even polar compounds elute as sharp and symmetrical peaks permitting surprisingly short columns to be used for high speed analysis. In addition to Silica, C8 and C18 phases, CLIQUEUS columns are available with phenyl or cyano functionality.

This unbuffered Pyridine and Phenol chromatogram illustrates the absence of any undesirable solute/silanol interaction on a CLIQUEUS C18 HPLC Column.



CLIQUEUS C18 5µm 150x4.6mm

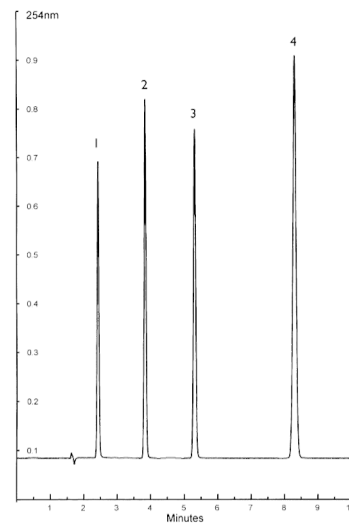
40% MeOH/water (unbuffered)  
1 mL/min, 25°C, 254nm  
P/N CS-1546-C185



Carbamates and Urea Pesticides  
EPA 632A

Industrial and Municipal Waste Water  
Column P/N CS-2546-C185

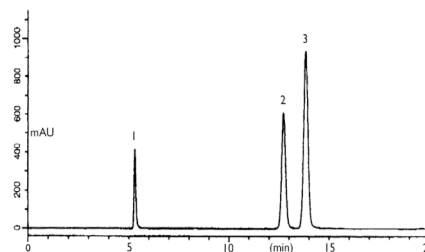
- |                 |                |
|-----------------|----------------|
| 1. Monuron      | 2. Propoxur    |
| 3. Carbaryl     | 4. Propham     |
| 5. Diuron       | 6. Linuron     |
| 7. Methiocarb   | 8. Mexacarbate |
| 9. Chlorpropham |                |
| 10. Barban      | 11. Neburon    |



Methylxanthines

CLIQUEUS C18 150x4.6mm  
P/N CS-1546-C185  
25% MeOH/water (unbuffered)  
1 mL/min, 30°C, 254nm

- |                |                 |
|----------------|-----------------|
| 1. Theobromine | 2. Theophylline |
| 3. Caffeine    | 4. Phenol       |



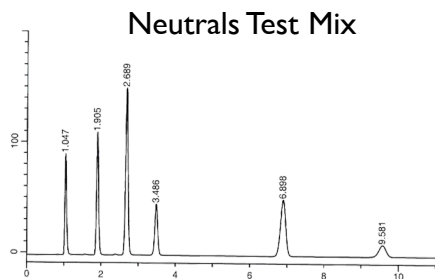
Sunscreen Formulation

CLIQUEUS C18 250x4.6mm  
P/N CS-2546-C185  
87.5% MeOH/ 12.5% water (unbuffered)  
1 mL/min, 30°C, 285nm

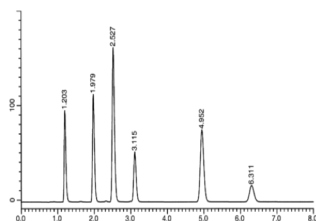
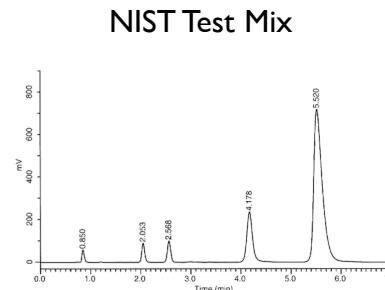
- |                           |               |
|---------------------------|---------------|
| 1. Oxybenzone             | 2. Padimate O |
| 3. Octyl Methoxycinnamate |               |



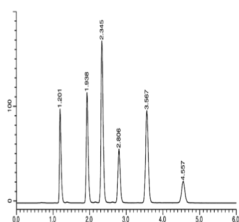
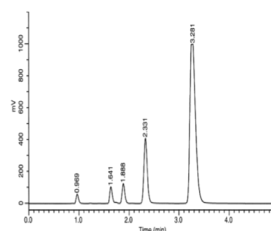
Comparative Selectivity of CLIEPUS HPLC Columns



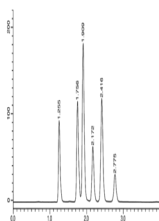
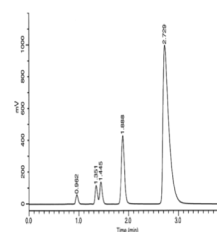
CLIEPUS C18 150x4.6mm P/N CS-1546-C185



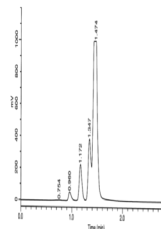
CLIEPUS C8 150x4.6mm P/N CS-1546-C085



CLIEPUS Phenyl 150x4.6mm P/N CS-1546-PHN5



CLIEPUS Cyano 150x4.6mm P/N CS-1546-CNP5



50% MeCN/water, 1.5mL/min, 205nm

1. Thiourea
2. Phenol
3. Acetophenone
4. Nitrobenzene
5. Toluene
6. Napthalene

80% MeOH/Buffer, 1.5mL/min, 254nm  
Buffer: 20mM potassium phosphate

1. Uracil
2. Toluene
3. Ethylbenzene
4. Quinizarin
5. Amitriptyline





## HAISIL 100 The Workhorse

Phases	Silica, C8, and C18
Particle Sizes	3 $\mu$ m and 5 $\mu$ m
Pore Size	100Å
Pore Volume	0.5mL/gm
Surface Area	190m <sup>2</sup> /gm
Carbon%(w/w)	C8 = 7%(w/w), C18 = 12%(w/w)
Phase type	Monofunctional & fully endcapped
Silica Class	Type A
USP Class	L3 (HAISIL Silica) L7 (HAISIL 100 C8) L1 (HAISIL 100 C18)

### Guide to HAISIL 100 Part Numbers

Hx-xxxx-SIL3 HAISIL 100 Silica 3 $\mu$ m

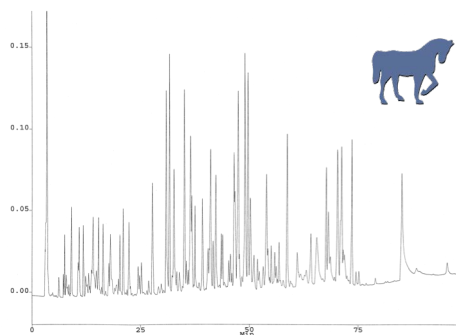
Hx-xxxx-M183 HAISIL 100 C18 3 $\mu$ m

Hx-xxxx-SIL5 HAISIL 100 Silica 5 $\mu$ m

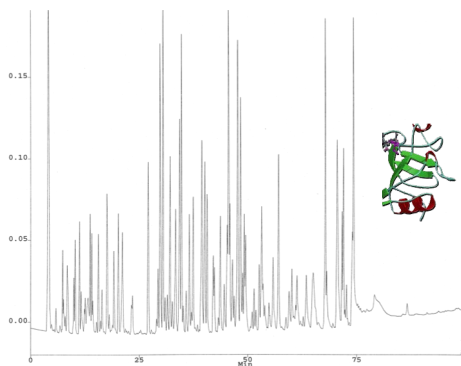
Hx-xxxx-M085 HAISIL 100 C8 5 $\mu$ m

Hx-xxxx-M185 HAISIL 100 C18 5 $\mu$ m

See Page 23 for complete Part Number information



Tryptic Map of Transferrin on HAISIL 100  
250x4.6mm P/N HS-2546-M185



Tryptic Map of Transferrin on HAISIL 300  
250x2.1mm P/N HS-2521-W185

### Applications

HAISIL 100 columns and cartridges are very good general purpose columns that are particularly well suited for small molecules and peptide applications. The HAISIL 100 column and cartridge efficiencies are unrivaled yet they represent one of the most economical product lines in the market today. In formats ranging from 0.075 to 20mm ID and from 10 to 250mm in length,

### 100Å vs. 300Å Columns for Peptide Mapping

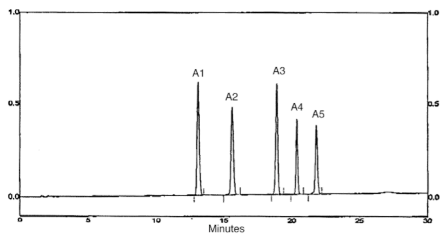
The question of whether to use a 100Å or 300Å column for mapping usually divides peptide chromatographers into two groups. Rather than take sides, we have chosen to offer very efficient columns with both pore diameters to suit both camp's preferences. HAISIL 100 and HAISIL 300 columns are available in 10 to 250mm lengths and 0.075mm to 20mm internal diameters.





**Hormone Analogs**

LH-RH (Luteinizing Hormone - Releasing Hormone) Analogs are used for the inhibition of gonadal steroid production. An important application area is in the treatment of prostate cancer.

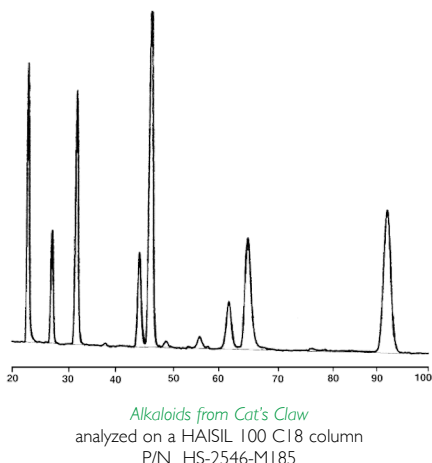


Conditions  
 HAISIL 100 C18 5µm 150x4.6mm  
 Solvent A: Phosphoric acid, ammonium sulfate aqueous buffer  
 Solvent B: Acetonitrile.  
 Linear gradient at 1mL/min  
 254nm detection

- Analogs:  
 A1: pGlu-His-Trp-Ser-Tyr-(d-Ser(but))-Leu-Arg-Pro-NHEt  
 A2: pGlu-His-Trp-Ser-Tyr-d-Ala-Leu-Arg-Pro-NHEt  
 A3: pGlu-His-Trp-Ser-Tyr-d-Leu-Leu-Arg-Pro-NHEt  
 A4: pGlu-His-Trp-Ser-Tyr-d-Ala-Trp-Leu-Pro-NHEt  
 A5: pGlu-His-Trp-Ser-Tyr-d-Trp-Leu-Arg-Pro-NHEt

**Alkaloids**

A Peruvian vine named "Una de Gato" (Uncaria tomentosa) and commonly referred to as Cat's Claw, has become a popular natural product source for herbal remedies. Enthusiasts claim the oxindole alkaloid extracts to be effective in the treatment of a wide range of digestive and circulatory diseases as well as other afflictions ranging from cancer to arthritis. Reputable providers of such phytochemical containing formulations carefully assay the alkaloid content of the extracts and formulations. The chromatogram above illustrates baseline resolution of Cat's Claw bark extracts containing isopteropodine, pteropodine, mitraphylline, isomitraphylline, ryncophylline and isorynchophylline.

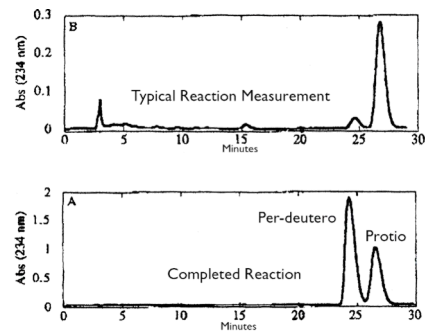


**Kinetic Measurements in Disease Research**

Researchers at the University of California, Santa Cruz have recently published a novel HPLC method that yields baseline separation of per-deuterated and protonated lipoxygenases.

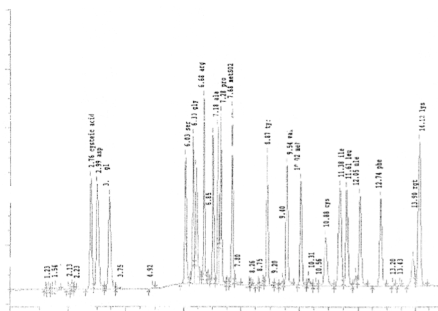
The striking ability of a 250x4.6mm HAISIL 100 C18 column to resolve these two very similar compounds is enabling researchers to study large competitive kinetic isotope effects in Human 15-lipoxygenase catalysis. Proton/per-deutero ratio data obtained by this HPLC method agreed within experimental error of data obtained by ES-MS.

The elucidation of these mechanisms is noteworthy because of the increasing role human lipoxygenases are playing in inflammatory diseases and cancer growth regulation.



Enzymatic Reaction Mixtures of Human 15-lipoxygenase

HAISIL 100 C18 250x4.6mm  
 74.9% MeOH, 25% water, 0.1%HoAc  
 1mL/min, 234nm  
 P/N HS-2546-M185

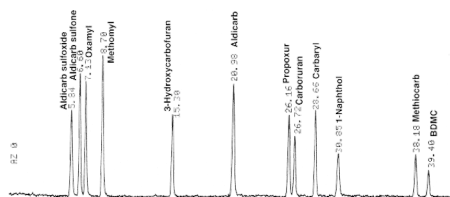


Economical Alternative for PICOTAG Analysis

Our HAISIL 100 C18 columns have demonstrated superior resolution and life time for PICOTAG™ amino acid analysis when compared to considerably more expensive columns from other manufacturers. Besides good linearity and column lifetime, the 150x4.6mm column yields very efficient amino acid analysis as shown in the chromatogram above (P/N HS-1546-M185).

**HAISIL 100 - the Separations Work Horse**

The 100Å pore size, monomeric bonded phase, and very high performance make HAISIL 100 an ideal choice for separations ranging from small molecules such as carbamate pesticides and pharmaceu-



Carbamate Pesticide Analysis  
 250 x 4.6mm HAISIL 100 C18

tical drugs to synthetic oligonucleotides and small peptides. High efficiency, symmetrical peaks, and long column life is characteristic not only of the C8 and C18 reverse phase columns, but the normal phase silica columns as well.



**HAISIL 300 For Biomolecules**

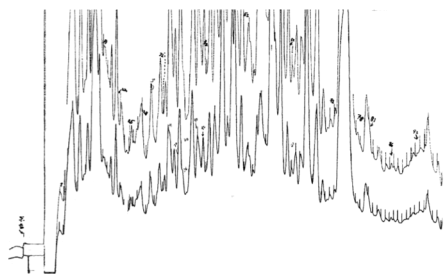
Phases	C18
Particle Sizes	5 and 10 $\mu\text{m}^*$
Pore Size	300Å
Pore Volume	0.7mL/gm
Surface Area	80m <sup>2</sup> /gm
%Carbon (w/w)	C18 = 6%
Phase type	Monofunctional and fully endcapped
Silica Class	Type A
USP Class	L1

**Guide to HAISIL 300 Part Numbers**

Hx-xxxx-W185 HAISIL 300 C18 5 $\mu\text{m}$

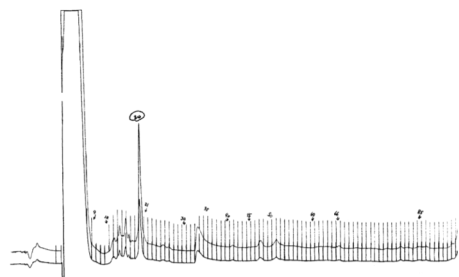
See Page 23 for complete Part Number information

\* 10 $\mu\text{m}$  is offered in HAIspeed 20 Guard Cartridges only. See pages 68-69.



*Fractionation of a Purified Tumor Cell Extract*

Peptides ranging from 100 fmol to 1 pmol are collected in 40sec intervals during a 70min gradient from 0 - 60% MeCN with HFBA modifier. A 40x2.1mm HAISIL 300 C18 5 $\mu\text{m}$  cartridge column (HK-0421-W185) is used.



*Reanalysis of a Fraction from the Chromatogram above*

The same 40x2.1mm HAISIL 300 cartridge is used for a 70min gradient from 0-60% MeCN with TFA modifier. Tic marks indicate 40sec fraction collections.

**Applications**

HAISIL 300 columns and cartridges are ideal for biomolecule separations such as peptides and small proteins. Optimized phase bonding and column packing techniques assure unsurpassed performance and column-to-column reproducibility. Short cartridge columns are economical and are ideally suited for LC/MS applications. The column and cartridge offering ranges from 150 $\mu\text{m}$  to 20mm I.D. which means that bioseparations can be optimized by selecting a format that best fits your analytical requirements.

**Micro-Preparative HPLC**

Higgins Analytical Cartridge Columns are helping researchers understand the immune response of living cells. An investigation to understand the genetic control of the immune response systems in organisms involves the extraction, isolation, and identification of more than 10,000 peptides. These distinct peptides are bound to a major histocompatibility complex (MHC) molecule on tumor cells.

Extraction of approximately  $5 \times 10^{10}$  cells yield several nanomoles of a very complex peptide mixture. Several rounds of RP-HPLC with different organic modifiers on a 40x2.1mm PEEK cartridge column (HAISIL 300 C18 5 $\mu\text{m}$ , P/N: HK-0421-W185) are performed to fractionate the mixture into individual components.

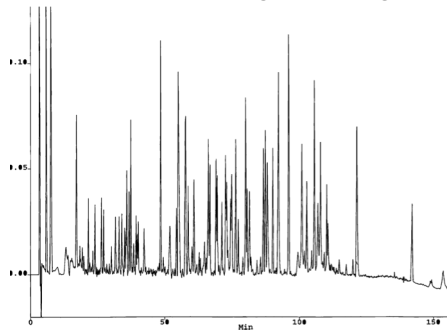
The chromatograms on the left illustrate how this technique is being used to narrow the search for the one peptide that marks a particular tumor cell as being diseased enabling it to be recognized by the immune cells.



Peek and Titanium cartridge columns used in the application described above. P/N: HK-0421-W185

**Very High Peak Capacity**

Depending upon the type of information a protein chemist is seeking, the HPLC analysis of a complex digest can take 1 to 2 hours. The following chromatogram

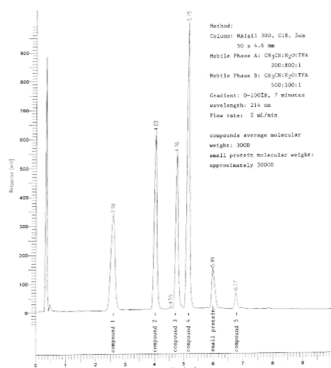


*Tryptic Map of BSA*  
on HAISIL 300 C18 5µm 250x4.6mm  
P/N HS-2546-W185

illustrates a high resolution tryptic digest map of BSA on a 250x2.1mm HAISIL 300 C18 5µm column indicates peak capacities in excess of 100. Small proteins, on the other hand can yield fewer fragments, and if only a "fingerprint" of a digest is required, high peak capacity columns can be a waste of time.

**Fast Analysis of a Complex Drug Delivery System**

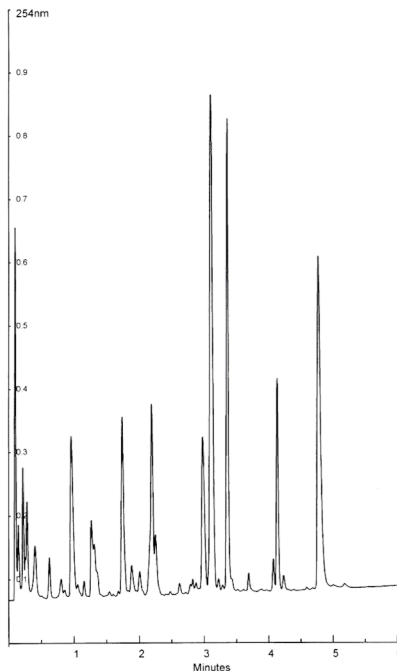
Most pharmaceutical QC laboratories are faced with rapidly increasing demands for high throughput capability. A good example of one laboratory's



approach to addressing a large number of samples for analysis on a daily basis is summarized below. This novel drug delivery system contains a small protein and other components that span an order of magnitude in molecular weight. All the compounds of interest were easily resolved in a single analysis with a fast linear gradient on a 5cm long HAISIL 300 C18 5µm column.

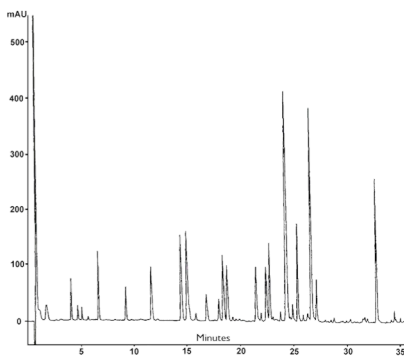
**Peptide Map in 5 minutes**

The figure below illustrates a very fast



peptide map of cytochrome-C. The information that can be gleaned from this five minute profile is more than adequate for many analytical requirements. The robust 50x4.6mm HAISIL 300 C18 column provides hundreds of runs without performance loss even under the aggressive 6ml/min flow conditions used in this example.

The cytochrome-C is a good example of pushing a column beyond its optimum operating conditions (more than six times optimum linear velocity) and still being able to get desired results. The same column can be run under more conventional conditions with a flatter gradient to obtain even higher resolution separations. The rhGH tryptic map below was done on a 5cm long column that replaced the conventional 25cm column that was used initially.

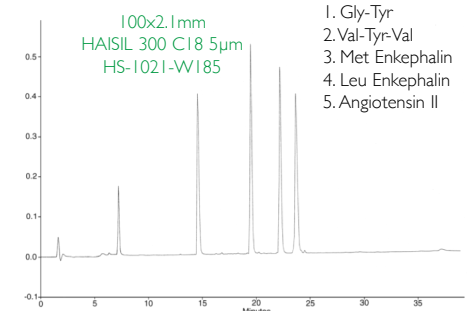
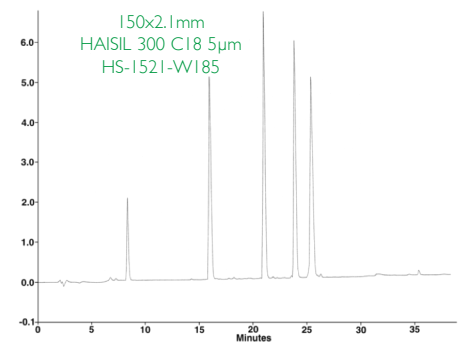
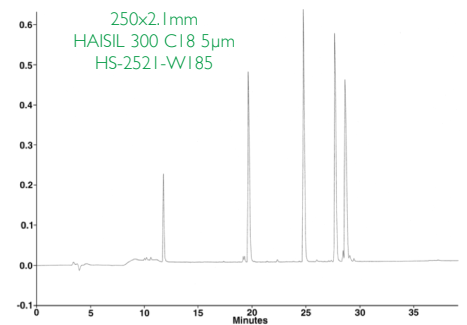


*Fast Tryptic Map of rhGH*  
50x4.6mm HAISIL 300 C18

**The Role of Column Length in Gradient Separations**

Changes in column length have a direct and linear effect on theoretical plates and analysis time in isocratic separations. Column length plays a less important role, however, in gradient techniques. The three chromatograms below illustrate how well packed short HPLC columns yield very similar peptide separations under identical gradient conditions.

For this study, the 2.1mm I.D. HAISIL 300 C18 5µm columns ranged from 250 to 100mm in length. While solvent and analysis time savings may be minimal, column cost savings can be significant when using as short a column as possible. Short columns also exhibit lower pressure at high flow rates.



1. Gly-Tyr
2. Val-Tyr-Val
3. Met Enkephalin
4. Leu Enkephalin
5. Angiotensin II



**HAISIL HL High Load**

Phases	C18
Particle Sizes	5 $\mu$ m
Pore Size	100 $\text{\AA}$
Pore Volume	0.8mL/gm
Surface Area	300m <sup>2</sup> /gm
%Carbon (w/w)	C18 = 18%
Phase type	Monofunctional & fully endcapped
Silica Class	Type B
USP Class	L1

**Guide to HAISIL HL Part Numbers**

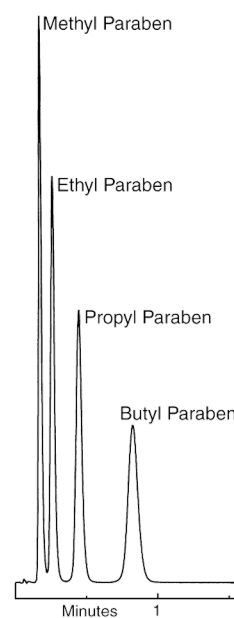
Lx-xxxx-C185      HAISIL HL C18 5 $\mu$ m  
 See Page 23 for complete Part Number information

**Applications**

HAISIL HL “high load” columns and cartridges are intended for applications requiring maximum loading and selectivity. The high surface area permits high bonded phase loading yet the monofunctional bonded phase and the absence of micro-pores eliminates the problems that plague many of the so-called “high capacity” columns currently on the market. The Type B silica backbone is pure, robust, and stable under harsh conditions. Users report satisfactory lifetime when used for prolonged periods at pH as high as 9.

**High Speed Analysis of Paraben Food Preservatives**

Parabens represent another example of food additives that are routinely analyzed by HPLC. Often, the food matrix being assayed for preservative content requires exhaustive cleanup and pre-filtration in order to prevent clogging of columns with nonporous or 2 $\mu$ m sorbents recently suggested for this analysis. As in the previous diet cola example, the compounds of interest are base line resolved under isocratic conditions. The inexpensive HAISIL HL 5 $\mu$ m 20x2.1mm cartridge column and the 50 second analysis time contribute significantly towards reducing operating costs.

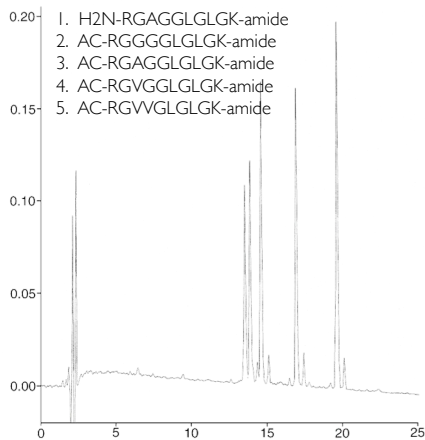
*Fast Paraben Analysis*

HAISIL HL C18 5 $\mu$ m  
 20x2.1mm Cartridge  
 LK-022.1-C185  
 700 $\mu$ L/min, 40% MeCN/water



### HPLC Peptide Standards for RP on the HAISIL HL C18 Column

The aromatic hydrocarbons that most HPLC column manufacturers use to quality control columns render little information about a column's selectivity

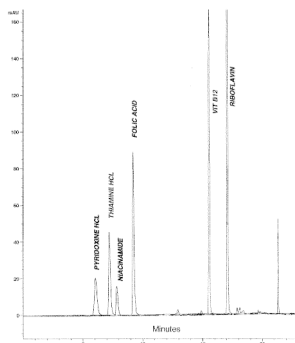


"Hodges Test Peptide Mix"  
(from Synthetic Peptides, Inc.)

