

## Dionex Product Selection Guide



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# Liquid Chromatography Hardware

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## UHPLC+ Solutions

Ultrahigh Performance LC (UHPLC) enables LC separations on columns with sub-3  $\mu\text{m}$  particles and therefore features shorter LC analysis times and higher resolution compared to conventional HPLC. It provides a higher return on investment at a low operating cost.

### UHPLC+ Focused: UHPLC Compatibility for All Standard HPLC Users

Dionex now offers UHPLC performance to standard LC users at standard HPLC prices. the UltiMate 3000 Standard and Basic LC systems support pressures up to 62 MPa (9000 psi) providing full compatibility with UHPLC methods. Dionex has also extended the UHPLC performance of the UltiMate 3000 RSLC system to 103 MPa (15,000 psi) giving you more flexibility for your chromatographic needs. In addition, the industry-leading RSLCnano systems offer UHPLC performance, supporting pressures as high as 80 MPa (11,600 psi) at flow rates from 20 nL/min to 50  $\mu\text{L}/\text{min}$ .

### UHPLC+ Solutions: Advanced Chromatographic Techniques for Increased Instrument Utilization Time

UltiMate 3000 UHPLC+ Solutions combine optimized Standard and RSLC system configurations, column chemistries, and software features to provide turnkey productivity suites for your toughest analytical challenges. Improved productivity, sensitivity, and/or resolution is achieved by combining UHPLC with advanced chromatographic techniques, such as parallel analysis, multidimensional separations, sample cleanup and analyte enrichment, method development, and proteomic workflows to enhance system utilization time compared to conventional LC. Freeing operator time, UHPLC+ solutions support LC applications over a wide flow rate range—from nano to analytical—with sophisticated automation. UHPLC+ Solutions can significantly increase the return on your system investment.

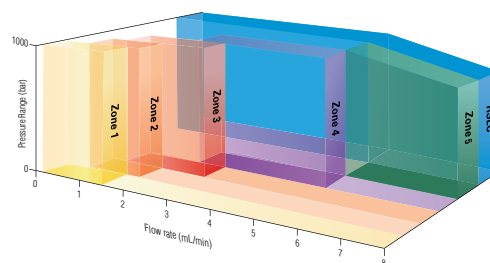
UHPLC+ Solutions Kits provide capillaries and comprehensive Quick Installation guides for fast, convenient kit implementation and UltiMate 3000 Standard (SD) and Rapid Separation (RS) LC and RSLC system setup. They are available under Accessories in the Columns & Accessories section. Learn more about UHPLC+ Solutions at [www.dionex.com](http://www.dionex.com) under Products/Liquid Chromatography/LC solutions. Contact your local representative for a UHPLC+ system configuration customized to your applications. For equipment specifications, see the LC Modules section.

## Rapid Separation LC

The UltiMate 3000 UHPLC+ Solution for Rapid Separation Liquid Chromatography (RSLC) provides the means for ultra-fast separations and high resolution chromatography: Ultrahigh performance chromatography (UHPLC) at a maximum level of reliability and flexibility.

- Binary, Quaternary and  $\times 2$  Dual Rapid Separation LC systems available for the most complete UHPLC portfolio
- Accelerate your conventional LC method by up to a factor of 50
- Improve resolution for the analysis of complex samples by increasing peak capacity
- Accelerate and revalidate existing LC methods in less than one week
- Stay flexible with the Rapid Separation LC System in combination with Acclaim 1, 2.1, 3, and 4.6 mm ID columns with particle sizes of 2.2, 3, and 5  $\mu\text{m}$
- Enjoy Chromeleon data processing and reporting tools including 3-D data handling and revalidation tools for instant results

The extensive flow-pressure footprint of the UltiMate 3000 Rapid Separation LC system together with the binary, quaternary, and  $\times 2$  dual options and the comprehensive set of Acclaim column formats allow you to exploit the full range of LC applications up to 5 mL/min at a maximum pressure of 103 MPa (15,000 psi) and up to 8 mL/min at a maximum pressure of 80 MPa (1600 psi).



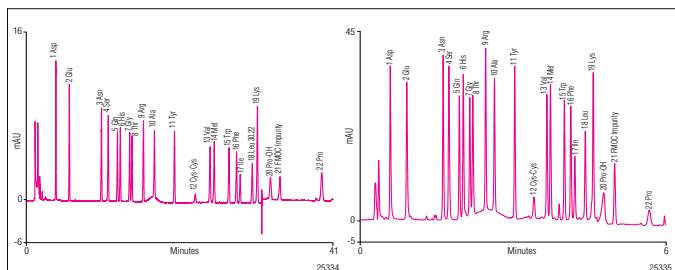
*With its extensive flow-pressure footprint, RSLC fully meets your chromatographic goals. Simply work with your column of choice and in the appropriate zone for your application.*

UltiMate 3000 RSLC Flow-Pressure Footprint					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
	RSLC				
Resolution	Ultrahigh	Conventional	Very High	High	High
Speed	High	Conventional	Very High	Ultrahigh	Ultrahigh
Typical Flow (mL/min)	0.2–1.5	0.75–2.0	1.0–3.0	2.5–5.0	5.0–8.0
Column Length (mm)	$\geq 100$	$\geq 150$	$\geq 50$ $\leq 100$	$\leq 50$	$\geq 100$
Column i.d. (mm)	$\leq 3$	$\geq 4$	$\leq 3$	$\leq 3$	$\geq 4$
Particle Size ( $\mu\text{m}$ )	$\leq 3$	$\geq 3$	$\leq 3$	$\leq 3$	$\geq 2$

A method speed-up calculator is provided for quick and easy conversion of conventional LC to RSLC methods.



The UHPLC+ Solution for RSLC significantly increases sample throughput of LC applications such as amino acid analysis, without compromising resolution.



*Accelerate your amino acid analysis: Conventional reversed-phase LC separation of 21 amino acids in 41 min (60 min total run time, left chromatogram) vs. baseline separation of 21 amino acids in less than 6 min (7 min total run time, right chromatogram) on the Acclaim RSLC 2.2 μm column.*

Further increase your sample throughput by combining UHPLC and  $\times 2$  Dual technology with the  $\times 2$  Dual RSLC System. The UltiMate 3000 Binary, Quaternary, and  $\times 2$  Dual RSLC system configuration for RSLC analyses are equipped with the Viper capillary fingertight fitting systems for reliable zero-dead volume connections for optimal peak resolution. The configurations also support conventional LC applications.

**Note:** For more information on the UltiMate 3000 Binary, Quaternary, and  $\times 2$  Dual RSLC Systems and Acclaim columns, refer to the corresponding sections of this catalog.

## Parallel Analyses

Increase sample throughput without the added time, effort, and cost of multiple LC instruments, method redevelopment, and revalidation. UltiMate 3000  $\times 2$  Dual LC Systems provide the functionality of two systems in one footprint. Chromeleon provides the brains to automatically switch between applications—for the productivity of two systems in the time and effort of running one. Double your sample throughput with Parallel LC.

- Run two different or identical LC applications in parallel
- Increase throughput for new and existing methods
- No revalidation of methods required
- Supports isocratic and gradient separations
- Dedicated Viper Solution Kits for UltiMate 3000 SD and RS systems

In Parallel LC mode, one autosampler and one column compartment are shared between the two independent flow paths of the  $\times 2$  Dual LC system with Dual-Gradient Pump (Figure 1). Two detectors record the chromatograms of two LC applications simultaneously. Chromeleon Chromatography Data System software treats the system configuration as two completely independent systems, and manages seamless autosampler and column compartment sharing.

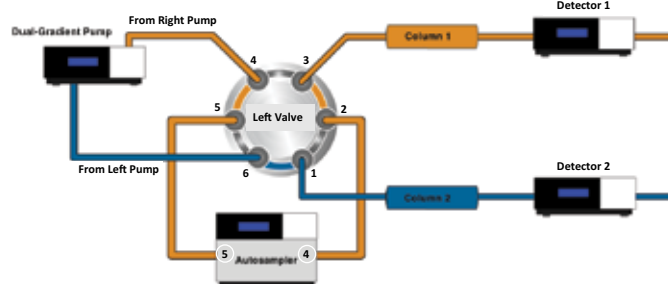


Figure 1. Flow scheme for Parallel Analyses.

The  $\times 2$  Dual LC System for Parallel Analyses costs significantly less than two separate LC systems, so you get double throughput without doubling costs.

The UltiMate 3000  $\times 2$  Dual LC system for Parallel Analyses includes the SRD-3600 Solvent Rack and Degasser, the DGP-3600SD Dual-Gradient Standard Pump or DGP-3600RS Dual-Gradient Rapid Separation Pump, the WPS-3000(T)SL Analytical or WPS-3000(T)RS Rapid Separation In-Line Split Loop Autosampler, the TCC-3000SD or TCC-3000RS Thermostatted Column Compartment with one 2-position 6-port switching valve, and a combination of two detectors, based on uv absorbance, fluorescence, or charged aerosol detection principle.



## Tandem Analyses

Tandem Analysis provides another way to shorten your run times, utilizing the power of off-line column regeneration.

- Increase throughput for new and existing methods
- No revalidation of methods required
- Up to 50% shorter run times, with off-line column regeneration
- Tandem Analysis Solution kits for UltiMate 3000 SD and RS Systems include all required tubing and instructions

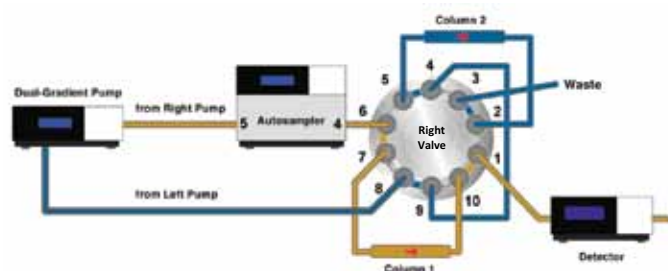


Figure 2. Flow scheme for Tandem Analyses.

In Tandem LC mode, two identical columns are switched between two flow paths—an analysis flow path and a regeneration flow path (Figure 2) to allow column washing and re-equilibration off-line. While one column is equilibrated, the system injects the next sample on the other. This solution saves the time required to wash and equilibrate a column for the next injection—typically 20–50% of total analysis time.

The UltiMate 3000 ×2 Dual LC system for Tandem Analyses includes the SRD-3600 Solvent Rack and Degasser, DGP-3600SD Dual-Gradient Standard Pump or DGP-3600RS Dual-Gradient Rapid Separation Pump, WPS-3000(T)SL Analytical or WPS-3000(T)RS Rapid Separation In-Line Split Loop Autosampler, TCC-3000SD or TCC-3000RS Thermostatted Column Compartment with one 2-position 10-port switching valve, and DAD-3000 (RS) Diode Array Detector or MWD-3000(RS) Multiple Wavelength Detector or VWD-3x00(RS) Variable Wavelength Detector, FLD-3x00 Fluorescence Detector, Corona *ultra* or Corona CAD Charged Aerosol Detector.

## Inverse Gradient Solution for Uniform Response CAD Analysis

CAD is a nebulizer-based, mass flow dependent technique enabling the universal detection of highly diverse analytes under isocratic conditions from one sample in one run. In gradient analyses, however, the nebulizer-based detection technique is subject to change in signal response with increasing content in organic mobile phase. This applies also for other nebulizer-based detectors like mass spectrometry with APCI and evaporative light scattering detectors. By providing the hardware- and software-related prerequisites the Inverse Gradient Solution provides an easy way to assure constant response with nebulizer-based detectors for gradient LC analysis.

Charged Aerosol Detection (CAD) provides the ability to measure virtually any non- or semivolatile analyte: lipids, proteins, DNA and oligonucleotides, amino acids, sugars, drugs, and ions (positive, negative, neutral, acidic or basic) with or without a chromophore. The unique Dual-Gradient Pump DGP-3600(RS) is used for running the separation gradient, and an inverse gradient from the same module is used for compensating the changing solvent composition in the detector during the run. The result is a constant CAD response allowing even the quantitation of unidentified impurities.

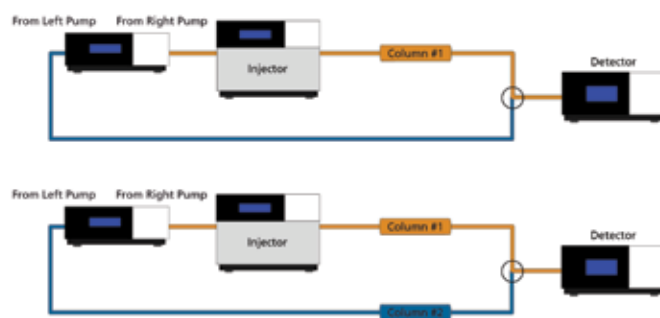


Figure 3. Flow scheme for Inverse Gradient Solution with CAD: single-column and dual-column variant.

In Inverse Gradient for uniform response with CAD mode, there are two flow paths—the analysis flow path and the compensation flow path. The analysis flow path includes the autosampler and the separation column, and is used for the separation of the sample, while the compensation flow path delivers the inverse gradient to compensate for the changing mobile phase composition in the detector. Both flow paths are combined by a mixing-T before the detector inlet. In order to gain a constant mobile phase composition in the detector, an isocratic hold must be programmed for the delay of the inverse gradient. The isocratic hold corresponds to the void volume difference of both flow paths.



Alternately, to account for the delay of the analysis and the compensation flow path, similar components in both flow paths can be included. Here, the outlet of the pump delivering the inverse gradient is fed to an identical column as installed in the analytical flow path (see lower flow path in Figure). The dual-column variant of the Inverse Gradient Solution with CAD allows setup of an automated gradient compensation without the need for accurate determination of gradient delays between compensation and analytical flow-paths.

Take advantage of the Inverse Gradient principle:

- Constant CAD response for best sensitivity and uniform detection of highly diverse chemical entities in gradient LC.
- Viper Inverse Gradient Solution Kits for Uniform Response with Nebulizer-based Detectors on UltiMate 3000 x2 Dual RS and SD Systems for easy installation.

The UltiMate 3000 x2 Dual LC System for Uniform Response Gradient with CAD and other Nebulizer-based Detectors includes the SRD-3600 Solvent Rack and Degasser, the DGP-3600SD Dual-Gradient Standard Pump or DGP-3600RS Dual-Gradient Rapid Separation Pump, the WPS-3000(T)SL Analytical or WPS-3000(T)RS Rapid Separation In-line Split-Loop Autosampler, the TCC-3000SD or TCC-3000RS Thermostatted Column Compartment, and the Corona *ultra* or Corona CAD Charged Aerosol Detector.

## Automated On-Line SPE-LC

Solid-phase extraction (SPE) is often used to isolate analytes of interest from a complex matrix. The UltiMate 3000 x2 Dual LC System provides the technology for fully automated On-Line SPE.

- Direct injection of untreated samples (e.g., plasma, urine, serum, vegetable oils, and surface water)
- Automated sample cleanup and/or analyte enrichment for unattended sample processing
- Elimination of conventional manual sample pretreatment steps
- Less prone to errors leading to better results
- Reduced operator exposure to hazardous samples
- Increased workload per system for higher return on your equipment investment
- Dedicated Viper Automated On-Line SPE-LC Solution Kits for UltiMate 3000 x2 Dual RS and SD systems

In On-Line SPE, the sample is first injected on to the SPE column for sample fractionation and matrix elimination (Figure 4). Next, the analytes of interest are transferred from the SPE column to a reversed-phase column for separation, followed by detection. The two independent flow paths of the UltiMate 3000 x2 Dual LC System ensure reliable SPE-LC operation.

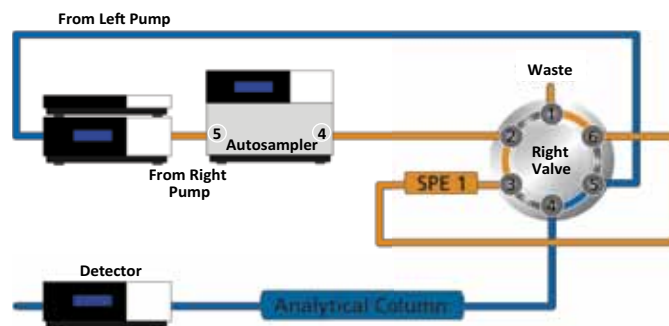


Figure 4. Flow scheme for on-line SPE-LC.

Chromeleon Chromatography Data System software provides an On-Line SPE-LC wizard to guide you through the steps to create and optimize an on-line SPE method. No special training is required—you can use these advanced features as soon as the UltiMate 3000 x2 Dual LC System is installed in your laboratory.

The UltiMate 3000 x2 Dual LC system for automated On-Line SPE-LC includes the SRD-3600 Solvent Rack and Degasser, DGP-3600SD Dual-Gradient Standard Pump or DGP-3600RS Dual-Gradient Rapid Separation Pump, WPS-3000(T)SL Analytical or WPS-3000(T)RS Rapid Separation In-line Split-Loop Autosampler, TCC-3000SD or TCC-3000RS Thermostatted Column Compartment with one 2-position 6-port switching valve, and DAD-3000(RS) Diode Array Detector, or MWD-3000(RS) Multiple Wavelength Detector, or VWD-3x00(RS) Variable Wavelength Detector, or FLD-3x00 Fluorescence Detector, or Corona *ultra* or Corona CAD Charged Aerosol Detector.

## Automated Application Switching

The UltiMate 3000 x2 Dual LC System makes it possible to automate the switchover between analytical methods, even when using different columns and mobile phases. This eliminates time spent changing mobile phase and columns, and flushing and equilibrating the system. The switch can be performed overnight or during the weekends, allowing maximum instrument utilization. The advanced x2 Dual LC System with Chromeleon Software automates these steps and switches applications in minutes.

- Easily switch between applications by clicking on the Chromeleon control panel
- Two independent flow paths support the use of separate columns and mobile phases
- Tubing to and from the autosampler can be flushed before switching to another application
- Low standby flow rate prevents precipitation of eluent buffers, increasing instrument uptime

- Application switching can be scheduled for ultimate flexibility. Set method A to run over the weekend, and automatically switch to method B Sunday morning—both will be complete when you arrive in the laboratory on Monday
- Dedicated Viper Automated Application Switching Kits for UltiMate 3000 SD and RS systems

In this solution, after the operator sets up both LC methods, the system automatically starts and equilibrates. As the analysis on the first column completes, the system automatically switches to the second method and column without additional operator intervention (Figure 5). This approach frees operator time, increases system use time, and thus improves productivity.

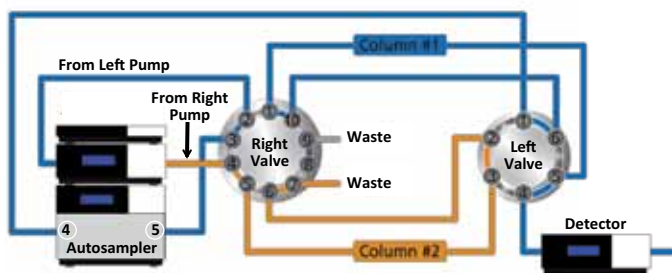


Figure 5. Flow scheme for Automated Application Switching.

The UltiMate 3000  $\times 2$  Dual LC system for Automated Application Switching includes the SRD-3600 Solvent Rack and Degasser, DGP-3600SD Dual-Gradient Standard Pump or DGP-3600RS Dual-Gradient Rapid Separation Pump, WPS-3000(T)SL Analytical or WPS-3000(T)RS Rapid Separation In-line Split-Loop Autosampler, TCC-3000SD or TCC-3000RS Thermostatted Column Compartment with one 2-position 10-port switching valve and one 2-position 6-port switching valve, and DAD-3000(RS) Diode Array Detector or MWD-3000(RS) Multiple Wavelength Detector or VWD-3x00(RS) Variable Wavelength Detector or CAD Charged Aerosol Detector.

## Automated Method Scouting

The UltiMate 3000 UHPLC+ Solution for Automated Method Scouting provides a technique for fast method development by automatically testing method parameters, such as pH value of the mobile phase, solvent composition, stationary phase and column temperature.

- Optimized hardware design, with two 6-position 7-port valves in the column compartment
- Dedicated Viper Automated Method Scouting Kits for UltiMate 3000 SD and RS systems
- Fast and convenient instrument control and method setup
- Powerful queries and reporting tools for data processing and evaluation
- Chromeleon post processing tools find the optimal method in seconds, eliminating the need for manual data assessment
- Extension kit with solvent selection valve available for screening nine additional solvents

Two 6-position 7-port valves integrated into the TCC-3000 Thermostatted Column Compartment are used for column selection; up to six columns can be scouted automatically. The DAD-3000 Diode Array Detector is used for peak purity and identity tracking.

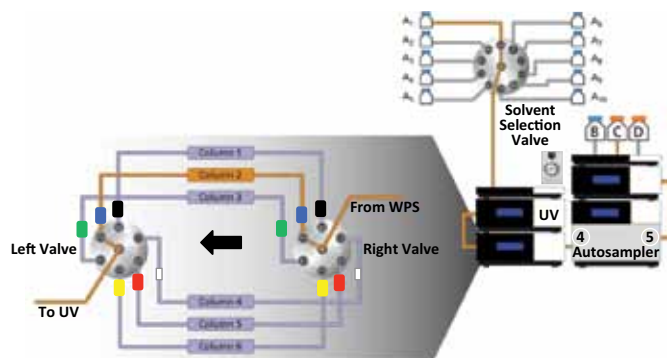


Figure 6. UltiMate 3000 LC system for Automated Method Scouting with extension kit for solvent selection.

Chromeleon Chromatography Data System software provides easy parameter permutation without the need for method changes. The data mining tools, such as automated SST and query functions, eliminate the need for manual data assessment and help to quickly identify the optimum set of parameters. Smart reports visualize results instantaneously.

The UltiMate 3000 LC system configuration for Automated Method Scouting includes the SRD-3000 Solvent Rack, LPG-3400SD Quaternary Standard Pump or LPG-3400RS Quaternary Rapid Separation Pump, WPS-3000(T)SL Analytical or WPS-3000(T)RS Rapid Separation In-Line Split-Loop Autosampler, TCC-3000SD or TCC-3000RS Thermostatted Column Compartment with two 6-position 7-port switching valves, and DAD-3000(RS) Diode Array Detector.

## Proteomics Solutions

The RSLCnano Preconcentration Solution is ideally suited for the analysis of in-gel digested protein samples. A reversed-phase trap column is used for sample cleanup and preconcentration of the peptides. The preconcentration configuration has the advantage that, by concentrating the sample onto the trap column, conventional injection volumes can be made on nano LC columns. In addition, the low flow resistance of the trap column allows the use of high flow rates to inject large sample volumes in a short time.

- Fast injection of large samples in nano LC
- High detection sensitivity
- On-line cleanup and desalting of samples
- Preconcentration kits available for nano, capillary, and monolithic configurations
- Chromeleon Chromatography Data System software for easy system and application control

The typical workflow in a preconcentration experiment starts with sample injection onto a trap column. The sample is preconcentrated and desalted by flushing an aqueous solvent through the trap column. After sample cleanup, the 2-position valve is switched to place the trap column in series with the separation column. The solvent gradient is started to elute and separate the analytes. The analytes are then detected by UV and/or ESI-MS/MS or are spotted on-line onto a MALDI target (Figure 7).

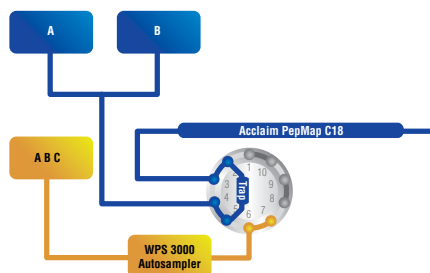


Figure 7. Flow scheme for proteomics preconcentration.

The UltiMate 3000 RSLCnano system for preconcentration and sample cleanup includes the SRD-3400 Solvent Rack, NCS 3500RS nano LC pump with Column Compartment, WPS-3000 TPLRS Nano/Cap Pulled-Loop Autosampler, and VWD-3400 UV/Vis Detector.

## Proteomics Tandem nano LC

To maximize sample throughput and MS utilization of nano LC-MS/MS for peptide sequencing and protein identification, you can perform peptide preconcentration and separation using a tandem nano LC setup. This LC configuration includes two preconcentration nano LC setups (above) for on-line sample cleanup.

- Increased sample throughput for new and existing proteomic methods
- Shorter run times due to off-line column regeneration
- On-line peptide preconcentration, cleanup and separation

In RSLCnano /Tandem nano LC, protein digests are injected onto a trap column for sample cleanup and desalting. After sample cleanup, the gradient is started to elute the peptides from the trap column. After separation on the analytical column, the columns are washed and equilibrated. During this phase, the next sample is injected onto the second trap and separation column system to wash and separate the peptides. A dedicated nano valve in the WPS-3000 FC is used to switch the nano columns to the MS detector for peptide identification (Figure 8).

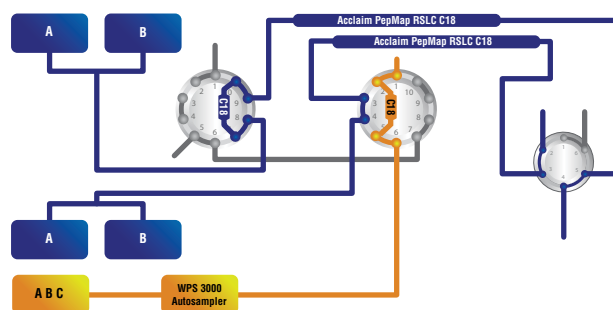


Figure 8. Flow scheme for proteomics Tandem nano LC.

The parallel LC setup allows simultaneous peptide separation and column equilibration, increasing sample throughput up to 100%.

The RSLC Tandem nano LC system includes the SRD-3400 Solvent Rack (NCS-3500RS) with two 10-port 2-position switching valves, NCP-3200RS, WPS-3000PL FC Pulled-Loop autosampler, and VWD-3100 UV/vis detector. The application kit contains the accessories required to equip the WPS-3000FC with a nano switching valve.

## Proteomics MDLC Solutions

These UHPLC+Solutions employ the UltiMate 3000 RSLCnano system to address challenging proteomics applications.

- Combination of two orthogonal chromatographic techniques, for example, IEX and RP-HPLC
- Separation of complex samples
- High peak capacities
- Easy system control and easy visualization of 2D-LC data with Chromeleon software
- Simple method development and optimization
- High method flexibility

### 2D Salt Plugs

The 2D-LC salt step solution is the easy-to-use and flexible solution for moderately complex proteomics analyses. It allows 2D separations by using the autosampler and salt injections to transfer fractions from the first to the second dimension.

The RSLCnano Salt Plug Solution is based on injections of salt plugs onto an ion-exchange column. Typically, a protein digest is injected onto a strong cation-exchange column for separation in the first dimension. Peptides are eluted and separated as fractions by injecting salt plugs with increasing salt concentrations. Each fraction is subsequently separated on a reversed-phase column in the second, orthogonal dimension (Figure 9). The total number of salt plugs depends on the sample complexity. This method can be fully automated. The same fluidics also support RSLCnano Preconcentration.

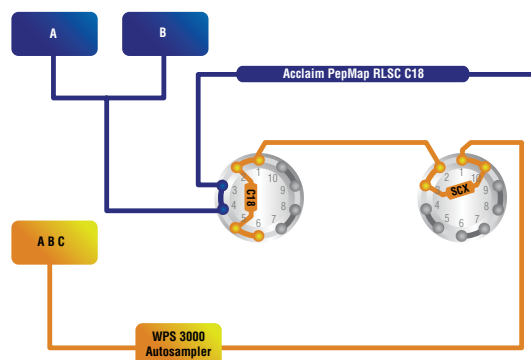


Figure 9. Flow scheme for 2D Salt Plugs.

### Automated Off-Line 2D-LC

The automated off-line 2D-LC solutions support the separation of highly complex proteomic samples. The advantages of off-line MDLC techniques over on-line approaches include high flexibility in column dimensions and mobile-phase compositions, as well as the ability to re-analyze sample fractions. The micro fraction collection option of the WPS-3000PL Nano/Cap Pulled-Loop autosampler supports fully automated off-line 2D-LC, a unique solution for the analysis of complex proteomics samples.

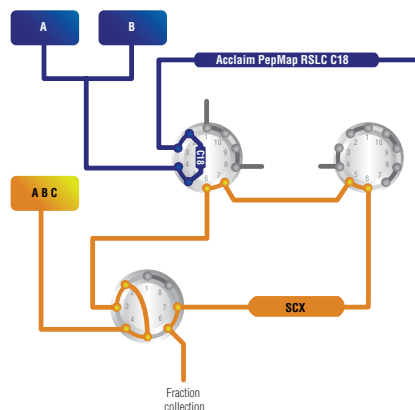


Figure 10. Flow scheme for automated off-line 2D-LC SCX-RP.

# UltiMate 3000 UHPLC+ Systems

*Best-in-class HPLC systems for all your chromatography needs*

UltiMate 3000 UHPLC+ Systems provide excellent chromatographic performance while maintaining easy, reliable operation. The basic and standard analytical systems offer UHPLC compatibility across all modules, ensuring maximum performance for all users and all laboratories. Covering flow rates from 20 nL/min to 10 mL/min with an industry-leading range of pumping, sampling, and detection modules, UltiMate 3000 UHPLC+ Systems provide solutions from nano to semipreparative, from conventional LC to UHPLC.

- Superior chromatographic performance
- UHPLC design philosophy throughout nano, standard analytical, and RSLC
- 620 bar (9,000 psi) and 100 Hz data rate set a new benchmark for basic and standard analytical systems
- ×2 Dual System for increased productivity solutions in routine analysis
- Fully UHPLC compatible advanced chromatographic techniques
- Viper and nanoViper—the first truly universal, fingertight fitting system even at UHPLC pressures

Dionex is the only HPLC company uniquely focused on making UHPLC technology available to all users, all laboratories, and for all analytes.



*Rapid Separation LC Systems:* The extended flow-pressure footprint of the RSLC system provides the performance for ultrafast high-resolution and conventional LC applications.

*RSLCnano Systems:* The Dionex Rapid Separation nanoLC System (RSLCnano) provides the power for high resolution and fast chromatography in nano-, capillary, and micro LC.

*Standard LC Systems:* Choose from a wide variety of Standard LC systems for demanding LC applications at nano, capillary, micro, analytical, and semipreparative flow rates.

*Basic LC Systems:* UltiMate 3000 Basic LC Systems are UHPLC compatible and provide reliable and high-performing solutions to fit your bench space and your budget.



## Rapid Separation LC Systems



The Rapid Separation (RSLC) System accelerates HPLC for unrivaled performance and flexibility. With binary, quaternary, or dual-gradient pumps, the RSLC System offers industry-leading versatility covering the maximum range of HPLC applications, including conventional and ultrafast LC.

- 1034 bar (15,000 psi) maximum pressure and flow rates up to 8 mL/min
- Extensive flow-pressure-footprint for ultrafast, ultrahigh-resolution separations
- Binary or quaternary systems for both UHPLC and conventional HPLC
- ×2 Dual RSLC systems for ultimate productivity solutions
- In-line split-loop injections for 15 second, no-sample-loss injections
- Column compartment temperatures up to 110 °C for reduced system backpressure
- Data collection rates of up to 200 Hz for the detectors
- Wide range of UHPLC compatible detectors

Precision-engineered instrumentation, advanced data processing, and highly optimized chemistries meet all chromatographic performance challenges. The seamless integration of UHPLC with ×2 Dual RSLC technology and powerful Chromeleon software brings new possibilities to laboratories.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

UltiMate 3000 RSLC System Brochure

## Binary Rapid Separation LC System

The Binary RSLC System offers an industry-leading flow-pressure footprint. With its superior performance, it is the best choice for any ultrahigh speed and ultrahigh resolution applications but perfectly suitable for conventional analytical applications as well.

- 1034 bar (15,000 psi) maximum pressure and flow rates up to 8 mL/min
- Automatic compressibility compensation, no manual solvent setting needed.
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- In-line split-loop injections for 15 second, no-sample-loss injections
- Inject up to 500 µL with the patented injection valve of the RSLC Autosampler
- Column compartment temperatures up to 110 °C for reduced system backpressure
- Wide range of UHPLC compatible detectors with a data collection rates of up to 200 Hz
- Zero-void-volume module connections using Viper fingertight fittings

**Note:** For specifications, refer to the LC Modules section.

## Ordering Information

The following RSLC modules and accessories represent a typical UltiMate 3000 Binary RSLC system configuration. Due to its modular setup, this system can be upgraded easily by adding or exchanging modules. For additional ordering information on LC modules and accessories, refer to the LC Modules section.

### Hardware

SRD-3400 UltiMate 3000 Integrated Solvent and Degasser Rack, 4 Channels .....	5035.9245
HPG-3400RS UltiMate 3000 Binary Rapid Separation Pump with Solvent Selector Valves .....	5040.0046
WPS-3000TRS UltiMate 3000 Rapid Separation Thermostatted Autosampler .....	5840.0020
TCC-3000RS UltiMate 3000 Rapid Separation Thermostatted Column Compartment .....	5730.0000
DAD-3000RS UltiMate 3000 Rapid Separation Diode Array Detector (Without Flow Cell) .....	5082.0020

### Accessories

Sample Loop, 25 µL WPS-3000RS and WPS-3000SL Analytical Samplers .....	6820.2415
Semi-Micro Flow Cell for DAD-3000 and MWD-3000 Series, SST, 2.5 µL Volume, 7 mm Path Length .....	6082.0300

## Quaternary Rapid Separation LC System

The Quaternary RSLC System provides the highest degree of flexibility in solvent proportioning for UHPLC and conventional HPLC applications. The system is ideal for ultrahigh resolution and conventional columns with particles ranging from sub-2 µm to 10 µm particle size for fast routine applications, and method development.

- 1034 bar (15,000 psi) maximum pressure and flow rates up to 8 mL/min
- Low pressure gradient proportioning at superior accuracy and precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- In-line split-loop injections for 15 second, no-sample-loss injections
- Inject up to 500 µL with the patented injection valve of the RS Well Plate Autosampler
- Column compartment temperatures up to 110 °C for reduced system backpressure
- Wide range of UHPLC compatible detectors with a data collection rates of up to 200 Hz
- Zero-void-volume module connections using Viper fingertight fittings

**Note:** For system specifications, refer to the LC Modules section.

## Ordering Information

The following modules and accessories represent an UltiMate 3000 Quaternary RSLC System for Automated Method Scouting

### Hardware

SR-3000 UltiMate 3000 Solvent Rack without Degasser .....	5035.9200
LPG-3400RS UltiMate 3000 Quaternary Rapid Separation Pump .....	5040.0036
WPS-3000TRS UltiMate 3000 Rapid Separation Thermostatted Autosampler .....	5840.0020
TCC-3000RS UltiMate 3000 Rapid Separation Thermostatted Column Compartment .....	5730.0000
DAD-3000RS UltiMate 3000 Rapid Separation Diode Array Detector (Without Flow Cell) .....	5082.0020

### Accessories

Sample Loop, 25 µL WPS-3000RS and WPS-3000SL Analytical Samplers .....	6820.2415
Semi-Analytical Flow Cell for DAD-3000 and MWD-3000 Series, SST, 13 µL Volume, 10 mm Path Length .....	6082.0200
Valve Actuator Kit HT for right side of TCC-3000RS/SD, Pressure < 1034 bar (15,000 psi) .....	6730.0001
<i>Required for Automated Method Scouting.</i>	
Valve Actuator Kit HT for left side of TCC-3000RS/SD, Pressure < 1034 bar (15,000 psi) .....	6730.0002
<i>Required for Automated Method Scouting.</i>	
Pod for 6-Position 7-Port HT Valve, SST Variant, Pressure < 1034 bar (15,000 psi) .....	6730.0016
<i>Two valve pods are required for Automated Method Scouting.</i>	
Viper UHPLC Fingertight Fitting and Capillary Kit for Automated Method Scouting on UltiMate 3000 x2 Dual RSLC Systems .....	6040.2807
<i>Required for Automated Method Scouting.</i>	
Extension Kit for Automated Method Scouting with 10-Position 11-Port Solvent Selection Valve for 1/8" OD Tubing .....	6040.0100

## ×2 Dual Rapid Separation LC System

The UltiMate 3000 ×2 Dual RSLC System offers unprecedented sample throughput and easy automation of advanced procedures. It provides highest selectivity and resolution with multi-dimensional LC and increased instrument use time by automatically switching between applications: UHPLC, HPLC, or both.

- 1034 bar (15,000 psi) maximum pressure and flow rates up to 8 mL/min
- Dual low pressure gradient proportioning at superior accuracy and precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- In-line split-loop injections for 15 second, no-sample-loss injections
- Inject up to 500 µL with the patented injection valve of the RS Well Plate sampler
- Column compartment temperatures up to 110 °C and freely-configurable switching valves
- Wide range of UHPLC compatible detectors with a data collection rates of up to 200 Hz
- Turnkey Viper kits for ease of use

**Note:** For system specifications, please refer to the LC Modules section.

### Ordering Information

The following RSLC modules and accessories represent an UltiMate 3000 system for Tandem Analysis

#### Accessories

Sample Loop, 2.5 µL, WPS-3000RS and WPS-3000SL Analytical Samplers .....	6820.2415
Analytical Flow Cell for DAD-3000 and MWD-3000 Series, SST, 13 µL Volume, 10 mm flow path.....	6082.0100
Semi-analytical Flow Cell for DAD-3000 and MWD-3000 Series, SST, 5 µL vol, 7 mm flow path .....	6082.0200
<i>Required for Tandem UHPLC</i>	
Pod for 2-Position 10-Port HT Valve, SST Variant, Pressure < 1034 bar (15,000 psi) .....	6730.0026
<i>Required for Tandem UHPLC</i>	
Viper UHPLC Fingertight Fitting and Capillary Kit for Tandem Operation on UltiMate 3000 ×2 Dual RSLC Systems.....	6040.2803
<i>Required for Tandem UHPLC</i>	

#### Hardware

SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack, 6 Channels .....	5035.9230
DGP-3600RS UltiMate 3000 Dual-Gradient Rapid Separation Pump System .....	5040.0066
WPS-3000TRS Rapid Separation Thermostatted Autosampler .....	5840.0020
TCC-3000RS UltiMate 3000 Rapid Separation Thermostatted Column Compartment.....	5730.0000
DAD-3000RS UltiMate 3000 Rapid Separation Diode Array Detector (Without Flow Cell).....	5082.0020



## RSLCnano Systems

The UltiMate 3000 RSLCnano System is developed with sample throughput in mind. The robust, splitless flow delivery is designed for continuous, interruption-free analysis. The wide flow-pressure footprint allows nano-, capillary, and micro flow rates at column pressures up to 800 bar. The RSLCnano system offers better confidence; in performance, in results, and ease of operation.

- Flow delivery from 20 nL/min up to 50  $\mu$ L/min at a maximum pressure of 800 bar
- Continuous direct flow
- Unparalleled gradient precision
- Small gradient delay volume of only 25 nL
- Up to two low-dispersion 2-position switching valves
- Nano, capillary, and micro LC applications
- Multidimensional separations
- Integrated ternary gradient pump, 10–2500  $\mu$ L/min

The heart of the UltiMate 3000 RSLCnano System is the HPG nano pump. The HPG nano pump generates a continuous, splitless, and pulse free flow. Refill cycles are not required, therefore the system will run as long as there is mobile phase available. The unmatched flow-pressure footprint of 800 bar of column pressure is available from 20 nL/min to 50  $\mu$ L/min and delivers the pump power required to drive any separation.

Tedious and troublesome nano LC application configuration is a thing of the past with the new nanoViper capillary fitting system. nanoViper fitting brings unparalleled ease of use to nano LC, providing fingertight, zero dead-volume connections to any module, valve, and column over the complete pressure range.



*The UltiMate 3000 RSLCnano System.*

The built-in column compartment features up to two micro switching valves capable of working at pressures up to 1000 bar. The valves can be pulled forward or taken out without tools, to maximize ease-of-use when setting up a new application.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Brochures*

UltiMate 3000 RSLCnano System Brochure

### *Product Data Sheets*

UltiMate 3000 RSLCnano Rapid Separation Nano LC System Data Sheet

**Note:** For system specifications, refer to the *LC Modules* section.

## Ordering Information

### Hardware

NCS-3500RS UltiMate 3000 Binary Rapid Separation Nano Flow Pump with Ternary Loading Pump and Column Compartment .....	5041.0010
NCS-3500RS UltiMate 3000 Binary Rapid Separation Capillary Flow Pump with Ternary Loading Pump and Column Compartment .....	5041.0020
NCP-3200RS UltiMate 3000 Binary Rapid Separation Nano Flow Pump .....	5041.0030
VWD-3400RS UltiMate 3000 Rapid Separation Four-Channel Variable Wavelength Detector (Without Flow Cell).....	5074.0010
SRD-3400 UltiMate 3000 Integrated Solvent and Degasser Rack, Four Channels .....	5035.9245
WPS-3000TPLRS UltiMate 3000 Thermostatted Rapid Separation Pulled Loop Well Plate Sampler .....	5826.0020

### Accessories

Low-Dispersion 2-Position 10-Port Snap-In Valve Pod with 10-32 Fittings, 0.15mm Bore, 900 bar/13,050 psi pressure limit, for UltiMate 3000 NCS-3x00RS .....	6041.0001
Flow Selector for Nano LC with flow range 50-1000 nL/min for NCS-3x00RS and NCP-3x00RS .....	6041.0002
Flow Selector for Capillary LC with low range 0.5-10 µL/min for NCS-3x00RS and NCP-3x00RS .....	6041.0003
Biocompatible (PEEK) Low-Dispersion 2-Position 10-Port Snap-In Valve Pod with 10-32 Fittings, 0.15 mm bore, 345 bar/5,000 psi pressure limit, for UltiMate 3000 NCS-3x00RS .....	6041.0012
Flow Selector for Micro LC with flow range 10-50 µL/min for NCS-3x00RS and NCP-3x00RS .....	6041.0014
Flow Cell VWD-3x00, nano, 3 nL, .....	6074.0270
Flow Cell VWD-3x00, nano, 45 nL .....	6074.0280
Flow Cell, VWD-3x00, nano, 180 nL.....	6074.0290

## Standard LC Systems



The UltiMate 3000 Standard LC Systems offer UHPLC compatibility across all modules, ensuring maximum performance for all users and all laboratories. The 620 bar maximum pressure sets a new benchmark in HPLC

- Optimal performance and reliability for conventional LC applications
- 620 bar (9000 psi) maximum pressure and 100 Hz data rate for UHPLC compatibility
- Flow rates up to 10 mL/min covering all application needs
- Widest range of system configurations for maximum application flexibility
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Active rear seal wash for increased piston seal lifetime
- Patented piston seal tightness monitoring
- System wellness and predictive performance indicators

Choose from a wide variety of Standard LC system configurations, or modify system setups to fit your specific demands and applications.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

UltiMate 3000 Liquid Chromatography Systems Brochure

## Binary Standard LC Systems

The UltiMate 3000 Binary Analytical System has been carefully configured to meet the demands of fast LC analyses at pressures up to 620 bar. Two serial dual-piston pumps provide stable, accurate pulse-free flows—essential for optimal binary gradient mixing performance—for consistent gradient formation, rapid gradient response, and excellent retention time precision.

- SmartFlow technology for precise and accurate flow rates 0.1 to 10 mL/min
- 620 bar (9000 psi) maximum pressure and 100 Hz data rate for UHPLC compatibility
- High-pressure gradient proportioning at superior accuracy and precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550  $\mu$ L) to cover all application needs
- In-line split-loop injections for 15 second, no-sample-loss injections
- Ultralow carryover, high precision auto-injections
- Column compartment temperatures up to 80 °C for reduced system backpressure

The UltiMate 3000 Binary Analytical System provides fast cycle time, reliable mobile phase temperature conditioning, and high data rate detection to ensure optimal performance for the full range of binary analytical applications.

**Note:** For specifications, refer to the LC Modules section.

## Ordering Information

The following LC modules represent an UltiMate 3000 system configuration for Tandem Analysis.

Hardware	
SRD-3200 UltiMate 3000 Integrated Solvent and Degasser Rack, 2 Channels .....	5035.9250
HPG-3200SD - UltiMate 3000 Binary Analytical Pump .....	5040.0021
WPS-3000TSL UltiMate 3000 Thermostatted Analytical Sampler .....	5822.0020
TCC-3000SD Thermostatted Column Compartment .....	5730.0010
MWD-3000UltiMate 3000 Multiple Wavelength Detector (Without Flow Cell).....	5082.0030
Accessories	
Analytical Flow Cell for DAD-3000 and MWD-3000 Series, SST, 13 $\mu$ L Volume, 10 mm Path Length .....	6082.0100

## Quaternary Standard LC Systems

The UltiMate 3000 Quaternary Standard System offers full support of all HPLC applications and provide UHPLC compatibility.

- SmartFlow technology for precise and accurate flow rates 0.1 to 10 mL/min
- 620 bar (9000 psi) maximum pressure and 100 Hz data rate for UHPLC compatibility
- Low-pressure gradient proportioning at superior accuracy and precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35-1550  $\mu$ L) to cover all application needs
- In-line split-loop injections for 15 second, no-sample-loss injections
- Ultralow carryover, high precision auto-injections
- Column compartment temperatures up to 80 °C for reduced system backpressure

The UltiMate 3000 Quaternary Standard System provides remarkable retention time precision, accurate and precise eluent selection and proportioning efficiency, and excellent mixing performance for quaternary analytical applications.

**Note:** For system specifications, refer to the LC Modules section.

### Ordering Information

The following RSLC modules and accessories represent a typical UltiMate 3000 Quaternary Standard system configuration. Due to its modular setup, this system can be upgraded easily by adding or exchanging modules. For additional ordering information on LC modules and accessories, refer to the LC Modules section.

#### Hardware

SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200
LPG-3400SD UltiMate 3000 Quaternary Analytical Pump.....	5040.0031
TCC-3000SD UltiMate 3000 Thermostatted Column Compartment.....	5730.0010
WPS-3000TSL UltiMate 3000 Thermostatted Analytical Sampler.....	5822.0020
DAD-3000 UltiMate 3000 Diode Array Detector (Without Flow Cell)...	5082.0010

#### Accessories

Analytical Flow Cell for DAD-3000 and MWD-3000 Series, SST, 13 $\mu$ L Volume, 10 mm Path Length.....	6082.0100
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## x2 Dual Standard Systems

The UltiMate 3000 x2 Dual LC System sets a new benchmark in flexibility, sample throughput, and automation of advanced procedures. The modular design is easily customized to your applications and sample preparation needs.

- SmartFlow technology for precise and accurate flow rates 0.1 to 10 mL/min
- 620 bar (9000 psi) maximum pressure and 100 Hz data rate for UHPLC compatibility
- Dual low-pressure gradient proportioning for superior accuracy and precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- In-line split-loop injections for 15 second, no-sample-loss injections
- Ultralow carryover, high-precision auto-injections
- Column compartment temperatures up to 80 °C for reduced system backpressure
- Turnkey Viper kits for ease of use

UHPLC+ solutions save time and effort. Parallel and tandem configurations increase sample throughput by up to 100%, by automating two applications in one run. Multidimensional separations provide resolutions impossible with single-column methods. On-line sample preparation saves time and reduces complexity, sample loss, and matrix interferences.

**Note:** For system specifications, refer to the LC Modules section.

### Ordering Information

The following RSLC modules and accessories represent a typical UltiMate 3000 x2 Dual Standard system configuration. The system can be easily upgraded by adding or exchanging modules. For additional ordering information on LC modules and accessories, refer to the LC Modules section

#### Hardware

SR-3600 UltiMate 3000 Integrated Solvent Rack and Degasser Rack, 6 Channels .....	5035.9230
DPG-3600SD UltiMate 3000 Dual-Gradient Analytical Pump.....	5040.0061
TCC-3000SD UltiMate 3000 Thermostatted Column Compartment.....	5730.0010
WPS-3000TSL UltiMate 3000 Thermostatted Analytical Sampler .....	5822.0020
DAD-3000 20 UltiMate 3000 Diode Array Detector (without Flow Cell) .....	5082.0010

#### Accessories

Analytical Flow Cell for DAD-3000 and MWD-3000 Series, SST, 13 $\mu$ L Volume, 10 mm Path Length .....	6082.0100
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## Basic LC Systems



## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Brochures*

UltiMate 3000 Basic Automated System

### *Product Data Sheets*

ACC-3000 Autosampler Column Compartment

UltiMate 3000 Basic LC Systems are cost-effective solutions for conventional HPLC and UHPLC at pressures up to 62 MPa (9000 psi). The fully-scalable and modular design ensures the flexibility you need to meet future system demands. In addition, the UltiMate 3000 Basic LC Systems provide excellent reliability and performance, ensuring optimal return on investment.

- UHPLC compatible with pressures up to 62 MPa (9000 psi)
- SmartFlow pulsation-free flows even at high flow rates and pressures
- High-performance operation for consistent and reliable results at low cost of ownership
- Excellent retention time precision, detector sensitivity, linearity, and drift
- Rugged components ensure maximum instrument uptime
- System wellness and predictive performance indicators
- Modular design for easy module upgrade, addition, or replacement
- Optional ACC-3000 Autosampler Column Compartment for expanded automation
- Chromeleon Chromatography Data System software for ease of use and maintenance

The UltiMate 3000 Basic Automated Systems integrate straightforward automation using the innovative analytical autosampler with integrated column compartment ACC-3000(T). For more information on the availability of manual injectors, contact your sales representative.

## Isocratic Basic Automated LC System

The UltiMate 3000 Isocratic Basic Automated System provides rugged, automated system performance in an economical yet flexible package. Each module of the system supports not only conventional isocratic HPLC applications, but also separations under UHPLC conditions with operating pressures up to 62 MPa (9000 psi).

- SmartFlow technology for precise and accurate flow rates from 50 µL/min to 10 mL/min
- Support of operating pressures of up to 62 MPa (9000 psi)
- Pulled-loop injection principle (full- and partial-loop injections) up to 200 µL
- Sample thermostating from 8 to 40 °C or 15 ° below ambient temperature
- Fast and stable column thermostating from 5 °C above ambient to 50 °C
- Variable UV wavelength detection up to 100 Hz
- Ultralow carryover, high precision auto-injections
- Column compartment temperatures up to 80 °C for reduced system backpressure

The UltiMate 3000 Isocratic Basic Automated System includes the ISO-3100SD Isocratic Analytical Pump and is best suited for detection techniques not compatible with gradient elution, such as refractive index detection.

**Note:** For system specifications, refer to the LC Modules section.

### Ordering Information

The following LC modules and accessories represent a typical UltiMate 3000 Isocratic Basic Automated System configuration. Due to its modular setup, the system can be upgraded easily by adding or exchanging LC modules. For additional order information for LC modules and accessories, refer to the LC Modules section

#### Hardware

SRD-3200 UltiMate 3000 Integrated Solvent and Degasser Rack, 2 Channels .....	5035.9250
ISO-3100SD UltiMate 3000 Isocratic Analytical Pump.....	5040.0011
ACC-3000T UltiMate 3000 Thermostatted Autosampler with Integrated Column Compartment .....	5830.0020
VWD-3100 UltiMate 3000 Single Channel Variable Wavelength Detector (without Flow Cell) .....	5074.0005

#### Accessories

Analytical Flow Cell for VWD-3000 Series, SST, 11 µL Volume, 10 mm Path length .....	6074.0250
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## Quaternary Basic Automated LC System

The UltiMate 3000 Quaternary Basic Automated System provides rugged, automated system performance with quaternary eluent proportioning. It combines the support of conventional isocratic and gradient HPLC and UHPLC applications with operating pressures up to 62 MPa (9000 psi) with the highest degree of choice in mobile phase selection and mixing.

- Wide operating flow-rate range from 200 µL/min to 10 mL/min with high flow-rate accuracy
- Support of operating pressures of up to 62 MPa (9000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Extensive mixer portfolio (35-1550 µL) to cover all application needs
- Pulled-loop injection principle (full- and partial-loop injections) up to 200 µL
- Sample thermostating from 8 to 40 °C or 15 ° below ambient temperature
- Fast and stable column thermostating from 5 °C above ambient to 50 °C
- Variable UV wavelength detection up to 100 Hz

The SpinFlow mixing design of the LPG-3400SD Quaternary Analytical Pump perfectly balances gradient delay volume against mixing efficiency.

**Note:** For system specifications, refer to the LC Modules section.

### Ordering Information

The following modules and accessories represent a typical UltiMate 3000 Quaternary Basic Automated System configuration. For additional information on modules and accessories, refer to the LC Modules section.

#### Hardware

SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200
LPG-3400SD - UltiMate 3000 Quaternary Analytical Pump .....	5040.0031
ACC-3000T UltiMate 3000 Thermostatted Autosampler with Integrated Column Compartment .....	5830.0020
VWD-3100 UltiMate 3000 Single Channel Variable Wavelength Detector (Without Flow Cell) .....	5074.0005
VWD-3100 20 Hz Single-Channel Variable Wavelength Detector (without Flow Cell) .....	5074.0005

#### Accessories

Analytical Flow Cell for VWD-3000 Series, SST, 11 µL Volume, 10 mm Path length .....	6074.0250
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## Binary Basic Automated LC System

The UltiMate 3000 Quaternary Basic Automated System provides rugged, automated system performance with binary eluent proportioning. It combines the support of fast LC and UHPLC applications with operating pressures up to 62 MPa (9000 psi).

- Wide operating flow rate range from 100  $\mu\text{L}/\text{min}$  to 10  $\text{mL}/\text{min}$  with high flow rate accuracy
- Support of operating pressures of up to 62 MPa (9000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Extensive mixer portfolio (35-1550  $\mu\text{L}$ ) to cover all application needs
- Pulled-loop injection principle (full- and partial-loop injections) up to 200  $\mu\text{L}$
- Sample thermostating from 8 to 40  $^{\circ}\text{C}$  or 15  $^{\circ}$  below ambient temperature
- Fast and stable column thermostating from 5  $^{\circ}\text{C}$  above ambient to 50  $^{\circ}\text{C}$
- Variable UV wavelength detection up to 100 Hz

The SpinFlow mixing design of the HPG-3400SD Binary Analytical Pump perfectly balances gradient delay volume against mixing efficiency

**Note:** For additional ordering information on LC modules and accessories, refer to the LC Modules section.

### Ordering Information

The following modules and accessories represent a typical UltiMate 3000 Binary Basic Automated System configuration. Due to its modular setup, this system can be upgraded easily by adding or exchanging modules. For additional information on modules and accessories, refer to the LC Modules section.

#### Hardware

SRD-3200 UltiMate 3000 Integrated Solvent and Degasser Rack, 2 Channels .....	5035.9250
HPG-3200SD UltiMate 3000 Binary Analytical Pump.....	5040.0021
ACC-3000T UltiMate 3000 Thermostatted Autosampler with Integrated Column Compartment .....	5830.0020
VWD-3100 UltiMate 3000 Single Channel Variable Wavelength Detector (Without Flow Cell) .....	5074.0005

#### Accessories

Analytical Flow Cell for VWD-3000 Series, SST, 11 $\mu\text{L}$ Volume, 10 mm Path length .....	6074.0250
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# UltiMate 3000 LC Systems

## *Modular flexibility for dedicated solutions*

UltiMate 3000 LC systems provide excellent chromatographic performance while maintaining easy and reliable operation. With electrochemical, biocompatible, and semipreparative systems, Dionex offers dedicated solutions for a wide range of applications. With an industry-leading range of pumping, sampling, and detection modules, the UltiMate 3000 series always provides outstanding versatility.

- Superior chromatographic performance
- Biocompatible systems for nano, micro, and analytical flow ranges
- Biocompatible ×2 Dual Systems for advanced biochromatographic techniques
- Dedicated systems for ultrasensitive electrochemical detection
- Wide range of purification system solution
- Viper and nanoViper—the first truly universal, fingertight fitting system even at UHPLC pressures

Whichever UltiMate 3000 LC system configuration you choose, you will get a highly integrated solution combined with the power of Operational Simplicity through innovative hardware and the Chromeleon software.



*Nano LC Systems:* Biocompatible, split-flow nano LC systems

*Electrochemical LC Systems:* A turnkey LC solution for measurement of femtogram levels of oxidizable or reducible compounds by electrochemical detection

*Biocompatible LC Systems:* UltiMate 3000 Biocompatible Systems for high-performance analysis and purification of proteins from micro to analytical flow range

*Semipreparative LC Systems:* UltiMate 3000 Semipreparative System for robust, safe, and high-performance purifications

## Nano LC Systems



The UltiMate 3000 nanoLC System provides excellent chromatographic performance while maintaining reliable operation. These systems allow ternary or quaternary gradients at nano LC flow rates and offer a fully biocompatible flow path. This provides the most flexible solution for nano, capillary, or micro flow.

- Superior chromatographic performance
- Biocompatible systems for nano, capillary, or micro flow ranges
- Biocompatible  $\times 2$  Dual Systems for advanced applications

The UltiMate 3000 nano LC Systems offer flexible solutions for labs working with nano, capillary, and micro LC.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

UltiMate 3000 Nano, Capillary, and Micro LC System Brochure

## Biocompatible Quaternary Nano/Cap/Micro System

The UltiMate 3000 Biocompatible Quaternary Nano/Cap/Micro System offers precise flow rates (from 50 nL/min) and ultrahigh sensitivity. It is the perfect fit when working with limited sample volumes or performing low-flow LC/MS applications. In its standard configuration, it allows the reliable direct injection and 1D-separation of a minimum of 20 nL from a 1  $\mu$ L sample.

- Biocompatible flow paths
- UltiFlow technology for precise and accurate flow rates as low as 50 nL/min
- High-precision sampling from well plates and microvials
- Exact temperature control for all critical flow path components protects labile samples
- Reliable injection reproducibility, down to 20 nL
- Excellent front end for MS detectors
- Includes system wellness and predictive performance indicators
- Seamless MS integration with single-point software control for most MS platforms

The UltiMate 3000 Biocompatible Nano/Cap/Micro Quaternary System features a unique Flow Manager. Its active flow splitter is responsible for nano/cap/micro flow delivery while thermostating ensures superior retention time reproducibility. The system's UV detector with dedicated low-volume nano/cap/micro flow cells is ideal to monitor separation results prior to MS detection.

**Note:** For system specifications, refer to the *LC Modules* section.

## Ordering Information

The following LC modules represent a typical UltiMate 3000 Biocompatible Quaternary Nano/Cap/Micro System configuration. Due to its modular setup, the system can be upgraded easily by adding or exchanging LC modules. For additional order information and key specifications for LC modules and accessories, refer to the LC Modules section.

**Hardware**

SRD-3000 without Degasser.....	5035.9200
LPG-3400MB UltiMate 3000 Biocompatible Low-Pressure Proportioning Micro pump .....	5037.0055
FLM-3300B Nano UltiMate 3000 Biocompatible Nano Flow Manager with one integrated motorized 2 -position 10 port switching valve.....	5721.0030
WPS-300TBPL Nano/Cap UltiMate 3000 Biocompatible Thermostatted Nano/Cap/Micro Pulled-Loop Well Plate Autosampler.....	5821.0020
VWD-3400RS UltiMate 3000 Four-Channel Variable Wavelength Detector (without Flow Cell) .....	5074.0010

**Accessories**

UZ-View Flow Cell, Nano for VWD-3000 Series, 3 nL volume, 10 mm Path Length .....	6074.0270
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## Biocompatible ×2 Dual Nano/Cap/Micro System

The UltiMate 3000 Biocompatible ×2 Dual Nano/Cap/Micro System is the essential tool for multidimensional LC separations of highly complex biological samples. The Dual-Gradient Nano/Cap/Micro pump with UltiFlow technology provides two independent, precise flows to 50 nL/min and 10 µL/min. The system is highly flexible, supporting a wide range of MDLC applications.

- Biocompatible flow paths
- Dual-Gradient pump with two independent ternary gradient pumps
- UltiFlow technology for constant flow independent of eluent composition and backpressure
- Wide flow rate range: 50 nL/min–2.5 mL/min
- Easily convertible between nano, capillary, and micro flow rates
- Low volume nano/cap/micro flow cells for UV-vis detector
- Supports key solutions such as off-line 2D-LC and 2D-LC salt plugs
- Microfraction collection option for fully automated off-line MDLC

The UltiMate 3000 Biocompatible ×2 Dual Nano/Cap/Micro System supports orthogonal separation techniques such as ion-exchange and reversed-phase chromatography in on-line and off-line 2D-LC mode. It is the ideal LC system for bioanalytical laboratories seeking to from automated sample preparation and higher sensitivity.

**Note:** For specifications, refer to the LC Modules section.

**Ordering Information****Hardware**

SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack, 6 Channels .....	5035.9230
DGP-3600MB UltiMate 3000 Biocompatible Dual Ternary Low- Pressure Proportioning Micro Pump System.....	5037.0060
WPS-3000TBPL Nano/Cap UltiMate 3000 Biocompatible Thermostatted Nano/Cap/Micro Pulled-Loop Well Plate Autosampler.....	5821.0020
Micro Fraction Collection Option, Biocompatible, WPS-3000PL.....	6821.0051
FLM-3100B Nano UltiMate 3000 Biocompatible Nano Flow Manager with Two Integrated Motorized 2-Position 10-Port Switching Valves ..	5721.0010
VWD-3100 UltiMate 3000 Single Channel Variable Wavelength Detector (Without Flow Cell) .....	5074.0005

**Accessories**

UZ-View Flow Cell Nano for VWD-3000 Series, 3 nL Volume, 10 mm Path length .....	6074.0270
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## Electrochemical LC Systems

*This system provides full capabilities for analysis of neurotransmitters, drugs, and metabolites*

The UtiMate 3000 System for ED is optimized for the Coulochem III detector to provide the ultimate in sensitivity through minimizing background currents and pump noise, resulting in the best limits of detection. The most sensitive, sophisticated LC electrochemical detector available, the Coulochem III detector comes with a choice of cell designs and is ideal for use in methods development or for routine applications requiring high sensitivity detection

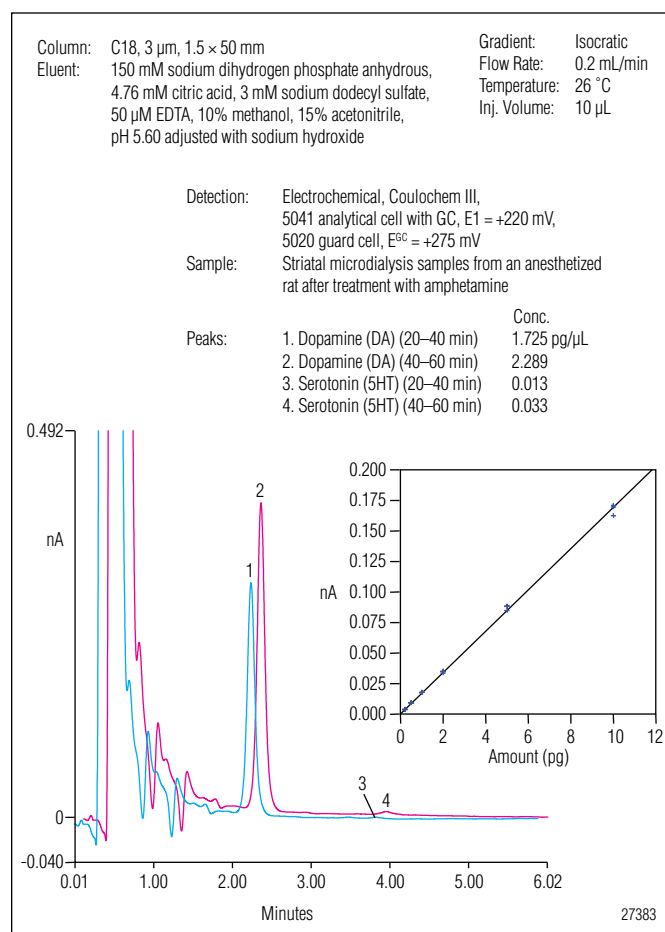
- The solution for analysis of neurotransmitters, thiols, and drug metabolites in biological systems
- Isocratic micro-pump with biocompatible flow path is ideally suited for use with electrochemical detection
- Dual micro-pump design incorporates isokinetic Smartflow technology to provide zero-pulsation delivery
- A completely biocompatible flow path minimizes interference and assures exceptionally low backgrounds
- Biocompatible Analytical Sampler delivers accurate sampling with zero sample carryover
- Low volume samples are thermostatted and handled with minimal waste
- The system is designed for reliable operation and increased system longevity
- Advanced system control and monitoring using Chromeleon Chromatography Data System software

Choosing an integrated system optimized for electrochemistry is important to achieve results with the highest level of sensitivity

This system provides full capabilities for analysis of many compounds including neurotransmitters, drugs and metabolites, natural products and genotoxins



*UtiMate 3000 System for Electrochemical Detection.*

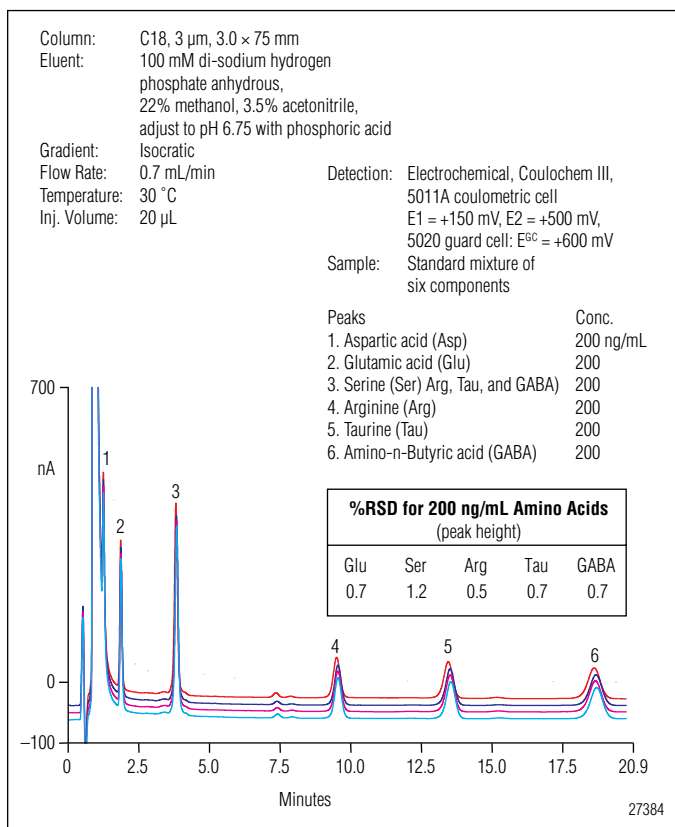


*Analysis of microdialysis samples from 20–40 and 40–60 min collection after amphetamine treatment.*

## Electrochemical Detection

The Coulochem III detector is the standard in electrochemical detection, achieving the highest possible sensitivity from standard bore to microbore chromatography. The advanced features of the Coulochem III platform provide performance and reliability in a detector that is convenient to use.