HAISIL HL C18 5µm  
150x4.6mm P/N LS-1546-C185

and performance characteristics for peptides. The Canadian corporation, SPI, produces a well characterized yet challenging peptide mixture that is very useful for quantifying HPLC column performance for peptides. The difficult to separate first pair of peptides are resolved to near base line on HAISIL HL C18 columns. Many so-called peptide analysis columns are unable to separate this pair.

### Water Soluble Vitamin Analysis on HAISIL HL

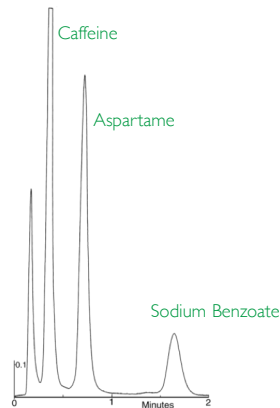


Water Soluble Vitamins

HAISIL HL C18 5µm 250x4.6mm  
A: 0.05mM KOAc, pH5; B: MeCN  
Gradient: 2.5% - 30%B in 25min

### Food Additives

Beverage additive analysis is not only an important industrial application, but it also serves as a practical and relatively simple procedure for introductory HPLC courses. Industry is increasingly driven by rapid analysis requirements and an HPLC column can represent an overwhelming expense in a teaching environment. The diet cola analysis in the chromatogram to the left illustrates an extremely fast analysis on an extremely inexpensive HPLC column. A package containing five



Fast Diet Cola Analysis

HAISIL HL C18 5µm  
2cm x 2.1mm Cartridge PN LK-0221-C185  
15% MeCN/Water 200µL/min

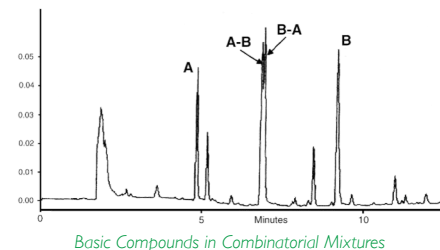
of the 20x2.1mm cartridge column used for this analysis costs about half as much as one moderately priced HPLC column. And, there's no need to pre-filter the cola sample through a 0.5µm filter as some column manufacturers recommend when using their expensive columns packed with 2µm particles for this analysis! The readily available and non-toxic nature of the sample and the low cost of Higgins Analytical cartridges has made the diet cola analysis an ideal choice for classroom purposes.

### Reverse Phase Chromatography of Basic Compounds in Combinatorial Mixtures

In the example at the top of the next column, A and B are single compounds containing two identical building blocks. A-B and B-A represent positional isomers, each containing two building blocks.

This analysis was conducted on the crude liquid-phase reaction mixture. Each component contains multiple secondary

and tertiary amine functionality yet the combinatorial products can be rapidly chromatographed and exhibit no tailing on a 150x4.6mm HAISIL HL C18 column using a simple linear 5% to 100% MeCN/water 0.1% TFA gradient.

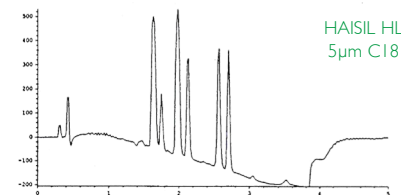


Basic Compounds in Combinatorial Mixtures

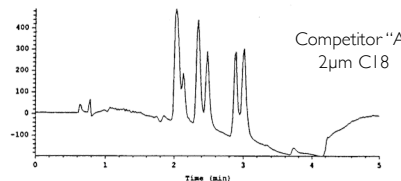
HAISIL HL C18  
P/N LS-1546-C185

### Speed and Selectivity for Ballistic Gradients on Complex Libraries

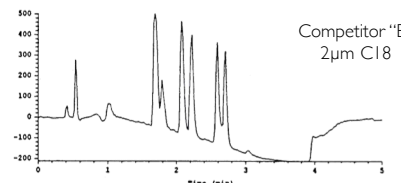
The relative importance of particle size and selectivity are graphically illustrated below by the high speed analysis of a six component combinatorial library on a HAISIL HL C18 5µm column and two competitor's C18 2µm columns. HAISIL HL with its high carbon loading and surface area often works much better than expensive small particle size columns that are prone to plugging up more quickly.



HAISIL HL  
5µm C18



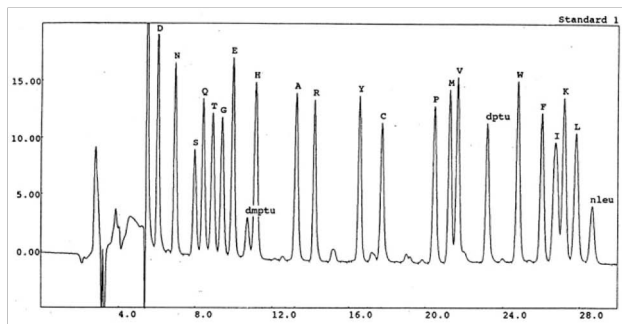
Competitor "A"  
2µm C18



Competitor "B"  
2µm C18



## HAISIL PTH Protein Sequencing Columns



PTH Standards on HAISIL PTH Column P/N: HS-2221-PTH5  
 Note: Chromatogram Courtesy of Al Smith, Stanford PAN Facility, (1996)

### Application

In 1985, protein sequencing by Edman degradation was revolutionized by Applied Biosystems when it introduced the Model 470 Protein Sequencer. This powerful, highly automated instrument evolved over the following 20 years into its most recent version - the PROCISE® Protein Sequencing System.

Today, over 30 years later, this unique platform continues to be a workhorse for many protein chemists worldwide.

Higgins Analytical offers a broad range of high quality, reasonably priced PTH Columns, Cartridges, and related consumables, for both HT and cLC sequencing on these classical instruments.

### Guide to HAISIL PTH Column and Cartridge Part Numbers

Part Number	Description	Price
HS-2221-PTH5	HAISIL PTH Column 220 x 2.1mm <i>This is the same conventional format, heater block compatible, HPLC column that Higgins Analytical has been manufacturing since 1996</i>	\$750
HF-2221-PTH5	HAISIL PTH Cartridge Column 220 x 2.1mm <i>This high efficiency cartridge requires two HAIPEEK Cartridge Holder End Caps, and is compatible with the Procise® Cartridge Heater Block</i>	\$700
HF-0203-PTH5	HAISIL PTH Cartridge Column 220 x 2.1mm <i>Compatible with the original ABI Cartridge Holder</i>	\$750
HS-25M8-PTH5	HAISIL PTH Column 250 x 0.8mm <i>Compatible with the Standard Procise® Cartridge Heater Block</i>	\$775
HF-0232-PTH5	HAISIL PTH GUARD 20 x 3.2mm (Pkg of 5) <i>These Cartridges are for the Static Mixer on the Pump</i>	\$175
PEEK-CAPS	HAIPEEK Cartridge Holder End Caps (Pkg of 2) <i>Convert Standard Cartridge Holder for HF-2221-PTH5 This modification of the Holder makes it compatible with both HF-2221-PTH5 and HF-0203-PTH5 cartridges</i>	\$100



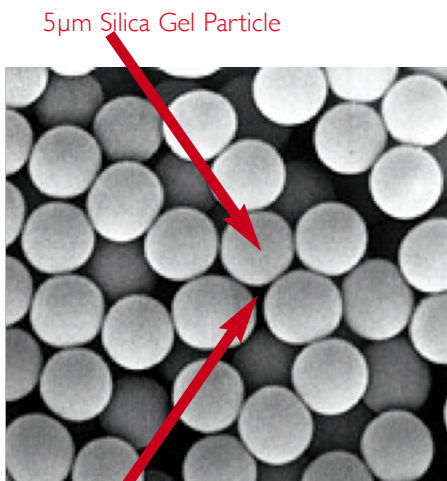
### Some of the Custom Columns We Manufacture for Special Applications

Part Number	Description	Price
HS-2521-PTH5	HAISIL PTH Column 250 x 2.1mm <i>A longer 250 x 2.1mm column that still fits in heater</i>	\$790
HC-25M1-PTH5	HAISIL PTH Column 250 x 0.1mm <i>Capillary Column for LC-MS Detection</i>	\$630



### Why do HPLC columns plug up?

A large percentage of HPLC columns die because the back pressure builds up to



levels that exceed the instrument's practical limits. Most chromatographers (and many column manufacturers) believe this is because the inlet frit plugs up with particles. Actually, it is usually the packed-bed that becomes plugged by smaller than 1µm particles that pass through in-line filters and the 2µm inlet frits. The SEM above illustrates the relative sizes of particles and pores. Higgins Analytical offers a wide variety of guard cartridges that address this problem.

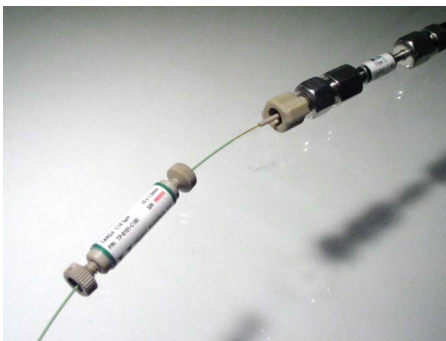
### SPRITE is Designed to Operate in Either Flow Direction

A SPRITE is made of PEEK and titanium and can be connected directly to a sample injection valve or directly to a mass spectrometer's source inlet.

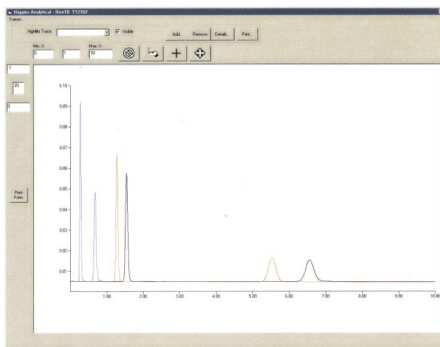


### Using a PICCOLO as a Microbore Guard Column

PICCOLO columns are normally used as trap columns but since they are manufactured with the same techniques



we use to pack microbore HPLC columns, they are very efficient. Their performance makes them ideal for use as short microbore HPLC column or as a guard for placed in front of another analytical microbore column. The chromatograms in the figure below illustrate typical performance when used in these unconventional modes.



*Piccolo Column performance as an Analytical Column and as a Guard Column*

Blue Trace:  
10x1mm Targa C18 5µm Piccolo Guard Column alone (P/N TP-0101-C185)

Red Trace:  
50x1mm TARGA C18 5µm Analytical Column (P/N TS-0501-C185)

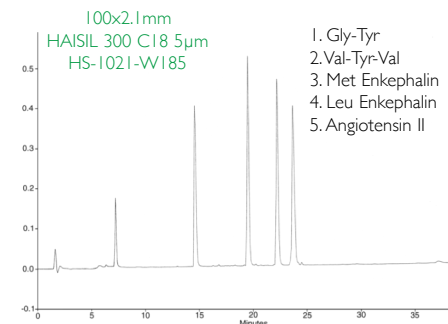
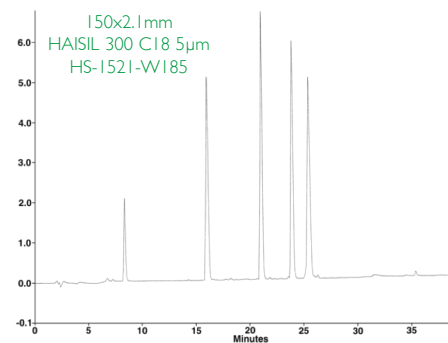
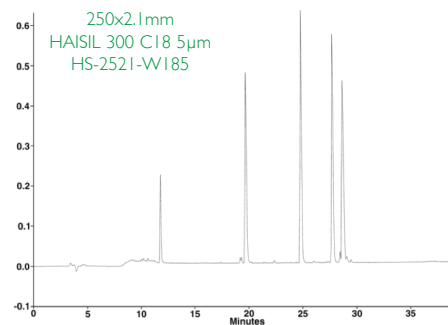
Black Trace:  
10x1mm Guard coupled to 50x1mm Analytical Column

Peak #1: Dimethyl Phthalate Peak #2: Fluorene  
60% MeCN/water, 50µL/min  
System Variance ~6µL<sup>2</sup> at 50µL/min

### The Role of Column Length in Gradient Separations

Changes in column length have a direct and linear effect on theoretical plates and analysis time in isocratic separations. Column length plays a less important role, however, in gradient techniques. The three chromatograms below illustrate how well packed short HPLC columns yield very similar peptide separations under identical gradient conditions.

For this study, the 2.1mm I.D. HAISIL 300 C18 5µm columns ranged from 250 to 100mm in length. While solvent and analysis time savings may be minimal, column cost savings can be significant when using as short a column as possible. Short columns also exhibit lower pressure at high flow rates.



**PROTO™ 200** More Selectivity and Resolution for Peptides

200

Phases	C4 and C18
Particle Sizes	4.5 and 10µm
Pore Size	200Å
Pore Volume	1.1 mL/gm
Surface Area	200m <sup>2</sup> /gm
%Carbon (w/w)	C4. = 4.5%, C18= 14%
Phase type	Monofunctional & fully endcapped
Silica Class	Type B
USP Class	L26 PROTO 200 C4 L1 PROTO 200 C18

**Applications**

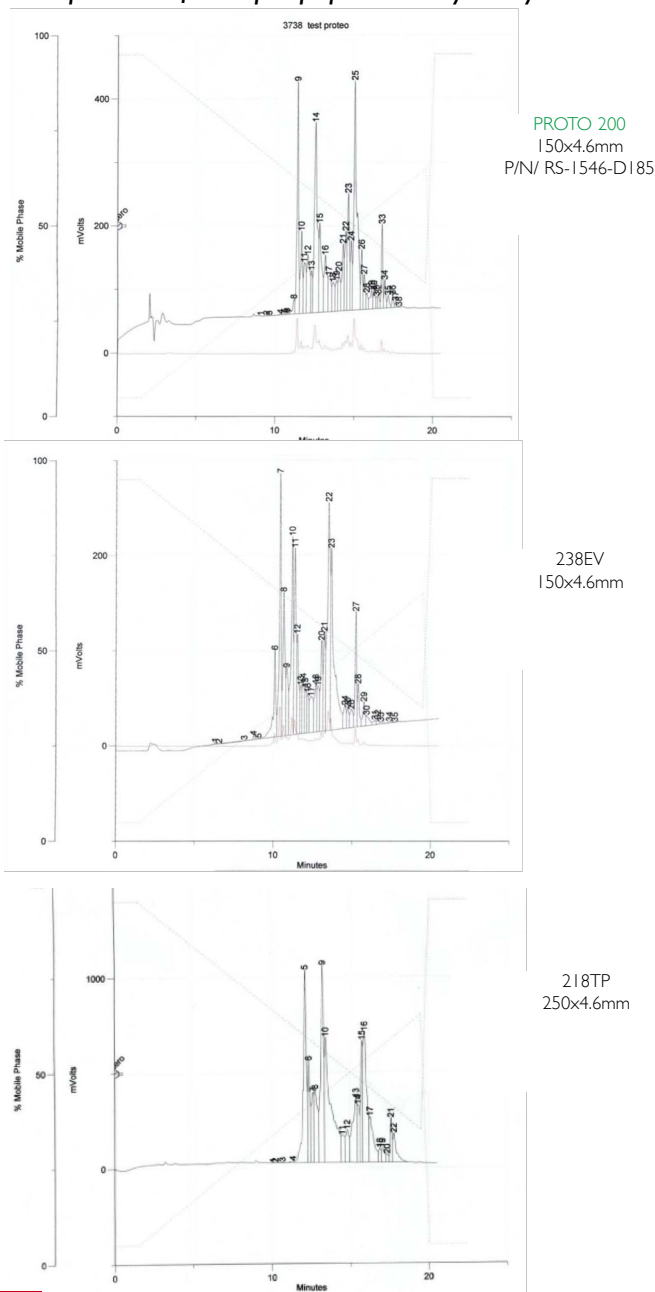
300Å wide pore HPLC columns are traditionally used for biomolecule analysis since the molecular radii of large peptides and proteins are better matched than with smaller pore size columns (80 - 120Å) typically used for small molecule analysis. 300Å sorbents, however, have reduced surface area, thus less capacity and selectivity than would be had with smaller pore size materials. Higgins Analytical's new PROTO™ 200 presents a powerful alternative for the analysis of peptides of ~19kD and less.

**Guide to PROTO 200 Part Numbers**

- Rx-xxxx-D045 PROTO 200 C4 5µm
- Rx-xxxx-D185 PROTO 200 C18 5µm

See Page 23 for complete Part Number information

**Comparison of Phosphopeptide Purity Analysis**



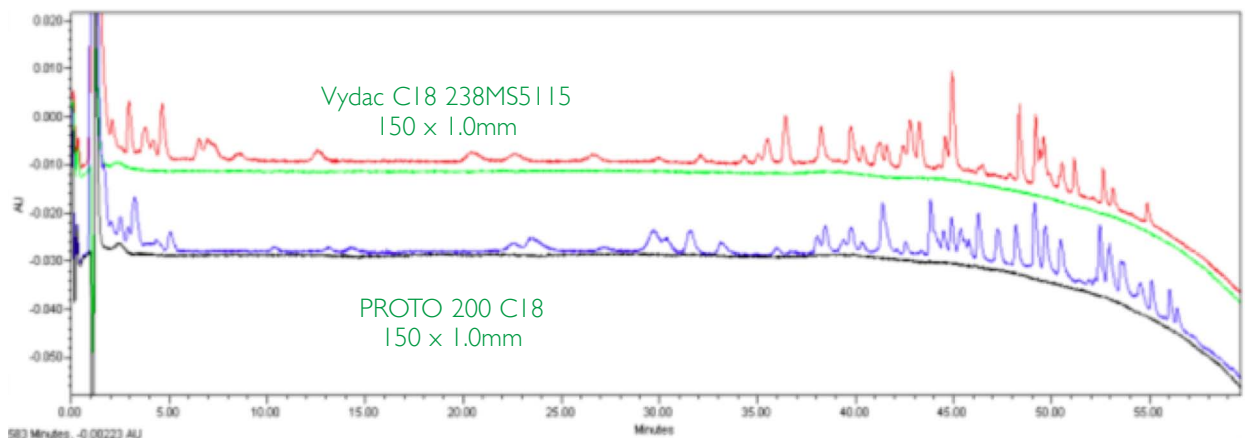
**Phosphopeptide Purity Analysis**

Peptide HPLC column performance, using the same gradient conditions, was evaluated on the PROTO™ 200 C18, a new peptide analysis column obtained from The Nest Group, Inc.. Against the industry standard, Grace/Vydac® 218TP C18, and their newer peptide chemistry, Everest® C18, the data show that the PROTO™ 200 C18 column has superior resolution to the 218TP chemistry and better resolution, especially for the more hydrophobic peptides, than the Everest® C18. In addition, the PROTO 200 columns can be run without TFA, which allows better detection when utilizing LC-MS.

Previously, the Everest chemistry had been shown by Grace/Vydac to be superior to all other wide pore columns, especially for the more hydrophobic peptides. However, the ready availability of the PROTO™ 200 peptide columns, in either C4 or C18 chemistries, and in capillary through preparative sizes, now allows researchers their first opportunity to save both time and money on a wider variety of applications, compared to the Grace/Vydac columns, and by extension to all other peptide columns.



Proto™ 200 C18 provides greater selectivity than the popular 300Å choice



Tryptic Digest of Carbamidomethylated BSA (16h, 20 pMols on column).

Column Size:  
150 x 1.0mm

Column Brand:			
Upper Chromatogram:	Vydac 300Å	238MS C18 5µm	P/N 238MS5115
Lower Chromatogram:	Higgins 200Å	Proto 200 C18 5µm	P/N RS-1501-D185

Conditions:  
 A = 0.1% formic acid containing 0.01% TFA  
 B = 0.085% formic acid in CH<sub>3</sub>CN containing 0.01% TFA  
 Initial 5 min isocratic hold at 5% B, then 60 min hyperbolic gradient to 65%B  
 Flow 0.15 ml/min, Green & Black curves: Blank gradient profile

**PROTO™ 300 Robust Bioseparations**



Phases	C4 and C18
Particle Sizes	4.5 and 10µm
Pore Size	300Å
Pore Volume	0.9mL/gm
Surface Area	100m <sup>2</sup> /gm
%Carbon (w/w)	C4 = 3%, C18= 8%
Phase type	Monofunctional & fully endcapped
Silica Class	Type B
USP Class	L26 PROTO 300 C4 L1 PROTO 300 C18

**Applications**

Low pH operating conditions and high pH column washing steps are typical bioprocessing operating conditions that can severely limit the lifetime and performance of widepore columns typically used for widepore and peptide analysis. Higgins Analytical's new PROTO300 has high capacity for enhanced resolution and is robust enough to withstand prolonged use at extreme pH (1.5 - 10).

**Guide to PROTO 300 Part Numbers**

Rx-xxxx-W045 PROTO 300 C4 5µm  
Rx-xxxx-W185 PROTO 300 C18 5µm

See Page 23 for complete Part Number information

**Stability Study Under Extremely Alkaline Conditions**

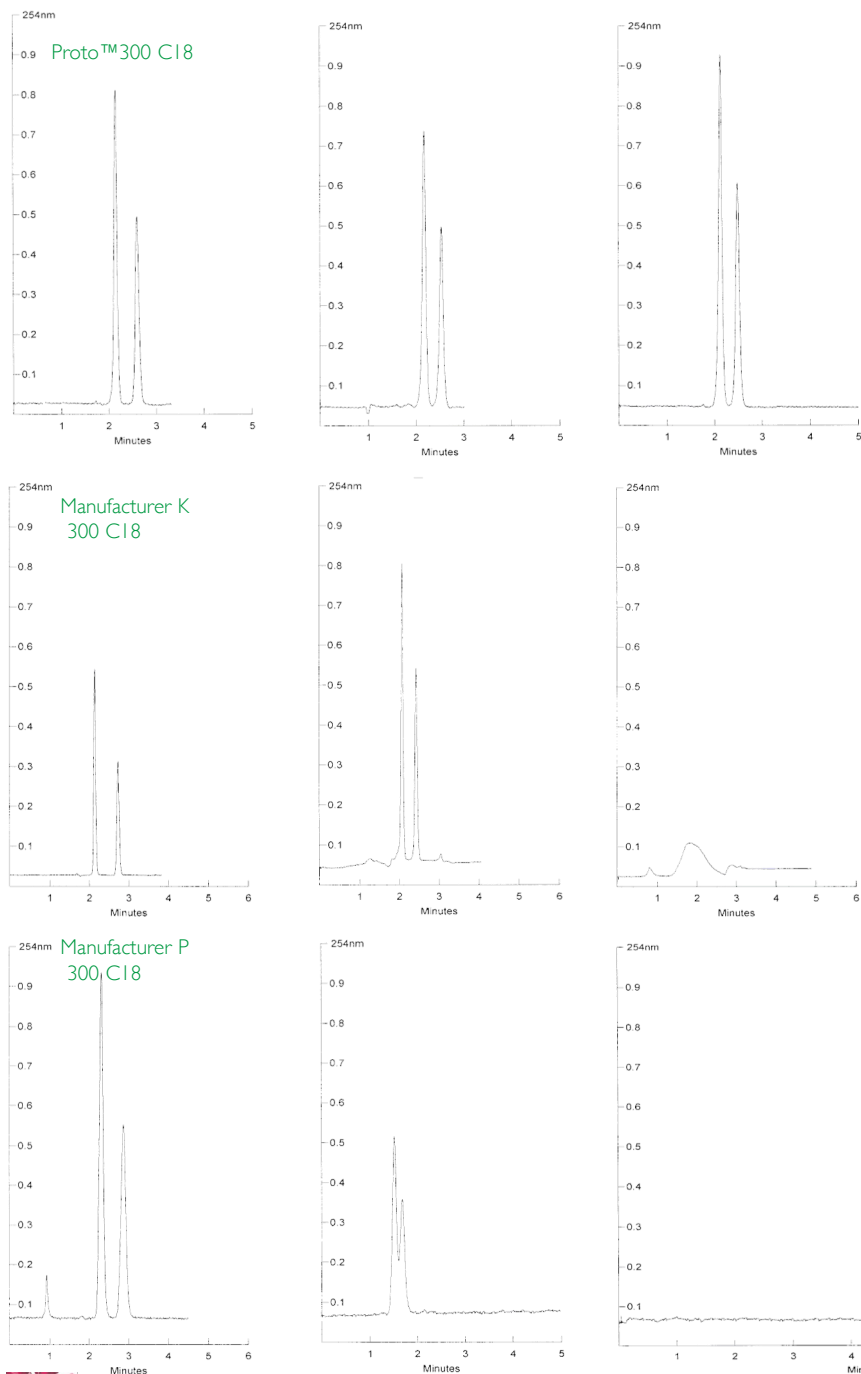
**Experimental:**  
150 x 4.6mm columns were studied. All experiments were conducted on duplicate columns. Solutes used for performance measurement were dimethylphthalate and fluorene.

**Step One:**  
Column stability and measurement precision was established for each column with multiple injections over 18hrs under neutral conditions (70% MeCN/water; 1mL/min). All columns were very stable. The chromatograms of a column from each manufacturer at the end of the 18 hour period are shown on the left hand side.