Unsurpassed selectivity and ruggedness can be achieved using serial coulometric cells. Amperometric cells provide great flexibility for a wide range of analytes and for use with microbore chromatography. The widest variety of electrochemical cells are available; choose the optimum cell design that meets your assay needs.



Analysis of amino acid mixture after OPA/BME precolumn derivatization (200 ng/mL of Asp, Glu, Ser, Arg, Tau, and GABA)

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Brochures

Coulochem III Electrochemical Detector Brochure

### Product Data Sheets

UltiMate 3000 for High Sensitivity Electrochemical Detection Data Sheet

**Note:** For system specifications, refer to the LC Modules section.

## Ordering Information

The following LC modules and accessories represent a typical UltiMate 3000 System configuration for high-sensitivity electrochemical detection. For additional order information and key specifications for LC modules and accessories, refer to the LC Modules section.

### Hardware

ISO-3100BM UltiMate 3000 Biocompatible Isocratic Micro Pump.....	5042.0011
WPS-3000TBSL UltiMate 3000 Biocompatible Well Plate	
Autosampler .....	5827.0020
Coulochem III Electrochemical Detector for UltiMate with Pulse/Scan Mode (100-240V).....	70-9138
<i>Choose the detector configuration for your application</i>	
Coulochem III Electrochemical Detector for UltiMate with DC and Pulse/Scan Modes (100-240V) .....	70-9141
Coulochem III Electrochemical Detector for UltiMate with DC mode (100-240V).....	70-9143
<i>Recommended for use in analysis of microdialysates, thiols, and genotoxic impurities</i>	
HPLC Workstation with 1 Class 1 Timebase .....	5960.0067
<i>Optional computer, monitor, and printer ordered separately</i>	
SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200

### Accessories

Organizer Module with Temperature Control, for Coulochem III detector .....	70-9121TA
<i>Choose a thermostatically controlled or ambient temperature organizer module.</i>	
Organizer Module, Non-Heated, for Coulochem III Detector .....	70-9208
SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200
Model 5041 Enhanced Amperometric Cell with Glassy Carbon Target....	70-4131
Model 5011A Improved High Sensitivity Cell, Dual-Channel.....	70-5660
Model 5041B Microdialysis Cell, Dual-Channel .....	70-0520B
Model 5020 Guard Cell .....	55-0417
Model 5021A Conditioning Cell.....	70-6068
Model 5040 Cell with Platinum Target.....	70-1074
Model 5040 Cell with Boron Doped Diamond Electrode.....	70-7900

**Note:** For information on electrochemical cells, refer to the LC Modules section.

## Biocompatible LC Systems



The UltiMate 3000 Biocompatible Systems provide the right solution for any biochromatographic demands from micro to analytical range. System components are perfectly matched to meet the requirements for high-performance analysis as well as purification. The wide range of solvent options allows easy implementation of different gradient profiles, essential for method development.

- Superior chromatographic performance
- Industry leading range of biocompatible pumps
- Titanium and PEEK flow-path for full biocompatibility
- Dual-gradient pump for true parallel, tandem, or multidimensional chromatography
- High precision auto-injections from 0.1 to 250  $\mu\text{L}$  (default) with ultralow carryover
- Sample fractionation and re-injection with the WPS-3000TBFC Autosampler Fraction Collector

The UltiMate 3000 Biocompatible System ensures full biocompatibility, critical to integrity of proteins during separation, while delivering high day-to-day reproducibility and robust operation even under harsh salt and pH conditions.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

Titanium System Data Sheet

UltiMate 3000 Data Sheet

## Biocompatible Quaternary Analytical System

The UltiMate 3000 Biocompatible Quaternary Analytical System is fully biocompatible, designed for high performance analysis and purification of proteins at pressures up to 350 bar (5000 psi). The wide range of solvent options allows easy implementation of different gradient profiles, essential for method development.

- Titanium pumps and PEEK flow-path for full biocompatibility
- SmartFlow technology for precise and accurate flow rates from 0.2 to 10 mL/min
- Support of operating pressures of up to 350 bar (5000 psi)
- Quaternary low-pressure proportioning at superior accuracy and precision
- Quaternary solvent selection for mobile phase preparation, system and column flushing
- High precision auto-injections from 0.1 to 250  $\mu\text{L}$  (default) with ultralow carryover

Titanium pumps and the all-PEEK flow-path of the UltiMate 3000 Titanium System ensure full biocompatibility, critical to the integrity of proteins during separation, while delivering high day-to-day reproducibility and robust operation, even under harsh salt and pH conditions

***Note:** For specifications, refer to the LC Modules section.*

## Ordering Information

The following LC modules and accessories represent a typical UltiMate 3000 Biocompatible Quaternary Analytical System configuration. Due to its modular setup, the system can be upgraded easily by adding or exchanging LC modules. For additional order information for LC modules and accessories, please refer to the LC Modules section.



**Hardware**

SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200
LPG-3400AB UltiMate 3000 Biocompatible Quaternary Low-Pressure Proportioning Analytical Pump.....	5037.0015
WPS-3000TBPL Analytical UltiMate 3000 Biocompatible Thermostatted Analytical Pulled-Loop Well Plate Autosampler.....	5823.0020
TCC-3000SD Thermostatted Column Compartment.....	5730.0010
VWD-3400RS UltiMate 3000 Rapid Separation Four Channel Variable Wavelength Detector (Without Flow Cell).....	5074.0010

**Accessories**

Analytical Flow Cell for VWD-3000 Series, PEEK, 11 $\mu$ L Volume, 10 mm Path Length.....	6074.0200
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## Biocompatible $\times 2$ Dual Analytical System

The UltiMate 3000  $\times 2$  Dual Analytical System is fully biocompatible for advanced multidimensional (MD) protein analysis and purification. It supports advanced biochromatography such as application switching and automated MD chromatography; for example, purification and analysis of biotherapeutics like monoclonal antibodies in a single method.

- Titanium pumps and PEEK flow path for full biocompatibility
- SmartFlow technology for precise and accurate flow rates from 0.2 to 10 mL/min
- Support of operating pressures of up to 350 bar (5000 psi)
- Dual-ternary low-pressure proportioning at superior accuracy and precision
- Dual-gradient pump for true parallel, tandem or multidimensional chromatography
- Dual-ternary solvent selection for mobile phase preparation, system and column flushing
- High precision auto-injections from 0.1 to 250  $\mu$ L (default) with ultralow carryover
- Sample fractionation and re-injection with the WPS-3000TBFC Autosampler Fraction Collector

The UltiMate 3000 Biocompatible  $\times 2$  Dual Analytical System combines the excellent features of the DGP-3600AB Biocompatible Analytical Dual-Gradient Pump and the WPS-3000TBFC Autosampler Fraction Collector to support parallel, tandem, and MD separations with automated sample fractionation and re-injection for the highest flexibility and productivity while saving money, time and space.

**Note:** For system specifications, refer to the LC Modules section.

**Ordering Information**

The following LC modules and accessories represent a typical UltiMate 3000 Biocompatible  $\times 2$  Dual Analytical System configuration. For additional order information and key specifications for LC modules and accessories, see the LC Modules section.

**Hardware**

SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack, 6 Channels.....	5035.9230
DGP-3600AB UltiMate 3000 Biocompatible Dual Ternary Low-Pressure Proportioning Analytical Pump System.....	5037.0014
WPS-3000TBFC UltiMate 3000 Thermostatted Biocompatible Pulled-Loop Well Plate Autosampler with Integrated Fraction Collection.....	5825.0020
TCC-3000SD Thermostatted Column Compartment.....	5730.0010
VWD-3400RS UltiMate 3000 Rapid Separation Four-Channel Variable Wavelength Detector (Without Flow Cell).....	5074.0010

**Accessories**

Analytical Flow Cell for VWD-3000 Series, PEEK, 11 $\mu$ L Volume, 10 mm Path Length.....	6074.0200
Valve Actuator Kit HP for Right Side of TCC-3000RS/SD, Pressure < 413 bar (6000 psi).....	6730.0003
Valve Actuator Kit HP for Left Side of TCC-3000RS/SD, Pressure < 413 bar (6000 psi).....	6730.0004
Pod for 2-Position 10-Port HP Valve, Biocompatible, Pressure < 345 bar (5000 psi).....	6723.9023

## Biocompatible Quaternary Micro System

The UltiMate 3000 Biocompatible Quaternary Micro System is fully biocompatible designed for high performance analysis of proteins at pressures up to 350 bar (5000 psi). The wide range of solvent options allows easy implementation of different gradient profiles, essential for method development.

- Titanium pumps and PEEK flow-path for full biocompatibility
- SmartFlow technology for precise and accurate flow rates from 0.05 to 2.5 mL/min
- Support of operating pressures of up to 350 bar (5000 psi)
- Quaternary low-pressure proportioning at superior accuracy and precision
- Quaternary solvent selection for mobile phase preparation, system and column flushing
- High precision auto-injections from 0.1 to 250  $\mu$ L (default) with ultralow carryover

Titanium pumps and the all-PEEK flow-path of the UltiMate 3000 Titanium Micro LC System ensure full biocompatibility, critical to the integrity of proteins during separation, while delivering high day-to-day reproducibility and robust operation, even under harsh salt and pH conditions.

**Note:** For specifications, refer to the LC Modules section.

## Ordering Information

The following LC modules and accessories represent a typical UltiMate 3000 Biocompatible Quaternary Micro System configuration. Due to its modular setup, the system can be upgraded easily by adding or exchanging LC modules. For additional order information for LC modules and accessories, refer to the LC Modules section.

### Hardware

SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200
LPG-3400BM UltiMate 3000 Biocompatible Quaternary Micro Pump..	5042.0036
WPS-3000TBPL Analytical UltiMate 3000 Biocompatible Thermostatted Analytical Pulled-Loop Well Plate Autosampler .....	5823.0020
TCC-3000SD UltiMate 3000 Thermostatted Column Compartment.....	5730.0010
VWD-3400RS UltiMate 3000 Rapid Separation Four Channel Variable Wavelength Detector (without flow cell) .....	5074.0010

### Accessories

Semi-Micro Flow Cell for VWD-3000 Series, PEEK, 2.5 µL Volume, 7 mm Path Length.....	6074.0300
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## Biocompatible ×2 Dual Micro System

The UltiMate 3000 Biocompatible ×2 Dual Micro System is fully biocompatible for advanced multidimensional (MD) protein analysis and purification. It supports advanced biochromatography such as application switching and automated MD chromatography; for example, purification and analysis of biotherapeutics like monoclonal antibodies in a single method.

- Titanium pumps and PEEK flow path for full biocompatibility
- SmartFlow technology for precise and accurate flow rates from 0.2 to 10 mL/min
- Support of operating pressures of up to 350 bar (5000 psi)
- Dual-ternary low-pressure proportioning at superior accuracy and precision
- Dual-gradient pump for true parallel, tandem or multidimensional chromatography
- Dual-ternary solvent selection for mobile phase preparation, system and column flushing

- High precision auto-injections from 0.1 to 250 µL (default) with ultralow carryover
- Sample fractionation and re-injection with the WPS-3000TBFC Autosampler Fraction Collector

The UltiMate 3000 Biocompatible ×2 Dual Micro System combines the excellent features of the DGP-3600BM Biocompatible Micro Dual-Gradient Pump and the WPS-3000TBFC Autosampler Fraction Collector to support parallel, tandem, and MD separations with automated sample fractionation and re-injection for the highest flexibility and productivity while saving money, time, and space.

**Note:** For system specifications, refer to the LC Modules section.

## Ordering Information

The following LC modules and accessories represent a typical UltiMate 3000 Biocompatible ×2 Dual Micro System configuration. Due to its modular setup, the system can be upgraded easily by adding or exchanging LC modules. For additional order information and key specifications for LC modules and accessories, see the LC Modules section

### Hardware

SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack, 6 Channels .....	5035.9230
DGP-3600BM UltiMate 3000 Biocompatible Dual-Gradient Micro Pump.....	5042.0066
WPS-3000TBFC UltiMate 3000 Thermostatted Biocompatible Pulled-Loop Well Plate Autosampler with Integrated Fraction Collection .....	5825.0020
TCC-3000SD UltiMate 3000 Thermostatted Column Compartment.....	5730.0010
VWD-3400RS UltiMate 3000 Rapid Separation Four Channel Variable Wavelength Detector (Without Flow Cell) .....	5074.0010

### Accessories

Semi-micro Flow Cell for VWD-3000 Series, PEEK, 2.5 µL Volume, 7 mm Path Length.....	6074.0300
Valve Actuator Kit HP for Right Side of TCC-3000RS/SD, Pressure < 413 bar (6000 psi).....	6730.0003
Valve Actuator Kit HP for Left Side of TCC-3000RS/SD, Pressure < 413 bar (6000 psi).....	6730.0004
Pod for 2-Position 10-Port HP Valve, Biocompatible, Pressure < 345 bar (5000 psi) (two valve pods are required).....	6723.9023



## Semipreparative LC Systems

### *Modular system configurations for any purification tasks*

The UltiMate 3000 Binary Semipreparative System is tailored for robust, safe, high-performance purifications. Based on the high-pressure proportioning principle, the system takes full advantage of UltiMate 3000 features such as SmartFlow pulse-free eluent delivery and wide linear range detection. The AFC-3000 Automated Fraction Collector collects fractions into an industry leading variety of vessels, such as 96 well plates, standard vial and tube sizes, and bottles.

- SmartFlow technology for precise, accurate flow rates from 0.5 to 50 mL/min
- Support of operating pressures of up to 100 bar (1450 psi)
- High-pressure gradient proportioning at superior accuracy and precision
- Variable mixing volumes for different flow and delay volume requirements
- Sample injections up to 2.5 mL with excellent injection linearity
- Large fractionation vessel capacity, holds up to 180 tubes or 4 × 96 well plates and other vessel types

Due to the optimized fluidic path design of the WPS-3000TSL Semipreparative Autosampler, the UltiMate 3000 Binary Semipreparative System supports high flow rates at low back-pressure. The system is the ideal platform for your purification of natural product extracts, isolation of impurities for structural elucidation, or other large scale LC processes.

**Note:** For system specifications, refer to the LC Modules section.

### Ordering Information

The following LC modules and accessories represent a typical UltiMate 3000 Binary Semipreparative System configuration. Due to its modular setup, the system can be upgraded easily by adding or exchanging LC modules. For additional order information for LC modules and accessories, please refer to the LC Modules section

#### Hardware

HPG-3200P UltiMate 3000 Binary High-Pressure Proportioning Semipreparative Pump System.....	5035.0025
WPS-3000TSL UltiMate 3000 Thermostatted Semipreparative Autosampler .....	5822.0028
TCC-3000SD UltiMate 3000 Thermostatted Column Compartment.....	5730.0010
DAD-3000 UltiMate 3000 Diode Array Detector (without flow cell).....	5082.0010
AFC-3000 UltiMate 3000 Automated Fraction Collector.....	5702.1000

#### Accessories

Semipreparative Flow Cell for DAD-3000 and MWD-3000 Series, PEEK, 0.7 µL Volume, 0.4 mm Path Length.....	6082.0600
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## LC Modules

### *The right LC modules for your application needs*

UltiMate 3000 modules integrate innovation and intelligent features into a broad selection of autosampler, injector, pump, flow-control, thermostatted column compartment, and detector modules. Our quality designs and construction ensure reliable, precise, and accurate operation. Select the right modules to match your LC application, whether it requires a nano, capillary, microbore, analytical, or semipreparative flow configuration.

- Superior chromatographic performance
- Unique  $\times 2$  dual-gradient configurations
- Unsurpassed instrument reliability
- Ease of use through powerful Chromeleon software
- UHPLC+ Solutions for unparalleled productivity

Each UltiMate 3000 LC module provides a highly integrated solution with optimum fluidic connections, single-point control through Chromeleon software, and seamless intermodule communications.



***Solvent Tray/Degasser:*** For high efficiency degassing and safe solvent bottle organization, a Dionex Solvent Rack is the ideal complement to every UltiMate 3000 pump.

***LC Pumps:*** Dionex offers a variety of LC pumps and provides top solutions from nano to semipreparative scale and ultrahigh-performance applications (UHPLC).

***LC Autosamplers:*** Select the right Dionex LC autosampler module to match your LC nano, capillary, micro, analytical, or semipreparative system needs.

***LC Column Compartments:*** For optimal retention time precision at different temperatures, a Dionex Thermostatted Column Compartment is essential for your LC system.

***LC Detectors:*** A wide selection of LC detectors to meet the selectivity and sensitivity needs of your LC applications.

***Charged Aerosol Detectors:*** Near universal LC detection independent of chemical structure

***Electrochemical Detectors:*** Electrochemical detectors offer advanced amperometric and coulometric detection optimized for rigorous, reliable, and reproducible results.

***Fraction Collection:*** Offering fraction collection options for LC applications at different flows, Dionex provides the right solution for your needs.

## LC Solvent Tray/Degasser



These online, chemically inert degassers provide unsurpassed performance and ensure stable baselines free of air bubble-related disturbances. From the two-degasser rack for a binary pump to the most flexible six-degasser rack for the powerful dual-ternary pump, the UltiMate 3000 Solvent Rack series has a solvent rack to fit your system.

- Teflon AF metal-free membranes
- Highest degassing efficiency and fastest degassing system equilibration times
- Neatly stacks onto the UltiMate 3000 LC system tower, conserving bench space
- User-friendly design with three LEDs (power, vacuum, and leak sensor status)
- Continuous vacuum level monitoring with UltiMate 3000 System Wellness functionality
- Easy connection of all fluidic lines

## Related Literature

The following provides more information on this product and can be found in the Documents section at [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

UltiMate 3000 Solvent Racks

## Solvent Rack without Degasser

The UltiMate 3000 Solvent Rack SR-3000 without degasser supports pumps with integrated degassers as a solvent organizer, and is therefore recommended in combination with UltiMate 3000 Quaternary Analytical and Micro Pumps with internal degassers (LPG-3400SD/RS/BM/AB).

- Securely organizes up to nine 1 L eluent bottles on top of your UltiMate 3000 system
- Conserves valuable bench space
- Offers optimum resistance to the most commonly used HPLC solvents and buffer solutions

## Key Specifications

*Solvent Reservoir Capacity:* nine 1 L reservoirs, or four 2.5 L reservoirs, or two 5 L reservoirs and two 1 L reservoirs

*Degassing Channels:* none

*Wetted Parts (Tubing and Inline Filter):* PEEK, FEP, and Tefzel;  
*Inline Filter Frit:* SST or titanium

*Dimensions (h × w × d):* 10 × 42 × 51 cm (3.9 × 16.5 × 20 in.)

## Ordering Information

Hardware	
SR-3000 Solvent Rack (without Degasser).....	5035.9200

## Solvent Racks with Degasser

The UltiMate 3000 Solvent Racks SRD-3200, SRD-3400, and SRD-3600 incorporate a low-volume (670 µL), chemically-inert degasser with two, four, or six channels. They support pumps without built-in degassers, such as the Dual-Gradient Analytical Pump with six channels, and high-pressure gradient pumps with two or four channels.

- Highest degassing efficiency, ensures stable baseline
- Securely organizes up to nine 1 L eluent bottles on top of your UltiMate 3000 system
- Conserves valuable bench space
- Optimum resistance to the most commonly used HPLC solvents and buffer solutions

### Key Specifications

**Solvent Reservoir Capacity:** nine 1 L reservoirs, or four 2.5 L reservoirs, or two 5 L reservoirs and two 1 L reservoirs

**Degassing Channels:** two, four, or six analytical degasser channels

**Degasser Membranes:** Teflon AF

**Channel Volume:** 670 µL

**Maximum Flow Rate per Channel:** 14 mL/min

**Control:** controlled by the UltiMate 3000 system pump (with Chromeleon) or in stand alone operation

**Communication:** 15-pin D-Sub connector (through a pump of the UltiMate 3000 system)

**Power Supply:** 15-pin D-Sub connector (through a pump of the UltiMate 3000 system) or external power supply unit

**User Input/Display:** three LEDs (Power, Vacuum, and Status), standby button

**Wetted Parts (Incl. Tubing and Inline Filter):** Teflon AF, PEEK, FEP, and Tefzel; Inline Filter Frit: SST or titanium

**Power Requirements:** max. 30 VA

**Dimensions (h × w × d):** 10 × 42 × 51 cm (3.9 × 16.5 × 20 in.)

## Ordering Information

### Hardware

SRD-3200 Solvent Rack with 2 Degasser Channels.....	5035.9250
SRD-3400 Solvent Rack with 4 Degasser Channels.....	5035.9245
SRD-3600 Solvent Rack with 6 Degasser Channels.....	5035.9230

### Accessories

Power Supply Unit 24V for SOR-100 and SRD-3x00.....	6510.0004
<i>For use with other than UltiMate 3000 pumps</i>	

## LC Pumps



The UltiMate 3000 pump family offers the most complete choice in the industry. From nano LC to Rapid Separation LC (RSLC) applications, from conventional applications to UHPLC, the UltiMate 3000 pumps always provide industry-leading flow rates, pressure, and precision.

- SmartFlow ensures optimal performance for any flow, pressure, or solvent composition
- Automatic compressibility compensation, no manual solvent setting needed
- Ultraprecise piston drive with 2 nL resolution for unrivaled flow precision
- Unique SpinFlow mixing design for exceptional mixing performance
- Extensive mixer portfolio (35–1550  $\mu\text{L}$ ) to cover all application needs
- Reliable solvent changeover for robust, air bubble-free operation
- All pumps are equipped with an active rear-seal wash system
- Precise auto-alignment of the pistons ensure highest possible seal lifetime
- Easy access and smart software support for effortless maintenance
- Clean and intuitive fluidic design

The UltiMate 3000 Rapid Separation LC offers the most complete range of UHPLC pumps on the market.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

UltiMate 3000 Series Rapid Separation Pump Systems Data Sheet

UltiMate 3000 Series Standard and Biocompatible Pumps Data sheet

UltiMate 3000 RSLCnano Rapid Separation Nano LC System Data Sheet

## Binary Rapid Separation Pump

The UltiMate 3000 Binary Rapid Separation Pump HPG-3x00RS is designed to operate at ultrahigh backpressures and high flow rates simultaneously. Achieve the highest separation efficiency in combination with UHPLC or conventional LC columns: The RS Pump is the most flexible UHPLC pump available.

- Serial dual-piston operating principle, high-pressure gradient proportioning
- Wide operating flow rate range; from 50  $\mu\text{L}/\text{min}$  to 8  $\text{mL}/\text{min}$  with high flow rate accuracy
- Support of operating pressures of up to 1034 bar (15,000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550  $\mu\text{L}$ ) to cover all application needs
- Optional solvent selection valves support up to four different mobile phases (HPG-3400RS)
- Active rear-seal wash and floating pistons for maximum seal lifetime

The HPG-3x00RS is ideal for MS front-end configurations, microflow, analytical, and ultrafast, high-resolution separations in pharmaceutical, life science, and environmental laboratories. The gradient delay volume can be easily adjusted within seconds according to your application requirements (e.g., 35  $\mu\text{L}$  for MS front end and 200  $\mu\text{L}$  for analytical LC).

## Key Specifications

*Flow range (settable range):*

0.050–8.000 mL/min (0.001–8.000 mL/min)

*Flow accuracy:*  $\pm 0.1\%$

*Flow precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure range:* 2–103 MPa (15,000 psi) up to 5 mL/min, 2–80 MPa (11,600 psi) up to 8 mL/min

*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$  whichever is greater

*Proportioning accuracy:*  $\pm 0.2\%$  (of full scale)

*Proportioning precision:*  $<0.15\%$  SD

*Gradient delay volume:* 200  $\mu$ L (35–1550  $\mu$ L with optional mixer kits)

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Two digital inputs; two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data system

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions (h  $\times$  w  $\times$  d):* 16  $\times$  42  $\times$  51 cm (6.3  $\times$  16.5  $\times$  20 in.)

## Ordering Information

### Hardware

HPG-3200RS UltiMate 3000 Binary Rapid Separation Pump .....	5040.0026
HPG-3400RS UltiMate 3000 Binary Rapid Separation Pump System with Solvent Selector Valves .....	5040.0046
SRD-3200 UltiMate 3000 Integrated Solvent and Degasser Rack, 2 Channels .....	5035.9250
SRD-3400 UltiMate 3000 Integrated Solvent and Degasser Rack, 4 Channels .....	5035.9245

### Accessories

Mixer Kit to 35 $\mu$ L Mixing Volume .....	6040.5000
Mixer Kit to 100 $\mu$ L Mixing Volume .....	6040.5100
Mixer Kit to 400 $\mu$ L Mixing Volume .....	6040.5310
Mixer Kit to 800 $\mu$ L Mixing Volume .....	6040.5750
Mixer Kit with to 1550 $\mu$ L Mixing Volume .....	6040.5450
UltiMate 3000 Pump Diagnostics Kit .....	6035.3000

## Quaternary Rapid Separation Pump

The UltiMate 3000 Quaternary Rapid Separation Pump LPG-3400RS provides the highest degree of flexibility in solvent proportioning for UHPLC applications. This pump is recommended for a wide range of research and routine applications, and for method development.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Wide operating flow rate range; from 50  $\mu$ L/min to 8 mL/min with high flow rate accuracy
- Support of operating pressures of up to 1034 bar (15,000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550  $\mu$ L) to cover all application needs
- Reliable in-line vacuum degassing (integrated degasser) and vacuum level monitoring
- Active rear-seal wash and floating pistons for maximum seal lifetime

The LPG-3400RS is recommended for any UHPLC and conventional LC applications in the pharmaceutical, food and beverage, and environmental industries.

## Key Specifications

*Flow Range (Settable Range):* 0.100–8.000 mL/min (0.001–8.000 mL/min)

*Flow Accuracy:*  $\pm 0.1\%$

*Flow Precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure Range:* 2–103 MPa (15,000 psi) up to 5 mL/min, 2–80 MPa (11,600 psi) up to 8 mL/min

*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$  whichever is greater

*Proportioning accuracy:*  $\pm 0.5\%$  (of full scale)

*Proportioning precision:*  $<0.15\%$  SD

*Gradient delay volume:* 690  $\mu$ L (325–1840  $\mu$ L with optional mixer kits)

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Two digital inputs; two relay outputs



**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data System

**Power Requirements:** 100–120 V, 60 Hz; 200–240 V, 50 Hz  
**Dimensions (h × w × d):** 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)

## Ordering Information

### Hardware

LPG-3400RS UltiMate 3000 Quaternary Rapid Separation Pump .....	5040.0036
SR-3000 UltiMate 3000 Solvent Rack without Degasser .....	5035.9200

### Accessories

Mixer Kit to 35 µL Mixing Volume .....	6040.5000
Mixer Kit to 100 µL Mixing Volume .....	6040.5100
Mixer Kit to 200 µL Mixing Volume .....	6040.5110
Mixer Kit to 800 µL Mixing Volume .....	6040.5750
Mixer Kit to 1500 µL Mixing Volume .....	6040.5450
UltiMate 3000 Pump Diagnostics Kit .....	6035.3000

## Dual-Gradient Rapid Separation Pump

The UltiMate 3000 Dual-Gradient Rapid Separation Pump DGP-3600RS is the first pump that combines the ultrahigh speed and resolution of UHPLC with advanced chromatographic techniques such as tandem, parallel, and two-dimensional LC. It is particularly suitable for laboratories that require high sample throughput and chromatographic resolution.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Two ternary gradient pumps in a single housing
- Wide operating flow rate range from 50 µL/min to 8 mL/min with high flow rate accuracy
- Support of operating pressures of up to 1034 bar (15,000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550 µL) to cover all application needs
- Active rear-seal wash and floating pistons for maximum seal lifetime

Typical applications include the purification of side products and impurities for structure elucidation, purification of compounds from natural product extracts, and purification of compound libraries for pharmaceutical discovery.

## Key Specifications

**Flow range (settable range):** 0.100–8.000 mL/min (0.001–8.000 mL/min)

**Flow accuracy:** ±0.1%

**Flow precision:** <0.05% RSD or <0.01 min SD, whichever is greater

**Pressure range:** 2–103 MPa (15,000 psi) up to 5 mL/min, 2–80 MPa (11,600 psi) up to 8 mL/min

**Pulsation:** Typically: <0.2 MPa or <1% whichever is greater

**Proportioning accuracy:** ±0.5% (of full scale)

**Proportioning precision:** <0.15% SD

**Gradient delay volume:** 690 µL (325–1, 840 µL with optional mixer kits)

**PC Connection:** All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

**I/O Interfaces:** Two digital inputs; two relay outputs

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data system

**Power Requirements:** 100–120 V, 60 Hz; 200–240 V, 50 Hz

**Dimensions (h × w × d):** 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)

## Ordering Information

### Hardware

DGP-3600RS UltiMate 3000 Dual-Gradient Rapid Separation Pump .....	5040.0066
SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack, 6 Channels .....	5035.9230

### Accessories

Mixer Kit to 35 µL Mixing Volume .....	6040.5000
Mixer Kit to 100 µL Mixing Volume .....	6040.5100
Mixer Kit to 200 µL Mixing Volume .....	6040.5110
Mixer Kit to 800 µL Mixing Volume .....	6040.5750
Mixer Kit to 1500 µL Mixing Volume .....	6040.5450
UltiMate 3000 Pump Diagnostics Kit .....	6035.3000

## RSLCnano Nano Pump with Column Compartment



The NCS-3500RS is the powerful combination of continuous direct flow, ultrahigh pressure pump operation and dual-gradient capabilities. It supports a wide flow range (20 nL/min to 50  $\mu$ L/min) at pressures up to 800 bar, allowing you to tune your separation for the highest resolution or the fastest analysis time; all in one module.

- The HPG nano pump delivers flows from 20 nL/min to 50  $\mu$ L/min at pressures up to 800 bar
- The dual-piston pump heads ensure splitless flow delivery that is interruption free
- The innovative flow meter provides a closed-loop flow control
- Nano, capillary, or micro flow ranges are selected by simply exchanging the flow selector
- The snap-in valves allows tool-free removal and installation
- Two high-pressure switching valves for applications up to 800 bar
- nanoViper connection system provides fingertight, zero-dead volume connections
- Ternary LPG  $\mu$ Ti pump to accommodate preconcentration or advanced 2D workflows

The NCS-3500RS module provides a Dual-Gradient Pump and column compartment in one housing. The high-pressure gradient nano pump can perform nano applications at pressures up to 800 bar. This unique combination allows you to tune your separation for the highest resolution with long columns or the fastest analysis time to increase throughput.

**Note:** The flow rate range of the binary HPG pump of the NCS-3500RS can be changed by exchanging the flow selector

### Key Specifications

*Flow Rate Range Binary HPG pump:* 20–1000 nL/min

*Flow Rate Range Ternary LPG pump:* 10–2500  $\mu$ L/min

*Pressure Range Binary HPG pump:* 2–80 MPa (300–11,600 psi)

*Pressure Range Ternary LPG pump:* 2–50 MPa (300–7250 psi)

*Retention Time RSD in Gradient Mode at 300 nL/min:* <0.2% RSD or <0.1 min SD, whichever is greater

*Gradient Delay Volume:* <25 nL (pump) and <350 nL in preconcentration application)

*Proportioning Accuracy:* <1% of full scale

*Proportioning Precision:* Typically <0.1% SD

*Temperature Range Column Compartment:* RT + 10 °C–75 °C

*Temperature Accuracy:*  $\pm 0.5$  °C (at 50 °C setpoint)

*Switching Valves:* Up to two 10-port, 2-position low-dispersion valves

*Column Capacity:* Up to three columns, up to 100 cm length (coiled)

### Ordering Information

#### Hardware

NCS-3500RS UltiMate 3000 Binary Rapid Separation Nano Flow Pump with Ternary Loading Pump and Column Compartment ..... 5041.0010

#### Accessories

Flow Selector for Nano LC with Flow Range 50-1000 nL/min for NCS-3x00RS and NCP-3x00RS ..... 6041.0002

Flow Selector for Capillary LC with Flow Range 0.5-10  $\mu$ L/min for NCS-3x00RS and NCP-3x00RS ..... 6041.0003

Flow Selector for Micro LC with Flow Range 0.5-10  $\mu$ L/min for NCS-3x00RS and NCP-3x00RS ..... 6041.0014

Low-Dispersion 2-Position 10-Port Snap-In Valve Pod with 10-32 Fittings, 0.15 mm Bore, 900 bar/13,050 psi Pressure Limit, for UltiMate 3000 NCS-3x00RS ..... 6041.0001

Biocompatible (PEEK) Low-Dispersion 2-Position 10-Port Snap-In Valve Pod with 10-32 Fittings, 0.15 mm Bore, 345 bar/5000 psi Pressure Limit, for UltiMate 3000 NCS-3x00RS ..... 6041.0012

## RSLCnano Capillary Pump with Column Compartment

The NCS-3500RS is the powerful combination of continuous direct flow, ultrahigh pressure pump operation and dual-gradient capabilities. It supports a wide flow range (20 nL/min to 50 µL/min) at pressures up to 800 bar, allowing you to tune your separation for the highest resolution or the fastest analysis time—all in one module.

- The HPG nano pump delivers flows from 20 nL/min to 50 µL/min at pressures up to 800 bar
- The dual piston pump heads ensure splitless flow delivery that is interruption free
- The innovative flow meter provides a closed loop flow control
- Nano, capillary, or micro flow ranges are selected by simply exchanging the flow selector
- The snap-in valves allows tool-free removal and installation
- Two high pressure switching valves for applications up to 800 bar
- nanoViper connection system provides fingertight, zero-dead volume connections
- Ternary LPG µTi pump to accommodate preconcentration or advanced 2D workflows

The NCS-3500RS module provides a dual-gradient pump and column compartment in one housing. The continuous direct flow, high-pressure gradient pump for capillary flow delivery features continuous direct flow delivery from 20 nL/min to 50 µL/min at pressures up to 800 bar. It is combined with a ternary low-pressure gradient micro pump and a column compartment.

**Note:** The flow rate range of the binary HPG pump of the NCS-3500RS can be changed by exchanging the flow selector

### Key Specifications

*Flow Rate Range Binary HPG pump:* 0.5–10 µL/min

*Flow Rate Range Ternary LPG pump:* 10–2500 µL/min

*Pressure Range Binary HPG pump:* 2–80 MPa  
(300–11,600 psi)

*Pressure Range Ternary LPG pump:* 2–50 MPa (300–7250 psi)

*Retention Time RSD in Gradient Mode at 300 nL/min:* <0.2%  
RSD or <0.1 min SD, whichever is greater

*Gradient Delay Volume:* <25 nL (pump) and <350 nL (system  
in preconcentration configuration)

*Proportioning Accuracy:* <1% of full scale

*Proportioning Precision:* Typically <0.1% SD

*Temperature Range Column Compartment:* RT + 10 °C–75 °C

*Temperature Accuracy:* ± 0.5 °C (at 50 °C setpoint)

*Switching Valves:* Up to two 10-port, 2-position low-dispersion valves

*Column Capacity:* Up to 3 columns, up to 100 cm length  
(coiled)

### Ordering Information

#### Hardware

NCS-3500RS UltiMate 3000 Binary Rapid Separation Capillary Flow Pump with Ternary Loading Pump and Column Compartment .....	5041.0020
Flow Cell UVD-3000, Capillary LC, 45 nL.....	6073.0003
Flow Selector for NCS-3500RS and NCP-3200RS for Capillary LC with Flow Range 0.5–10 µL/min .....	6041.0003

#### Accessories

Flow Selector for Nano LC with Flow Range 50–1000 nL/min for NCS-3x00RS and NCP-3x00RS .....	6041.0002
Flow Selector for Capillary LC with Flow Range 0.5–10 µL/min for NCS-3x00RS and NCP-3x00RS.....	6041.0003
Flow Selector for Micro LC with Flow Range 10–50 µL/min for NCS-3x00RS and NCP-3x00RS.....	6041.0014
Low-Dispersion 2-position 10-port Snap-In Valve Pod w/10/32" fittings, 0.15 mm Bore, 900 bar/13,050 psi Pressure Limit for UltiMate 3000 NCS-3x00RS .....	6041.0001
Biocompatible (PEEK) Low-Dispersion 2-position 10-Port Snap-In Valve Pod w/10/32" fittings, 0.15 mm Bore, 345 bar/5000 psi Pressure Limit for UltiMate 3000 NCS-3x00RS .....	6041.0012

## NCP-3200RS Nano Pump



The NCP-3200RS pump is a continuous direct flow, ultrahigh pressure nano- and capillary LC pump. It supports a wide flow rate range (20 nL/min to 50  $\mu$ L/min) at pressures up to 800 bar, allowing you to tune your separation for the highest resolution or the fastest analysis time.

- The HPG nano- and capillary pump delivers flows from 20 nL/min to 50  $\mu$ L/min
- The pressure limit of up to 800 bar allows for UHPLC applications
- The dual-piston pump heads ensure splitless flow delivery that is interruption free
- The innovative flow meter provides a closed loop flow control
- Nano, capillary, or micro flow ranges are selected by simply exchanging the flow selector

The NCP-3200RS can be used to configure a basic RSLCnano system or combined with the NCS-3500RS for advanced nano- and capillary LC workflows

**Note:** The flow rate range of the NCP-3200RS can be changed by exchanging the flow selector

### Key Specifications

**Flow Rate Range Binary HPG pump:** 20 nL/min–50  $\mu$ L/min

**Pressure Range Binary HPG pump:** 2–80 MPa (300–11,600 psi)

**Retention Time RSD in Gradient Mode at 300 nL/min:** <0.2% RSD or <0.1 min SD, whichever is greater

**Gradient Delay Volume:** <25 nL (pump)

**Proportioning Accuracy:** <1% of full scale

**Proportioning Precision:** Typically <0.1% SD

## Ordering Information

### Hardware

NCP-3200RS UltiMate 3000 Binary Rapid Separation Nano Flow Pump ..... 5041.0030

### Accessories

Flow Selector for Nano LC with Flow Range 50-1000 nL/min for NCS-3x00RS and NCP-3x00RS..... 6041.0002

Flow Selector for Capillary LC with Flow Range 0.5-10  $\mu$ L/min for NCS-3x00RS and NCP-3x00RS..... 6041.0003

Flow Selector for Micro LC with Flow Range 10-50  $\mu$ L/min for NCS-3x00RS and NCP-3x00RS..... 6041.0014

## Isocratic Analytical Pump

The UltiMate 3000 Isocratic Analytical Pump ISO-3100SD is the pump of choice for isocratic applications. It offers robust, dependable operation to meet the demanding requirements of QA and QC laboratories while making the most of your equipment budget.

- Serial dual-piston operating principle
- Wide operating flow rate range from 50  $\mu$ L/min to 10 mL/min with high flow rate accuracy
- Support of operating pressures of up to 620 bar (9000 psi)
- Robust, dependable performance with low operating and maintenance costs
- Patented piston seal leakage monitoring and System Wellness functions
- SmartFlow technology for high flow rate and retention time precision
- Active rear-seal wash and floating pistons for maximum seal lifetime

This pump is recommended for standard isocratic applications such as those commonly used in QA/QC laboratories. It is ideal in combination with detection techniques that do not support gradient elution, such as refractive index detection. The ISO-3100SD is also an excellent choice as an added pump for LC-MS systems.

### Key Specifications

**Flow range (settable range):** 0.050–10.000 mL/min (0.001–10.000 mL/min)

**Flow accuracy:**  $\pm$ 0.1%

**Flow precision:** <0.05% RSD or <0.01 min SD, whichever is greater

**Pressure range:** 2-62 MPa (9000 psi)

**Pulsation:** Typically: <0.2 MPa or <1% whichever is greater

**PC Connection:** All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

**I/O Interfaces:** Two digital inputs; two relay outputs

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data System

**Power Requirements:** 100–120 V, 60 Hz; 200–240 V, 50 Hz

**Dimensions (h × w × d):** 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)

## Ordering Information

### Hardware

ISO-3100SD UltiMate 3000 Isocratic Analytical Pump.....	5040.0011
SRD-3200 UltiMate 3000 Integrated Solvent and Degasser Rack, 2 Channels.....	5035.9250

### Accessories

UltiMate 3000 Pump Diagnostics Kit .....	6035.3000
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## Binary Analytical Pump



The UltiMate 3000 Binary Analytical Pump HPG-3x00SD is ideal for analytical LC separations on standard bore columns requiring highest gradient accuracy. In addition, it is also suitable for fast LC separations on narrow bore columns at pressures up to 620 bar. SmartFlow technology enables virtually pulse-free eluent delivery without a pulse damper.

- Serial dual-piston operating principle, high-pressure gradient proportioning
- Wide operating flow rate range from 100 µL/min to 10 mL/min with high flow rate accuracy
- Support of operating pressures of up to 620 bar (9000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550 µL) to cover all application needs
- Optional solvent selection valves support up to four different mobile phases
- Active rear-seal wash and floating pistons for maximum seal lifetime

Typical applications include the purification of side products and impurities for structure elucidation, purification of compounds from natural product extracts, and purification of compound libraries for pharmaceutical discovery.

## Key Specifications

**Flow range (settable range):**

0.100–10.000 mL/min (0.001–10.000 mL/min)

**Flow accuracy:** ±0.1%

**Flow precision:** <0.05% RSD or <0.01 min SD, whichever is greater

**Pressure range:** 2–62 MPa (9000 psi)

**Pulsation:** Typically: <0.2 MPa or <1% whichever is greater

**Proportioning accuracy:** ±0.2% (of full scale)

**Proportioning precision:** <0.15% SD

**Gradient delay volume:** 400 µL (35–1550 µL with optional mixer kits)

**PC Connection:** All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

**I/O Interfaces:** Two digital inputs; two relay outputs

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data System

**Power Requirements:** 100–120 V, 60 Hz; 200–240 V, 50 Hz

**Dimensions:** (h × w × d): 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)



## Ordering Information

## Hardware

HPG-3200SD UltiMate 3000 Binary Analytical Pump.....	5040.0021
HPG3400SD UltiMate 3000 Binary Analytical Pump with Solvent Selector Valves Pump.....	6040.0041
SRD-3200 Solvent Rack with 2 Degasser Channels.....	5035.9250
SRD-3400 Solvent Rack with 4 Degasser Channels.....	5035.9245

## Accessories

Mixer Kit to 35 $\mu$ L Mixing Volume.....	6040.5000
Mixer Kit to 100 $\mu$ L Mixing Volume.....	6040.5100
Mixer Kit to 200 $\mu$ L Mixing Volume.....	6040.5110
Mixer Kit to 800 $\mu$ L Mixing Volume.....	6040.5750
Mixer Kit to 1500 $\mu$ L Mixing Volume.....	6040.5450
UltiMate 3000 Pump Diagnostics Kit.....	6035.3000

## Quaternary Analytical Pump

The UltiMate 3000 Quaternary Analytical Pump LPG-3400SD is the pump of choice for flexibility across a broad range of analytical LC applications, with the highest degree of choice in eluent proportioning and mixing. Up to four solvents may be used for convenient method development, system flushing, and eluent preparation.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Wide operating flow rate range; from 200  $\mu$ L/min to 10 mL/min with high flow rate accuracy
- Support of operating pressures of up to 620 bar (9000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- SpinFlow mixing design perfectly balance gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550  $\mu$ L) to cover all application needs
- Reliable in-line vacuum degassing (integrated degasser) and vacuum level monitoring
- Active rear-seal wash and floating pistons for maximum seal lifetime

The LPG-3400SD is ideally-suited for method development, as well as for analytical research and routine analysis in the pharmaceutical, food and beverage, and environmental industries.

## Key Specifications

*Flow range (settable range):*

0.200–10.000 mL/min (0.001–10.000 mL/min)

*Flow accuracy:*  $\pm 0.1\%$

*Flow precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure range:* 2–62 MPa (9000 psi)

*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$  whichever is greater

*Proportioning accuracy:*  $\pm 0.5\%$  (of full scale)

*Proportioning precision:*  $<0.15\%$  SD

*Gradient delay volume:* 690  $\mu$ L (325–1840  $\mu$ L with optional mixer kits)

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Two digital inputs; two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data system

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions:* (h  $\times$  w  $\times$  d): 16  $\times$  42  $\times$  51 cm (6.3  $\times$  16.5  $\times$  20 in.)

## Ordering Information

## Hardware

LPG-3400SD UltiMate 3000 Quaternary Analytical Pump.....	5040.0031
SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200

## Accessories

Mixer Kit to 35 $\mu$ L Mixing Volume.....	6040.5000
Mixer Kit to 100 $\mu$ L Mixing Volume.....	6040.5100
Mixer Kit to 200 $\mu$ L Mixing Volume.....	6040.5110
Mixer Kit to 800 $\mu$ L Mixing Volume.....	6040.5750
Mixer Kit to 1500 $\mu$ L Mixing Volume.....	6040.5450
UltiMate 3000 Pump Diagnostics Kit.....	6035.3000

## Dual-Gradient Analytical Pump

The Ultimate 3000 Dual-Gradient Analytical Pump DGP-3600SD is the pump of choice for advanced analytical chromatographic techniques. It supports all standard LC applications and is ideal for increasing sample throughput, achieving higher chromatographic resolution, or automating sample preparations steps such as analyte enrichment or matrix elimination.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Two ternary pumps in a single housing
- Wide operating flow rate range: 200 µL/min to 10 mL/min with high flow rate accuracy
- Support of operating pressures up to 620 bar (9000 psi)
- SmartFlow technology for high flow rate, gradient, and retention time precision
- SpinFlow mixing design perfectly balances gradient delay volume against mixing efficiency
- Extensive mixer portfolio (35–1550 µL) to cover all application needs
- Active rear-seal wash and floating pistons for maximum seal lifetime

The DGP-3600SD is recommended for research and other analytical laboratories that require a general-purpose LC pump capable of standard and advanced two-dimensional techniques.

### Key Specifications

**Flow range (settable range):** 0.200–10.000 mL/min (0.001–10.000 mL/min)

**Flow accuracy:** ±0.1%

**Flow precision:** <0.05% RSD or <0.01 min SD, whichever is greater

**Pressure range:** 2–62 MPa (9000 psi)

**Pulsation:** Typically: <0.2 MPa or <1% whichever is greater

**Proportioning accuracy:** ± 0.5% (of full scale)

**Proportioning precision:** <0.15% SD

**Gradient delay volume:** 690 µL (325–1840 µL with optional mixer kits)

**PC Connection:** All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

**I/O Interfaces:** Two digital inputs; two relay outputs

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data System

**Power Requirements:** 100–120 V, 60 Hz; 200–240 V, 50 Hz

**Dimensions:** (h × w × d): 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)

### Ordering Information

#### Hardware

DGP-3600SD Dual-Gradient Analytical Pump.....	5040.0061
SR-3600 Solvent Rack with Six Degasser Channels.....	5035.9230

#### Accessories

Mixer Kit, 35 µL Mixing Volume.....	6040.5000
Mixer Kit to 100 µL Mixing Volume.....	6040.5100
Mixer Kit to 200 µL Mixing Volume.....	6040.5110
Mixer Kit to 800 µL Mixing Volume.....	6040.5750
Mixer Kit with 1550 µL Mixing Volume.....	6040.5450
UltiMate 3000 Pump Diagnostics Kit.....	6035.3000

## Biocompatible Isocratic Micro Pump

The UltiMate 3000 Biocompatible Isocratic Micro Pump ISO-3100BM is developed for high sensitivity applications using electrochemical detection. The pump is optimized for ultralow pressure ripples to reduce baseline noise in electrochemical detection. The biocompatible flow path eliminates metallic interferences for unequaled low LODs.

- Serial dual-piston operating principle
- Flow rate range from 50 µL/min to 2.5 mL/min with high flow rate accuracy
- All wetted, flow path components are made of inert materials
- Optimized for ultralow pressure ripples
- Patented piston seal leakage monitoring and System Wellness functions
- SmartFlow technology for high flow rate and retention time precision
- Active rear-seal wash and floating pistons for maximum seal lifetime

The ISO-3100BM is suitable in highly sensitive ECD-LC systems for clinical and pharmaceutical analyses of neurotransmitters, drugs and metabolites, natural products, and genotoxins.



## Key Specifications

*Flow Rate Range:* (settable)

0.050–2.500 mL/min (0.001–2.500 mL/min)

*Flow Accuracy:*  $\pm 0.5\%$

*Flow Precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure range:* 2–41 MPa (6000 psi)

*Pulsation:* Typically:  $<0.02$  MPa or  $<0.1\%$  whichever is greater

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Two digital inputs; two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data system

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions:* (h  $\times$  w  $\times$  d): 16  $\times$  42  $\times$  51 cm (6.3  $\times$  16.5  $\times$  20 in.)

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with Chromeleon Chromatography Data system software

*Power Requirements:* 100–120V, 60 Hz; 200–240V, 50 Hz

*Dimensions (h  $\times$  w  $\times$  d):* 16  $\times$  42  $\times$  51 cm (6.3  $\times$  16.5  $\times$  20 in.)

## Ordering Information

### Hardware

ISO-3100BM UltiMate 3000 Biocompatible Isocratic Micro Pump.....	5042.0011
SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200

### Accessories

UltiMate 3000 Pump Diagnostics Kit .....	6035.3000
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## Biocompatible Quaternary Micro Pump

The Biocompatible Quaternary Micro Pump LPG-3400BM is the ideal choice for laboratories that need maximum flexibility for microbore LC and LC/MS analyses. The ability to select up to four solvents and quaternary gradient profiles accelerates method development and provides flexibility for automated system startup and shutdown.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Flow rate range from 50  $\mu$ L/min to 2.5 mL/min with high flow rate accuracy
- All wetted flow path components are made of inert materials
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Reliable in-line vacuum degassing (integrated degasser) and vacuum level monitoring
- Active rear-seal wash and floating pistons for maximum seal lifetime

The LPG-3400BM is ideally-suited for method development, as well as for research and routine analysis in the pharmaceutical, food and beverage, and environmental industries.

## Key Specifications

*Flow range (settable):* 0.050–2.500 mL/min (0.001–2.500 mL/min)

*Flow accuracy:*  $\pm 0.5\%$

*Flow precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure range:* 2–50 MPa (7250 psi)

*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$  whichever is greater

*Proportioning accuracy:*  $\pm 1.0\%$  (of full scale)

*Proportioning precision:*  $<0.3\%$  SD

*Gradient delay volume:* 220  $\mu$ L

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Two digital inputs; two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data system software

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions:* (h  $\times$  w  $\times$  d): 16  $\times$  42  $\times$  51 cm (6.3  $\times$  16.5  $\times$  20 in.)

## Ordering Information

## Hardware

LPG-3400BM UltiMate 3000 Biocompatible Quaternary Micro Pump.. 5042.0036  
 SR-3000 UltiMate 3000 Solvent Rack without Degasser..... 5035.9200

## Accessories

UltiMate 3000 Pump Diagnostics Kit ..... 6035.3000

## Biocompatible Dual-Gradient Micro Pump

The UltiMate 3000 Biocompatible Dual-Gradient Micro Pump DGP-3600BM can be used in biocompatible analytical LC, narrowbore LC, and microbore LC systems for multidimensional (MD) protein analysis and purification. It supports advanced biochromatography schemes such as application switching and automated multidimensional chromatography.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Two ternary gradient pumps in a single housing
- Flow rate range from 50  $\mu\text{L}/\text{min}$  to 2.5  $\text{mL}/\text{min}$  with high flow rate accuracy
- All wetted, flow path components are made of inert materials
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Reliable in-line vacuum degassing (integrated degasser) and vacuum level monitoring
- Active rear-seal wash and floating pistons for maximum seal lifetime

## Key Specifications

*Flow range (settable):* 0.050–2.500  $\text{mL}/\text{min}$   
 (0.001–2.500  $\text{mL}/\text{min}$ )

*Flow accuracy:*  $\pm 0.5\%$

*Flow precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure range:* 2–50 MPa (7250 psi)

*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$  whichever is greater

*Proportioning accuracy:*  $\pm 1.0\%$  (of full scale)

*Proportioning precision:*  $<0.3\%$  SD

*Gradient delay volume:* 220  $\mu\text{L}$

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Two digital inputs; two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance software

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data System

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions:* (h  $\times$  w  $\times$  d) 16  $\times$  42  $\times$  51 cm (6.3  $\times$  16.5  $\times$  20 in.)

## Ordering Information

## Hardware

DGP-3600BM UltiMate 3000 Biocompatible Dual-Gradient Micro Pump..... 5042.0066  
 SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack, 6 Channels ..... 5035.9230

## Accessories

UltiMate 3000 Pump Diagnostics Kit ..... 6035.3000

## Biocompatible Quaternary Analytical Pump

The UltiMate 3000 Biocompatible Quaternary Analytical Pump LPG-3400AB is the pump of choice for flexibility across a broad range of biochromatographic applications, with the highest degree of choice in eluent proportioning and mixing. Up to four solvents may be used for convenient method development, system flushing, and eluent preparation.

- Serial dual-piston operating principle, low-pressure gradient proportioning
- Wide operating flow rate range from 200  $\mu\text{L}/\text{min}$  to 10  $\text{mL}/\text{min}$  with high flow rate accuracy
- All wetted, flow path components are made of inert materials
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Reliable in-line vacuum degassing (integrated degasser) and vacuum level monitoring
- Active rear-seal wash and floating pistons for maximum seal lifetime

The LPG-3400AB is ideally-suited for method development as well as analytical research and routine analysis of pharmaceuticals, foods and beverages, and environmental samples.

## Key Specifications

*Flow range (settable):* 0.200–10.000 mL/min  
(0.001–10 mL/min)

*Flow accuracy:*  $\pm 0.1\%$

*Flow precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater

*Pressure range:* 2–50 MPa (7250 psi)

*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$  whichever is greater

*Proportioning accuracy:*  $\pm 0.5\%$  (of full scale)

*Proportioning precision:*  $<0.2\%$  SD

*Gradient delay volume:* 690  $\mu$ L

*PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

*I/O Interfaces:* Three digital inputs; four programmable relays; one analog output for pressure monitoring

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with Chromeleon Chromatography Data system software

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions (h  $\times$  w  $\times$  d):* 19  $\times$  42  $\times$  51 cm (7.5  $\times$  16.5  $\times$  20 in.)

- Serial dual-piston operating principle, low pressure, gradient proportioning
- Two ternary gradient pumps in a single housing
- Wide operating flow rate range; 200  $\mu$ L/min to 10 mL/min
- All wetted flow path components are made from inert materials
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Reliable in-line vacuum degassing (integrated degasser) and vacuum level monitoring
- Active rear seal wash and floating pistons for maximum seal lifetime

The DGP-3600 AB is recommended for research labs and other analytical laboratories that require a general-purpose LC pump capable of standard as well as advanced two-dimensional techniques.

## Key Specifications

*Flow Rate (Settable):*  
0.200–10.000 mL/min

*Flow Accuracy:*  $\pm 0.1\%$

*Flow Precision:*  $<0.05\%$  RSD or  $<0.01$  min SD whichever is greater

*Pressure Range:* 2–50 MPa (7250 psi)

*Pulsation:* typically  $<0.2$  MPa or  $<1\%$ , whichever is greater

*Proportioning Accuracy:*  $\pm 0.5\%$  of full scale

*Proportioning precision:*  $<0.2\%$  SD

*Gradient delay volume:* 690  $\mu$ L

*PC Connection:* All functions controllable via USB; integrated USB hub with three USB ports

*I/O Interfaces:* Three digital inputs, four programmable relays, one analog output for pressure monitoring

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Automatic Instrument Qualification (AutoQ), system wellness and qualification, monitoring with Chromeleon Chromatography Data System software

*Power Requirements:* 100–120V, 60 Hz; 200–240V, 50 Hz software

*Dimensions (h  $\times$  w  $\times$  d):* 19  $\times$  42  $\times$  51 cm (7.5  $\times$  16.5  $\times$  20 in.)

## Ordering Information

### Hardware

LPG-3400AB UltiMate 3000 Biocompatible Quaternary Low-Pressure Proportioning Analytical Pump.....	5037.0015
SR-3000 UltiMate 3000 Solvent Rack without Degasser.....	5035.9200

### Accessories

1200 $\mu$ L Mixer Extension for AB pumps .....	6037.1979
UltiMate 3000 Pump Diagnostics Kit .....	6035.3000

## Biocompatible Dual-Gradient Analytical Pump

The UltiMate 3000 Biocompatible Dual-Gradient Analytical Pump DGP-3600AB is the pump of choice for advanced analytical biochromatographic techniques. It supports all standard LC applications and is ideal for increasing sample throughput, achieving higher chromatographic resolution, or automating sample preparation steps such as analyte enrichment and matrix elimination.

## Ordering Information

## Hardware

Biocompatible Dual-Gradient Analytical Pump DGP-3600AB .....	5037.0014
Solvent Rack with Six Degasser Channels.....	5035.9230

## Accessories

1200 $\mu$ L Mixer Extension for AB Pumps .....	6037.1979
UltiMate 3000 Pump Diagnostics Kit .....	6035.3000

## Quaternary Nano/Cap/Micro Pump



The UltiMate 3000 Quaternary Nano/Cap/Micro Pump is equipped with the Quaternary Micro Pump LPG-3400M(B) and a Nano/Cap/Micro Flow Manager FLM-3x00(B). It supports the accurate and precise delivery of quaternary gradients with a flow range of 50 nL/min to 2.5 mL/min with the UltiFlow eluent delivery system.

- Wide flow rate range from 50 nL/min up to 2.5 mL/min (depending on split ratio)
- Easily convertible between nano, capillary and micro flow rates
- UltiFlow technology for constant flow independent of eluent composition and backpressure
- Supports use of up to four solvents for gradient applications
- Active rear-seal wash system for increased pump uptime
- Superior gradient accuracy and precision
- Biocompatible option

The UltiMate 3000 Quaternary Nano Pump is used primarily as a front-end separation system for mass spectrometry in proteomic and bioanalytical analyses. The Cap/Micro pump variant is recommended for research and routine analyses of small sample amounts in drug discovery applications, particularly for drug metabolism and pharmacokinetic studies.

## Key Specifications

**Recommended Flow Rate Range:** nano: 50–1,000 nL/min, cap: 0.5–10  $\mu$ L/min, micro: 10–160  $\mu$ L/min

**Flow Rate Accuracy:** nano:  $\pm 3\%$  at 300 nL/min, cap:  $\pm 1.5\%$  at 4  $\mu$ L/min, micro:  $\pm 1\%$  at 50  $\mu$ L/min

**Flow Rate Precision:**  $<0.1\%$  RSD

**Pressure Range:** 0.1–50 MPa (7250 psi)

**Proportioning Accuracy:**  $\pm 2\%$  on column (typically  $\pm 1\%$ )

**Proportioning Precision:**  $<0.5\%$  SD on column

**Effective Gradient Delay Volume:** nano: 0.5  $\mu$ L, cap: 3.3  $\mu$ L, micro: 50  $\mu$ L

**PC Connection:** All functions controllable via USB; integrated USB hub with three USB ports

**I/O interfaces:** three digital inputs, four programmable relays, one analog output for pressure monitoring

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with Chromeleon software

**Power Requirements:** 100–120V, 60 Hz; 200–240V, 50 Hz software

**Dimensions:** (h  $\times$  w  $\times$  d): 38  $\times$  42  $\times$  51 cm (15  $\times$  16.5  $\times$  20 in.)

## Ordering Information

The UltiMate 3000 Quaternary Nano/Cap/Micro Pump consists of the LPG-3400M(B) Quaternary Micro Pump and FLM-3x00(B) Nano/Cap/Micro Flow Manager with the UltiFlow eluent delivery system delivering the appropriate flow rate. The pump can be easily converted between nano, capillary, and micro flow rates by exchanging the flow splitter of the FLM-3x00(B). For order information on the Flow Manager and Flow Splitter, refer to the Flow Managers section.

## Hardware

LPG-3400M UltiMate 3000 Quaternary Micro pump.....	5035.0045
LPG-3400MB 3000 Biocompatible Micro Pump.....	5037.0055
SR-3000 Solvent Rack (without Degasser) .....	5035.9200

## Dual-Gradient Nano/Cap/Micro Pump

The UltiMate 3000 Dual-Gradient Nano/Cap/Micro Pump is equipped with the DGP-3600M(B) Dual-Gradient Micro Pump and a Nano/Cap/Micro Flow Manager FLM-3x00(B). It provides two independent ternary low-pressure gradients down to 50 nL/min and 10  $\mu$ L/min with the UltiFlow eluent delivery system.

- Wide flow rate range; from 50 nL/min to 2.5 mL/min (Depending on split ratio)
- Dual-gradient pump with two independent ternary gradient pumps
- Easily convertible between nano, capillary, and micro flow rates
- UltiFlow technology for constant flow independent of eluent composition and backpressure
- Active rear-seal wash system for increased pump uptime
- Superior gradient accuracy and precision
- Biocompatible option

The Dual-Gradient Nano/Cap/Micro Pump is used primarily for bioanalytical studies such as MS-based proteomics. It enables preconcentration, on-line and off-line multidimensional LC applications and supports complex proteomic workflows such as protein prefractionation, protein/peptide separation, and peptide mapping.

### Key Specifications

**Recommended Flow Rate Range:** nano: 50–1000 nL/min, cap: 0.5–10  $\mu$ L/min, micro: 10–160  $\mu$ L/min

**Flow Rate Accuracy:** nano:  $\pm 3\%$  at 300 nL/min, cap:  $\pm 1.5\%$  at 4  $\mu$ L/min, micro:  $\pm 1\%$  at 50  $\mu$ L/min

**Flow Rate Precision:**  $<0.1\%$  RSD

**Pressure Range:** 0.1–50 MPa (7250 psi)

**Proportioning Accuracy:**  $\pm 2\%$  on column (typically  $\pm 1\%$ )

**Proportioning Precision:**  $<0.5\%$  SD on column

**Effective Gradient Delay Volume:** nano: 0.5  $\mu$ L, cap: 3.3  $\mu$ L, micro: 50  $\mu$ L

**PC Connection:** All functions controllable via USB; integrated USB hub with three USB ports

**I/O Interfaces:** Three digital inputs, four programmable relays, one analog output for pressure monitoring

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**GLP Features:** Automatic Instrument Qualification (AutoQ), system wellness and qualification, monitoring with Chromeleon software

**Power Requirements:** 100–120V, 60 Hz; 200–240V, 50 Hz

**Dimensions (h  $\times$  w  $\times$  d):** 38  $\times$  42  $\times$  51 cm (15  $\times$  16.5  $\times$  20 in.)

### Ordering Information

The Dual-Gradient Nano/Cap/Micro Pump consists of a DGP-3600M(B) Dual-Gradient Micro Pump and FLM-3x00 Nano/Cap/Micro Flow Manager with the UltiFlow eluent delivery system. The pump can be easily converted between nano, capillary, and micro flow rates by exchanging the Flow Splitter of the FLM-3x00(B). For order information on the Flow Manager and Flow Splitter, refer to the Flow Managers section.

Hardware	
DGP-3600M UltiMate 3000 Dual-Gradient Micro Pump .....	5035.0050
DGP-3600MB UltiMate 3000, Biocompatible Dual-Gradient Micro Pump.....	5037.0060
SRD-3600 UltiMate 3000 Integrated Solvent and Degasser Rack (6 Channels).....	5035.9230

## Binary Semipreparative Pump

The UltiMate 3000 Binary Semipreparative Pump HPG-3200P is the right choice for laboratories that need to purify compounds in the microgram to lower-milligram range. It is recommended for semipreparative separations on 4.6–21.2 mm i.d. columns.

- Serial dual-piston operating principle, high-pressure gradient proportioning
- Flow rate range from 0.5 to 50 mL/min with high flow rate accuracy
- SmartFlow technology for high flow rate, gradient, and retention time precision
- Support for operating pressures of up to 100 bar (1450 psi)
- Gradient delay volume of 1035  $\mu$ L
- Mixing volume extension (+1200  $\mu$ L) available
- Active rear-seal wash and floating pistons for maximum seal lifetime

Typical applications include the purification of side products and impurities for structure elucidation, purification of compounds from natural product extracts, and purification of compound libraries for pharmaceutical discovery.



**Key Specifications***Flow range (settable):*

0.5–50 mL/min (0.001–50 mL/min)

*Flow accuracy:*  $\pm 0.1\%$ *Flow precision:*  $<0.05\%$  RSD or  $<0.01$  min SD, whichever is greater*Pressure range:* 1–10 MPa (1450 psi)*Pulsation:* Typically:  $<0.2$  MPa or  $<1\%$ , whichever is greater*Proportioning accuracy:*  $\pm 0.2\%$  (of full scale)*Proportioning precision:*  $<0.2\%$  SD*Gradient delay volume:* 1035  $\mu\text{L}$ *PC Connection:* All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports*I/O Interfaces:* 3 digital inputs; 4 programmable relays; 1 analog output for pressure monitoring*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance*GLP Features:* Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with the Chromeleon Chromatography Data system*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz*Dimensions (h  $\times$  w  $\times$  d):* 19  $\times$  42  $\times$  51 cm (7.5  $\times$  16.5  $\times$  20 in.)**Ordering Information****Hardware**

HPG-3200P UltiMate 3000 Binary High-Pressure Proportioning Semipreparative Pump System.....	5035.0025
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**Accessories**

Mixing Chamber Extension for UltiMate 3000 Pump Systems, 1200 $\mu\text{L}$ .....	6035.1979
UltiMate 3000 Pump Diagnostics Kit .....	6035.3000.....

## LC Autosamplers



The UltiMate 3000 Autosampler Series features innovative and carefully designed modules that ensure reliable, precise, and accurate injection for nL to mL sample volumes. Select the right autosampler module to match your LC application, whether it requires a nano, capillary, micro, analytical, or semipreparative column and system configuration.

- Fast injection cycles (<15 s at 5  $\mu$ L injection volume)
- Supports simultaneous use of up to four different sample formats, including well plates
- Patented sample compartment temperature control to protect thermally sensitive samples
- Easy access to all fluidic components through the flip-up front door panel
- Precision mechanical syringe drives for injection volume accuracies of  $\pm 0.5\%$
- Automated validation procedures with Chromeleon software
- Predefined diagnostic tests to help identify and resolve operational interruptions
- Autosamplers available with either pulled-loop or in-line split-loop injection principle
- Very low extracolumn volume contribution

Each UltiMate 3000 autosampler provides a highly-integrated solution with optimum fluidic connections, single-point control through the Chromeleon Chromatography Data System, and seamless intermodule communication. The WPS-3000FC Autosampler and Fraction Collector provides unmatched flexibility and workflow automation possibilities. The ACC-3000 Autosampler Column Compartment features an integrated column oven and provides a cost-effective solution for routine analyses.

## Related Literature

The following provides more information on this product and can be found in the Documents section at [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

UltiMate 3000 Well Plate Autosampler Series

ACC-3000 Autosampler Column Compartment

## RSLC Autosampler

The UltiMate 3000 Rapid Separation Autosampler injects sample volumes up to 100  $\mu$ L at pressures up to 1034 bar (15,000 psi). The in-line, split-loop (flow-through) injection principle provides highly accurate, precise delivery of the sample with ultralow carryover. The wide injection volume range makes the module suitable for both UHPLC and conventional HPLC applications.

- Peak area precision is typically <0.15% RSD for 5  $\mu$ L injections
- Superior injector linearity of  $r^2 > 0.9999$  (5–90  $\mu$ L) due to high-precision drive mechanism
- Wide injection volume range from 1–100  $\mu$ L (default configuration) for maximum injection flexibility
- Optional injection volume ranges of 0.2–25  $\mu$ L, 1.5–250  $\mu$ L, and 1.5–500  $\mu$ L available
- Low gradient delay volume of 140  $\mu$ L (default configuration) or 50  $\mu$ L (with 25  $\mu$ L sample loop)
- Volumetric accuracy better than  $\pm 0.5\%$  for 20  $\mu$ L injections for easy method transfer
- Supports well plates and short injection cycle times for high-throughput applications
- Sample thermostating for optimal protection of thermally sensitive analytes (WPS-3000TRS)

The UltiMate 3000 Rapid Separation Autosampler offers minimal gradient delay and low extracolumn volume for high efficiency separations and short chromatographic run times. It is strongly recommended for ultrahigh pressure, high-throughput and high-resolution applications, and is available in non-thermostatted (WPS-3000RS) and thermostatted versions (WPS-3000TRS).



## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others:** 3 × 24 deep, 96, and/or 384 normal and deep well plates, 3 × 384 low well PCR plates, 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** in-line split-loop (flow-through) injections, bypass mode, user-defined programs

**Injection Volume Range (Recommended):** 0.01–100 µL (1–100 µL)

**Minimum Sample Required:** 1 µL out of 5 µL (250 µL conical vial)

**Injection Volume Accuracy:** ±0.5% at 20 µL

**Injection Volume Precision:** <0.25% RSD at 5 µL (typically <0.15% RSD), caffeine in water

**Linearity:** corr. coeff. >0.9999, RSD <0.5% at 5–90 µL, caffeine in water

**Needle Wash:** active external

**Carryover:** <0.004% for caffeine with external wash at 20 MPa

**Injection Cycle Time:** <15 s for 5 µL

**Sample Thermostatting:** 4–45 °C or 22 °C below ambient

**Sample Thermostatting Accuracy:** ±2 °C

**PC Connection:** all functions controllable via USB; integrated USB hub with three USB 1.1 ports

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

## Hardware

WPS-3000RS Rapid Separation In-Line Split-Loop Autosampler .....	5840.0010
WPS-3000TRS Rapid Separation Thermostatted Autosampler .....	5840.0020

## Accessories

Sample Loop, 25 µL, WPS-3000RS and WPS-3000SL	
Analytical Samplers .....	6820.2415
Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical 1.2 mL Vials .....	6820.4090
Sample Tray for 40 Cylindrical 1.8 mL/2.0 mL Vials .....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Sample Support Rack for Deep Well Plates, 34-46 mm .....	6820.4079
Sample Support Rack for Deep Well Plates, 30-36 mm .....	6820.4083
Support Rack (Adapter) for Low Well PCR Plates, 8-12 mm .....	6820.4088
Sample Tray for 0.5 mL Eppendorf Tubes .....	6820.4096
Sample Tray for 1.5 mL Eppendorf Tubes .....	6820.4094
Vial Pusher Adapter .....	6820.2402
<i>(Required for 24 Deep Well Plates)</i>	
Transparent Front Cover .....	6820.1419

## Analytical Autosampler

The UltiMate 3000 Analytical Autosampler WPS-3000(T)SL is highly versatile in sample format and injection volume. It performs rapid, accurate, and precise injections for analytical LC and UHPLC applications at pressures up to 62 MPa (9000 psi). The in-line, split-loop (flow-through) injection principle and external needle wash options virtually eliminate carryover.

- Peak area precision typically <0.15% RSD for 5 µL injections
- Superior injector linearity of  $r^2=0.999$  (5–90 µL) due to a high-precision drive mechanism
- Low gradient delay volume of 140 µL (default configuration) or 50 µL (with 25 µL sample loop)
- Superior volumetric accuracy: better than ±0.5% for consistent results
- Supports an injection volume range from 1 to 100 µL, suitable for most analytical applications
- Optional injection volume ranges of 0.2–25 µL, 1.5–250 µL, and 1.5–500 µL are available

- Supports well plates and short injection cycle times for high-throughput applications
- Sample thermostating for optimal protection of thermally sensitive analytes (WPS-3000TSL)

The UltiMate 3000 Analytical Autosampler offers robust, dependable performance as well as high flexibility with low operating and maintenance costs. It is ideally suited for routine analyses in pharmaceutical, food and beverage, and environmental laboratories, and is available in a non-thermostatted (WPS-3000SL) and thermostatted versions (WPS-3000TSL).

## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others:** 3 × 24 deep, 96 and/or 384 normal and deep well plates, 3 × 384 low well PCR plates, 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** in-line split-loop (flow-through) injections, bypass mode, user-defined programs

**Injection Volume Range (Recommended):** 0.01–100  $\mu$ L (1–100  $\mu$ L)

**Minimum Sample Required:** 1  $\mu$ L out of 5  $\mu$ L (250  $\mu$ L conical vial)

**Injection Volume Accuracy:**  $\pm 0.5\%$  at 50 and 90  $\mu$ L

**Injection Volume Precision:**  $<0.25\%$  RSD at 5  $\mu$ L (typically  $<0.15\%$  RSD), caffeine in water

**Linearity:** corr. coeff.  $>0.9999$ , RSD  $<0.5\%$  at 5–90  $\mu$ L, caffeine in water

**Needle Wash:** active external

**Carryover:**  $<0.004\%$  for caffeine with external wash at 7.5 MPa

**Injection Cycle Time:**  $<15$  s for 5  $\mu$ L

**Sample Thermostating:** 4–45  $^{\circ}$ C or 22  $^{\circ}$ C below ambient

**Sample Temperature Accuracy:**  $\pm 2$   $^{\circ}$ C

**PC Connection:** all functions controllable via USB; integrated USB hub with three USB 1.1 ports

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

Hardware	
WPS-3000SL Analytical In-Line, Split-Loop Autosampler .....	5822.0010
WPS-3000TSL Analytical In-Line, Split-Loop Autosampler .....	5822.0020
Accessories	
Sample Loop, 25 $\mu$ L, WPS-3000RS and WPS-3000SL Analytical Samplers .....	6820.2415
Injection Volume Kit, 250 $\mu$ L, WPS-3000RS and WPS-3000SL Analytical Samplers .....	6822.2432
Injection Volume Kit, 500 $\mu$ L, WPS-3000RS and WPS-3000SL Analytical Samplers .....	6822.2433
Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical 1.2 mL Vials .....	6820.4090
Sample Tray for 40 Cylindrical 1.8 mL/2.0 mL Vials .....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Sample Support Rack for Deep Well Plates, .....	6820.4079
Sample Support Rack for Deep Well Plates, 30-36 mm .....	6820.4083
Sample Support Rack (Adapter) for Low Well PCR plates, 8-12 mm .....	6820.4088
Sample Tray for 0.5 mL Eppendorf Tubes .....	6820.4096
Sample Tray for 1.5 mL Eppendorf Tubes .....	6820.4094
Vial Pusher Adapter .....	6820.2402
<i>(Required for 24 Deep Well Plates)</i>	
Transparent Front Cover .....	6820.1419

## Autosampler for Electrochemical Detection

The UltiMate 3000 Analytical Autosampler WPS-3000TBSL is based on the in-line-split-loop (flow-through) injection principle and features PEEK injection valves and fluidics. It is therefore perfectly suited for high-sensitivity electrochemical detection.

- PEEK injection valve and fluidics for reduced ECD baseline noise
- Peak area precision typically, 0.15% RSD for 5  $\mu$ L injections
- Low gradient delay volume of 140  $\mu$ L
- Superior volumetric accuracy of  $\pm 0.5\%$  for consistent results
- Supports an injection range of 1 to 100  $\mu$ L, suitable for analytical applications
- Supports well plates and short injection cycle times for high-throughput applications
- Sample thermostating for optimal protection of thermally sensitive analytes

The UltiMate 3000 Analytical Autosampler offers robust, dependable performance plus high flexibility with low operating and maintenance costs. It is ideally suited for routine analyses in clinical pharmaceutical, food and beverage, and environmental laboratories.

## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others :** 3 × 24 deep, 96 and/or 384 normal and deep well plates, 3 × 384 low well PCR plates, 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** in-line split-loop (flow-through) injections, bypass mode, user-defined programs

**Injection Volume Range (Recommended):** 0.01–100 µL (1–100 µL)

**Minimum Sample Required:** 1 µL out of 5 µL (250 µL conical vial)

**Injection Volume Accuracy:** ±0.5% at 50 and 90 µL

**Injection Volume Precision:** <0.25% RSD at 5 µL (typically <0.15% RSD), caffeine in water

**Linearity:** corr. coeff. >0.9999, RSD <0.5% at 5–90 µL, (caffeine in water)

**Needle Wash:** active external

**Carryover:** <0.004% for caffeine with external wash at 7.5 MPa

**Injection Cycle Time:** <15 s for 5 µL

**Sample Thermostatting:** 4–45 °C or 22 °C below ambient

**Sample Temperature Accuracy:** ±2 °C

**PC Connection:** all functions controllable via USB; integrated USB hub with three USB 1.1 ports

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

### Hardware

WPS-3000TBSL Thermostatted Analytical Autosampler ..... 5822.0010

### Accessories

Sample Tray for 72 Cylindrical 0.3 mL Vials ..... 6820.4091  
 Sample Tray for 40 Conical 1.1 mL Vials ..... 6820.4087  
 Sample Tray for 72 Cylindrical 1.2 mL Vials ..... 6820.4090  
 Sample Tray for 40 Cylindrical 1.8 mL/2.0 mL Vials ..... 6820.4070  
 Sample Tray for 22 Cylindrical 4 mL Vials ..... 6820.4084  
 Sample Tray for 10 Cylindrical 10 mL Vials ..... 6820.4086  
 Sample Support Rack for Deep Well Plates, ..... 6820.4079  
 Sample Support Rack for Deep Well Plates, 30-36 mm ..... 6820.4083  
 Sample Support Rack (Adapter) for Low Well PCR plates, 8-12 mm ..... 6820.4088  
 Sample Tray for 0.5 mL Eppendorf Tubes ..... 6820.4096  
 Sample Tray for 1.5 mL Eppendorf Tubes ..... 6820.4094  
 Vial Pusher Adapter ..... 6820.2402  
 (Required for 24 Deep Well Plates)  
 Transparent Front Cover ..... 6820.1419

## Analytical Autosampler for Fraction Collection

The UltiMate 3000 Autosampler and Fraction Collector WPS-3000T(B)FC features a diverter valve to allow injection fractionation, and re-injection at micro and analytical flow rates and pressures up to 35 MPa (5000 psi.) The autosampler extends the flexibility of 2D workflows and allows fraction collection in combination with Dual-Gradient Pumps.

- Analytical scale injector and fraction collector
- Heating and cooling of samples and fractions
- Automation of multistep and multidimensional LC analyses
- Sample derivatization
- Based on WPS-3000PL, with the same performance specifications
- Inert PEEK flow path (biocompatible version)
- Up to 1100 sample and fraction positions
- A 90 MPa/13,050 psi valve for the WPS-3000TFC supports UHPLC applications

Combined with the Extended Fraction Collection capabilities of the Chromeleon Chromatography Data Management software, setup, system control, reviewing, and data reporting are straightforward and simple.

## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others:** 3 × 24 deep, 96 and/or 384 normal and deep well plates, 3 × 384 low well PCR plates, 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** Full-loop and partial-loop injections, low-dispersion mode, Microliter Pickup, user-defined programs

**Injection Volume Range (Recommended):** 0.01–250 µL (0.01–250 µL)

**Minimum Sample Required:** 1 µL out of 1 µL (Microliter Pickup)

**Injection Volume Precision:** <0.25% RSD at 5 µL in full-loop mode, 0.3% RSD at 5 µL and 20 µL partial-loop, (caffeine in water)

**Linearity:** corr. coeff. >0.9999, RSD <0.5% at 5–30 µL, (caffeine in water)

**Needle Wash:** active external

**Carryover:** <0.02% for caffeine with external wash

**Injection Cycle Time:** <60 s for 5 µL, (full-loop injection < 90 s for 5 µL (partial-loop injection)

**Sample Thermostatting:** 4–45 °C or 22 °C below ambient

**Thermostatting Temperature Accuracy:** ±2 °C

**PC Connection:** all functions controllable via USB

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

### Hardware

WPS-3000TFC Thermostatted Well Plate Autosampler with Integrated Fraction Collection.....	5822.0010
WPS-3000TBFC Thermostatted Biocompatible Well Plate Autosampler with Integrated Fraction Collection.....	5825.0020

### Accessories

Needle, 15 µL, Fused Silica, WPS-3000PL and WPS-3000FC .....	6820.3115
Sample Loop, 1 µL, PEEKsil, WPS-3000PL and WPS-3000FC .....	6820.0015
Sample Loop, 5 µL, PEEKsil, WPS-3000PL and WPS-3000FC .....	6820.0016
Sample Loop, 10 µL, PEEKsil, WPS-3000PL and WPS-3000FC .....	6820.0017
Sample Loop, 5 µL, Biocompatible, PEEK, WPS-3000PL and WPS-3000FC.....	6823.0016
Sample Loop, 10 µL, Biocompatible, PEEK, WPS-3000PL and WPS-3000FC.....	6823.0017
Sample Loop, 20 µL, Biocompatible, PEEK, WPS-3000PL and WPS-3000FC.....	6823.0018

Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical Vials .....	6820.4090
Sample Tray for 40 Eppendorf Tubes, 0.5 mL .....	6820.4096
Sample Tray for 40 Eppendorf Tubes, 1.5 mL .....	6820.4094
Sample Tray for 40 Cylindrical 1.8 mL/2.0 Vials.....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Sample Support Rack for Deep Well Plates, 34-46 mm .....	6820.4079
Sample Support Rack for Deep Well Plates, 30-36 mm .....	6820.4083
Support Rack (Adapter) for Low Well Plates, 8-12 mm .....	6820.4088
Vial Pusher Adapter.....	6820.2402
<i>(Required for Deep Well plates)</i>	
Transparent Front Cover .....	6820.1419

## RSLC Nano/Cap Autosampler

The RSLC Nano Well Plate Autosampler is the perfect autosampler for UHPLC in proteomics analyses with no sample loss at pressures up to 900 bar (13,050 psi). Thermostating to 4° C ensures the stability of thermolabile samples.

- Pulled-loop injection principle, full, partial-loop, and Microliter Pickup as standard injections or completely user-programmable by UDP
- Handles up to three 96- or 384 well plates or sample vial trays, or combination thereof
- Supports a wide injection volume range 20 nL to 25 µL for maximum flexibility
- Microliter Pickup routine allows for injection with virtually zero sample loss
- Micro Fraction option allows for automated off-line multidimensional LC (MDLC)

The WPS-3000(T)PL RS Well Plate Autosampler was specifically designed to provide unattended sample throughput combined with superior reproducible injections, even with the smallest volumes. It is the ideal solution for customers seeking the highest injection precision at nano/cap/micro flow rates for UHPLC applications

**Note:** For more information on the Micro Fraction option, refer to the Fraction Collection section under LC Modules.

## Key Specifications

**Sample Capacity, For Sample Capacity Vials and Sample Capacity, Others,** see RSLC Autosampler section, p. 57

**Injection Methods:** Full-loop and partial-loop injections; low dispersion mode, Microliter Pickup; user-defined programs

**Injection Volume (Settable):** 0.001-20 µL (20 nL-20 µL)

**Injection Volume Precision:** <0.4% RSD for 1 µL full-loop injections; <1% RSD for 200 nL partial-loop injections (caffeine in water)

**Linearity:** corr. coeff. >0.9995, from 100 nL to 500 nL partial-loop injections (caffeine in water)

**Needle Wash:** active external

**Carryover:** <0.02% for caffeine with external wash

**Injection Cycle Time:** <30 s for 1 µL (full-loop injection)

**Sample Thermostating:** 4–45 °C or 22 °C below ambient

**Thermostating Temperature Accuracy:** ±2 °C

**PC Connection:** USB; USB hub with three sockets integrated

**Dimensions (h × w × d):** 40 × 42 × 51 cm (16 × 16.5 × 20 in.)

### Ordering Information

#### Hardware

WPS-3000TPLRS Thermostatted Rapid Separation Pulled-Loop Well Plate Autosampler .....	5826.0020
WPS-3000PLRS Rapid Separation Pulled-Loop Nano/Cap Autosampler .....	5826.0010

#### Accessories

Needle, 15 µL, Fused Silica nanoViper .....	6820.3115
Sample Loop, 5 µL, nanoViper, WPS PL (RS) Samplers .....	6826.2405
Sample Loop, 20 µL, nanoViper, WPS PL (RS) .....	6826.2420
Buffer Tubing, 500 µL .....	6820.0020
Syringe, 100 µL, WPS-3000 Samplers .....	6822.0002
Injection Volume Kit, 125 µL .....	6820.0031
Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical Vials .....	6820.4090
Sample Tray for 40 Eppendorf Tubes, 0.5 mL .....	6820.4096
Sample Tray for 40 Eppendorf Tubes, 1.5 mL .....	6820.4094
Sample Tray for 40 Cylindrical 1.8 mL/2.0 Vials .....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Sample Support Rack for Deep Well Plates, 34-46 mm .....	6820.4079
Sample Support Rack for Deep Well Plates, 30-36 mm .....	6820.4083
Support Rack (adapter) for Low Well Plates, 8-12 mm .....	6820.4088
Vial Pusher Adapter .....	6820.2402
<i>(Required for deep well plates)</i>	
Transparent Front Cover .....	6820.1419

## Nano/Cap/Autosampler

The UltiMate 3000 Nano/Cap Autosamplers WPS-3000(T)PL and WPS-3000TBPL (biocompatible) have been specifically designed to provide reliable unattended sample throughput and handling of nL sample volumes. They are ideal for LC applications at nano, capillary, and micro flow rates providing the highest injection precision and zero sample loss.

- Pulled-loop injection principle, full-loop and low dispersion partial-loop injections
- Needle-in-Needle injection technique for robust operation with different sample formats
- Handles up to three 96- or 384-well plates or sample vial trays, or combination thereof
- Injection volume range from 0.02 to 20 µL (default), 0.02–10 µL, or 0.1–125 µL
- Sample tray thermostating and cover for injection of thermolabile and UV-labile samples
- External needle wash for lowest carryover of typically <0.01%
- Microliter Pickup routine for injections with virtually zero sample loss
- Micro Fraction Collection option for automated off-line multidimensional LC (MDLC)

The UltiMate 3000 Nano/Cap Autosampler is ideally suited for LC/MS applications. Biocompatibility and sample thermostating qualify the instrument for all small-scale bioanalytical applications. It is available in non-thermostatted (WPS-3000PL), thermostatted (WPS-3000TPL) and thermostatted biocompatible (WPS-3000TBPL) versions.

**Note:** For more information on the Micro Fraction option, refer to the Fraction collection section under LC Modules.

### Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others:** 3 × 24 deep, 96 and/or 384 normal and deep well plates, 3 × 384 low well PCR plates, 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** Full-loop and partial-loop injections, low dispersion mode, Microliter Pickup, user-defined programs

**Injection Volume Range (Recommended):** 0.001–20 µL (20 nL–20 µL)

**Minimum Sample Required:** 1 µL out of 1 µL (Microliter Pickup)



**Injection Volume Precision:** "<0.4% RSD for 1 µL in full-loop and <1% for 200 nL in partial-loop injection mode, caffeine in water"

**Linearity:** corr. coeff. >0.9995, from 100 nL to 500 nL partial-loop injections, caffeine in water

**Needle Wash:** active external

**Carryover:** <0.02% for caffeine with external wash

**Injection Cycle Time:** <30 s for 1 µL, full-loop injection

**Sample Thermostatting:** 4–45 °C or 22 °C below ambient

**Thermostatting Temperature Accuracy:** ±2 °C

**PC Connection:** All functions controllable via USB; integrated USB hub with three USB 1.1 ports"

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

For an injection volume range up to 20 µL, the 20 µL sample loop in combination with a 100 µL syringe and 500 µL buffer-tubing is recommended.

### Hardware

WPS-3000PL Nano/Cap Pulled-Loop Autosampler.....	5820.0010
WPS-3000TPL Nano/Cap Pulled-Loop Thermostatted Autosampler ....	5820.0020
WPS-3000TBFC Thermostatted Biocompatible Well Plate Autosampler with Integrated Fraction Collection .....	5821.0020

### Accessories

Needle, 15 µL, Fused Silica nanoViper .....	6820.3115
Needle, 15 µL, PEEK, Viper.....	6820.3025
Sample Loop, 20 µL, PEEK .....	6820.0018
Sample Loop, 20 µL, Biocompatible, PEEKsil, .....	6821.0018
Buffer Tubing, 500 µL .....	6820.0020
Buffer Tubing, 500 µL, Biocompatible.....	6821.0020
Syringe, 100 µL, WPS-3000 .....	6822.0002
Injection Volume Kit, 125 µL .....	6820.0031
Injection Volume Kit, Biocompatible, 125 µL, .....	6821.0031
Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical Vials .....	6820.4090
Sample Tray for 40 Eppendorf tubes, 0.5 mL .....	6820.4096
Sample Tray for 40 Eppendorf tubes, 1.5 mL .....	6820.4094
Sample Tray for 40 Cylindrical 1.8 mL/2.0 Vials.....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Support Rack for Deep Well Plates, 34–46 mm.....	6820.4079
Sample Support Rack for Deep Well Plates, 30–36 mm .....	6820.4083
Support Rack for Low Well PCR Plates, 8–12 mm.....	6820.4088
Vial Pusher Adapter (required for 24 Deep Well Plates).....	6820.2402
<i>(required for 24 Deep Well Plates)</i>	
Transparent Front Cover .....	6820.1419

## Biocompatible Analytical Autosampler

The UltiMate 3000 Biocompatible Analytical Autosampler has been specifically designed to provide rapid, accurate, and precise injections of complex samples containing biomolecules. It features low gradient delay volume and low carryover.

- Pulled-loop injection principle, full- and partial-loop injections possible
- Dual-needle injection technique for robust operation with different sample formats
- Inert PEEK flow paths
- Supports up to three 96 or 384 well plates or sample vial trays, or a combination thereof
- Wide injection volume ranges from 0.1–50 µL or 0.25–250 µL for maximum flexibility
- Sample tray thermostatting and cover for injection of thermo- and UV-labile samples
- Low gradient delay volume

The UltiMate 3000 Analytical Autosampler is ideally suited for analytical LC applications requiring biocompatibility. As part of the UltiMate 3000 Titanium System, this autosampler helps to support the analysis of proteins.

## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 120 × 0.5/1.5 mL Eppendorf tubes, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others:** 3 × 24 96 and/or 384 normal or deep well plates, 3 × 384 low well plates 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Methods:** Full-loop and partial-loop injections low-dispersion, Microliter Pickup, user-defined programs

**Injection Volume Range (Recommended):** 0.01–250 µL (0.1–250 µL)

**Minimum Sample Required:** 1 µL out of 1 µL (Microliter Pickup)

**Injection Volume Precision:** <0.25% RSD at 5 µL in full-loop and <0.3% RSD at 5 µL and 20 µL in partial-loop mode

**Linearity:** corr. coeff. >0.9999, RSD <0.5% at 5–30 µL (partial-loop mode), caffeine in water

**Needle Wash:** active external

**Carryover:** <0.02% for caffeine with external wash

## LC Modules

**Injection Cycle Time:** <60 s for 5 µL full-loop injection, <90 s for 5 µL partial-loop injection

**Sample Thermostatting:** 4–45 °C, or 22 °C below ambient

**Sample Temperature Accuracy:** ± 2 °C

**PC Connection:** all functions controllable via USB

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

### Ordering Information

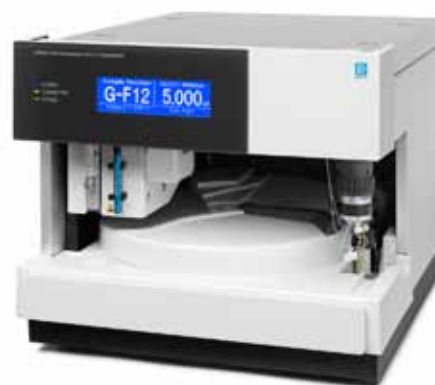
#### Hardware

WPS-3000TBPL Biocompatible Analytical Pulled-Loop  
Thermostatted Autosampler ..... 5823.0020

#### Accessories

Needle, 15 µL, PEEK, Viper, WPS-3000PL and WPS-3000FC ..... 6821.3115  
Sample Loop, 5 µL, Biocompatible, PEEK, WPS-3000TBPL Analytical.. 6823.0016  
Sample Loop, 10 µL, Biocompatible, PEEK, WPS-3000TBPL Analytical 6823.0017  
Sample Loop, 20 µL, Biocompatible, PEEK, WPS-3000TBPL Analytical 6823.0018  
Sample Tray for 72 Cylindrical 0.3 mL Vials ..... 6820.4091  
Sample Tray for 40 Conical 1.1 mL Vials ..... 6820.4087  
Sample Tray for 72 Cylindrical 1.2 mL Vials ..... 6820.4090  
Sample Tray for 40 Cylindrical 1.8 mL/2.0 mL Vials..... 6820.4070  
Sample Tray for 22 Cylindrical 4 mL Vials ..... 6820.4084  
Sample Tray for 10 Cylindrical 10 mL Vials ..... 6820.4086  
Sample Support Rack for Deep Well Plates, 34-46 mm ..... 6820.4079  
Sample Support Rack for Deep Well Plates, 30-36 mm ..... 6820.4083  
Support Rack (Adapter) for Low Well PCR Plates, 8-12 mm ..... 6820.4088  
Sample Tray for 0.5 mL Eppendorf tubes..... 6820.4096  
Sample Tray for 1.5 mL Eppendorf tubes ..... 6820.4094  
Vial Pusher Adapter (required for well plates) ..... 6820.2402  
(Required for well plates)  
Transparent Front Cover ..... 6820.1419

## Autosampler Column Compartment



The UltiMate 3000 Autosampler Column Compartment ACC-3000(T) provides a cost-effective solution for conventional LC and UHPLC applications at up to 62 MPa (9,000 psi). It integrates an autosampler and column oven in a single module and offers performance and flexibility that exceed most analytical method requirements. In addition, it reduces height and cost of your LC system.

- Pulled-loop injection principle (full- and partial-loop injections possible)
- Wide injection volume ranges from 1 to 10 µL in partial-loop and 20 µL in full-loop mode or 10 to 100 µL and 200 µL, respectively
- Low sample carryover
- Patented temperature control to protect thermally sensitive samples
- Accurate, precise column temperature control for reliable chromatographic results
- Built-in eluent preheating for increased chromatographic reliability at high temperatures
- Easy front access to all fluidic components
- Trouble-free operation due to minimized number of wear parts

The UltiMate 3000 Autosampler Column Compartment is recommended for research and other analytical laboratories dealing in a cost-sensitive environment. It is available in non-thermostatted (ACC-3000) and thermostatted (ACC-3000T) versions and is an essential part of the UltiMate 3000 Basic Automated System.



## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Others:** 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** pulled-loop injections (full-loop and partial-loop mode)

**Full-Loop Injection Volume:** 20, 50, and 200 µL

**Injection Volume Range (Recommended):** 0–50% (10–50%) of installed sample loop in partial-loop mode

**Injection Volume Precision:** <0.25% RSD at 20 µL in full-loop mode, typically <0.3% at 5 µL in partial-loop mode (20 µL sample loop)

**Linearity (20 µL Sample Loop):** corr. coeff. >0.9995, RSD <1% for 1–10 µL injections in partial-loop mode

**Linearity (200 µL Sample Loop):** corr. coeff. >0.9995, RSD <0.5% for 10–100 µL injections in partial loop mode

**Needle Wash:** active external

**Carryover:** <0.02% (with caffeine)

**Injection Cycle Time:** typically <45 seconds with 5 µL injections

**Sample Thermostatting:** 8–45 °C or 15 °C below ambient

**Column Temperature Range:** 5 °C above ambient to 50 °C

**PC Connection:** all functions controllable via USB ports

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

### Hardware

ACC-3000 Autosampler Column Compartment.....	5830.0010
ACC-3000T Autosampler Column Compartment with Sample Thermostatting.....	5830.0020

### Accessories

Sample Loop, 50 µL, ACC-3000 Autosampler Column Compartment...	6830.2442
Syringe, 1000 µL, WPS-3000 and ACC-3000 Series .....	6822.0005
Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical 1.2 mL Vials .....	6820.4090
Sample Tray for 40 Cylindrical 1.8 mL/2.0 mL Vials.....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Sample Tray for 1.5 mL Eppendorf Tubes .....	6820.4094
Sample Tray for 0.5 mL Eppendorf Tubes .....	6820.4096
Transparent Front Cover .....	6820.1419

## Semipreparative Autosampler

The UltiMate 3000 Semipreparative Autosampler WPS-3000(T)SL performs reliable, accurate, and precise injections in semipreparative LC applications at backpressures up to 62 MPa (9,000 psi). It is designed to deliver mL injection volumes while minimizing backpressure contributions. The in-line, split-loop injection principle and needle wash options virtually eliminate carryover.

- Robust, dependable performance with low operating and maintenance costs
- Injection volume range from 100–2500 µL (default) or 10–1000 µL (optional)
- Superior flow path design for flow rates up to 50 mL/min at low backpressures
- 66 × 4 mL or 45 × 10 mL vial formats for multiple large volume injections of the same sample
- Sample thermostating for optimal protection of thermally sensitive analytes (WPS-3000TSL)

The Ultimate 3000 Semipreparative Autosampler is recommended for all semipreparative LC instrument configurations and is available in a non-thermostatted (WPS-3000SL) and thermostatted version (WPS-3000TSL).

## Key Specifications

**Sample Capacity, Vials:** 216 × 0.3 mL, 120 × 1.1 mL (conical), 216 × 1.2 mL, 120 × 1.8 mL/2.0 mL, 66 × 4 mL, and/or 30 × 10 mL + 15 × 10 mL

**Sample Capacity, Well Plates:** 3 × 24 deep, 96 and/or 384 normal or deep well plates, 3 × 384 low well plates 3 × 40 0.5 mL and/or 1.5 mL Eppendorf tubes

**Injection Method:** in-line split-loop injections, bypass mode, user-defined programs

**Injection Volume Range (Recommended):** 0.01–2500 µL (100–2500 µL)

**Injection Volume Accuracy:** ±1% at 2000 µL

**Injection Volume Precision:** <0.3% RSD at 100 µL (typically <0.15% RSD), caffeine in water

**Linearity:** corr. coeff. >0.9995, RSD <1% at 100–2000 µL, caffeine in water

**Needle Wash:** active external

**Carryover:** <0.004% for caffeine with external wash at 7.5 MPa

**Injection Cycle Time:** <20 s for 100 µL

**Sample Thermostatting:** 4–45 °C or 22 °C below ambient

**Sample Thermostatting Accuracy:** ±2 °C

**PC Connection:** all functions controllable via USB; integrated USB hub with three USB 1.1 ports

**Dimensions (*h × w × d*):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

### Hardware

WPS-3000SL Semipreparative In-Line Split-Loop Autosampler .....	5822.0018
WPS-3000TSL Semipreparative In-Line Split-Loop Thermostatted Autosampler .....	5822.0028

### Accessories

Injection Volume Kit, 1000 µL, WPS-3000SL Semipreparative .....	6820.2436
Sample Tray for 72 Cylindrical 0.3 mL Vials .....	6820.4091
Sample Tray for 40 Conical 1.1 mL Vials .....	6820.4087
Sample Tray for 72 Cylindrical 1.2 mL Vials .....	6820.4090
Sample Tray for 40 Cylindrical 1.8 mL/2.0 mL Vials .....	6820.4070
Sample Tray for 22 Cylindrical 4 mL Vials .....	6820.4084
Sample Tray for 10 Cylindrical 10 mL Vials .....	6820.4086
Sample Support Rack for Deep Well Plates .....	6820.4079
Transparent Front Cover .....	6820.1419
Sample Support Rack for Deep Well Plates, 30-36 mm .....	6820.4083
Support Rack (Adapter) for Low Well PCR Plates, 8-12 mm .....	6820.4088
Sample Tray for 0.5 mL Eppendorf Tubes .....	6820.4096
Sample Tray for 1.5 mL Eppendorf Tubes .....	6820.4094
Vial Pusher Adapter .....	6820.2402
<i>(required for well plates)</i>	
Transparent Front Cover .....	6820.1419

## LC Column Compartments



The UltiMate 3000 Thermostatted Column Compartment (TCC) offers precise temperature control under varying ambient conditions for standard as well as UHPLC applications. Easily accessible valves with operating pressure up to 1034 bar (15,000 psi) extend flexibility, and enable tandem and parallel operation, on-line sample preparation, and multidimensional chromatography.

- Column thermostating for reliable LC at elevated, ambient, and subambient temperatures
- Freely-configurable switching valves for advanced column switching techniques
- User-interchangeable high-pressure switching valves for UHPLC compatibility
- Capacity for up to 12 columns to facilitate automated method development
- Accommodates columns up to 30 cm length
- Short equilibration times for temperature step gradients and fast application switching
- Low-dispersion precolumn eluent heater for better peak shapes at elevated temperatures
- Homogeneous temperature distribution using a fan-based forced-air design
- AutoQ instrument qualification for method documentation and regulatory compliance

The UltiMate 3000 Thermostatted Column Compartment meets the requirements of any laboratory with a need to increase performance and productivity with temperature-sensitive applications. Run methods at temperatures from 5 up to 110 °C and pressures up to 1034 bar (15,000 psi), using x2 dual technology.

**Note:** For more information on advanced column switching techniques, refer to the *UHPLC+ Solutions* section.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

UltiMate-3000 Thermostatted Column Compartment Data Sheet

ACC-3000 Autosampler Column Compartment Data Sheet

## RSLC Thermostatted Column Compartment

The UltiMate 3000 Rapid Separation Thermostatted Column Compartment TCC-3000RS operates at temperatures up to 110° C precisely and accurately. Advantages of high column temperatures are reduced system backpressures and typically sharper peaks. Efficient precolumn heating and postcolumn cooling technology ensures the best chromatography under these challenging conditions.

- Wide temperature range; 5–110° C with excellent accuracy and precision
- Precise temperature control, even under varying ambient conditions
- Optional column switching valves in SST and PEEK
- Fast and easy installation of precolumn heater and postcolumn coolers using Viper fittings
- Postcolumn cooling assures lowest detector noise at high temperatures
- Fast heat up and cool down times
- Increase your laboratory performance and productivity with x2 Dual technology
- Column identification system for up to four columns

The TCC RS is highly flexible and supports up to 12 LC columns (depending on column dimensions) to lengths up to 30 cm. It can easily be upgraded with up to two integrated column switching valves, providing access to advanced column switching techniques. The TCC-3000RS meets the demands of ultrafast conventional LC applications even at high column temperatures

**Note:** For more information on how you can benefit from advanced column switching techniques, refer to the *UHPLC+ Solutions* section

## Key Specifications

*Compartment Temperature Range:* 5–110 °C or 18 °C below ambient

*Compartment Temperature Accuracy:*  $\pm 0.5$  °C

*Compartment Temperature Stability and Precision:*  $\pm 0.1$  °C

*Compartment Heat-up and Cool-down Time:* typically 12 min from 20 °C to 50 °C, typically 15 min from 50 °C to 20 °C

*Postcolumn Cooler Temperature Range:*  
5–110 °C (settable)

*Postcolumn Cooler Capacity:* 40 °C below column chamber temperature, at 100 °C with water at 3 mL/min

*Switching Valves (optional):* one or two switching valves:  
2-position 6-port, 2-position 10-port, or 6-position 7-port valves

*Column Capacity:* up to 12 columns (depending on column dimension), maximum column length 30 cm

*PC Connection:* all functions controlled via USB

*I/O Interfaces:* two digital inputs, two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Column Identification System, Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with Chromeleon

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions (h × w × d):* 19 × 42 × 51 cm (7.5 × 16.5 × 20 in.)

*Additional Specifications:* See data sheet

## Ordering Information

The TCC-3000RS comes without preinstalled column switching valves. To add a switching valve to the TCC, a valve drive and a valve pod must be ordered separately depending on left- or right-side valve installation. A 2  $\mu$ L pre-heater and a 2.2  $\mu$ L postcolumn cooler insert are shipped with the TCC-3000RS.

### Hardware

TCC-3000RS UltiMate 3000 Rapid Separation Thermostatted Column Compartment .....	5730.0000
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### Accessories

Valve Actuation Kit, HT Right Side, <1034 bar (15,000 psi).....	6730.0001
Valve Actuation Kit, HT Left Side, <1034 bar (15,000 psi).....	6730.0002
Valve Actuation Kit, HP Right Side, <413 bar (6000 psi).....	6730.0003
Valve Actuation Kit, HP Left Side, <413 bar (6000 psi).....	6730.0004
2-Position 6-Port HT Valve Pod, <1034 bar (15,000 psi).....	6730.0006
2-Position 10-Port HT Valve Pod, <1034 bar (15,000) .....	6730.0026
2-Position 7-Port HT Valve Pod, <1034 bar (15,000 psi) .....	6730.0016
2-Position 6-Port HP Valve Pod, <413 bar (6000 psi).....	6722.9013
2-Position 10-Port HP Valve Pod, <413 bar (6000 psi).....	6722.9023
6-Position 7-Port HP Valve Pod, <413 bar (6000 psi).....	6722.9035
2-Position 6-Port HP Valve Pod, Biocompatible, PEEK, <345 bar (5000 psi) .....	6723.9013
2-position 10-port HP Valve, Biocompatible, PEEK, <345 bar (5000 psi).....	6723.9023
Precolumn Heater, 2 $\mu$ L, Stainless Steel, with Viper fittings.....	6722.0530
Precolumn Heater 7 $\mu$ L Stainless Steel, with Viper fittings.....	6722.0540
Precolumn Heater 11 $\mu$ L, Stainless Steel, with Viper fittings.....	6722.0550
Precolumn Heater 2 $\mu$ L, Biocompatible .....	6723.0232
Precolumn Heater, 7 $\mu$ L, Biocompatible.....	6723.0242
Precolumn Heater 11 $\mu$ L, Biocompatible .....	6723.0252
Postcolumn Cooler Insert with Viper Fittings, 2 $\mu$ L .....	6730.0008
Column Identification Chip Cards, 5 pcs.....	6710.1505

## Thermostatted Column Compartment

The UltiMate 3000 Thermostatted Column Compartment TCC-3000SD offers precise temperatures control up to 80 °C. A variety of optional installable switching valves operating at up to 1034 bar (15,000 psi) provides full UHPLC compatibility and access to advanced column switching techniques.

- Wide temperature range from 5 to 80 °C with excellent accuracy and precision
- Precise temperature control even under varying ambient conditions
- Fast heat-up/cool-down times
- Optional column switching valves in SST or PEEK
- Optional precolumn eluent heaters ensure optimal eluent thermostating for better resolution
- Fast and easy installation of precolumn heaters with Viper fittings
- Increases laboratory productivity with advanced column switching techniques
- Column identification system for up to four columns

Very similar to the TCC-3000RS but with a temperature range of 5 to 80 °C, the TCC-3000SD Column Compartment is a cost effective choice for performing conventional HPLC and biochromatography separations, and provides access to ×2 Dual technology.

*Note:* For more information on ×2 Dual technology, refer to the UHPLC+ Solutions section.

### Key Specifications

*Compartment Temperature Range:* 5–80 °C or 18 °C below ambient temperature

*Compartment Temperature Accuracy:* ±0.5 °C

*Compartment Temperature Stability and Precision:* ±0.1 °C

*Compartment Heat-up and Cool-down Time:* typically 12 min from 20 °C to 50 °C, typically 15 min from 50 °C to 20 °C

*Switching Valves (optional):* one or two switching valves: 2-position 6-port, 2-position 10-port, or 6-position 7-port valves

*Column Capacity:* up to 12 columns (depending on column dimension), maximum column length 30 cm

*PC Connection:* all functions controlled via USB

*I/O Interfaces:* two digital inputs, two relay outputs

*User Input/Display:* LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

*GLP Features:* Column Identification System, Automatic Instrument Qualification (AutoQ), System Wellness, and Qualification Monitoring with Chromeleon

*Power Requirements:* 100–120 V, 60 Hz; 200–240 V, 50 Hz

*Dimensions (h × w × d):* 19 × 42 × 51 cm (7.5 × 16.5 × 20 in.)

*Additional Specifications:* See data sheet

### Ordering Information

The TCC-3000SD comes without preinstalled column switching valves. To add a switching valve to the TCC, a valve drive and a valve pod must be ordered separately depending on left- or right-hand valve installation.

#### Hardware

TCC-3000 SD UltiMate 3000 Thermostatted Column Compartment .... 5730.0000

#### Accessories

Valve Actuation Kit, HT Right Side, <1034 bar (15,000 psi).....	6730.0001
Valve Actuation Kit, HT Left Side, <1034 bar (15,000 psi).....	6730.0002
Valve Actuation Kit HP, Right Side, <413 bar (6000 psi) .....	6730.0003
Valve Actuation Kit, HP Left Side, <413 bar (6000 psi).....	6730.0004
2-Position 6-Port HT Valve Pod, <1034 bar (15,000 psi).....	6730.0006
2-Position 10-Port HT Valve Pod, <1034 bar (15,000 psi).....	6730.0026
6-Position 7-Port HT Valve Pod, <1034 bar (15,000 psi).....	6730.0016
2-Position 6-Port HP Valve Pod, <413 bar (6000 psi), .....	6723.9013
2-Position 10-Port HP Valve Pod, <413 bar (6000 psi).....	6722.9023
6-Position 7-Port HP Valve Pod, <413 bar (6000 psi).....	6722.9035
2-Position 6-Port HP Valve, Biocompatible, PEEK <345 bar (5000 psi).....	6722.9013
2-Position 10-Port HP Valve, Biocompatible, PEEK <345 bar (5000 psi).....	6723.9023
Precolumn Heater, 2 µL Stainless Steel with Viper fittings .....	6722.0530
Precolumn Heater, 7 µL Stainless Steel with Viper fittings .....	6722.0540
Precolumn Heater, 11 µL Stainless Steel with Viper fittings .....	6722.0550
Precolumn Heater, 2 µL Biocompatible.....	6723.0232
Precolumn Heater, 7 µL Biocompatible.....	6723.0242
Precolumn Heater, 11 µL Biocompatible.....	6723.0252
Column Identification Chip Cards, 5 pcs.....	6710.1505

### Related Literature

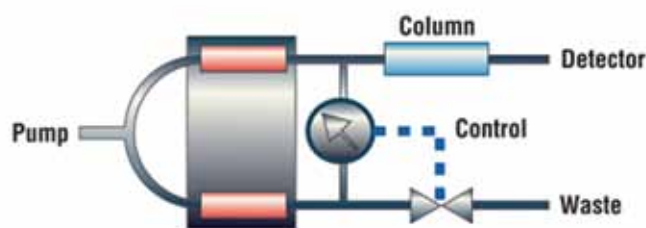
The following provides more information on this product and can be found in the Documents section at [www.dionex.com](http://www.dionex.com).

#### Product Data Sheets

UltiMate 3000 Thermostatted Column Compartment Series

Ordering Information

## LC Flow Managers



The UltiMate 3000 Flow Manager FLM-3000 series features UltiFlow active splitting technology for nano, capillary, and micro flow rates, and also integrates column thermostating. It includes up to two low-dispersion switching valves for automated sample preparation and multidimensional LC applications and supports the use of up to three columns.

- Column thermostating from 5 to 70 °C, (max. 15 °C below ambient temperature)
- Short warm-up/cool-down times for fast temperature stabilization
- Column capacity of up to three microcolumns (max length: 30 cm)
- UltiFlow technology for nano, capillary, and micro flow rates (50 nL/min–200 µL/min)
- Easy change of flow rate range (nano, cap, or micro) by exchanging the splitter cartridge
- Column thermostating for reliable LC at nano, capillary, and micro flow rates
- Thermostatted microswitching valves for maximum application flexibility
- Biocompatible versions for high salt applications and/or delicate biomolecule analyses enables Proteomics MDLC solutions

UltiFlow splitting technology integrates proportioning and mixing of up to three eluents from a Quaternary or Dual-Gradient Micro Pump with actively controlled flow splitting to nano, capillary, or micro flow rates. This results in accurate and precise gradient formation, short gradient delay times, and smooth baselines.

**Note:** For more details on the Quaternary or Dual-Gradient Micro Pumps, see the LC pump section.

## UltiMate 3000 Flow Manager FLM-3000 Series

The UltiMate 3000 Flow Manager FLM-3x00 includes up to two 2-position 10-port switching valves, which enable preconcentration 2D Salt Plug and Off-line 2D-LC. The Flow Manager features the UltiFlow eluent delivery system for nano, capillary, and micro flow rates, and is also available in a biocompatible version (FLM-3x00B).

- Column thermostating from 5 to 70 °C
- Short warm-up/cool-down times for fast temperature stabilization
- Column capacity of up to three microcolumns (max length: 30 cm)
- UltiFlow technology for nano, capillary, and micro flow rates (50 nL/min–160 µL/min)

The UltiMate 3000 Flow Manager FLM-3x00(B) can be easily converted between nano, capillary, and micro flow rates by exchanging the flow splitter cartridge.

**Note:** For more details on Proteomics MDLC 2-D Salt Plug and Proteomics MDLC Off-line 2D-LC, refer to the UHPLC+ Solutions section.

### Key Specifications

**Temperature Range:** 5 °C to 70 °C (max. 15 °C below ambient)

**Temperature Accuracy:** ±0.5 °C

**Temperature Stability and Precision:** ±0.1 °C

**Heat-Up and Cool-Down Time:** from 20 °C to 50 °C in <25 min, from 50 °C to 20 °C in <35 min

**Switching Valves:** up to two low-dispersion thermostatted 2-position/10-port micro valves; optional: 10-port biocompatible and 6-port nano valves

**Column Capacity:** Up to three columns, max. 30 cm length

**Flow Splitter/Control:** nano, capillary, or micro thermostatted splitter with splitter identification system

**Flow Range Selection:** 50–1000 nL/min (nano), 0.5–10 µL/min (capillary), 10 µL/min–200 µL/min (micro flow splitter)

**Gradient Delay Time:** Typically <1.5 min at 200 nL/min to splitter outlet

**Maximum Column Pressure:** 35 MPa (4900 psi)

**I/O Interfaces:** two digital inputs, two programmable relay outputs



**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring (Power, Connected, Status), four soft keys

**GLP Features:** electronic identification system for three columns, automatic equipment qualification (AutoQ), system wellness monitoring with Chromeleon software

**Power Requirements:** 162 VA, automatic voltage selection

**Dimensions (h × w × d):** 17 × 42 × 51 cm (6.7 × 16.5 × 20 in)

## Ordering Information

### Hardware

FLM-3100 Nano UltiMate 3000 Nano Flow Manager with Two Integrated Motorized 2-Position 10-Port Switching Valves.....	5720.0010
FLM-3100 Cap UltiMate 3000 Cap Flow Manager with Two Integrated Motorized 2-Position 10-Port Switching Valves.....	5720.0015
FLM-3100 Micro UltiMate 3000 Micro Flow Manager with Two Integrated Motorized 2-Position 10-Port Switching Valves.....	5720.0018
FLM-3100B Nano UltiMate 3000 Biocompatible Nano Flow Manager with Two Integrated Motorized 2-Position 10-Port Switching Valves ..	5721.0010
FLM-3200 Nano UltiMate 3000 Nano Flow Manager with Two Integrated Motorized Switching Valves, 1x 2 Position, 10 Port, 1x 2 Position-6 Port.....	5720.0020
FLM-3200B Nano UltiMate 3000 Biocompatible Nano Flow Manager with One 2-Position 10-Port and One 2-Position 6-Port Integrated Motorized Switching Valve .....	5721.0020
FLM-3300 Nano UltiMate 3000 Nano Flow Manager with One Integrated Motorized 2-Position 10-Port Switching Valve.....	5720.0030
FLM-3300 Cap UltiMate 3000 Cap Flow Manager with One Integrated Motorized 2-Position 10-Port Switching Valve.....	5720.0035
FLM-3300 Micro UltiMate 3000 Micro Flow Manager with One Integrated Motorized 2-Position 10-Port Switching Valve.....	5720.0038
FLM-3300B Cap UltiMate 3000 Biocompatible Cap Flow Manager with One Integrated Motorized 2-Position 10-Port Switching Valve ....	5721.0035
Column Identification System with Chip Cards, 5 pcs .....	6710.1505



## Optical LC Detectors



A full range of optical detectors is available for the UltiMate 3000 LC and LC/MS systems. Choose from diode array, multiple and variable wavelength UV-vis, fluorescence, or refractive index detectors according to your LC application needs. All data generated can be easily processed and reported using the powerful tools in the Chromeleon Chromatography Data Management System.

- Diode array detectors for peak characterization and acquisition of several UV-vis channels
- Multiple wavelength detectors for simultaneous detection of up to eight UV-vis wavelengths
- Multiple wavelength detectors can be upgraded to full DAD functionality
- Variable wavelength detectors offer flexibility for UV-vis applications in any laboratory
- Fluorescence detectors provide sensitive detection of fluorescing trace-level analytes
- The refractive index detector supports detection of analytes with limited UV absorption

High quality detector components, intelligent mechanical and electronic detector design, and rigorous quality assurance testing guarantee durable and reliable operation. AutoQ equipment qualification tests and predictive performance indicators simplify installation, qualification, and performance verification.

## Related Literature

The following provides more information on this product and can be found in the Documents section at [www.dionex.com](http://www.dionex.com).

### *Product Data Sheets*

UltiMate 3000 Diode Array Detector

UltiMate 3000 Variable Wavelength Detectors

UltiMate 3000 Fluorescence Detectors

RI-101 Refractive Index Detectors

## RSLC Diode Array Detector



The UltiMate 3000 Rapid Separation Diode Array Detector DAD-3000RS is the detector of choice if you need maximum flexibility in your laboratory. Data collection rates up to 200 Hz (8 channels plus 3D field simultaneously) and a wide choice of flow cells make the detector fully compatible with UHPLC, conventional HPLC, and semipreparative applications.

- Up to 200 Hz data rate on each channel for perfect integration of the narrowest peaks
- Low noise, wide slit ( $\pm 8 \mu\text{AU}$  and drift) ( $<1 \text{ mAU/h}$ ) for the lowest LODs and LOQs
- Full UV-vis spectra data acquisition even for 10 peaks separated in ten seconds
- Stainless steel and PEEK flow cells provide maximum application flexibility
- Front access to prealigned cells and lamps simplifies routine maintenance
- ID chips for tracking of lamp and cell parameters in audit trails

The UltiMate 3000 Rapid Separation Diode Array Detector DAD-3000RS features eight channels of single-wavelength data acquisition, a 1024 element diode array, and excellent noise and drift performance close to that of forward-optic detectors. The comprehensive set of 3D data tools in the Chromeleon Chromatography Data Management system makes it easy to process and report your data.

**Note:** The DAD-3000RS is also available in a non-RS version (DAD-3000) with a data rate of up to 100 Hz for conventional LC methods.

## Key Specifications

**Detection Type:** Single-beam, reverse optics design with concave holographic grating

**Maximum Data Collection Rate:** 200 Hz: DAD-3000RS: (including 3-D aquisition under Chromeleon 7.1 software control; 100 Hz, DAD-3000: (including 3-D aquisition)

**Wavelength Range:** 190–800 nm

**Noise:** Wide slit:  $\leq \pm 8 \mu\text{AU}$  at 254 nm; Narrow slit:  $\leq \pm 10 \mu\text{AU}$  at 254 nm; Response time: 2 s according to ASTM constant app. 1 s, 4 nm bandwidth, water at 1.0 mL/min

**Drift:**  $< 1 \text{ mAU/h}$  (typically  $< 0.5 \text{ mAU/h}$ ) at 254 nm and 520 nm with water at 1.0 mL/min

**Linearity:**  $< 3\%$  RSD and corr. coeff.  $> 0.9995$  up to 1.5 AU, typically  $< 2.5\%$  RSD and corr. coeff.  $> 0.999$  up to 1.8 AU

**Light Source:** deuterium lamp, tungsten lamp, temperature control for both lamps

**Wavelength Accuracy:**  $\pm 1.0 \text{ nm}$ , self-calibration with D-alpha line, verification with holmium oxide filter

**Pixel Resolution:**  $< 1 \text{ nm}$

**Slit Width:** narrow or wide slit settable for the DAD-3000RS

**PC Connection:** All functions controllable via USB 2.0; integrated USB hub with three USB 2.0 ports

**GLP Features:** Automatic Equipment Qualification (AutoQ), System Wellness, and Qualification Monitoring with Chromeleon software, lamp, and cell ID chips

**User Input/Display:** LCD indicating system parameters, standby button, three LEDs for status monitoring, four function keys for initial operation and maintenance

**Power Requirements:** 85–260 V AC, 50/60 Hz, max. 150 W

**Dimensions (h × w × d):** 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)

## Ordering Information

The Diode Array Detector DAD-3000RS and DAD-3000 are shipped without flow cells. Flow cells must be ordered separately and according to your LC application requirements.

### Hardware

DAD-3000RS Diode Array Detector (without flow cell).....	5082.0020
DAD-3000 Diode Array Detector (without flow cell).....	5082.0010

### Accessories

D2-Lamp .....	6074.1110
VIS-Lamp (Tungsten) .....	6074.2000
Analytical flow cell SST, 13 $\mu\text{L}$ volume, 10 mm path length.....	6082.0100
Semi-analytical flow cell SST, 5 $\mu\text{L}$ volume, 7 mm path length.....	6082.0200
Semi-micro flow cell SST, 2.5 $\mu\text{L}$ volume, 7 mm path length .....	6082.0300
Analytical flow cell, PEEK 13 $\mu\text{L}$ volume, 10 mm path length .....	6082.0400
Semi-micro flow cell 2.5 $\mu\text{L}$ volume, 7 mm path length.....	6082.0500
Semipreparative flow cell 0.7 $\mu\text{L}$ volume, 0.4 mm path length .....	6082.0600

## RSLC Multiple Wavelength Detector



The UltiMate 3000 Rapid Separation Multiple Wavelength Detector MWD-3000RS can operate up to eight UV-vis channels at up to 200 Hz simultaneously. A wide choice of flow cells is available for UHPLC, conventional HPLC, and semi-preparative applications. The detector is based on diode array technology and can be upgraded to acquire 3D UV-vis spectra.

- Up to 200 Hz data rate on each channel for perfect integration of the narrowest peaks
- Low noise, wide slit ( $\leq \pm 8 \mu\text{AU}$ ) and drift ( $< 1 \text{ mAU/h}$ ) for the lowest LODs and LOQs
- Stainless steel and PEEK flow cells provide maximum application flexibility
- Front access to cells and lamps simplifies routine maintenance
- ID chips for tracking lamp and cell parameters
- Upgrade to full DAD functionality available

**Note:** The Multiple Wavelength Detector is also available in a non-RS variant (MWD-3000) with a data rate of up to 100 Hz for optimum support of Ultimate 3000 Standard systems.

## Key Specifications

**Detection Type:** Single-beam, reverse optics design with concave holographic grating

**Maximum Data Collection Rate:** MWD-3000RS: 200 Hz, (under Chromeleon 7 software control MWD-3000: 100 Hz)

**Wavelength Range:** 190–800 nm

**Noise:** Wide slit:  $\pm 8 \mu\text{AU}$  at 254 nm, Narrow slit:  $\pm 10 \mu\text{AU}$  at 254 nm; Response time: 2s (according to ASTM rime constant app. 1 s.) 4 nm bandwidth (water at 1.0 mL/min)

**Drift:**  $< 1 \text{ mAU/h}$  (typically  $< 0.5 \text{ mAU/h}$ ) at 254 nm, deionized water at 1.0 mL/min

**Linearity:**  $< 3\%$  RSD and corr. coeff.  $> 0.9995$  up to 1.5 AU, typically  $< 2.5\%$  RSD and corr. coeff.  $> 0.999$  up to 1.8 AU

**Light Source:** deuterium lamp, tungsten lamp, temperature control for both lamps

**Wavelength Accuracy:**  $\pm 1.0 \text{ nm}$ , self calibration with D-alpha line, verification with holmium oxide filter

**Pixel Resolution:**  $< 1 \text{ nm}$

**Slit Width:** Narrow or wide slit, settable for the MWD-3000RS

**PC Connection:** All functions controllable by USB 2.0; integrated USB hub with three USB 2.0 ports

**GLP Features:** Automatic Equipment Qualification (AutoQ), System Wellness Monitoring with Chromeleon software, lamp and cell ID chips

**User Input Display:** LCD indicating system parameters, standby button LEDs for status monitoring four function keys for initial operation and maintenance

**Power Requirements:** 85–260 V AC, 50/60 Hz, max. 150 W

**Dimensions (h × w × d):** 16 × 42 × 51 cm (6.3 × 16.5 × 20 in.)

## Ordering Information

The Multiple Wavelength Detector MWD-3000RS and MWD-3000 are shipped without flow cells. Flow cells must be ordered separately and according to your LC application requirements.

### Hardware

MWD-3000RS Rapid Separation Multiple Wavelength Detector (without Flow Cell) .....	5082.0040
MWD-3000 Multiple Wavelength Detector (without Flow Cell) .....	5082.0030

### Accessories

Deuterium lamp .....	6074.1110
Tungsten lamp .....	6074.2000
Analytical flow cell SST, 13 $\mu\text{L}$ volume, 10 mm path length .....	6082.0100
Semi-analytical flow cell SST, 5 $\mu\text{L}$ volume, 7 mm path length .....	6082.0200
Semi-micro flow cell SST, 2.5 $\mu\text{L}$ volume, 7 mm path length .....	6082.0300
Analytical flow cell, PEEK 13 $\mu\text{L}$ volume, 10 mm path length .....	6082.0400
Semi-micro flow cell, PEEK, 2.5 $\mu\text{L}$ volume, 7 mm path length .....	6082.0500
Semipreparative flow cell, PEEK, 0.7 $\mu\text{L}$ volume, 0.4 mm path length ..	6082.0600

## RSLC Variable Wavelength Detector



The UltiMate 3000 Rapid Separation Variable Wavelength Detector VWD-3400RS offers the best noise and linearity specifications, providing data collection rates up to 200 Hz for optimal support of today's UHPLC separations. A wide range of flow cells cover nano to semipreparative flow rate requirements.

- Superior detection of trace analyties with low noise ( $\pm 3.5 \mu\text{AU}$ ) and drift ( $< 0.1 \text{ mAU/h}$ )
- Large linearity range (up to 2.5 AU) ideal for widely varying analyte concentrations
- Up to four absorption channels (VWD-3400RS only) and spectral scans for method development
- Quick and easy exchange of lamps and flow cells by ergonomic front panel access

The VWD-3400RS Rapid Separation Variable Wavelength Detector is ideal for any single UV-vis detection challenge. Various flow cell sizes are available in SST, PEEK, and fused silica. Full regulatory compliance is achieved with detailed information tracking and automated qualification monitoring.

**Note:** The VWD-3400RS is also available in a non-RS version (VWD-3100) with up to 100 Hz data collection rate for optimum support of UltiMate 3000 Standard systems.

## Key Specifications

**Data Collection Rate:** single wavelength up to 100 Hz (VWD-3100); single wavelength up to 200 Hz (VWD-3400RS); multiple wavelength up to 5 Hz

**Noise, Single Wavelength:**  $< \pm 3.5 \mu\text{AU}$  (typical  $\pm 2.5 \mu\text{AU}$ ) at 254 nm, time constant 1s, dry analytical flow cell

**Noise, Multiple Wavelength:**  $\pm 10 \mu\text{AU}$  (typical  $\pm 7 \mu\text{AU}$ ) at 254 and 280 nm, time constant 1s, dry analytical flow cell

**Drift:**  $< 1 \times 10^{-4} \text{ AU/Hr}$ ; dry analytical cell

**Linearity:**  $< 5\%$  RSD (typically  $< 3\%$  RSD) at 2.5 AU (caffeine), wavelength: 272 nm based on ASTM

**Light Source:** deuterium lamp, tungsten lamp, (tungsten lamp optional on VWD-3100); temperature control for both lamps

**Wavelength Range:** 190 nm; tungsten lamp is recommended for wavelengths  $> 600 \text{ nm}$

**Wavelength Accuracy:**  $\pm 1 \text{ nm}$  at over lifetime of the detector

**Wavelength Repeatability:**  $\pm 1 \text{ nm}$

**Optical Bandwidth:** 6 nm at 254 nm

**I/O Interfaces:** four digital inputs and outputs

**Analog Output:** Two analog outputs available as a option with DAC plug-in module. Software selectable absorbance, 20-bit resolution, 0-1V (full range and 0-10 V full range with adjustable mAU ranges

**Power Requirements:** 85-260 V, 50/60 Hz, max 150 W Wide range (automatic voltage selection)

**Dimensions (h x w x d):** 16 x 42 x 51 cm (6.3 x 16.3 x 20 in.)

## Ordering Information

The Variable Wavelength Detectors VWD-3400RS and VWD-3100 are shipped without flow cells, which must be ordered separately based on your LC application. For multiple wavelength detection in routine analysis, consider the multiple wavelength detector MWD-3000(RS) or diode array detector DAD-3000(RS).

### Hardware

VWD-3400RS Rapid Separation Variable Wavelength Detector (without Flow Cell) .....	5074.0010
VWD-3100 Variable Wavelength Detector (without Flow Cell) .....	5074.0005

### Accessories

Deuterium Lamp .....	6074.1110
Tungsten Lamp .....	6074.2000
Analytical Flow Cell, PEEK, 11 $\mu\text{L}$ Volume, 10 mm Path Length .....	6074.0200
Analytical Flow Cell, SST, 11 $\mu\text{L}$ Volume, 10 mm Path Length .....	6074.0250

Semi-micro flow cell, SST, 2.5 $\mu\text{L}$ volume, 7 mm Path Length .....	6074.0360
Analytical flow cell, PEEK, 11 $\mu\text{L}$ Volume, 10 mm Path Length .....	6074.0200
Semi-micro flow cell, PEEK, 2.5 $\mu\text{L}$ Volume, 7 mm Path Length .....	6074.0300
Semipreparative flow cell PEEK, 0.7 $\mu\text{L}$ Volume, 0.4 mm Path Length ..	6074.0320
UZ-View flow cell, Nano 3 nL Volume, 10 mm Path Length .....	6074.0270
UZ-View flow cell Cap 45 nL Volume, 10 mm Path Length .....	6074.0280
UZ-View flow cell, Micro, 180 nL Volume, 10 mm Path Length, .....	6074.0290
Analog Output Board .....	6074.0305

## Fluorescence Detector



The multi-channel UltiMate 3000 Rapid Separation Fluorescence Detector FLD-3400RS offers unrivaled performance, reliability, and ease of use. With data collection rates up to 200 Hz in single-channel mode, the detector is ideal for RSLC applications. The detector is also available as a 100 Hz, single-channel version (FLD-3100).