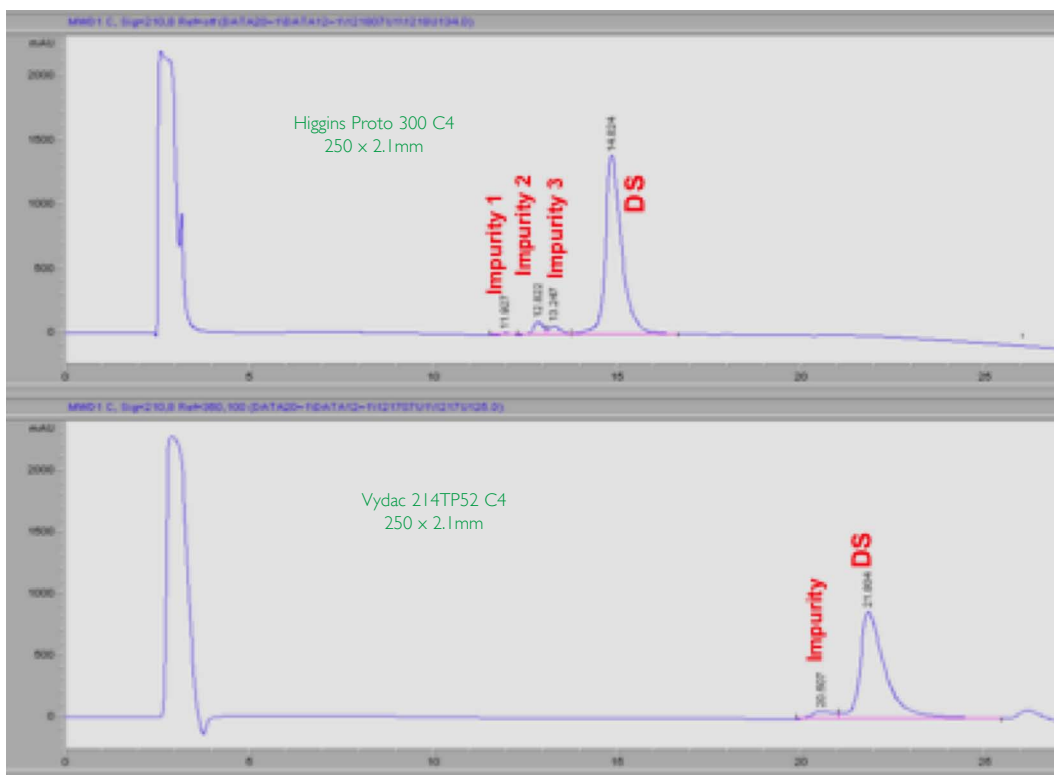
**Step Two:**  
Each column was flushed with 70% MeCN/0.5N NaOH solution at 1mL/min for one hour (23°C). The columns were then purged and equilibrated under the standard neutral conditions then retested. The center chromatograms are the results of the first test after neutral equilibration

**Step Three:**  
After the second step, the neutral test conditions were maintained for one hour and a repeat injection was made. The results are illustrated in the chromatograms on the right hand side of the figure.

While Higgins Analytical does not recommend flushing any silica-based HPLC column under such aggressive conditions, these data show the superior alkaline stability of Proto™ 300 C18.

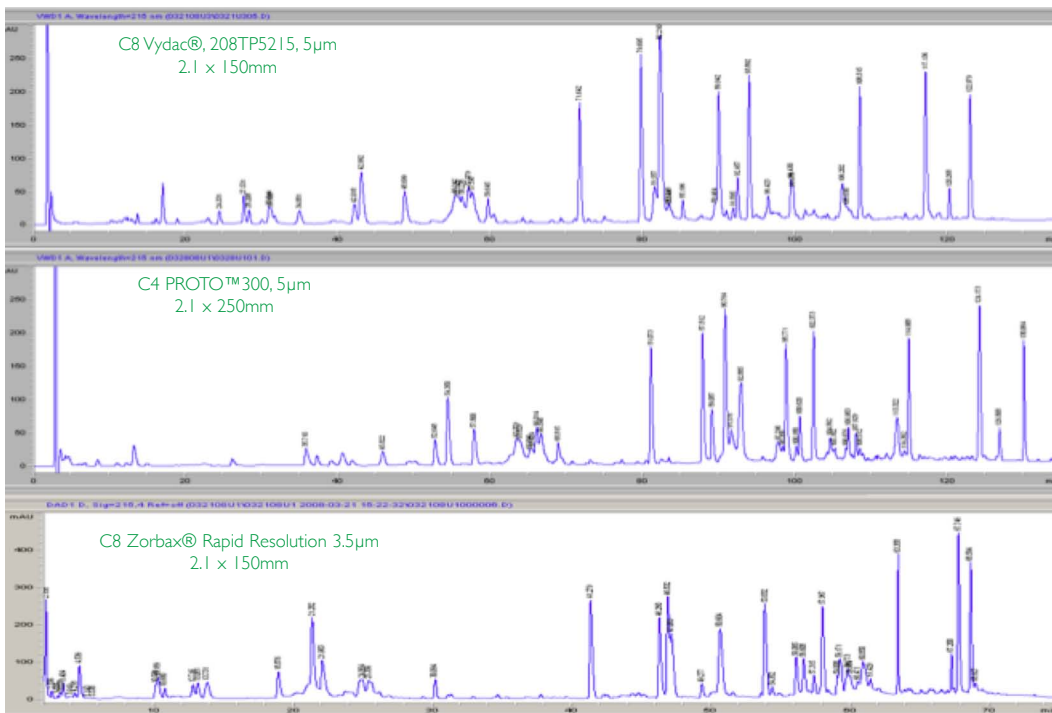


PROTO™ 300 C4 for Protein Analysis



Column: 250 x 2.1mm Higgins P/N RS-2521-W045 (5µm, 300Å)  
 Vydac P/N 214TP52 (5µm, 300Å)  
 Mobile Phase: (A) 0.1%TFA in water; (B) 0.08%TFA in ACN, Flow Rate: 0.3min  
 Start Conditions: 25%B, Linear Gradient Run Time 34min

Superior Resolution with PROTO™ 300 C4 for Protein Tryptic Digests



Higgins Analytical thanks Amos Heckendorf of The Nest Group ([www.nestgrp.com](http://www.nestgrp.com)) for these data.





## PHALANX Ultra High Density End Capping

Phases	C18
Particle Sizes	3, 4.5, 10µm
Pore Size	100Å
Pore Volume	1.1mL/gm
Surface Area	430m <sup>2</sup> /gm
%Carbon (w/w)	C18 = 18%
Phase type	Monofunctional & fully endcapped
Silica Class	Type B

### Guide to Phalanx Part Number

Px-xxxx-C185 Phalanx C18 5µm  
 See Page 23 for complete Part Number information

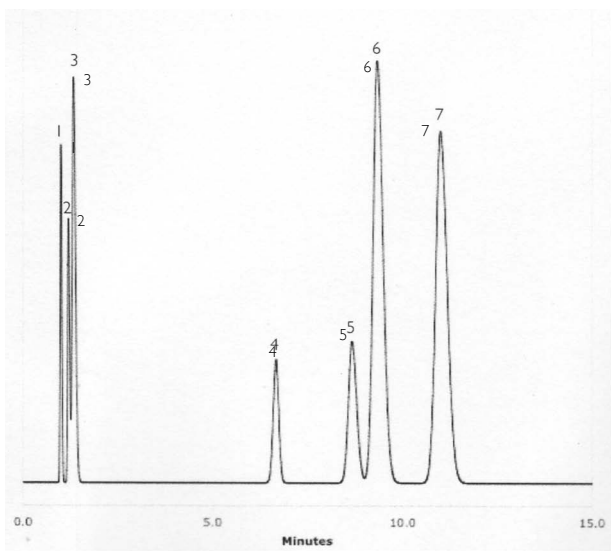
Phalanx HPLC columns and cartridges facilitate the development of robust assays for challenging analytes

#### Unique Features:

- Ideal for Basic and Acidic Analytes
- Wide pH Range Stability
- High Capacity
- No secondary Si-OH interaction
- No metal contamination
- Extreme hydrophobicity range

#### Standard Sizes:

- Special products for LC-MS
- 0.075 - 20mm I.D. range
- Wide range of HPLC Cartridge and Column types
- PEEK/titanium as well as stainless steel formats



#### High Selectivity

Wide range of solutes resolve quickly on a short HPLC column

Phalanx C18, 100x4.6mm, P/N: PS-1046-C185

(1) Uracil, (2) Caffeine, (3) Phenol, (4) n-Butylbenzene, (5) o-Terphenyl,

(6) n-Amylbenzene, (7) Triphenylene

80% MeOH/water; 1mL/min

### Applications

Phalanx is uniquely suitable for the efficient analysis of both acidic and basic analytes. In addition, its high capacity, good stability at high pH, and fast equilibration at extreme ranges of hydrophobicity make Phalanx a powerful option for challenging separation problems.

Phalanx is Higgins Analytical's latest addition to a family of unique high performance HPLC sorbents. The novel end capping technology of this new sorbent is a continuation of the pioneering approach taken in 1996 when we introduced Targa®, the first HPLC sorbent specifically designed for efficient LC-MS applications without TFA.

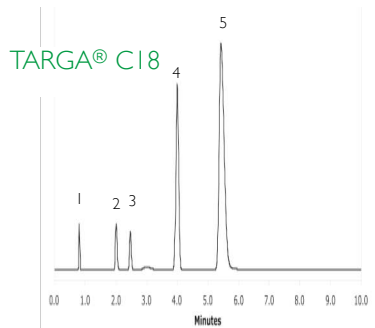


Based on an ultrapure, Type-B silica backbone, Phalanx has a relatively high surface area of 430 m<sup>2</sup>/gm, but its very tight pore size distribution eliminates the undesirable side effects of micropores that often plague other high surface materials.

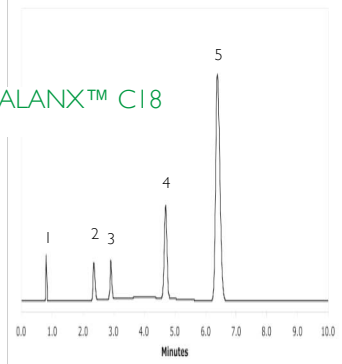
Optimum for Basic and Acidic compounds: Many modern HPLC sorbents employ embedded polar functionality. While these secondary structures can provide unique selectivity and eliminate undesirable solute/sorbent interaction, they often compromise the useful range of solutes or buffers that can be used. The figure on the left and those on page 2 illustrate that Phalanx columns produce symmetrical peaks during the analysis of basic, neutral, and acidic compounds.

Wide pH operating range: The unique endcapping reduces acid/base hydrolysis of the bonded phase and greatly reduces silica solvation at high pH.





TARGA® C18

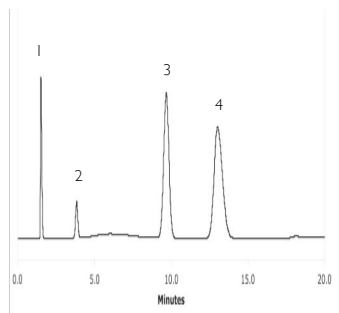


PHALANX™ C18

NIST Test Mix for Metal Activity and Residual Silanols

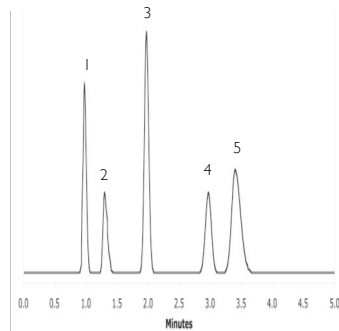
Quinizarin, a strong metal chelator; and amitriptyline, a very sensitive solute for residual silanols, both elute with good recovery and symmetrical peaks on both Targa and Phalanx C18 columns.  
 Targa® C18, 150x4.6mm, P/N: TS-1546-C185  
 Phalanx™ C18, 150x4.6mm, P/N: PS-1546-C185  
 (1) Uracil, (2) Toluene, (3) Ethylbenzene, (4) Quinizarin, (5) Amitriptyline.  
 80% MeOH/buffer, 1.5mL/min

See page 28 for an interesting comparison of PHALANX to KROMASIL C18 for an analysis of a pharmaceutical drug.



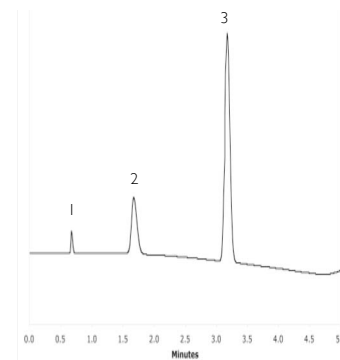
Good Peak Symmetry for Basic Compounds

The very low solute/sorbent interaction of Phalanx C18 is clearly illustrated by the analysis of basic compounds on a short 5cm cartridge column.  
 Phalanx C18, 50x2.1mm, P/N: PK-0521-C185  
 (1) Propanediol, (2) Diphenyldramine, (3) Acenaphthene, (4) Amitiptyline.  
 65% MeOH/water 20mM KH<sub>2</sub>PO<sub>4</sub> (pH 7.0), 200µL/min



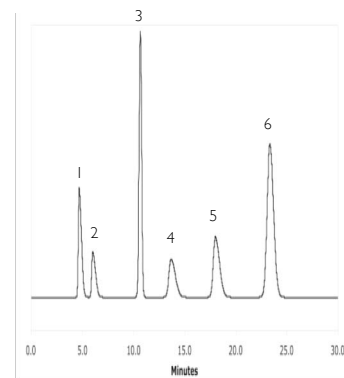
Nucleosides

Like its cousin Targa, Phalanx's unique end-capping chemistry works equally well at extreme hydrophilic and hydrophobic ranges.  
 Phalanx C18, 50x2.1mm, P/N: PK-0521-C185  
 (1) Cytosine, (2) Uracil, (3) Cytidine, (4) Uridine, (5) Thymine.  
 100% Water, 1.0mL/min



Unbuffered Pyridine Test for Free Silanol Activity

A very sensitive test for residual silanols produces a symmetrical pyridine peak in a low organic mobile phase without buffers.  
 Phalanx C18, 50x2.1mm, P/N: PK-0521-C185  
 (1) Uracil, (2) Phenol, (3) Pyridine  
 40% MeCN/water, 200µL/min



Tricyclic Antidepressants

The very low solute/sorbent interaction of Phalanx C18 is clearly illustrated by the analysis of basic compounds on a 100x4.6mm HPLC column.  
 Phalanx C18, 100x4.6mm, P/N: PS-1046-C185  
 (1) Desipramine, (2) Nortriptyline, (3) Acenaphthene, (4) Imipramine, (5) Amitriptyline, (6) Trimipramine.  
 70% MeOH/water 20mM KH<sub>2</sub>PO<sub>4</sub> (pH 7.0), 1.0mL/min





## TARGA A Uniquely Shielded Surface

Phases	C8 and C18
Particle Sizes	3, 4.5 and 10µm
Pore Size	120Å
Pore Volume	0.8mL/gm
Surface Area	330m <sup>2</sup> /gm
Carbon%(w/w)	C18 = 18%
Phase type	Monofunctional with a unique polar and bulky end-capping
Silica Class	Type B

### Guide to TARGA Part Numbers

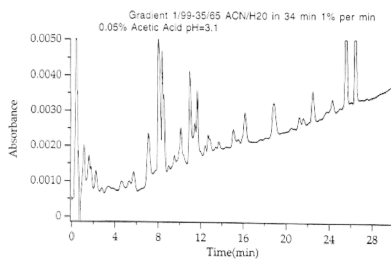
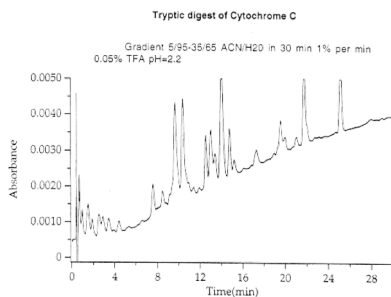
Tx-xxxx-C183 Targa C18 3µm

Tx-xxxx-C185 Targa C18 5µm

See Page 23 for complete Part Number information

### Peptide Mapping without TFA

The following chromatograms illustrate the differences in selectivity for peptide maps of cytochrome-C when using 0.05% TFA or 0.05% acetic acid buffer in

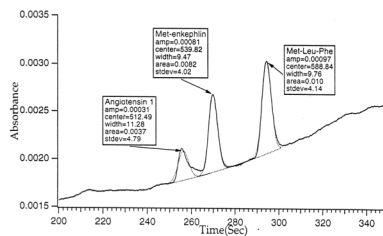


1%/min acetonitrile gradient on a short 50x1.0mm TARGA C18 column. Both dilute buffer examples are characterized by sharp peaks and no tailing.

### LC-MS without TFA

Researchers have shown that Higgins Analytical's TARGA C8 and C18 phases have an extremely well protected silanol surface. An acetonitrile/water 1%/min gradients with as little as 0.05% acetic acid gives a very satisfactory peptide map on a short 5cm x 1mm TARGA C18 column. The ability to buffer with acetic or formic acid rather than TFA greatly enhances signals for LC/MS techniques.

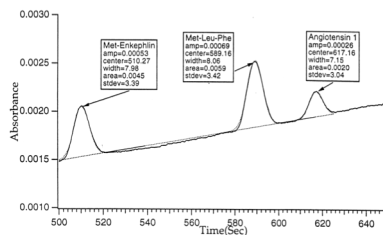
While TARGA columns give exceptional performance without TFA buffer, it does not mean that you are precluded from using it. In fact, the changes in selectivity



Basic Peptides

with 0.1% Acetic Acid pH 3.1  
TARGA C18 5µm 50x1.0mm

that comes with changing buffer acids can be a powerful tool for separation optimization. Notice how the peptide elution orders change between the acetic acid (above) and TFA (below) buffered chromatogram. This is due to the differences in pH of the acetic acid and TFA mobile phase.

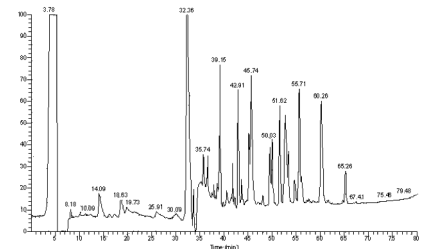


Basic Peptides

with 0.1% TFA pH 2.2  
TARGA C18 5µm 50x1.0mm

### Applications

TARGA columns and cartridges are ideal for applications requiring an absence of secondary solute-silanol interaction. Basic and acidic drugs and peptides can be chromatographed efficiently with little or no buffer. Targa columns are particularly well suited for LC/MS applications where acetic acid or formic acid can be substituted for TFA resulting in significant increase in signal. While TFA is not required, it does not preclude its use on TARGA columns. TARGA exhibits extremely fast equilibration kinetics from high to low organic phase compositions. It works well in 100% aqueous conditions for hydrophilic applications also.

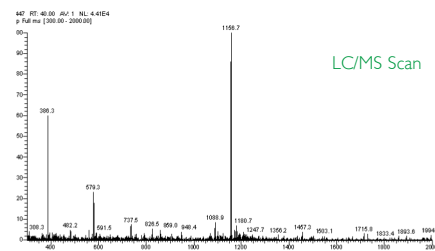


Tryptic Map of Human Ocular Lens Proteins  
beta A1 crystallin and gamma S crystallin

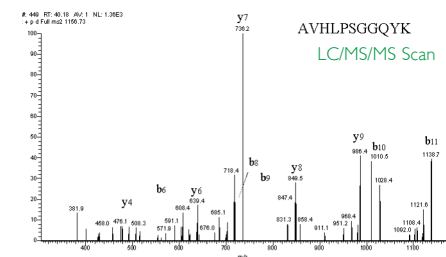
TARGA C18 5µm 150x0.5mm  
P/N TS-15M5-C185

Solvent A: 0.1% Acetic Acid  
Solvent B: 0.1% Acetic Acid, 65% MeCN  
0 - 50% B in 60min, 50 - 100%B in 15min

Sample is a tryptic digest of a 2D electrophoresis separated spot digested from PDVF membrane. The two ocular proteins are ~25kD. The LC/MS zoom scan below confirms the peak at 39.15min is singly charged, and software interpretation of the MS/MS scan at the bottom confirms the 1156.6 ion as residues 84-94 in human gamma S crystallin.



LC/MS Scan



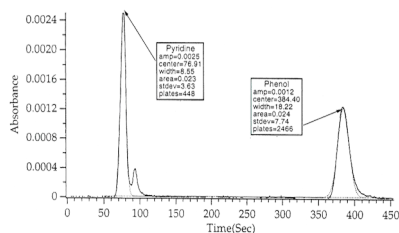
AVHLPSSGGQYK  
LC/MS/MS Scan



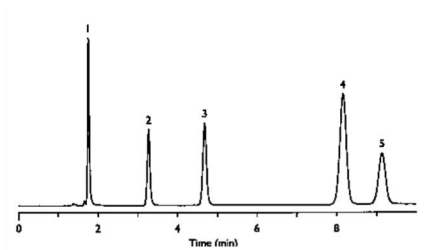
### Unrivaled End Capping Technology Efforts to eliminate solute-silanol

Targa HPLC columns are true to the Latin root of their name. TARGA, meaning "shield," is precisely the effect the unique bonded phase has on the silica's silanol surface.

Many HPLC column manufacturers illustrate the performance of their columns packed with inert, base deactivated, "Type B silica" bonded phases by the chromatographic behavior of polar compounds such as pyridine. Performance claims can be misleading, however, when mobile phases are buffered to low pH or when they contain high percentages of organic solvent.

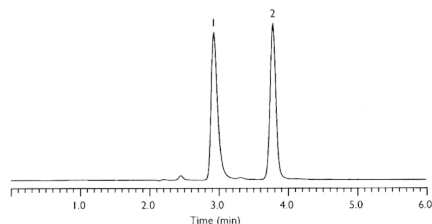


Unbuffered 20% MeCN/water



Analgesics and Anti-Inflammatories

TARGA C18 5µm 150x4.6mm  
Part Number TS-1546-C185  
45% MeCN/20mM NaH<sub>2</sub>PO<sub>4</sub> pH3.2 1mL/min 260nm  
1. Acetaminophen 2. Indoprofen  
3. Naproxan 4. Indomethacin  
5. Ibuprofen

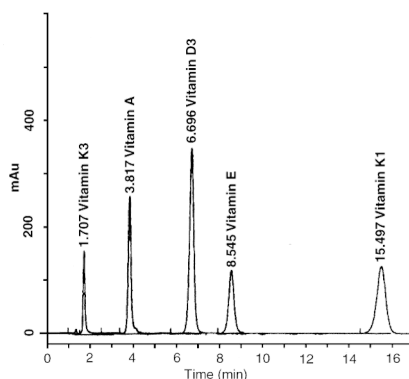


Anti-Hypertensives

TARGA C18 5µm 150x4.6mm  
Part Number TS-1546-C185  
25% MeCN/20mM NaH<sub>2</sub>PO<sub>4</sub> pH3.2 1mL/min 260nm  
1. Triamterene 2. Hydrochlorothiazide

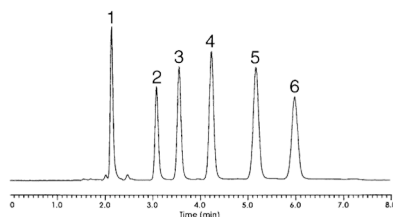
### Favorable Kinetics at Aqueous or Organic Mobile Phase Extremes

The bulky moiety used for end capping TARGA C8 and C18 sorbents present other valuable selectivity characteristics in addition to the extreme inertness to basic and acidic compounds. Long chain alkane bonded phases collapse under low organic phase conditions on most reverse phase HPLC columns causing poor reproducibility and slow reequilibration. Fast gradients can be run on TARGA columns from initial 100% aqueous conditions with fast cycle times and very good run-to-run reproducibility. TARGA columns can also be run isocratically in 100% aqueous conditions for carbohydrate analysis, or with only a few percent organic modifier to achieve selectivity on solutes that are retained under typical reverse phase conditions.



Fat-Soluble Vitamin Assay

TARGA C18 5µm 100x2.1mm  
Part Number TS-1021-C185  
3% water in MeOH mobile phase  
200µl/min, diode array detection



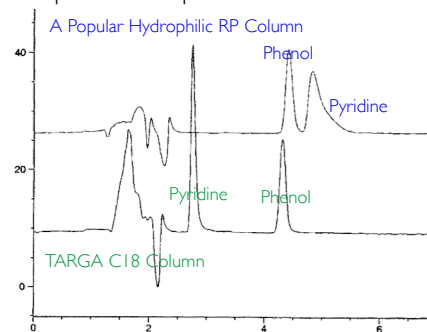
Analysis of Very Polar Antibacterials with a Highly Aqueous Mobile Phase

1. Vancomycin, 2. Cefotaxime, 3. Cefazolin

TARGA C18 100x2.1mm TS-1021-C185  
Mobile Phase: 92% Water with 0.1% TFA pH2.5,  
8% MeOH, DAD at 230nm

### TARGA's Superior Hydrophilic Reverse Phase Properties

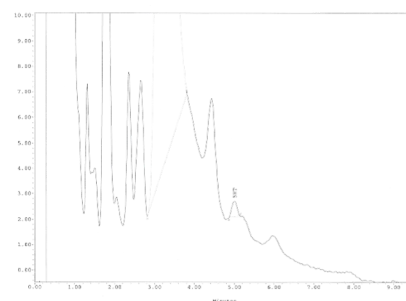
Several manufacturers offer reverse phase column products with imbedded polar functionality intended to enhance the chromatography of hydrophilic compounds like those illustrated in the previous antibacterial example. Unfortunately, most of these approaches introduce undesirable secondary effects that preclude their use with acidic or basic solutes unlike TARGA with its unique bonded phase.



TARGA Compared to a Competitor's Hydrophilic Column  
150x4.6mm, 20% MeCN/water (unbuffered) 1mL/min

### Trace Catecholamine Analysis

In vivo microdialysis present a challenge to both instrumentation and column design, especially when depended upon as a tool for routine analysis. The chromatogram below illustrates rat hypothalamus microdialysis analysis for 5HT. Researchers report that the 100x2.1mm Higgins Analytical PEEK and titanium TARGA C18 column operates routinely at 0.2 - 100 nM detection levels.



5HT Analysis of Rat Hypothalamus Dialysate

TARGA C18 5µm 100x2.1mm  
P/N TS-1021-C185

NaH<sub>2</sub>PO<sub>4</sub> 0.15M, OSA 0.74mM, EDTA 0.1mM  
pH 2.87 (orthophosphoric acid) 2% IPA

Instrumentation: Flux Rheos Isocratic Pump, In-line Solvent Degasser, Spark Holland Triathlon Autosampler, Antec INTRO EC Detector

Detection levels of 0.2 - 100 nM are routinely achieved.



## PTC Amino Acid Analysis

Higgins Analytical now manufactures the PTC Amino Acid analysis column used on the Applied Biosystems Model 420 Analyzer. We have approval from AB to manufacture these columns and we can provide a certificate indicating that our columns have the identical form and function as the product previously supplied by AB.

Part Number: 0711-0204

Price: \$600

Always available from stock.

A recent publication cites a Higgins Analytical PTC column: **Mass-spectrometric study of changes in allergen proteins by application of controlled chemical reaction**, where attempts to identify stable peptide markers from hazelnut and soybean were made.

C. Platteau, T. Cucu, R. Dobson, S. Fourdrilis, C. Bourgeon, D. Ebo, M. De Loose, I. Taverniers, E. Daeseleire, B. De Meulenaer, B. Devreese, E. De Pauw, G. Maghuin-Rogister, M.-L. Scippo, W. Stevens, C. Bridts. "Development of an integrated strategy for controlling the allergen issue in the Belgian food and catering industry ALLERRISK". Final Report. Brussels : Belgian Science Policy 2011 – 109 p. (Research Programme Science for a Sustainable Development), Page 54

 [http://www.belspo.be/belspo/SSD/science/Reports/ALLERRISK\\_FinRep%20ML.pdf](http://www.belspo.be/belspo/SSD/science/Reports/ALLERRISK_FinRep%20ML.pdf)

## We Manufacture Products with Internal Diameters Ranging Almost Three Orders of Magnitude

This catalog contains over one thousand products manufactured with over fifteen different phases in an unequalled variety of formats. This generous offering makes it easy to choose the proper column for your application.