- Unique optical design for extra low light scatter and superior signal-to-noise performance
- Data collection rates of up to 200 Hz allow detection of even the sharpest peaks
- Single or multi-signal detection of up to four different excitation and emission wavelengths (FLD-3400RS)
- Thermostatted Flow Cell for extraordinary baseline stability and reproducibility
- Unique Dual-PMT option for extended wavelength range without sacrifice sensitivity in the UV wavelength range
- Spectrum scanning functionality for analyte characterization
- Variable emission filter for compound-related sensitivity optimization (FLD-3400RS only)
- Cost-effective accessory for performing off-line measurements



Two flow cell sizes are available for easy optimization of application requirements. The 8  $\mu\text{L}$  flow cell is ideal for trace analysis, while the 2  $\mu\text{L}$  cell offers the best peak resolution with narrowbore HPLC and UHPLC columns

## Key Specifications

*Light Source:* Xenon flash lamp

*Lamp Pulse Frequency:* High (~300 Hz); Standard (~100 Hz); Long life (~20 Hz)

*Data Collection Rate:* single wavelength: up to 200 Hz (FLD-3400RS under Chromeleon 7.1 control) up to 100 Hz (FLD-3100) multiple wavelength: Up to 4 Hz (FLD-3400RS)

*Spectral Scanning Modes:* Permanent spectra acquisition, stop/continuous-flow excitation/emission synchronous scans

*Wavelength Range (Single PMT):* Excitation 200–630 nm, emission 220–650 (FLD-3400RS) or 265–650 nm (FLD-3100)

*Wavelength Range (Dual PMT):* Excitation 200–880 nm, emission 200–900 nm (FLD-3400RS) or 265–900 (FLD-3100)

*Emission Filter:* Variable, 5 positions (FLD-3400RS) Fixed; 280 nm (FLD-3100)

*Spectral Bandwidth:* excitation: 20 nm, emission: 20 nm

*Number of Fluorescence Channels:* (FLD-3400RS) Up to four (FLD-3100): One

*Excitation/Emission Wavelength Switching Time:* <250 ms

*Wavelength Accuracy:*  $\pm 2$  nm

*Wavelength Repeatability:*  $\pm 2$  nm

*Sensitivity:* Raman S/N: >550 ASTM over the entire lifetime of the lamp (>2100 using dark signal as noise reference)

*Flow Cell Thermostatting:* Ambient + 15  $^{\circ}\text{C}$  to 50  $^{\circ}\text{C}$

*Flow Cells :* Analytical Flow Cell: volume: 8  $\mu\text{L}$ , maximum cell pressure: 20 bar (290 psi), Micro Cell: volume: 2  $\mu\text{L}$ , maximum cell pressure: 40 bar (580 psi)

## Ordering Information

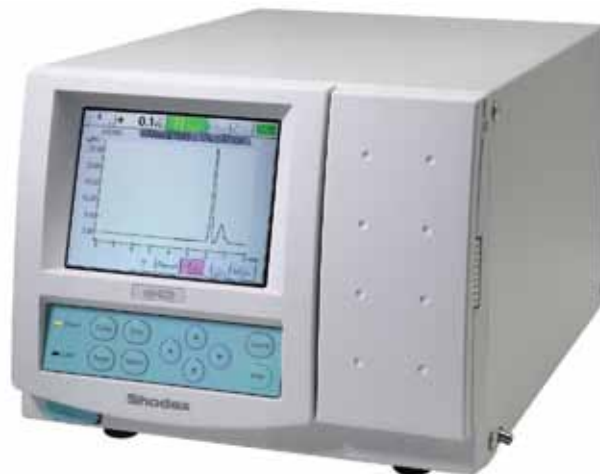
### Hardware

FLD-3100 UltiMate 3000 Fluorescence Detector (without Flow Cell)...	5078.0010
FLD-3100 UltiMate 3000 Fluorescence Detector with Dual-PMT (without Flow Cell) .....	5078.0015
FLD-3400RS UltiMate 3000 Rapid Separation Fluorescence Detector (without Flow Cell) .....	5078.0020
FLD-3400RS UltiMate 3000 Rapid Separation Fluorescence Detector with Dual-PMT (without Flow Cell) .....	5078.0025

### Accessories

Analytical Flow Cell, 8 $\mu\text{L}$ , SST .....	6078.4230
Micro Flow Cell , 2 $\mu\text{L}$ , SST .....	6078.4330
Dual PMT option.....	6078.5360
Flow Cell Syringe Injection kit .....	6078.4200

## Refractive Index Detector



The Refractive Index Detector RI-101 is a simple detector for isocratically eluted analytes with limited or no UV absorption such as alcohols, sugars, carbohydrates, fatty acids, and polymers. Good trace detection performance is assured, with noise below 2.5 nRIU. An optimized temperature control system ensures fast baseline stabilization after system startup.

- Innovative, sophisticated temperature control for fast startup (less than 40 min)
- Built-in startup sequence with automated purging and control of baseline stability and noise
- AutoQ validation functions for time savings and easy validation
- Operation with Chromeleon software for maximum productivity

The Refractive Index Detector provides ease of use with a start-up sequence that automates purging, equilibration, autozero, and control of baseline stability and noise. In addition, a full-color, liquid-crystal display provides fast access to instrument settings and performance parameters, and shows an on-line signal.

## Key Specifications

*Measuring Method:* deflection type

*Refractive Index Range:* 1.00–1.75

*Measuring Range:* 1/4–512  $\mu$ RIU

*Linearity Range:* 600  $\mu$ RIU

*Noise Level:* less than 2.5 nRIU, response: 1.5 s

*Flow Cell:* 8  $\mu$ L; 0.05 MPa (7.5 psi) pressure maximum

*Dead Volume:* less than 600  $\mu$ L

*Maximum Flow Rate:* 10 mL/min with water

*Temperature Control:* 30–50 °C in 1 °C steps

*Analog Outputs:* integrator, 0–1 V; recorder, 0–10 mV

*Contact Closure Inputs:* Autozero, Marker, Polarity,  
Purge on/off

*Contact Closure Outputs:* Ready, Solvent leak, Error

*PC Communication:* RS-232

*Power Consumption:* 150 VA Max.

*Dimensions (h  $\times$  w  $\times$  d):* 26  $\times$  20  $\times$  40 cm  
(10.1  $\times$  7.8  $\times$  15.6 in.)

## Ordering Information

### Hardware

RI-101 Refractive Index Detector including Flow Cell (8  $\mu$ L)..... 5060.0030



## Charged Aerosol Detectors



Charged Aerosol Detection (CAD) provides near universal detection independent of chemical structure for non- or semi-volatile analytes. The Corona Charged Aerosol detectors is ideal as a primary detector for providing data complementary to UV or MS. No other detector available today can match the performance of CAD.

- High sensitivity
- Response independent of chemical structure
- Wide dynamic range
- Ease of use
- Easy integration with any HPLC and UHPLC system

The Corona family has the flexibility and performance required for analytical R&D and the simplicity and reproducibility needed for manufacturing QC/QA. It can be used for almost any analysis in pharmaceuticals, biofuels, food and beverages, specialty chemicals, and counterions; and for a range of applications from basic research to quality control.

## Corona *ultra* Detector



The Corona *ultra* brings Charged Aerosol Detection to UHPLC, delivering the speed and resolution of UHPLC to any nonvolatile or semivolatile analyte—with or without a chromophore—for performance no other detector can provide:

- Nanogram to picogram sensitivity
- Response independent of chemical structure
- Wide dynamic range
- Ease of use
- Compatibility with UHPLC/RSLC
- Easily integrates with any HPLC system

The Corona *ultra* Detector has the flexibility to operate with standard HPLC or UHPLC, with no modifications necessary. From analytical development to production, the Corona *ultra* Detector brings a high level of reliability to any analysis.

**Note:** A nitrogen generator (70-6003) is recommended with every Corona detector.



**Key Specifications**

*Operating Mode:* charged aerosol detection

*Mobile Phase Flow Rate:* 0.2 mL/min to 2 mL/min

*Full Scale Output Range:* 1 pA to 470 pA

*Filter Time Constants:* none, low, medium, high

*Signal Output:* 0–1 V DC

*Output Resolution:* 0.12 V at 1 V full scale (24 bit bipolar)

*Function Keys:* Autozero, Event marker, Gas On/Off

*Remote Control:* via USB or RS232

*Method Storage:* Up to 25 methods

*Programmable Events:* Gas (on/off), Set Output Contact Closures (4), Autozero, Filter, Marker, Current Range, Hold, Loop, Reset Parameters

*Power:* 100–20 V, 60 Hz; 230–240 V, 50Hz, 100 VA

*Gas:* air or nitrogen (nitrogen is recommended)

*Operating Gas Pressure:* 35 psi (2.4 bar)

*Operating Gas Flow:* Up to 5 L/min

*Dimensions and Weight:* 52.5 × 23 × 28.6 cm (20.5 × 9 × 11.25 in); 10 kg (22 lbs)

**Ordering Information**

The Corona CAD comes complete with accessories.

**Hardware**

Corona CAD Charged Aerosol Detector with Accessories  
(100/240 VAC — Includes: Detector module, signal cable, I/O control cable, fittings, filters, drain/vent tubing, waste bottle and cap, exhaust hose, test standard kit and instruction manual..... 70-9116

**Accessories**

Nitrogen Generator for Corona CAD detector, benchtop. Provides high-purity nitrogen (+99%) from 60 to 125 psig with maximum flow of 4 L/min. Installation kit included. Requires compressed air inlet (95-145 psig) ..... 70-6003

*Note: The nitrogen generator (70-6003) is recommended for the Corona CAD detector. For more information please contact your local sales representative.*

Gas Conditioning Module, in-line, for use at pressure inlet to Corona CAD detector — Includes: in-line high precision gas pressure regulator, particle filter (0.01 µm) and moisture trap..... 70-8285

*The gas conditioning module (70-8285) is an option for the Corona CAD detector.*

## Electrochemical Detectors



Electrochemical detection is the most sensitive, selective mode of HPLC detection for the measurement of oxidizable or reducible compounds. Dionex high-performance Electrochemical detectors offer the widest range of advanced amperometric and coulometric detection optimized to ensure robust, reliable, and reproducible results.

- Sensitive
- Selective
- Stable
- Flexible
- Unique cell designs

## Coulochem III Electrochemical Detector



The Coulochem III Detector is ideally suited for high-sensitivity analyses in coulometric or amperometric mode. This HPLC/UHPLC detector is the Gold Standard for neuroscience applications.

- Sensitivity: routinely to femtogram levels
- Stability: temperature control option ensures reproducible measurements day after day
- Reliable trouble-free operation: easy to implement, easy to learn, easy to use

The most sensitive, sophisticated HPLC electrochemical detector available, the Coulochem III comes with a choice of cell designs and is ideal for use in methods development or for routine applications requiring high sensitivity detection.

**Note:** Choose from a wide selection of cells for your specific application.

### Key Specifications

**Detector Configuration:** DC potentiostat for 1 or 2 electrodes and/or Scan Mode/Pulse Mode; potentiostat for guard cell

**Operating Modes:** DC, Pulse, Scan

**Potential Range:**  $\pm 2000$  mV in 1 mV steps

**Full Scale Current Range:** 10 pA to 1 mA in 1-2-5 sequence (DC mode)

**Filter Time Constants:** 0.2 to 10 seconds in 1-2-5 sequence (DC mode)

**Output Noise:**  $<750$  fA (0.75 pA) with a 500 M $\Omega$ , 0.47  $\mu$ F test load and a 2 second filter (DC Mode)

**Signal Output:**  $\pm 100$  mV;  $\pm 1$  V

**Function Keys:** Autozero, Event Marker, Cell On/Off, Run/Stop

**USB, RS-232C Interface Capability:** full parametric instrument control of DC and Pulse

**Method Storage:** up to 25 methods (any combination of DC, Scan, Pulse, and Time line)

**Output Resolution:** 24 bit bipolar

**Guard Cell Potentials:**  $\pm 200$  mV in 1 mV steps

**Coulochem Module: Dimensions and Weight:** 28.6  $\times$  23  $\times$  49.5 cm (11.25  $\times$  9  $\times$  19.5 in); 6.7 kg (14.8 lbs) Detector only

**Power:** 100–120 V, 60 Hz; 230–240 V, 50 Hz

**Certifications:** UL, CSA, CE

### Ordering Information

Dionex has the most extensive selection of unique electrochemical cells optimized for a variety of applications.

#### Hardware

Coulochem III DC Detector — Includes: Detector with dual-channel DC module, two analog output cables, guard/conditioning cell cable, guard cell test load, analytical cell test load, logic module-to-accessory cable and accessory kit. .... 70-9143

Coulochem III Pulse/Scan Detector — Includes: Detector with pulse/scan module, analog output cable, guard/conditioning cell cable, guard cell test load, analytical cell test load, logic module-to-accessory cable and accessory kit. .... 70-9138

Coulochem III DC and Pulse/Scan Detector — Includes: Detector with DC and Pulse/Scan modules, two analog output cables, guard/conditioning cell cable, guard cell test load, analytical cell test load, logic module-to-accessory cable and accessory kit. .... 70-9141

#### Accessories

Coulochem III Organizer Module; designed to fit securely on top of the detector or sit on the bench. Pulse damper and manual injector can be conveniently mounted in the organizer. .... 70-9208

*Enclosed protection for EC cells, tubing, filters injector, columns, and in-line filters.*

Thermal Organizer Module with Accessories ..... 70-9121TA

Model 5010A Improved Standard Analytical Cell, Dual-Channel ..... 70-5560

Model 5011A High Sensitivity Analytical Cell ..... 70-5561

Model 5014B Microdialysis Cell, Dual-Channel ..... 70-0520B

Model 5125 Synthesis Cell; for analytical scale electrochemical synthesis of ng to  $\mu$ g quantities ..... 70-7700

Model 5020 Guard Cell; for pre-injector location only ..... 55-0417

Model 5021A Conditioning Cell ..... 70-6068

Model 5030 Electrochemical Cell — Includes cell, cable, PEEK microfilter assembly and high-voltage ground decoupler kit ..... 70-6069

Model 5150 Synthesis Cell — For semipreparative scale electrochemical synthesis of  $\mu$ g quantities ..... 70-7701

Model 5040 Cell with Boron-Doped Diamond electrode — For Coulochem III ..... 70-7900

Model 5041 Amperometric Analytical Cell with Accessories, no Target.. 70-1985

Model 5041 Enhanced Amperometric Cell Kit for Coulochem .....	70-4131
Model 5040 Cell with Gold Target and Accessories.....	55-0185
Model 5040 Cell with Platinum Target and Accessories.....	70-1074
Model 5040 Cell with Silver Target and Accessories.....	70-1076
Model 6011 <i>ultra</i> Coulometric Analytical cell for UHPLC .....	70-8711

### CoulArray Multi-Channel EC Detector



Multi-array electrochemical detection produces qualitative information for compound identification, resolves coeluting peaks, determines peak purity; simplifies sample preparation, and measures multiple analytes per sample.

- Unparalleled selectivity to femtomole levels
- Simultaneously analyze multiple analytes or a single analyte in a very complex sample
- Software provides analysis and identification of single or multiple analytes and patterns
- Widest dynamic range of any commercial electrochemical detector
- Measures analytes from femtomole to micromole levels with autoranging
- The only high sensitivity ECD that can be used with the most aggressive gradients
- Multiple system configurations (upgradeable 4, 8, 12, or 16 channel options)
- Easy to implement, easy to learn, easy to operate, easy to maintain

The only practical multi-channel electrochemical detector that allows you to measure multiple analytes simultaneously, including those that are chromatographically unresolved. The CoulArray Detector delivers unmatched selectivity for detection of trace components in complex matrixes, even in the presence of coeluting molecules.

**Note:** The CoulArray Detector comes complete with a 6210 Array cell for every 4-channel increment

## Key Specifications

**Number of Electrodes:** Choice of 4, 8, 12, or 16 coulometric electrodes

**Potential Range:** Independent potential control for each electrode from -1V to +2V in 1mV increments

**Current Ranges:**  $\pm 50$  nA,  $\pm 5$   $\mu$ A,  $\pm 100$   $\mu$ A autoranged; full scale for each electrode, displayed from 10 pA to 100  $\mu$ A

**Acquisition Rate:** Selectable: 2 or 10 Hz

**Autozero:** Up to 6  $\mu$ A on the 50  $\mu$ A and 5  $\mu$ A scale and 100  $\mu$ A on the 100  $\mu$ A scale

**Output Noise:** < 5 pA peak to peak (10 M $\Omega$ , 2  $\mu$ F, low filter setting)

**Output Resolution:** 30 fA on 50 nA gain range; 3 pA on 5  $\mu$ A gain range, and 47 pA on 100  $\mu$ A gain range

**Power:** 100–120 V, 60 Hz; 230–240 V, 50 Hz; 36 VA

**External Start Inputs:** 2

**Operating Temperature Range (Instrument):** -10 °C to 35 °C

**Operating Temperature Range (Cells):** -10 °C to 45 °C

**Dimensions and Weight: Detector:** 44.5 × 26 × 46.2 cm (17.5 × 10.25 × 18.3 in); 12 kg (26 lbs)

**Dimensions and Weight: Organizer:** 44.5 × 26 × 44.2 cm (17.5 × 10.25 × 17.4 in); 6.8 kg (15 lbs)

**Certifications:** UL, CSA, CE

## Ordering Information

Choose a thermostatically controlled or ambient temperature organizer module.

## Hardware

Model 5600A CoulArray Detector, 4-channel — Includes: Detector control module, 4-ch Array Cell, Windows Computer System, LCD Monitor and Color Ink Jet Printer, CoulArray for Windows software, CoulArray to PC cable and CoulArray Accessory Kit..... 70-4320

Model 5600 CoulArray Detector, 8-Channel — Includes: Detector control module, 2- 4-channel Array Cells, Windows Computer System, LCD Monitor & Color Ink Jet Printer, CoulArray for Windows software, CoulArray to PC cable & CoulArray Accessory Kit, PEEK prefilter kits and PEEK tubing for inert connection to an HPLC system. .... 70-4325

CoulArray Detector, 12-channel..... 70-4330

Model 5600 CoulArray Detector, 16-Channel — Includes: Detector control module, (4) 4-channel Array Cells, Windows Computer System, LCD Monitor & Color Ink Jet Printer, CoulArray for Windows software, CoulArray to PC cable & CoulArray Accessory Kit, PEEK prefilter kits and PEEK tubing for inert connection to an HPLC system. .... 70-4335  
Includes computer, printer and CoulArray for Windows software

## Accessories

CoulArray Organizer Module: Enclosure with integrated drip control system for organizing coulometric array cells\*, pre-filters, columns\*, manual injection valve\*, PEEK pulse damper\* and biocompatible gradient mixer\* (\*items not included)..... 70-4340

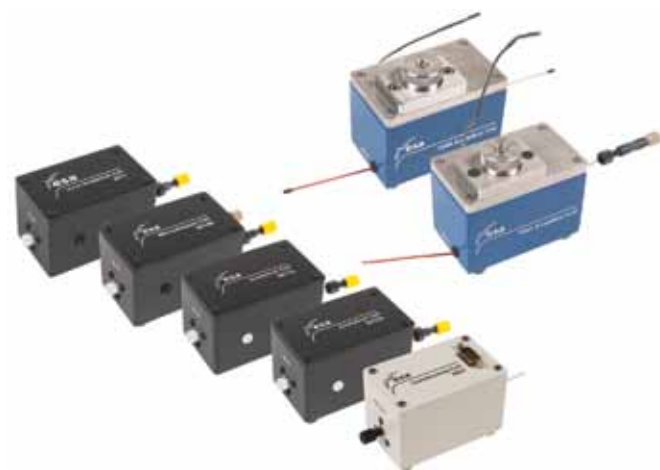
CoulArray Thermal Organizer Module — Temperature controlled enclosure for organizing and maintaining constant temperature (range: ambient +5 to 45°C) for coulometric array cells\*, pre-filters, columns\*, manual injection valve\*, PEEK pulse damper,\* and biocompatible gradient mixer\* (\*items not included)..... 70-4340T

Model 6210 4-Channel Cell for 5500/5600 Series Detectors ..... 55-0685E  
Included for each 4-channel increment purchased with CoulArray detector

*The CoulArray detector includes detector module, computer, CoulArray for Windows software and color printer*



## Electrochemical Cells



From coulometric to amperometric, to specialty cells (synthesis, boron-doped diamond, UHPLC), Dionex has electrochemical cells for a variety of applications.

- Application specific cells
- Coulometric cells
- Amperometric cells
- Solid-state reference electrode
- Unrivalled stability and performance
- Cells appropriate for HPLC and UHPLC
- Select the appropriate cell for your detector and application.

### Key Specifications

**Amperometric Analytical Cells:** Available working electrodes include: glassy carbon, gold, silver, platinum, and boron-doped diamond

**Coulometric Analytical Cells:** Available in dual- or multi-channel array with porous graphite working electrodes and solid-state reference.

**Application-Specific Cells:** 5014B cell is designed for analysis of in-vivo microdialysis perfusates in neuroscience research

**Special Use Coulometric Cells:** 5020 Guard Cell removes mobile phase impurities, 5021A Conditioning Cell enhances redox capabilities

**Synthesis Cells:** These reactor cells may be used with (EC-MS) for assisted ionization, compound stability studies, metabolic prediction and micro-synthesis.

## Ordering Information

Accessories	
Model 6011 <i>ultra</i> Coulometric Analytical Cell for UHPLC .....	70-8711
Model 5010A Improved Standard Analytical Cell, Dual-Channel .....	70-5560
Model 5011A High Sensitivity Analytical Cell .....	70-5561
Model 5014B Microdialysis Cell, Dual-Channel .....	70-0520B
ESA Model 5020 Guard Cell — for pre-injector location only .....	55-0417
Model 5021A Conditioning Cell.....	70-6068
Model 5030 Electrochemical Cell (Includes cell, cable, PEEK microfilter assembly and high-voltage ground decoupler kit) .....	70-6069
Model 5125 Synthesis Cell-for analytical-scale electrochemical synthesis of $\mu$ g to ng levels .....	70-7700
<i>minimizes over-oxidation reactions</i>	
Model 5150 Synthesis Cell — for semipreparative scale electrochemical synthesis of $\mu$ g quantities.....	70-7701
Model 5041 Enhanced Amperometric Cell Kit for Coulochem .....	70-4131
Model 5040 Cell with Gold Target and Accessories.....	55-0185
Model 5040 Cell with Silver Target and Accessories .....	70-1076
Model 5041 Amperometric Analytical Cell with Accessories, (no Target).....	70-1985
Model 5040 Cell with BDD Kit for CoulArray.....	70-8055
Model 5040 Cell with Boron-Doped Diamond Electrode (for Coulochem 3) .....	70-7900
Glassy Electrode Carbon/Ceramic Target for 5040 or 5041 cell.....	70-2000
Target Electrode Gold/Ceramic for 5040 or 5041 cell.....	70-2134
Target Electrode Platinum/Ceramic for 5040 or 5041 cell.....	70-2135
Target Electrode Silver/Ceramic for 5040 or 5041 cell.....	70-0096
Target Electrode Polishing Kit for Model 5040/5041 cells .....	55-0181

## Fraction Collection

Dionex provides the right solution for your fraction collection needs with easy-to-use fraction collection devices for a wide variety of LC applications, such as multidimensional LC, MALDI target spotting for MALDI-MS analyses, as well as analytical or semipreparative LC separations.

- WPS-3000 microfraction collection option for automated off-line multidimensional LC
- Probot MALDI spotter for on-line  $\mu\text{L}$  to nL fraction collection
- The AFC-3000 Automated Fraction Collector for preparative reversed-phase or normal-phase HPLC
- Flexibility with comprehensive Chromeleon fraction collection capabilities

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Probot Microfraction Collector Brochure

### Product Data Sheets

UltiMate 3000 Autosampler Series

### Application Notes

AN 530: Proteome Analysis Involving Off-Line 2D-LC of Intact Proteins, Proteolytic Digestion, and Capillary RP-LC-MS/MS Analysis Using Monolithic PS-DVB Columns

AN 526: PS-DVB Monolithic Columns Applied in an Off-Line 2D-LC/ESI-MS Bottom-Up Study for the Identification of Platelet Proteins

## Autosampler and Fraction Collector



The UltiMate 3000 Autosampler and Fraction Collector WPS-3000FC features a diverter valve to allow injection, fractionation, and re-injection at micro and analytical flow rates. This autosampler extends the flexibility of 2D workflows and allows fraction collection in combination with  $\times 2$  Dual pumps.

- Analytical-scale injector and fraction collector
- Heating and cooling of samples and fractions
- Automation of multistep and multidimensional LC analysis
- Sample derivatization
- Based on WPS-3000PL, same injection performance specifications
- Inert PEEK flow path (biocompatible version)
- Up to 1100 sample and fraction positions

Combined with the Extended Fraction Collection capabilities of the Chromeleon Chromatography Data Management system, setup, system control, reviewing, and data reporting are straightforward and easily performed.

**Note:** For more details on the  $\mu\text{FC}$  option and the UltiMate 3000 Proteomics MDLC system, refer to the UHPLC+Solutions section.

## Key Specifications

**Sample capacity, Vials:**  $216 \times 0.3 \text{ mL}$ ,  $120 \times 1.1 \text{ mL}$  (conical),  $216 \times 1.2 \text{ mL}$ ,  $120 \times 1.8 \text{ mL}/2.0 \text{ mL}$  or Eppendorf tubes,  $66 \times 4 \text{ mL}$ , and/or  $30 \times 10 \text{ mL} + 15 \times 10 \text{ mL}$

**Sample Capacity, Well Plates:**  $3 \times 96$  and/or 384 normal or deep well plates

**Injection Methods:** pulled-loop injections (full-loop and partial loop mode), low-dispersion mode, Microliter Pickup, user-defined programs

**Injection Volume Range (Recommended):** 0.01–250 µL (0.1–250 µL)

**Minimum Sample Required:** 1 µL out of 1 µL (microliter pickup)

**Injection Volume Precision:** <0.25% RSD at 5 µL in full-loop and <0.3% RSD at 5 and 20 µL in partial-loop mode

**Linearity:** corr. coeff. >0.9999, RSD <0.5% at 5–30 µL (partial loop mode), caffeine in water

**Needle Wash:** active external

**Carryover:** <0.02% for caffeine with external wash

**Injection Cycle Time:** <60 s for 5 µL full-loop injection, <90 s for 5 µL partial-loop injection

**Sample and Fraction Thermostating:** 4–45 °C, or 22 °C below ambient temperature

**Thermostating Temperature Accuracy:** ± 2 °C

**PC Connection:** all functions controllable via USB

**Dimensions (h × w × d):** 36 × 42 × 51 cm (14.2 × 16.5 × 20 in.)

## Ordering Information

Hardware parts listed below are needed to upgrade the WPS-3000(T)PL Autosamplers in existing UltiMate 3000 Nano/Capillary/Micro system configurations. For information on fraction collection control and automation features in Chromeleon Chromatography Software, contact your local Dionex representative.

### Hardware

WPS-3000TFC, UltiMate 3000 Thermostatted Pulled-Loop Well Plate Autosampler with Integrated Fraction Collection .....	5824.0020
WPS-3000TBFC- UltiMate 3000 Thermostatted Biocompatible Pulled-Loop Well Plate Autosampler with Integrated Fraction Collection.....	5825.0020
WPS-3000PL Micro Fraction Collection Option, Biocompatible.....	6821.0051

### Accessories

15 µL Needle, Stainless Steel.....	6820.3115
1 µL Sample Loop, PEEKsil, WPS-3000PL .....	6820.0015
WPS-3000PL Micro Fraction Collection Option, Biocompatible.....	6821.0051

## Automated Fraction Collector



The AFC-3000 Automated Fraction Collector, a rugged and flexible fraction collector, is ideal for preparative reversed-phase or normal-phase HPLC as well as purification of proteins, peptides, and nucleotides. It collects fractions into an industry-leading variety of vessels, such as 96 well plates, standard vial and tube sizes, and bottles.

- Rugged and easy-to-use design with very fast tube changes
- Resistant against a broad range of solvents, buffers, acids, and bases
- Flow rates up to 150 mL/min and optional kit for improved performance at low flow rates
- Smallest possible carryover through minimized delay volume between valve and drop former
- Large capacity, holds up to 180 tubes or 4 × 96 well plates and wide variety of collection vessels
- Ideally suited for working with sophisticated Chromeleon software fraction collection features

The AFC 3000 manages analytical and semipreparative to preparative flow rates. A funnel rack directs virtually unlimited volumes into any bottle or reactor.

## Key Specifications

**Maximum Flow Rate:** 150 mL/min

**Carryover volume:** 15 µL (standard), 1.3 µL (with optional low-flow kit)

**Tube Change Time:** typically 0.2–0.4 s, depending on collection mode and rack type

**Wetted Parts:** Tefzel, Simriz, PFA, and PEEK (with standard and low-flow drop former)

**Dimensions (h × w × d):** 43 × 34 × 46 cm (16.5 × 13.4 × 18.1 in.)

**Weight:** 8.0 kg (17.7 lbs)

**System Control:** RS-232 or USB, requires Chromeleon Chromatography Data System

## Microfraction Collection Option for WPS



The Microfraction Collection (µFC) option for the WPS-3000(T)PL(RS) Nano/Cap/Micro Autosampler enables fully automated injection, fractionation, and re-injection on a single, integrated system. Taking full advantage of the three well plate capacity, the system is capable of fractionating and reinjecting more than 1000 samples without the need for any manual handling.

- Highest flexibility with respect to column dimensions and mobile phase selections
- Easy method development
- Dedicated optimization of each separation dimension
- Multiple analyses of the fractionated sample, even with different methods

The µFC option can be used only with the pulled-loop WPS-3000(T)PL, WPS-3000TBPL, and WPS-3000TPLRS autosamplers. This option is an essential component of the UltiMate 3000 nanoLC and UltiMate 3000 RSLCnano systems, which offers fully-automated off-line multidimensional (MD) LC for a variety of methods and flow rate ranges.

*For more details on the µFC option and the UltiMate 3000 RSLCnano system, refer to the UHPLC+ Solutions section. For key specifications, refer to the Nan/Cap Autosampler section*

## Ordering Information

Hardware parts listed below are needed to upgrade the WPS-3000(T)PL Autosamplers in existing UltiMate 3000 system configurations. For information on fraction collection control and automation features in Chromeleon Chromatography Software, contact your local Dionex representative.

## Ordering Information

### Hardware

AFC-3000 UltiMate 3000 Automated Fraction Collector ..... 5702.1000

### Accessories

Eluent Bottle, 0.25 L, Including Screw Cap for Tubing Guides ..... 2270.0026

Collection Rack with 21 Positions for Tubes with 33 mm o.d., 50 mL Volume, for AFC-3000 ..... 6702.0021

Collection Rack with 24 Positions for Tubes with 26 mm o.d., 30 mL Volume, for AFC-3000 ..... 6702.0024

Collection Rack with 40 Positions for Tubes with 21 mm o.d., 20 mL Volume, for AFC-3000 ..... 6702.0040

Collection Rack with 60 Positions for Tubes with 16 mm o.d., 14 mL Volume, for AFC-3000 ..... 6702.0060

Collection Rack with 90 Positions for Tubes with 13 mm o.d., 8 mL Volume, for AFC-3000 ..... 6702.0090

Adapter for 4 WPS-3000 Sample Trays for AFC-3000 ..... 6702.0100

Adapter for 4 96 Well Plates for AFC-3000 ..... 6702.0200

Kit for Low Flow Rates with 0.4 mm ID PEEK Drop Former for AFC-3000 ..... 6702.0300

Kit for Normal Phase LC with SST Drop Former, for AFC-3000 ..... 6702.0400

Vial Tray Compl, WPS ..... 6820.4070

Sample Tray for 22 Cylindrical Vials 4 mL, WPS-3000 and WPS-3000 SL Series ..... 6820.4084

Sample Tray for 10 Cylindrical Vials 10 mL, WPS-3000 and WPS-3000 SL Series ..... 6820.4086

### Hardware

Micro Fraction Collection Option, WPS-3000PL ..... 6820.0051

Micro Fraction Collection Option, Biocompatible, WPS-3000PL ..... 6821.0051

## Probot MALDI Spotter



The Probot MALDI spotter is designed for on-line collection of  $\mu\text{L}$ - and nL-fractions eluting from nano and capillary LC systems on different types of sample carriers such as MALDI targets, PVDF membranes, 96, 384, or 1536 well plates, or microchip structures. The X,Y,Z-moving table and fixed needle design allow nL-spotting with excellent precision and minimal dead volume.

- Robotic system for MALDI spotting (and fraction collection)
- Supports MALDI targets and sample carriers from every vendor
- Small nL-volumes collection with zero chromatographic dispersion maintaining LC resolution
- Two well plate (or six AB4700) capacity for collection of more than 4000 spots
- Integrated reagent (matrix) addition for easy MALDI-spotting
- Dual-collection mode for fraction splitting over two different sample carriers

Typical Probot applications include on-line MALDI target preparation. Due to its accuracy and flexibility, the Probot is the ideal nano-LC/MALDI-MS interface, integrating the high-sensitivity separation power of nano-LC and high resolving power of MALDI-MS.

### Key Specifications

*Table Dimensions (w × d):* 210 × 135 mm (8.27 × 5.31 in.)

*Table Movement:* X = 195 mm, speed 0.250–20 mm/s; Y = 130 mm, speed 0.125–10 mm/s; Z = 95 mm, speed 0.125–10 mm/s

*Precision of Table Positioning:* better than 20  $\mu\text{m}$

*Spotting Frequency:* user-selectable down to 5 s with minimal volumes of 5 nL

*Lifting Force:* >2 kp

*Carryover:* in pipetting mode, less than 0.02% (with additional needle wash)

*Dimensions (h × w × d):* 30 × 48 × 50 cm (12 × 19 × 20 in.)

*Software:* Fully controlled by  $\mu\text{Carrier}$  Software. Supported by Chromeleon software.

*Collection Modes:* time-based collection and peak collection

### Ordering Information

#### Hardware

Probot Microfraction Collector with Dosage Unit..... 5713.0200

#### Accessories

Probot Table Adapter for 2 x Bruker MALDI Target (Micro Titer Plate Type) ..... 5713.6307  
 Universal Table for ABI 4700 Proteomics Analyzer for 6 Targets ..... 5713.6402  
 Probot Table Adapter for 2 x Shimadzu/Kratos Axima QIT Targets..... 5713.6319  
 Probot Table Adapter for 6 Micromass Rectangular Targets..... 5713.6328  
 Probot Demonstration Table Adapter with Adjustable Strips ..... 5713.6338  
 Probot Table Adapter for 6 × ABI-4700 Proteomics Analyzer ..... 5713.6348  
 Probot Table Adapter AB 4800..... 6713.0022  
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# Ion Chromatography Hardware

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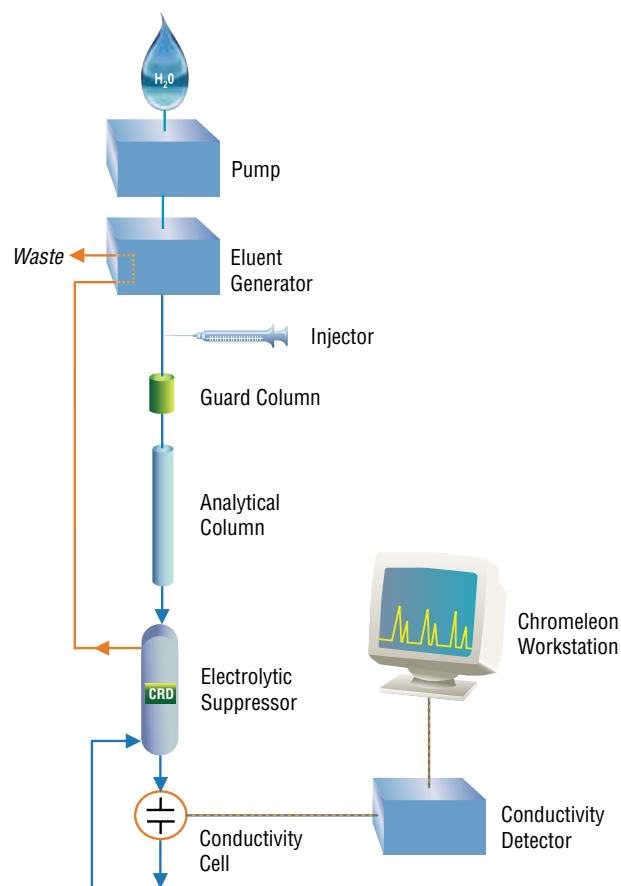
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## RFIC Solutions

### Reagent-Free IC with Eluent Generation

*Outstanding consistency for gradient and isocratic applications*

Reagent-Free IC (RFIC) systems with eluent generation include the ICS-5000 and ICS-2100. These RFIC-EG systems combine automated eluent generators and Self-Regenerating Suppressors to electrolytically create the eluents and regenerants needed for IC applications. Plumb in a clean source of deionized water, and the RFIC-EG system takes care of the rest.



#### RFIC-EG System

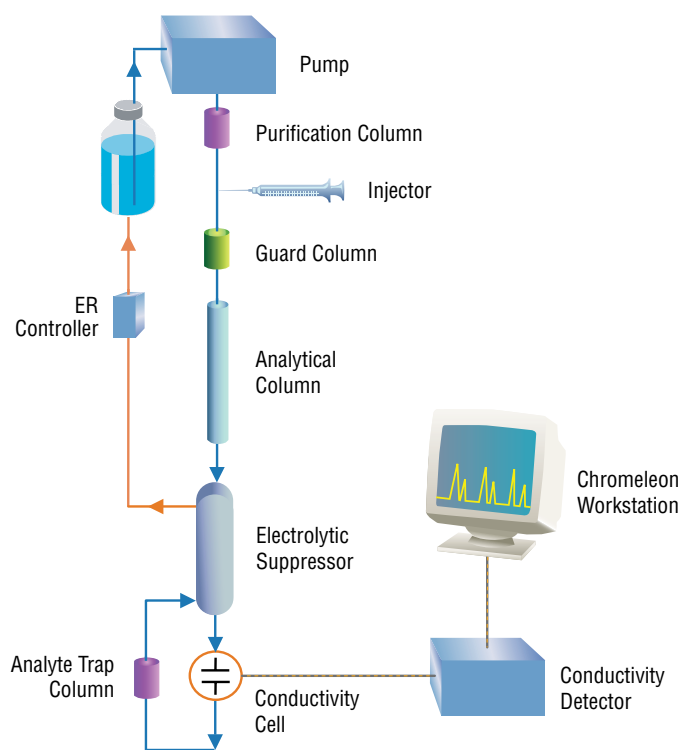
*Eluent generators increase accuracy and reproducibility and simplify operation. Eluent generation is an important reason why RFIC-EG systems are superseding traditional IC systems.*

### Reagent-Free IC with Eluent Regeneration

*Always On, Always Ready*

RFIC-ER systems (available option for ICS-1100, -1600, -2100, and -5000 systems) are designed for routine isocratic separations. The systems use the Self-Regenerating Suppressor and patented trap and purification columns to electrolytically regenerate suppressed eluent. A single 4 L bottle of eluent can be recirculated for up to four weeks.

When left on, an RFIC-ER system remains equilibrated and calibrated between eluent changes. Time that would have been used maintaining the system can now be used for running additional samples, increasing productivity.



#### RFIC-ER System

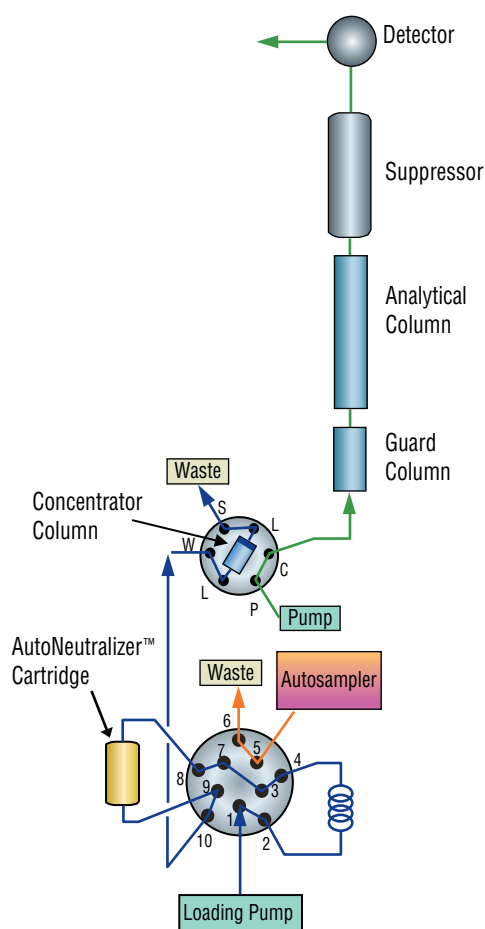
*Eluent regeneration saves time and reduces cost for frequent-use isocratic analyses. Always On, Always Ready, the RFIC-ER system is ideal for municipalities and contract labs that monitor water quality.*

## Reagent-Free IC with Electrolytic Sample Preparation

*Automated sample preparation for reduced costs and improved accuracy*

RFIC-ESP technology on the ICS-5000 and ICS-2100 systems combine automation solutions for sample preparation with the power of electrolytic devices. These automated Electrolytic Sample Preparation solutions save time and money in sample processing, improve processing accuracy and reproducibility, and enable easy methods transfer.

Devices such as the Electrolytic Water Purifier, AutoNeutralization cartridge, and Continuously Regenerated Trap Columns are available.



### RFIC-ESP Sample

*Electrolytic devices increase sensitivity by reducing loading water background, and reduce complexity by replacing pumps with devices with no moving parts.*



## IC & RFIC Systems

*A complete range of ion chromatography solutions for all customer performance and price requirements*

For ion analysis, nothing compares to a Dionex ion chromatography system. Whether you have just a few samples or a heavy workload, whether your analytical task is simple or challenging, we have a solution to match your needs and budget. And with your IC purchase, you get more than just an instrument—you get a complete solution based on the modern technology and world-class support of Dionex, the leader in IC for over 30 years.

- ICS-5000: The world's first capillary IC system
- ICS-2100: Award-winning integrated reagent-free IC system
- ICS-1600: Standard integrated IC system
- ICS-1100: Basic integrated IC system
- ICS-900: Starter line IC system

Ranging from the ICS-900 to the ICS-5000, Dionex IC systems cover the entire range of IC needs and budgets. Dionex systems come with superior support and service worldwide.

**Note:** See also the *Supplies and Accessories* section for RFIC-EG and RFIC-ER accessory ordering information.



**ICS-5000:** Developed with flexibility, modularity, and ease-of-use in mind, the ICS-5000 combines the highest sensitivity with convenience

**ICS-2100:** An integrated RFIC-EG system for electrolytically generated isocratic and gradient separations with conductivity detection, now with RFIC-ESP.

**ICS-1600:** The ICS-1600 combines high sensitivity with convenience. RFIC-ER ready, with available dual valve configuration for automated sample preparation.

**ICS-1100:** With dual-piston pumping and electrolytic suppression. Now RFIC-ER ready, with available dual valve configuration for automated sample preparation.

**ICS-900:** Can routinely analyze multiple anions and cations in 10–15 min—fully automated with DCR Displacement Chemical Regeneration.



## ICS-5000

*The world's first capillary IC system developed for flexibility, modularity, and ease-of-use*

Dionex introduces capillary IC to the world with the ICS-5000 Reagent-Free IC (RFIC) system with Eluent Generation; the world's first capillary IC system. Developed with flexibility, modularity in mind, the ICS-5000 combines the highest sensitivity with convenience. We have taken sensitivity and ease of use to a new level, simplifying ion chromatography while simultaneously increasing the power and reproducibility of ion analysis.

- ICS-5000 SP and DP Pumps for highest performance separations
- ICS-5000 EG Eluent Generator for the benefits of Reagent-Free IC
- ICS-5000 DC Detector/Chromatography module, a high-performance environmental chamber
- IC Cube module contains all capillary-based consumables in one convenient location
- ICS-5000 TC Thermal Compartment for precise temperature control from 5 to 85 °C
- Wide range of detectors: Electrochemical, Conductivity, ICS-Series VWD, and Photodiode Array detectors
- Highly versatile, modular design
- Dual-RFIC system configurations for high-throughput and complex applications

Capillary RFIC systems redefine the way IC is performed. The ICS-5000 represents the next step in the evolution of IC. With the ability to analyze samples at capillary, microbore or standard flow rates (or any combination of two, in a dual system) the system is always ready. The wide variety of ICS-5000 modules allows you to configure an IC system designed specifically to provide the solutions you need.

Significant performance enhancements make the ICS-5000 the most sensitive, stable, and easy-to-use ion chromatography system available today. Dramatic improvements in flow rate accuracy, eluent generator electronics stability, and conductivity cell temperature control increase baseline stability and enhance sensitivity.

**Note:** See the IC Modules section for equipment specifications.



*The ICS-5000 system; the world's first capillary ion chromatography system.*

## Innovative Reagent-Free and Dual IC

With your IC purchase, you get more than just an instrument—you get a complete solution based on the modern technology and the world-class support of Dionex, the leader in IC for more than 30 years.

The system can be easily upgraded from a single- to dual-system configuration—boosting productivity without taking up more valuable laboratory bench space. Dual detection and simultaneous and sequential injection deliver increased productivity—more information from one injection. Dual analysis provides more flexibility, more application choices, and more information.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

ICS-5000 System Brochure

Environmental Analysis Using the ICS-3000 Ion Chromatography System

ICS-3000 Solutions for the Power Industry

ICS-3000 Solutions for the Semiconductor and Electronics Industries

### Product Data Sheets

ICS-5000 Reagent-Free Ion Chromatography System

## Ordering Information

Contact your local Dionex representative for an ICS-5000 system customized to your application needs. See Dionex Locations in the Global Subsidiaries and Distributors section on our website for contact information.

### Hardware

Single Channel RFIC system (Analytical)..... 072241

Single Channel RFIC System (Capillary) ..... 072243

*Note: Add consumables, PC and Chromeleon, and autosampler*

Dual Channel RFIC system (SB and MB) ..... 072249

Dual Channel RFIC system (SB and Cap) ..... 072250

Dual Channel RFIC system (Cap and Cap) ..... 072248

Dual Channel RFIC system (SB and Cap ED) ..... 072253

## ICS-2100

*Powerful RFIC-ESP technology fully integrated with RFIC-EG technology in an easy to use system.*

The ICS-2100 is an integrated, single-channel RFIC-EG system that performs isocratic and gradient IC separations. With the built-in suppressor control for SRS and Atlas suppressors, the system includes AutoSuppression for high performance with unparalleled ease of use. Eluent Generation provides isocratic and gradient electrolytic eluent concentrations, adding simplicity and day-to-day consistency. The standard ICS-2100 system includes:

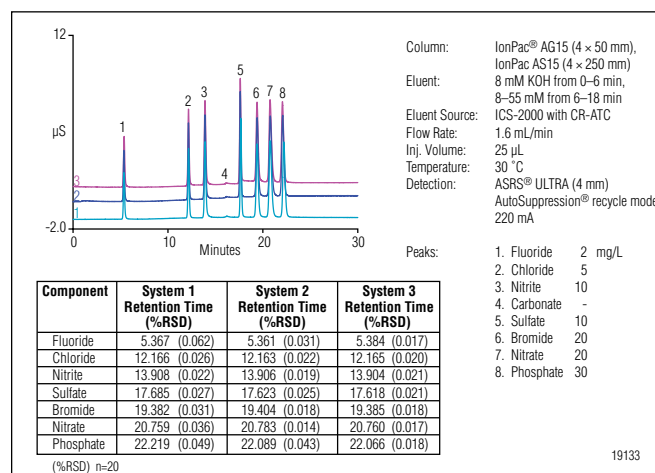
- Integrated electrolytic eluent generation; just add water
- Dual-piston, isocratic, serial pump that supports 2, 3, and 4 mm ID columns
- Reliable electric PEEK Rheodyne injection valve
- Column heater
- Electrolytic suppression
- Advanced digital conductivity detector with thermal control capabilities
- Inert, nonmetallic PEEK flowpath
- Touchscreen LCD display

RFIC-EG systems produce consistent eluent concentrations day-to-day and lab-to-lab for highly reproducible retention times and peak areas. The ICS-2100 comes standard with integrated eluent generation, and can be equipped with optional eluent regeneration.

Available auxiliary valves and electrolytic sample preparation devices provide fully integrated solutions for matrix elimination, filtration, and ultratrace analysis.



ICS-2100 ion chromatography system



*RFIC-EG produces consistent concentrations for highly reproducible retention times and peak areas, day-to-day, system-to-system, and lab-to-lab.*



All components are easily accessed through the front panel on the ICS-2100.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

ICS-2100/1600/1100 Brochure

### Product Data Sheets

ICS-2100 Ion Chromatography System Data Sheet

## Ordering Information

### Hardware

ICS-2100 (Pump, Eluent Generator, Injection Valve, Column Heater, Conductivity Detector, Touchscreen Display), shipkit, Chromeleon and PC .....	069656
ICS-2100 (Pump, Degasser, Eluent Generator, Injection Valve, Column Heater, Conductivity Detector, Touchscreen Display), shipkit, Chromeleon and PC .....	069657
ICS-2100 (Pump, Eluent Generator, Injection Valve, Column Heater, Conductivity Detector, Touchscreen Display), shipkit, Chromeleon .....	069658
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ICS-2100 (Pump, Eluent Generator, Injection Valve, Column Heater, Conductivity Detector, Touchscreen Display), shipkit.....	069573
ICS-2100 (Pump, Degasser, Eluent Generator, Injection Valve, Column Heater, Conductivity Detector, Touchscreen Display), shipkit.....	069576

### Accessories

Spare Parts Kit, ICS-1100/1600/2100, also for ICS-1000/1500/2000 .....	061304
Heat Exchanger Assembly (0.01" i.d.).....	059979
Heat Exchanger Assembly (0.005" i.d.).....	060943
Preventative Maintenance Kit .....	057954
Microbore Tubing Kit .....	052324
Electrolytic Water Purifier with Installation Kit, for Anion Analysis .....	072629
Electrolytic Water Purifier with Installation Kit, for Cation Analysis .....	072630
Training Course, ICS-1100/1600/2100 Basic Operation and Troubleshooting. Also for ICS-1000/1500/2000.....	065230
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See the *RFIC-ER* and *RFIC-EG* sections under *Supplies and Accessories for kits and accessories*.

## ICS-1600

*IC system ready for Eluent Regeneration, integrating high pressure valves for automated sample preparation*

The ICS-1600 system has all PEEK components throughout, providing a contamination-free polymeric flow path. The ICS-1600 has a column heater to provide day-to-day thermal stability for high-performance applications, and eluent Degas capability for outstanding eluent consistency. The standard ICS-1600 system includes:

- Optional 6 or 10-port high-pressure valve for automated sample preparation
- Dual-piston, isocratic, serial pump that supports 2, 3, and 4 mm i.d. columns
- Reliable electric PEEK Rheodyne injection valve
- Column heater
- Electrolytic suppression
- Advanced digital conductivity detector with thermal control capabilities
- Touchscreen LCD display

Vacuum degas and column heater options further improve baseline stability and yield lower detection limits. Compact and easy to operate, the ICS-1600 delivers solid performance at an attractive price.

**Note:** See the RFIC-ER section under Chromatography Accessories for ER kits and accessories.



ICS-1600 Ion Chromatography System

## Eluent Regeneration

Add an Eluent Regeneration installation kit to create an RFIC-ER system capable of continuous operation for routine isocratic applications for up to 4 weeks without requiring new eluent. When left on, the system remains equilibrated and calibrated. Just load samples and collect results!

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

ICS-2100/1600/1100 Brochure

### Product Data Sheets

ICS-1600 Ion Chromatography System Data Sheet

## Ordering Information

Hardware	
ICS-1600 (Pump, Injection Valve, Conductivity Detector, Column Oven, Touchscreen Display) with shipkit, Chromeleon and PC .....	069652
ICS-1600 (Pump, Degasser, Injection Valve, Conductivity Detector, Column Oven, Touchscreen Display) with shipkit, Chromeleon CHM-1 and PC .....	069653
ICS-1600 (Pump, Injection Valve, Conductivity Detector, Column Oven, Touchscreen Display), Chromeleon CHM-1 and shipkit .....	069654
ICS-1600 (Pump, Degasser, Injection Valve, Conductivity Detector, Column Oven, Touchscreen Display) with shipkit and Chromeleon CHM-1 .....	069655
ICS-1600 (Pump, Injection Valve, Conductivity Detector, Column Oven, Touchscreen Display) with shipkit .....	069572
ICS-1600 (Pump, Degasser, Injection Valve, Conductivity Detector, Column Oven, Touchscreen Display) with shipkit .....	069575
Accessories	
Spare Parts Kit, ICS-1100/1600/2100, (also for ICS-1000/1500/2000) .....	061304
Eluent Regeneration Startup Kit, Anion, for ICS-1100 and ICS-1600 .....	069569
Eluent Regeneration Startup Kit, Anion, for ICS-1100 and ICS-1600 .....	069570
Auxiliary 6-Port Valve Kit for ICS-1100/1600/2100, cable, installation manual .....	069472
Auxiliary 10-Port Valve Kit for ICS-1100/1600/2100, cable, installation manual .....	069473
Auxiliary 10-Port Valve (0.02 inch ports) for ICS-1100, -1600, and -2100 systems .....	071589
Heat Exchanger Assembly (0.005" i.d.) .....	060943
Preventative Maintenance Kit .....	057954
Microbore Tubing Kit .....	052324
OQ/PQ Service, Ion Chromatograph .....	061529

## ICS-1100

*Reliable operation and RFIC-ER ready, taking up small space on your bench and in your budget.*

The ICS-1100 has all PEEK components throughout the system, providing a contamination-free polymeric flow path. The ICS-1100 has an optional column heater to provide day-to-day thermal stability for high-performance applications and eluent degas capability for excellent eluent consistency. Automate the system with an AS-DV or AS autosampler for fully-automated analysis. The standard ICS-1100 system includes:

- Optional 6 or 10-port high-pressure valve for automated sample preparation
- Dual-piston, isocratic, serial pump that supports 2, 3, and 4 mm i.d. columns
- Reliable electric PEEK Rheodyne injection valve
- Optional column heater
- Electrolytic suppression
- Advanced digital conductivity detector with thermal control capabilities
- Informative front LED panel for system status monitoring

Vacuum degas and column heater options further improve baseline stability and yield lower detection limits. Compact and easy to operate, the ICS-1100 delivers solid performance at an attractive price. The ICS-1100 is available with Chromeleon SE, which allows affordable control of a single ICS-1100 with autosampler.

**Note:** See the RFIC-ER section under Chromatography Accessories for ER kits and accessories.



ICS-1100 Ion Chromatography System

## Eluent Regeneration

Add an Eluent Regeneration installation kit to create an RFIC-ER system, capable of continuous operation for routine isocratic applications for up to four weeks without the need to create new eluent. When left on, the system remains equilibrated and calibrated. Just load samples and collect results!

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

ICS-2100/1600/1100 Brochure

### Product Data Sheets

ICS-1100 Ion Chromatography System Data Sheet

## Ordering Information

Hardware	
ICS-1100 (Pump, Injection Valve, Conductivity Detector) with Chromeleon SE and shipkit .....	069648
ICS-1100 (Pump, Degasser, Injection Valve, Conductivity Detector) with Chromeleon SE, PC and shipkit .....	069649
ICS-1100 (Pump, Injection Valve, Conductivity Detector) with CM SE and shipkit .....	069650
ICS-1100 (Pump, Degasser, Injection Valve, Conductivity Detector) with Chromeleon SE and shipkit .....	069651
ICS-1100 (Pump, Injection Valve, Conductivity Detector) with shipkit .....	069571
ICS-1100 (Pump, Degasser, Injection Valve, Conductivity Detector) with shipkit .....	069574

Accessories	
Column Heater Assembly, ICS-1100, -1600, -2100 .....	070063
Microbore Heat Exchanger Assembly (0.005" i.d.) for ICS-1100/1600/2100 .....	060943
Spare Parts Kit, ICS-1100/1600/2100, (also for ICS-1000/1500/2000) .....	061304
Preventative Maintenance Kit, ICS-900/1100/1600/2100, (also for ICS-1000/1500/2000) .....	057954
Eluent Regeneration Startup Kit, Anion, for ICS-1100 and ICS-1600 .....	069569
Eluent Regeneration Startup Kit, Anion, for ICS-1100 and ICS-1600 .....	069570
Microbore Tubing Kit .....	052324
Auxiliary 6-Port Valve Kit for ICS-1100/1600/2100, cable, installation manual .....	069472
Auxiliary 10-Port Valve Kit for ICS-1100/1600/2100, cable, installation manual .....	069473
Auxiliary 10-port valve kit, (0.02 inch ports) for ICS-1100, 1600, and -2100 systems .....	071589



## ICS-900

### *ICS-900 integrated starter line ion chromatography system*

The ICS-900 is an integrated single-channel ion chromatography system designed to run specific isocratic anion and cation applications. The system uses MMS 300 suppression with Displacement Chemical Regeneration (DCR) technology for low noise and stable baselines. Each ICS-900 system has an all polymeric flow path with a reliable dual-piston pump, high-pressure pulse damper, electrically-actuated PEEK Rheodyne valve, and a temperature-controlled conductivity cell.

- Starter line IC designed specifically for routine analysis
- MMS suppression with DCR technology for low baseline noise and fast startup
- DCR eliminates regenerant pumps for reduced cost, higher reliability.
- Contamination-free with inert material throughout the fluidic flow path
- High-performance digital, thermally controlled conductivity detection
- Supports 2 mm, 3 mm, and 4 mm i.d. columns

The ICS-900 can be ordered with Chromeleon SE, which allows control of a single ICS-900 with autosampler at an attractive price.

**Note:** See the *Chromatography Accessories* section for ICS-900 consumables kits.

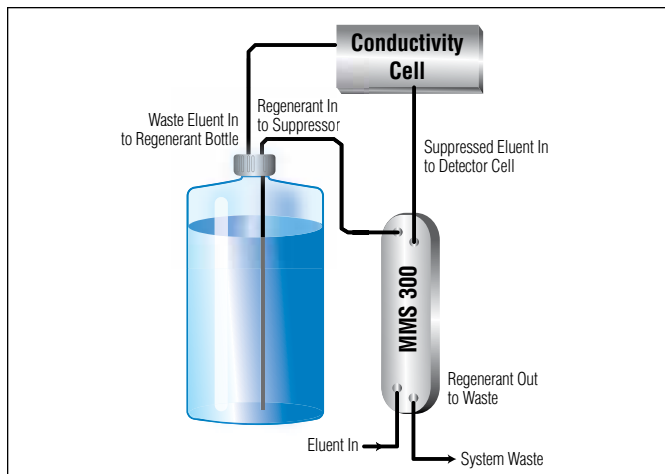


*ICS-900 Ion Chromatography System*



*Easily access ICS-900 system components*

## Ordering Information



*Schematic of the ICS-900 DCR flow path*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

ICS-900 Brochure

### Product Datasheets

ICS-900 Ion Chromatography System Data Sheet

### ICS-900 Systems

ICS-900 Ion Chromatography System with Chromeleon 6.8 SE and Windows XP Workstation.....	067552
ICS-900 Ion Chromatography System with Chromeleon 6.8 SE.....	067551
ICS-900 Ion Chromatography System Expansion Unit, (requires existing ICS-900 and software).....	067550
<i>Adds a second system to an existing ICS-900</i>	

### ICS-900 Accessories

Preventative Maintenance Kit, ICS-900/1100/1600/2100, also for ICS-1000/1500/2000.....	057954
Microbore Tubing Kit.....	052324
ICS-900 Installation Service. ....	060124
<i>Includes system setup and testing. Extends warranty coverage on hardware and software to one year.</i>	



## IC & RFIC Modules

*From basic autosampling to ultrasensitive detection, Dionex IC module offerings are unmatched*

The IC product family includes an extensive set of fully inert, PEEK-based modules engineered for high performance, ease of use, and reliability. We offer a wide variety of autosamplers, injectors, pumps, thermostatted column compartments, and detectors with reliable, precise, and accurate operation. Whether you require a dedicated system or modularity for flexible applications, all components are integrated and single-point controlled through Chromeleon software or easy-to-use TTL control.

- Automated eluent generation for simplicity and reliability
- Single and dual isocratic and gradient pumps
- Autosamplers from basic to state-of-the-art automation and high-volume sample preparation
- Column and detector compartments that integrate thermal control with sample preparation and injection
- High performance detectors, including conductivity, electrochemical, optical, and MS

**Note:** See the Mass Spectrometry section for MS detectors.



**Eluent Generation:** Eluent Generation is a part of RFIC and empowers laboratories to automatically generate high-purity eluents.

**IC & RFIC Pumps:** Completely inert, robust pump design capable of incredible accuracy and precision.

**IC & RFIC Injectors & Autosamplers:** State-of-the-art automation and sample care with the all-inert AS, high-volume AS-HV, and economical AS-DV autosamplers.

**IC & RFIC Column Compartments:** IC and RFIC column compartments and column thermostats for high retention time stability.

**IC & RFIC Detectors:** Conductivity, electrochemical, and optical absorbance detectors (single-wavelength, multiple-wavelength, and photodiode array).

**Postcolumn Reaction Systems & Accessories:** Postcolumn derivatization can be used to improve the detection limits of ions that may otherwise exhibit limited sensitivity.

## Eluent Generation



Eluent Generation is an essential part of RFIC systems, empowering users to generate high-purity eluents with a mouse click and to perform electrolytically generated gradient analysis with our isocratic pump.

**Note:** See also *RFIC-Eluent Regeneration under Chromatography Accessories for EluGen eluent generation cartridges and CR-TC trap columns.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Reagent-Free Ion Chromatography

ICS-5000 System Brochure

### Product Data Sheets

Reagent-Free Ion Chromatography Systems with Eluent Generation for IC Without Manually Prepared Eluents

Reagent-Free Controller for Ion Chromatography

ICS-5000 Reagent-Free Ion Chromatography System

## ICS-5000 EG Eluent Generator

The ICS-5000 Eluent Generator (EG) takes the guesswork and complexity out of ion chromatography. The EG module provides the benefits of a Reagent-Free IC (RFIC) system with eluent generation (RFIC-EG) to produce eluent automatically from deionized water. Stable, robust electronics provide an extremely stable baseline and generate high-purity eluents (up to 200 mM in capillary formats) on-line, making gradient separations as easy as isocratic; with a click of the mouse.

- EG Module supports analytical and capillary cartridges
- New chip-based technology improves ease of use and eliminates errors
- Generates high-purity, carbonate-free hydroxide eluent from deionized water
- Minimizes baseline drift
- Improves retention time stability and resolution
- Provides excellent run-to-run reproducibility
- Extends the lifetime of pistons and pump seals by pumping only water
- Built-in leak sensor and operator alert for maximum system safety

Reagent-Free IC (RFIC) systems are compatible with most applications by providing carbonate/bicarbonate, hydroxide and methanesulfonic acid eluents including gradients. The EG's slide-out tray provides easy access to the cartridges, CR-TC and fluidic connections, making IC more convenient than ever. Just add water to generate the perfect eluent for your application automatically.

## Key Specifications

**Minimum and Maximum Eluent Concentrations:** 0.01 up to 100 mM (Analytical), 0.01 to 200 mM (Capillary)

**Eluent Flow Rates:** 0.100–3.000 mL/min

**Eluent Types:** KOH, LiOH, NaOH, Carbonate, Carbonate/Bicarbonate, Carbonate with pH modifier, MSA (Analytical), KOH, MSA (Capillary)

**Maximum Operating Pressure:** 21 MPa, 3000 psi

**Maximum Solvent Concentration:** Cations: None; Anions: 25% methanol

**Operating Temperature Range:** 4–40 °C

**Operating Humidity Range:** 5–95% relative, noncondensing

**Dimensions (h × w × d):** 41 × 23 × 56 cm (16 × 8.75 × 21.5 in.)

**Weight:** 25 kg (40 lb)

**Power Requirements:** 90–265 V AC, 47–63 Hz

## Ordering Information

## Hardware

EG Eluent Generator Module, order EG degasser separately .....	072045
Analytical EG degasser module .....	074218
Capillary EG degasser module .....	072051

*Note: EGC III cartridges required. See consumables section for complete list.*

## RFC-30 Reagent-Free Controller



The RFC-30 Reagent-Free Controller enables you to experience the ease of use, cost savings and simplicity that Reagent-Free IC offers. Reagent-Free IC is the powerful combination of Dionex Just Add Water eluent-generation technology, plus electrolytic suppression, and the Continuously Regenerated Trap Column (CR-TC). Standard RFC-30 System includes:

- RFC-30 Reagent-Free Controller with EGC-KOH Cartridge AND
- CR-ATC Continuously Regenerated Anion Trap *or*
- RFC-30 with EGC-MSA Cartridge *and*
- CR-CTC Continuously Regenerated Cation Trap

Reagent-Free IC eliminates variability and potential contamination, providing a stable baseline, higher sensitivity, resolution, and maximum reproducibility. Reagent-Free IC greatly reduces the complexity of an IC system, allowing you to focus on what matters—your application and results. Reagent-Free IC is available exclusively from Dionex.\

**Note:** For use with DX-120, DX-320, DX-500, DX-600, or ICS-2500 ion chromatography systems. DX-120 bundle includes a column temperature stabilizer.

## Ordering Information

## Hardware

RFC-30 Reagent-Free Controller (EGC-KOH, CR-ATC) .....	060667
<i>Use with EGC II KOH cartridge, CR-ATC.</i>	
RFC-30 Reagent-Free Controller (EGC-MSA, CR-CTC) .....	060668

## Accessories

DX-120 Adapter Cable.....	057861
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## RFC-10 Reagent-Free Controller

The RFC-10 Reagent-Free Controller can be ordered to provide continuously variable current (with 1 mA resolution) to the Atlas and SRS suppressors when using DX-600 or DX-500 systems configured with an ED40/50 or CD20/25 detector; the DX-320 with an IC25 detector; or the DX-120. The DX-120 requires an adapter cable (P/N 057861) for the RFC-10.

## Ordering Information

## Hardware

RFC-10 Reagent-Free Controller .....	060335
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## Accessories

DX-120 Adapter Cable.....	057861
<i>An adapter cable is required to connect the RFC-10 or RFC-30 to the DX-120.</i>	



## IC & RFIC Pumps



The ICS-5000 pumps are dual-piston, serial design pumps that support micro- and standard bore formats. The ICS-5000 pump comes in either a Single (SP) or Dual (DP) format in the same benchtop footprint. The pump is upgradeable from a single to a dual pump to meet your needs now and in the future. Analytical low-pressure quaternary gradients are available for linear and curved gradients.

### ICS-5000 DP Dual Pumps

The ICS-5000 DP Dual Pump is available in multiple configurations including analytical, capillary or hybrid (analytical and capillary) versions to support capillary, microbore, standard bore, semipreparative and IC × IC (2D-IC) applications. Various flow rates are available to support capillary, microbore, standard bore or semipreparative applications. Analytical pumps offer the option of mechanical gradients (proportioning valve) yielding linear, concave and convex gradients. Dual independent seal wash prolongs seal lifetimes and removes cross-contamination in dual-channel systems.

- Hybrid pump with analytical and capillary option makes IC × IC (2D-IC) analysis easy to configure and perform
- Integrated piston seal wash, dual independent wash system option to eliminate crosstalk
- Easy access to all fluidics
- Built-in vacuum degas
- User selectable upper and lower pressure limits for pump shutdown

Benefits of Dual Pump configurations: Dual analysis, (e.g. anions and cations from a single injection). Sample preconcentration or matrix elimination. Postcolumn reagent delivery. External water or chemical regenerant delivery. A backup pump for your primary application. Consumables cleanup or startup preparation, preventing primary system downtime.

### Key Specifications

*Flow Rate Range:* 0.000 to 10.000 mL/min (Analytical); 0.000 to 3.000 mL/min (Capillary)

*Flow Rate Accuracy:* <0.1%

*Flow Rate Precision:* <0.1%

*Gradient Proportioning Accuracy and Precision:* ±0.5% at 2 mL/min (Analytical only)

*Pressure Range:* 0–35 MPa (0–5000 psi) (Analytical); 0–41 MPa (0–6000 psi) (Capillary)

*Dimensions (h × w × d):* 36 × 21 × 48 cm (14 × 8.25 × 19 in.)

*Weight:* 24.1 kg (55 lb.)

*Power Requirements:* 90–265 V AC, 47–63 Hz

*Additional Specifications:* Refer to ICS-5000 Reagent-Free Ion Chromatography System Data Sheet

### Ordering Information

Hardware	
DP Analytical-Isocratic Analytical Isocratic with Degas.....	072030
DP Analytical-Gradient Analytical Isocratic with Degas .....	072032
DP Analytical-Gradient Analytical Gradient with Degas .....	072034
Analytical Isocratic-Capillary Isocratic .....	072104
Analytical Gradient-Capillary Isocratic .....	072106
Capillary Isocratic-Capillary Isocratic .....	072108

## ICS-5000 SP Single Pumps

The ICS-5000 SP Single Pump can be configured with either capillary or analytical pump heads to support capillary, micro-bore, standard bore or semipreparative applications. The pump is upgradeable from a single to a dual pump yielding either a dual capillary, dual analytical or hybrid (capillary and analytical) pump to meet your application needs. Analytical pumps offer the option of mechanical gradients (proportioning valve) yielding linear, concave and convex gradients.

- Inert, PEEK pump heads, mixing chamber, and flow paths
- Integrated piston seal wash
- Easy access to all fluidics
- Built-in vacuum degas
- User selectable upper and lower pressure limits for pump shut down
- Field upgradeable to DP Dual Pump configuration

### Key Specifications

*Flow Rate Range:* 0.000 to 10.000 mL/min (Analytical);  
0.000 to 3.000 mL/min (Capillary)

*Flow Rate Accuracy:* <0.1%

*Flow Rate Precision:* <0.1%

*Gradient Proportioning Accuracy and Precision:*  $\pm 0.5\%$  at 2 mL/min (Analytical only)

*Pressure Range:* 0–35 MPa (0–5000 psi) (Analytical);  
0–41 MPa (0–6000 psi) (Capillary)

*Dimensions (h × w × d):* 36 × 21 × 48 cm (14 × 8.25 × 19 in.)

*Weight:* 20.4 kg (45 lb)

*Power Requirements:* 90–265 V AC, 47–63 Hz

*Additional Specifications:* Refer to ICS-5000 Reagent-Free Ion Chromatography System Data Sheet

### Ordering Information

#### Hardware

SP Analytical-Gradient with Degas .....	072028
SP Analytical-Isocratic with Degas .....	072026
SP Capillary-Isocratic with Degas.....	072102

## EO Eluent Organizer and Accessories



The EO Eluent Organizer, constructed of corrosion-proof polypropylene, is designed to hold eluent containers and organize eluent tubing and air lines.

- Holds four 1 or 2 L plastic, two 1 L glass or one 2 L glass bottles
- Up to two EO organizers stack on top of a DC or TC module
- Translucent liner contains spills and allows view of liquid levels
- Constructed of corrosion-proof polypropylene and epoxy
- Pressure regulator option is available

### Ordering Information

#### Hardware

EO Eluent Organizer with two 2 L Plastic Bottles .....	072057
EO Eluent Organizer with four 2 L Bottles .....	072058

#### Accessories

EO Regulator Accessory and Stand (for mounting on the DC).....	074423
EO Regulator Accessory and Stand (for mounting on the TC/VWD/PDA) .....	074424
Bottle, 1 L, Plastic, ea.....	063291
Bottle, 2 L, Plastic, ea.....	062510
Bottle, 4 L, Plastic, ea.....	067796
Bottle, 1 L, Glass, ea. ....	062595
Bottle, 2 L, Glass, ea. ....	061729

## AXP Auxiliary Pump



The AXP Auxiliary Pump is a single-piston, isocratic metering pump ideal for ion chromatography sample and reagent delivery. The chemically inert, metal-free, PEEK-based flow path eliminates corrosion and contamination problems when using acidic or alkaline reagents, or common water-miscible solvent.

- Digital control and status
- Wide flow rate range
- Internal pulse damper
- Compatible with IC and bio applications
- Standard positive seal washing
- Easy maintenance
- Flexible, advanced Chromeleon control
- Convenient size

### Key Specifications

*Pressure Range:* 0.35–17.5 psi (50–2500 psi)

*Flow Rates:* 0.01–9.99 mL/min

*Flow Accuracy:* 3% throughout flow range

*Pressure Pulsation:* 2% peak-to-peak at 100 psi, 1 mL/min with in-line pulse damper

*Flow Rate Precision:* 0.5% at calibration pressure

*Dimensions (h × w × d):* 16.5 × 16.5 × 25.4 cm  
(6.5 × 6.5 × 10 in)

*Weight:* 6.8 kg (15 lbs)

*Power Requirements:* 120–230 V ac; 50–60 Hz

*Materials:* PEEK, ceramic, and inert polymers

*Control:* Chromeleon (USB), front panel, and relay control

### Ordering Information

#### Hardware

AXP Auxiliary Pump..... 063973

## IC and RFIC Injectors and Autosamplers



Dionex injectors and autosamplers feature completely metal-free flow paths, including the injection loop and autosampler needle. A selection of autosamplers is available to fit your automation needs.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### Product Brochures

IC Autosamplers: AS, AS-DV, and AS-HV

#### Product Data Sheets

AS-DV Autosampler Data Sheet

Simultaneous Injection AS Autosampler

ICS-5000 Reagent-Free Ion Chromatography System

## AS Autosampler

The Dionex AS Autosampler is designed for high precision, flexibility, reliability, and ease of use. The AS can be used with the entire ICS product family. The AS Autosampler is a high performance, metal-free automated sample loading device designed especially for ion chromatography applications.

- Capable of simultaneous injection without cross-contamination of chemistries
- Consistent operation at RSDs less than 0.3% for reproducible and accurate results
- 10 mL polystyrene sample vials with wide openings for large-volume injections and trace analysis
- All-PEEK flow paths, compatible with aqueous and reversed-phase eluents, safe from metal contamination
- Moving-needle design to guarantee reliable sampling from a variety of vial sizes
- Easy syringe priming
- Sample Prep option to automate sample and standard preparations, saving time and labor
- Well Plate capabilities, optional sample tray cooling

The AS features can be controlled through either Chromeleon Chromatography Data System (CDS) Software or the module front panel.

### Key Specifications

*Sample Capacity (Vials):* 49 ea. 10 mL; 100 ea. 1.5 mL

*Sample Capacity (Well Plates):* 2 ea. 2 mL 96 deep well plate or 2 ea. 0.5 mL 96 well plate

*Injections per Vial:* 1–99

*Minimum Sample Volume:* 10  $\mu$ L can be sampled from a 300  $\mu$ L microvial; 20  $\mu$ L can be sampled from a 500  $\mu$ L microvial

*Variable Volume Range:* 1–100  $\mu$ L in 0.1  $\mu$ L increments; 100–8000  $\mu$ L in 1  $\mu$ L increments

*Injection Precision* Fixed loop <0.3% RSD at 20  $\mu$ L; Partial loop <0.5% RSD at 20  $\mu$ L

*Dilution Precision:* <1.0% RSD for a 1:100 dilution

*Dispensing Precision:* <0.2% RSD (by weighing)

*Carryover:* <0.01% with 500  $\mu$ L flush volume

*Operating Temperature Range:* 4–40  $^{\circ}$ C (40–104  $^{\circ}$ F)

*Power Requirements:* 90–265 V AC, 47–63 Hz

## Ordering Information

## Hardware

AS Autosampler, Base Configuration .....	063102
AS Autosampler, with Sample Preparation Option.....	063103
AS Autosampler, Simultaneous Injection Configuration without Valves....	063104
AS Autosampler, Simultaneous Injection with Sample Prep Option .....	063105
AS Autosampler, with Sample Tray Temperature Control Option .....	063106
AS Autosampler, with Sample Prep and Tray Temp Control Options.....	063107
AS Autosampler, Simultaneous Injection Configuration with Internal Valves.....	063101
AS Autosampler, with Injection Valve.....	061786
AS Autosampler, with Injection Valve and Sample Tray Temperature Control .....	061788

## Kits

Sample Prep Syringe Kit for AS/AS50.....	063916
Inject Port Line Extension Kit for Second AS .....	062578
AS Diverter Valve Kit for Sequential Injection .....	063294
Upgrade Kit to Simultaneous for AS/AS50 (USB).....	063742
Valve Rebuild Kit .....	057896
Rheodyne 10-Port Valve Rebuild Kit.....	061759
Preventive Maintenance Kit for AS50 (USB) and AS .....	060581
AS Autosampler Spare Parts Kit.....	064762

## Well Plate and Vial Trays

AS 10 mL Vial Plastic Tray, 49 Vial Capacity .....	062374
AS 2 mL Vial Cast Tray, 99 Vial Capacity.....	062481
AS 2.0 mL Vial Insulated Cast Tray with Covers, 99 Vial Capacity.....	063442
Micro-Well Plate Tray, Includes Two Well Plates with Round (U) Shaped 0.5 mL Wells and Covers .....	066324
Micro-Well Plate Tray, Includes Two Well Plates with Conical (V) Shaped 0.45 mL Wells and Covers. ....	066331
Deep-Well Plate Tray, Includes Two, 2 mL Well Plates and Covers.....	066325

## Vial Kits

Vial Kit, 10 mL Polystyrene with Caps and Septa, 100 Each .....	055058
Vial Kit 1.5 mL Glass with Caps and Septa, 100 Each.....	055427
Vial Kit, 0.3 mL Polypropylene with Caps and Septa, 100 Each .....	055428
Vial Kit, 1.5 mL Polypropylene with Caps and Septa, Pkg of 100.....	061696

## Well Plates and Well Plates Covers

Well Plates, 96 Micro-well, 0.5 mL Round (U) Wells, Pkg of 10 .....	066332
Well Plates, 96 Micro-well, 0.45 mL Conical (V) Shaped Wells (Pkg of 20). (Not suitable for IC).....	066333
Well Plates, 96 Deep-Well, 2 mL Wells (Pkg of 5). (Suitable for IC where concentration of ions is above 1 ppm).....	066334
Well Plate Covers (Pkg. of 10) for 0.45 mL and 0.5 mL Well Plates .....	066335
Well Plate Covers (Pkg. of 10) for 2 mL Well Plates .....	066330

## Syringes

Sample Syringe, 100 µL.....	055064
Sample Syringe, 250 µL.....	053916
Sample Syringe, 500 µL.....	055065
Sample Syringe, 1.0 mL.....	055066
Sample Prep Syringe, 2.5 mL .....	055067
Sample Prep Syringe, 5.0 mL .....	053915
Sample Prep Syringe, 10.0 mL .....	055068

## AS-DV Autosampler



The AS-DV autosampler provides high performance automated sample processing for ion chromatography applications. Constructed from acid and base-resistant materials, the AS-DV uses precise mechanics to accurately control dispense speed and volume, yielding highly reproducible results.

- New interactive Chromeleon panels help to visualize advanced sample preparation methods.
- Programmable dispense speed: 0.1 mL/min to 5.0 mL/min
- Programmable dispense volume: 0.1 mL to 5.0 mL
- Accommodates disposable PolyVial sample vials in both 5.0 mL and 0.5 mL sizes
- Automatic sample preparation with variable filter caps and optional injection valves
- Chemically inert fluid paths and vials
- Rinses or regenerates between samples
- Sample displacement—no pump required

The AS-DV holds 50 vials. Vials can be sampled in any order and multiple samples can be taken from each vial. The AS-DV remembers the vial size and volume delivered for each vial position, allowing multiple samples to be taken from a vial non-sequentially. Sample can be delivered to a sample loop or a concentrator column with backpressures up to 690 kPa (100 psi).

### Key Specifications

**Sample Delivery Method:** Positive displacement against backpressure of up to 690 kPa (100 psi)

**Capacity:** 50 PolyVials: 5 mL, 0.5 mL, or combination

**Vial Size:** 0.5 or 5 mL

**Filter Pore Size:** 20 µm

**Volume Delivered:** 0.1 mL to 5.0 mL in 0.1 mL increments

**Speed Control:** 0.1 mL/min to 5.0 mL/min in 0.1 mL/min increments

**Injections Per Vial:** Multiple injections

**Valves (optional):** High-pressure switching valve: 6- or 10-port; Bleed valve; Injection valve; Matrix elimination; Concentration

**Concentrator (optional):** Delivers sample against backpressure of up to 690 kPa (100 psi). Recommended values are ~0.4 mL/min (0.5 mL vials) or 1 mL/min (5 mL vials)

**Software Control:** Chromeleon and random access

**External Control:** USB and TTL relay

**Power Supply:** 100 to 240 V AC, 50 to 60 Hz, 45 W (autosensing power supply; no manual voltage or frequency adjustments required)

**Dimensions (h × w × d):** Width: 44.45 cm (17.5 in); Height: 23 cm (9 in); Depth: 56 cm (22 in)

**Weight:** 8.9 kg (19.5 lb)

### Ordering Information

Hardware	
AS-DV Automated Sampler .....	068907
AS-DV Automated Sampler w/ 0.5 mL vial adaptors .....	068908

Accessories	
Optional 6-Port Valve Kit for AS-DV Autosampler .....	068920
Optional 10-port valve kit .....	068921
PolyVials and Filter Caps (20 µm), 250 each, for 5.0 mL vials .....	038141
PolyVials and Filter Caps (20 µm), 250 each, for 0.5 mL vials .....	038142
PolyVials and Plain Caps, 250 each, for 5.0 mL vials .....	038008
PolyVials and Plain Caps, 250 each, for 0.5 mL vials .....	038010
Sample Tip Kit .....	040835
Cap Removal Tool .....	068925
Poly Vials and Plain Caps without Filters, 5.0 mL, 250 each .....	039532
Poly Vials and Plain Caps, 0.5 mL, 250 each .....	042014
Filter Caps, 5.0 mL, Pkg. of 250 .....	038009

Accessories (Continued)	
Filter Caps, 0.5 mL, Pkg. of 250 .....	038011
Plain Caps without Filters, 5.0 mL, Pkg. of 250 .....	039528
Plain Caps without Filters, 5.0 mL, Pkg. of 250 .....	039528
Plain Caps, 0.5 mL, Pkg. of 250 .....	042154



## AS-HV Autosampler



The AS-HV is a large-volume autosampler that can be programmed to execute a series liquid handling steps. It has a sample capacity of up to 250 mL and through the use of either a syringe pump, peristaltic pump, or piston pump, can deliver sample to an injection valve loop or a concentrator column.

- Non-metallic (all-PEEK) flow path
- Volumes up to 250 mL with extremely pure tissue culture flasks or poly bottles
- Rapid, precise arm motion speeds up sampling time to maximize efficiency
- Supports push or pull sample loading
- Multiple loading pumps to suit your budget and your application
- Fully Supported under Chromelon 6.8 Data system software or greater

**Note:** See also the AXP Auxiliary Pump and Peristaltic Pump under IC & RFIC Pumps.

### Key Specifications

**Sampler Capacity:** 24 with 250 mL tissue culture flask; 15 with 250 mL narrow mouth Nalgene bottle; 63 with 50 mL centrifuge tube

**Sample Capacity:** 63 with 40 mL or 60 mL ASE collection vials; 72 with 26 mL tube; 120 with 15 mL centrifuge tube; 180 with 10 mL centrifuge tube

**Sample Protection:** Pre-split septum with cap and/or Plexiglas Protective Cover for the entire AS-HV

**Vial Size:** 250 mL

**Maximum Injection Volume:** Application dependent (up to 250 mL)

**Minimum Sample Volume:** Sample loop dependent

**Number of Injections per Vial:** Variable

**Injection Type:** Full-loop/concentrator

**Injection Valve:** None, AS-HV relies on a valve in the IC system

**Injection Precision—Sample Loop:** <0.3%

**Injection Precision—Concentrator:** <2%

**Injection Valve Carryover—Sample Loop:** <0.1%

**Injection Valve Carryover—Concentrator:** <0.2%

**Sample Loading:** Push or pull

**Software:** Control: Program and Sequence Wizard;  
**Compatibility:** Chromeleon 6.8 or greater

### Ordering Information

Hardware	
AS-HV with Integrated Wash Station .....	064051
AS-HV Syringe Pump with 10 mL Syringe.....	064506
AS-HV AXP Pump .....	064507
Peristaltic Pump.....	064508

Accessories	
Bottles, Caps, and Septa for 250 mL Tissue Culture Flasks, Box of 50 .....	064235
250 mL Nalgene Poly Bottles with Caps and Septa, Pkg. of 72 .....	064232
Trace Analysis Cover .....	064052
Sample Rack for 250 mL Nalgene Bottles. 15 Position .....	064234
Sample Probe PTFE Lined and Sleeved for AS-HV.....	064056
PEEK Probe.....	064254
Standards Rack Kit, Six Position.....	064252
10 mL Syringe for AS-HV .....	064224
USB to RS-232 Cable.....	064261
Rheodyne, 6-Port, Automated Injection Valve.....	063573
Relay Cable for Externally Controlled Pump.....	064350

### Racks

Sample rack for 50 mL vials (30 mm o.d.) 21 position .....	074050
Sample rack for 26 mL vials (24 mm o.d.) 24 position .....	074049
Sample rack for 15 mL vials (20 mm o.d.) 40 position .....	074048
Sample rack for 10 mL vials (16 mm o.d.) 60 position .....	074047
Sample rack for 60/40 mL ASE collection vials 21 position .....	072733
22 mm Septa Crosscut for 250 mL Nalgene Bottle.....	064256

### AS-HV Vials

50 mL centrifuge tube, 28 × 114, PP, 250/case .....	074050
26 mL tube, 87 × 23.5 mm, PS, 500/case .....	074049
15 mL centrifuge tube, 76 × 20 mm, PP, 500/case .....	074048
10 mL centrifuge tube, 97 × 16 mm, PS, 100 pieces/bag .....	074047

**Note:** The ASHV can accommodate up to three of the racks shown above (one type only).

## MX Six-Port Injection Valve



The Rheodyne MX Series II automated fluidic valve provides added flexibility where stand-alone injection is required. Easily combine the MX with the valves in your existing instrument to support complex fluid switching and sample injection needs.

### Ordering Information

#### Hardware

Rheodyne, 6 Port, Automated Injection Valve.....	063573
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## IC & RFIC Column Compartments



Dionex offers a selection of column compartments to organize columns and achieve precise thermostating for ultimate retention time reproducibility.

### ICS-5000 Thermal Compartment



Get the benefits of better separations and reproducibility with precise temperature control. The ICS-5000 TC Thermal Compartment—for use with optical or MS detection—enhances performance by integrating column temperature regulation with injection valves. This maximizes thermal stability and minimizes extracolumn volumes.

- Wide temperature range of 5–85 °C
- Precise temperature control
- Fast heat up and cool down times
- Single-zone oven minimizes tubing lengths for less delay volume and better peak efficiency
- Single and dual valve configurations
- Column ID chip system for monitoring column properties and usage
- Optional heat exchangers for optimal eluent temperature and improved reproducibility

#### Key Specifications

*Temperature Range:* 5–85 °C (maximum cooling 18 °C below ambient)

*Temperature Accuracy:*  $\pm 0.5$  °C

*Temperature Stability:*  $\pm 0.1$  °C

*Temperature Precision:*  $\pm 0.1$  °C

*Column Capacity:* three columns; max. 30 cm in length

*Heat-Up/Cool-Down Time:* Typically 15 min from 20 °C to 50 °C; typically 15 min from 50 °C to 20 °C

*Inputs/Outputs:* Two digital inputs/outputs, two relay outputs

*Dimensions (h × w × d):* 17.4 × 44.4 × 50.3 cm (6.8 × 17.5 × 20 in.)

*Power Requirements:* 90–265 V AC, 47–63 Hz

*Operating Temperature Range:* 10–35 °C (50–95 °F)

*Operating Humidity Range:* <80% relative, noncondensing

#### Ordering Information

Hardware	
Thermal Compartment, no valves .....	074108
Thermal Compartment, one 6-port valve, PEEK .....	074109
Thermal Compartment, two 6-port valves, PEEK .....	074112
Thermal Compartment, 6-port valve, 10-port valve, PEEK.....	070239
Thermal compartment, two 10-port valves, PEEK.....	074113

## Detector/Chromatography Compartment



This compartment houses the detector, suppressor control, column thermal controller, and the preparation module. This combination provides complete tubing thermal stability and short connections between components. The CD and ED detectors are easy to install for immediate use.

- Innovative electrochemical detection technology
- Conductivity Detector (CD) features improved electronics for superior detection
- Dual conductivity and electrochemical detection provides increased flexibility and utility
- Optional Automation Manager (AM) with extra valves for eluent addition and sample handling
- Supports AutoPrep, preconcentration, AutoNeutralization, matrix elimination, and postcolumn reagent addition
- Valve control integral to software, eliminating complicated TTL or relay programming

With the DC's flexible configuration and Chromeleon control, your possibilities have more than doubled. Configure your system for simultaneous injection and perform both anion and cation analysis with one injection. Perform two different anion applications. Or eliminate dilutions of unknown samples by running the same application with large loop/small loop injections.

### Key Specifications

**Temperature Range:** Upper zone: 10–40 °C; Lower zone: 10–70 °C

**Temperature Accuracy:** ±0.5 °C

**Temperature Stability:** ±0.2 °C

**Temperature Precision:** ±0.2 °C

**Lower Column Section:** injection valves: 1 or 2 ea., 6- or 10-port, standard bore (SB) or microbore (MB)

**Column Capacity:** up to two column sets, 1–9 mm; maximum column length: 250 mm plus 50 mm guard column; precolumn heat exchangers: 2

**Automation Manager (Option):** Two high-pressure injection valves, 6- or 10-port; 2 low-pressure valves, two or three way;

**Reaction Coil Heater (Option):** 5 °C above DC upper compartment temperature to 80 °C, 2 coils

**Leak Detection:** optical leak sensor

**Power Requirements:** 90–265 V AC, 47–63 Hz

**Dimensions (h × w × d):** 44.5 cm × 42 cm × 57 cm (17.5 in × 16.5 in × 22.5 in)

### Ordering Information

#### DC Compartment

DC with Dual Temperature Zones, no injection valves, capillary .....	072006
DC with Dual Temperature Zones, one injection valve, standard bore.....	072012
DC with Dual Temperature Zones, two injection valves, standard bore....	072014
DC with Dual Temperature Zones, one injection valve, microbore .....	072020
DC with Dual Temperature Zones, two injection valves, microbore.....	072022

#### Automation Manager

AM Automation Manager with One 6-Port high-pressure valve and one low-pressure 3-way valve.....	061740
AM Automation Manager with one 10-port high-pressure valve and one low-pressure 3-way valve.....	061736
AM Automation Manager with two 10-port high-pressure valves and two low-pressure 3-way valves.....	061738
RCH-1 Reaction Coil Heater .....	061746
Knitted Reaction Coil, 500 µL, Potted (PCH-2) .....	039349
Spooled Reaction Coil, 750 µL (PCH-2) .....	037859

## ICS-5000 IC Cube



The IC Cube module, the latest innovation from Dionex, allows the use of capillary consumables on the ICS-5000. Any ICS-5000 analytical system can be converted to a capillary system by utilizing an ICS-5000 capillary pump and adding the IC Cube to the DC upper compartment. The IC Cube is used to conveniently house and configure the cartridges used in capillary IC, such as:

- Capillary EG degasser
- Injection valve (4-port, 2 position)
- Capillary separation and guard column
- Capillary electrolytic suppressor
- Capillary carbonate removal device
- Column ID chip system for monitoring column properties and usage
- Optional heat exchangers for optimal eluent temperature and improved reproducibility

The ICS-5000 system has adequate room for one or two IC Cube modules, both with independent temperature control of the separation column. In this way, dual-channel, capillary-based systems can actually perform analysis with columns running at two different temperatures (for example, 30 °C on channel one and 60 °C on channel two).

## Key Specifications

*Up to two independent IC Cubes, each containing:*  
High-Pressure Injection Valves, EG Degasser, Column and Guard, Carbonate Removal Device.

*Injection Valves:* Up to two (one per cube) high pressure valves, 4-port, 2 position

*Capillary Column Heater:* 15 to 85 °C

*Note:* IC Cubes and cartridges are customer installable with preformed tubing and color-coded labeling

*More information on Capillary Suppressor:* See the Suppressor section

## Ordering Information

Hardware	
IC Cube Module, with 4-port valve (no consumables) .....	072000
ACES 300 Anion Capillary Electrolytic Suppressor .....	072052
CCES 300 Cation Capillary Electrolytic Suppressor .....	072053
CRD 200 Capillary.....	072054
Capillary IC Degas .....	072051

## IC & RFIC Detectors



Dionex detectors are designed for high sensitivity and minimum peak dispersion with all PEEK flow paths making the detectors compatible with eluents of pH 0–14.

- ICS-5000 CD conductivity detector with integrated design and plug-and-play capability
- The ICS-5000 ED, the latest, most innovative electrochemical detector known
- VWD Variable Wavelength Detector in either single or four wavelength configuration
- 1024-element PDA Photodiode Array Detector for broad spectral range high-resolution 3-D absorbance detection

Also see the Mass Spectrometry section.

### ICS-5000 CD Conductivity Detector



The CD Conductivity Detector handles any IC application, from single-column methods with high background signals to determination of trace contaminants in high purity water, without disruptive range change distortions.

- Microprocessor-controlled digital signal processing detects high and low concentrations
- Large dynamic range: up to 15,000  $\mu\text{S}/\text{cm}$
- Snap-in design, no cables or tools required for installation
- Minimizes noise while maximizing sensitivity
- Electronics integrated between the cell and detector for greater stability
- Independent temperature control, separate from the rest of the DC module

#### Key Specifications

*Electronics Type:* microprocessor-controlled digital signal processing

*Detection Type:* single and dual conductivity detection

*Cell Drive:* 8 kHz square wave

*Linearity:* 1% at 1000  $\mu\text{S}/\text{cm}$

*Resolution:* 0.00238 nS

*Output Range:* 0–15,000  $\mu\text{S}$ , digital or analog

*Electronic Noise, Wet:* <0.2 nS at 23  $\mu\text{S}/\text{cm}$  background, <0.1 nS at 1  $\mu\text{S}/\text{cm}$  background

*Filter:* rise times of 0–10 s

*Temperature Compensation:* default at 1.7%; programmable at 0–3%

*Autoranging:* Autoranging digital conductivity signal monitoring with Chromeleon software

#### Ordering Information

Hardware	
CD Conductivity Detector (Analytical) and Integrated Cell.....	061716
Remote Detector Housing for CD .....	063725
CD Conductivity Detector (Capillary) .....	072041



## ICS-5000 ED Electrochemical Detector



The ICS-5000 ED Electrochemical Detector features a new cell design along with a newly designed reference electrode. The rugged the new yoke-knob assembly provides consistent compression to the working electrode and cell gasket. Exciting innovations will create new opportunities for your laboratory.

- One-piece combination pH and Ag/AgCl reference electrode for consistency and reliability
- Yoke-knob design for reproducible installation of working electrode and cell gasket
- Microprocessor-controlled digital signal processing
- DC amperometry, cyclic voltammetry, and integrated amperometry including 3-D (current, voltage, retention)
- Multiple waveforms and integration times to optimize conditions for individual analytes
- 3-D display of raw integrated amperometry data similar to PDA data display
- Integrated amperometry mode with complete freedom to change waveform profile segments
- Dual-detection configurations (detectors in series or parallel)

## Key Specifications

**Electronics Type:** microprocessor controlled digital signal processing

**Electronic Noise:** <80 pC; DC Amperometry <5 pA

**Potential Range:** -2 V to + 2 V in 0.001 V increments

**Signal Range, Digital and Analog:** DC amperometry: 5 pA to 74  $\mu$ A; integrated amperometry: 50 pC to 200  $\mu$ C

**Filter:** 0–10 s response time

**Control Mode:** local or remote using relay closures, TTL, or Chromeleon using DC module

**Cell Body:** titanium body and inlet tubing, compatible with 2 and 4 mm i.d. columns; pressure rating 120 psi when fully assembled

**Working Electrodes:** disposable gold, silver, and platinum; conventional gold, silver, platinum, and glassy carbon

**Reference Electrode:** pH-Ag/AgCl combination

**Autoranging:** autoranging digital amperometry with Chromeleon Data System software.

**Analog Output:** user-selectable full scale of 10, 100, or 1000 mV

**Working Cell Volume:** <0.5  $\mu$ L

**Maximum Operating Pressure:** 0.7 MPa (100 psi)

## Ordering Information

Hardware	
ED Electrochemical Detector (without cell).....	072042
ED Cell (no working or reference electrode).....	072044
Ag/AgCl pH Reference electrode .....	061879

## ED Detector Conventional Working Electrodes

ED Electrode, Au, with Gasket and Polishing Kit .....	061749
ED Electrode, AAA, with Gasket and Polishing Kit .....	063722
ED Electrode, Ag, with Gasket and Polishing Kit .....	061755
ED Electrode, Pt, with Gasket and Polishing Kit .....	061751
ED Electrode, GC, with Gasket and Polishing Kit .....	061753
3 mm Gold Working Electrode with Gasket and Polishing Kit .....	063723
AAA-Direct Installation Kit .....	059539

## Disposable Working Electrode for ED, ED50A, ED50, and ED40 Amperometry Cells

Disposable Electrodes for Amino Acids, Pkg. of 6 with 2 Gaskets .....	060082
Disposable Electrodes for Amino Acids, Pkg. of 24 with 8 Gaskets .....	060140
Disposable Electrodes for Carbohydrates, Pkg. of 6 with 2 Gaskets .....	060139
Disposable Electrodes, Gold on Polyester, Pkg. of 24 with 8 Gaskets .....	060216
Gasket for Disposable Electrode, Pkg. of 4 .....	060141
Silver Disposable Electrodes, Pkg. of 6 with 2 0.002" Gaskets.....	063003
Platinum Disposable Electrodes, Pkg. of 6 with 2 0.002" Gaskets.....	064440
Carbohydrate Removal Accessory Kit for ICS-2500 .....	063522
Carbohydrate Removal Accessory Kit for ICS-3000 DP .....	064418
Carbohydrate Removal Accessory Kit for ICS-3000 SP .....	070510
Carbon on PEEK Disposable Electrode, Pkg. of 6 .....	069336
Gold on PTFE Disposable Electrode, Pkg. of 6 .....	066480

## ICS Series Variable Wavelength Detector



The high-performance ICS-5000 VWD dual lamp detector is available in either single or four wavelength capability with PEEK flow cells.

- High signal-to-noise ratio for maximum sensitivity
- Broad wavelength range from 190 to 900 nm
- Deuterium and tungsten lamps for low noise and high intensity over the full spectral range
- Full control and data collection through Chromeleon software via USB
- Digital data collection rates up to 100 Hz
- Built-in holmium oxide filter for easy verification of wavelength accuracy
- Low baseline drift for reliable results

### Key Specifications

*Noise:* typically  $\leq \pm 2.5 \mu\text{AU}$  at 254 nm

*Drift:*  $< 0.1 \text{ mAU/hr}$  at 254 nm

*Wavelength Accuracy:*  $\pm 1 \text{ nm}$

*Wavelength Bandwidth:* 6 nm at 254 nm

*Linearity:* up to 2.5 AU

*Data Collection Rate:* up to 100 Hz (multiple wavelength version); up to 10 Hz (single wavelength version)

*Flow Cell:* PEEK, 11  $\mu\text{L}$  volume, 10 mm path length (Analytical); 2.5  $\mu\text{L}$ , 7 mm path length (semimicro)

*Lamps:* simultaneous tungsten and deuterium

*Analog Outputs:* Two: absorbance, 20-bit resolution, 0–1 Volt and 0–10 Volt

*Dimensions (h  $\times$  w  $\times$  d):* 15.2  $\times$  44.4  $\times$  50.3 cm, (6.0  $\times$  17.5  $\times$  20 in.)

*Power Requirements:* 85–265 V AC, 47–63 Hz

*Operating Temperature:* 10–35  $^{\circ}\text{C}$  (50–95  $^{\circ}\text{F}$ )

*Operating Humidity Range:*  $< 80\%$  relative, noncondensing

### Ordering Information

#### Hardware

VWD Variable Wavelength Absorbance Detector, Single Wavelength....	069116
VWD, 4 Wavelengths, No Flow Cell.....	069117
Digital/Analog Converter for VWD with Cables.....	066349
VWD Analytical Flow Cell, PEEK, 10 mm, 11 $\mu\text{L}$ .....	066346
Semi-micro Flow Cell for VWD-3x00, SST, 2.5 $\mu\text{L}$ .....	6074.0360

## ICS Series Photodiode Array Detector



The ICS-5000 Series Photodiode Array Detector maximizes your optical absorbance information by providing full UV-Vis spectra in high resolution along with an ultra-quiet optical bench for excellent detection performance.

- 1024-element photodiode array for optimum wavelength resolution
- Broad wavelength range from 190 to 800 nm
- Deuterium and tungsten lamps for low noise and high intensity over the full spectral range
- Full control and data collection through Chromeleon Data System software with 3-D option
- USB-based digital data collection for simple installation
- Four analog outputs to support alternate data collection
- Built-in holmium oxide filter for easy verification of wavelength accuracy
- Low baseline drift for excellent reliability and reproducibility

### Key Specifications

*Noise:*  $\pm 10 \mu\text{AU}$  at 254 nm (flowing water, 2-s rise time);  
 $\pm 15 \mu\text{AU}$  at 520 nm (flowing water, 2 s rise time)

*Drift:*  $< 500 \mu\text{AU/h}$

*Wavelength Accuracy:*  $\pm 1 \text{ nm}$ , self-calibration with deuterium lines, verification with built-in holmium oxide filter

*Resolution:* 1 nm

*Linearity:*  $< 2 \text{ AU}$

*Photodiode Array:* 1024 element

*Pixel Resolution:* 0.7 nm

*Optical Resolution:* 1.0 nm

*Lamps:* tungsten and deuterium, simultaneous operation

*Analog Outputs:* four, 0–3 AU, 1000 mV range

*Flow Cell Materials:* PEEK, fused silica, SST

*Flow Cell Pressure Limit:*  $< 2 \text{ MPa}$  (300 psi) PEEK,  $< 3 \text{ MPa}$  (500 psi) SST

*Dimensions (h × w × d):* 17.4 × 44.4 × 50.3 cm,  
(6.8 × 17.5 × 20 in.)

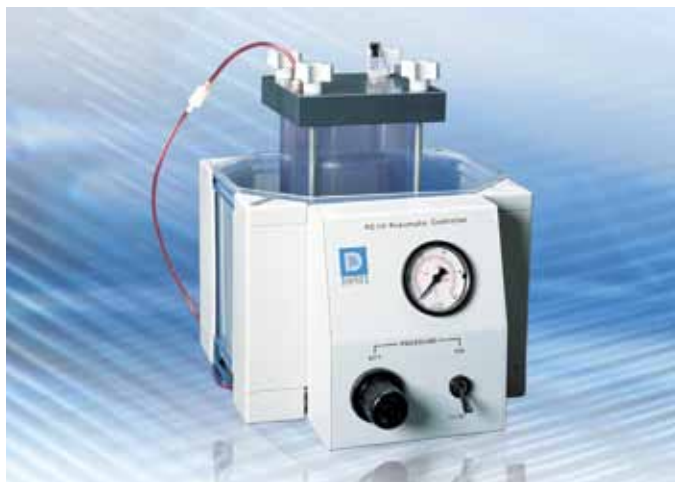
*Power Requirements:* 90–265 V AC, 47–63 Hz

*Operating Temperature and Humidity Range:* 4–40 °C  
(40–104 °F);  $< 95\%$  relative, noncondensing

### Ordering Information

Hardware	
PDA Photodiode Array Detector .....	074114
Absorbance Cell, PEEK, 13 $\mu\text{L}$ .....	056346
Absorbance Cell, Semi Micro, PEEK, 3 $\mu\text{L}$ , 9 mm Path Length.....	064169
Absorbance Cell, Semi Prep, PEEK, 0.7 $\mu\text{L}$ , 0.4 mm Path Length .....	064167
Software	
Chromeleon option for PDA Full Spectrum Data Acquisition .....	060728

## Postcolumn Reaction Systems



Postcolumn reagent chemistries, as delivered by the PC10 Postcolumn Pneumatic Delivery System, can often extend detection limits for ions that would otherwise exhibit detection sensitivity.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

PC10 Postcolumn Delivery System

## PC10 Postcolumn Delivery System

The PC10 Postcolumn Pneumatic Delivery System ensures a constant, pulseless flow of reagent. It assures optimal flow by applying constant pressure, eliminating the need for a pump and its associated moving parts, labor, and expense.

The PC10 Automation Kit option supports automation of the PC10. The kit includes a two-way valve to shut off flow from the PC10 to the analytical system, and a solenoid for valve control. Do not use this kit if configuring an ICS-3000. Instead, use the solenoid valves with the DC.

### Ordering Information

Accessories	
PC10 Postcolumn Pneumatic Delivery Pkg., 4 mm.....	050601
PC10 Postcolumn Pneumatic Delivery Pkg., 2 mm.....	053591
PC10 Pneumatic Controller .....	043903
Pressurizable Chamber .....	037460
PC10 Reagent Organizer .....	050602
Knitted Reaction Coil, 375 $\mu$ L, Unpotted .....	043700
Knitted Reaction Coil, (For 2 mm system, 125 $\mu$ L).....	053640
PC10 Automation Kit .....	050603



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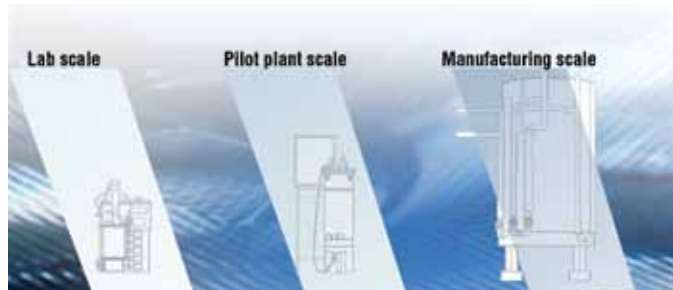
# Process Analytical Systems and Software

*Improve your process by improving your process monitoring with a Dionex on-line IC or HPLC system*

Dionex process analytical systems provide timely results by moving liquid chromatography-based measurements on-line. Information from the Integral Process Analyzer can help reduce process variability, improve efficiency, and reduce downtime. These systems provide comprehensive, precise, accurate information faster than is possible with laboratory-based results. From the lab to the factory floor, your plant's performance will benefit from the information provided by on-line LC.

- Characterize your samples completely with multicomponent analysis
- Reduce sample collection time and resources with automated multipoint sampling
- Improve your process control with more timely results
- See more analytes with unique detection capabilities
- 25 years of experience providing on-line IC and HPLC capabilities to a wide range of industries.
- Integral Migration Path lets you choose the systems that best meets your needs

The Integral Migration Path approach enables on-line IC/HPLC to generate timely, high-resolution information when monitoring a small-scale reactor in a process R&D lab, in a pilot plant, or improving current a manufacturing plant. No matter what the application, Integral has the versatility to place a solution using on-line IC/HPLC, whenever and wherever it is needed.



**Integral:** Integral Migration Path: System solutions wherever you need them: lab, pilot plant, or manufacturing.

**Chromeleon PA:** Chromeleon PA software provides unique capabilities to support on-line IC or HPLC analysis

## Integral



Integral systems provide a versatile and adaptable approach to process analytical LC systems. An unsurpassed range of IC and HPLC capabilities are combined with configurable sample systems and adaptable off-the-shelf industrial enclosures options. Configure solutions for R&D labs, pilot plants, or production environments.

- Configure sampling modules with ICS-5000 and ICS-2100 RFIC, or UltiMate 3000 HPLC systems
- Automated, multipoint sampling options
- Automated sample preparation
- Off-the-shelf enclosure options
- Chromeleon PA Process Analytical software for system control, data analysis, connectivity

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Integral Process Analytical Systems Brochure

### Product Data Sheets

Application Notes

## SS Stream Selector Module



The SS Stream Selector module automatically selects from up to 21 sample streams for analysis. The SS can be configured to deliver samples to up to four IC or HPLC systems running in parallel. Samples streams configurable to flow to waste, sample recovery systems, deadhead at the valve, or return to the process. Streams can be sampled in sequence or randomly.

- SS available with 1, 2, or 3 multiposition valves for 7, 14, or 21 stream capacity
- Multi-position valves available in PEEK or stainless steel
- Module equipped with liquid leak detection and ambient temperature sensors
- Module configurable with optional expansion electronics and accessories

## Key Specifications

*Enclosure options:* Stand-alone for lab installations, internal for industrial enclosure, or mounted on a wall. Available in horizontal or vertical orientation.

*Expandable:* Add 1, 2, or 3 stream selection valves for 7, 14, or 21 sample streams

*Stream Selection Valves:* 17-port PEEK or stainless steel

*Solenoid Valve Control:* Connections available for up to 10 valves

*Temperature Sensor:* RTD sensor, +/- 1 °C

*Leak Detection Sensor:* Optical type sensor; no calibration required

## Ordering Information

Ordering information is provided for your reference. Contact your local representative for assistance in choosing the appropriate standard SP module or to configure a custom configuration SP for your particular application.

### Hardware

SS Stream Selector, 1 Valve, Ext, PEEK.....	069090
SS Stream Selector, 1 Valve, Int, PEEK.....	069095
SS Sampling Valve and Tubing Kit, PEEK.....	068535
SS Stream Selector, 1 Valve, Ext, SST.....	069100
SS Stream Selector, 1 Valve, Int, SST.....	069105
SS Sampling Valve and Tubing Kit, SST.....	068540

## SP Sample Preparer Module



The SP Sample Preparer provides versatile, automated sample preparation capabilities prior to chromatographic analysis. The SP module is designed for continuous, unattended operation. The SP can be configured with Dionex benchtop IC or HPLC systems or combined with the AE and/or LE enclosure options for applications in industrial environments.

- Sample and standard selection
- Dilution of standards or samples
- Addition of reagents prior to analysis
- Analyte pre-concentration on selective resin columns
- Available in pre-defined or custom configurations.
- Sample mixing, heating, and standard cooling
- Sensors to monitor sample flow, pressure, and pH
- Module equipped with liquid leak detection and ambient temperature sensors

The SP Sample Preparer can be configured with multiple devices to perform a variety of sample preps prior to chromatographic analysis. Enclosure options are available for stand-alone operation in a lab or mounted internally or externally as part of the industrial enclosure in horizontal or vertical configurations.

## Key Specifications

*Dilution Pump:* Variable speed, stepper motor drive

*Loading Pump:* Variable speed, stepper motor drive

*Loading Pump:* Peristaltic pump

*Stream Diversion Valves:* 3-way solenoid valves, PEEK

*Metering (Dilution) Valve:* 2-position, 6- or 10-port, PEEK or stainless steel

*Dilution vessel:* 50 mL heated PEEK or 200 mL unheated HDPE

*Dilution Vessel Mixer:* Variable speed, magnetic stirrer

*Standard Vial Cooler:* Peltier cooled block, designed for 20 mL scintillation vial

*Flow Sensor:* Thermal pulse type, PEEK, 0.1–5.0 mL/min

*Liquid Level Sensors:* Up to 4 capacitance type sensors for polymer bottles

*Leak Detection Sensor:* Optical type sensor; no calibration required

*Pressure Sensor:* 0–10 V output, up to 1,000 psi

*Temperature Sensor:* RTD sensor, +/- 1 C

*TTL In / Relay Out:* 8 TTL inputs, 9 relay outputs

*Analog Inputs:* 4 inputs, 0–10 V

## Ordering Information

### Hardware

SP1 Sample Preparer; Conc. or Direct Inj., Ext., Vert.....	069076
SP1 Sample Preparer; Conc. or Direct Inj., Int., Horiz.....	069078
SP2 Sample Preparer; Dil. or Direct Inj., Ext., Vert.....	069079
SP2 Sample Preparer ; Dil. or Direct Inj., Int., Horiz.....	069081
<i>Custom configurable version</i>	
SPx Sample Preparer; Base, Int., Horiz.....	069084

## AE Analyzer Enclosure



The AE Analyzer Enclosure provides an adaptable housing for a variety of IC or HPLC system configurations when installation is required in an industrial environment. The enclosure is designed to provide a suitable environment for the instrument inside.

- Stainless steel construction for a long-lasting and low-maintenance investment
- Open access to enable multiple IC or HPLC instrumentation options
- Slide-out shelves and tool-free access panels enable ready access to instrumentation
- Gasketed doors and openings prevent contamination
- Optional air conditioning unit for elevated ambient temperatures
- Purge options available for installation in explosive atmospheres
- On-board Windows-based controller and panel-mounted LCD display

### Key Specifications

*Mounting Options:* Wall mount (with kit) or mount on LE for stand-alone or wheeled configuration.

Enclosure Rating: NEMA 12 / IP52

Explosion Hazard Purge Options: Z-purge for NEC C1/D2, EU Zone 2. X-purge for NEC C1/D1, EU Zone 1

*Blower:* Standard option for NEMA 12 / IP52 environment

Air Conditioner: Use when ambient temperature exceeds 35 °C

Operating Temperature Range: 4–40 °C (40–104 °F)

Operating Humidity Range: 5–95% RH, noncondensing; 100% RH with air conditioner or air purge

Temperature Sensor: RTD sensor, +/- 1 C

Leak Detection Sensor: Optical type sensor; no calibration required

*Dimensions (h × w × d):* 113 cm × 76 cm × 69 cm (45 × 30 × 28 in) with blower on side

*Weight:* 70 kg (155 lb) empty

### Ordering Information

Hardware	
AE Analyzer Enclosure.....	069070
AE Purge Unit, Z-Purge.....	068546
AE Purge Unit, X-Purge with Power Isolation and Keyed Bypass .....	070187
Dell Optiplex 780 Ultra Small Form Factor PC with Windows XP, 4G RAM, 320GB HD, 3.0 GHz Duo Core E8400 Processor, no keyboard, no mouse .....	071665
AE Display Kit and Controller Enclosure.....	069094
Logitech MK300 Wireless Keyboard And Mouse.....	071666
AE Ventilation Blower.....	068544
AE Air Conditioner, 120V AC, 50/60Hz .....	068545
AE Air Conditioner, 240V AC, 50/60Hz .....	069093

## LE Liquid Enclosure



The LE Liquids Enclosure provides an optional base for the AE for stand-alone or wheeled installations. The LE provides a means of isolating and protecting liquid containers for eluent, reagents, or standards.

- Stand-alone or wheeled operation; provide means of transporting within a facility
- Tempered glass door for easy viewing of contents
- Slotted shelves provide protection of containers from leaks or spills
- Optical leak detection sensors
- Preconfigured with threaded drain for leak management
- Can be used as an expansion enclosure for additional IC or HPLC instrumentation
- Liquid and gas manifold between AE and LE; isolate or allow air flow between enclosures

## Key Specifications

**Enclosure Options:** Use LE beneath AE for stand-alone or wheeled operation of analyzer

**Fluidics I/O:** Configured at fluidics I/O panels located between AE and LE and on side and bottom of LE.

**Gas Controller:** Panel mounted regulator to maintain head pressure on eluent, reagent, standard bottles

**Leak Detection Sensor:** Optical type sensor; no calibration required

**Leak Management:** Slotted shelves provide protection of containers from leaks or spills. Drain located on bottom I/O panel

**Casters:** Double wheel design for low profile and system stability

**Dimensions (h × w × d):** 75 cm × 64 cm × 68 cm (30 × 25 × 27 in.)

**Weight:** 75 kg (166 lb) empty

## Ordering Information

Hardware	
LE Liquids Enclosure .....	069075
NOWPak 20-L PP Kit, with Pressurizable Dispenser Cap .....	068551



## Chromeleon PA

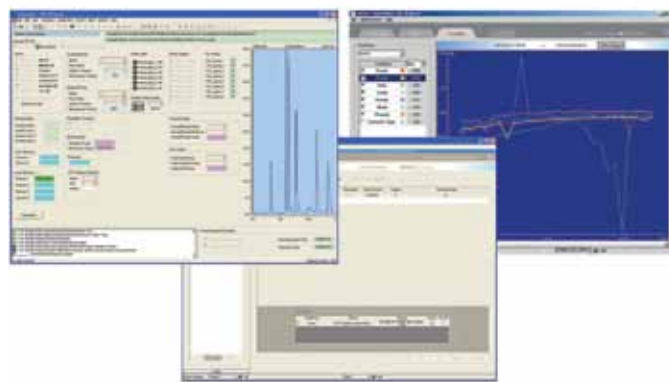
*Designed for reliability, ease of operation, reproducibility, accuracy, and regulatory compliance*

Chromeleon PA Process Analytical software is part of a total solution for continuous process monitoring using ion chromatography or HPLC. Chromeleon PA 6.8 is the latest generation of process analytical software from Dionex. This solution is based on Chromeleon 6.8 and incorporates a unique analyzer interface to expand the user's ability to configure, control, monitor, and report data from multiple IC or HPLC systems configured for continuous monitoring.

- Consistent user interface for laboratory and process systems; save on training costs
- Common platform enables electronic transfer of methods from the lab to the process
- Real-time display of current analyzer status and historical trending of results
- Supports remote monitoring and control of analyzer
- Analyzer security controlled through multi-level access linked to user logon ID
- Designed for pharmaceutical industry regulatory compliance (CFR21, Part 11)
- Built-in audit trail; date and time stamp all analyzer actions
- User defined alarms and alarm actions; link events to analyzer results

Chromeleon PA provides total control of the Integral on-line LC analyzer. It enables automated, unattended sampling, sample preparation, and analysis of your process. Chromeleon PA's Results Based Events enable the end-user to configure the software to automatically make decisions based on the analyzer's results. You define the alarm setpoints and the alarm actions. Change sampling sequences, analysis frequencies, sample preps, or analysis methods all automatically without operator intervention.

Chromeleon and Chromeleon PA were designed to meet the challenges of the regulated environment. It is fully validated, has multiple access levels linked to the user's log-on ID, and has capabilities for automated system suitability including the ability for the user to define the tests performed and the acceptance criteria.



*Integrated process control software sets up and controls systems, monitors status, and reports process results.*

## Process Analyzer with Chromeleon PA

Achieve near real-time control of your process by integrating Integral with your process control system using industry-standard OPC. The Chromeleon PA OPC server option enables bi-directional exchange of information with other OPC servers on your plant network. This enables the Integral analyzer to send process results to your control system for near real-time decisions. The OPC server can also be used to exchange analyzer operating information and control commands with your control system.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature at [www.dionex.com](http://www.dionex.com).

*Product Brochures*

Integral Process Analytical Systems Brochure

*Product Data Sheets*

Integral Process Analytical Liquid Chromatography Systems

## Ordering Information

Ordering information is provided for your reference. Contact your local representative for assistance in configuring Chromeleon PA software for your particular installation.

### Software

Chromeleon PA 6.80 Base Server and Client Bundle.....	070182
Chromeleon PA 6.80 Analyzer Client License.....	070176
Chromeleon Class 1 Timebase.....	060722
<i>Order 1 license for each system on the server</i>	
Chromeleon Client Option—GLP .....	060731
<i>Order for GLP or GMP applications</i>	
Chromeleon PA 6.80 OPC Server .....	070178
<i>Order for systems requiring data transfer to external systems</i>	
Chromeleon Remote License Timebase .....	061366
<i>Order for analyzer monitoring and/or control</i>	
Server Option: Multiple Network Control & Network Failure .....	060725
<i>Order for data storage on the remote server</i>	



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## MS Instruments

*Single-point control and automation for improved ease-of-use in LC/MS and IC/MS*

Dionex provides advanced integrated IC/MS and LC/MS solutions with superior ease of use and modest price and space requirements. UltiMate 3000 System Wellness technology and automatic MS calibration allow continuous operation with minimal maintenance. The ICS-5000 instrument and the family of RFIC systems automatically remove mobile phase ions for effortless transition to MS detection.

- MSQ Plus, the smallest and most sensitive single quadrupole on the market for LC and IC
- Self-cleaning ion source for low-maintenance operation
- Chromeleon software for single-point method setup, instrument control, and data management
- Compatible with existing IC and LC methods
- The complete system includes the MSQ Plus, PC data system, ESI and APCI probe inlets, and vacuum system

You no longer need two software packages to operate your LC/MS system. Chromeleon LC/MS software provides single-software method setup and instrument control, powerful UV, conductivity, and MS data analysis, and fully integrated reporting.



*MS Systems and Modules:* MSQ Plus Mass Spectrometer; MSQ18LA Nitrogen Gas Generator; AXP-MS digital auxiliary pump



## MS Systems and Modules



The MSQ Plus features a newly designed self-cleaning Atmospheric Pressure Ionization (API) source for outstanding sensitivity and noise reduction. Compatible with existing LC and IC methods, the MSQ Plus is more sensitive, rugged, powerful, easier to use, and smaller than any other instrument of its kind.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

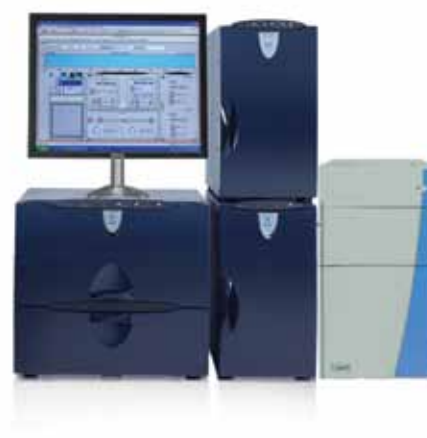
#### Product Data Sheets

MSQ Plus Mass Spectrometric Detector

MSQ18LA Nitrogen Gas Generator

AXP-MS Auxiliary Pump for Mass Spectrometry Data Sheet

## MSQ Plus Mass Spectrometer



The MSQ Plus Mass Spectrometer can be used in a wide range of applications and methodologies in both HPLC and IC. Only 12 in. wide, the MSQ Plus is by far the most compact mass spectrometer on the market today. It provides universal detection and characterization of analytes in the 17–2000  $m/z$  range.

- New M Path source design virtually eliminates neutral noise and background
- Unique FastLoc probes provide simple and rapid changes for both ESI and APCI modes
- All features fully supported in Chromeleon CDS
- Full scan and Selected Ion Monitoring allow rapid screen and target compound analysis
- Quadrupole analyzer maximizes resolution and provides high stability and minimal drift
- Enhanced low-mass response for analytes below 60  $m/z$
- All new Ion Bright detector system eliminates neutral noise, extending the dynamic range
- Advanced autotuning wizard includes full system optimization and mass scale calibration

The MSQ Plus features a high-sensitivity, self-cleaning ESI/APCI ionization source that requires no mechanical adjustment or electrostatic focusing for sample optimization. The compact source design is optimized for a wide range of flow rates and supports a wide range of chromatographic buffers.

**Note:** Sensitivity specifications below are based on loop injections at a flow rate of 1 mL/min in SIM mode. Noise is RMS after appropriate smoothing.

## Key Specifications

**Power Requirements:** 230 V AC 13A power outlets (for rotary pump and MSQ Plus); 230 or 115 V ac (as required) for PC and monitor and additional hardware

**Gas Requirements:** MSQ Plus requires a supply of high-purity (>99%) nitrogen capable of supplying 12 L/min at 75 psi (5 bar).

**Dimensions (h × w × d):** 530 × 300 × 710 mm (21 × 12 × 28 in.)

**Weight:** 60 kg (132 lb)

**Ionization Modes (supplied as standard):** Electrospray (ESI), Atmospheric Pressure Chemical Ionization (APCI)

**Range:** 17–2000 m/z

**Sensitivity, positive ion ESI:** 50 pg injection (10 µL × 5 pg/µL) of erythromycin: 1000:1 S/N

**Sensitivity, negative ion ESI:** 20 pg loop injection (10 µL × 2 pg/µL) of p-nitrophenol: 500:1 S/N

**Sensitivity, positive ion APCI:** 50 pg injection (10 µL × 5 pg/µL) of erythromycin: 200:1 S/N

**Sensitivity, negative ion APCI:** 20 pg injection (10 µL × 2 pg/µL) of p-nitrophenol: 50:1 S/N

## Ordering Information

### Hardware

MSQ Plus Mass Spectrometric Detector, Computer, and Software ..... 063116

### Accessories

Odor Removal Filters (5) for MS Vacuum Pump Oil Trap..... 063142

Kit for MSQ PM and Annual Maintenance ..... 061494

Kit for API Probe Maintenance ..... 061495

Perchlorate O-18 Internal Standard, 1 mg/L, 10 mL ..... 062923

### Software

Chromeleon Mass Spec Software Control Option..... 060726

## AXP-MS Auxiliary Pump for MS



The AXP-MS single-piston pump uses a digital stepper drive and rapid refill to deliver precise and accurate flow. An internal transducer provides pressure display and monitoring capability. The AXP-MS is a high-quality auxiliary pump for MS support or general metering applications. It is also useful as a flow source when other pumping is not available or may be inconvenient.

- Wide flow range
- Internal pulse damper
- Fully IC and biocompatible
- Positive seal-washing standard to extend seal life by removing salts and wetting the seal
- Easy maintenance
- Flexible, advanced Chromeleon software control (version 6.8 or later)
- Integrated injection valve with a purge/priming port for precise flow or loop injections

**Key Specifications**

Rated Pressure: 2500 psi

Flow Rates: 0.01–1.00 mL/min

Flow Accuracy: 3% throughout flow range

Pressure Pulsation: 2% peak-to-peak at 100 psi, 1 mL/min with in-line pulse damper

Flow Rate Precision: 0.5% at calibration pressure

Control: full serial/USB control with Chromeleon 6.8 system software or later; generic serial driver control (no status feedback); front panel and relay control

Dimensions (h × w × d): 6.5 × 6.5 × 10 in.

Weight: 15 lbs

Power: 120/230 V AC; 50/60 Hz

Materials: PEEK, ceramic, and inert polymers

**Ordering Information****Hardware**

AXP-MS Auxiliary Pump..... 060684

**MSQ18LA Nitrogen Gas Generator**

With constant pressure, flow, and purity, the MSQ18LA gives you complete independence from cylinder changes, gas costs, and associated administration charges. In addition, you will realize the maximum safety, convenience, and productivity for your instrument.

- Constant gas supply
- Up to 15 times more economical than cylinders
- Simple installation

- Minimal servicing requirements
- Internal air compressor
- CE approved
- Energy efficient

The quiet-running MSQ18LA uses membrane technology to selectively remove moisture, oxygen, and other gasses for clean, dry, phthalate-free nitrogen at a maximum flow rate of 18 L/min. The internal oil-free air compressor ensures years of operation with no fall-off in purity or performance. Its PLC features a total-run hour count for the compressor, and tracks time until next service.

**Note:** The MSQ18LA is for the operation of a single MSQ MS.

**Key Specifications**

Flow Rate: 18 L/min

Outlet Pressure: 100 psi (7 bar)

Internal Air Compressor: yes

Particles >0.01 µm: none

Electrical Requirements: 220 V 50/60 Hz 4A

Outlet Port: 6 mm

Dimensions: 35 × 17 × 16 in./89 × 43 × 41 cms

Weight: 90 lbs (40 kg)

Product Certificate: CE approved; EN61010:1993; EN60204:1992; EN50116:1996

**Ordering Information****Hardware**

MSQ18LA Nitrogen Generator for MS..... 068126

Filter Maintenance Kit for MSQ18LA..... 068349

# Sample Preparation

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# ASE Accelerated Solvent Extractors

*Superior extractions using less time and solvent*

- US EPA Methods 3545A, 6850, and 6860
- CLP SOW OLM 0.42
- ASTM Standard Practice D-7210 and D-7567
- Chinese Method GB/T 19649-2005
- German Method L00.00-34



*ASE Systems:* ASE uses solvents at elevated temperatures and pressure to extract organic and ionic compounds from solid samples.

## ASE Systems

*Two new solvent extraction systems with pH-hardened Dionium components*

Dionex offers two solvent extraction systems. The ASE 150 is an entry-level system with a single extraction cell, for laboratories with modest throughput. The ASE 350 is a sequential extraction system capable of automated extraction of up to 24 samples. Both systems feature chemically-inert Dionium components that allow the extraction of acid- or base-pretreated samples.



*The ASE 150 Accelerated Solvent Extractor.*



*The ASE 350 supports automated extraction of up to 24 samples with variable cell sizes.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Documents on [www.dionex.com](http://www.dionex.com).

### Product Brochures

ASE Series Accelerated Solvent Extractors Brochure

### Product Datasheets

ASE 150 Accelerated Solvent Extractor

ASE 350 Accelerated Solvent Extractor

### Application Notes

**Note:** The following is only a sample of the application notes available using ASE instrumentation and methodologies. Visit [www.dionex.com](http://www.dionex.com) for more application notes

AN 356: Determination of Perchlorate in Vegetation Samples Using Accelerated Solvent Extraction (ASE) and Ion Chromatography

AN 357: Extraction of Phenolic Acids from Plant Tissue Using ASE

AN 358: Extraction and Cleanup of Acrylamide in Complex Matrices Using Accelerated Solvent Extraction (ASE) followed by Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

AN 359: Extraction of Contaminants, Pollutants, and Poisons from Animal Tissue Using Accelerated Solvent Extraction (ASE)

AN 361: Extraction of Total Fat from Food Samples After Acid Hydrolysis Using Accelerated Solvent Extraction (ASE) with GC-MS Analysis

## Ordering Information

### Hardware

ASE 150 Accelerated Solvent Extractor .....	066400
<i>This system does not include extraction cells. Installation is not covered. Installation is P/N 057798.</i>	
ASE 350 Accelerated Solvent Extractor .....	066050
<i>This system does not include extraction cells. Installation is included.</i>	



## ASE Parts & Accessories

*ASE accessories to improve productivity and reduce the need for sample handling*

Dionex offers ASE part and accessories to maintain high productivity in sample extraction. All are designed to meet the unique specifications of ASE instrumentation, and manufactured to meet the quality requirements of modern analytical laboratories.



ASE Starter Kits: All parts and accessories needed to begin using ASE

ASE Heat Exchanger: Cools solvent prior to collection.

ASE Resins and Dispersants: Better extractions with ASE Prep DE dispersant and drying agent, or Prep CR Cation-Exchange resin to absorb strong mineral acids.

ASE Cells: Extraction cells and cell parts for ASE systems.

ASE Filters and Thimbles: Filters and thimbles for uses in ASE extraction cells.