The columns and cartridges included in this version of the Higgins Analytical catalog have internal diameters ranging from 75µm to 20mm. Not listed are our 30mm and 50mm i.d. prep-columns. The bulk of our business in these large formats is based on Proto 200 and Proto 300 C4 and C18 products on particle sizes ranging from 10µm to 50µm geared for biomolecule purification - especially synthetic peptides.

As outlined in the paragraph below, another service we provide is custom manufacturing for columns of all sizes, 30mm and 50mm prep-columns included, with sorbents produced by manufacturers other than ourselves. So, if you are interested in one of our many sorbents, or another material that you may prefer, please

give us a call to discuss the details.

## UNEQUALED FLEXIBILITY

### Custom Manufacturing Service

Besides being known worldwide for our huge variety of high quality and uncompromisingly affordable Higgins Analytical products, custom labeled manufacturing represents a sizeable part of our business. In fact, a lot of people might be very surprised if they learned that their favorite competitive column was actually packed by Higgins Analytical. In addition to being based on our own unique sorbents, many of the products we manufacture are produced with our customers' own proprietary media. So, if your company feels it might want to add a selection of high quality HPLC columns to its product offering, or if you need large numbers of a particular column or device for your internal analytical needs, please give us a call. Higgins Analytical is very expert at providing this type of service.

***If you can put it in a bottle, Higgins Analytical will pack it into a column.  
If we're unsuccessful, it won't cost a thing!***



## HPLC Columns and Cartridges

Higgins Analytical HPLC column product part numbers are based on a 2-4-4 character pattern. For example:

TS-1521-C185

is the part number for a conventional 15cm x 2.1mm stainless steel column packed with Targa C18 5µm sorbent.

The two character prefix indicates sorbent and hardware type.

Prefix Character 1 (Sorbent)  
 ■X-XXXX-XXXX

C = CLIPEUS  
 H = HAISIL 100 or HAISIL 300  
 L = HAISIL HL  
 P = PHALANX  
 R = PROTO 200 or 300  
 T = TARGA  
 V = HEAVY

Prefix Character 2 (Hardware)  
 X■-XXXX-XXXX

FS = Capellini 6-32 column  
 PS = Capellini 10-32 column  
 S = Stainless steel HPLC Column  
 P = PEEK HPLC column  
 F = Stainless steel cartridge column  
 K = PEEK cartridge column  
 R = Sprite Direct-Connect column

Note: Microbore columns have the second character, S, like stainless steel columns, but they are glass lined.

The four center characters indicate the column or cartridge length (cm) and internal diameter (mm).

Center Characters 1 and 2 (Length)  
 XX-■■XX-XXX

03 = 3cm  
 04 = 4cm  
 05 = 5cm  
 07 = 7.5cm  
 10 = 10cm  
 12 = 12.5cm  
 15 = 15cm  
 20 = 20cm  
 22 = 22cm  
 25 = 25cm  
 30 = 30cm  
 50 = 50cm

The four center characters indicate the column or cartridge length (cm) and internal diameter (mm).

Center Characters 3 and 4 (I.D.)  
 XX-XX■-XXXX

07 = 0.075mm  
 M1 = 0.1mm  
 15 = 0.15mm  
 M3 = 0.3mm  
 M5 = 0.5mm  
 M8 = 0.8mm  
 01 = 1.0mm  
 21 = 2.1mm  
 30 = 3.0mm  
 32 = 3.2mm  
 39 = 3.9mm  
 40 = 4.0mm  
 46 = 4.6mm  
 10 = 10mm  
 20 = 20mm

The four character suffix indicates sorbent chemistry and particle size.

Suffix Characters 1 to 3 (Phase)  
 XX-XXXX-■■■X

C04 = Butyl or C4  
 C08 = Octyl or C8  
 C18 = ODS or C18  
 CNP = Cyano or Nitrile  
 D04 = 200Å C4  
 D18 = 200Å C18  
 M08 = HAISIL 100 C8  
 M18 = HAISIL 100 C18  
 NH2 = Amino  
 PHN = Phenyl  
 SIL = Silica Gel  
 W04 = 300Å C4  
 W08 = 300Å C8  
 W18 = 300Å C18

Suffix Character 4 (Particle Size)  
 XX-XXXX-XXX■

1 = 10µm  
 2 = 10 - 15µm  
 3 = 3 or 3.5µm  
 5 = 4 - 5µm  
 7 = 15 - 20µm

Notes:

- (1) Standard configurations are highlighted.
- (2) Polymeric phases have a 3-4-6 pattern. The first two prefix characters are PL. The last character denotes particle size.

PLx-xxxx-xxxxxx

## Cartridge Holders

### Guards

Two types of holders for 2cm long PEEK and s.s. cartridges are offered.

HK-GUARD-FF Female/Female  
 HK-GUARD-FM Direct Connect

### Analytical Cartridge Holders

Three internal diameters (2.1, 3.2, and 4.6mm) and three lengths are offered.

HK-HOLD-40 for 4cm long cartridge  
 HK-HOLD-50 for 5cm long cartridge  
 HK-HOLD-100 for 10cm long cartridge

### HAISpeed 10 Cartridge Holders

These 10mm i.d. cartridges are offered in three lengths.

10-HOLD-30 for 3cm long cartridge  
 10-HOLD-50 for 5cm long cartridge  
 10-HOLD-100 for 10cm long cartridge

### HAISpeed 20 Cartridge Holder

20mm i.d. prep guard cartridges require a 25, 35, or a 50mm long cartridge holder.

20-HOLD-25 for 20 x 25mm cartridge  
 20-HOLD-35 for 20 x 35mm cartridge  
 20-HOLD-50 for 20 x 50mm cartridge

## HPLC Columns

### Wide Range of Stainless Steel HPLC COLUMNS



### Widest Range of Hardware Types and Sizes Available Anywhere

Higgins Analytical manufactures the widest range of column formats in the widest range of hardware types available anywhere. Conventional HPLC columns are offered in stainless steel hardware. Frit materials include stainless steel, Carpenter C, titanium. Standard lengths range from 3.3cm to 25 cm. Custom columns are routinely manufactured in odd length ranging from 3.3 to 50cm. The internal diameters of our entire HPLC column and cartridge offering range from 75µm to 20mm, over two orders of magnitude.

### Guide to Some Standard HPLC Column Part Numbers

xS-xxxx-xxxx	Stainless Steel (ss) column	
xP-xxxx-xxxx	PEEK column	
xS-03xx-xxxx	3.5cm ss column	Shortest standard size
xS-25xx-xxxx	25cm ss column	Longest standard size
xP-05xx-xxxx	5cm PEEK column	Shortest standard size
xP-25xx-xxxx	25cm PEEK column	Longest standard size
xS-xx21-xxxx	2.1mm ss I.D.	Smallest standard I.D.
xP-xx21-xxxx	2.1mm PEEK I.D.	Smallest standard I.D.
xS-xx46-xxxx	4.6mm ss I.D.	Popular standard I.D.
xP-xx46-xxxx	4.6mm PEEK I.D.	Popular standard I.D.

See Page 23 for complete Part Number information

## CLIQUEUS Analytical Columns - Stainless Steel



<b>CLIQUEUS C8 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
CS-0346-C085	\$330	CS-0546-C085	\$340	CS-1046-C085	\$350	CS-1546-C085	\$390	CS-2546-C085	\$420
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
CS-0340-C085	\$330	CS-0540-C085	\$340	CS-1040-C085	\$350	CS-1540-C085	\$390	CS-2540-C085	\$420
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
CS-0330-C085	\$330	CS-0530-C085	\$340	CS-1030-C085	\$350	CS-1530-C085	\$390	CS-2530-C085	\$420
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
CS-0321-C085	\$330	CS-0521-C085	\$340	CS-1021-C085	\$350	CS-1521-C085	\$390	CS-2521-C085	\$420
<b>CLIQUEUS C18 10µm</b>		<b>4.6mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
CS-0346-C181	\$290	CS-0546-C181	\$300	CS-1046-C181	\$320	CS-1546-C181	\$360	CS-2546-C181	\$390
<b>CLIQUEUS C18 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
CS-0346-C185	\$330	CS-0546-C185	\$340	CS-1046-C185	\$350	CS-1546-C185	\$390	CS-2546-C185	\$420
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
CS-0340-C185	\$330	CS-0540-C185	\$340	CS-1040-C185	\$350	CS-1540-C185	\$390	CS-2540-C185	\$420
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
CS-0330-C185	\$330	CS-0530-C185	\$340	CS-1030-C185	\$350	CS-1530-C185	\$390	CS-2530-C185	\$420
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
CS-0321-C185	\$330	CS-0521-C185	\$340	CS-1021-C185	\$350	CS-1521-C185	\$390	CS-2521-C185	\$420



## CLIQUEUS Analytical Columns - Stainless Steel



<b>CLIQUEUS Cyano 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm	250x4.6mm		
CS-0346-CNP5	\$340	CS-0546-CNP5	\$350	CS-1046-CNP5	\$360	CS-1546-CNP5	\$410	CS-2546-CNP5	\$430
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm	250x4.0mm		
CS-0340-CNP5	\$340	CS-0540-CNP5	\$350	CS-1040-CNP5	\$360	CS-1540-CNP5	\$410	CS-2540-CNP5	\$430
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm	250x3.0mm		
CS-0330-CNP5	\$340	CS-0530-CNP5	\$350	CS-1030-CNP5	\$360	CS-1530-CNP5	\$410	CS-2530-CP5	\$430
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm	250x2.1mm		
CS-0321-CNP5	\$340	CS-0521-CNP5	\$350	CS-1021-CNP5	\$360	CS-1521-CNP5	\$410	CS-2521-CNP5	\$430

<b>CLIQUEUS Phenyl 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm	250x4.6mm		
CS-0346-PHN5	\$340	CS-0546-PHN5	\$350	CS-1046-PHN5	\$360	CS-1546-PHN5	\$410	CS-2546-PHN5	\$430
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm	250x4.0mm		
CS-0340-PHN5	\$340	CS-0540-PHN5	\$350	CS-1040-PHN5	\$360	CS-1540-PHN5	\$410	CS-2540-PHN5	\$430
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm	250x3.0mm		
CS-0330-PHN5	\$340	CS-0530-PHN5	\$350	CS-1030-PHN5	\$360	CS-1530-PHN5	\$410	CS-2530-PHN5	\$430
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm	250x2.1mm		
CS-0321-PHN5	\$340	CS-0521-PHN5	\$350	CS-1021-PHN5	\$360	CS-1521-PHN5	\$410	CS-2521-PHN5	\$430

<b>CLIQUEUS Silica 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm	250x4.6mm		
CS-0346-SIL5	\$290	CS-0546-SIL5	\$290	CS-1046-SIL5	\$320	CS-1546-SIL5	\$360	CS-2546-SIL5	\$380
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm	250x4.0mm		
CS-0340-SIL5	\$290	CS-0540-SIL5	\$290	CS-1040-SIL5	\$320	CS-1540-SIL5	\$360	CS-2540-SIL5	\$380
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm	250x3.0mm		
CS-0330-SIL5	\$290	CS-0530-SIL5	\$290	CS-1030-SIL5	\$320	CS-1530-SIL5	\$360	CS-2530-SIL5	\$380
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm	250x2.1mm		
CS-0321-SIL5	\$290	CS-0521-SIL5	\$290	CS-1021-SIL5	\$320	CS-1521-SIL5	\$360	CS-2521-SIL5	\$380

## HASIL 100 Analytical Columns - Stainless Steel



<b>HASIL 100 C8 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm	250x4.6mm		
HS-0346-M085	\$330	HS-0546-M085	\$340	HS-1046-M085	\$350	HS-1546-M085	\$390	HS-2546-M085	\$420
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm	250x4.0mm		
HS-0340-M085	\$330	HS-0540-M085	\$340	HS-1040-M085	\$350	HS-1540-M085	\$390	HS-2540-M085	\$420
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm	250x3.0mm		
HS-0330-M085	\$330	HS-0530-M085	\$340	HS-1030-M085	\$350	HS-1530-M085	\$390	HS-2530-M085	\$420
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm	250x2.1mm		
HS-0321-M085	\$330	HS-0521-M085	\$340	HS-1021-M085	\$350	HS-1521-M085	\$390	HS-2521-M085	\$420

<b>HASIL 100 C18 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm	250x4.6mm		
HS-0346-M185	\$330	HS-0546-M185	\$340	HS-1046-M185	\$350	HS-1546-M185	\$390	HS-2546-M185	\$420
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm	250x4.0mm		
HS-0340-M185	\$330	HS-0540-M185	\$340	HS-1040-M185	\$350	HS-1540-M185	\$390	HS-2540-M185	\$420
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm	250x3.0mm		
HS-0330-M185	\$330	HS-0530-M185	\$340	HS-1030-M185	\$350	HS-1530-M185	\$390	HS-2530-M185	\$420
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm	250x2.1mm		
HS-0321-M185	\$330	HS-0521-M185	\$340	HS-1021-M185	\$350	HS-1521-M185	\$390	HS-2521-M185	\$420



## HPLC Columns (continued)

Wide Range of Stainless Steel HPLC COLUMNS



### HAISIL100 Analytical Columns - Stainless Steel (cont.)



HAISIL 100 Silica 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
HS-0346-SIL5	\$290	HS-0546-SIL5	\$290	HS-1046-SIL5	\$300	HS-1546-SIL5	\$360	HS-2546-SIL5	\$380
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
HS-0340-SIL5	\$290	HS-0540-SIL5	\$290	HS-1040-SIL5	\$300	HS-1540-SIL5	\$360	HS-2540-SIL5	\$380
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
HS-0330-SIL5	\$290	HS-0530-SIL5	\$290	HS-1030-SIL5	\$300	HS-1530-SIL5	\$360	HS-2530-SIL5	\$380
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
HS-0321-SIL5	\$290	HS-0521-SIL5	\$290	HS-1021-SIL5	\$300	HS-1521-SIL5	\$360	HS-2521-SIL5	\$380

### HAISIL300 Analytical Columns - Stainless Steel



HAISIL 300 C18 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
HS-0346-W185	\$370	HS-0546-W185	\$390	HS-1046-W185	\$420	HS-1546-W185	\$450	HS-2546-W185	\$480
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
HS-0340-W185	\$370	HS-0540-W185	\$390	HS-1040-W185	\$420	HS-1540-W185	\$450	HS-2540-W185	\$480
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
HS-0330-W185	\$370	HS-0530-W185	\$390	HS-1030-W185	\$420	HS-1530-W185	\$450	HS-2530-W185	\$480
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
HS-0321-W185	\$370	HS-0521-W185	\$390	HS-1021-W185	\$420	HS-1521-W185	\$450	HS-2521-W185	\$480

### HAISIL HL Analytical Columns - Stainless Steel



HAISIL HL C18 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
LS-0346-C185	\$460	LS-0546-C185	\$470	LS-1046-C185	\$480	LS-1546-C185	\$500	LS-2546-C185	\$530
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
LS-0340-C185	\$460	LS-0540-C185	\$470	LS-1040-C185	\$480	LS-1540-C185	\$500	LS-2540-C185	\$530
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
LS-0330-C185	\$460	LS-0530-C185	\$470	LS-1030-C185	\$480	LS-1530-C185	\$500	LS-2530-C185	\$530
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
LS-0321-C185	\$460	LS-0521-C185	\$470	LS-1021-C185	\$480	LS-1521-C185	\$500	LS-2521-C185	\$530





See pages 62 - 63 for information on the wide variety of Guard Cartridges available for these Analytical Columns

### PROTO 200 Analytical Columns - Stainless Steel

200

PROTO 200 C4 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
RS-0346-D045	\$370	RS-0546-D045	\$390	RS-1046-D045	\$420	RS-1546-D045	\$450	RS-2546-D045	\$480
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
RS-0340-D045	\$370	RS-0540-D045	\$390	RS-1040-D045	\$420	RS-1540-D045	\$450	RS-2540-D045	\$480
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
RS-0330-D045	\$370	RS-0530-D045	\$390	RS-1030-D045	\$420	RS-1530-D045	\$450	RS-2530-D045	\$480
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
RS-0321-D045	\$370	RS-0521-D045	\$390	RS-1021-D045	\$420	RS-1521-D045	\$450	RS-2521-D045	\$480

PROTO 200 C18 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
RS-0346-D185	\$370	RS-0546-D185	\$390	RS-1046-D185	\$420	RS-1546-D185	\$450	RS-2546-D185	\$480
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
RS-0340-D185	\$370	RS-0540-D185	\$390	RS-1040-D185	\$420	RS-1540-D185	\$450	RS-2540-D185	\$480
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
RS-0330-D185	\$370	RS-0530-D185	\$390	RS-1030-D185	\$420	RS-1530-D185	\$450	RS-2530-D185	\$480
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
RS-0321-D185	\$370	RS-0521-D185	\$390	RS-1021-D185	\$420	RS-1521-D185	\$450	RS-2521-D185	\$480

### PROTO 300 Analytical Columns - Stainless Steel



PROTO 300 C4 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
RS-0346-W045	\$370	RS-0546-W045	\$390	RS-1046-W045	\$420	RS-1546-W045	\$450	RS-2546-W045	\$480
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
RS-0340-W045	\$370	RS-0540-W045	\$390	RS-1040-W045	\$420	RS-1540-W045	\$450	RS-2540-W045	\$480
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
RS-0330-W045	\$370	RS-0530-W045	\$390	RS-1030-W045	\$420	RS-1530-W045	\$450	RS-2530-W045	\$480
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
RS-0321-W045	\$370	RS-0521-W045	\$390	RS-1021-W045	\$420	RS-1521-W045	\$450	RS-2521-W045	\$480

PROTO 300 C18 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
RS-0346-W185	\$370	RS-0546-W185	\$390	RS-1046-W185	\$420	RS-1546-W185	\$450	RS-2546-W185	\$480
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
RS-0340-W185	\$370	RS-0540-W185	\$390	RS-1040-W185	\$420	RS-1540-W185	\$450	RS-2540-W185	\$480
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
RS-0330-W185	\$370	RS-0530-W185	\$390	RS-1030-W185	\$420	RS-1530-W185	\$450	RS-2530-W185	\$480
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
RS-0321-W185	\$370	RS-0521-W185	\$390	RS-1021-W185	\$420	RS-1521-W185	\$450	RS-2521-W185	\$480



## HPLC Columns (continued)

Wide Range of Stainless Steel HPLC COLUMNS



### PHALANX Analytical Columns - Stainless Steel

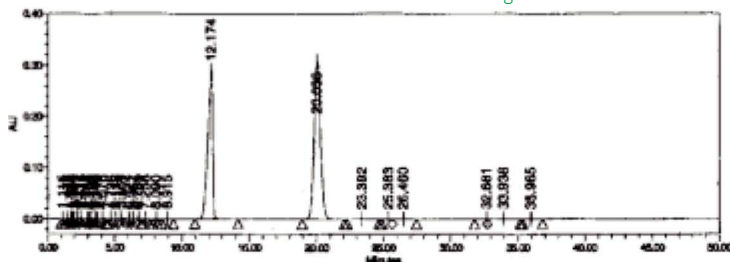


PHALANX C18 3µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
PS-0346-C183	\$460	PS-0546-C183	\$470	PS-1046-C183	\$530	PS-1546-C183	\$570	PS-2546-C183	\$600
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
PS-0340-C183	\$460	PS-0540-C183	\$470	PS-1040-C183	\$530	PS-1540-C183	\$570	PS-2540-C183	\$600
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
PS-0330-C183	\$460	PS-0530-C183	\$470	PS-1030-C183	\$530	PS-1530-C183	\$570	PS-2530-C183	\$600
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
PS-0321-C183	\$460	PS-0521-C183	\$470	PS-1021-C183	\$530	PS-1521-C183	\$570	PS-2521-C183	\$600

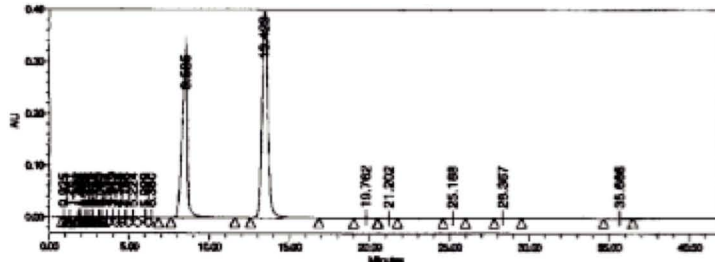
PHALANX C18 5µm		4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
PS-0346-C185	\$370	PS-0546-C185	\$390	PS-1046-C185	\$420	PS-1546-C185	\$450	PS-2546-C185	\$480
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
PS-0340-C185	\$370	PS-0540-C185	\$390	PS-1040-C185	\$420	PS-1540-C185	\$450	PS-2540-C185	\$480
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
PS-0330-C185	\$370	PS-0530-C185	\$390	PS-1030-C185	\$420	PS-1530-C185	\$450	PS-2530-C185	\$480
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
PS-0321-C185	\$370	PS-0521-C185	\$390	PS-1021-C185	\$420	PS-1521-C185	\$450	PS-2521-C185	\$480

### Comparison of PHALANX to Kromasil C18 for a Pharmaceutical Drug Analysis 150 X 4.6mm Columns, 1mL/min Linear Gradient for 50 minutes

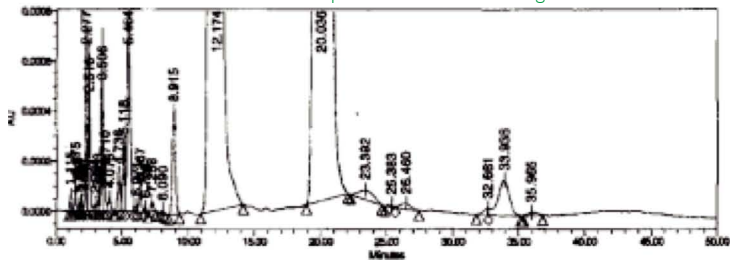
PHALANX Full Scale Chromatogram



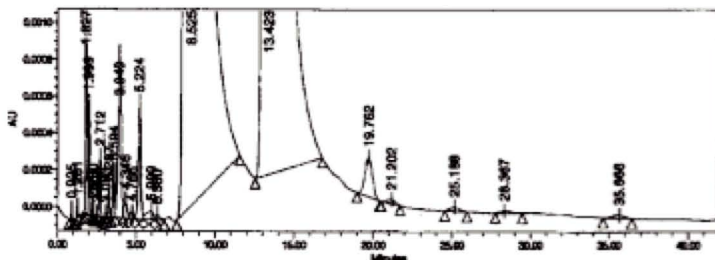
KROMASIL C18 Full Scale Chromatogram



PHALANX Expanded Scale Chromatogram



KROMASIL C18 Expanded Scale Chromatogram



Higgins Analytical thanks Amos Heckendorf of The Nest Group ([www.nestgrp.com](http://www.nestgrp.com)) for these data.



See pages 62 - 63 for information on the wide variety of Guard Cartridges available for these Analytical Columns

### TARGA Analytical Columns - Stainless Steel



<b>TARGA C8 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
TS-0346-C085	\$350	TS-0546-C085	\$360	TS-1046-C085	\$390	TS-1546-C085	\$420	TS-2546-C085	\$430
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
TS-0340-C085	\$350	TS-0540-C085	\$360	TS-1040-C085	\$390	TS-1540-C085	\$420	TS-2540-C085	\$430
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
TS-0330-C085	\$350	TS-0530-C085	\$360	TS-1030-C085	\$390	TS-1530-C085	\$420	TS-2530-C085	\$430
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
TS-0321-C085	\$350	TS-0521-C085	\$360	TS-1021-C085	\$390	TS-1521-C085	\$420	TS-2521-C085	\$430

<b>TARGA C18 3µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
TS-0346-C183	\$410	TS-0546-C183	\$450	TS-1046-C183	\$480	TS-1546-C183	\$510	TS-2546-C183	\$550
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
TS-0340-C183	\$410	TS-0540-C183	\$450	TS-1040-C183	\$480	TS-1540-C183	\$510	TS-2540-C183	\$550
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
TS-0330-C183	\$410	TS-0530-C183	\$450	TS-1030-C183	\$480	TS-1530-C183	\$510	TS-2530-C183	\$550
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
TS-0321-C183	\$410	TS-0521-C183	\$450	TS-1021-C183	\$480	TS-1521-C183	\$510	TS-2521-C183	\$550

<b>TARGA C18 5µm</b>		<b>4.6, 4.0, 3.0, and 2.1mm I.D. s.s. columns</b>							
30x4.6mm		50x4.6mm		100x4.6mm		150x4.6mm		250x4.6mm	
TS-0346-C185	\$350	TS-0546-C185	\$360	TS-1046-C185	\$390	TS-1546-C185	\$420	TS-2546-C185	\$430
30x4.0mm		50x4.0mm		100x4.0mm		150x4.0mm		250x4.0mm	
TS-0340-C185	\$350	TS-0540-C185	\$360	TS-1040-C185	\$390	TS-1540-C185	\$420	TS-2540-C185	\$430
30x3.0mm		50x3.0mm		100x3.0mm		150x3.0mm		250x3.0mm	
TS-0330-C185	\$350	TS-0530-C185	\$360	TS-1030-C185	\$390	TS-1530-C185	\$420	TS-2530-C185	\$430
30x2.1mm		50x2.1mm		100x2.1mm		150x2.1mm		250x2.1mm	
TS-0321-C185	\$350	TS-0521-C185	\$360	TS-1021-C185	\$390	TS-1521-C185	\$420	TS-2521-C185	\$430



## Microbore HPLC Columns

Wide Range of 1mm, 0.8mm, 0.5mm, and 0.3mm Columns

### Guide to MICROBORE Part Numbers

xS-xx01-xxxx	1.0mm Microbore
xS-xxM8-xxxx	0.8mm Microbore
xS-xxM5-xxxx	0.5mm Microbore
xS-xxM3-xxxx	0.3mm Microbore

See Page 23 for complete Part Number information

### Widest Range of Microbore column sizes with a wide range of sorbents

Higgins Analytical manufactures the widest range of Microbore column formats available anywhere. In addition to the glass-lined columns ranging from 300µm to 1mm I.D., we also provide unique PEEK/Titanium microbore columns for specialized applications (see our **PICCOLO** on page 52).