ASE Vials and Bottles: Collection vials for ASE systems. (Includes lids and septa).

## ASE Starter Kits

Everything you need to start using ASE

ASE Starter Kits are customized to match your instrument and cell size requirements include rinse tubes, funnels, filters, and vials designed to match various ASE cell sizes the 34 mL and small-volume kits for ASE 350 include 60 mL collection vial inserts. The kits also include PEEK seals and o-rings for cell maintenance.

ASE Prep CR is a Dionex-proprietary cation exchange resin (NA form) designed to absorb strong mineral acids. Mix with acid hydrolyzed samples for lipid determination using ASE 150 or 350 systems.

**Note:** Contact your local Dionex sales representative to confirm part numbers.

## Ordering Information

### ASE 150 and 350 Starter Kits

ASE 150 Startup Kit, Small Volume.....	068250
ASE 150 Startup Kit, 34 mL.....	068251
ASE 150 Startup Kit, 66 mL.....	068252
ASE 150 Startup Kit, 100 mL.....	068253
ASE 350 Startup Kit, Small Volume.....	068254
ASE 350 Startup Kit, 34 mL.....	068255
ASE 350 Startup Kit, Large Volume .....	068256

## ASE Heat Exchanger

The ASE Heat Exchanger uses a water jacket to cool solvent as it leaves the extraction cells. It is useful for high-temperature extractions (above 150 °C) to minimize solvent or volatile analyte loss.

**Note:** Contact your local Dionex sales representative to confirm part numbers.

## Ordering Information

### ASE Heat Exchanger

Heat Exchanger for ASE 150 or 350 .....	068247
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## ASE Cells



Replacement cells and cell parts for ASE systems are provided in stainless steel (all ASE systems) and Dionium (ASE 150 and 350 only). Use the Dionium cells for samples that require treatment with acid or base.

## Dionium ASE Cells

## Ordering Information

### Dionium Cell Kits for ASE 150 and 350

66 mL Dionium Extraction Cell Kit, 1 cell for ASE 150 or 350 .....	068102
100 mL Dionium Extraction Cell Kit, 1 cell for ASE 150 or 350 .....	068103
66 mL Dionium Extraction Cell Kit, 3 cell for ASE 150 or 350 .....	068104
100 mL Dionium Extraction Cell Kit, 3 cell for ASE 150 or 350 .....	068105

## Stainless Steel ASE Cells

### Ordering Information

#### Stainless Steel Cell Kits for ASE 150 and 350

1 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068095
5 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068096
10 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068097
22 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068098
34 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068099
66 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068100
100 mL Stainless Steel Extraction Cell Kit, Pkg. of 6.....	068101
1 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068085
5 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068086
10 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068087
22 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068088
34 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068089
66 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068090
100 mL Stainless Steel Extraction Cell Kit, 1 cell .....	068091

#### Stainless Steel Cell Kits for ASE 100 and ASE 300

10 mL Extraction Cell Kit, Pkg. of 6.....	060074
34 mL Extraction Cell Kit, Pkg. of 6.....	060075
66 mL Extraction Cell Kit, Pkg. of 6.....	060076
100 mL Extraction Cell Kit, Pkg. of 6.....	060077
10 mL Extraction Cell, 1 cell.....	060070
34 mL Extraction Cell, 1 cell.....	060071
66 mL Extraction Cell, 1 cell.....	060072
100 mL Extraction Cell, 1 cell.....	060073

#### Stainless Steel Cell Kits for ASE 200

11 mL Extraction Cell Kit, Pkg. of 6 for ASE 200 .....	049560
22 mL Extraction Cell Kit, Pkg. of 6 for ASE 200 .....	049561
33 mL Extraction Cell Kit, Pkg. of 6.....	049562
1 mL Extraction Cell, Pkg. of 6 for ASE 200.....	055421
5 mL Extraction Cell, Pkg. of 6 for ASE 200.....	055422
1 mL Extraction Cell, Single for ASE 200.....	055815
5 mL Extraction Cell, Single for ASE 200.....	055817
11 mL Extraction Cell, Single for ASE 200.....	048765
22 mL Extraction Cell, Single for ASE 200.....	048764
33 mL Extraction Cell, Single for ASE 200.....	048763

## ASE Cell Parts

O-rings, PEEK seals and frits require periodic replacement to ensure a proper seal and maximize extraction efficiency.

### Ordering Information

#### Cell Parts for ASE 100, 150, 300 or 350

100 mL Extraction Cell Body .....	056693
66 mL Extraction Cell Body .....	056696
34 mL Extraction Cell Body .....	056646
Frits, 10 µm SST, ASE Cells, Pkg. of 50.....	056775
ASE 300/100 PEEK Seals, Pkg. of 50.....	061687
Vespel Seals for ASE 300/100 Cell Caps, Pkg. of 50 .....	056776
Vespel Seals for ASE 300/100 Cell Caps, Pkg. of 10 .....	056777
Snap Ring for ASE Cell Caps, Pkg. of 10 .....	056778
O-Rings, Teflon, ASE Cell Cap, Pkg. of 50.....	049457
O-Rings, Viton, ASE Cell Caps, Pkg. of 50.....	056325

#### Cell Parts for ASE 150 or 350

Short Rinse Tube for Use with ASE 150 .....	060174
Medium Rinse Tube for Use with ASE 150 .....	060175
Long Rinse Tube for Use with ASE 150 .....	060176
Endcap, package of 2, Dionium, for ASE 350 .....	068107

#### Cell Parts for ASE 200

11 mL Extraction Cell Body for ASE 200.....	048820
22 mL Extraction Cell Body for ASE 200.....	048821
33 mL Extraction Cell Body for ASE 200.....	048822
1 mL Extraction Cell Body for ASE 200.....	054973
5 mL Extraction Cell Body for ASE 200.....	054974
Extraction Cell End Caps, Pkg. of 2, Includes Frits, Seals for ASE 200 .....	049450
Frits, 10 µm SST, ASE Cells, Pkg. of 50 for ASE 200 cells .....	049453
ASE 200 PEEK Seals, Pkg. of 50.....	049454
Snap Ring, ASE 200 Cell Cap, Pkg of 10.....	049456

## ASE Filters and Thimbles

Use filters and thimbles in the extraction cells when extracting complex matrices to prevent plugging and maximize separation of the solvent extract from the matrix.

### ASE Filters

Cellulose and glass fiber filters for use on the ASE systems specified below.

#### Ordering Information

##### Filters for ASE 150 and 350

Glass Fiber Filters for 1, 5, 10, or 22 mL Cells, 27 mm Type D28, Pkg. of 100 .....	068092
Cellulose Filters for 1, 5, 10, or 22 mL cells, 27 mm Type D28, Pkg. of 100 .....	068093
Filter, ASE 100 .....	060941

##### Filters for ASE 100, 150, 300, or 350

Filters, Cellulose for 34, 66, or 100 mL Cells, Pkg of 100, ASE 300/100....	056780
Filters, Glass Fiber, 30 mm, for 34, 66, or 100 mL Cell, Pkg Of 100 .....	056781
Filter, ASE 100 .....	060941
Filters, Cellulose, for 5 mL Extraction Cells, Pkg. of 100.....	055399

##### Filters for ASE 200 Only

Filters, Cellulose for 11, 22, or 33 mL Cell, Pkg. of 100, ASE 200 .....	049458
Filters, Glass Fiber, for 11, 22, or 33 mL Cell, Pkg. of 100, ASE 200.....	047017
Filters, Cellulose, for 1 mL Extraction Cell, Pkg. of 100, ASE 200 .....	055398
Filters, Cellulose for 5 mL Extraction Cell, Pkg. of 100, ASE 200 .....	055399

### ASE Thimbles

Thimbles for use on ASE 200 systems.

#### Ordering Information

##### Thimbles for ASE 200 Only

Thimbles, Cellulose, 11 mL Cell Bodies, Pkg. of 25, ASE 200 .....	055708
Thimbles, Cellulose, 22 mL Cell Bodies, Pkg. of 25, ASE 200 .....	055999

## Vials and Bottles



Collection vessels for ASE systems are available in 40, 60, and 250 mL sizes. Collection vials and bottles come with lids and solvent resistant (TFE) septa. 40 mL and 60 mL graduated vials are only compatible with the ASE 200. 60 mL collection vials are not compatible with the ASE 100.

### ASE Vials and Bottles

#### Ordering Information

##### Collection Bottles

250 mL Clear Collection Bottles for ASE 100, 150 or 350, Pkg. of 12, VOC Cert. ....	056284
<i>Can be used with ASE 100, 150, 300, or 350.</i>	

##### Septa

Ultra Low Bleed Septa, Pkg. of 72 .....	055395
<i>Can be used with all ASE systems.</i>	

##### Collection Vials for ASE 150, 200, and 350

40 mL Clear Collection Vials for ASE 200, I, Pkg. of 72 .....	048783
60 mL Clear Collection Vials for ASE 150, 200 or 350, Clear, Pkg. of 72 ...	048784
40 mL Amber Collection Vials for ASE 200, I, Pkg. of 72 .....	048780
60 mL Clear Collection Vials for ASE 150, 200 or 350, Amber, Pkg. of 72 .	048781

##### Graduated Vials for ASE 150, 200, and 350

Conc.Vial with Spacer (Graduated), 40 mL, Pkg. of 6.....	055441
Conc.Vial (Graduated), 40 mL, Pkg. of 6 .....	055442

## ASE Resins and Dispersants

To aid extractions of wet samples, use ASE Prep DE. For lipid extractions involving acids hydrolysis. Use ASE Prep CR Na<sup>+</sup>, and for lipid extractions using base hydrolysis, use ASE Prep CR H<sup>+</sup> resin.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

#### Product Data Sheets

ASE Prep CR Na<sup>+</sup> Form Cation-Exchange Resin for use with ASE 150 or 350

ASE Prep CR H<sup>+</sup> Form Cation-Exchange Resin for use with ASE 150 or 350

### ASE Prep DE

ASE Prep DE is pelletized diatomaceous earth used as a dispersant and drying agent with wet samples.

### Ordering Information

#### Accessories

Diatomaceous Earth Dispersant for ASE, 1 kg. Bottle..... 062819

### ASE Prep CR Na<sup>+</sup>

ASE Prep CR is a cation-exchange resin (Na<sup>+</sup> form) designed to absorb strong mineral acids. Mix with acid hydrolyzed samples for lipid determination using the ASE 150 or 350.

### Ordering Information

#### Accessories

ASE Prep CR, Na<sup>+</sup> Form, Mineral Acid Neutralizer, 500 g..... 080024

### ASE Prep CR H<sup>+</sup>



The ASE Prep CR H<sup>+</sup> is a cation-exchange resin consumable in the hydrogen form used with the new ASE 350/150 systems for determination of total lipids in foods after base hydrolysis (e.g. extraction of dairy products).

### Ordering Information

#### Accessories

ASE Prep CR H<sup>+</sup>, Qty. 1 bottle, 400 g..... 071397



## Solid-Phase Extraction Systems (SPE)

*Faster, more reliable solid-phase extraction while using less solvent*

The AutoTrace 280 unit can process six samples simultaneously with minimal intervention. The instrument uses powerful pumps and positive pressure with constant flow-rate technology. Current analytical methods that require SPE sample preparation include GC, GC-MS, LC, and LC-MS, IC and IC-MS. The AutoTrace 280 instrument is approved or adapted for US EPA clean water methods and safe drinking water methods (600 and 500 series) and can extract the following analytes:

- PCBs (polychlorinated biphenyls)
- OPPs (Organophosphorus pesticides), OCPs (Organochlorine pesticides), and chlorinated herbicides
- BNAs (base, neutral, acid semivolatiles)
- Dioxins and furans
- PAHs (polyaromatic hydrocarbons)
- Oil and Grease or hexane extractable material

With solid-phase extraction (SPE), large volumes of liquid sample are passed through the system and the compounds of interest are trapped on SPE adsorbents (cartridge or disk format) then eluted with strong solvents to generate an extract ready for analysis. Automated solid-phase extraction saves time, solvent, and labor for analytical laboratories.



*AutoTrace Systems:* The new AutoTrace 280 system provides fast and reliable automated solid phase extraction for organic pollutants from liquid samples.

*AutoTrace Accessories:* AutoTrace 280 high quality parts and accessories



### AutoTrace Systems

*Provides fast and reliable automated solid phase extraction of organic pollutants from samples*

The AutoTrace 280 instrument provides reliable automated SPE for analytical chemists determining organic pollutants in large-volume liquid samples. Compared to liquid-liquid extraction, the AutoTrace 280 saves time, solvent, and labor, ensuring high reproducibility and productivity for analytical labs. The system uses powerful pumps (no check valves) and positive-pressure constant-flow technology to process the most difficult samples and can process up to six samples. Features include:

- SPE technology for liquid-liquid extraction: Reduces solvent usage and eliminates glassware.
- No technician involvement is required to maintain a liquid reservoir or to control the flow.
- Provides constant flow of liquids through SPE cartridges resulting in superior reproducibility.
- Closed systems with fan to vent solvent vapors: No hood required, conserves valuable hood space.
- The instrument can store 24 methods on board and the software used for editing methods is easy to use.
- USB cable connection to PC. Methods to run can be chosen from those stored in the instrument memory.
- Multi-port switching valve ensures the systems reliability.

**Note:** Contact your local Dionex sales representative to confirm part numbers.



*The AutoTrace 280 instrument provides automated solid-phase extraction with a choice of cartridge or disk formatting.*

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

Product Brochures

AutoTrace 280 SPE Instrument Brochure

Product Data Sheets

AutoTrace 280 Solid Phase Extraction Instrument Data Sheet

Application Notes

AN 817: US EPA Method 1664A; Extraction of Oil and Grease from Water Samples AutoTrace 280 Solid-Phase Extraction Cartridge Configuration

AN 818: US EPA Method 1664A; Extraction of Oil and Grease from Water Samples AutoTrace 280 Solid-Phase Extraction Disk Configuration

Ordering Information

The following AutoTrace 280 system configurations require a desktop or laptop computer for operation. It is not included with a system but can be purchased through Dionex. (LAPTOP, PC, DELL, E6400, 2 G,160G, WXP PN 069726)

Hardware	
AutoTrace Automated Large Volume SPE for Disks, 47 mm.....	071386
AutoTrace Automated Large Volume SPE for Cartridges, 6 mL.....	071385
AutoTrace Automated Large Volume SPE for Cartridges, 3 mL.....	072605
AutoTrace Automated Large Volume SPE for Cartridges, 1 mL.....	072604
AutoTrace Automated Large Volume SPE for Cartridges, 6 mL glass .....	072606

## AutoTrace Accessories

The AutoTrace 280 parts and accessories are designed to be used specifically with the AutoTrace 280 solid-phase extraction system. Each part and accessory meets strict Dionex quality standards.

### Plunger Assemblies

#### Ordering Information

Accessories	
Plunger Assembly for 1 mL Columns .....	071078
Plunger Assembly for 3 mL Columns .....	071079
Plunger Assembly for 6 mL Columns .....	071080
Plunger Assembly for 6 mL Glass Cartridges .....	071081

### Elution Racks

#### Ordering Information

Accessories	
Elution Rack for 11 mm GC vials.....	071068
Elution Rack for 15 mL Conical Tubes.....	071069
Elution Rack for 16 x 100 mL Test Tubes .....	071070
Elution Rack for 17 x 60 mm Vials .....	071071
Elution Rack for 4 mL Vials.....	071072
15 mL Conical Tubes (Case of 12).....	071056

### Sample Rack

The AutoTrace 280 sample rack will hold six 60 mL vials, 250 mL bottles or 1 L bottles. The rack is angled to ensure all the sample is retrieved from the sample vessels.

#### Ordering Information

Accessories	
Sample Rack for 60, 250, and 1000 mL Bottles for AutoTrace 280.....	071333

## Glass-Coated Solvent Bottle

Dionex offers glass-coated solvent bottles in 1 and 2 L sizes.

#### Ordering Information

Accessories	
Bottle, 1 L, Coated Glass .....	045900
Bottle, 2 L, Coated Glass, GL45 .....	045901

## PM kit for AutoTrace 280

The preventative maintenance kit contains new tubing, seals and rotors.

#### Ordering Information

Preventative Maintenance Kit	
AutoTrace 280 Preventative Maintenance Kit .....	072598

## SolEx Cartridges



SolEx Silica-Based SPE cartridges are designed for use in the Dionex AutoTrace 280 and other SPE apparatus, including vacuum manifolds and all older models of AutoTrace instruments. These cartridges come with C8, C18, silica gel and charcoal functionality packed in syringe type bodies for utilization in a wide variety of applications. Dionex also offers SPE disks in 47 mm size.

### Key Specifications

Sorbent Media:: Irregular silica particles, 40–63 micron

Surface Area:: 470–530 m<sup>2</sup>/g

Pore Volume:: 0.70–0.85 cm<sup>3</sup>/g

Percent Organic Loading:: 10.5–11.7% (C8);  
21.0–22.2% (C18)

Shelf Life: 24 months from date of shipment if stored in original unopened container

## Ordering Information

Accessories	
SolEx C18 6 mL Cartridge; 1.0 g of Packing.....	074410
SolEx C18 6 mL Cartridge; 0.5 g of Packing.....	074417
SolEx C18 3 mL Cartridge; 0.5 g of Packing.....	074412
SolEx C18 1 mL Cartridge; 0.1 g of Packing.....	074623
SolEx C18 Unendcapped 6 mL Cartridge; 1.0 g of Packing.....	074416
SolEx C8 6 mL Cartridge; 1.0 g of Packing.....	074411
SolEx C8 3 mL Cartridge; 0.5 g of Packing.....	074413
SolEx C8 1 mL Cartridge; 0.1 g of Packing.....	074415



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# Chromeleon Software

## *Innovative Solutions from the World Leader in Chromatography Software*

Software is more than just an essential component of a modern chromatography system—it's often the most important factor affecting how much you get out of that system. With Chromeleon software, you'll get the most out of your chromatography system investment, with measurable productivity gains for your laboratory

- Controls more than 300 HPLC, LC, and IC instruments
- Controls all Dionex chromatographs, Agilent 1100/1200/6890, Waters Alliance, and many more
- Reduces data processing and reporting times by more than 70%
- Gets you quickly from data to knowledge with powerful query, trend, and reporting tools
- Provides complete set of tools for 21 CFR Part 11 compliance

Whether your needs are basic or complex—whether you use instruments from Dionex or other manufacturers, or both—there's a Chromeleon software solution that's right for you. Find out why Chromeleon has become the preferred chromatography data system in thousands of laboratories throughout the world.

**Note:** For more information and ordering details, please contact your local Dionex representative.



**Chromeleon 7.0:** Go from samples to results in the fastest time possible with Chromeleon 7—the Simply Intelligent data system.

**Chromeleon 6.8:** For the broadest multi-vendor control and the most extensive feature set available, choose Chromeleon 6—the world's most complete chromatography software.

**DCMS<sup>Link</sup>:** Operate your Dionex instruments and your mass spectrometer from the same software platform by adding Chromeleon DCMS<sup>Link</sup> plug-in to your MS software (ABI Analyst, Thermo XCaliber, or Bruker Hystar).

**Virtual Column:** Discover the fastest, easiest, and most economical way to optimize IC separations.

## Chromeleon 7

*The fastest way to get from samples to results.*

Discover Chromeleon 7, the chromatography software that streamlines your path from samples to results. Get rich, intelligent functionality and outstanding usability at the same time with Chromeleon 7—the Simply Intelligent chromatography software.

- Enjoy a modern, intuitive user interface designed around the principle of Operational Simplicity.
- Streamlines laboratory processes and eliminate errors with eWorkflows, which enable anyone to perform a complete analysis perfectly with just a few clicks
- Access your instruments, data, and eWorkflows instantly in the Chromeleon Console
- Locate and collate results quickly and easily using powerful built-in database query features
- Interpret multiple chromatograms at a glance using Mini Plots
- Find everything you need to view, analyze, and report data in the Chromatography Studio
- Accelerate analyses and learn more from your data through dynamic, interactive displays
- Deliver customized reports using the built-in Excel-compatible spreadsheet

Chromeleon 7 is a forward-looking solution to your long-term chromatography data needs. It is developed using the most modern software tools and technologies, and innovative features will continue to be added for many years to come.

The Cobra Integration Wizard uses an advanced mathematical algorithm to define peaks. This ensures that noise and shifting baselines are no longer a challenge in difficult chromatograms. When peaks are not fully resolved, the SmartPeaks Integration Assistant visually displays integration options. Once a treatment is selected, the appropriate parameters are automatically included in the processing method.

Chromeleon 7 ensures data integrity and reliability with a suite of compliance tools. Compliance Tools provide sophisticated user management, protected database structures, and a detailed interactive audit trail and versioning system.

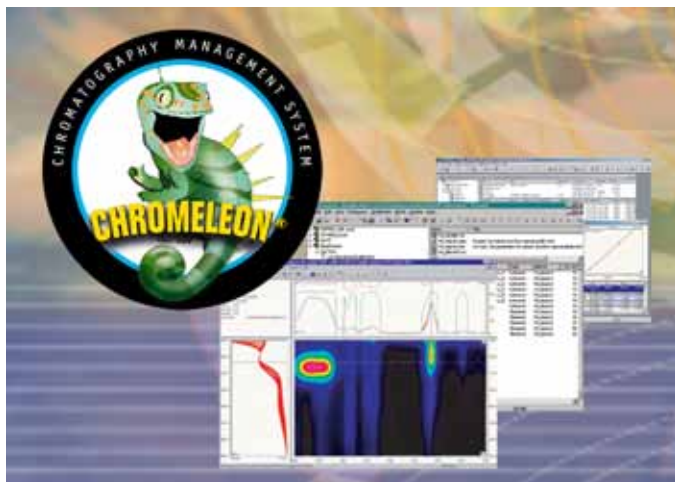
### *Product Brochures*

Chromeleon 7 Chromatography Data System

### *Product Datasheets*

Computer Requirements for Chromeleon 7.0 Chromatography Data System

## Chromeleon 6.8



For the broadest multi-vendor instrument control and the most extensive set of software features, Chromeleon 6.8 is your best choice. Whether you need a solution for HPLC, IC, or GC—whether your scope is a single instrument, a laboratory, a department, or an enterprise—Chromeleon 6.8 has what you need to accomplish the job.

- Controls more than 300 HPLC, LC, and IC instruments, including many legacy models) from more than 30 instrument manufacturers
- Navigate quickly and easily through your data using the Chromeleon browser
- Accelerate our analyses and learn more from your data through dynamic interactive displays
- Locate and collate results quickly and easily using powerful built-in database queries
- Deliver customized reports using built-in customizable Excel-compatible spreadsheets
- Ensure regulatory compliance with a comprehensive security system, validation tools, audit trails, and electronic signatures
- Perform special instrumental techniques like mass spectrometry, fraction collection, and Autodilution
- Scale up easily; from individual workstations to small workgroups to enterprise-wide installations

Chromeleon 6.8 has become the standard chromatography data system in thousands of laboratories worldwide. It meets the needs of any laboratory environment, and readily adapts to changing needs.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### *Product Brochures*

Chromeleon 6—Chromatography Management System Brochure

Chromeleon Chromatography Management System for Ion Chromatography Brochure

Virtual Column Brochure

### *Product Data Sheets*

Computer Requirements for Chromeleon 6.8 Software

### *Application Notes*

AN 174: Calculating Instrument Utilization Using Chromeleon

### *Technical Notes*

TN 54: Using Chromeleon Chromatography Management Software to Comply with 21 CFR Part 11

TN 57: Automated System Suitability Testing with Chromeleon

TN 65: Using Chromeleon in a Networked Environment

TN 67: Instrument Control and Data Acquisition with Chromeleon

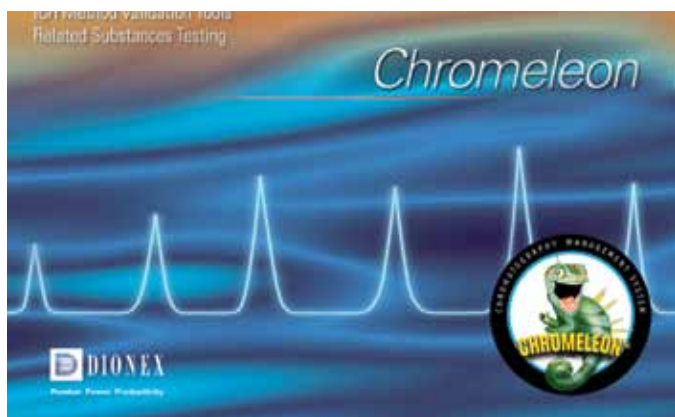
TN 70: Data Reporting in Chromeleon

TN: 81 Automatic Dilutions Using Chromeleon AutoDilution and the Partial Loop Injection Capability of the ICS-3000 AS Autosampler

TN: 83 Automatic Vial-to-Vial Dilutions Using Chromeleon AutoDilution and the ICS-3000 AS Autosampler with the Sample Prep Option

TN 84: Automatic Dilutions Using Chromeleon AutoDilution and Two Injection Loops

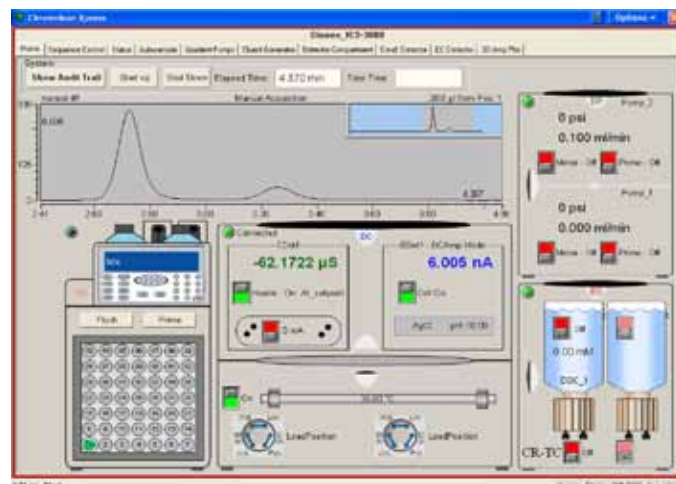
## Chromeleon 6.8 Extension Pack



The Chromeleon 6.8 Extension Pack provides Sequence, Query, and Report templates that help you quickly and easily perform common analyses that would otherwise be slow and tedious. Supported analyses include:

- Size Exclusion Chromatography
- Content Uniformity Testing
- Dissolution Testing
- Related Substances Testing
- ICH Method Validation Tools

## Chromeleon 6.8 Xpress



If you have to use a chromatography data system other than Chromeleon, you can still enjoy full control of Dionex instruments using Chromeleon Express Xpress. It provides Dionex instrument control and sequence management capabilities of Chromeleon, plus real-time displays of instrument status and chromatograms, and co-exists peacefully with your other chromatography software.

- Save effort and eliminate errors by gaining full control and automation of all instrument functions
- Monitor and control all instrument components conveniently through a single intuitive graphical user interface
- Create instrument control programs and sample sequences quickly and easily with click-through wizards
- See real-time instrument status and developing chromatograms
- Protect system components from damages through automatic safety shutoffs in the event of leaks, blockages, empty reservoirs, and other anomalies
- Gain extra confidence in your results with audit trails that automatically track every event that happened during every analysis

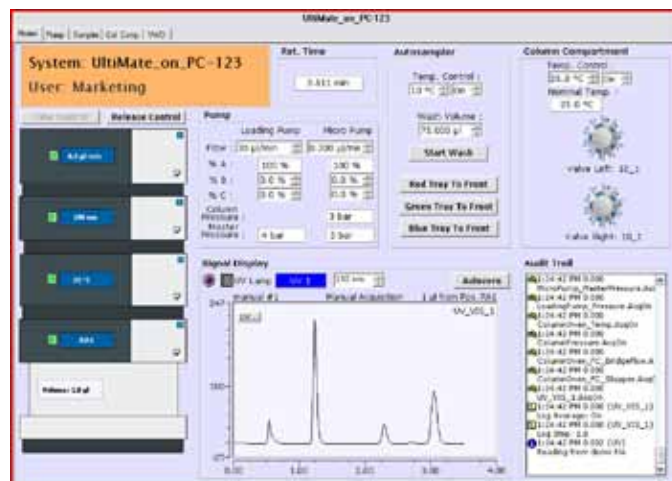
## DCMSLink

*Direct control of Dionex instruments from MS software by ABI/Sciex, Thermo, and Bruker.*

Now you can operate your Dionex instruments from the same platform you use to operate your mass spectrometer by adding Chromeleon DCMSLink.

- DCMSLink for Analyst
- DCMSLink for HyStar
- DCMSLink for Xcalibur

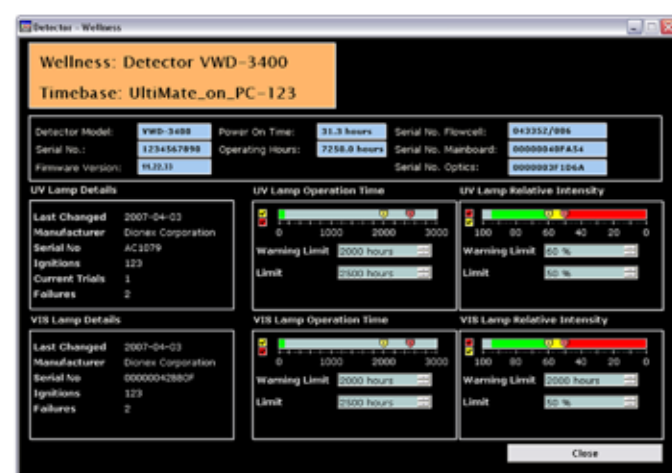
DCMSLink brings additional tools to other MS software, including graphical control interfaces for the Dionex instruments.



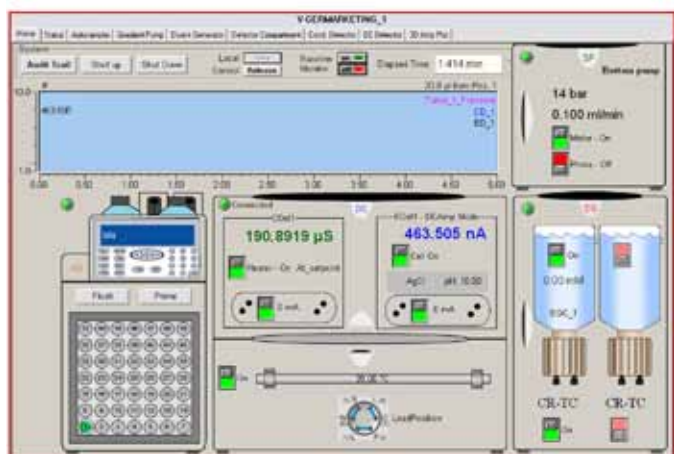
Control interface for the Dionex UltiMate 3000.



DCMSLink provides control of Dionex chromatography devices through MS software from ABI/Sciex, Thermo Fisher Scientific, and Bruker Daltonics.



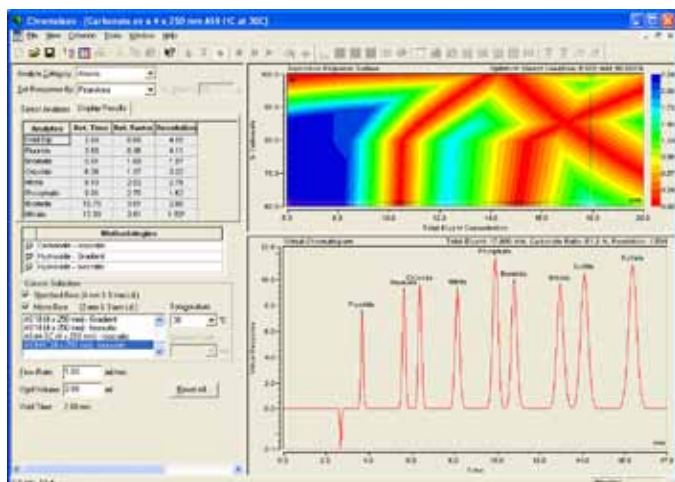
Easy access to system wellness counters.



Control interface for the Dionex ICS-3000.



## Virtual Column



Now you can easily determine the best column and separation conditions for any IC application in just a few minutes, without even turning on your instrument! Virtual Column eliminates the risks and hassles of optimizing separations by modeling their behavior using pre-acquired Dionex-validated data.

- Find the best way to separate your specific analytes of interest and get better resolution in less time—without doing any laboratory work!
- Model separations on different columns under various isocratic or gradient conditions and at different temperatures
- See in advance how your chromatograms will be affected by issues such as void volume changes, flow rate changes, variations in concentration/analyte ratio, and column overloading
- Save days or weeks of trial-and-error experimentation by identifying the best solution before you make the first injection

Virtual Column is available as an option for Chromeleon 6 and Chromeleon 7.

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## Reversed-Phase LC Columns

### *Reversed-phase silica columns with high-efficiency and ideal selectivity*

Acclaim columns are based on high-purity, porous silica particles, advanced column bonding and packing technologies, and controlled manufacturing processes. This provides complementary selectivity, high column efficiencies, and symmetrical peaks. Acclaim columns meet the high standards set by modern HPLC and LC/MS methods and are used in such applications as pharmaceutical, environmental, food and beverage, chemical, and consumer products.

- Ultrapure, porous, spherical silica
- Novel and proprietary surface chemistries for diversified selectivities
- Low silanol activity for good basic analyte peak shapes
- Reliable manufacturing process with thorough testing
- LC/MS compatible
- IonPac NS1 for determination of high molecular weight ionic analytes.

Acclaim columns are based on ultrahigh-purity, porous, spherical silica particles and include C18, C8, Polar Advantage (PA) and Polar Advantage II (PA2), available in three particle sizes (2.2  $\mu\text{m}$ , 3  $\mu\text{m}$ , and 5  $\mu\text{m}$ ) and various column formats.

**Note:** See the Acclaim Library at <http://www.dionex.com/en-us/documents/acclaim-library/lp-71591.html>



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

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

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

*Acclaim PolarAdvantage:* Sulfonamide-embedded column for separating a wide variety of polar and nonpolar analytes.

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

*Acclaim Rapid Separation LC:* 2.2  $\mu\text{m}$  and 3  $\mu\text{m}$  columns of various surface chemistries for high-throughput, high-resolution analysis with reduced solvent consumption.

## Acclaim 120 C18

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

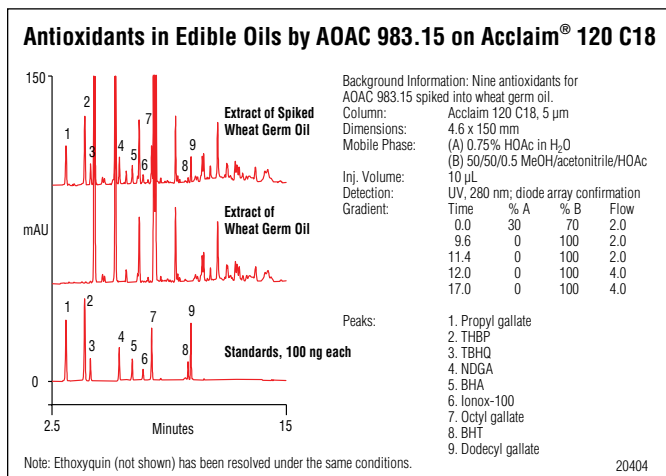
The Acclaim 120 columns are for high resolution reversed-phase separations. The very high surface coverage and very low metal content together result in columns with excellent efficiencies. These columns provide exceptional performance for a variety of applications in the pharmaceutical, chemical, environmental,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

- Low silanol activity for excellent peak shapes for basic analytes
- High hydrophobic retention
- Very high efficiencies for maximum resolution
- Reproducible manufacturing practices for reproducible column-to-column performance
- LC/MS compatible

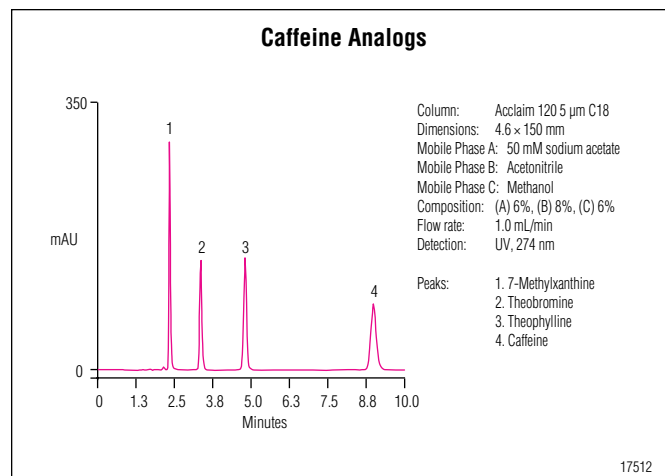
Acclaim 120 C18 columns have high surface coverage, resulting in high-capacity columns. They are stable between pH 2 and 8 and available in 2.2, 3 and 5  $\mu\text{m}$  particles sizes, and 4.6, 3.0, and 2.1 mm-diameters, with an average pore diameter of 120 Å and surface area of 300 m<sup>2</sup>/g. All phases are LC/MS compatible because of the low silica bleed that results from the stable bonding procedure. These columns are also available for fast UHPLC; please see the Acclaim Rapid Separation LC section.

### Wide Range of Applications

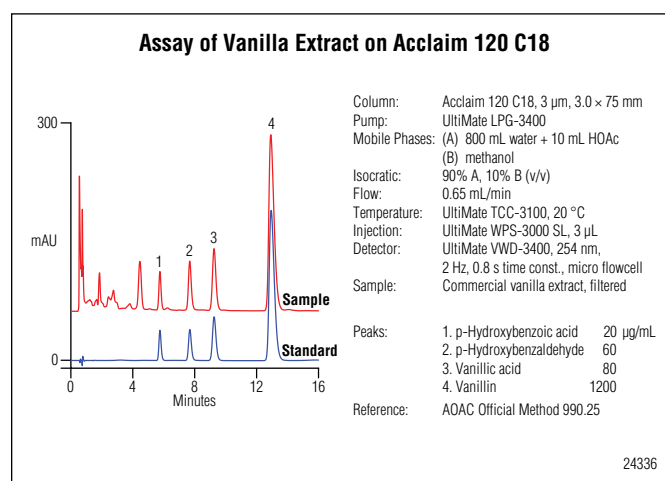
The Acclaim 120 C18 can be used for the many diverse reversed-phase C18 separations. Its rugged, reproducible, and reliable chromatographic performance make it appropriate for pharmaceutical, environmental, food, and other industrial chromatographic separations. The Acclaim Catalog has many examples of the use of this column.



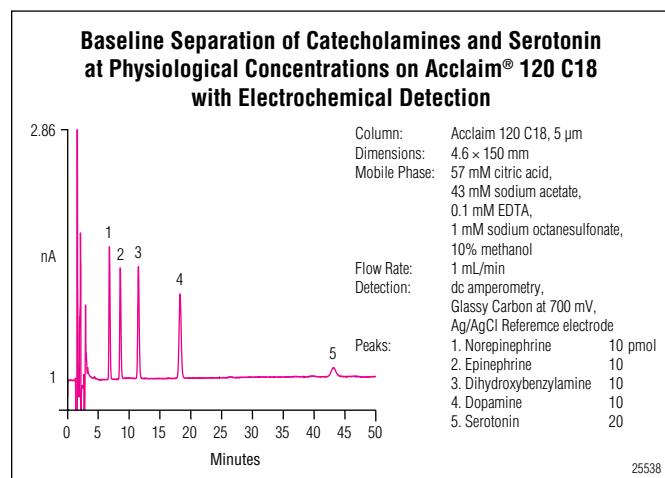
Antioxidants in edible oils using AOAC Method 983.15.



Caffeine analogs.



Assay of vanilla extract.



Separation of Catecholamines and Serotonin on Acclaim 120 C18.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Acclaim Bonded Silica-Based Columns for HPLC

Dionex MS Applications Guide

### Product Data Sheets

Acclaim 120 HPLC Columns Data Sheet

### Application Notes

AN 130: Identification of a Hydroxylysine-Containing Peptide Using AAA-Direct

AN 192: Rapid Analysis of Ginseng Using Accelerated Solvent Extraction and High Performance Liquid Chromatography

AN 207: Chromatographic Fingerprinting of Flos Chrysanthema Indici Using HPLC

AN 223: Determination of Ten Active Ingredients in Sunscreen-Containing Products in a Single Injection

AN 224: Determination of Melamine in Milk Powder by Reversed-Phase HPLC with UV Detection

AN 232: Determination of Anthraquinones and Stilbenes in Giant Knotweed Rhizome by HPLC with UV Detection

### Application Updates

AU 156: Evaluation of Acclaim HPLC Columns Using the National Institute of Standards Standard Reference Material 870

### Technical Notes

TN 701: Sub One-Minute, Nine-Component Gradient HPLC Separation for Increased Productivity Using an Acclaim 120 3- $\mu$ m C18 Column

## Ordering Information

Columns for fast LC (UHPLC) are listed in the RSLC section.

### Analytical Columns

Acclaim 120, C18, 3 $\mu$ m Analytical (2.1 x 50 mm).....	059128
Acclaim 120, C18, 3 $\mu$ m Analytical (2.1 x 100 mm).....	059129
Acclaim 120, C18, 3 $\mu$ m Analytical (2.1 x 150 mm).....	059130
Acclaim 120 C18, 3 $\mu$ m Analytical, (3.0 x 50 mm).....	068971
Acclaim 120, C18, 3 $\mu$ m Analytical (3.0 x 150 mm).....	063691
Acclaim 120, C18, 3 $\mu$ m, Analytical, (3.0 x 250 mm).....	070077
Acclaim 120, C18, 3 $\mu$ m Analytical (4.6 x 50 mm).....	059131

Acclaim 120, C18, 3 $\mu$ m Analytical (4.6 x 100 mm).....	059132
Acclaim 120, C18, 3 $\mu$ m Analytical (4.6 x 150 mm).....	059133
Acclaim 120, C18, 5 $\mu$ m Analytical (2.1 x 50 mm).....	059142
Acclaim 120, C18, 5 $\mu$ m Analytical (2.1 x 100 mm).....	059143
Acclaim 120, C18, 5 $\mu$ m Analytical (2.1 x 150 mm).....	059144
Acclaim 120, C18, 5 $\mu$ m Analytical (2.1 x 250 mm).....	059145
Acclaim 120, C18, 5 $\mu$ m Analytical (4.6 x 50 mm).....	059146
Acclaim 120, C18, 5 $\mu$ m Analytical (4.6 x 100 mm).....	059147
Acclaim 120, C18, 5 $\mu$ m Analytical (4.6 x 150 mm).....	059148
Acclaim 120, C18, 5 $\mu$ m Analytical (4.6 x 250 mm).....	059149

### Guard Columns

Acclaim 120, C18, 5 $\mu$ m Guard Cartridges, (2.1 x 10 mm) 2 ea.; (Requires Holder 069580).....	069689
Acclaim 120 C18, 5 $\mu$ m Guard Cartridges (3 x 10 mm), 2 ea., (Requires Holder 069580).....	071981
Acclaim 120, C18, 5 $\mu$ m Guard Cartridges, (4.6 x 10 mm) (use V-2 holder).....	069695
Acclaim SST Guard Cartridge Holder (V-2).....	069580
Guard-to- Analytical Column Coupler (V-2) .....	074188
Acclaim Guard Kit (Holder and coupler) (V-2).....	069707

### Micro and Nano Columns

Acclaim 120, C18, 3 $\mu$ m, 120 Å, 75 $\mu$ m i.d. x 5 cm.....	162238
Acclaim 120, C18, 3 $\mu$ m, 120 Å, 75 $\mu$ m i.d. x 15 cm.....	162239
Acclaim 120, C18, 3 $\mu$ m, 120 Å, 300 $\mu$ m i.d. x 5 cm.....	162236
Acclaim 120, C18, 3 $\mu$ m, 120 Å, 300 $\mu$ m i.d. x 15 cm.....	162237
Acclaim 120, C18, 3 $\mu$ m, 120 Å, 1.0 mm i.d. x 5 cm.....	162234
Acclaim 120, C18, 3 $\mu$ m, 120 Å, 1.0 mm i.d. x 15 cm.....	162235
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 75 $\mu$ m i.d. x 5 cm.....	161456
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 75 $\mu$ m i.d. x 15 cm.....	161457
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 75 $\mu$ m i.d. x 25 cm.....	161458
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 300 $\mu$ m i.d. x 5 cm.....	161453
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 300 $\mu$ m i.d. x 15 cm.....	161454
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 300 $\mu$ m i.d. x 25 cm.....	161455
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 1.0 mm i.d. x 5 cm.....	161450
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 1.0 mm i.d. x 15 cm.....	161451
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 1.0 mm i.d. x 25 cm.....	161452

### Micro and Nano Precolumns

Acclaim 120, C18, 5 $\mu$ m, 120 Å, 300 $\mu$ m i.d. x 5 mm, 5 Cartridges .....	162326
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 500 $\mu$ m i.d. x 5 mm, 5 Cartridges .....	162324
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 1.0 mm i.d. x 5 mm, 5 Cartridges .....	162321
Acclaim 120, C18, 5 $\mu$ m, 120 Å, 1.0 mm i.d. x 15 mm, 5 Cartridges .....	162322

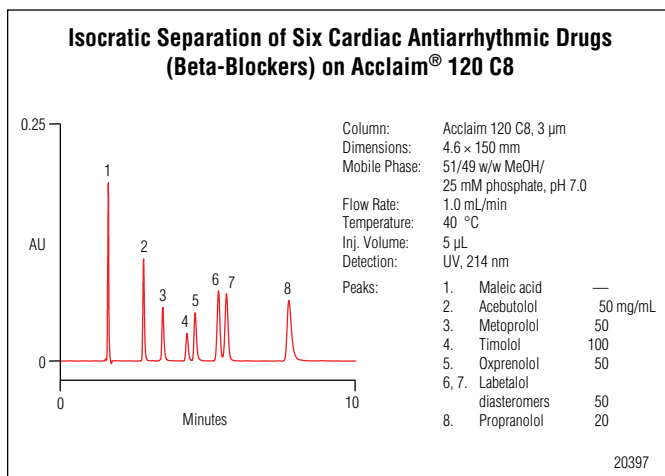
*These columns are designed for optimal performance using Dionex UltiMate 3000 and ICS-5000 chromatography instruments.*

## Acclaim 120 C8

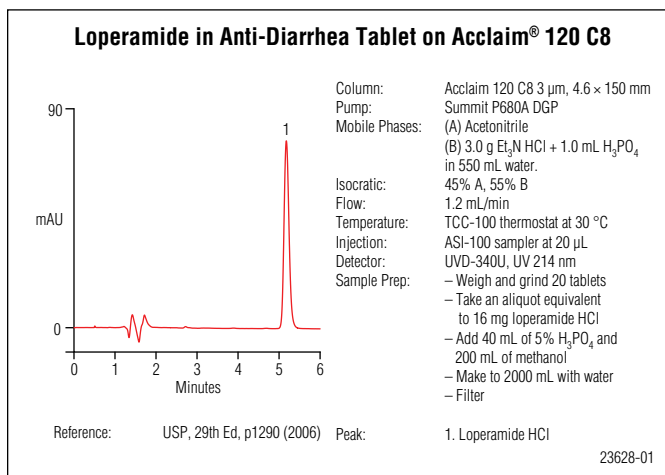
*High performance reversed-phase columns for the separation of small molecules*

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

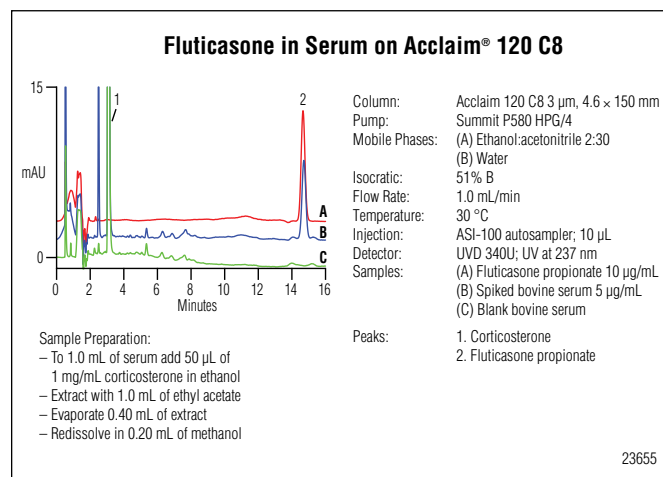
- Low silanol activity for excellent peak shapes for basic analytes
- Excellent column efficiencies
- LC/MS compatible
- Reproducible manufacturing practices for reproducible column-to-column performance



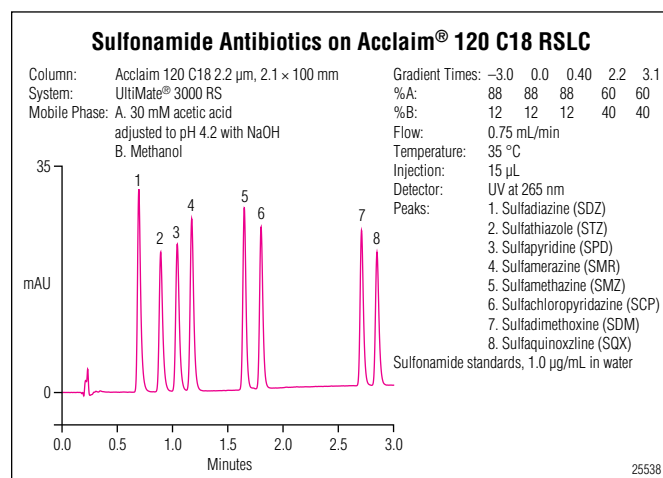
*Isocratic separation of six cardiac antiarrhythmic drugs (Beta-Blockers).*



*Determination of loperamide in antidiarrheal tablets.*



*Fluticasone in serum.*



*Assay of aspirin.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

[Product Brochures](#)

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

[Product Data Sheets](#)

Acclaim 120 HPLC Columns Data Sheet

[Application Updates](#)

AU 156: Evaluation of Acclaim HPLC Columns Using the National Institute of Standards Standard Reference Material 870

## Ordering Information

### Analytical Columns

Acclaim 120, C8, 3 µm Analytical (2.1 x 50 mm).....	059122
Acclaim 120, C8, 3 µm Analytical (3.0 x 150 mm).....	068970
Acclaim 120, C8, 3 µm Analytical (3.0 x 250 mm).....	070078
Acclaim 120, C8, 3 µm Analytical (2.1 x 100 mm).....	059123
Acclaim 120, C8, 3 µm Analytical (2.1 x 150 mm).....	059124
Acclaim 120, C8, 3 µm Analytical (4.6 x 50 mm).....	059125
Acclaim 120, C8, 3 µm Analytical (4.6 x 100 mm).....	059126
Acclaim 120, C8, 3 µm Analytical (4.6 x 150 mm).....	059127
Acclaim 120, C8, 5 µm Analytical (2.1 x 50 mm).....	059134
Acclaim 120, C8, 5 µm Analytical (2.1 x 100 mm).....	059135
Acclaim 120, C8, 5 µm Analytical (2.1 x 150 mm).....	059136
Acclaim 120, C8, 5 µm Analytical (2.1 x 250 mm).....	059137
Acclaim 120, C8, 5 µm Analytical (4.6 x 50 mm).....	059138
Acclaim 120, C8, 5 µm Analytical (4.6 x 100 mm).....	059139
Acclaim 120, C8, 5 µm Analytical (4.6 x 150 mm).....	059140
Acclaim 120, C8, 5 µm Analytical (4.6 x 250 mm).....	059141

### Guard Columns

Acclaim 120, C8, 5 µm, Guard Cartridges, (2.1 x 10 mm), 2 ea.; (Requires Holder 069580).....	069688
Acclaim 120, C8, 5 µm Guard Cartridges (3 x 10 mm), 2 ea., (Requires Holder 069580).....	071979
Acclaim 120, C8, 5 µm Guard Cartridges, (4.6 x 10 mm), 2 ea., (use V-2 Holder).....	069696
Guard to Analytical Column Coupler V-2.....	074188
Acclaim Guard Kit (Holder and coupler) V-2.....	069707
Acclaim SST Guard Cartridge Holder V-2.....	069580
SST Guard Cartridge Holder.....	059456

### Micro and Nano Columns

Acclaim 120, C8, 3 µm, 120 Å, 75 µm i.d. x 5 cm.....	162208
Acclaim 120, C8, 3 µm, 120 Å, 75 µm i.d. x 15 cm.....	162209
Acclaim 120, C8, 3 µm, 120 Å, 300 µm i.d. x 15 cm.....	162207
Acclaim 120, C8, 3 µm, 120 Å, 300 µm i.d. x 5 cm.....	162206
Acclaim 120, C8, 3 µm, 120 Å, 1.0 mm i.d. x 5 cm.....	162204
Acclaim 120, C8, 3 µm, 120 Å, 1.0 mm i.d. x 15 cm.....	162205
Acclaim 120, C8, 5 µm, 120 Å, 75 µm i.d. x 5 cm.....	162216
Acclaim 120, C8, 5 µm, 120 Å, 75 µm i.d. x 15 cm.....	162217
Acclaim 120, C8, 5 µm, 120 Å, 75 µm i.d. x 25 cm.....	162218
Acclaim 120, C8, 5 µm, 120 Å, 300 µm i.d. x 5 cm.....	162213
Acclaim 120, C8, 5 µm, 120 Å, 300 µm i.d. x 25 cm.....	162215
Acclaim 120, C8, 5 µm, 120 Å, 1.0 mm i.d. x 5 cm.....	162210
Acclaim 120, C8, 5 µm, 120 Å, 1.0 mm i.d. x 15 cm.....	162211
Acclaim 120, C8, 5 µm, 120 Å, 1.0 mm i.d. x 25 cm.....	162212

### Micro and Nano Precolumns

Acclaim 120, C8, 5 µm, 120 Å, 300 µm i.d. x 5 mm, 5 Cartridges .....	162266
Acclaim 120, C8, 5 µm, 120 Å, 500 µm i.d. x 5 mm, 5 Cartridges .....	162264
Acclaim 120, C8, 5 µm, 120 Å, 500 µm i.d. x 15 mm, 5 Cartridges .....	162265
Acclaim 120, C8, 5 µm, 120 Å, 800 µm i.d. x 5 mm, 5 Cartridges .....	162263
Acclaim 120, C8, 5 µm, 120 Å, 1.0 mm i.d. x 5 mm, 5 Cartridges .....	162261
Acclaim 120, C8, 5 µm, 120 Å, 1.0 mm i.d. x 15 mm, 5 Cartridges .....	162262

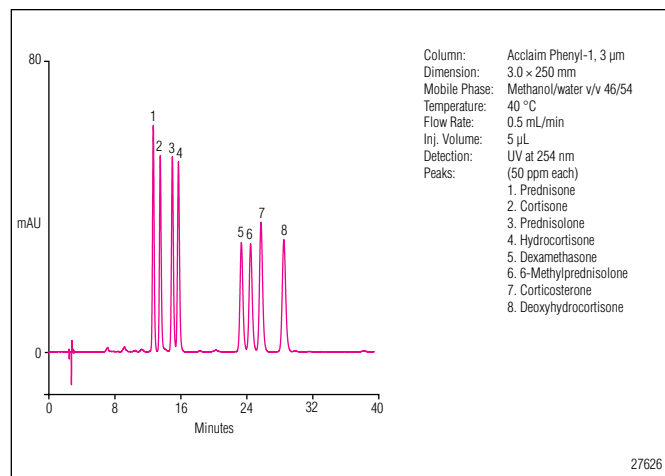
## Acclaim Phenyl-1

*A unique reversed-phase column with high aromatic selectivity*

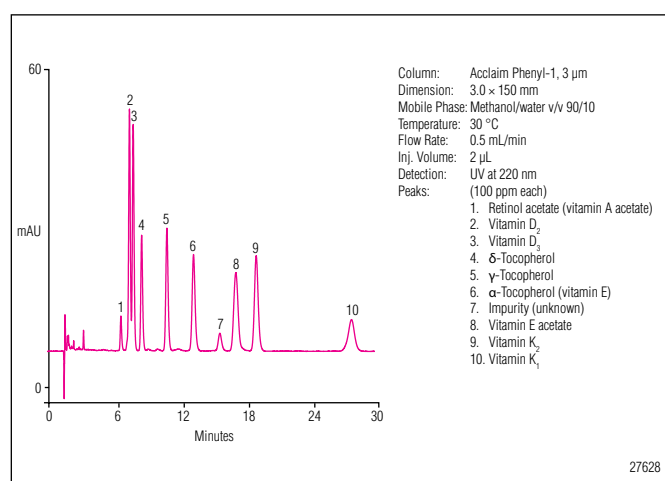
Acclaim Phenyl-1 columns provide unique selectivity of aromatic compounds for superior chromatographic performance. This column has higher  $\pi$ - $\pi$  interaction than other phenyl phases, thus providing unique selectivity and greater separation options than other phenyl supports. The column is engineered to provide high hydrophobic retention, ideal for retaining a broad range of analytes. It is compatible with 100% aqueous conditions for good hydrolytic stability.

- High aromatic selectivity
- High hydrophobic retention
- Unique and complementary selectivity
- Compatibility with highly aqueous mobile phase
- High efficiency and rugged packing

The Acclaim Phenyl-1 column is based on covalent modification of high-purity, spherical, porous silica particles, with a specially designed silane ligand bearing proprietary alkyl aromatic functionality. This novel column chemistry results in the following benefits. Acclaim Phenyl columns are available in 3  $\mu$ m particle sizes and 4.6, 3.0, and 2.1 mm diameters, with an average pore diameter of 120Å. The Acclaim Phenyl-1 may be used for LC/MS applications.



Separation of glucocorticosteroids.

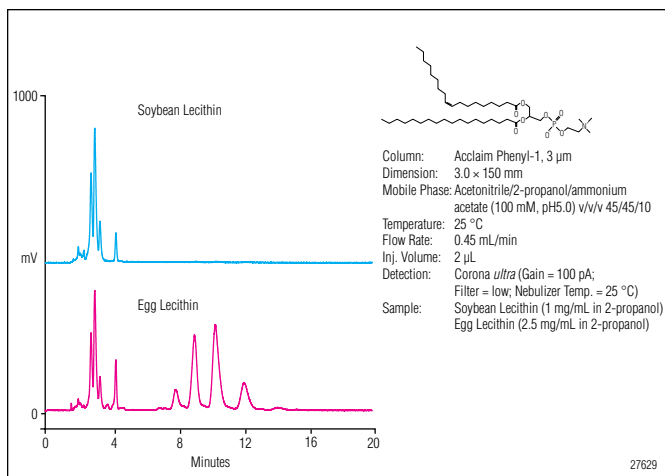


Separation of fat-soluble vitamins.

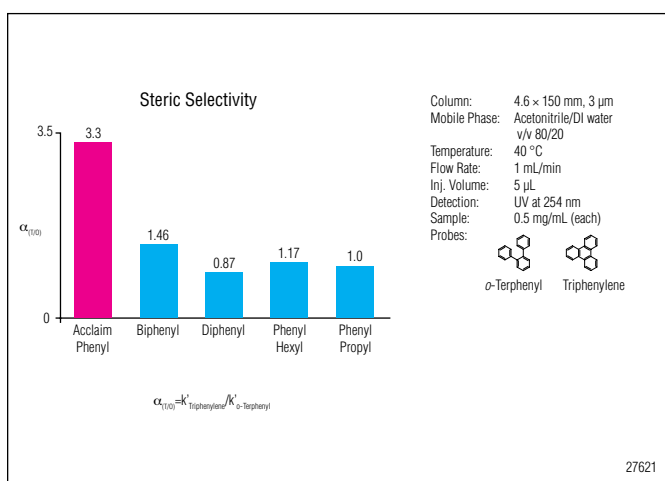
## Applications

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





Analysis of soybean lecithin and egg lecithin.



Aromatic selectivity comparison.

## Ordering Information

### Analytical Columns

Acclaim Phenyl-1, 3 $\mu$ m, Analytical, (4.6 x 150mm).....	071969
Acclaim Phenyl-1, 3 $\mu$ m, Analytical, (3.0 x 250 mm).....	074694
Acclaim Phenyl-1, 3 $\mu$ m, Analytical, (3.0 x 150 mm).....	071970
Acclaim Phenyl-1, 3 $\mu$ m, Analytical, (3.0 x 100 mm).....	074693
Acclaim Phenyl-1, 3 $\mu$ m, Analytical, (3.0 x 50 mm).....	071972
Acclaim Phenyl-1, 3 $\mu$ m, Analytical, (2.1 x 150mm).....	071971

### Guard Columns

Acclaim Phenyl-1, 3 $\mu$ m, Guard (4.6 x 10 mm).....	071973
Acclaim Phenyl-1, 3 $\mu$ m, Guard (3.0 x 10 mm).....	071974
Acclaim Phenyl-1, 3 $\mu$ m Guard (2.1 x 10 mm).....	071975
Guard to Analytical Column Coupler V-2.....	074188
Acclaim Guard Kit (Holder and coupler) V-2.....	069707
Acclaim SST Guard Cartridge Holder V-2.....	069580

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

Acclaim Phenyl-1: A Reversed-Phase Column with High Aromatic Selectivity

## Acclaim PolarAdvantage

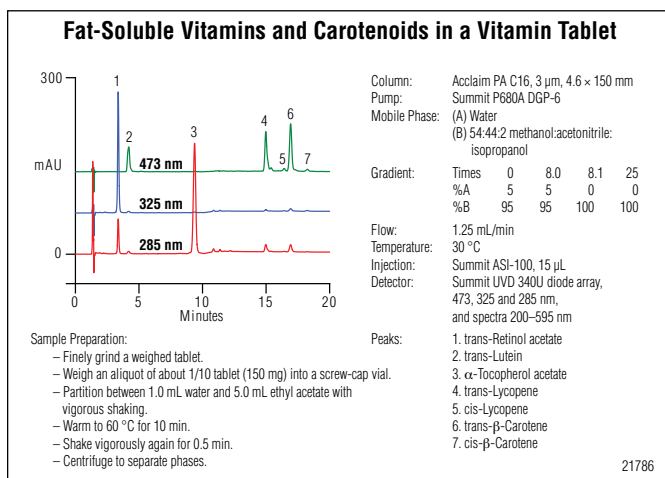
*Novel polar-embedded reversed-phase columns with unique selectivity*

Acclaim Polar Advantage (PA) columns feature a patented bonding column chemistry that incorporates a polar sulfonamide group with an ether linkage near the silica surface. This unique chemistry provides low silanol activity, compatibility with 100% aqueous mobile phase, and different selectivity complementary to C18 column. The Acclaim PA column offers great separation power to resolve a wide variety of polar and nonpolar analytes and supports LC/MS analysis.

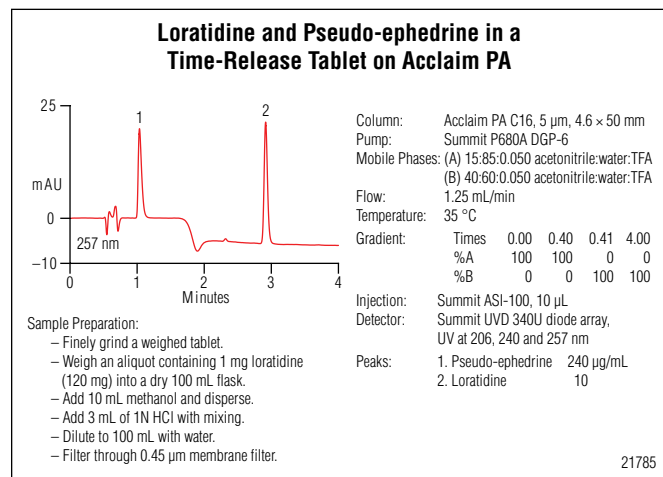
- Novel polar-embedded column chemistry
- Selectivity complementary to the C18 column
- Low silanol activity for excellent peak shape with basic compounds
- Compatible with mobile phases from 100% aqueous to 100% organic solvent
- High selectivity for hydrophobic aromatic molecules
- Wide range of applications

Conventional C18 phases are not compatible with highly aqueous mobile phases, due to dewetting. The Acclaim PA column by design has a mildly hydrophilic surface, which remains in contact with aqueous-only mobile phases, negating the problems of dewetting common with conventional reversed-phase columns.

Acclaim PA columns are available in 2.2, 3, and 5  $\mu\text{m}$  particle sizes and 4.6, 3.0, and 2.1 mm diameters, with an average pore diameter of 120 Å. The Acclaim PA column is compatible with LC/MS applications. These columns are available for fast LC; see the RSLC section.



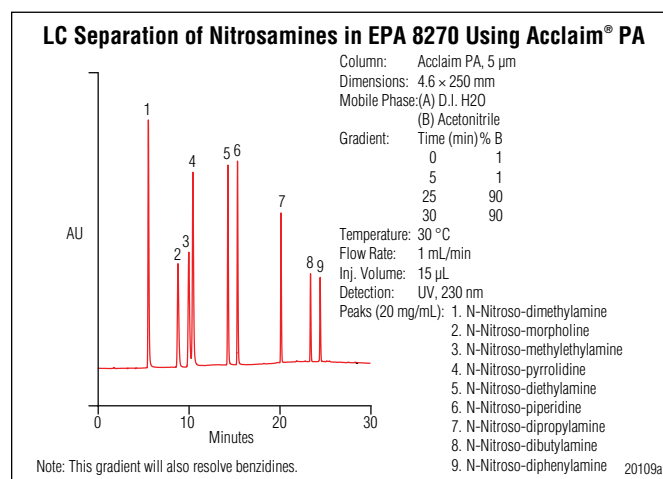
Analysis of fat-soluble vitamins and carotenoids in a vitamin tablet.



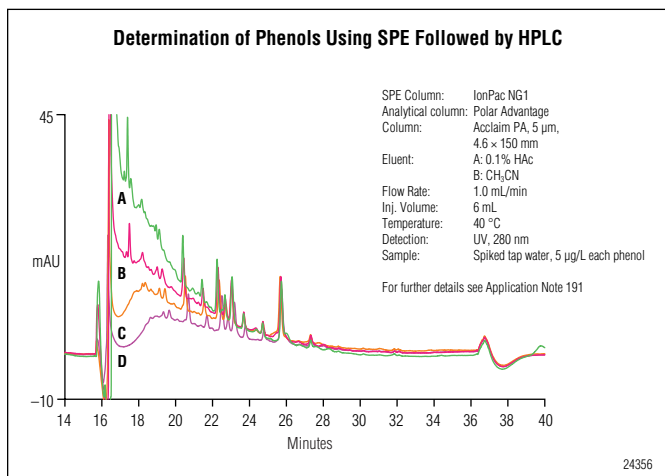
Analysis of loratidine and pseudo-ephedrine in a time-release tablet.

## Applications

The Acclaim PA column can be used in a wide range of applications. Compared to the C18 column, Acclaim PA columns provide unique selectivity, good peak shape for acidic, basic, and neutral analytes, and full compatibility with 100% aqueous conditions. Applications include pharmaceutical, environmental, life science, food testing, and product-quality testing.



LC separation of nitrosamines, as specified in EPA 8270.



Determination of phenols in drinking water.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

LC/MS Application Guide

### Product Data Sheets

Acclaim PolarAdvantage HPLC Columns Data Sheet

### Application Notes

AN 180: Determination of Nevirapine Using HPLC with UV Detection

AN 191: Determination of Phenols in Drinking and Bottled Mineral Waters Using Online Solid-Phase Extraction Followed by HPLC with UV Detection

AN 195: Determination of Verapamil Hydrochloride Purity Using the Acclaim PA Column

AB 102: Determination of Aucubin, Genipoides, and Pinoresinol Diglucoside in Cortex Eucommiae Using ASE and HPLC

### Application Updates

AU 156: Evaluation of Acclaim HPLC Columns Using the National Institute of Standards Standard Reference Material 870

## Ordering Information

Columns for fast LC (UHPLC) are listed in the RSLC section.

## Analytical Columns

Acclaim PA, 3 µm Analytical (2.1 × 50 mm).....	063174
Acclaim PA, 3 µm Analytical (2.1 × 100 mm).....	061316
Acclaim PA, 3 µm Analytical (2.1 × 150 mm).....	061317
Acclaim PA, 3 µm Analytical (3.0 × 50 mm).....	068972
Acclaim PA, 3 µm Analytical (3.0 × 150 mm).....	063693
Acclaim PA, 3 µm Analytical (3.0 × 250 mm).....	070079
Acclaim PA, 3 µm Analytical (4.6 × 150 mm).....	061318
Acclaim PA, 5 µm Analytical (4.6 × 50 mm).....	061319
Acclaim PA, 5 µm Analytical (4.6 × 150 mm).....	061320
Acclaim PA, 5 µm Analytical (4.6 × 250 mm).....	061321

## Guard Columns

Acclaim PA, 5 µm, Guard Cartridges (2.1 × 10 mm), 2 ea. ....	069691
Acclaim PA, 5 µm Guard Cartridges (3 × 10 mm), 2 ea. ....	071983
Acclaim PA, 5 µm Guard Cartridges (4.6 × 10 mm), 2 ea. ....	069698
Acclaim SST Guard Cartridge Holder V2 .....	069580
Guard Kit (Holder and Coupler) .....	069707
Guard to Analytical Column Coupler .....	074188

## Micro and Nano Columns

Acclaim PA, 3 µm, 120 Å, 75 µm i.d. × 5 cm.....	162244
Acclaim PA, 3 µm, 120 Å, 300 µm i.d. × 5 cm.....	162242
Acclaim PA, 3 µm, 120 Å, 300 µm i.d. × 15 cm.....	162243
Acclaim PA, 3 µm, 120 Å, 1.0 mm i.d. × 5 cm.....	162240
Acclaim PA, 3 µm, 120 Å, 1.0 mm i.d. × 15 cm.....	162241
Acclaim PA, 5 µm, 120 Å, 75 µm i.d. × 5 cm.....	162252
Acclaim PA, 5 µm, 120 Å, 75 µm i.d. × 15 cm.....	162253
Acclaim PA, 5 µm, 120 Å, 75 µm i.d. × 25 cm.....	162254
Acclaim PA, 5 µm, 120 Å, 300 µm i.d. × 5 cm.....	162249
Acclaim PA, 5 µm, 120 Å, 300 µm i.d. × 15 cm.....	162250
Acclaim PA, 5 µm, 120 Å, 1.0 mm i.d. × 5 cm.....	162246
Acclaim PA, 5 µm, 120 Å, 1.0 mm i.d. × 15 cm.....	162247
Acclaim PA, 5 µm, 120 Å, 1.0 mm i.d. × 25 cm.....	162248

## Micro and Nano Precolumns

Acclaim PA, 5 µm, 120 Å, 300 µm i.d. × 5 mm, 5 Cartridges .....	162302
Acclaim PA, 5 µm, 120 Å, 500 µm i.d. × 5 mm, 5 Cartridges .....	162336
Acclaim PA, 5 µm, 120 Å, 500 µm i.d. × 15 mm, 5 Cartridges .....	162337
Acclaim PA, 5 µm, 120 Å, 800 µm i.d. × 5 mm, 5 Cartridges .....	162335
Acclaim PA, 5 µm, 120 Å, 1.0 mm i.d. × 5 mm, 5 Cartridges .....	162333
Acclaim PA, 5 µm, 120 Å, 1.0 mm i.d. × 15 mm, 5 Cartridges .....	162334
Acclaim PA, 3 µm, 120 Å, 75 µm i.d. × 15 cm.....	162245

*These columns are designed for optimal performance using Dionex UltiMate 3000 and ICS-5000 chromatography instruments.*

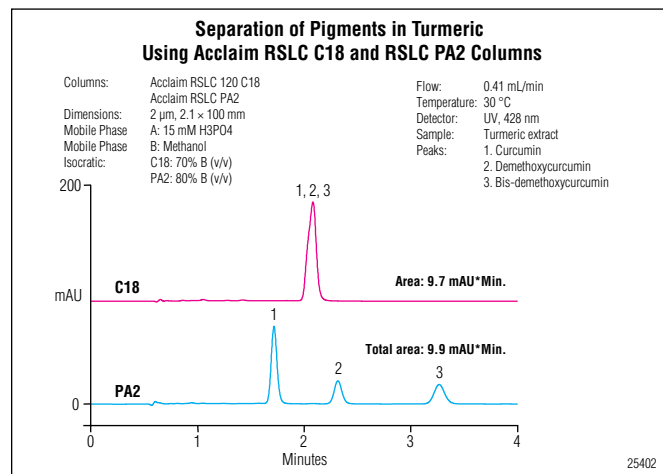
## Acclaim PolarAdvantage II

*Complementary selectivity and enhanced hydrolytic stability*

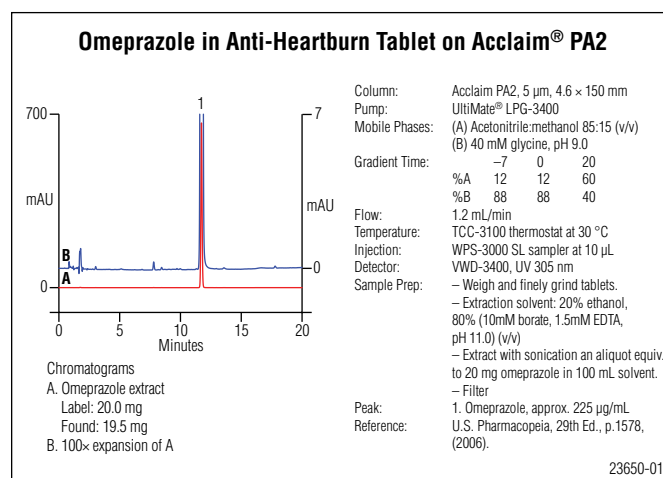
Acclaim Polar Advantage II (PA2) columns feature a patented surface chemistry that incorporates amide-embedded polar group and multi-point attachment between the ligands and the silica surface. This unique chemistry provides enhanced hydrolytic stability from pH 1.5–10 with 100% aqueous mobile phases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

- Hydrolytic stability at both low pH and high pHs (pH 1.5–10)
- Good peak shape for both basic and acidic compounds
- Compatible with 100% aqueous mobile phases
- Selectivity complementary to C18 columns
- Compatible with MS detection

Acclaim PA2 columns are available in 2.2, 3, and 5  $\mu\text{m}$  particle sizes and 4.6, 3.0, and 2.1 mm diameters, with an average pore diameter of 120 Å. These columns are available for fast LC; refer to the RSLC section.



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



Determination of omeprazole in anti-heartburn tablet.

## Highly Stable Under Wide pH Range

The proprietary bonding of the Acclaim PA2 column resists hydrolytic attack by protecting the bonded phase. Due to its enhanced hydrolytic stability and hydrophilic surface, these columns are ideal for applications requiring aggressive pHs (PFOS/PFOA or anionic surfactants by suppressed conductivity detection) or aqueous conditions (water-soluble vitamins). The Acclaim PA2 column can also be used for any application of conventional reversed-phase C18 columns with complementary selectivity.

In addition to low pH stability, although it is common to analyze basic compounds under high-pH conditions to reduce peak tailing, most polar-embedded phases are even less hydrolytically stable than conventional C18 columns. The Acclaim PA2 column is specifically designed to withstand high pH conditions, making it a good choice for the separation of both basic and acidic analytes.

## Application Updates

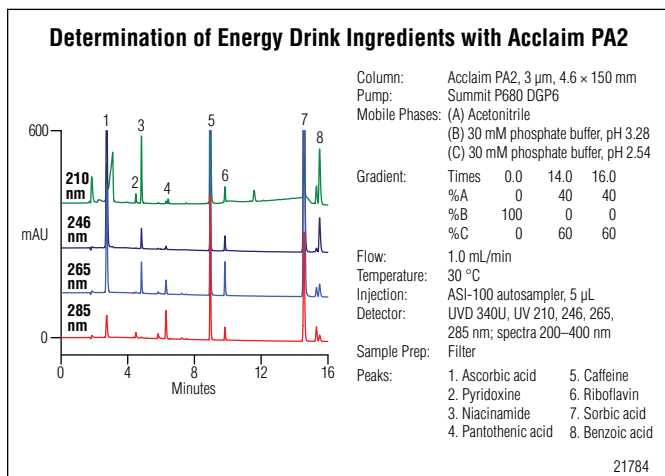
AU 156: Evaluation of Acclaim HPLC Columns Using the National Institute of Standards Standard Reference Material

## Technical Notes

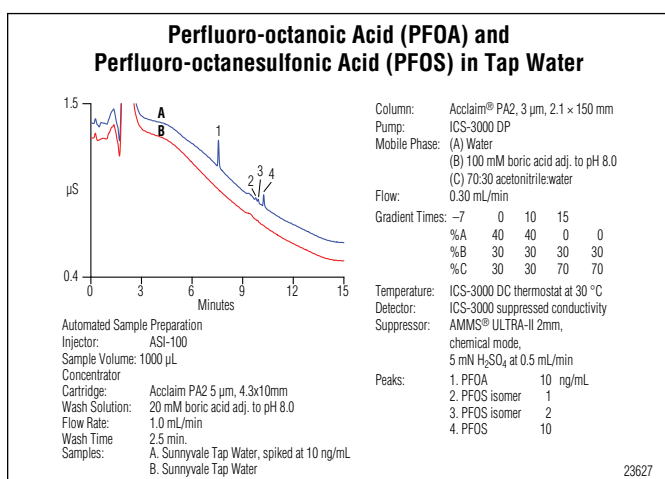
TN 85: Automated Two-Dimensional Separation of Peptides by Ion-Pair Reversed-Phase High-Performance Liquid Chromatography-Electrospray Ionization-Mass Spectrometry at High and Low pH

## Ordering Information

Columns for fast LC are listed in the Acclaim RSLC section.



Determination of ingredients in energy drinks.



Analysis of perfluoro-octanoic acid (PFOA) and perfluoro-octanesulfonic (PFOS) acid in tap water.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

## Product Data Sheets

Acclaim Polar Advantage II (PA2) HPLC Columns Data Sheet

## Application Notes

AN 213: Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Tap Water Using On-Line Solid-Phase Extraction Followed by HPLC with UV and Fluorescence Detections

AN 216: Determination of Water- and Fat-Soluble Vitamins in Functional Waters by HPLC with UV-PDA Detection

## Analytical Columns

Acclaim PA2, 3 $\mu$ m Analytical (4.6 $\times$ 150 mm).....	063191
Acclaim PA2, 3 $\mu$ m Analytical (4.6 $\times$ 50 mm).....	063189
Acclaim PA2, 3 $\mu$ m, Analytical (3.0 $\times$ 250 mm).....	070080
Acclaim PA2, 3 $\mu$ m Analytical (3.0 $\times$ 150 mm).....	063705
Acclaim PA2, 2.2 $\mu$ m Analytical (3.0 $\times$ 50mm).....	068973
Acclaim PA2, 3 $\mu$ m Analytical (2.1 $\times$ 150 mm).....	063187
Acclaim PA2, 5 $\mu$ m Analytical (4.6 $\times$ 150 mm).....	063197
Acclaim PA2, 5 $\mu$ m Analytical (4.6 $\times$ 250 mm).....	063199

## Guard Columns

Acclaim PA2, 5 $\mu$ m Guard Cartridges, (2.1 $\times$ 10 mm), 2 ea.; (use V2 Holder) .....	069692
Acclaim PA2, 5 $\mu$ m Guard Cartridges (3 $\times$ 10 mm), 2 ea., (use V2 Holder)..	071985
Acclaim PA2, 5 $\mu$ m Guard Cartridges, (4.6 $\times$ 10 mm), 2 ea (use V-2 Holder) .....	069699
Acclaim SST Guard Cartridge Holder V2 .....	069580
Acclaim Guard to Analytical Column Coupler V2 .....	074188
Guard Kit (Holder and Coupler) V2.....	069707

## Acclaim Rapid Separation RSLC

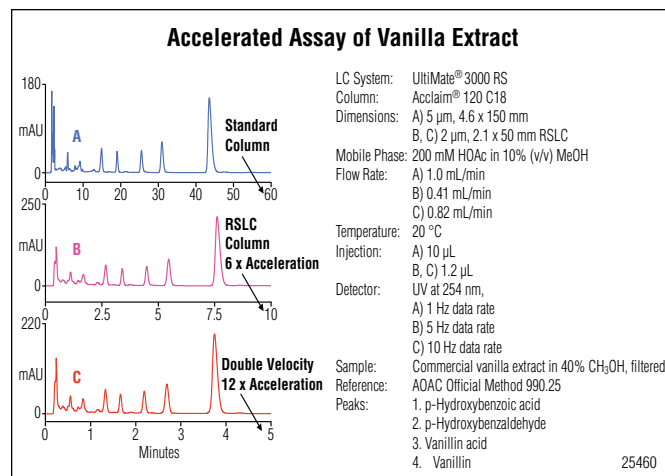
*High-throughput, cost-effective and environment-friendly HPLC solution*

Acclaim Rapid Separation Liquid Chromatography (RSLC) columns provide high-throughput HPLC solutions in a cost-effective and environmentally friendly way, without sacrificing chromatographic performance. The Acclaim RSLC columns, together with the UltiMate RSLC system, provide ultrafast, high-efficiency LC separations.

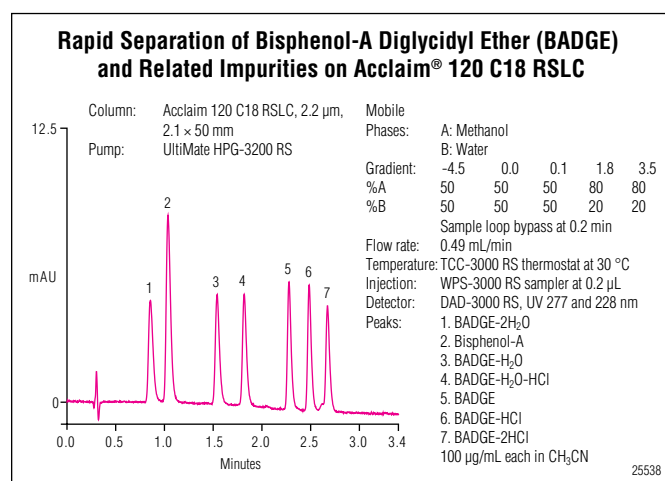
- High throughput with uncompromised chromatographic performance and reduced solvent consumption
- Accelerate separations up to fifteen-fold compared to conventional LC
- Save up to 85% of solvent with 3  $\mu\text{m}$  columns and 92% of solvent with 2  $\mu\text{m}$  columns
- Use as little as 15–40% of sample volume traditionally required for LC
- More resistant to column fouling compared to sub-2  $\mu\text{m}$  particle columns
- Reduced backpressure and compatible with both standard HPLC (400 bar) and UHPLC (800 bar) systems
- Ease of operation ensures optimal, fast separations

Acclaim RSLC columns are based on high-purity spherical porous silica gel in 2.2  $\mu\text{m}$  and 3  $\mu\text{m}$  particle sizes and 2.1 and 3.0 mm column inner diameters. They are available in four column chemistries: C18, C8, Polar Advantage (PA), and Polar Advantage II (PA2). This range offers different and complementary selectivities, making these columns ideal for applications where fast analysis, reduced solvent consumption, and ease of use are required.

The Acclaim RSLC 2.2  $\mu\text{m}$  C18 and C8 material feature high-density monomeric C18 chemistry with exhaustive endcapping. This provides the selectivity of a standard reversed phase and extremely low silanol activity. The PA columns have excellent hydrolytic stability and are compatible with 100% aqueous mobile phases. The PA2 material features amide-embedded chemistry with excellent hydrolytic stability (pH 1.5 to 10). In addition, it provides selectivity complementary to its C18 counterpart.



*Validated methods can be accelerated without changing the principle of the analysis by using RSLC columns and simple geometric rules.*



*Rapid separation of bisphenol-A diglycidyl ether.*

Acclaim RSLC 3  $\mu\text{m}$  columns are available in three stationary phases: Acclaim 120 C18, Polar Advantage (PA), and Polar Advantage II (PA2). The columns are packed in 3 mm i.d. with 33 mm or 75 mm length. The inner diameter of 3 mm makes these columns fully compatible with standard analytical LC instrumentation, and saves up to 85% solvent compared to a 4.6 mm column of otherwise identical features.

Acclaim RSLC columns complement the Dionex UltiMate 3000 RSLC system to provide superior speed, reliability, and ease-of-use. Using RSLC with Dionex Intelligent LC solutions for tandem LC, parallel LC, or other techniques further increases sample throughput up to 30-fold. See the UltiMate RSLC section for more information.



## Technical Notes

**TN 701: Sub One-Minute, Nine-Component Gradient HPLC Separation for Increased Productivity Using an Acclaim 120 3 µm C18 Column**

**TN 75: Easy Method Transfer from HPLC to RSLC with the Dionex Method Speed-Up Calculator**

## Ordering Information

### Acclaim RSLC 120 C18 2.2 µm Analytical Columns

Acclaim RSLC 120, C18, 2.2 µm Analytical (2.1 x 30 mm).....	071400
Acclaim RSLC 120, C18, 2.2 µm Analytical (2.1 x 50 mm).....	068981
Acclaim RSLC 120, C18, 2.2 µm Analytical (2.1 x 100 mm).....	068982
Acclaim RSLC 120, C18, 2.2 µm Analytical (2.1 x 150 mm).....	071399
Acclaim RSLC 120, C18, 2.2 µm Analytical (2.1 x 150 mm) .....	074812
Acclaim RSLC 120, C18, 2.2 µm Analytical, (3.0 x 30 mm).....	071606
Acclaim RSLC 120, C18, 2.2 µm Analytical (3.0 x 50 mm).....	071605
Acclaim RSLC 120, C18, 2.2 µm Analytical (3.0 x 100 mm).....	071604

### Acclaim RSLC 120 C18 3 µm Analytical Columns

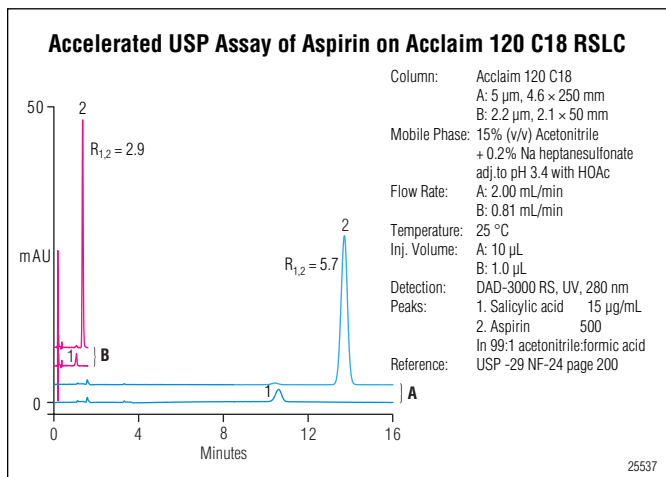
Acclaim RSLC 120, C18, 3 µm Analytical (3.0 x 33 mm).....	066272
Acclaim RSLC 120, C18, 3 µm Analytical (3.0 x 50 mm).....	068971
Acclaim RSLC 120, C18, 3 µm Analytical (3.0 x 75 mm).....	066273
	063691

### Acclaim RSLC 120 C8 Analytical Columns

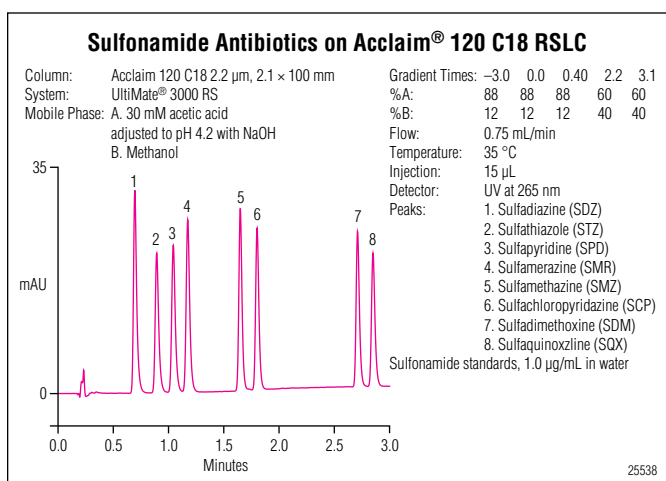
Acclaim RSLC 120, C8, 2.2 µm Analytical (2.1 x 30 mm).....	072614
Acclaim RSLC 120, C8, 2.2 µm (2.1 x 50 mm).....	072615
Acclaim RSLC 120, C8, 2.2 µm (2.1 x 100 mm).....	072616
Acclaim RSLC 120, C8, 2.2 µm (2.1 x 150 mm).....	072617
Acclaim RSLC 120, C18, 2.2 µm (3.0 x 150 mm).....	063691
Acclaim RSLC 120, C8, 2.2 µm (3 x 30 mm).....	072618
Acclaim RSLC 120, C8, 2.2 µm (3 x 50 mm).....	072619
Acclaim RSLC 120, C8, 2.2 µm (3 x 100 mm).....	072620
Acclaim RSLC 120, C8, 2.2 µm (2.1x 250 mm).....	074811

### Acclaim RSLC PA Analytical Columns

Acclaim RSLC PA, 2.2 µm (2.1 x 30 mm).....	072621
Acclaim RSLC PA, 2.2 µm (2.1 x 50 mm).....	072622
Acclaim RSLC PA, 2.2 µm (2.1 x 100 mm).....	072623
Acclaim RSLC PA, 2.2 µm (2.1 x 150 mm).....	072624



Accelerated assay of aspirin.



Determination of sulfonamide antibiotics using the Acclaim 120 C18 RSLC column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

Acclaim Rapid Separation LC 3 µm Columns Data Sheet

### Application Notes

AN 242: Robust and Fast Analysis of Tobacco-Specific Nitrosamines by LC-MS/MS

### Application Updates

AU 170: Fast Determination of Vanillin and its Synthesis Precursor by HPLC



Acclaim RSLC PA, C8, 2.2 $\mu$ m (2.1 x 250 mm) .....	074813
Acclaim RSLC PA, 2.2 $\mu$ m (3 x 30 mm) .....	072625
Acclaim RSLC PA, 2.2 $\mu$ m (3 x 50 mm) .....	072626
Acclaim RSLC PA, 2.2 $\mu$ m (3 x 100 mm) .....	072627
Acclaim RSLC PA, 3 $\mu$ m Analytical (3.0 x 33 mm) .....	066274
Acclaim RSLC PA, 3 $\mu$ m Analytical (3.0 x 75 mm) .....	066275

### Acclaim RSLC PA2 Analytical Columns

Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (2.1 x 30 mm) .....	071402
Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (2.1 x 50 mm) .....	068989
Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (2.1 x 100 mm) .....	068990
Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (2.1 x 150 mm) .....	071401
Acclaim RSLC PA2, 2.2 $\mu$ m, Analytical (2.1 x 250 mm) .....	074814
Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (3.0 x 30 mm) .....	071609
Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (3.0 x 50 mm) .....	071608
Acclaim RSLC PA2, 2.2 $\mu$ m Analytical (3.0 x 100 mm) .....	071607
Acclaim RSLC PA2, 3 $\mu$ m Analytical (3 x 33 mm) .....	066276
Acclaim PA2, 3 $\mu$ m Analytical (3.0 x 50 mm) .....	068973
Acclaim RSLC PA2, 3 $\mu$ m Analytical (3.0 x 75 mm) .....	066277
Acclaim PA2, 3 $\mu$ m Analytical (3.0 x 150 mm) .....	063705

## HILIC Columns

### *Separates highly hydrophilic molecules by Hydrophilic Interaction Liquid Chromatography*

The Acclaim HILIC-10 column separates highly hydrophilic molecules by Hydrophilic Interaction Liquid Chromatography (HILIC). This new column is suited for use in a broad range of applications including separation of hydrophilic drugs and drug metabolites.

- Designed for the chromatographic separation of highly polar molecules
- Unique selectivity
- Rugged column packing
- Broad application range

HILIC is a complementary technique to Reversed-Phase Liquid Chromatography (RPLC) with several benefits. The Acclaim HILIC-10 column can retain and separate polar analytes that cannot be retained using RP columns.

**Note:** See the Acclaim Library at <http://www.dionex.com/en-us/documents/acclaim-library/lp-71591.html>. Acclaim Mixed-Mode HILIC-1 columns are described in the Mixed-Mode section.



*Acclaim HILIC-10:* The Acclaim HILIC-10 column is designed for separating highly hydrophilic molecules by Hydrophilic Interaction Liquid Chromatography (HILIC).

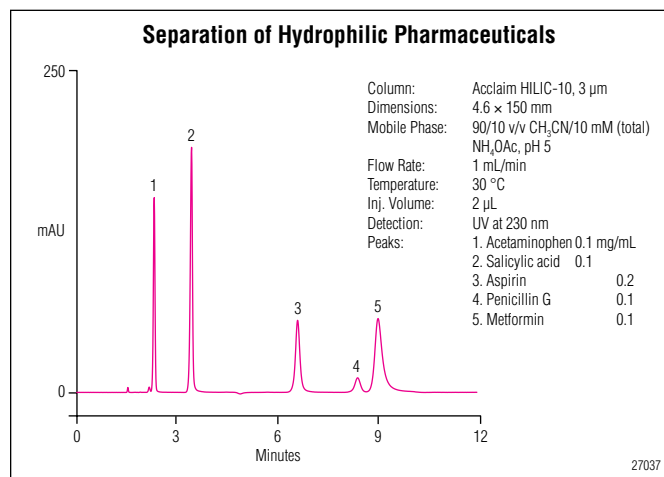
## Acclaim HILIC-10

*For the separation of hydrophilic drugs and drug metabolites*

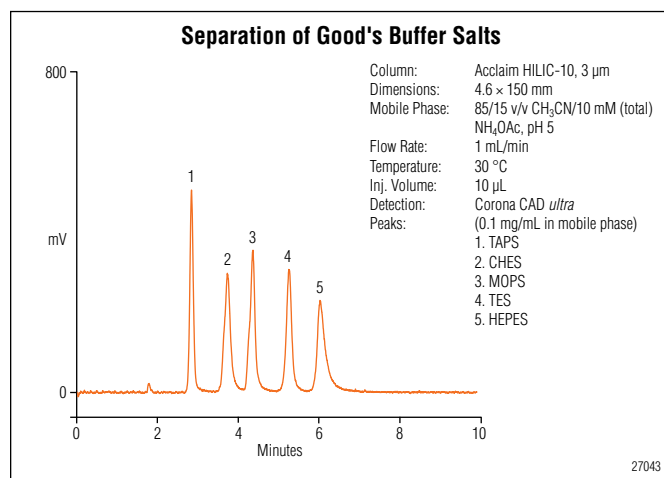
The Acclaim HILIC-10 column is designed for separating highly hydrophilic molecules by Hydrophilic Interaction Liquid Chromatography (HILIC). This column is based on high-purity spherical porous silica covalently modified with a proprietary hydrophilic layer.

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

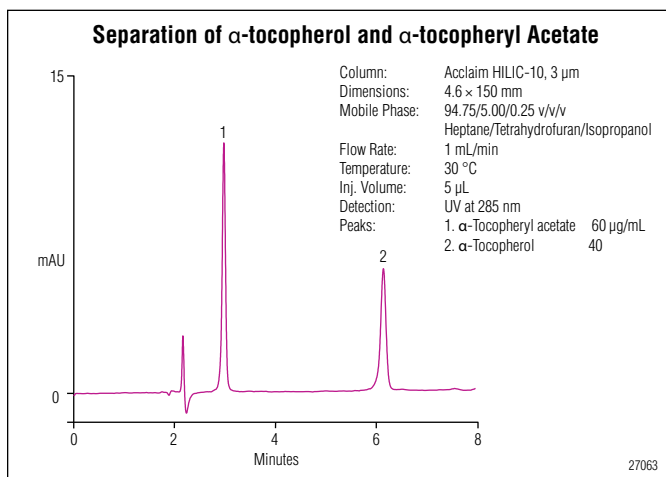
The advantage of the Acclaim HILIC-10 phase is its compatibility with up to 20% aqueous mobile phase, while maintaining affinity for polar analytes. Acclaim HILIC-10 columns are available in 3  $\mu\text{m}$  particle size. A variety of column formats are available: 4.6  $\times$  150 mm for high-throughput routine analysis; 3.0  $\times$  150 mm for high-throughput analysis with reduced solvent consumption; and 2.1  $\times$  150 mm for LC-MS analysis.



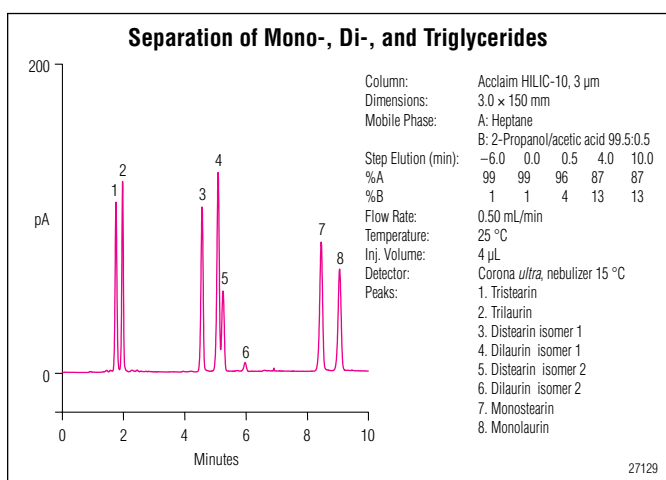
*Isocratic separation of hydrophilic pharmaceuticals.*



*Separation of Good's buffer salts.*



Separation of vitamin E ( $\alpha$ -tocopherol and its acetate form).



Separation of mono-, di-, and triglycerides.

## Ordering Information

### Analytical Columns

Acclaim HILIC-10, 3 $\mu$ m, Analytical (4.6 x 150 mm) .....	074257
Acclaim HILIC-10, 3 $\mu$ m, Analytical (3.0 x 150 mm) .....	074258
Acclaim HILIC-10, 3 $\mu$ m, Analytical (2.1 x 150 mm) .....	074259

### Guard Columns

Acclaim HILIC-10, 5 $\mu$ m, Guard (4.6 x 10 mm) 2 ea. (Use Holder V-2) .....	074262
Acclaim HILIC-10, 5 $\mu$ m, Guard (3.0 x 10 mm) 2 ea. (Use Holder V-2) .....	074261
Acclaim HILIC-10, 5 $\mu$ m, Guard (2.1 x 10 mm) 2 ea. (Use Holder V-2) .....	074263
<i>Guard cartridges require holder.</i>	
Acclaim SST Guard Cartridge Holder V-2 .....	069580
Acclaim Guard Kit (Holder and coupler) V-2 .....	069707
Guard to Analytical Column Coupler V-2 .....	074188

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

Acclaim HILIC-10 Column for Separating Highly Hydrophilic Molecules



## Specialty LC Columns

*Columns for organic acids, surfactants, explosives residues, and carbamate analysis.*

Dionex specialty columns include: Acclaim OA (for hydrophilic organic acids), Surfactant (for anionic, nonionic, and cationic surfactants), Explosives (separates all 14 explosives targeted by EPA Method 8330), and Carbamate columns.

- Acclaim OA column for fast organic acid analysis
- Acclaim Surfactant column for separation of surfactants
- Acclaim Explosives column for separation of explosive residues
- Acclaim Carbamate column for the separation of carbamates.
- Combination reversed-phase and ion-exchange specialty phase columns
- Unique mixed-mode selectivity complementary to RP columns

The novel and unique chemistries of these columns provide superior resolution and ease-of-use.

**Note:** See the Acclaim Library of applications at [www.dionex.com](http://www.dionex.com) under Documents, Acclaim Library.



**Acclaim Organic Acid:** Acclaim OA reversed-phase silica columns are designed for separation of hydrophilic, aliphatic, and aromatic organic acids.

**Acclaim Surfactant:** The Acclaim Surfactant column is the most versatile commercially-available column specifically for the separation of all classes of surfactants.

**Acclaim Explosives:** Acclaim Explosives columns baseline separate all 14 explosives in EPA Method 8330, with complementary selectivity.

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

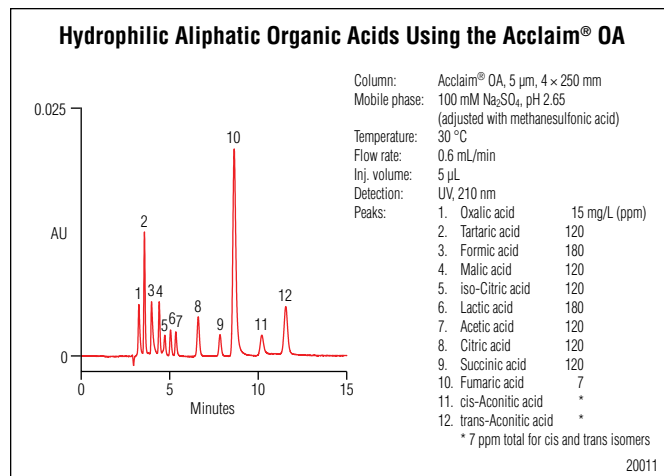
## Acclaim Organic Acid

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

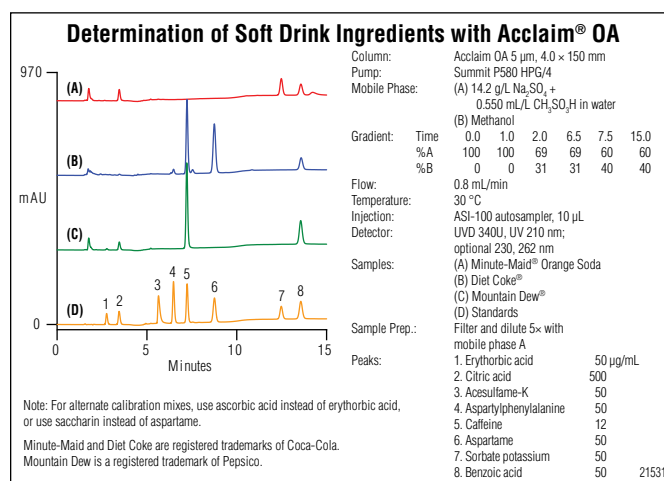
The Acclaim Organic Acid (OA) is a silica-based reversed-phase column designed for high-efficiency, high-throughput organic acids analysis. It offers unparalleled performance for separating hydroxyl aliphatic and aromatic organic acids.

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

The Acclaim OA columns are ideal for retaining and separating a wide spectrum of organic acids and are available in 3 and 5  $\mu\text{m}$  particle sizes and 4.0, 3.0, and 2.1 mm column i.d. The 3.0 and 4.0 mm i.d. columns are packed in metal-free PEEK column bodies to eliminate unwanted interaction between the analytes and the column body. The Acclaim OA columns undergo extensive testing to ensure column-to-column reproducibility and are shipped with certificates of analysis.



*Isocratic separation of hydrophilic organic acids.*



*Determination of soft drink ingredients.*

## Acclaim OA Column Applications

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

Example applications: aliphatic organic acids in foods (juice, wine, drinks), organic acids in drug preparations, acrylic acid and its oligomers, hydroxybenzoic acids, hydroxyphenylacetic acids, arylacetic acids, benzenepolycarboxylic acids, and selected amino acids.



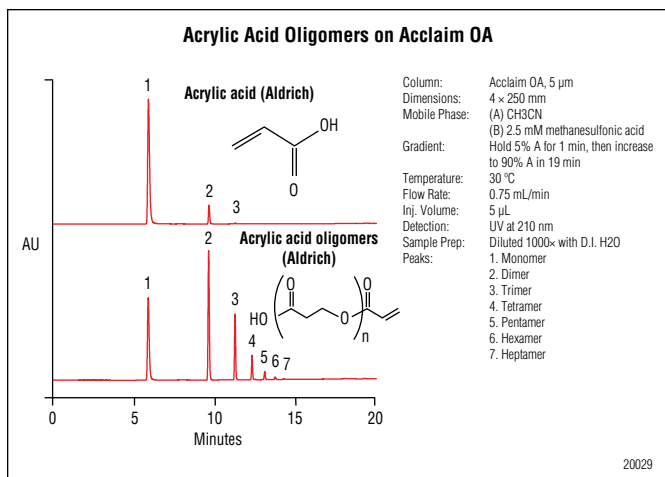
## Ordering Information

### Analytical Columns

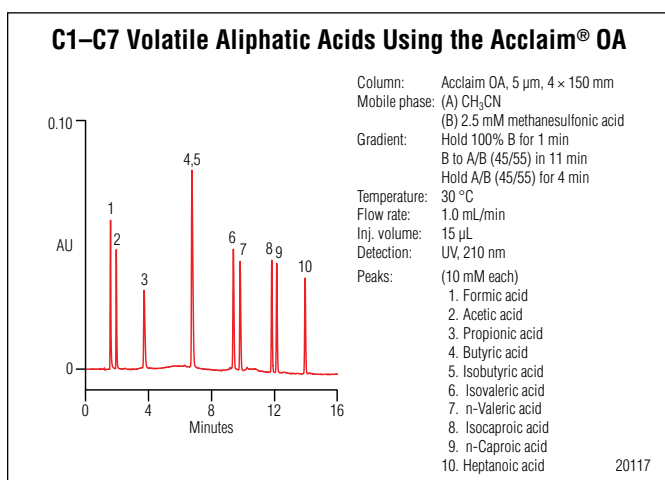
Acclaim OA, 3 µm Analytical (2.1 x 150 mm) .....	070087
Acclaim OA, 3 µm Analytical (3.0 x 150 mm) .....	070086
Acclaim OA, 5 µm Analytical (4 x 250 mm) .....	062902
Acclaim OA, 5 µm Analytical (4 x 150 mm) .....	062903

### Guard Columns

Acclaim OA, 5 µm Guard Cartridges (3 x 10 mm), 2 ea, (requires holder 069580) .....	071987
Acclaim OA, 5 µm Guard Cartridge (4.6 x 10 mm), 2 ea (use V-2 Holder) ..	069700
Acclaim SST Guard Cartridge Holder V-2 .....	069580
Guard to Analytical Column Coupler V-2 .....	074188
Acclaim Guard Kit (Holder and coupler) V-2 .....	069707



Analysis of organic acids in orange juice.



Separation of C1 to C7 volatile aliphatic acids.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

### Product Data Sheets

Acclaim Organic Acid (OA) HPLC Column Data Sheet

## Acclaim Surfactant

*Unmatched Performance for separating all classes of surfactants*

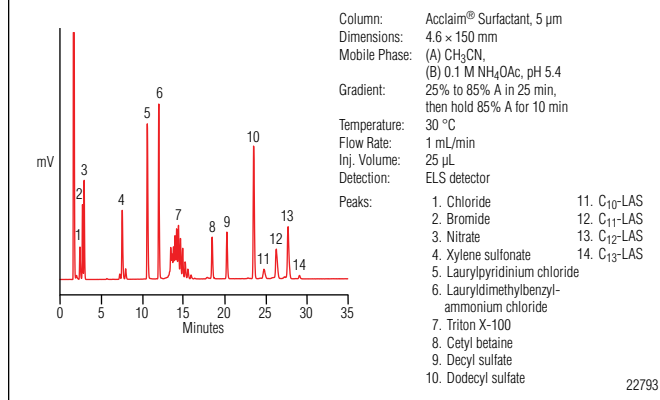
The Acclaim Surfactant column is a high-efficiency, silica-based column designed specifically for separating a wide variety of surfactants, including anionic, cationic, nonionic, and amphoteric surfactants. As a consequence of its novel chemistry, this column exhibits a unique polarity that provides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

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

The Acclaim Surfactant columns are ideal for separating various surfactants in a variety of sample matrices. Each column undergoes extensive testing to ensure column-to-column reproducibility, and is shipped with certificates of analysis detailing these tests. Acclaim Surfactant columns are available in 3 and 5  $\mu\text{m}$  particle sizes and 4.6, 3.0, and 2.1 mm column inner diameters.

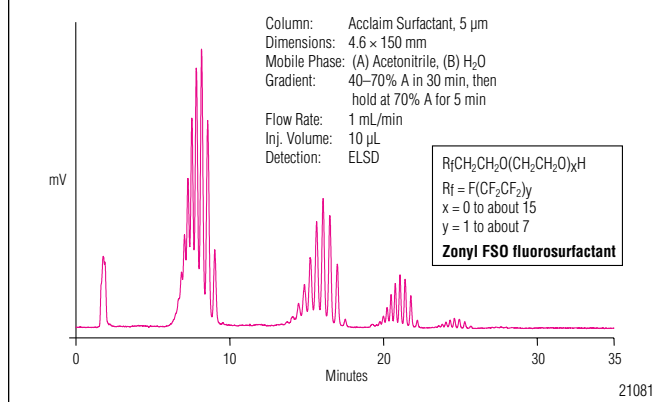
The Acclaim Surfactant is also resistant to dewetting under highly aqueous mobile phase conditions, and thus can be used to provide excellent resolution between strongly hydrophilic compounds, such as isomers of xylene sulfonate.

### Complex Surfactant Separation: Inorganic Anions, Hydrotropes, Cationic, Nonionic, Amphoteric and Anionic Surfactants



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

### Analysis of ZONYL FSO Fluorosurfactant



*Analysis of ZONYL FSO fluorosurfactant.*

## Broad Range of Applications

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

The Acclaim Surfactant column can be used for the HPLC separation of anionic surfactants (alkylbenzenesulfonates, alkyl sulfates, alkylether sulfates) and cationic surfactants (alkyl quaternary ammonium salts, benzylalkylammonium salts, pyridinium salts, and quaternary imidazolium compounds) nonionic surfactants, and polyethylene glycols (PEGs).

## Ordering Information

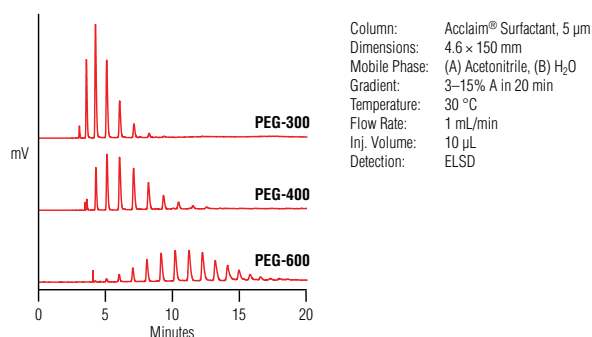
### Analytical Columns

Acclaim Surfactant, 3 $\mu$ m Analytical (2.1 x 150 mm).....	070085
Acclaim Surfactant, 3 $\mu$ m Analytical (3.0 x 150 mm).....	070084
Acclaim Surfactant, 5 $\mu$ m, Analytical (2.1 x 150 mm).....	068123
Acclaim Surfactant, 5 $\mu$ m Analytical (4.6 x 150 mm).....	063201
Acclaim Surfactant, 5 $\mu$ m Analytical (4.6 x 250 mm).....	063203

### Guard Columns

Acclaim Surfactant, 5 $\mu$ m, Guard Cartridges (2.1 x 10 mm), 2 ea., requires holder 069580 .....	069693
Acclaim Surfactant, 5 $\mu$ m Guard Cartridges (3 x 10 mm), 2 ea., requires holder 069580 .....	071991
Acclaim Surfactant, 5 $\mu$ m Guard Cartridges (4.6 x 10 mm), 2 ea., (use V-2 Holder) .....	069701
<i>Guard cartridges require holder.</i>	
Acclaim SST Guard Cartridge Holder V-2 .....	069580
Guard to Analytical Column Coupler V-2 .....	074188
Acclaim Guard Kit (Holder and coupler) V-2 .....	069707

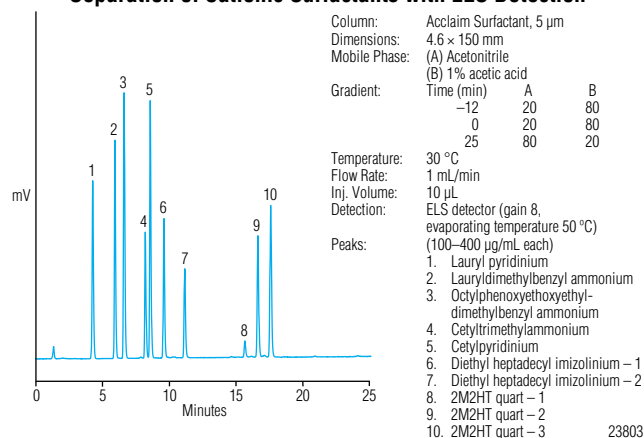
### Separation of Different Polyethylene Glycols



21077

Separation of different polyethylene glycols.

### Separation of Cationic Surfactants with ELS Detection



23803

Separation of cationic surfactants.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

### Product Data Sheets

Acclaim Surfactant Column Data Sheet

### Application Notes

AN 219: Determination of Linear Alkylbenzene Sulphonate in Treatment Plant Wastewater Streams Using On-Line Solid-Phase Extraction Followed by HPLC with Fluorescence Detection

AN 237: Analysis of Benzalkonium Chloride on the Acclaim Surfactant Column by High-Performance Liquid Chromatography

## Acclaim Explosives

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

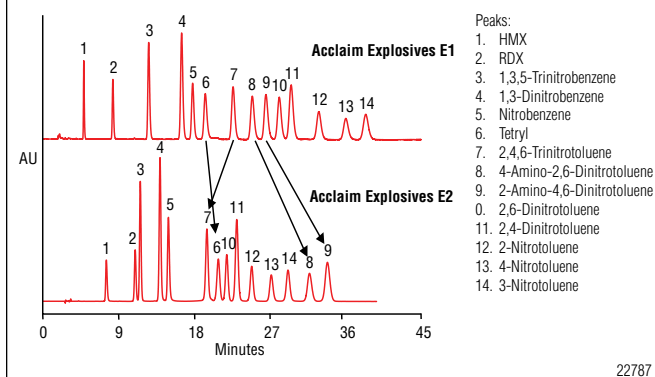
The Acclaim Explosives E1 and E2 columns are specifically designed to resolve all 14 explosives listed in EPA SW-846 Method 8330: Nitroaromatics and Nitramines by HPLC. The novel and unique chemistries of these columns provide superior resolution with complementary selectivities.

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

The Acclaim Explosives E1 is recommended for use as a direct replacement for ODS columns for the primary analysis. The Acclaim Explosives E2 may be used as either a primary or a confirmatory column. The unique selectivity and versatility of Acclaim Explosives E2 column provides a wider application range, including the analysis of explosives beyond U.S. EPA Method 8330 (ISO22478), gun surveillance, and carbonyl compounds from vehicle exhaust (CARB 1004).

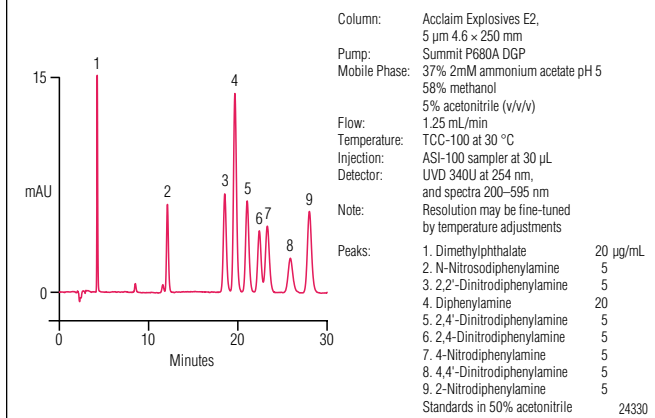
All Acclaim Explosives E2, 3  $\mu$ m column can be used with pressures up to 800 bar, allowing for high-throughput and high-resolution separations supported by the UltiMate 3000 RS instrument.

### Comparison of Elution Patterns of Acclaim® Explosives E1 and E2



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

### Gun Surveillance Standards on Acclaim® Explosives E2



*Gun surveillance standards using the Acclaim Explosives E2 column.*

The Acclaim Explosives E1 and E2 columns are available in 4.6 x 250 mm column format with 5  $\mu$ m bonded silica particles. The Acclaim Explosives E2 column is also available in 3  $\mu$ m particle size in both 3.0 and 2.1 mm column i.d. The 3  $\mu$ m, 3 x 150 mm format is ideal for high-throughput analysis. The 3  $\mu$ m, 2.1 x 150 mm format is good for LC/MS applications.

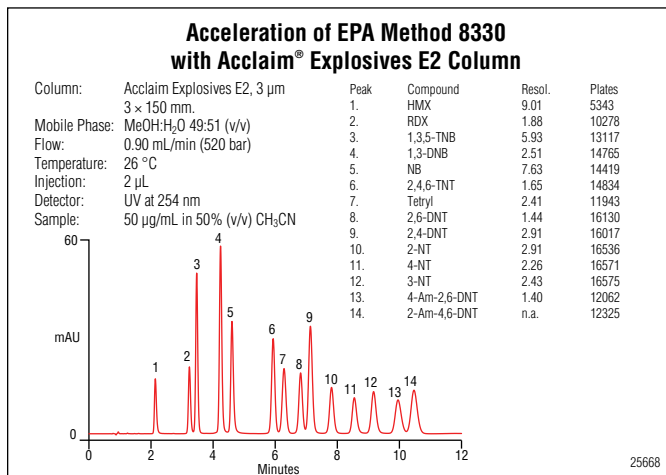
## Ordering Information

### Analytical Columns

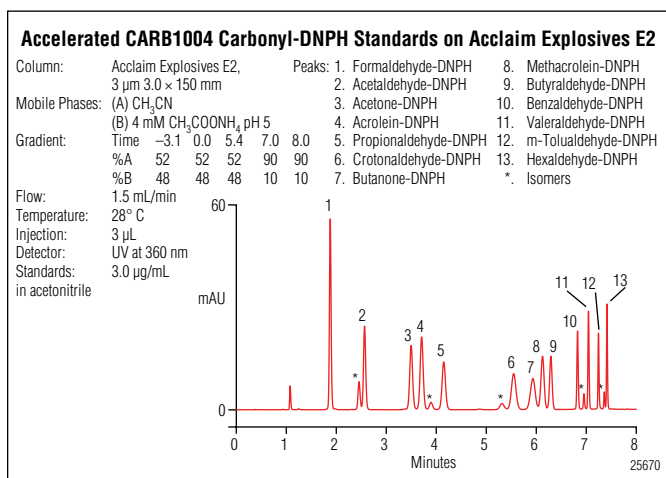
Acclaim Explosive E2, 3 µm, Analytical (2.1 x 150 mm).....	070083
Acclaim Explosive E2, 3 µm, Analytical (3.0 x 150 mm).....	070082
Acclaim Explosive E2, 3 µm, Analytical (3.0 x 250 mm).....	070081
Acclaim Explosives E1, 5 µm, Analytical (4.6 x 250 mm).....	064305
Acclaim Explosives E2, 5 µm, Analytical (4.6 x 250 mm).....	064309
Acclaim Explosives Kit (includes 064305, 064309, 064303, 064307; requires holder 059456) .....	064312

### Guard Columns

Acclaim E2, 5 µm Guard Cartridges (3 x 10 mm) 2 ea., (requires holder 069580) .....	071989
Acclaim Explosives E1, 5 µm Guard Cartridges, (4.6 x 10 mm) 2 ea., (use V-2 Holder) .....	069702
Acclaim Explosives E2, 5 µm Guard Cartridges, (4.6 x 10 mm) 2 ea., (use V-2 Holder) .....	069703
Acclaim Explosive E1 Guard (4.3 x 10 mm), 2 ea. (use V-1 holder) .....	064303
Guard cartridges require holder.	
Acclaim Explosive E2 Guard (4.3 x 10 mm), 2 ea. (use V-1 holder) .....	064307
Guard cartridges require holder.	
SST Guard Cartridge Holder V-1 .....	059456
Guard to Analytical Column Coupler V-1 .....	059457
Guard Kit (Holder and Coupler) V-1 .....	059526
Acclaim SST Guard Cartridge Holder V-2 .....	069580
Guard to Analytical Column Coupler V-2 .....	074188
Acclaim Guard Kit (Holder and coupler) V-2 .....	069707
Acclaim Guard Holder V-2 .....	069580



ISO22478 explosives on Acclaim Explosives E2 column.



CARB1004 carboxyl-DNPH standards.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

### Product Data Sheets

Acclaim Explosives Columns: A Total Solution for Explosives Analysis

### Application Notes

AN 189: Determination of Explosive Compounds in Drinking Water Using Parallel-HPLC with UV Detection

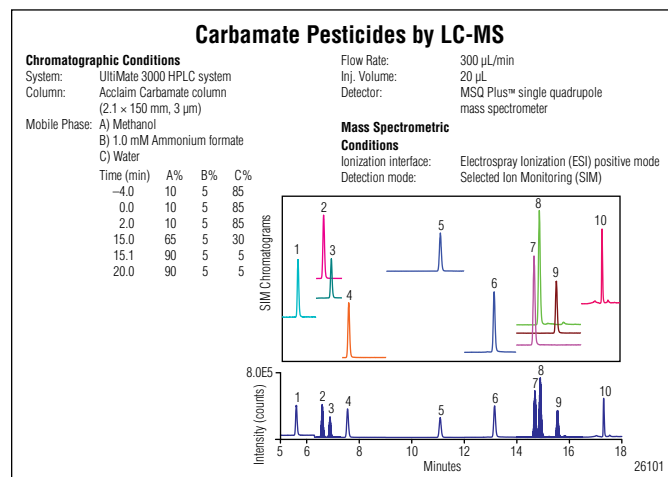
## Acclaim Carbamate

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

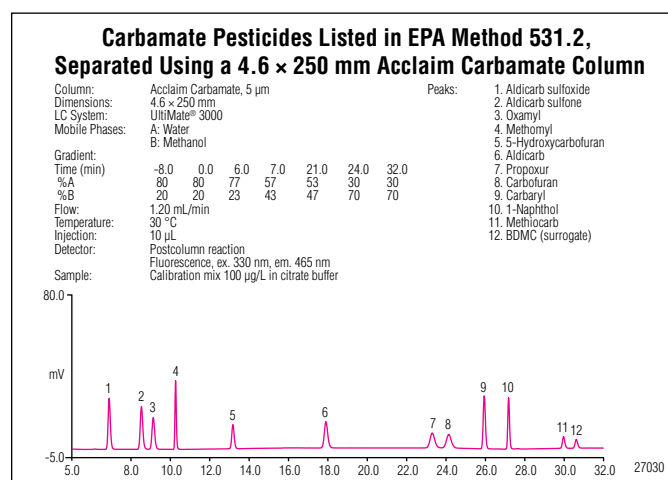
The Acclaim Carbamate column is designed for baseline separation of carbamates (N-methylcarbamate and N-methylcarbamoyloxime pesticides) specified in US EPA Method 531.2. Carbamate pesticides are widely used throughout the world. Drinking water and raw surface water is monitored for the presence of carbamate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

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

Acclaim Carbamate columns are available in a variety of column formats: The 5  $\mu\text{m}$ , 4.6  $\times$  250 mm column sets the standard for the highest resolution with postcolumn reaction (PCR) and fluorescence detection (FLD); the 3  $\mu\text{m}$ , 4.6  $\times$  150 mm column saves time and increases sample throughput; the 3  $\mu\text{m}$ , 3.0  $\times$  150 mm column saves time and reduces solvent consumption; and the 3  $\mu\text{m}$ , 2.1  $\times$  150 mm column is for LC/MS to achieve the lowest possible detection limits.



Carbamate pesticides by LC-MS.



Carbamate pesticide analysis.

## Ordering Information

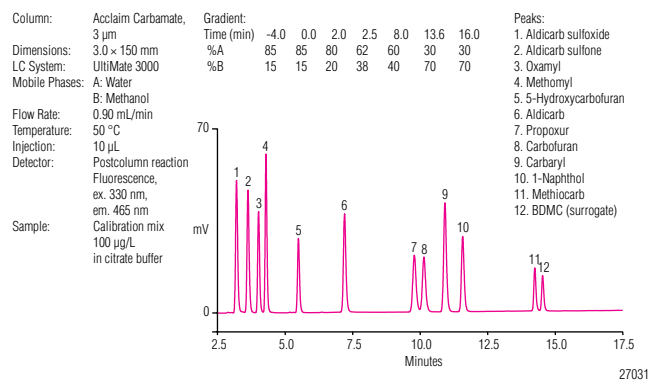
### Analytical Columns

Acclaim Carbamate, 5 µm Analytical (4.6 x 250 mm).....	072924
Acclaim Carbamate, 3 µm Analytical (4.6 x 150 mm).....	072925
Acclaim Carbamate, 3 µm Analytical (3.0 x 150 mm).....	072926
Acclaim Carbamate, 3 µm Analytical (2.1 x 150 mm).....	072927

### Guard Columns

Acclaim Carbamate, 3 µm Guard (4.6 x 10 mm) 2 ea. (Use Holder V-2).....	072928
Acclaim Carbamate, 3 µm Guard (3.0 x 10 mm) 2 ea. (Use Holder V-2).....	072929
Acclaim Carbamate, 3µm Guard (2.1 x 10 mm) 2 ea. (Use Holder V-2).....	072930
Acclaim SST Guard Cartridge Holder V-2.....	069580
Guard to Analytical Column Coupler V-2.....	074188
Acclaim Guard Kit (Holder and coupler) V-2.....	069707

### Carbamate Pesticides Listed in EPA Method 531.2, Separated Using a 3.0 × 150 mm Acclaim Carbamate Column



Carbamate pesticide analysis.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

The Acclaim Carbamate Column—A Superior Solution to Carbamate Pesticide Analysis (US EPA Method 531.2)





## Mixed-Mode LC Columns

### *Mixed-mode columns for greater separation power*

Mixed-mode columns are designed for multimode separations. The surface chemistry of these columns provides combinations of reversed-phase, HILIC, cation-exchange, and/or anion-exchange simultaneously. The advantage is that complex analytes interact with multiple mechanisms, and this extra interaction provides a greater opportunity for separation. Dionex offers silica-based and polymer-based columns with multimode capabilities.

- Greater power to simplify the chromatography of complex samples
- Multiple retention mechanisms: anion-exchange, cation-exchange, reversed-phase, and HILIC
- Adjustable selectivity by mobile phase ionic strength, pH, and organic solvents
- Selectivity orthogonal to reversed-phase columns
- Silica and Polymer based mixed-mode columns available
- Bi-mode or tri-mode columns are available

Dionex offers the Trinity P1, the first tri-mode column which combines anion-exchange, cation-exchange, and reversed-phase mechanisms for the most powerful separation capabilities available in HPLC. The WCX-1, WAX-1, and HILIC-1 are silica-based bi-mode columns. The OmniPac is a polymer-based mixed-mode column combining the ion-exchange mechanism with reversed-phase separation.

**Note:** See the Acclaim Library of applications at [www.dionex.com](http://www.dionex.com) under Documents, Acclaim Library.



*Acclaim Trinity P1:* Simultaneous reversed-phase, anion- and cation-exchange functionality on a single support.

*Acclaim Mixed-Mode HILIC-1:* The Acclaim Mixed-Mode HILIC-1 column combines both reversed-phase and hydrophilic interaction liquid chromatography (HILIC) properties.

*Acclaim Mixed-Mode WAX-1:* Acclaim Mixed-Mode WAX columns use a silica-based stationary phase that incorporates both reversed-phase and weak anion-exchange properties.

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

*OmniPac:* OmniPac columns combine ion-exchange and reversed-phase characteristics in a single column, and are available in anion- and cation-exchange formats.

## Acclaim Trinity P1

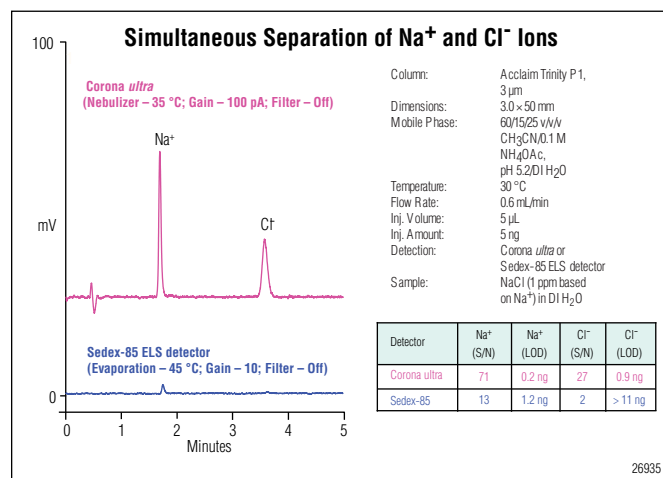
*Simultaneous reversed-phase, anion- and cation-exchange functionality on a single support*

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

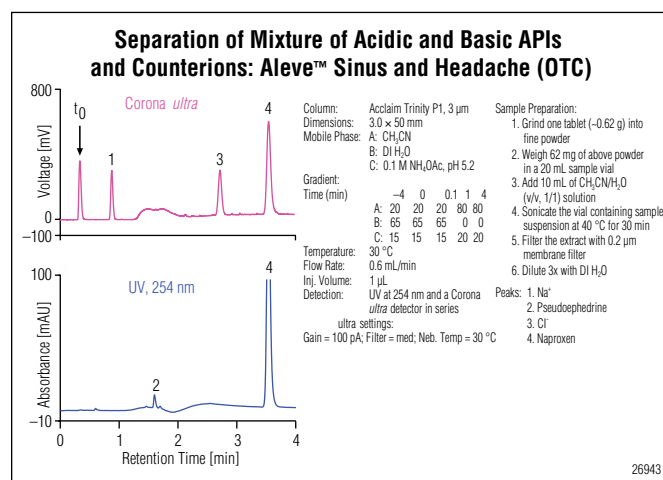
- Multiple retention mechanisms: anion-exchange, and cation-exchange, reversed-phase, and HILIC.
- Selectivity adjustable by mobile phase ionic strength, electrolyte type, pH, and organic solvent
- Ideal selectivity for simultaneous separation of basic, neutral, and acidic analytes
- Simultaneous retention and separation of hydrophobic (drugs) and highly hydrophilic ( $\text{Na}^+$  and  $\text{Cl}^-$ ) analytes
- Selectivity orthogonal to reversed-phase columns
- Retention of ionic and ionizable analytes without ion-pairing reagents
- Great flexibility in method development: each retention mechanism can be controlled independently
- Highly hydrophilic molecules can be retained by running in HILIC mode

The Acclaim Trinity P1 stationary phase, based on this Nanopolymer Silica Hybrid (NSH) technology (patent pending), consists of high-purity porous, spherical 3  $\mu\text{m}$  silica particles, coated with charged nanopolymer beads.

The unique surface chemistry includes an inner-pore area modified with an organic layer that provides both reversed-phase and anion-exchange properties. The outer-pore surface, conversely, is modified with cation-exchange functionality. The NSH technology ensures distinctive spatial separation of the anion-exchange region (inner-pore area) and the cation-exchange region (outer-pore area), resulting in all retention mechanisms functioning simultaneously and with independent control.