## CLIQUEUS Microbore Columns



<b>CLIQUEUS C8 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
CS-0301-C085	\$370	CS-0501-C085	\$390	CS-1001-C085	\$420	CS-1501-C085	\$450	CS-2501-C085	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
CS-03M8-C085	\$370	CS-05M8-C085	\$390	CS-10M8-C085	\$420	CS-15M8-C085	\$450	CS-25M8-C085	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
CS-03M5-C085	\$370	CS-05M5-C085	\$390	CS-10M5-C085	\$420	CS-15M5-C085	\$450	CS-25M5-C085	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
CS-03M3-C085	\$370	CS-05M3-C085	\$390	CS-10M3-C085	\$420	CS-15M3-C085	\$450	CS-25M3-C085	\$480

<b>CLIQUEUS C18 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
CS-0301-C185	\$370	CS-0501-C185	\$390	CS-1001-C185	\$420	CS-1501-C185	\$450	CS-2501-C185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
CS-03M8-C185	\$370	CS-05M8-C185	\$390	CS-10M8-C185	\$420	CS-15M8-C185	\$450	CS-25M8-C185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
CS-03M5-C185	\$370	CS-05M5-C185	\$390	CS-10M5-C185	\$420	CS-15M5-C185	\$450	CS-25M5-C185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
CS-03M3-C185	\$370	CS-05M3-C185	\$390	CS-10M3-C185	\$420	CS-15M3-C185	\$450	CS-25M3-C185	\$480

<b>CLIQUEUS Cyano 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
CS-0301-CNP5	\$390	CS-0501-CNP5	\$410	CS-1001-CNP5	\$430	CS-1501-CNP5	\$470	CS-2501-CNP5	\$500
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
CS-03M8-CNP5	\$390	CS-05M8-CNP5	\$410	CS-10M8-CNP5	\$430	CS-15M8-CNP5	\$470	CS-25M8-CNP5	\$500
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
CS-03M5-CNP5	\$390	CS-05M5-CNP5	\$410	CS-10M5-CNP5	\$430	CS-15M5-CNP5	\$470	CS-25M5-CNP5	\$500
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
CS-03M3-CNP5	\$390	CS-05M3-CNP5	\$410	CS-10M3-CNP5	\$430	CS-15M3-CNP5	\$470	CS-25M3-CNP5	\$500

<b>CLIQUEUS Phenyl 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
CS-0301-PHN5	\$390	CS-0501-PHN5	\$410	CS-1001-PHN5	\$430	CS-1501-PHN5	\$470	CS-2501-PHN5	\$500
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
CS-03M8-PHN5	\$390	CS-05M8-PHN5	\$410	CS-10M8-PHN5	\$430	CS-15M8-PHN5	\$470	CS-25M8-PHN5	\$500
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
CS-03M5-PHN5	\$390	CS-05M5-PHN5	\$410	CS-10M5-PHN5	\$430	CS-15M5-PHN5	\$470	CS-25M5-PHN5	\$500
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
CS-03M3-PHN5	\$390	CS-05M3-PHN5	\$410	CS-10M3-PHN5	\$430	CS-15M3-PHN5	\$470	CS-25M3-PHN5	\$500





**CLYPEUS Microbore Columns (cont.)**



<b>CLYPEUS Silica 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
CS-0301-SIL5	\$370	CS-0501-SIL5	\$390	CS-1001-SIL5	\$420	CS-1501-SIL5	\$450	CS-2501-SIL5	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
CS-03M8-SIL5	\$370	CS-05M8-SIL5	\$390	CS-10M8-SIL5	\$420	CS-15M8-SIL5	\$450	CS-25M8-SIL5	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
CS-03M5-SIL5	\$370	CS-05M5-SIL5	\$390	CS-10M5-SIL5	\$420	CS-15M5-SIL5	\$450	CS-25M5-SIL5	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
CS-03M3-SIL5	\$370	CS-05M3-SIL5	\$390	CS-10M3-SIL5	\$420	CS-15M3-SIL5	\$450	CS-25M3-SIL5	\$480

**HAISIL100 Microbore Columns**



<b>HAISIL 100 C8 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
HS-0301-M085	\$370	HS-0501-M085	\$390	HS-1001-M085	\$420	HS-1501-M085	\$450	HS-2501-M085	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
HS-03M8-M085	\$370	HS-05M8-M085	\$390	HS-10M8-M085	\$420	HS-15M8-M085	\$450	HS-25M8-M085	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
HS-03M5-M085	\$370	HS-05M5-M085	\$390	HS-10M5-M085	\$420	HS-15M5-M085	\$450	HS-25M5-M085	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
HS-03M3-M085	\$370	HS-05M3-M085	\$390	HS-10M3-M085	\$420	HS-15M3-M085	\$450	HS-25M3-M085	\$480

<b>HAISIL 100 C18 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
HS-0301-M185	\$370	HS-0501-M185	\$390	HS-1001-M185	\$420	HS-1501-M185	\$450	HS-2501-M185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
HS-03M8-M185	\$370	HS-05M8-M185	\$390	HS-10M8-M185	\$420	HS-15M8-M185	\$450	HS-25M8-M185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
HS-03M5-M185	\$370	HS-05M5-M185	\$390	HS-10M5-M185	\$420	HS-15M5-M185	\$450	HS-25M5-M185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
HS-03M3-M185	\$370	HS-05M3-M185	\$390	HS-10M3-M185	\$420	HS-15M3-M185	\$450	HS-25M3-M185	\$480

<b>HAISIL 100 Silica 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
HS-0301-SIL5	\$370	HS-0501-SIL5	\$390	HS-1001-SIL5	\$420	HS-1501-SIL5	\$450	HS-2501-SIL5	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
HS-03M8-SIL5	\$370	HS-05M8-SIL5	\$390	HS-10M8-SIL5	\$420	HS-15M8-SIL5	\$450	HS-25M8-SIL5	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
HS-03M5-SIL5	\$370	HS-05M5-SIL5	\$390	HS-10M5-SIL5	\$420	HS-15M5-SIL5	\$450	HS-25M5-SIL5	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
HS-03M3-SIL5	\$370	HS-05M3-SIL5	\$390	HS-10M3-SIL5	\$420	HS-15M3-SIL5	\$450	HS-25M3-SIL5	\$480



## Microbore HPLC Columns (continued)

Wide Range of 1mm, 0.5mm, and 0.3mm Columns



### HAISIL300 Microbore Columns



HAISIL 300 C18 5µm		1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
HS-0301-W185	\$390	HS-0501-W185	\$400	HS-1001-W185	\$420	HS-1501-W185	\$450	HS-2501-W185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
HS-03M8-W185	\$390	HS-05M8-W185	\$400	HS-10M8-W185	\$420	HS-15M8-W185	\$450	HS-25M8-W185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
HS-03M5-W185	\$390	HS-05M5-W185	\$400	HS-10M5-W185	\$420	HS-15M5-W185	\$450	HS-25M5-W185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
HS-03M3-W185	\$390	HS-05M3-W185	\$400	HS-10M3-W185	\$420	HS-15M3-W185	\$450	HS-25M3-W185	\$480

### HAISIL HL Microbore Columns



HAISIL HL C18 5µm		1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
LS-0301-C185	\$390	LS-0501-C185	\$400	LS-1001-C185	\$420	LS-1501-C185	\$450	LS-2501-C185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
LS-03M8-C185	\$390	LS-05M8-C185	\$400	LS-10M8-C185	\$420	LS-15M8-C185	\$450	LS-25M8-C185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
LS-03M5-C185	\$390	LS-05M5-C185	\$400	LS-10M5-C185	\$420	LS-15M5-C185	\$450	LS-25M5-C185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
LS-03M3-C185	\$390	LS-05M3-C185	\$400	LS-10M3-C185	\$420	LS-15M3-C185	\$450	LS-25M3-C185	\$480



**PROTO 200 Microbore Columns**

200

<b>PROTO 200 C4 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
RS-0301-D045	\$390	RS-0501-D045	\$400	RS-1001-D045	\$420	RS-1501-D045	\$450	RS-2501-D045	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
RS-03M8-D185	\$390	RS-05M8-D185	\$400	RS-10M8-D185	\$420	RS-15M8-D185	\$450	RS-25M8-D185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
RS-03M5-D045	\$390	RS-05M5-D045	\$400	RS-10M5-D045	\$420	RS-15M5-D045	\$450	RS-25M5-D045	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
RS-03M3-D045	\$390	RS-05M3-D045	\$400	RS-10M3-D045	\$420	RS-15M3-D045	\$450	RS-25M3-D045	\$480

<b>PROTO 200 C18 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
RS-0301-D185	\$390	RS-0501-D185	\$400	RS-1001-D185	\$420	RS-1501-D185	\$450	RS-2501-D185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
RS-03M8-D185	\$390	RS-05M8-D185	\$400	RS-10M8-D185	\$420	RS-15M8-D185	\$450	RS-25M8-D185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
RS-03M5-D185	\$390	RS-05M5-D185	\$400	RS-10M5-D185	\$420	RS-15M5-D185	\$450	RS-25M5-D185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
RS-03M3-D185	\$390	RS-05M3-D185	\$400	RS-10M3-D185	\$420	RS-15M3-D185	\$450	RS-25M3-D185	\$480

**PROTO 300 Microbore Columns**



<b>PROTO 300 C4 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
RS-0301-W045	\$390	RS-0501-W045	\$400	RS-1001-W045	\$420	RS-1501-W045	\$450	RS-2501-W045	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
RS-03M8-W045	\$390	RS-05M8-W045	\$400	RS-10M8-W045	\$420	RS-15M8-W045	\$450	RS-25M8-W045	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
RS-03M5-W045	\$390	RS-05M5-W045	\$400	RS-10M5-W045	\$420	RS-15M5-W045	\$450	RS-25M5-W045	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
RS-03M3-W045	\$390	RS-05M3-W045	\$400	RS-10M3-W045	\$420	RS-15M3-W045	\$450	RS-25M3-W045	\$480

<b>PROTO 300 C18 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
RS-0301-W185	\$390	RS-0501-W185	\$400	RS-1001-W185	\$420	RS-1501-W185	\$450	RS-2501-W185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
RS-03M8-W185	\$390	RS-05M8-W185	\$400	RS-10M8-W185	\$420	RS-15M8-W185	\$450	RS-25M8-W185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
RS-03M5-W185	\$390	RS-05M5-W185	\$400	RS-10M5-W185	\$420	RS-15M5-W185	\$450	RS-25M5-W185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
RS-03M3-W185	\$390	RS-05M3-W185	\$400	RS-10M3-W185	\$420	RS-15M3-W185	\$450	RS-25M3-W185	\$480

**PHALANX Microbore Columns (5µm PHALANX on following page)**



<b>PHALANX C18 3µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
PS-0301-C183	\$460	PS-0501-C183	\$470	PS-1001-C183	\$530	PS-1501-C183	\$570	PS-2501-C183	\$600
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
PS-03M8-C183	\$460	PS-05M8-C183	\$470	PS-10M8-C183	\$530	PS-15M8-C183	\$570	PS-25M8-C183	\$600
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
PS-03M5-C183	\$460	PS-05M5-C183	\$470	PS-10M5-C183	\$530	PS-15M5-C183	\$570	PS-25M5-C183	\$600
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
PS-03M3-C183	\$460	PS-05M3-C183	\$470	PS-10M3-C183	\$530	PS-15M3-C183	\$570	PS-25M3-C183	\$600



## Microbore HPLC Columns (continued)

Wide Range of 1mm, 0.5mm, and 0.3mm Columns



Higgins Analytical manufactures the widest range of Microbore HPLC Columns in the world.

### PHALANX Microbore Columns (cont. - 3µm PHALANX on previous page)



<b>PHALANX C18 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
PS-0301-C185	\$390	PS-0501-C185	\$400	PS-1001-C185	\$420	PS-1501-C185	\$450	PS-2501-C185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
PS-03M8-C185	\$390	PS-05M8-C185	\$400	PS-10M8-C185	\$420	PS-15M8-C185	\$450	PS-25M8-C185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
PS-03M5-C185	\$390	PS-05M5-C185	\$400	PS-10M5-C185	\$420	PS-15M5-C185	\$450	PS-25M5-C185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
PS-03M3-C185	\$390	PS-05M3-C185	\$400	PS-10M3-C185	\$420	PS-15M3-C185	\$450	PS-25M3-C185	\$480

### TARGA Microbore Columns



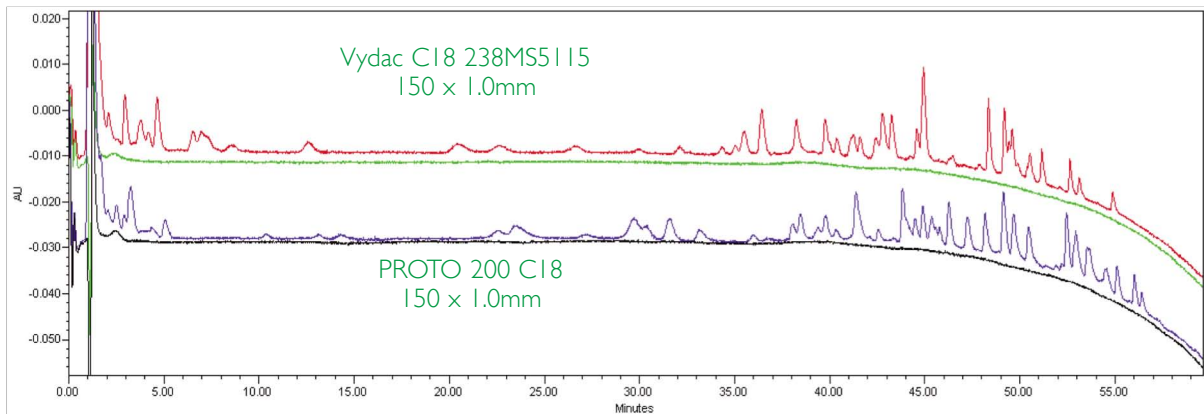
<b>TARGA C8 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
TS-0301-C085	\$390	TS-0501-C085	\$400	TS-1001-C085	\$420	TS-1501-C085	\$450	TS-2501-C085	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
TS-03M8-C085	\$390	TS-05M8-C085	\$400	TS-10M8-C085	\$420	TS-15M8-C085	\$450	TS-25M8-C085	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
TS-03M5-C085	\$390	TS-05M5-C085	\$400	TS-10M5-C085	\$420	TS-15M5-C085	\$450	TS-25M5-C085	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
TS-03M3-C085	\$390	TS-05M3-C085	\$400	TS-10M3-C085	\$420	TS-15M3-C085	\$450	TS-25M3-C085	\$480

<b>TARGA C18 3µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
TS-0301-C183	\$430	TS-0501-C183	\$460	TS-1001-C183	\$480	TS-1501-C183	\$510	TS-2501-C183	\$550
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
TS-03M8-C183	\$430	TS-05M8-C183	\$460	TS-10M8-C183	\$480	TS-15M8-C183	\$510	TS-25M8-C183	\$550
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
TS-03M5-C183	\$430	TS-05M5-C183	\$460	TS-10M5-C183	\$480	TS-15M5-C183	\$510	TS-25M5-C183	\$550
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
TS-03M3-C183	\$430	TS-05M3-C183	\$460	TS-10M3-C183	\$480	TS-15M3-C183	\$510	TS-25M3-C183	\$550

<b>TARGA C18 5µm</b>		<b>1.0, 0.8, 0.5, and 0.3mm I.D. s.s. columns</b>							
30x1.0mm		50x1.0mm		100x1.0mm		150x1.0mm		250x1.0mm	
TS-0301-C185	\$390	TS-0501-C185	\$400	TS-1001-C185	\$420	TS-1501-C185	\$450	TS-2501-C185	\$480
30x0.8mm		50x0.8mm		100x0.8mm		150x0.8mm		250x0.8mm	
TS-03M8-C185	\$390	TS-05M8-C185	\$400	TS-10M8-C185	\$420	TS-15M8-C185	\$450	TS-25M8-C185	\$480
30x0.5mm		50x0.5mm		100x0.5mm		150x0.5mm		250x0.5mm	
TS-03M5-C185	\$390	TS-05M5-C185	\$400	TS-10M5-C185	\$420	TS-15M5-C185	\$450	TS-25M5-C185	\$480
30x0.3mm		50x0.3mm		100x0.3mm		150x0.3mm		250x0.3mm	
TS-03M3-C185	\$390	TS-05M3-C185	\$400	TS-10M3-C185	\$420	TS-15M3-C185	\$450	TS-25M3-C185	\$480



Comparison of a Higgins to Another Manufacturer's Imm Column



Tryptic Digest of Carbamidomethylated BSA (see page 15 for details)



## Semi-Prep and Prep Columns

Wide Range of 10mm and 20mm i.d. columns



### Semi-Prep (10mm) and Prep (20mm) Columns

Not only does Higgins Analytical manufacturer semi-prep and prep columns with our most popular phases, we also produce guard cartridges for these columns.

See pages 56 - 57 (10mm) and 60 - 61 (20mm) for more information about guard cartridges, and pages 62 - 63 for cartridge holders.

### Guide to Semi-Prep and Prep Column Part Numbers

xS-xx10-xxxx 10mm I.D. columns

xS-xx20-xxxx 20mm I.D. columns

See Page 23 for complete Part Number information

### CLIQUEUS 10mm Semi-Prep and 20mm Prep Columns



CLIQUEUS C8 5µm	10 and 20mm I.D. s.s. columns							
	50x10mm		100x10mm		150x10mm		250x10mm	
	CS-0510-C085	\$580	CS-1010-C085	\$780	CS-1510-C085	\$1080	CS-2510-C085	\$1310
	50x20mm		100x20mm		150x20mm		250x20mm	
	CS-0520-C085	\$1260	CS-1020-C085	\$2000	CS-1520-C085	\$2360	CS-2520-C085	\$3470
CLIQUEUS C18 10µm	10 and 20mm I.D. s.s. columns							
	50x10mm		100x10mm		150x10mm		250x10mm	
	CS-0510-C181	\$360	CS-1010-C181	\$410	CS-1510-C181	\$620	CS-2510-C181	\$790
	50x20mm		100x20mm		150x20mm		250x20mm	
	CS-0520-C181	\$1000	CS-1020-C181	\$1280	CS-1520-C181	\$1640	CS-2520-C181	\$2090
CLIQUEUS C18 5µm	10 and 20mm I.D. s.s. columns							
	50x10mm		100x10mm		150x10mm		250x10mm	
	CS-0510-C185	\$580	CS-1010-C185	\$780	CS-1510-C185	\$1080	CS-2510-C185	\$1310
	50x20mm		100x20mm		150x20mm		250x20mm	
	CS-0520-C185	\$1260	CS-1020-C185	\$2000	CS-1520-C185	\$2360	CS-2520-C185	\$3470
CLIQUEUS Silica 10µm	10 and 20mm I.D. s.s. columns							
	50x10mm		100x10mm		150x10mm		250x10mm	
	CS-0510-SIL1	\$300	CS-1010-SIL1	\$430	CS-1510-SIL1	\$590	CS-2510-SIL1	\$740
	50x20mm		100x20mm		150x20mm		250x20mm	
	CS-0520-SIL1	\$930	CS-1020-SIL1	\$1100	CS-1520-SIL1	\$1530	CS-2520-SIL1	\$1940



## HAISIL100 10mm Semi-Prep and 20mm Prep Columns



HAISIL 100 C8 5µm		10 and 20mm I.D. s.s. columns					
50x10mm		100x10mm		150x10mm		250x10mm	
HS-0510-M085	\$580	HS-1010-M085	\$780	HS-1510-M085	\$1080	HS-2510-M085	\$1310
50x20mm		100x20mm		150x20mm		250x20mm	
HS-0520-M085	\$1260	HS-1020-M085	\$2000	HS-1520-M085	\$2360	HS-2520-M085	\$3470

## HAISIL 100 C18 5µm

## 10 and 20mm I.D. s.s. columns

50x10mm		100x10mm		150x10mm		250x10mm	
HS-0510-M185	\$580	HS-1010-M185	\$780	HS-1510-M185	\$1080	HS-2510-M185	\$1310
50x20mm		100x20mm		150x20mm		250x20mm	
HS-0520-M185	\$1260	HS-1020-M185	\$2000	HS-1520-M185	\$2360	HS-2520-M185	\$3470

## PHALANX 10mm Semi-Prep and 20mm Prep Columns



PHALANX C18 10µm		10 and 20mm I.D. s.s. columns					
50x10mm		100x10mm		150x10mm		250x10mm	
PS-0510-C181	\$360	PS-1010-C181	\$410	PS-1510-C181	\$620	PS-2510-C181	\$790
50x20mm		100x20mm		150x20mm		250x20mm	
PS-0520-C181	\$1000	PS-1020-C181	\$1280	PS-1520-C181	\$1640	PS-2520-C181	\$2090

## PHALANX C18 5µm

## 10 and 20mm I.D. s.s. columns

50x10mm		100x10mm		150x10mm		250x10mm	
PS-0510-C185	\$600	PS-1010-C185	\$780	PS-1510-C185	\$1080	PS-2510-C185	\$1310
50x20mm		100x20mm		150x20mm		250x20mm	
PS-0520-C185	\$1260	PS-1020-C185	\$2000	PS-1520-C185	\$2360	PS-2520-C185	\$3470

## PROTO 200 10mm Semi-Prep and 20mm Prep Columns

200

PROTO 200 C4 10µm		10 and 20mm I.D. s.s. columns					
50x10mm		100x10mm		150x10mm		250x10mm	
RS-0510-D041	\$360	RS-1010-D041	\$410	RS-1510-D041	\$620	RS-2510-D041	\$790
50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-D041	\$1000	RS-1020-D041	\$1280	RS-1520-D041	\$1640	RS-2520-D041	\$2090

## PROTO 200 C4 5µm

## 10 and 20mm I.D. s.s. columns

50x10mm		100x10mm		150x10mm		250x10mm	
RS-0510-D045	\$580	RS-1010-D045	\$780	RS-1510-D045	\$1080	RS-2510-D045	\$1310
50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-D045	\$1260	RS-1020-D045	\$2000	RS-1520-D045	\$2360	RS-2520-D045	\$3470

## PROTO 200 C18 10µm

## 10 and 20mm I.D. s.s. columns

50x10mm		100x10mm		150x10mm		250x10mm	
RS-0510-D181	\$360	RS-1010-D181	\$410	RS-1510-D181	\$620	RS-2510-D181	\$790
50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-D181	\$1000	RS-1020-D181	\$1280	RS-1520-D181	\$1640	RS-2520-D181	\$2090

## PROTO 200 C18 5µm

## 10 and 20mm I.D. s.s. columns

50x10mm		100x10mm		150x10mm		250x10mm	
RS-0510-D185	\$580	RS-1010-D185	\$780	RS-1510-D185	\$1080	RS-2510-D185	\$1310
50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-D185	\$1260	RS-1020-D185	\$2000	RS-1520-D185	\$2360	RS-2520-D185	\$3470



**PROTO 300 10mm Semi-Prep and 20mm Prep Columns**



<b>PROTO 300 C4 10µm</b>	<b>10 and 20mm I.D. s.s. columns</b>							
	50x10mm		100x10mm		150x10mm		250x10mm	
	RS-0510-W041	\$360	RS-1010-W041	\$410	RS-1510-W041	\$620	RS-2510-W041	\$790
	50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-W041	\$1000	RS-1020-W041	\$1280	RS-1520-W041	\$1640	RS-2520-W041	\$2090	

<b>PROTO 300 C4 5µm</b>	<b>10 and 20mm I.D. s.s. columns</b>							
	50x10mm		100x10mm		150x10mm		250x10mm	
	RS-0510-W045	\$580	RS-1010-W045	\$780	RS-1510-W045	\$1080	RS-2510-W045	\$1310
	50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-W045	\$1260	RS-1020-W045	\$2000	RS-1520-W045	\$2360	RS-2520-W045	\$3470	

<b>PROTO 300 C18 10µm</b>	<b>10 and 20mm I.D. s.s. columns</b>							
	50x10mm		100x10mm		150x10mm		250x10mm	
	RS-0510-W181	\$360	RS-1010-W181	\$410	RS-1510-W181	\$620	RS-2510-W181	\$790
	50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-W181	\$1000	RS-1020-W181	\$1280	RS-1520-W181	\$1640	RS-2520-W181	\$2090	

<b>PROTO 300 C18 5µm</b>	<b>10 and 20mm I.D. s.s. columns</b>							
	50x10mm		100x10mm		150x10mm		250x10mm	
	RS-0510-W185	\$580	RS-1010-W185	\$780	RS-1510-W185	\$1080	RS-2510-W185	\$1310
	50x20mm		100x20mm		150x20mm		250x20mm	
RS-0520-W185	\$1260	RS-1020-W185	\$2000	RS-1520-W185	\$2360	RS-2520-W185	\$3470	

**TARGA 10mm Semi-Prep and 20mm Prep Columns**



<b>TARGA C18 10µm</b>	<b>10 and 20mm I.D. s.s. columns</b>							
	50x10mm		100x10mm		150x10mm		250x10mm	
	TS-0510-C181	\$360	TS-1010-C181	\$410	TS-1510-C181	\$620	TS-2510-C181	\$790
	50x20mm		100x20mm		150x20mm		250x20mm	
TS-0520-C181	\$1000	TS-1020-C181	\$1280	TS-1520-C181	\$1640	TS-2520-C181	\$2090	

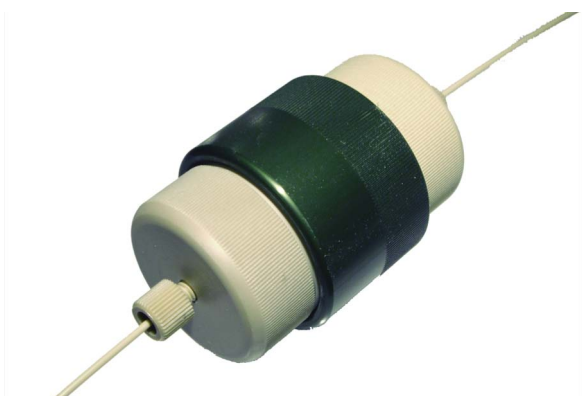
<b>TARGA C18 5µm</b>	<b>10 and 20mm I.D. s.s. columns</b>							
	50x10mm		100x10mm		150x10mm		250x10mm	
	TS-0510-C185	\$580	TS-1010-C185	\$780	TS-1510-C185	\$1080	TS-2510-C185	\$1310
	50x20mm		100x20mm		150x20mm		250x20mm	
TS-0520-C185	\$1260	TS-1020-C185	\$2000	TS-1520-C185	\$2360	TS-2520-C185	\$3470	

See pages 56 - 57 and 60 - 61 for information about Guard Cartridges available for these Prep and Semi-Prep Columns





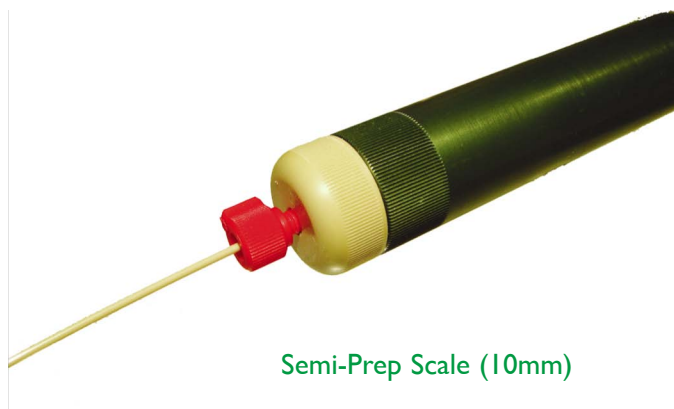
See pages 66 - 67 for information about the Prep and Semi-Prep Cartridge Holders



Prep Scale (20mm)



Prep Scale (20mm)



Semi-Prep Scale (10mm)

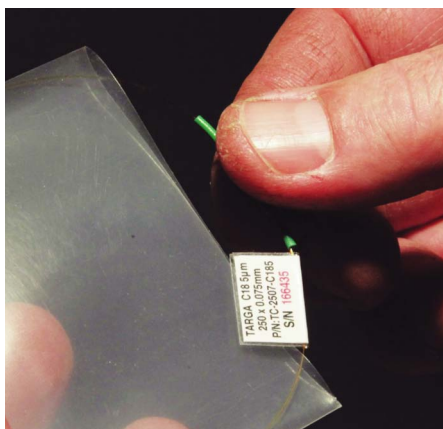


**Caπllary™**  
CAPILLARY HPLC COLUMNS

*A New Benchmark in Capillary Column Quality and Cost:*

Higgins Analytical's unique approach provides a flexible format and reasonably priced capillary HPLC column for LC-MS applications. Caπllary, π, columns are all manufactured and tested as 250mm products and are offered for the reasonable price of \$314.16 for both 75µm and 150µm versions.

**\$314.16**

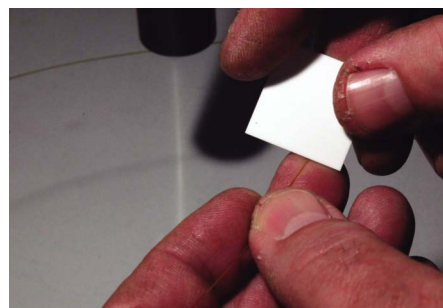
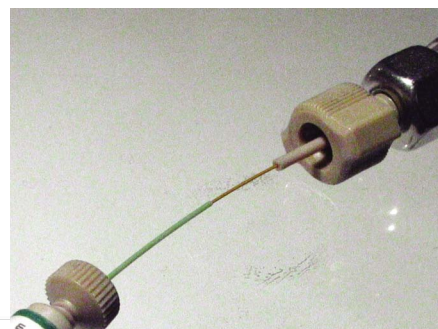
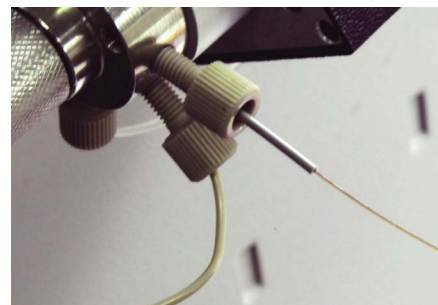


*Cutting and trimming a Caπllary™ Column:*

The Caπllaries can be used as is, or they can be easily cut to any required length, with a ceramic cutter that is included with each column. Caπllary™ columns are nominally 25cm in length. Unless the capillary is going to be used in its full length, the white ceramic cutter is used to cut the column to the required size. Measure from the frit in the center of the green section. This technique can also be useful for removing a short section from the column inlet if it becomes contaminated or plugged. Similarly, the column outlet can be trimmed to a proper length before attaching it to the post-column device.

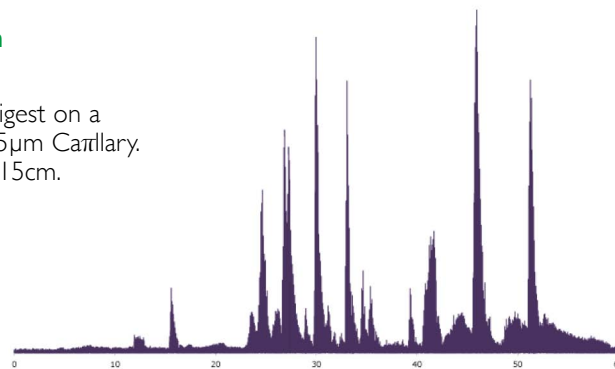
*Plumbing Considerations:*

The Caπllary™ 75 and Caπllary™ 150 columns have standard 360µm outer diameters which can be conveniently plumbed to HPLC systems in a wide variety of manners. The optional Higgins Micro Column Connection Kit (P/N MIC-KIT, see page 69) includes sleeves and finger-tight bushings to facilitate capillary column attachment to most injection valves, detectors, and MS source inlets.



**Robust design with High Performance:**

To the right, aBSA tryptic digest on a 150cm x 75µm Targa C18 5µm Caπllary. P/N TC-2507-C185 cut to 15cm.





**HAISIL 300 C18 5µm**



250x0.075mm	
HC-2507-W185	\$314.16
250x0.150mm	
HC-2515-W185	\$314.16

**HAISIL HL C18 5µm**



250x0.075mm	
LC-2507-C185	\$314.16
250x0.150mm	
LC-2515-C185	\$314.16

**CLIQUEUS C8 5µm**



250x0.075mm	
CC-2507-C085	\$314.16
250x0.150mm	
CC-2515-C085	\$314.16

**CLIQUEUS C18 5µm**

250x0.075mm	
CC-2507-C185	\$314.16
250x0.150mm	
CC-2515-C185	\$314.16

**CLIQUEUS CYANO 5µm**

250x0.075mm	
CC-2507-CNP5	\$314.16
250x0.150mm	
CC-2515-CNP5	\$314.16

**CLIQUEUS PHENYL 5µm**

250x0.075mm	
CC-2507-PHN5	\$314.16
250x0.150mm	
CC-2515-PHN5	\$314.16

**CLIQUEUS SILICA 5µm**

250x0.075mm	
CC-2507-SIL5	\$314.16
250x0.150mm	
CC-2515-SIL5	\$314.16

**HAISIL 100 C8 5µm**



250x0.075mm	
HC-2507-M085	\$314.16
250x0.150mm	
HC-2515-M085	\$314.16

**HAISIL 100 C18 5µm**

250x0.075mm	
HC-2507-M185	\$314.16
250x0.150mm	
HC-2515-M185	\$314.16

**HAISIL 100 SILICA 5µm**

250x0.075mm	
HC-2507-SIL5	\$314.16
250x0.150mm	
HC-2515-SIL5	\$314.16

**PROTO 200 C4 5µm**



250x0.075mm	
RC-2507-D045	\$314.16
250x0.150mm	
RC-2515-D045	\$314.16

**PROTO 200 C18 5µm**

250x0.075mm	
RC-2507-D185	\$314.16
250x0.150mm	
RC-2515-D185	\$314.16

**PROTO 300 C4 5µm75µm and 150µm**



250x0.075mm	
RC-2507-W045	\$314.16
250x0.150mm	
RC-2515-W045	\$314.16

**PROTO 300 C18 5µm75µm and 150µm**

250x0.075mm	
RC-2507-W185	\$314.16
250x0.150mm	
RC-2515-W185	\$314.16

**PHALANX C18 5µm75µm and 150µm**



250x0.075mm	
PC-2507-C185	\$314.16
250x0.150mm	
PC-2515-C185	\$314.16

**TARGA C8 5µm75µm and 150µm**



250x0.075mm	
TC-2507-C085	\$314.16
250x0.150mm	
TC-2515-C085	\$314.16

**TARGA C18 5µm**

250x0.075mm	
TC-2507-C185	\$314.16
250x0.150mm	
TC-2515-C185	\$314.16

## CAPELLINI 6-32

CAPILLARY HPLC COLUMNS with 6-32 Thread PEEK/Ti Fittings



### Capillary HPLC Columns

Unique Features:

- 6-32 threads for capillary fittings
- PEEK/Titanium fittings
- Tested and supplied with CofA
- High performance
- Higgins Analytical Sorbents

Applications:

- LC-MS
- Microbore HPLC

Standard Sizes:

- 50 to 150 x 0.150mm
- 50 to 150 x 0.075mm
- Longer and shorter lengths available

### Guide to CAPELLINI Part Numbers

xFS-xx07-xxxx 75µm CAPELLINI 6-32  
 xFS-xx15-xxxx 150µm CAPELLINI 6-32

See Page 23 for complete Part Number information

Higgins Analytical Capellini are robust, high performance capillary HPLC columns for LC-MS and other very small scale applications. The inert PEEK and titanium fittings complement the Higgins Analytical sorbents such as TARGA which was developed to enable LC-MS applications without TFA.

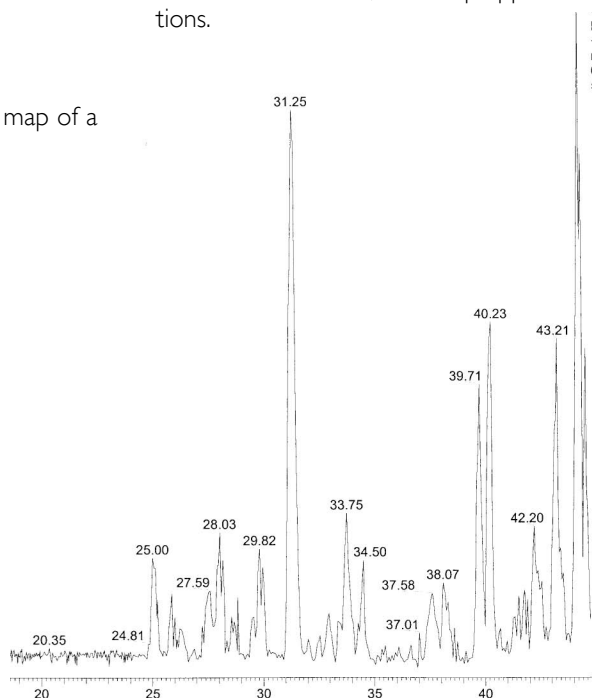
Our no nonsense testing procedure does not resort to sample and flow splitting techniques, inaccurate *k'* values, and miniscule chromatograms, as do some manufacturers, to illustrate column performance. The CofA's symmetrical peaks and the high resolution map speak for themselves.

### Capellini - Back by Popular Demand

When Higgins Analytical introduced Capillary columns three years ago, we removed Capellini from our catalog, however, we continued to manufacture this design for customers that had been using it for several years. Somewhat to our surprise, Capellini sales have continued to grow and we still receive numerous product inquiries in spite of their absence from our literature. While Capillary columns are very efficient and cost effective (see page 40), we have found that many chromatographers prefer the symmetrical, flow reversible design and the 6-32 threaded end-fittings of Capellini. Even though Capellini are more expensive to manufacture and somewhat less efficient than Capillary columns, due to the end fitting design, they enjoy a wide variety of uses that involve flow reversal, such trap applications.

### High Selectivity:

A partial 1.5µL/min LCMSMS map of a BSA tryptic digest.



**CLIQUEUS Capillary Columns with 6-32 threads**



<b>CLIQUEUS C8 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CFS-0507-C085	\$480	CFS-1007-C085	\$480	CFS-1507-C085	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	CFS-0515-C085	\$480	CFS-1015-C085	\$480	CFS-1515-C085	\$480
<b>CLIQUEUS C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CFS-0507-C185	\$480	CFS-1007-C185	\$480	CFS-1507-C185	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	CFS-0515-C185	\$480	CFS-1015-C185	\$480	CFS-1515-C185	\$480
<b>CLIQUEUS Cyano 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CFS-0507-CNP5	\$480	CFS-1007-CNP5	\$480	CFS-1507-CNP5	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	CFS-0515-CNP5	\$480	CFS-1015-CNP5	\$480	CFS-1515-CNP5	\$480
<b>CLIQUEUS Phenyl 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CFS-0507-PHN5	\$480	CFS-1007-PHN5	\$480	CFS-1507-PHN5	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	CFS-0515-PHN5	\$480	CFS-1015-PHN5	\$480	CFS-1515-PHN5	\$480
<b>CLIQUEUS Silica 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CFS-0507-SIL5	\$480	CFS-1007-SIL5	\$480	CFS-1507-SIL5	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	CFS-0515-SIL5	\$480	CFS-1015-SIL5	\$480	CFS-1515-SIL5	\$480

**HAISIL100 Capillary Columns with 6-32 threads**



<b>HAISIL 100 C8 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HFS-0507-M085	\$480	HFS-1007-M085	\$480	HFS-1507-M085	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	HFS-0515-M085	\$480	HFS-1015-M085	\$480	HFS-1515-M085	\$480
<b>HAISIL 100 C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HFS-0507-M185	\$480	HFS-1007-M185	\$480	HFS-1507-M185	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	HFS-0515-M185	\$480	HFS-1015-M185	\$480	HFS-1515-M185	\$480
<b>HAISIL 100 Silica 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HFS-0507-SIL5	\$480	HFS-1007-SIL5	\$480	HFS-1507-SIL5	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	HFS-0515-SIL5	\$480	HFS-1015-SIL5	\$480	HFS-1515-SIL5	\$480



## CAPELLINI 6-32 (cont.)

CAPILLARY HPLC COLUMNS with 6-32 Thread PEEK/Ti Fittings



### HAISIL300 Capillary Columns with 6-32 threads

HAISIL 300 C18 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HFS-0507-W185	\$480	HFS-1007-W185	\$480	HFS-1507-W185	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	HFS-0515-W185	\$480	HFS-1015-W185	\$480	HFS-1515-W185	\$480

200

### PROTO 200 Capillary Columns with 6-32 threads

PROTO 200 C4 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
	RFS-0507-D045	\$480	RFS-1007-D045	\$480	RFS-1507-D045	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	RFS-0515-D045	\$480	RFS-1015-D045	\$480	RFS-1515-D045	\$480

PROTO 200 C18 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
	RFS-0507-D185	\$480	RFS-1007-D185	\$480	RFS-1507-D185	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	RFS-0515-D185	\$480	RFS-1015-D185	\$480	RFS-1515-D185	\$480



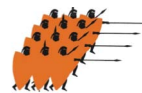
### PROTO 300 Capillary Columns with 6-32 threads

PROTO 300 C4 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
	RFS-0507-W045	\$480	RFS-1007-W045	\$480	RFS-1507-W045	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	RFS-0515-W045	\$480	RFS-1015-W045	\$480	RFS-1515-W045	\$480

PROTO 300 C18 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
	RFS-0507-W185	\$480	RFS-1007-W185	\$480	RFS-1507-W185	\$480
	50x0.150mm		100x0.150mm		150x0.150mm	
	RFS-0515-W185	\$480	RFS-1015-W185	\$480	RFS-1515-W185	\$480



**PHALANX Capillary Columns with 6-32 threads**



<b>PHALANX C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>						
50x0.075mm			100x0.075mm			150x0.075mm	
PFS-0507-C185	\$480		PFS-1007-C185	\$480		PFS-1507-C185	\$480
50x0.150mm			100x0.150mm			150x0.150mm	
PFS-0515-C185	\$480		PFS-1015-C185	\$480		PFS-1515-C185	\$480

**TARGA Capillary Columns with 6-32 threads**



<b>TARGA C8 5µm</b>	<b>75µm and 150µm Capillary columns</b>						
50x0.075mm			100x0.075mm			150x0.075mm	
TFS-0507-C085	\$480		TFS-1007-C085	\$480		TFS-1507-C085	\$480
50x0.150mm			100x0.150mm			150x0.150mm	
TFS-0515-C085	\$480		TFS-1015-C085	\$480		TFS-1515-C085	\$480

<b>TARGA C18 3µm</b>	<b>75µm and 150µm Capillary columns</b>						
50x0.075mm			100x0.075mm			150x0.075mm	
TFS-0507-C183	\$480		TFS-1007-C183	\$480		TFS-1507-C183	\$480
50x0.150mm			100x0.150mm			150x0.150mm	
TFS-0515-C183	\$480		TFS-1015-C183	\$480		TFS-1515-C183	\$480

<b>TARGA C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>						
50x0.075mm			100x0.075mm			150x0.075mm	
TFS-0507-C185	\$480		TFS-1007-C185	\$480		TFS-1507-C185	\$480
50x0.150mm			100x0.150mm			150x0.150mm	
TFS-0515-C185	\$480		TFS-1015-C185	\$480		TFS-1515-C185	\$480



## CAPELLINI 10-32

CAPILLARY HPLC COLUMNS with 10-32 Thread s.s. Fittings



### Capillary HPLC Columns

Unique Features:

- 10-32 threads for standard fittings
- s.s. End Fittings/Titanium Frits
- Tested and supplied with CofA
- High performance
- Higgins Analytical Sorbents

Applications:

- LC-MS
- Microbore HPLC

Standard Sizes:

- 50 to 150 x 0.150mm
- 50 to 150 x 0.075mm
- Longer and shorter lengths available

### Guide to CAPELLINI 10-32 Part Numbers

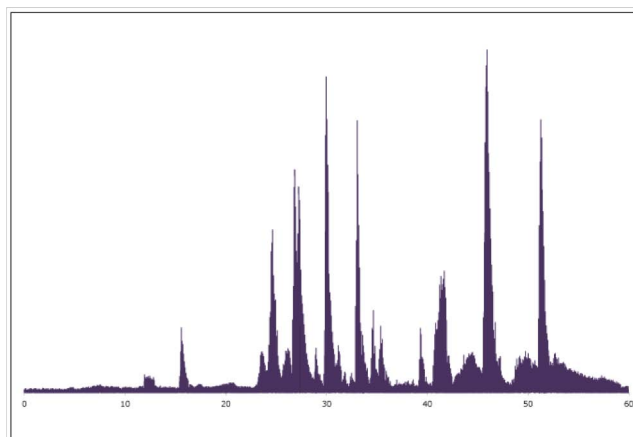
xPS-xx07-xxxx    75µm CAPELLINI 10-32  
 xPS-xx15-xxxx    150µm CAPELLINI 10-32

See Page 23 for complete Part Number information

Higgins Analytical Capellini have been popular with chromatographers requiring an easy-to-use and robust capillary HPLC column. The original Capellini (now called Capellini 6-32) were available only with 6-32 fittings. Now, we have another version for chromatographers preferring 10-32 thread fittings - Capellini 10-32. Another difference between the two versions of Capellini is that the 10-32 threads are stainless steel rather than PEEK. Both types are made with titanium frits on each end, providing inertness and flow direction reversability.

### Robust design with High Performance:

To the right, aBSA tryptic digest on a 150cm x 75µm Targa C18 5µm Capellini. P/N TC-1507-C185





**CLIQUEUS Capillary Columns with 10-32 threads**



<b>CLIQUEUS C8 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CPS-0507-C085	\$470	CPS-1007-C085	\$470	CPS-1507-C085	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	CPS-0515-C085	\$470	CPS-1015-C085	\$470	CPS-1515-C085	\$470

<b>CLIQUEUS C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CPS-0507-C185	\$470	CPS-1007-C185	\$470	CPS-1507-C185	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	CPS-0515-C185	\$470	CPS-1015-C185	\$470	CPS-1515-C185	\$470

<b>CLIQUEUS Cyano 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CPS-0507-CNP5	\$470	CPS-1007-CNP5	\$470	CPS-1507-CNP5	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	CPS-0515-CNP5	\$470	CPS-1015-CNP5	\$470	CPS-1515-CNP5	\$470

<b>CLIQUEUS Phenyl 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CPS-0507-PHN5	\$470	CPS-1007-PHN5	\$470	CPS-1507-PHN5	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	CPS-0515-PHN5	\$470	CPS-1015-PHN5	\$470	CPS-1515-PHN5	\$470

<b>CLIQUEUS Silica 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	CPS-0507-SIL5	\$470	CPS-1007-SIL5	\$470	CPS-1507-SIL5	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	CPS-0515-SIL5	\$470	CPS-1015-SIL5	\$470	CPS-1515-SIL5	\$470

**HAISIL100 Capillary Columns with 10-32 threads**



<b>HAISIL 100 C8 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HPS-0507-M085	\$470	HPS-1007-M085	\$470	HPS-1507-M085	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	HPS-0515-M085	\$470	HPS-1015-M085	\$470	HPS-1515-M085	\$470

<b>HAISIL 100 C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HPS-0507-M185	\$470	HPS-1007-M185	\$470	HPS-1507-M185	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	HPS-0515-M185	\$470	HPS-1015-M185	\$470	HPS-1515-M185	\$470

<b>HAISIL 100 Silica 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	HPS-0507-SIL5	\$470	HPS-1007-SIL5	\$470	HPS-1507-SIL5	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	HPS-0515-SIL5	\$470	HPS-1015-SIL5	\$470	HPS-1515-SIL5	\$470



## CAPELLINI 10-32 (cont.)

CAPILLARY HPLC COLUMNS with 10-32 Thread s.s. Fittings



### HAISIL300 Capillary Columns with 10-32 threads

HAISIL 300 C18 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
HPS-0507-W185	\$470	HPS-1007-W185	\$470	HPS-1507-W185	\$470	
50x0.150mm		100x0.150mm		150x0.150mm		
HPS-0515-W185	\$470	HPS-1015-W185	\$470	HPS-1515-W185	\$470	

### PROTO 200 Capillary Columns with 10-32 threads

200

PROTO 200 C4 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
RPS-0507-D045	\$470	RPS-1007-D045	\$470	RPS-1507-D045	\$470	
50x0.150mm		100x0.150mm		150x0.150mm		
RPS-0515-D045	\$470	RPS-1015-D045	\$470	RPS-1515-D045	\$470	

PROTO 200 C18 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
RPS-0507-D185	\$470	RPS-1007-D185	\$470	RPS-1507-D185	\$470	
50x0.150mm		100x0.150mm		150x0.150mm		
RPS-0515-D185	\$470	RPS-1015-D185	\$470	RPS-1515-D185	\$470	

### PROTO 300 Capillary Columns with 10-32 threads

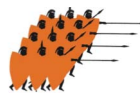


PROTO 300 C4 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
RPS-0507-W045	\$470	RPS-1007-W045	\$470	RPS-1507-W045	\$470	
50x0.150mm		100x0.150mm		150x0.150mm		
RPS-0515-W045	\$470	RPS-1015-W045	\$470	RPS-1515-W045	\$470	

PROTO 300 C18 5µm	75µm and 150µm Capillary columns					
	50x0.075mm		100x0.075mm		150x0.075mm	
RPS-0507-W185	\$470	RPS-1007-W185	\$470	RPS-1507-W185	\$470	
50x0.150mm		100x0.150mm		150x0.150mm		
RPS-0515-W185	\$470	RPS-1015-W185	\$470	RPS-1515-W185	\$470	



**PHALANX Capillary Columns with 10-32 threads**



<b>PHALANX C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	PPS-0507-C185	\$470	PPS-1007-C185	\$470	PPS-1507-C185	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	PPS-0515-C185	\$470	PPS-1015-C185	\$470	PPS-1515-C185	\$470

**TARGA Capillary Columns with 10-32 threads**



<b>TARGA C8 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	TPS-0507-C085	\$470	TPS-1007-C085	\$470	TPS-1507-C085	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	TPS-0515-C085	\$470	TPS-1015-C085	\$470	TPS-1515-C085	\$470

<b>TARGA C18 3µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	TPS-0507-C183	\$470	TPS-1007-C183	\$470	TPS-1507-C183	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	TPS-0515-C183	\$470	TPS-1015-C183	\$470	TPS-1515-C183	\$470

<b>TARGA C18 5µm</b>	<b>75µm and 150µm Capillary columns</b>					
	50x0.075mm		100x0.075mm		150x0.075mm	
	TPS-0507-C185	\$470	TPS-1007-C185	\$470	TPS-1507-C185	\$470
	50x0.150mm		100x0.150mm		150x0.150mm	
	TPS-0515-C185	\$470	TPS-1015-C185	\$470	TPS-1515-C185	\$470



# SPRITE

## DIRECT CONNECT HPLC COLUMN



### Guide to SPRITE Part Numbers

- xR-0121-xxxx 10 x 2.1mm Sprite
- xR-0221-xxxx 20 x 2.1mm Sprite
- xR-0421-xxxx 40 x 2.1mm Sprite

See Page 23 for complete Part Number information

The Sprite family of narrowbore HPLC columns is a unique high performance product for LC-MS and other high-speed, small volume applications. All three sizes of 2.1mm I.D Sprite HPLC columns are individually tested. A Certificate of Analysis accompanies each column. The Sprite's certificate includes the original chromatogram and comprehensive testing and sorbent documentation.

The inert PEEK and titanium design has been proven to be structurally sound to over 5,000 PSI (340Bar).

The optional Higgins *Micro Column Connection Kit* (P/N MIC-KIT, see page 69) includes sleeves and finger-tight bushings to facilitate the attachment of a Sprite to most injection valves, detectors, and MS source inlets.

## CLIQUEUS Sprite



### CLIQUEUS C8 5µm

10X2.1mm CR-0121-C085	\$220	20X2.1mm CR-0221-C085	\$230	40X2.1mm CR-0421-C085	\$280
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### CLIQUEUS C18 5µm

10X2.1mm CR-0121-C185	\$220	20X2.1mm CR-0221-C185	\$230	40X2.1mm CR-0421-C185	\$280
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### CLIQUEUS Cyano 5µm

10X2.1mm CR-0121-CNP5	\$220	20X2.1mm CR-0221-CNP5	\$230	40X2.1mm CR-0421-CNP5	\$280
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### CLIQUEUS Phenyl 5µm

10X2.1mm CR-0121-PHN5	\$220	20X2.1mm CR-0221-PHN5	\$230	40X2.1mm CR-0421-PHN5	\$280
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### CLIQUEUS Silica 5µm

10X2.1mm CR-0121-SIL5	\$220	20X2.1mm CR-0221-SIL5	\$230	40X2.1mm CR-0421-SIL5	\$280
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## HASIL 100 Sprite



### HASIL 100 C8 5µm

10X2.1mm HR-0121-M085	\$220	20X2.1mm HR-0221-M085	\$230	40X2.1mm HR-0421-M085	\$280
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### HASIL 100 C18 5µm

10X2.1mm HR-0121-M185	\$220	20X2.1mm HR-0221-M185	\$230	40X2.1mm HR-0421-M185	\$280
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## HASIL 300 Sprite



### HASIL 300 C18 5µm

10X2.1mm HR-0121-W185	\$220	20X2.1mm HR-0221-W185	\$230	40X2.1mm HR-0421-W185	\$280
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## HAISIL HL Sprite



### HAISIL HL C18 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
LR-0121-C185	\$220	LR-0221-C185	\$230	LR-0421-C185	\$280

## PHALANX Sprite



### PHALANX C18 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
PR-0121-C185	\$220	PR-0221-C185	\$230	PR-0421-C185	\$280

## PROTO 200 Sprite

200

### PROTO 200 C4 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
RR-0121-D045	\$220	RR-0221-D045	\$230	RR-0421-D045	\$280

### PROTO 200 C18 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
RR-0121-D185	\$220	RR-0221-D185	\$230	RR-0421-D185	\$280

## PROTO 300 Sprite



### PROTO 300 C4 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
RR-0121-W045	\$220	RR-0221-W045	\$230	RR-0421-W045	\$280

### PROTO 300 C18 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
RR-0121-W185	\$220	RR-0221-W185	\$230	RR-0421-W185	\$280

## TARGA Sprite



### TARGA C8 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
TR-0121-C085	\$220	TR-0221-C085	\$230	TR-0421-C085	\$280

### TARGA C18 5µm

10X2.1mm		20X2.1mm		40X2.1mm	
TR-0121-C185	\$220	TR-0221-C185	\$230	TR-0421-C185	\$280



### SPRITE is Designed to Operate in Either Flow Direction

A SPRITE is made of PEEK and titanium and can be connected directly to a sample injection valve or directly to a mass spectrometer's source inlet.



# PICCOLO

## SHORT MICROBORE TRAPS AND COLUMNS



The Piccolo family of microbore HPLC columns is a unique high performance product for LC-MS and other high-speed, small volume applications. These efficient columns are the only products of their type that are individually tested. A Certificate of Analysis accompanies each column.

In addition to analytical microbore applications Piccolo columns are ideal guards for protecting longer microbore HPLC columns.

Piccolo column void volumes range from approximately 5µl to 300nL, making them perfect for a wide variety of trapping, desalting, and trace enrichment applications. These small columns can be conveniently used with micro injection and switching valves as pictured on the left.

The optional Higgins *Micro Column Connection Kit* (P/N MIC-KIT, see page 69) includes sleeves and finger-tight bushings to facilitate the attachment of a Piccolo's 6-32 threads to most injection valves, detectors, and MS source inlets.

### Guide to PICCOLO Part Numbers

- xP-M2M3-xxxx 2.5 x 0.3mm PICCOLO
- xP-M2M5-xxxx 2.5 x 0.5mm PICCOLO
- xP-M501-xxxx 5 x 1mm PICCOLO
- xP-0101-xxxx 10 x 1mm PICCOLO
- xP-0301-xxxx 30 x 1mm PICCOLO

See Page 23 for complete Part Number information

## CLIQUEUS Piccolo



### CLIQUEUS C8 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
CP-M2M3-C085 \$210	CP-M2M5-C085 \$210	CP-M501-C085 \$210	CP-0101-C085 \$210	CP-0301-C085 \$270

### CLIQUEUS C18 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
CP-M2M3-C185 \$210	CP-M2M5-C185 \$210	CP-M501-C185 \$210	CP-0101-C185 \$210	CP-0301-C185 \$270

### CLIQUEUS Cyano 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
CP-M2M3-CNP5 \$210	CP-M2M5-CNP5 \$210	CP-M501-CNP5 \$210	CP-0101-CNP5 \$210	CP-0301-CNP5 \$270

### CLIQUEUS Phenyl 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
CP-M2M3-PHN5 \$210	CP-M2M5-PHN5 \$210	CP-M501-PHN5 \$210	CP-0101-PHN5 \$210	CP-0301-PHN5 \$270

### CLIQUEUS Silica 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
CP-M2M3-SIL5 \$210	CP-M2M5-SIL5 \$210	CP-M501-SIL5 \$210	CP-0101-SIL5 \$210	CP-0301-SIL5 \$270

## HAISIL 100 Piccolo



### HAISIL 100 C8 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
HP-M2M3-M085 \$210	HP-M2M5-M085 \$210	HP-M501-M085 \$210	HP-0101-M085 \$210	HP-0301-M085 \$270

### HAISIL 100 C18 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
HP-M2M3-M185 \$210	HP-M2M5-M185 \$210	HP-M501-M185 \$210	HP-0101-M185 \$210	HP-0301-M185 \$270

## HAISIL 300 Piccolo



### HAISIL 300 C18 5µm

2.5X0.3mm	2.5X0.5mm	5X1mm	10x1mm	30x1mm
HP-M2M3-W185 \$210	HP-M2M5-W185 \$210	HP-M501-W185 \$210	HP-0101-W185 \$210	HP-0301-W185 \$270



## PICCOLO (continued)

### SHORT MICROBORE COLUMNS



#### HAISIL HL Piccolo

##### HAISIL HL C18 5µm

2.5X0.3mm LP-M2M3-C185 \$210	2.5X0.5mm LP-M2M5-C185 \$210	5X1mm LP-M501-C185 \$210	10x1mm LP-0101-C185 \$210	30x1mm LP-0301-C185 \$270
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#### PHALANX Piccolo

##### PHALANX C18 5µm

2.5X0.3mm PP-M2M3-C185 \$210	2.5X0.5mm PP-M2M5-C185 \$210	5X1mm PP-M501-C185 \$210	10x1mm PP-0101-C185 \$210	30x1mm PP-0301-C185 \$270
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#### PROTO 200 Piccolo

200

##### PROTO 200 C4 5µm

2.5X0.3mm RP-M2M3-D045 \$210	2.5X0.5mm RP-M2M5-D045 \$210	5X1mm RP-M501-D045 \$210	10x1mm RP-0101-D045 \$210	30x1mm RP-0301-D045 \$270
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##### PROTO 200 C18 5µm

2.5X0.3mm RP-M2M3-D185 \$210	2.5X0.5mm RP-M2M5-D185 \$210	5X1mm RP-M501-D185 \$210	10x1mm RP-0101-D185 \$210	30x1mm RP-0301-D185 \$270
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#### PROTO 300 Piccolo

##### PROTO 300 C4 5µm

2.5X0.3mm RP-M2M3-W045 \$210	2.5X0.5mm RP-M2M5-W045 \$210	5X1mm RP-M501-W045 \$210	10x1mm RP-0101-W045 \$210	30x1mm RP-0301-W045 \$270
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##### PROTO 300 C18 5µm

2.5X0.3mm RP-M2M3-W185 \$210	2.5X0.5mm RP-M2M5-W185 \$210	5X1mm RP-M501-W185 \$210	10x1mm RP-0101-W185 \$210	30x1mm RP-0301-W185 \$270
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#### TARGA Piccolo

##### TARGA C8 5µm

2.5X0.3mm TP-M2M3-C085 \$210	2.5X0.5mm TP-M2M5-C085 \$210	5X1mm TP-M501-C085 \$210	10x1mm TP-0101-C085 \$210	30x1mm TP-0301-C085 \$270
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##### TARGA C18 5µm

2.5X0.3mm TP-M2M3-C185 \$210	2.5X0.5mm TP-M2M5-C185 \$210	5X1mm TP-M501-C185 \$210	10x1mm TP-0101-C185 \$210	30x1mm TP-0301-C185 \$270
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## HAICART CARTRIDGES

### STAINLESS STEEL CARTRIDGE COLUMNS



#### Guide to HAICART Analytical Cartridge Part Numbers

xF-0421-xxxx	40 x 3.2mm stainless steel cartridge
xF-0532-xxxx	50 x 3.2mm stainless steel cartridge
xF-1032-xxxx	100 x 3.2mm stainless steel cartridge
xF-0446-xxxx	40 x 4.6mm stainless steel cartridge
xF-0546-xxxx	50 x 4.6mm stainless steel cartridge
xF-1046-xxxx	100 x 4.6mm stainless steel cartridge

See Page 23 for complete Part Number information

The HAICART family of HPLC cartridge columns provides a convenient and economical approach to guard column, trace enrichment, and fast analysis applications. These stainless steel cartridges are available with 3.2mm and 4.6mm internal diameters and with 2, 4, 5, or 10cm lengths. This wide selection makes it possible to address numerous analytical needs. See pages 66 - 67 for information about the cartridge holders required for Higgins Analytical's HAICART Cartridge Columns. HAICART cartridges are also compatible with PE/Brownlee MPLC cartridge holders.

### CLIQUEUS 3.2 and 4.6mm I.D. S.S. Cartridges



#### CLIQUEUS C8 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
CF-0232-C085	\$200	CF-0432-C085	\$300	CF-0532-C085	\$340	CF-1032-C085	\$220
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		CF-0446-C085	\$300	CF-0546-C085	\$340	CF-1046-C085	\$220

#### CLIQUEUS C18 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
CF-0232-C185	\$200	CF-0432-C185	\$300	CF-0532-C185	\$340	CF-1032-C185	\$220
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		CF-0446-C185	\$300	CF-0546-C185	\$340	CF-1046-C185	\$220

#### CLIQUEUS Cyano 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
CF-0232-CNP5	\$200	CF-0432-CNP5	\$340	CF-0532-CNP5	\$360	CF-1032-CNP5	\$215
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		CF-0446-CNP5	\$340	CF-0546-CNP5	\$360	CF-1046-CNP5	\$215

#### CLIQUEUS Phenyl 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
CF-0232-PHN5	\$200	CF-0432-PHN5	\$340	CF-0532-PHN5	\$360	CF-1032-PHN5	\$215
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		CF-0446-PHN5	\$340	CF-0546-PHN5	\$360	CF-1046-PHN5	\$215

#### CLIQUEUS Silica 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
CF-0232-SIL5	\$190	CF-0432-SIL5	\$300	CF-0532-SIL5	\$340	CF-1032-SIL5	\$220
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		CF-0446-SIL5	\$300	CF-0546-SIL5	\$340	CF-1046-SIL5	\$220





**HAISIL 100 C8 3.2 and 4.6mm I.D. S.S.Cartridges**



**HAISIL 100 C8 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
HF-0232-M085	\$190	HF-0432-M085	\$300	HF-0532-M085	\$310	HF-1032-M085	\$220
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		HF-0446-M085	\$300	HF-0546-M085	\$310	HF-1046-M085	\$220

**HAISIL 100 C18 3.2 and 4.6mm I.D. S.S.Cartridges**

**HAISIL 100 C18 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
HF-0232-M185	\$190	HF-0432-M185	\$300	HF-0532-M185	\$310	HF-1032-M185	\$220
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		HF-0446-M185	\$300	HF-0546-M185	\$310	HF-1046-M185	\$220



**HAISIL 300 3.2 and 4.6mm I.D. S.S.Cartridges**

**HAISIL 300 C18 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
HF-0232-W185	\$210	HF-0432-W185	\$350	HF-0532-W185	\$360	HF-1032-W185	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		HF-0446-W185	\$350	HF-0546-W185	\$360	HF-1046-W185	\$240

**HAISIL HL 3.2 and 4.6mm I.D. S.S.Cartridges**



**HAISIL HL C18 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
LF-0232-C185	\$210	LF-0432-C185	\$370	LF-0532-C185	\$390	LF-1032-C185	\$270
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		LF-0446-C185	\$370	LF-0546-C185	\$390	LF-1046-C185	\$270

**PROTO 200 3.2 and 4.6mm I.D. S.S.Cartridges**

200

**PROTO 200 C4 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
RF-0232-D045	\$210	RF-0432-D045	\$350	RF-0532-D045	\$360	RF-1032-D045	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		RF-0446-D045	\$350	RF-0546-D045	\$360	RF-1046-D045	\$240

**PROTO 200 C18 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
RF-0232-D185	\$210	RF-0432-D185	\$350	RF-0532-D185	\$360	RF-1032-D185	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		RF-0446-D185	\$350	RF-0546-D185	\$360	RF-1046-D185	\$240

**PROTO 300 3.2 and 4.6mm I.D. S.S.Cartridges**



**PROTO 300 C4 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
RF-0232-W045	\$210	RF-0432-W045	\$350	RF-0532-W045	\$360	RF-1032-W045	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		RF-0446-W045	\$350	RF-0546-W045	\$360	RF-1046-W045	\$240

**PROTO 300 C18 5µm**

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
RF-0232-W185	\$210	RF-0432-W185	\$350	RF-0532-W185	\$360	RF-1032-W185	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		RF-0446-W185	\$350	RF-0546-W185	\$360	RF-1046-W185	\$240



## HAICART CARTRIDGES (continued)

### STAINLESS STEEL CARTRIDGE COLUMNS



#### PHALANX 3.2 and 4.6mm I.D. S.S.Cartridges



##### PHALANX C18 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
PF-0232-C185	\$210	PF-0432-C185	\$350	PF-0532-C185	\$360	PF-1032-C185	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		PF-0446-C185	\$350	PF-0546-C185	\$360	PF-1046-C185	\$240

#### TARGA 3.2 and 4.6mm I.D. S.S.Cartridges



##### TARGA C8 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
TF-0232-C085	\$190	TF-0432-C085	\$350	TF-0532-C085	\$360	TF-1032-C085	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		TF-0446-C085	\$350	TF-0546-C085	\$360	TF-1046-C085	\$240

##### TARGA C18 5µm

20X3.2mm	5/pkg	40X3.2mm	2/pkg	50X3.2mm	2/pkg	100X3.2mm	1/pkg
TF-0232-C185	\$190	TF-0432-C185	\$350	TF-0532-C185	\$360	TF-1032-C185	\$240
		40X4.6mm	2/pkg	50X4.6mm	2/pkg	100X4.6mm	1/pkg
		TF-0446-C185	\$350	TF-0546-C185	\$360	TF-1046-C185	\$240



See pages 66 - 67 for information about the Cartridge Holders required for these Cartridges



## HAIPEEK CARTRIDGES

### PEEK/TITANIUM CARTRIDGE COLUMNS



#### Guide to HAIPEEK Analytical Cartridge Part Numbers

xK-0421-xxxx 40 x 2.1mm PEEK/titanium cartridge

xK-0521-xxxx 50 x 2.1mm PEEK/titanium cartridge

See Page 23 for complete Part Number information

#### PEEK and Titanium Cartridges

The HAIPEEK family of narrowbore HPLC cartridge columns is a unique high performance product for LC-MS and other high-speed, small volume applications. The 40 and 50mm sizes of 2.1mm I.D HAIPEEK HPLC Cartridges are individually tested. A Certificate of Analysis, which includes the original chromatogram and comprehensive testing and sorbent documentation, accompanies each column. The 20mm x 2.1mm cartridges excel as narrowbore guard columns, yet even though they are not individually tested, the majority are routinely used as very economical and efficient columns for high speed HPLC screening and LC-MS applications. See pages 66 - 67 for information about the cartridge holders required for Higgins Analytical's HAIPEEK Cartridge Columns. HAIPEEK cartridges are also compatible with PE/Brownlee MPLC cartridge holders.

### CLIQUEUS 2.1mm I.D. PEEK/Titanium Cartridges



#### CLIQUEUS C8 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
CK-0221-C085	\$200	CK-0421-C085	\$290	CK-0521-C085	\$290

#### CLIQUEUS C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
CK-0221-C185	\$200	CK-0421-C185	\$290	CK-0521-C185	\$290

#### CLIQUEUS Cyano 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
CK-0221-CNP5	\$210	CK-0421-CNP5	\$290	CK-0521-CNP5	\$300

#### CLIQUEUS Phenyl 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
CK-0221-PHN5	\$210	CK-0421-PHN5	\$290	CK-0521-PHN5	\$300

#### CLIQUEUS Silica 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
CK-0221-SIL5	\$200	CK-0421-SIL5	\$290	CK-0521-SIL5	\$290

### HASIL 100 2.1mm I.D. PEEK/Titanium Cartridges



#### HASIL 100 C8 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
HK-0221-M085	\$200	HK-0421-M085	\$290	HK-0521-M085	\$290

#### HASIL 100 C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
HK-0221-M185	\$200	HK-0421-M185	\$290	HK-0521-M185	\$290



See pages 66 - 67 for information about the Cartridge Holders required for these Cartridges



### HAISIL 300 2.1mm I.D. PEEK/Titanium Cartridges

#### HAISIL 300 C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
HK-0221-W185	\$210	HK-0421-W185	\$310	HK-0521-W185	\$330



### HAISIL HL 2.1mm I.D. PEEK/Titanium Cartridges

#### HAISIL HL C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
LK-0221-C185	\$210	LK-0421-C185	\$320	LK-0521-C185	\$330



### HALANX 2.1mm I.D. PEEK/Titanium Cartridges

#### HALANX C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
PK-0221-C185	\$210	PK-0421-C185	\$320	PK-0521-C185	\$330

### ROTO 200 2.1mm I.D. PEEK/Titanium Cartridges

#### ROTO 200 C4 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
RK-0221-D045	\$210	RK-0421-D045	\$320	RK-0521-D045	\$330



#### ROTO 200 C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
RK-0221-D185	\$210	RK-0421-D185	\$320	RK-0521-D185	\$330



### ROTO 300 2.1mm I.D. PEEK/Titanium Cartridges

#### ROTO 300 C4 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
RK-0221-W045	\$210	RK-0421-W045	\$320	RK-0521-W045	\$330

#### ROTO 300 C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
RK-0221-W185	\$210	RK-0421-W185	\$320	RK-0521-W185	\$330



### ARGA 2.1mm I.D. PEEK/Titanium Cartridges

#### ARGA C8 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
TK-0221-C085	\$200	TK-0421-C085	\$290	TK-0521-C085	\$290

#### ARGA C18 5µm

20X2.1mm	5/pkg	40X2.1mm	2/pkg	50X2.1mm	2/pkg
TK-0221-C185	\$200	TK-0421-C185	\$290	TK-0521-C185	\$290



## HAISpeed10 CARTRIDGES

10mm I.D. Semi-Prep Cartridge Columns



### Guide to HAI Speed 10 Cartridge Part Numbers

xF-0310-xxxx 30 x 10mm cartridge  
 xF-0510-xxxx 50 x 10mm cartridge  
 xF-1010-xxxx 100 x 10mm cartridge

See Page 23 for complete Part Number information

## HAISpeed10 - A high performance 10mm I.D. Cartridge System

High throughput requirements for combinatorial chemistry applications often call for 10mm I.D. columns. Higgins Analytical has developed a convenient cartridge system that offers an economical solution for demanding combinatorial and semi-preparative needs. Even though a HAI Speed10 cartridge costs a fraction of conventional 10mm HPLC column of the same length, they have the same consistently high performance of other Higgins Analytical columns.

Each 5cm and 10cm cartridge column is tested and is shipped with a CofA.

## CLIQUEUS 10mm I.D. Semi-Prep Cartridges



### CLIQUEUS C18 10µm

#### 10mm I.D. s.s. Guard Cartridges

30x10mm 2/pkg  
 CF-0310-C181 \$300

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 CF-0510-C181 \$215 CF-1010-C181 \$290

### CLIQUEUS C18 5µm

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 CF-0510-C185 \$350 CF-1010-C185 \$410

## HAISIL 100 10mm I.D. Semi-Prep Cartridges



### HAISIL 300 C18 10µm

#### 10mm I.D. s.s. Guard Cartridges

30x10mm 2/pkg  
 HF-0310-W181 \$300

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 HF-0510-W181 \$215 HF-1010-W181 \$290

## HAISIL 300 10mm I.D. Semi-Prep Cartridges



### HAISIL 300 C18 5µm

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 HF-0510-W185 \$350 HF-1010-W185 \$410

## PROTO 200 10mm I.D. Semi-Prep Cartridges

200

### PROTO 200 C4 10µm

#### 10mm I.D. s.s. Guard Cartridges

30x10mm 2/pkg  
 RF-0310-D041 \$300

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 RF-0510-D041 \$215 RF-1010-D041 \$290

### PROTO 200 C4 5µm

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 RF-0510-D045 \$350 RF-1010-D045 \$440

### PROTO 200 C18 10µm

#### 10mm I.D. s.s. Guard Cartridges

30x10mm 2/pkg  
 RF-0310-D181 \$300

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 RF-0510-D181 \$215 RF-1010-D181 \$290

### PROTO 200 C18 5µm

#### 10mm I.D. s.s. Semi-Prep Cartridges

50x10mm 1/pkg 100x10mm 1/pkg  
 RF-0510-D185 \$350 RF-1010-D185 \$440



**PROTO 300 10mm I.D. Semi-Prep Cartridges**



**PROTO 300 C4 10µm**

**10mm I.D. s.s. Guard Cartridges**

30x10mm 2/pkg  
RF-0310-W041 \$300

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
RF-0510-W041 \$215 RF-1010-W041 \$290

**PROTO 300 C4 5µm**

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
RF-0510-W045 \$350 RF-1010-W045 \$440

**PROTO 300 C18 10µm**

**10mm I.D. s.s. Guard Cartridges**

30x10mm 2/pkg  
RF-0310-W181 \$300

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
RF-0510-W181 \$215 RF-1010-W181 \$290

**PROTO 300 C18 5µm**

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
RF-0510-W185 \$350 RF-1010-W185 \$440

**PHALANX 10mm I.D. Semi-Prep Cartridges**



**PHALANX C18 10µm**

**10mm I.D. s.s. Guard Cartridges**

30x10mm 2/pkg  
PF-0310-C181 \$300

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
PF-0510-C181 \$215 PF-1010-C181 \$290

**PHALANX C18 5µm**

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
PF-0510-C185 \$350 PF-1010-C185 \$440

**TARGA 10mm I.D. Semi-Prep Cartridges**



**TARGA C18 10µm**

**10mm I.D. s.s. Guard Cartridges**

30x10mm 2/pkg  
TF-0310-C181 \$300

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
TF-0510-C181 \$215 TF-1010-C181 \$290

**TARGA C18 5µm**

**10mm I.D. s.s. Semi-Prep Cartridges**

50x10mm 1/pkg 100x10mm 1/pkg  
TF-0510-C185 \$350 TF-1010-C185 \$440

See pages 66 - 67 for information about Cartridge Holders required for these Cartridges



## HAIPEEK & HAICART Guards

PEEK/TITANIUM and s.s. Guard Cartridges



### Guide to HAIPEEK and HAICART Guard Cartridge Part Numbers

xK-0221-xxxx 20 x 2.1mm PEEK/titanium guard cartridge  
 xF-0232-xxxx 20 x 3.2mm stainless steel guard cartridge

See Page 23 for complete Part Number information

Note: Old HAICART P/INs such as HI 18, TI 18, CIPH, etc. can still be used when ordering.

### Analytical Guard Cartridges

The complete range of sorbents manufactured by Higgins Analytical is available in 2cm x 2.1 or 3.2mm I.D. guard cartridges. Not only does this provide a wide selection of products for protecting analytical and narrowbore HPLC columns, it also facilitates a wide variety of trace enrichment, column switching, and ballistic gradient applications.

These 2cm long cartridges require a reusable holder and are compatible with Higgins Analytical's HAIPEEK Guard Holders as well as PE/Brownlee's NewGuard Holder.

## CLIQUEUS Guard Cartridges



### CLIQUEUS C8 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 CK-0221-C085 \$200

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 CF-0232-C085 \$200

### CLIQUEUS C18 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 CK-0221-C185 \$200

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 CF-0232-C185 \$200

### CLIQUEUS Cyano 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 CK-0221-CNP5 \$210

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 CF-0232-CNP5 \$200

### CLIQUEUS Phenyl 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 CK-0221-PHN5 \$210

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 CF-0232-PHN5 \$200

### CLIQUEUS Silica 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 CK-0221-SIL5 \$200

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 CF-0232-SIL5 \$200

## HAISIL 100 Guard Cartridges



### HAISIL 100 C8 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 HK-0221-M085 \$200

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 HF-0232-M085 \$200

### HAISIL 100 C18 5µm

#### 2.1mm I.D. Peek/Titanium

20X2.1mm 5/pkg  
 HK-0221-M185 \$200

#### 3.2mm I.D. Stainless Steel

20X3.2mm 5/pkg  
 HF-0232-M185 \$200





**HAISIL 300 Guard Cartridges**



**HAISIL 300 C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 HK-0221-W185 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 HF-0232-W185 \$210

**HAISIL HL Guard Cartridges**



**HAISIL HL C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 LK-0221-C185 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 LF-0232-C185 \$210

**HEAVY Guard Cartridges**



**HEAVY C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 VK-0221-C185 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 VF-0232-C185 \$210

**PHALANX Guard Cartridges**



**PHALANX C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 PK-0221-C185 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 PF-0232-C185 \$210

**PROTO 200 Guard Cartridges**



**PROTO 200 C4 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 RK-0221-D045 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 RF-0232-D045 \$210

**PROTO 200 C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 RK-0221-D185 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 RF-0232-D185 \$210

**PROTO 300 Guard Cartridges**



**PROTO 300 C4 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 RK-0221-W045 \$210

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 RF-0232-W045 \$210

**PROTO 300 C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 RK-0221-W185 \$210

**3.2mm I.D. Stainless Steel**  
 0X3.2mm 5/pkg  
 RF-0232-W185 \$210

**TARGA Guard Cartridges**



**TARGA C8 5µm**

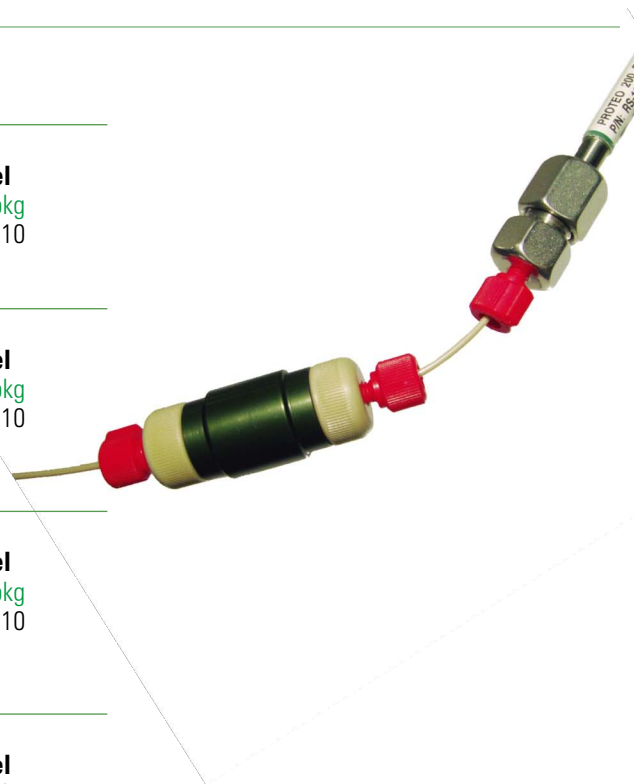
**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 TK-0221-C085 \$200

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 TF-0232-C085 \$200

**TARGA C18 5µm**

**2.1mm I.D. Peek/Titanium**  
 20X2.1mm 5/pkg  
 TK-0221-C185 \$200

**3.2mm I.D. Stainless Steel**  
 20X3.2mm 5/pkg  
 TF-0232-C185 \$200



# HAI Speed20 CARTRIDGES

20mm I.D. Prep Guard Cartridge Columns



HAI Speed20 guard cartridges provide unique Protection for 20mm I.D. prep columns.

"Prep is a dirty business," and expensive columns can be quickly destroyed by crude samples if proper precautions are not taken. Higgins Analytical's HAI Speed20 Prep Guard System provides effective column protection without compromising performance. In addition to an efficiently packed bed which retains strongly absorbing junk that would change the selectivity of the prep column, these unique guard cartridges have 0.5µm frits that remove particulate contaminants as well.

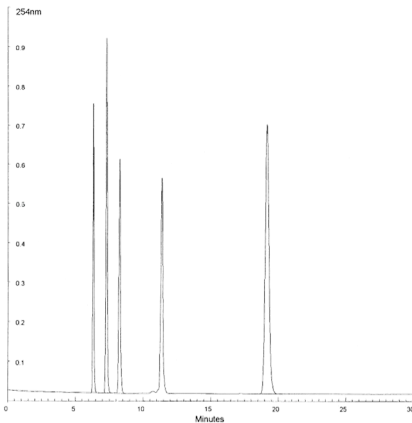
## Guide to HAI Speed 20 Cartridge Part Numbers

xF-0220-xxxx 25 x 20mm cartridge

See Page 23 for complete Part Number information

HAI Speed20 guard cartridges provide convenience and performance

HAI SIL 100 C18 5µm  
Dimensions 250 x 20mm  
Catalog No. HS-2520-M185  
Serial No. 937306



Catalog No.	HS-2520-M185		
Description:	HAI SIL 100 C18 5µm		
Dimensions:	250 x 20mm		
Sorbent Lot#:	A18143	Monofunctional/Endcapped	
Particle Size:	5µm		
Pore Size:	100 Å		
Mobile Phase:	70% Acetonitrile in Water		
Flow Rate:	10mL/min		
Pressure:	33 bar	Temp:	29.5 °C
Peak: tR(min)		Plates(N)	Skewness
# 1	6.31	Dimethyl Phthalate	21,383 0.217
# 2	7.28	Nitrobenzene	21,020 0.164
# 3	8.25	Anisole	20,183 0.190
# 4	11.36	Diphenylamine	
# 5	19.16	Fluorene	18,694 0.161

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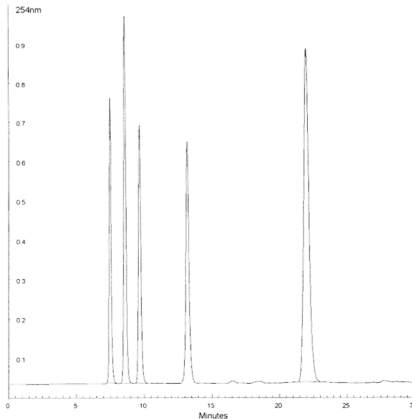


Typical 250x20mm HAI SIL 100 C18 5µm Test Chromatogram.

HAI SIL 300 C18 12µm  
Dimensions 25 x 20mm  
Catalog No. HF-0220-W182  
Batch No. 260402

Coupled to

HAI SIL 100 C18 5µm  
Dimensions 250 x 20mm  
Catalog No. HS-2520-M185



Catalog No.	HF-0220-W182		
Description:	HAI SIL 300 C18 12µm		
Dimensions:	25 x 20mm		
Sorbent Lot#:	P25076	Monofunctional/Endcapped	
Particle Size:	12µm		
Pore Size:	300 Å		
Mobile Phase:	70% Acetonitrile in Water		
Flow Rate:	10mL/min		
Pressure:	bar	Temp:	28.5 °C
Peak: tR(min)		Plates(N)	Skewness
# 1	7.50	Dimethyl Phthalate	10,655 0.328
# 2	8.59	Nitrobenzene	10,725 0.298
# 3	9.67	Anisole	11,094 0.294
# 4	13.19	Diphenylamine	
# 5	22.01	Fluorene	12,886 0.238

File: 172 26/4



The same 250x20mm 5µm column shown in the top chromatogram retested with a HAI SPEED 20 Guard Cartridge in line.



**HAISIL 100 20mm I.D. Prep Guard Cartridges** 

HAISIL 100 C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	HF-0220-M181	\$300	HF-0320-M181	\$160	HF-0520-M181	\$210

**CLIPEUS 20mm I.D. Prep Guard Cartridges** 

CLIPEUS C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	CF-0220-C181	\$300	CF-0320-C181	\$160	CF-0520-C181	\$210

**HAISIL 300 20mm I.D. Prep Guard Cartridges** 

HAISIL 300 C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	HF-0220-W181	\$300	HF-0320-W181	\$160	HF-0520-W181	\$210

**PROTO 200 20mm I.D. Prep Guard Cartridges** 200 

PROTO 200 C4 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	RF-0220-D041	\$300	RF-0320-D041	\$160	RF-0520-D041	\$210

PROTO 200 C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	RF-0220-D181	\$300	RF-0320-D181	\$160	RF-0520-D181	\$210

**PROTO 300 20mm I.D. Prep Guard Cartridges** 

PROTO 300 C4 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	RF-0220-W041	\$300	RF-0320-W041	\$160	RF-0520-W041	\$210

PROTO 300 C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	RF-0220-W181	\$300	RF-0320-W181	\$160	RF-0520-W181	\$210

**PHALANX 20mm I.D. Prep Guard Cartridges** 

PHALANX C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	PF-0220-C181	\$300	PF-0320-C181	\$160	PF-0520-C181	\$210

**TARGA 20mm I.D. Prep Guard Cartridges** 

TARGA C18 10µm	20mm I.D.	s.s. Prep Guard Cartridges				
	25x20mm	2/pkg	35x20mm	1/pk	50x20mm	1/pk
	TF-0220-C181	\$300	TF-0320-C181	\$160	TF-0520-C181	\$210

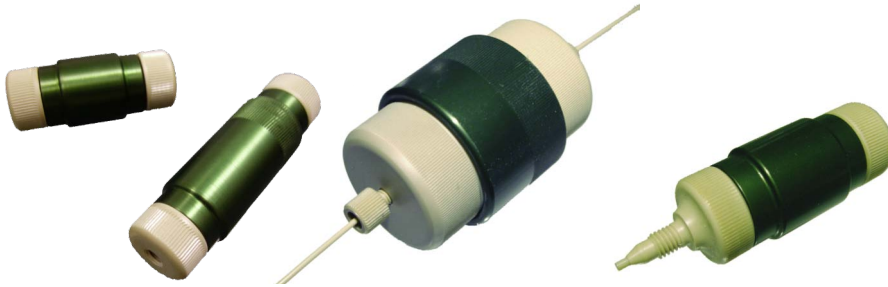
**Both a Filter and a Guard**

The 0.5µm pore size frits on HAIspeed20 cartridges provide unique built-in filtration for maximum column protection. These cartridges are shipped with end caps that prevent solvent loss and protect the cartridge and frits.



## Cartridge Holders

Holders for 2.1, 3.2, 4.6, 10, and 20mm I.D. Cartridges



No Tools Required for Leak-Free Operation

Even though Higgins Analytical cartridge holders do not require any tools for assembly and disassembly, their leak-free operation assures that maximum performance will be achieved in your demanding, high-speed separations.

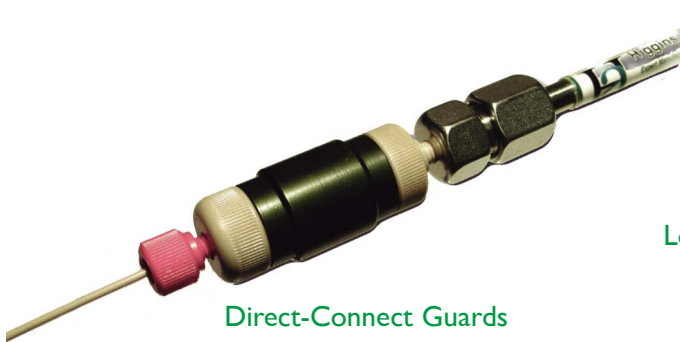
The Holder's light weight also makes it easy to handle and assures its compatibility in challenging plumbing situations.

### Guide to Cartridge Holder Part Numbers

HK-GUARD-FF	Female/Female Holder for 2cm cartridge
HK-GUARD-FM	Female/Male Direct Connect Holder for 2cm cartridge
HK-HOLD-40	Holder for 4cm x 2.1, 3.2, 4.6mm cartridge
HK-HOLD-50	Holder for 5cm x 2.1, 3.2, 4.6mm cartridge
HK-HOLD-100	Holder for 10cm x 2.1, 3.2, 4.6mm cartridge
10-HOLD-30	Holder for 30x10mm cartridge
10-HOLD-50	Holder for 50x10mm cartridge
10-HOLD-100	Holder for 100x10mm cartridge
20-HOLD-25	Holder for 20 x 25mm cartridge

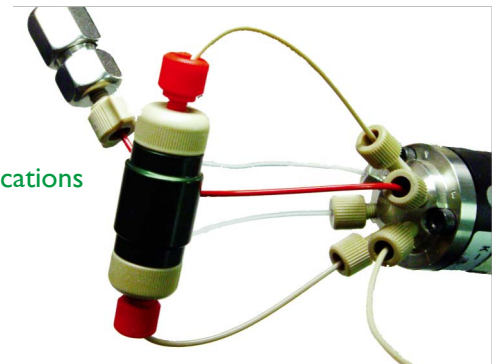


Higgins Analytical Cartridges and Holders enable a wide range of applications and techniques



Direct-Connect Guards

Loop-Column applications



## 2cm Guard Cartridge Holders

### Direct Connect Holders

Female/Male Standard	Female/Male for Waters Column
HK-GUARD-FM \$170	WK-GUARD-FM \$170

### Symmetrical Connection Holders

Female/Female Holder
HK-GUARD-FF \$180

## Holdings for Analytical Cartridge Columns

### Analytical Cartridge Holders

2cm Cartridges	4cm Cartridges	5cm Cartridges	10cm Cartridges
HK-HOLD-20 \$180	HK-HOLD-40 \$180	HK-HOLD-50 \$190	HK-HOLD-100 \$190

Note: HK-HOLD-20 is the same as HK-GUARD-FF

## Holdings for 10mm I.D. Semi-Prep Guards and Cartridges

### HAISPEED 10 Cartridge Holders

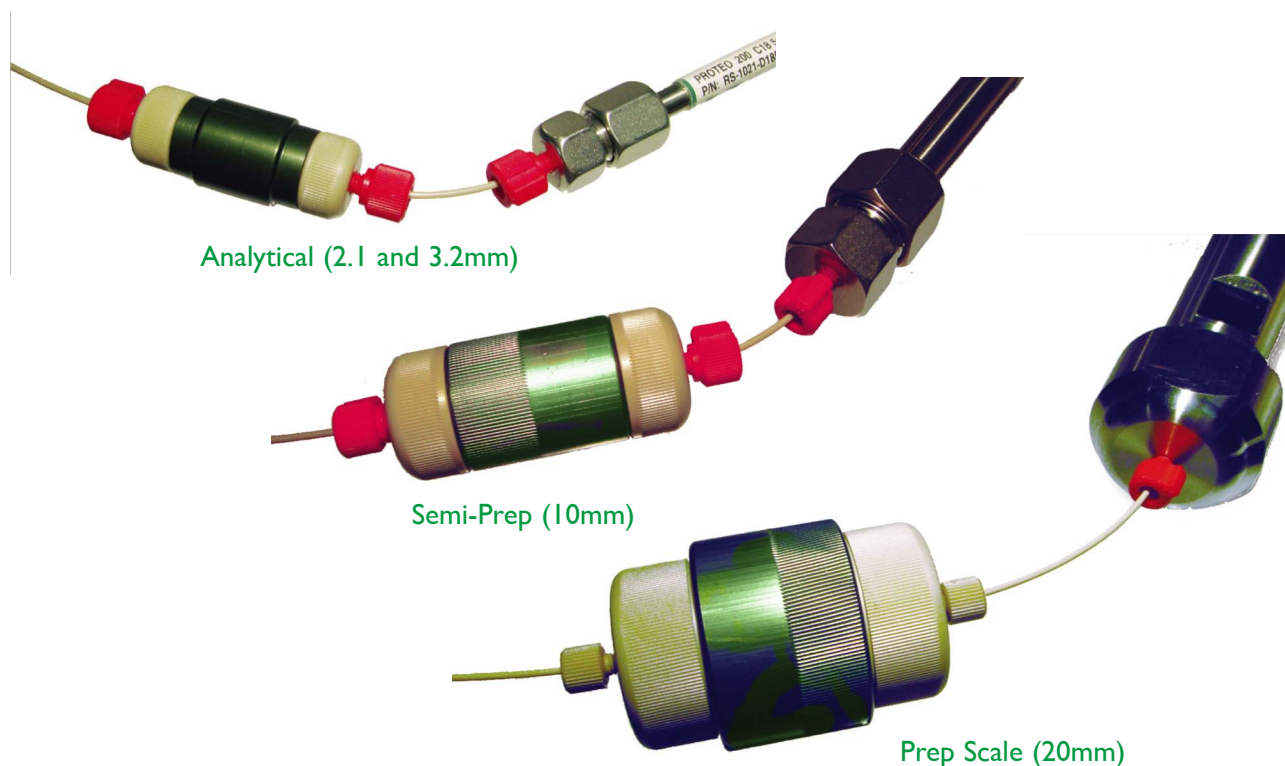
3cm Cartridges	5cm Cartridges	10cm Cartridges
10-HOLD-30 \$180	10-HOLD-50 \$190	10-HOLD-100 \$190

## Holdings for 20mm I.D. Prep Guard Cartridges

### HAISPEED 20 Guard Cartridge Holders

20x25mm Cartridges	20x35mm Cartridges	20x50mm Cartridges
20-HOLD-25 \$280	20-HOLD-35 \$280	20-HOLD-50 \$280

Higgins Analytical manufactures the widest range of guard cartridges in the world



## HAIFILTER

*“We found the HAIFILTER to be an ideal solution for our high performance in-line filtration needs, and it doesn’t require any tools or wrenches!”*



**KEY FEATURES:**

- Low cost, yet effective column protection
- Direct column connection and symmetrical versions
- No tools required • Leak free operation
- 0.5µm filters in stainless steel, titanium or PEEK
- Inert construction's threads won't oxidize or gall

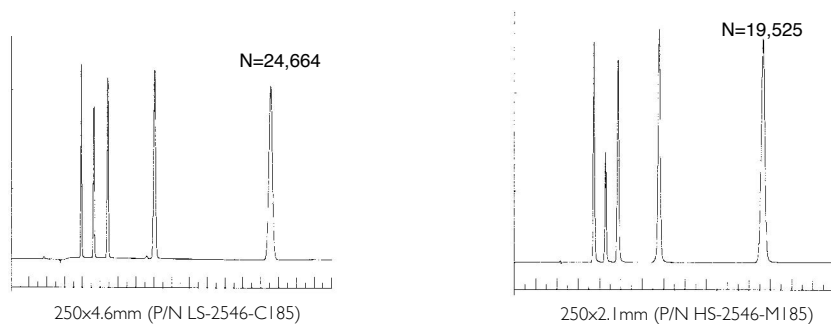
*A simple, yet effective, means of protection is to place a filter in the flow path between the sample injection valve and the HPLC column. While this technique is commonly used, it is also commonly plagued by leaky holders and significant performance loss. The Higgins Analytical HAIFILTER resolves all of these problems!*

### Simplicity and Convenience

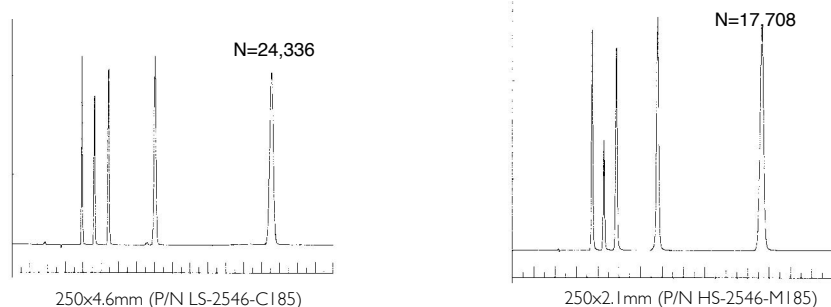
The Higgins Analytical HAIFILTER provides efficient and leak-free in-line filtration, yet it does not require any tools. To make it even more convenient, the HAIFILTER is designed to connect directly to the inlet fitting on the HPLC column, maximizing performance, and minimizing hardware. The 0.5µm porosity frits will remove much of the particulate contamination that is largely responsible for column pressure build up and plugging. The holder's inert construction, and the availability of PEEK and titanium as well as stainless steel frits, insures that the HAIFILTER can address all of your in-line filtration needs.



### HPLC Columns *without* a HAIFILTER



### HPLC Columns *with* a HAIFILTER



### Performance

Try the experiment summarized by the chromatograms above with another manufacturer's in-line filter. You may be very surprised how much more other inline filters contribute to peak broadening when comparison to the miniscule 28µL<sup>2</sup> at 200µL/min volume-variance that is

obtained with the HAIFILTER. This exceptional efficiency is confirmed by chromatographers reporting that using a HAIFILTER permits the routine analysis of solid-phase sample extracts by LC/MS with good efficiency and greatly enhanced HPLC column life.

### Two Convenient Formats

HAIFILTER is now available in two formats. The leak-free, finger-tight, and efficient performance are qualities of the HAIFILTER that have made it a popular product, replacing the competition's awkward and leaky alternatives in hundreds of laboratories worldwide. The direct-connect feature in the original design makes the HAIFILTER FM ideal for protecting HPLC columns while the symmetrical female thread fittings on each end of HAIFILTER FF provide unequalled flexibility to address your HPLC system's filtration requirements.

**HAIFILTER Holders and Replacement Filters**



**HAIFILTER FM (Female/Male) Starter Kits**

HF-FKIT	HAIFILTER FM (Standard)	\$320
HF-WKIT	HAIFILTER FM (for Waters HPLC columns)	\$320
HF-RKIT	HAIFILTER FM (for Rheodyne injection valves - Specify valve model when ordering)	\$320

Note: HAIFILTER FM Starter Kits include a package of 10 filters (HF-SFILT), a 10cm piece of PEEK tubing, and a Delrin bushing and a PEEK ferrule.



**HAIFILTER FF (Female/Female) Starter Kit**

FF-FKIT	HAIFILTER FF	\$320
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Note: The HAIFILTER FF Starter Kit includes a package of 10 filters (HF-SFILT), two 10cm pieces of PEEK tubing, and two Delrin bushings and two PEEK ferrules.



**Replacement Filters**

All replacement kits contain 10 filters per package

HF-SFILT	Stainless steel HAIFILTER replacement filters	pkg of 10	\$110
HF-TFILT	Titanium HAIFILTER replacements filters	pkg of 10	\$170
HF-PFILT	PEEK HAIFILTER replacements filters	pkg of 10	\$210



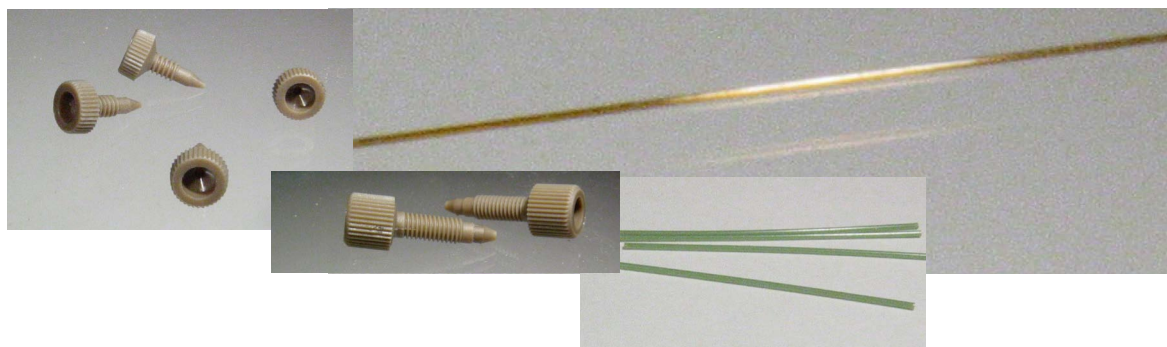
FILTER replacement is easy and requires no tools

**Flexibility**

Not only is the HAIFILTER available in two formats, it can also be directly connected to a sample injection or switching valve. The photograph to the right demonstrates how the HAIFILTER has been designed to clear the bushings on a popular Rheodyne sample injection valve.



**PARTS AND ACCESSORIES**



**Micro Column Connector Kit**

Kit facilitates plumbing a Piccolo, Sprite, Capellini 6-32, or a Capillary to your instrument

MIC-KIT	\$120
---------	-------

Kit Contains:

- 6-32 PEEK Bushings (4 each)
- 10-32 PEEK Long Bushings (2 each)
- Green Sleeve 0.155 x 0.025" (4 each)
- Brown Sleeve 0.062 x 0.015" (2 each)
- Fused Silica Capillaries 10cm x 150µm (4 each)

### Expert and Responsive Technical Support

As a Higgins Analytical Customer seeking technical support or product information, you will eliminate long waits and expensive phone calls, and you will never be transferred from one person to another only to end up in someone's phone mail! By simply faxing (1-650-988-8931) or e-mailing ([hplc@higanalyt.com](mailto:hplc@higanalyt.com)) your question to our Technical Support Group, you will receive a prompt written response. If we don't know the answer, we will tell you so – but, that doesn't happen very often. Additional up-to-date product and application information can be found by pointing your browser at our web site. [www.higanalyt.com](http://www.higanalyt.com)

### Easy Ordering and Rapid Delivery

Our worldwide network of qualified distributors can provide expert support and prompt delivery from their local inventory. Our catalog-listed items are generally shipped from the factory within a day of receiving the order. In the event that we have not provided you with a near by distributor, we can ship an order to you directly from the factory by a variety of carriers.

In order to further simplify the process for you and your purchasing department,



Higgins Analytical and many of its distributors accept credit card orders. Payment terms for all other orders are net 30 days from date of invoice.

### Product Availability

Higgins Analytical products are available worldwide through a network of responsive distributors. These organizations can provide qualified technical support and prompt product delivery. The names can be found by sending us a fax (650-988-8931) or by checking our web site which, in addition to names, addresses and phone numbers, contains many hyperlinked e-mail and URL addresses.





HIGGINS ANALYTICAL PRODUCTS MAY BE PURCHASED AND ARE SOLD ONLY ON THE FOLLOWING WARRANTY TERMS AND CONDITIONS. ADDITIONAL OR DIFFERENT TERMS, WHETHER IN AN ORDER, ACKNOWLEDGMENT, INVOICE OR OTHER DOCUMENT, SHALL NOT BECOME PART OF OR VARY THE FOLLOWING TERMS UNLESS AGREED TO IN WRITING BY HIGGINS ANALYTICAL.

#### LIMITED WARRANTY

Higgins Analytical products are manufactured and quality controlled to the highest industry standards, and Higgins Analytical warrants that the products, when properly applied in accordance with Higgins Analytical's standards therefor, will perform for a period of thirty (30) days after delivery substantially as described in Higgins Analytical's then current specifications for the product. If a customer believes a product does not comply with such warranty, the customer shall, within the warranty period, report the purported defect to Higgins Analytical and cooperate fully with Higgins Analytical in determining the conditions and cause of any purported defect and, thereby, obtain a returned goods authorization from Higgins Analytical or the place of purchase. If Higgins Analytical determines the alleged defect occurred as a result of misuse, neglect, improper installation, repair, alteration, application or accident, rapid depressurization, removal of column end fittings, unusual physical or electrical stress or improper handling procedure, the warranty shall be void and ineffective.

#### EXPRESS LIMITATIONS

HIGGINS ANALYTICAL PRODUCTS ARE MANUFACTURED FOR USE IN RESEARCH IN CHEMICAL MANUFACTURING LABORATORIES ONLY AND ARE NOT INTENDED FOR USE IN CLINICAL OR DIAGNOSTIC APPLICATIONS. THE HAI-SPEED 10 AND HAI-SPEED 20 CARTRIDGE HOLDERS ARE RATED FOR USE UP TO 3,000 PSI (200BAR) WITH FLUIDS THAT ARE LIQUID AT STP (STANDARD TEMPERATURE AND PRESSURE) ONLY. SERIOUS BODILY INJURY OR DEATH MAY RESULT IF A HAI-SPEED HOLDER BROKE WHILE WORKING WITH SUPERCRITICAL FLUIDS.

#### DISCLAIMER

EXCEPT AS EXPRESSLY PROVIDED, ALL WARRANTIES, CONDITIONS, REPRESENTATIONS, INDEMNITIES AND GUARANTEES, WHETHER EXPRESS OR IMPLIED, ARISING BY LAW, CUSTOM, PRIOR ORAL OR WRITTEN STATEMENTS BY HIGGINS ANALYTICAL OR OTHERWISE (INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) ARE OVERRIDDEN, EXCLUDED AND DISCLAIMED.

#### EXCLUSIVE REMEDY

In the event a customer establishes a breach of the above warranty, customer's exclusive remedy against Higgins Analytical, and Higgins Analytical's sole liability, is, at its option, the replacement of the defective product or the refund of the purchase price therefor.

#### NO CONSEQUENTIAL DAMAGES

HIGGINS ANALYTICAL SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL, INDIRECT, SPECIAL, PUNITIVE OR INCIDENTAL DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE, INCLUDING, BUT NOT LIMITED TO, CLAIMS FOR LOSS OF GOODWILL, PROFITS, USE OF MONEY OR USE OF PRODUCTS, STOPPAGE OF OTHER WORK OR IMPAIRMENT OF OTHER ASSETS, ARISING OUT OF BREACH OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY IN TORT OR OTHERWISE, EXCEPT ONLY IN THE CASE OF PERSONAL INJURY WHERE AND TO THE EXTENT THAT APPLICABLE LAW REQUIRES SUCH LIABILITY.

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Higgins Analytical develops and manufactures a wide range of stainless steel and PEEK (polyetheretherketone) High Performance Liquid Chromatography (HPLC) columns and cartridges. These unique offerings address many needs of chromatographers desiring fast analysis times, efficient system and column protection, and chemical inertness.

Special application areas include LC/MS, combinatorial chemistry, column switching techniques, in-line filtration, and guard column requirements. Products are supplied and supported worldwide by a network of responsive distributors.

We are a quality-oriented chromatography company dedicated to providing performance products, expert support, and rapid delivery to research and quality control laboratories worldwide.



## Higgins Analytical

*Expert Manufacturers of  
HPLC Consumables*

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[www.higanalyt.com](http://www.higanalyt.com)