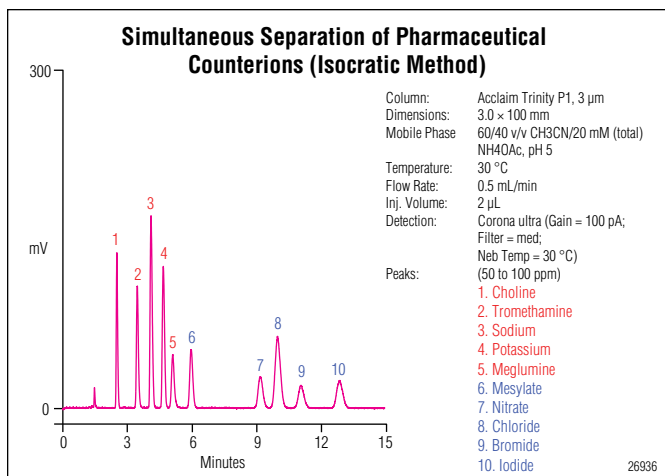
Simultaneous separation of  $\text{Na}^+$  and  $\text{Cl}^-$  ions.



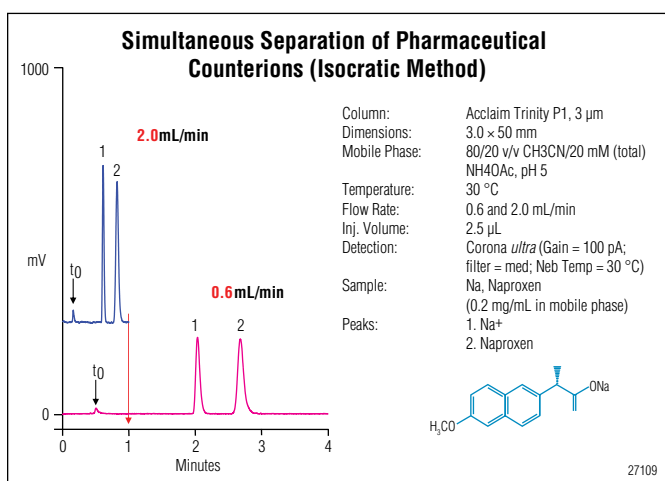
Separation of mixture of acidic and basic APIs and counterions.

## Separates Drugs and Counterions

The Acclaim Trinity P1 retains both cations and anions at the same time. In pharmaceutical formulations, the  $\text{Na}^+$  ion is the most used counterion for acidic drugs, or  $\text{Cl}^-$  ion for basic drugs. Neither of these ions can be retained on any reversed-phase column, while the Acclaim Trinity P1 can baseline separate both these ions and the drug. The adjustable selectivity also allows for separation optimization with increased resolution. This can result in faster separations and higher throughput.



Simultaneous separation of pharmaceutical counterions.



Increased resolution allows for faster separations.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

### Product Data Sheets

Acclaim Trinity P1 Column Data Sheet

### Application Notes

AN 51: Method for Determination of Anions in Sodium Hydroxide

## Ordering Information

### Analytical Columns

Acclaim Trinity P1, 3 $\mu$ m Analytical (2.1 x 100 mm).....	071389
Acclaim Trinity P1, 3 $\mu$ m Analytical (3.0 x 50 mm).....	071388
Acclaim Trinity P1, 3 $\mu$ m Analytical (3.0 x 100 mm).....	071387

### Guard Columns

Acclaim Trinity P1, 3 $\mu$ m Guard Cartridges, (2.1 x 10 mm), 2 ea. (Use Holder V-2).....	071391
<i>Requires V-2 Holder, P/N 069580</i>	
Acclaim Trinity P1, 3 $\mu$ m Guard Cartridges, (3.0 x 10 mm), 2 ea. (Use Holder V-2).....	071390
<i>Requires V-2 Holder, P/N 069580</i>	
SST Guard Cartridge Holder (V-2).....	069580
Guard to Analytical Column Coupler (V-2).....	074188
Guard Kit (Holder and Coupler) (V-2).....	069707

## Acclaim Mixed-Mode HILIC-1

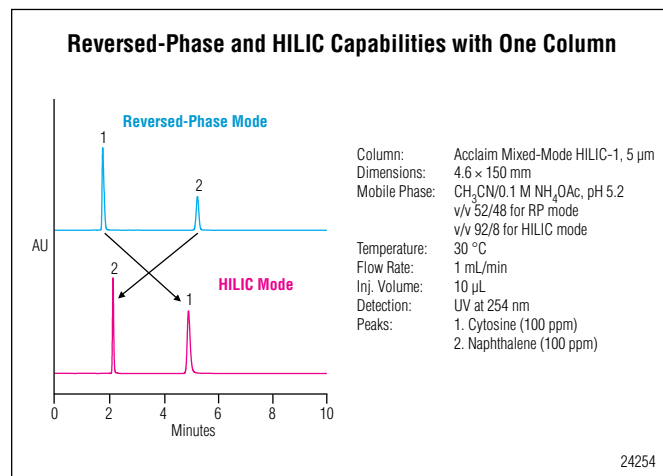
*Reversed-phase and hydrophilic interaction phases combined on a single column*

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

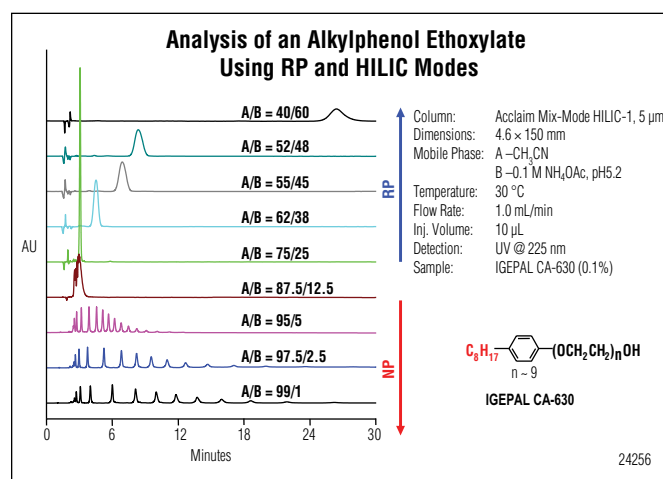
- Operates in both RP and HILIC modes
- Retains highly polar molecules
- Unique selectivity complementary to RP columns
- Broader application range compared to conventional diol-based columns
- High-efficiency column for high-resolution separations

The Acclaim Mixed-Mode HILIC-1 stationary phase consists of a hydrophobic alkyl chain with a diol group at the terminus. The hydrophobic moiety provides reversed-phase retention and the terminal diol group facilitates hydrophilic interactions. This unique combination results in the adjustable selectivity, making Acclaim Mixed-Mode HILIC-1 separate mixtures that would be impossible for a C18 column.

Acclaim Mixed-Mode HILIC-1 columns are available in two particle sizes (3 and 5  $\mu\text{m}$ ), three inner diameters (4.6, 3.0, and 2.1 mm) and three lengths (250, 150, and 50 mm). Guard cartridges are also available in 5  $\mu\text{m}$  and three formats: 4.6  $\times$  10, 3.0  $\times$  10 and 2.1  $\times$  10 mm.



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



*Note the advantages for reversed-phase and normal-phase modes on a single column.*

## Wide Range of Applications

The Acclaim Mixed-Mode HILIC-1 column separates both polar and nonpolar molecules with selectivity complementary to RP columns and is suitable for a broad range of applications, including nonionic ethoxylated surfactants, drug metabolites, lipids, polyethylene glycols (PEGs), ethoxylated surfactants, and more.

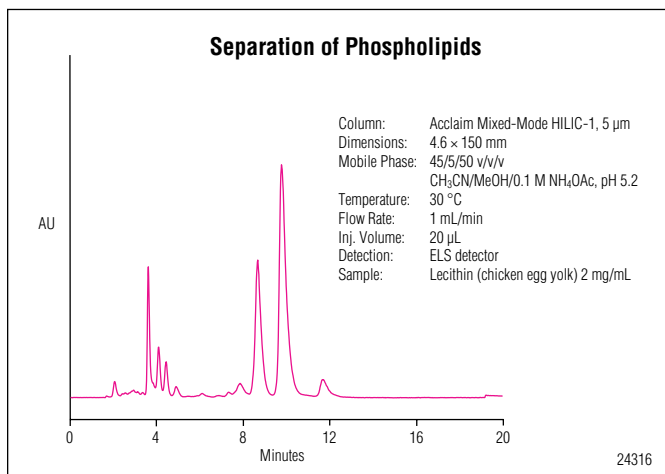
## Ordering Information

## Analytical Columns

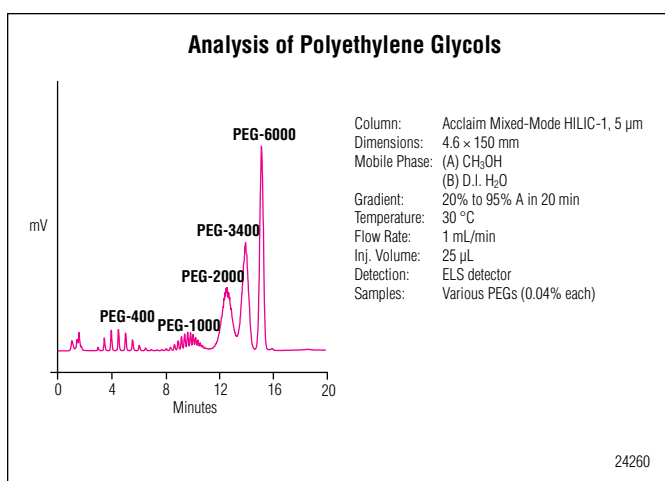
Acclaim Mixed-Mode HILIC-1, 3 $\mu$ m Analytical (2.1 x 150 mm).....	070091
Acclaim Mixed-Mode HILIC-1, 3 $\mu$ m Analytical (3.0 x 50 mm).....	071912
Acclaim Mixed-Mode HILIC-1, 3 $\mu$ m Analytical (3.0 x 150 mm).....	070090
Acclaim Mixed-Mode HILIC-1, 5 $\mu$ m (2.1 x 150 mm) .....	066847
Acclaim Mixed-Mode HILIC-1, 5 $\mu$ m (4.6 x 150 mm) .....	066843
Acclaim Mixed-Mode HILIC-1, 5 $\mu$ m (4.6 x 250 mm) .....	066844

## Guard Columns

Acclaim Mixed-Mode HILIC-1, 5 $\mu$ m, Guards (2.1 x 10 mm), 2 ea., (requires holder 069580) .....	069694
Acclaim Mixed-Mode HILIC-1, 5 $\mu$ m Guards (3 x 10 mm), 2 ea., (requires holder 069580) .....	071913
Acclaim Mixed-Mode HILIC-1, 5 $\mu$ m Guard Cartridges, (4.6 x 10 mm), 2 ea. (use V-2 Holder).....	069706
Acclaim SST Guard Cartridge Holder V-2.....	069580
Guard to Analytical Column Coupler V-2.....	074188
Acclaim Guard Kit (Holder and coupler) V-2.....	069707



Separation of phospholipids (lecithin from chicken egg yolk).



Analysis of polyethylene glycols.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

## Product Data Sheets

Acclaim Mixed-Mode HILIC-1 Column Datasheet

## Application Notes

AN 198: Determination of Urea and Allantoin in Cosmetics  
 Using the Acclaim Mixed-Mode HILIC Column

## Acclaim Mixed-Mode WAX-1

*Reversed-phase and weak anion-exchange properties on a single column*

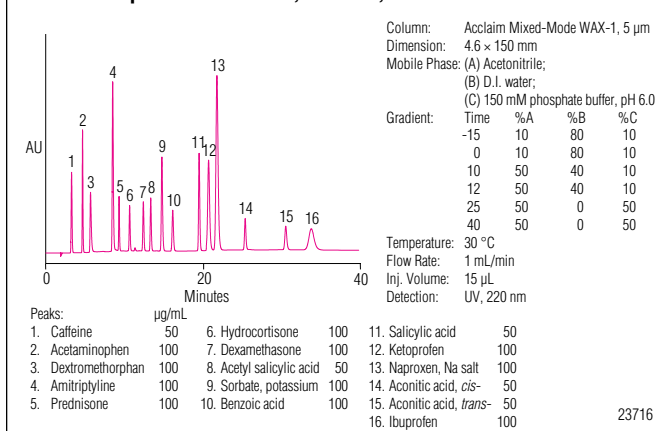
The Acclaim Mixed-Mode WAX-1 is a novel, high-efficiency silica HPLC column that combines hydrophobic and weak anion-exchange characteristics. Its unique chemistry results in a multimode separation mechanism that includes reversed-phase, anion-exchange, cation-exclusion, and HILIC interactions. Selectivity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

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

The Acclaim Mixed-Mode WAX-1 surface consists of a hydrophobic alkyl chain with a tertiary amine group at the terminus. The hydrophobic moiety provides reversed-phase retention and the terminal amino group facilitates electro-static interactions. Acclaim Mixed-Mode WAX-1 columns are available in two particle sizes (3 and 5  $\mu\text{m}$ ), three inner diameters (4.6, 3.0, and 2.1 mm) and three lengths (250, 150, and 50 mm). Guard cartridges are also available.

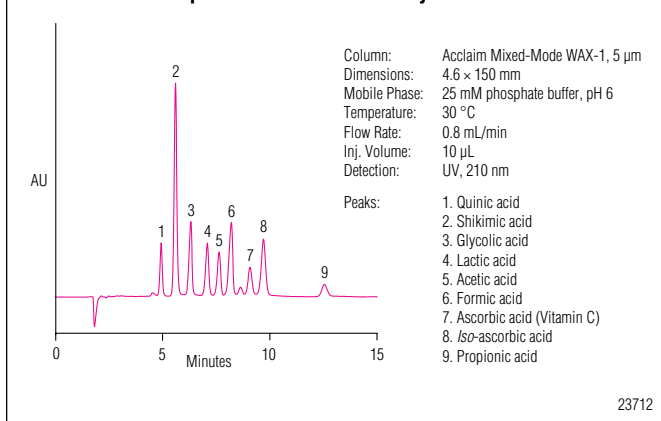
The unique surface characteristics allow for adjustable selectivity, ideal for separating complex mixtures. Hydrophilic organic acids are often difficult to separate with common RP columns. This can be overcome using the bi-functional Acclaim Mixed-Mode WAX-1 column; it provides sufficient retention, and ideal selectivity for a variety of anionic molecules, even those with weak charges.

### Gradient Separation of Basic, Neutral, and Acidic Pharmaceuticals



*Separation of acids, bases, and neutral molecules in a single run.*

### Separation of Monocarboxylic Acids

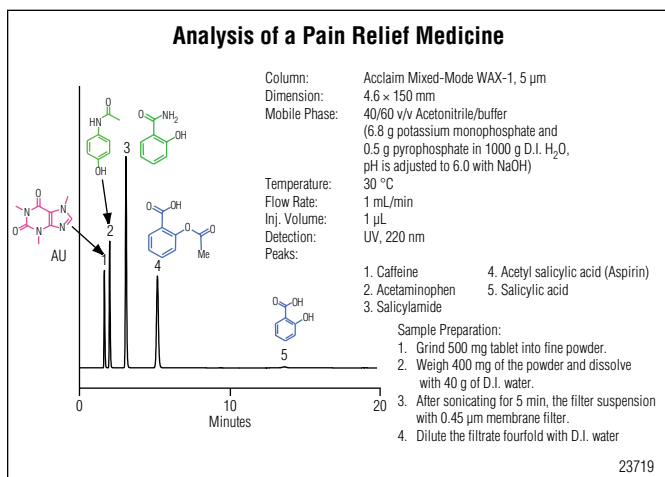


*Separation of monocarboxylic acids.*

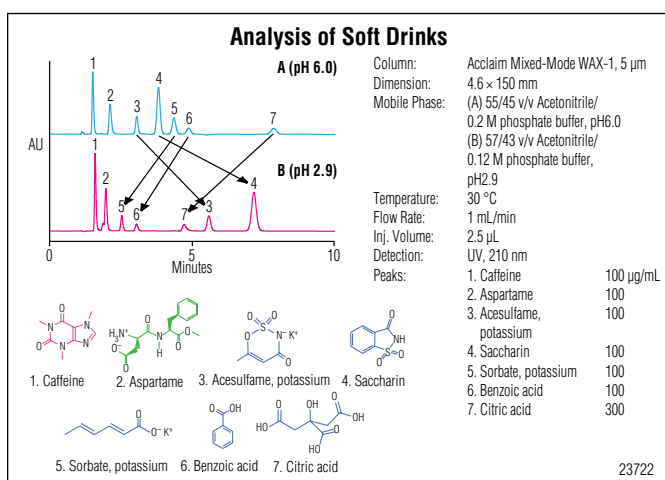
## Applications

The unique chemistry of the Acclaim Mixed-Mode WAX-1 offers a simpler analytical solution to the C18 reversed-phase columns by providing complimentary selectivity to the C18 column. As a result, this column can be used to separate a wide range of samples in the pharmaceutical, food and beverage, and chemical industries. Separation of basic active ingredients can be determined, as well as separation of substances with basic, neutral, and acidic ingredients.





Analysis of a pain relief medicine.



Analysis of soft drinks.

AN 241: Determination of Steviol Glycosides by HPLC with UV and ELS Detections

## Ordering Information

### Analytical Columns

Acclaim Mixed-Mode WAX-1, 3 $\mu$ m Analytical (2.1 x 150 mm).....	070089
Acclaim Mixed-Mode WAX-1, 3 $\mu$ m Analytical (3.0 x 50 mm).....	071908
Acclaim Mixed-Mode WAX-1, 3 $\mu$ m Analytical (3.0 x 150 mm).....	070088
Acclaim Mixed-Mode WAX-1, 5 $\mu$ m (4.6 x 250 mm) .....	064985
Acclaim Mixed-Mode WAX-1, 5 $\mu$ m (4.6 x 150 mm) .....	064984
Acclaim Mixed-Mode WAX-1, 5 $\mu$ m (2.1 x 150 mm) .....	067084

### Guard Columns

Acclaim Mixed-Mode WAX-1, 5 $\mu$ m, Guards (2.1 x 10 mm), 2 ea., (requires holder 069580) .....	069686
Acclaim Mixed-Mode WAX-1, 5 $\mu$ m Guards (3 x 10 mm), 2 ea., (requires holder 069580) .....	071909
Acclaim Mixed-Mode WAX-1, 5 $\mu$ m Guard Cartridges (4.6 x 10 mm), 2 ea. (use V-2 Holder).....	069704
Acclaim SST Guard Cartridge Holder V-2.....	069580
Guard to Analytical Column Coupler V-2.....	074188
Acclaim Guard Kit (Holder and coupler) V-2.....	069707

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

Acclaim Mixed-Mode WAX-1 Column: Total Control of Selectivity

### Application Notes

AN 193: Determination of Additives in Carbonated Beverages

AN 204: An Improved Method for Determination of Corrosion Inhibitors in Engine Coolants

AN 234: Simultaneous Determination of Pharmaceutical Peptides and Acetate by HPLC with UV Detection Using the Acclaim Mixed-Mode WAX-1 Column

AN: 236: Determination of Iodide and Iodate in Seawater and Iodized Table Salt by HPLC with UV Detection

## Acclaim Mixed-Mode WCX-1

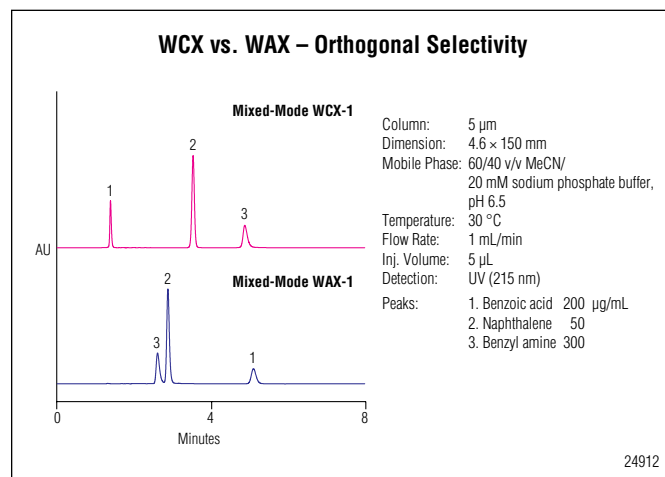
*Reversed-phase and weak cation-exchange on a single column*

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

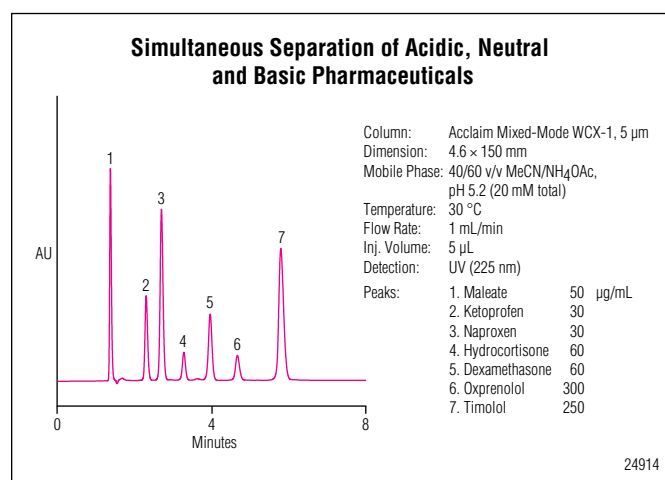
- Adjustable selectivity
- Ideal selectivity for separating basic molecules
- Selectivity complementary to C18 RP columns
- Multimode separation mechanism: reversed-phase, weak cation-exchange, anion-exclusion and HILIC
- Capable of separating a mixture of neutral and basic compounds

The Acclaim Mixed-Mode WCX-1 stationary phase consists of a hydrophobic alkyl chain with a carboxylic group at the terminus. The hydrophobic moiety provides reversed-phase retention and the carboxylic group facilitates electro-static interactions. This unique combination results in the adjustable selectivity, making Acclaim Mixed-Mode WCX-1 separate mixtures that would be impossible for a C18 column.

Acclaim Mixed-Mode WCX-1 columns are available in two particle sizes (3 and 5  $\mu\text{m}$ ), three inner diameters (4.6, 3.0, and 2.1 mm) and three lengths (250, 150, and 50 mm). Guard cartridges are also available in 5  $\mu\text{m}$  and three formats: 4.6  $\times$  10, 3.0  $\times$  10, and 2.1  $\times$  10 mm.



*Orthogonal selectivity.*



*Simultaneous separation of acidic, neutral and basic pharmaceuticals.*

## Broad Range of Applications

Basic compounds are important in a variety of industrial applications, including pharmaceutical, chemical, consumer products, foods and beverages, and more. However, analyses of these compounds are often challenging when using reversed-phase silica columns. The Acclaim Mixed-Mode WCX-1 provides a remedy to these difficulties: not only does it retain basic molecules (from highly hydrophilic to highly hydrophobic), but also separates them with symmetrical peak shapes and excellent efficiency.

The Acclaim Mixed-Mode WCX-1 column can serve as a primary column for a variety of basic analytes containing samples as well as a secondary column that provides selectivity orthogonal to that of reversed-phase columns.

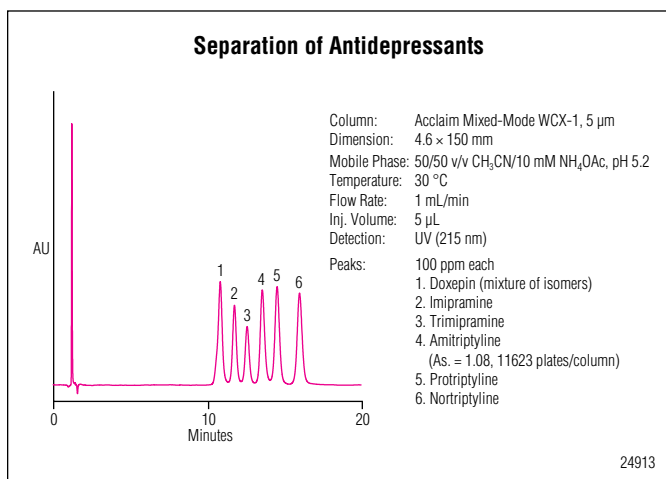
## Ordering Information

### Analytical Columns

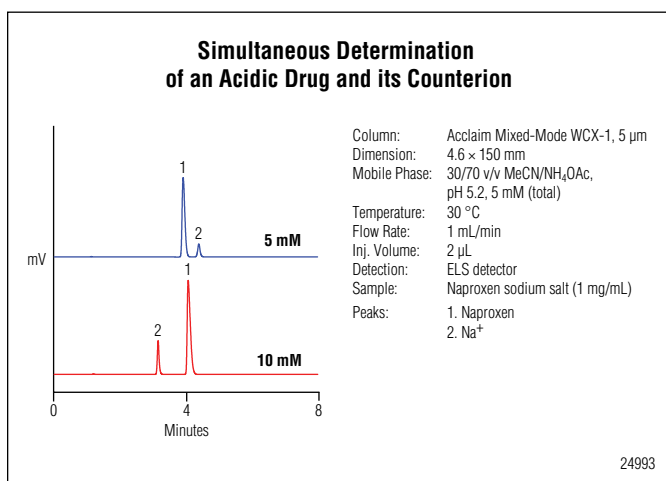
Acclaim Mixed-Mode WCX-1, 3 $\mu$ m Analytical (2.1 x 150 mm).....	070093
Acclaim Mixed-Mode WCX-1, 3 $\mu$ m Analytical (3.0 x 50 mm).....	071910
Acclaim Mixed-Mode WCX-1, 3 $\mu$ m Analytical (3.0 x 150 mm).....	070092
Acclaim Mixed-Mode WCX-1, 5 $\mu$ m Analytical (2.1 x 150 mm).....	068371
Acclaim Mixed-Mode WCX, 5 $\mu$ m Analytical (4.6 x 150 mm).....	068353
Acclaim Mixed-Mode WCX, 5 $\mu$ m Analytical (4.6 x 250 mm).....	068352

### Guard Column

Acclaim Mixed-Mode WCX-1, 5 $\mu$ m Guards (3 x 10 mm), 2 ea., (requires holder 069580).....	071911
Acclaim Mixed-Mode WCX-1 Guard, 5 $\mu$ m (4.6 x 10 mm), 2 ea. (use V-2 Holder).....	069705
Acclaim SST Guard Cartridge Holder V-2.....	069580
Guard to Analytical Column Coupler V-2.....	074188
Acclaim Guard Kit (Holder and coupler) V-2.....	069707



Separation of antidepressants.



Analysis of naproxen sodium salt.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

### Product Data Sheets

Acclaim Mixed-Mode WCX-1 for Separating Basic Molecules  
 Data Sheet

### Application Notes

AN 221: Rapid Determination of Melamine in Liquid Milk and Milk Powder by HPLC on the Acclaim Mixed-Mode WCX-1 Column with UV Detection

## OmniPac

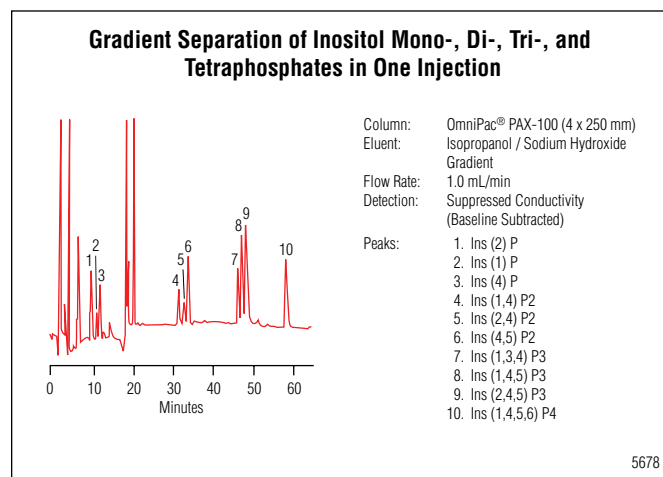
*DBV polymer columns for combined ion-exchange and reversed-phase separations*

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

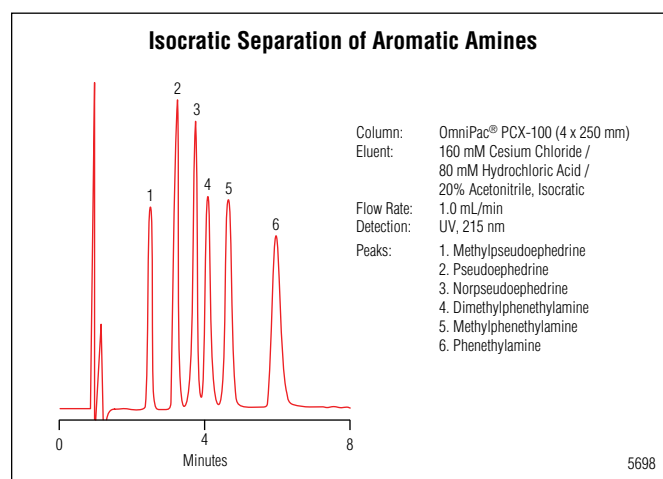
- Acid-, base-, and solvent-compatible, pH 0–14
- Ideal for the separation of high-molecular-weight organic acids
- Delivers optimal separation of very hydrophobic anions
- Delivers optimal separation of halogenated anions
- Provides simultaneous separation of neutral and ionic species
- Unique selectivity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

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

The OmniPac PAX-100 column was one of the first 100% solvent-compatible, anion-exchange columns developed for the separation of inorganic and organic anions, providing acid and base-compatibility over the entire pH range. Because the OmniPac PAX-100 column is solvent-compatible, solvents can be used to modify the ion-exchange selectivity.



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



*Isocratic separation of aromatic amines.*

## Wide Range of Applications

Use the OmniPac PAX-100 column for analysis of larger organic acids, including alkylbenzene sulfonates, aromatic acids, polyphosphates, and inositol phosphates. Use the OmniPac PAX-500 column for separation of alcohols, alkanolamines, antihistamines, anti-inflammatory agents, aromatic acids, inorganic acids, peptides, purines and pyrimidines, and sulfonamides.

The OmniPac PCX-100 column can be used to separate hydrophobic cationic analytes such as amines, anilines, antidepressants, drugs, and metabolites. The OmniPac PCX-500 column may be used for the separation of adrenergics, alcohols, anilines, antidepressants, anti-inflammatory agents, plating bath brighteners, cephalosporins, stains and dyes, herbicides, nucleotides, and nucleosides.

## Application Updates

AU 126: Determination of Diethanolamine and Triethanolamine in Surface Finishing, Wastewater and Scrubber Solutions

AU 133: Saccharin in Electrolytic Nickel Sulfate Baths

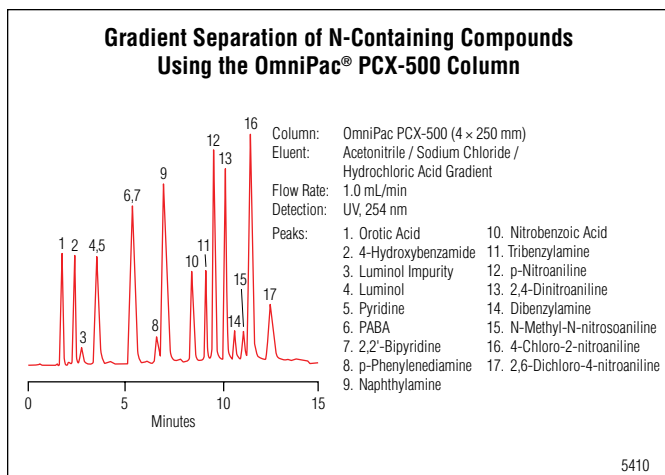
## Ordering Information

## Analytical Columns

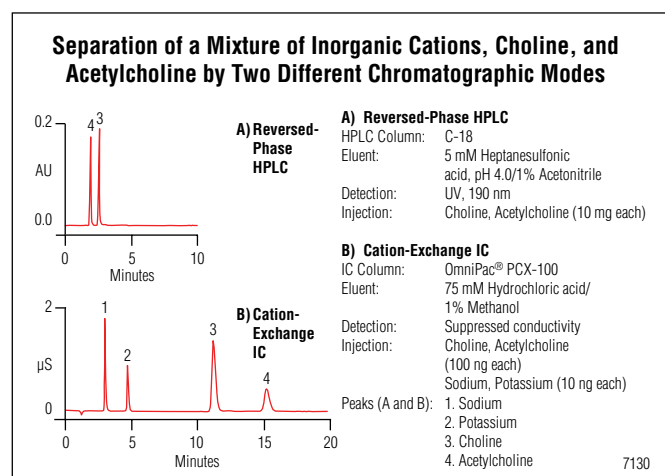
OmniPac PAX-100 Analytical Column (4 × 250 mm)	042150
OmniPac PAX-500 Analytical Column (4 × 250 mm)	042152
OmniPac PCX-100 Analytical Column (4 × 250 mm)	042189
OmniPac PCX-500 Analytical Column (4 × 250 mm)	042191

## Guard Columns

OmniPac PAX-100 Guard Column (4 × 50 mm)	042151
OmniPac PAX-500 Guard Column (4 × 50 mm)	042153
OmniPac PCX-100 Guard Column (4 × 50 mm)	042193
OmniPac PCX-500 Guard Column (4 × 50 mm)	042195



Gradient separation of N-containing compounds.



Comparison of OmniPac and a reversed-phase column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## Product Brochures

Catalog: Acclaim Bonded Silica-Based Columns for HPLC

## Product Data Sheets

Acclaim Organic Acid (OA) HPLC Column Data Sheet

## Application Notes

AN 106: Ion Chromatography in the Pharmaceutical Industry

AN 65: Analysis of Inositol Phosphates

AN 70: Choline and Acetylcholine



## IC & RFIC Columns

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## Hydroxide-Selective Anion-Exchange Monolithic Columns

*Columns for fast separation of organic acids and inorganic anions*

The new IonSwift anion-exchange columns provide high-speed, high-resolution separations of small molecules including inorganic anions and organic acids. These columns were developed using monolith technology, and allow the use of high flow rates for faster analyte separations. Hydroxide eluents for gradient elution are very convenient with Reagent-Free Ion Chromatography (RFIC) systems using electrolytic generation of the eluent.

RFIC systems simplify method development for hydroxide-gradient elution; the electrolytic eluent generator provides gradient methods that are simpler to use and more precise than manually-prepared isocratic eluents. Modern continuous-eluent-suppression systems are designed to suppress hydroxide eluents, even at high concentrations.



*IonSwift MAX-100: A new generation of unique separation media engineered for fast separation of organic acids and inorganic anions.*

## IonSwift MAX-100

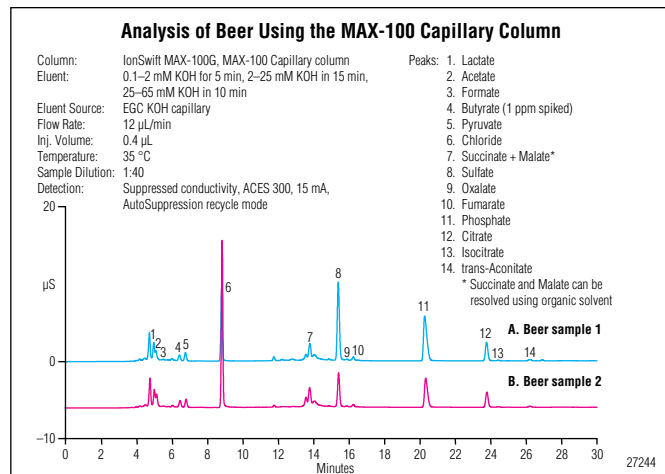
*A new generation of unique separation media engineered to separate small molecules.*

The IonSwift MAX-100 anion-exchange column is a new generation of unique separation media, engineered to separate small molecules including organic acids and inorganic anions, with fast analysis completed in approximately 25 minutes. The IonSwift MAX-100 is the first of a series of columns developed using monolith technology, designed to provide high-speed, high-resolution separations of organic acids and inorganic anions using a hydroxide gradient delivered by an Eluent Generator.

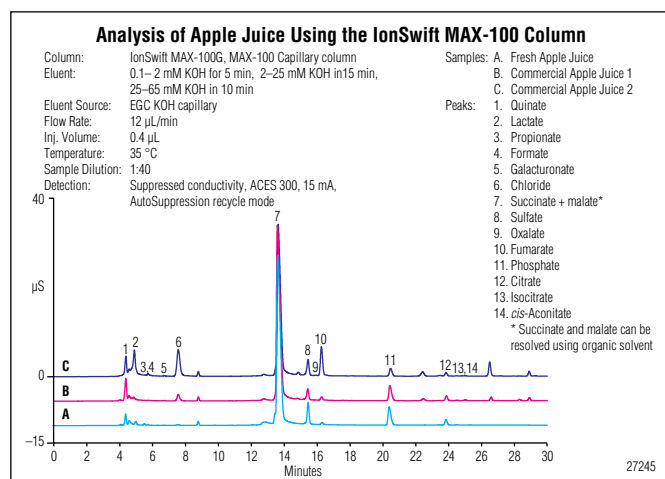
- Fast gradient separation of organic acids and inorganic anions in 25 minutes
- Ideal alternative for most AS11-HC applications
- High capacity: 12  $\mu\text{eq}$  per column ( $1 \times 250$  mm column)
- Unique monolith design provides fast mass transfer and fast separations
- High throughput and improved productivity
- Outstanding reproducibility

The IonSwift MAX-100 is an ideal alternative to the AS11-HC column for most organic acid and inorganic anion applications. For highest resolution and capacity, the AS11-HC column is recommended.

The IonSwift MAX-100 column is available in 2 formats:  $1.0 \times 250$  mm microbore and  $0.25 \times 250$  mm capillary formats. These formats offer the advantage of reduced eluent consumption, providing reduced operating costs. High mass sensitivity can be achieved with both formats, providing lower MDLS.



Analysis of beer using the IonSwift MAX-100 capillary column.



Analysis of apple juice using the IonSwift MAX-100 capillary column.

## Ordering Information

### Analytical Columns

IonSwift MAX-100 Analytical Column (1 x 250 mm) ..... 071279

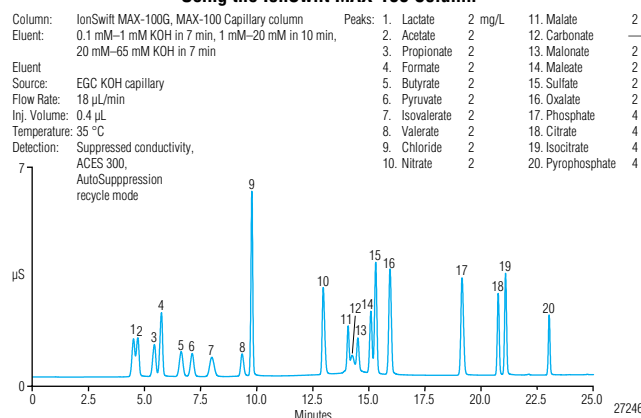
IonSwift MAX-100 Analytical Column (0.25 x 250 mm) ..... 074246

### Guard Columns

IonSwift MAX-100G Guard Column (1 x 50 mm) ..... 071280

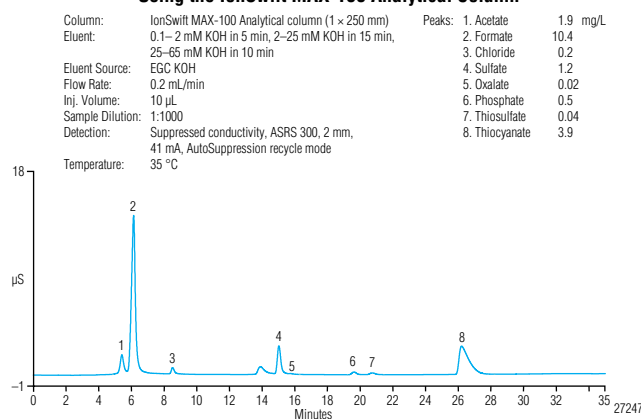
IonSwift MAX-100G Guard Column (0.25 x 50 mm) ..... 074247

### Separation of Common Fermentation Broth Anions Using the IonSwift MAX-100 Column



Separation of common fermentation broth anions using the IonSwift MAX-100 capillary column.

### Separation of Common Petrochemical Anions Using the IonSwift MAX-100 Analytical Column



Separation of common petrochemical anions using the IonSwift MAX-100 capillary column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonSwift MAX-100 Anion-Exchange Column

# Hydroxide-Selective Anion-Exchange Packed Columns

## *Hydroxide-selective anion-exchange columns optimized for use with hydroxide eluent*

Choose a hydroxide eluent column for use with an eluent generator for isocratic and gradient analysis. Hydroxide eluents for isocratic or gradient elution are very convenient with Reagent-Free Ion Chromatography (RFIC) systems with electrolytic eluent generation. Hydroxide-selective anion-exchange columns are available in a wide range of capacities and hydrophobicities.

RFIC technology simplifies method development for hydroxide-gradient systems; the electrolytic eluent generator provides gradient methods that are simpler to use than manually-prepared isocratic eluents. Modern continuous-eluent-suppression systems are designed to suppress hydroxide eluents, even at high concentrations.



**IonPac AS24:** High-capacity anion-exchange column for separation of haloacetic acids and bromate in drinking water prior to MS or MS/MS detection or 2-D analysis.

**IonPac Fast Anion IIIA:** Hydroxide-selective anion-exchange column designed for the rapid determination of phosphoric and citric acids in cola soft drink samples

**IonPac AS21:** Hydroxide-selective anion-exchange column for fast analysis of trace perchlorate in drinking water prior to detection with MS/MS

**IonPac AS20:** High-capacity anion-exchange column for determination of trace perchlorate using suppressed conductivity detection

**IonPac AS19:** High-capacity hydroxide-selective column for determination of oxyhalides and inorganic anions

**IonPac AS18:** Hydroxide-selective anion-exchange column for determination of inorganic anions and low-molecular-weight organic acids

**IonPac AS17-C:** Hydroxide-selective anion-exchange column for fast gradient separation of inorganic anions in high-purity water matrices

**IonPac AS16:** High-capacity hydroxide-selective anion-exchange column optimized for the determination of highly polarizable anions

**IonPac AS15:** High-capacity anion-exchange column for determination of trace-level concentrations of inorganic anions and low molecular weight organic acids

**IonPac AS11-HC:** High-capacity anion-exchange column designed to resolve a large number of organic acids and inorganic anion in complex matrices

**IonPac AS11:** Anion-exchange column for fast profiling of inorganic anions and organic acid anions.

**IonPac AS10:** High-capacity hydroxide-selective, anion-exchange column designed for the isocratic and gradient separation of inorganic anions and organic acids

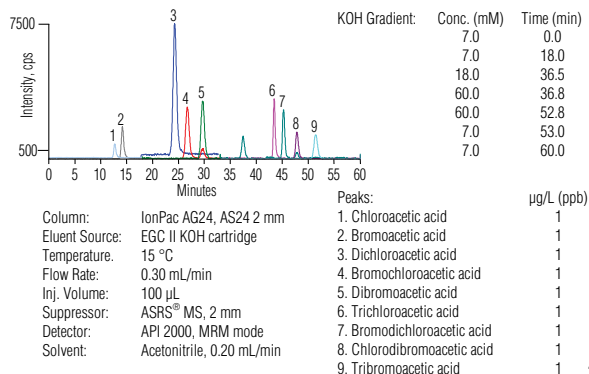
## IonPac AS24

*For separation of haloacetic acids and bromate in drinking water prior to MS or MS/MS detection*

The IonPac AS24 hydroxide-selective anion-exchange column is specifically designed for haloacetic acids in drinking water prior to MS or MS/MS detection. The capacity and selectivity enables analysis of haloacetic acids in drinking water at low- $\mu\text{g/L}$  concentrations. The AS24 column is the specified column in US EPA Method 553.

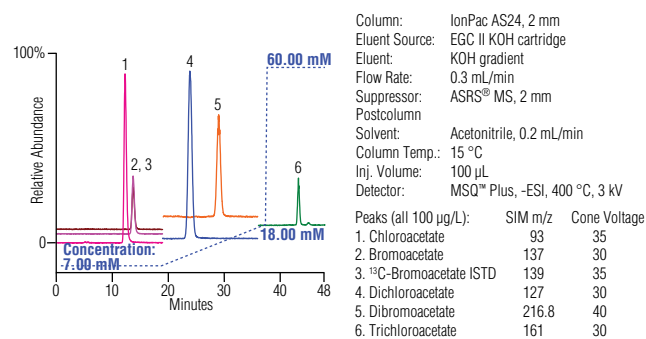
- Specified column for US EPA Method 553
- High capacity: 140  $\mu\text{eq}$  per column ( $2 \times 250$  mm)
- Determine HAAs in high-ionic strength matrices without sample pretreatment
- Column selectivity is optimized for a 15 °C operating temperature
- Compatible with HPLC organic solvents
- Used as second dimension column in 2-D method for bromate in US EPA Method 302.0

### Determination of Haloacetic Acids Using the IonPac® AS24 Column and MS/MS Detection



*Determination of haloacetic acids using the IonPac AS24 column and MS/MS detection.*

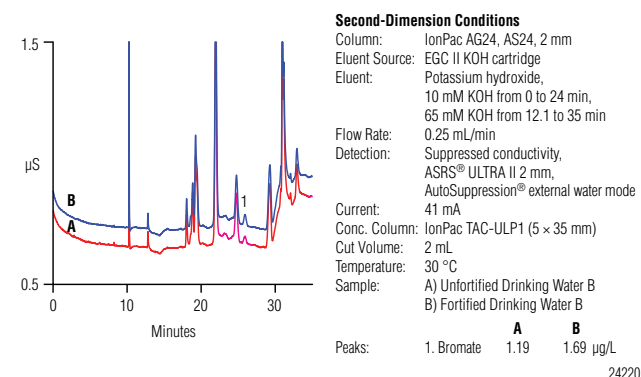
### Determination of Haloacetic Acids Using the IonPac® AS24 Column and MS Detection



*Determination of haloacetic acids using the IonPac AS24 column and MS detection.*

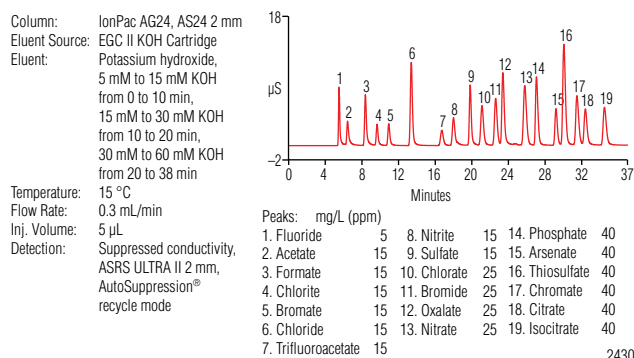


### Determination of Trace Concentrations of Bromate Using the IonPac® AS24 Column with Two-Dimensional Ion Chromatography



Determination of trace concentrations of bromate using the IonPac AS24 column with two-dimensional ion chromatography.

### Anion Separation Including Inorganic Anions, Organic Acids, Oxyanions, and Oxyhalides on an IonPac® AS24 Column Using a Potassium Hydroxide Eluent Delivered by an Eluent Generator



Separation of various anions on an IonPac AS24 column using potassium hydroxide eluent delivered by an Eluent Generator.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS24 Anion-Exchange Column

### Application Notes

AN 187: Determination of Sub-μg/L Bromate in Municipal and Natural Mineral Waters Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

## Ordering Information

### Analytical Columns

IonPac AS24 Analytical Column (2 × 250 mm) ..... 064153

### Guard Columns

IonPac AG24 Guard Column (2 × 50 mm) ..... 064151

## IonPac Fast Anion IIIA

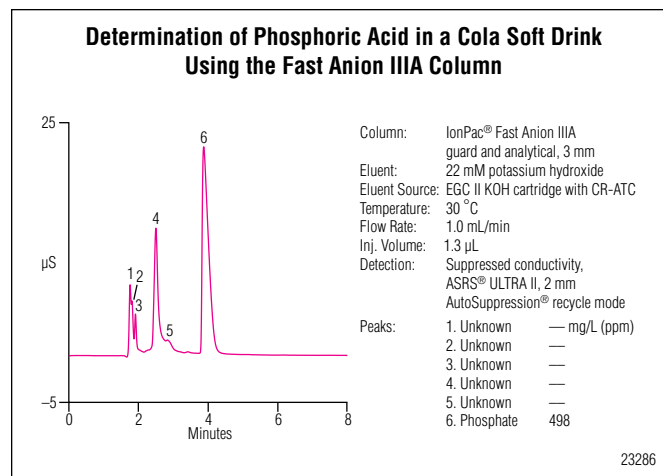
*Rugged reliable, rapid determination of phosphoric and citric acids in colas*

This hydroxide-selective anion-exchange column is specifically designed for the determination of phosphoric and citric acids in cola soft drinks. Its capacity and selectivity allows rapid analysis of these acids in less than 7 minutes.

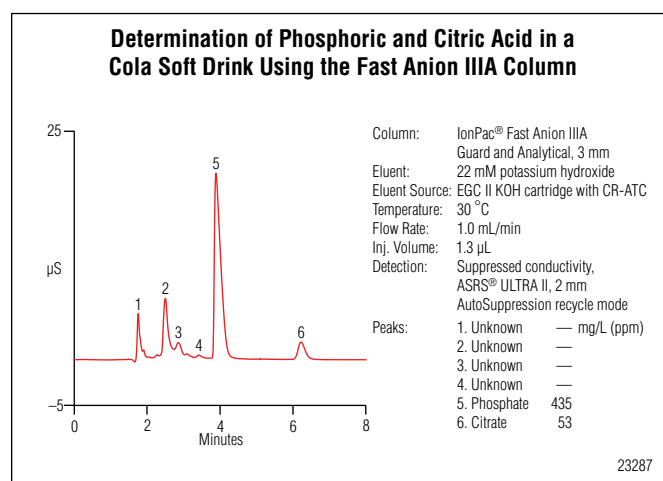
- Use with the Eluent Generator for simplified Reagent-Free IC operation.
- The 3 mm i.d. configuration provides economical operation.
- Combine with the ASRS 300 suppressor for low background and enhanced sensitivity.
- Compatible with organic solvents.

The Fast Anion IIIA is optimized for a 30 °C operating temperature to ensure reproducible retention times in all environmental conditions. It is compatible with organic solvents to enhance analyte solubility, modify column selectivity, or allow effective column cleanup. The Fast Anion IIIA column is recommended for use with the Eluent Generator, requiring only a deionized water source to produce potassium hydroxide eluent.

The cola samples may require sample pretreatment with sonication to remove carbonation. Sample dilution of cola syrups is recommended prior to analysis to ensure optimum column life. These acids can be analyzed in less than 7 minutes using an isocratic potassium hydroxide eluent delivered by an Eluent Generator in combination with suppressed conductivity detection.

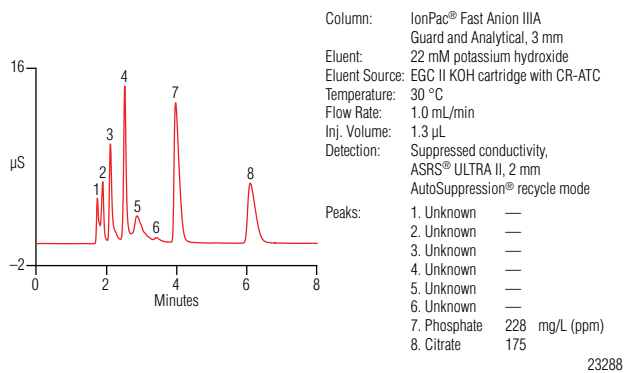


*Determination of phosphoric acid in a cola soft drink using the Fast Anion IIIA column.*



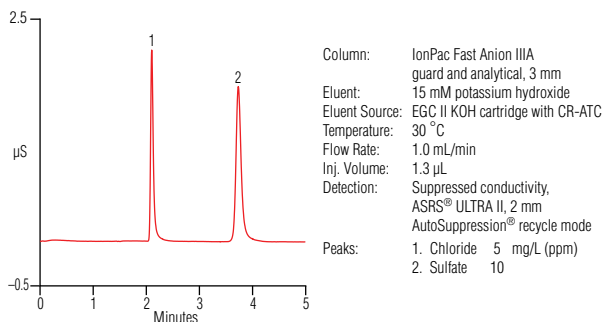
*Determination of phosphoric and citric acid in a cola soft drink using the Fast Anion IIIA column.*

### Determination of Phosphoric and Citric Acid in a Diet Cola Soft Drink Using the Fast Anion IIIA Column



Determination of phosphoric and citric acid in a diet cola soft drink using the Fast Anion IIIA column.

### Rapid Analysis of Chloride and Sulfate on an IonPac® Fast Anion IIIA Column



Rapid analysis of chloride and sulfate on an IonPac Fast Anion IIIA column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac Fast Anion IIIA Anion-Exchange Column

### Application Updates

AU 153: Fast Determinations of Phosphate and Citrate in Carbonated Beverages Using On-Line Degassing with the Carbonate Removal Device (CRD) and a Reagent-Free Ion Chromatography System

## Ordering Information

### Analytical Columns

IonPac Fast Anion IIIA Analytical Column (3 × 250 mm)..... 062964

### Guard Columns

IonPac Fast Anion IIIA Guard Column (3 × 50 mm) ..... 062966

## IonPac AS21

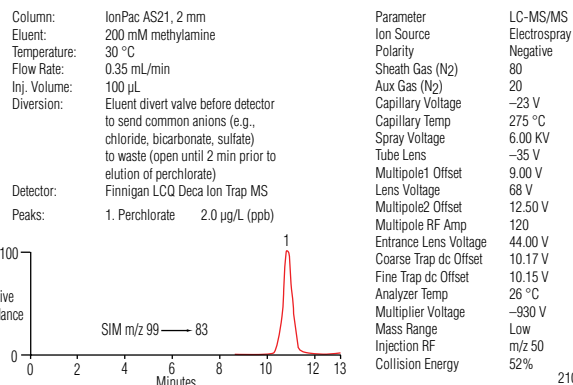
*For fast analysis of trace perchlorate in drinking water prior to detection with MS/MS*

The AS21 hydroxide-selective anion-exchange column is specifically designed for determination of trace perchlorate in drinking water prior to MS/MS detection. The capacity and selectivity enable fast analysis of perchlorate at low  $\mu\text{g/L}$  concentrations. The AS21 is the specified column in US EPA Method 331.0.

- Fast separation of perchlorate prior to MS/MS detection
- Optimized for methylamine or hydroxide mobile phases
- Specified column for US EPA Method 331.0
- Optimum capacity: 45  $\mu\text{eq}$  per column ( $2 \times 250$  mm)
- Operates at ambient or elevated temperatures
- Compatible with organic solvents

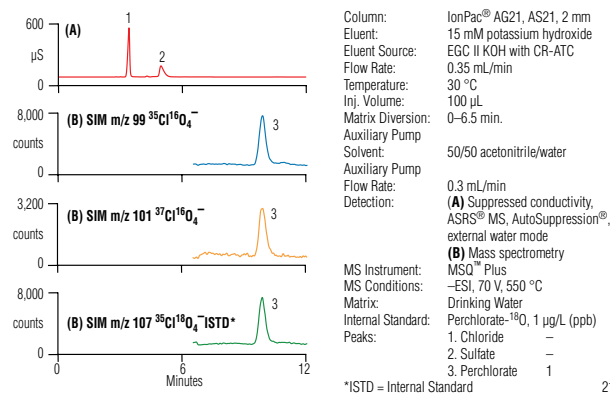
The AS21  $2 \times 250$  mm column format was specifically developed for MS/MS compatibility to allow use of volatile mobile phases such as methylamine.

### Determination of Perchlorate Using the IonPac® AS21 and MS/MS Detection



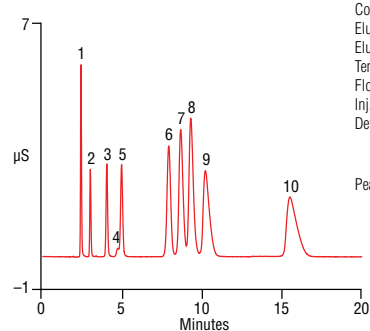
*Determination of perchlorate using the IonPac AS21 and MS/MS detection.*

### IC/MS Determination of Perchlorate in Drinking Water Using the IonPac® AS21 Column



*IC/MS determination of perchlorate in drinking water using the IonPac AS21 column.*

## Analysis of Environmental Anions Using the IonPac® AS21 Column



Column: IonPac AG21, AS21, 2 mm  
 Eluent: 15 mM potassium hydroxide  
 Eluent Source: EGC II KOH cartridge with CR-ATC  
 Temperature: 30 °C  
 Flow Rate: 0.35 mL/min  
 Inj. Volume: 2.5 µL  
 Detection: Suppressed conductivity,  
 ASRS® ULTRA II, 2 mm,  
 AutoSuppression® recycle mode

Peaks:	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Fluoride	Chloride	Nitrate	Carbonate	Sulfate	Tungstate	Chromate	Perchlorate	Phosphate	Arsenate
	2	2	5	—	5	30	30	30	30	30
	mg/L (ppm)									

21062

## Ordering Information

## Analytical Columns

IonPac AS21 Analytical Column (2 × 250 mm) ..... 063009

## Guard Columns

IonPac AG21 Guard Column (2 × 50 mm) ..... 063071

*Analysis of environmental anions using the IonPac AS21 column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## Product Data Sheets

IonPac AS21 Anion-Exchange Column Data Sheet

## IonPac AS20

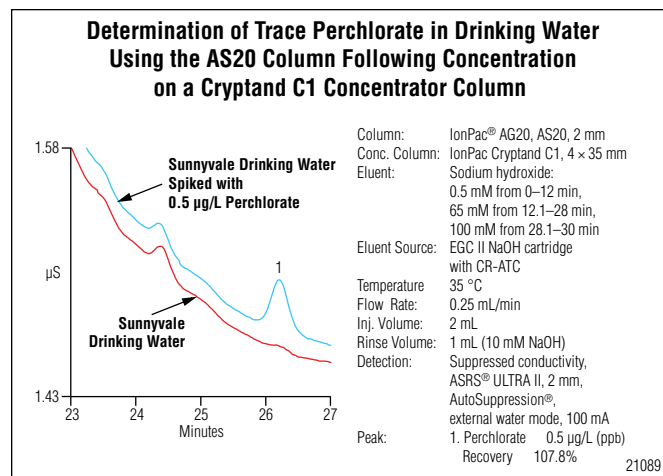
*For determination of trace perchlorate using suppressed conductivity detection*

The AS20 hydroxide-selective anion-exchange column is specifically designed for the determination of trace concentrations of perchlorate in drinking water, surface water, and groundwater matrices. The capacity and selectivity of the AS20 ensures that perchlorate can be quantified at low  $\mu\text{g/L}$  concentrations using suppressed conductivity detection even in the presence of very high concentrations of chloride, carbonate, and sulfate.

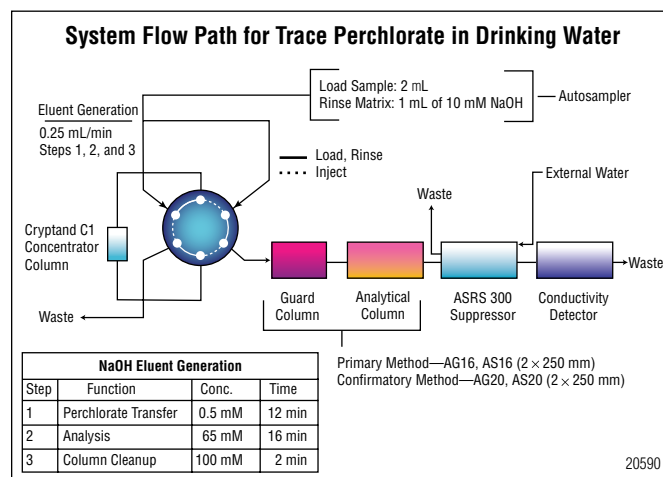
- Recommended for US EPA Method 314.1 (Confirmatory Method)
- High capacity: 310  $\mu\text{eq}$  per column. (4 × 250 mm)
- Use the Cryptand C1 Concentrator Column for sample preconcentration
- Simplified Reagent-Free IC operation provided by the Eluent Generator
- ASRS 300 provides RFIC operation with low background and enhanced analyte sensitivity
- Column selectivity is optimized for 30 °C operating temperature
- Compatible with organic solvents

The AS20 is the specified column in US EPA Method 314.1 (Confirmatory Method). The Cryptand C1 Concentrator Column is the specified concentrator column for sample preconcentration in that method.

The AS20 column is ideally used with an RFIC system for best detection limits. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS20 column for eluent suppression.



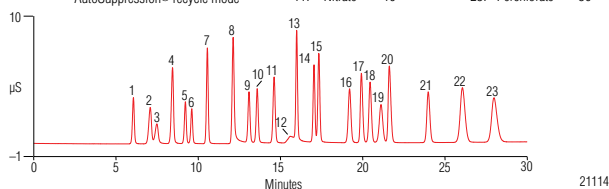
*Determination of trace perchlorate in drinking water using the AS20 column following concentration on a Cryptand C1 Concentrator column.*



*System flow path for trace perchlorate in drinking water.*

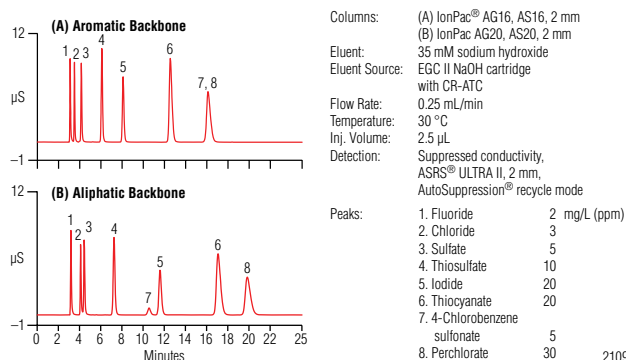
### Gradient Separation of a Variety of Environmental Anions Using the AS20 Column

Column:	IonPac® AG20, AS20, 4 mm	Peaks: mg/L (ppm)	12. Carbonate	20
Eluent:	Potassium hydroxide:	1. Fluoride	13. Sulfate	10
	5 mM from 0 to 5 min,	2. Acetate	14. Selenate	10
	5–30 mM from 5 to 15 min,	3. Butyrate	15. Oxalate	10
	30–55 mM from 15 to 30 min	4. Formate	16. Phthalate	20
Eluent Source:	EGC II KOH with CR-ATC	5. Chlorite	17. Phosphate	20
Temperature:	30 °C	6. Bromate	18. Chromate	20
Flow Rate:	1.0 mL/min	7. Chloride	19. Iodide	20
Inj. Volume:	10 µL	8. Nitrite	20. Arsenate	20
Detection:	Suppressed conductivity, ASRS® ULTRA II, 4 mm, AutoSuppression® recycle mode	9. Chlorate	21. Citrate	20
		10. Bromide	22. Thiocyanate	20
		11. Nitrate	23. Perchlorate	30



Gradient separation of a variety of environmental anions using the AS20 column.

### Comparison of the AS16 and AS20 Columns for Separation of Common Anions, Hydrophobic Anions and 4-Chlorobenzene Sulfonate



Comparison of the AS16 and AS20 columns for separation of common anions, hydrophobic anions and 4-chlorobenzene sulfonate.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac AS20 Anion-Exchange Column Data Sheet

### Application Notes

AN 176: Determining Sub-ppb Perchlorate in Drinking Water Using Preconcentration/Matrix Elimination IC with Suppressed Conductivity Detection by U.S. EPA Method 314.1

AN 178: Improved Determination of Trace Concentrations of Perchlorate in Drinking Water Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

## Ordering Information

### Analytical Columns

IonPac AS20 Analytical Column (2 × 250 mm).....	063065
IonPac AS20 Analytical Column (4 × 250 mm).....	063148

### Guard Columns

IonPac AG20 Guard Column (2 × 50 mm).....	063066
IonPac AG20 Guard Column (4 × 50 mm).....	063154



## IonPac AS19

*For determination of oxyhalides and inorganic anions*

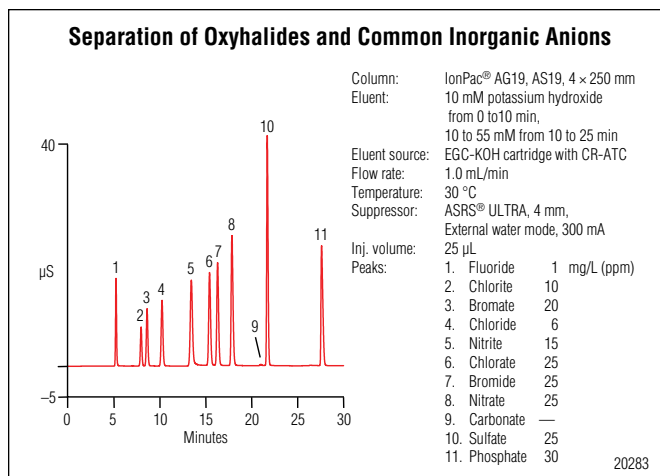
The IonPac AS19 hydroxide-selective anion-exchange column is specifically designed for trace bromate in drinking water. Its high capacity and selectivity allow the determination of bromate in drinking water at the low- $\mu\text{g/L}$  level. The AS19 meets the performance requirements of US EPA Methods 300.0 and 300.1.

- Recommended hydroxide-selective column for trace bromate in drinking water matrices
- High capacity: 240  $\mu\text{eq}$  per column (4  $\times$  250 mm)
- Meets or exceeds performance requirements of US EPA Methods 300.0 and 300.1
- Column selectivity is optimized for a 30  $^{\circ}\text{C}$  operating temperature
- Compatible with organic solvents
- Low backgrounds and enhanced analyte sensitivity with the ASRS 300 and an RFIC system

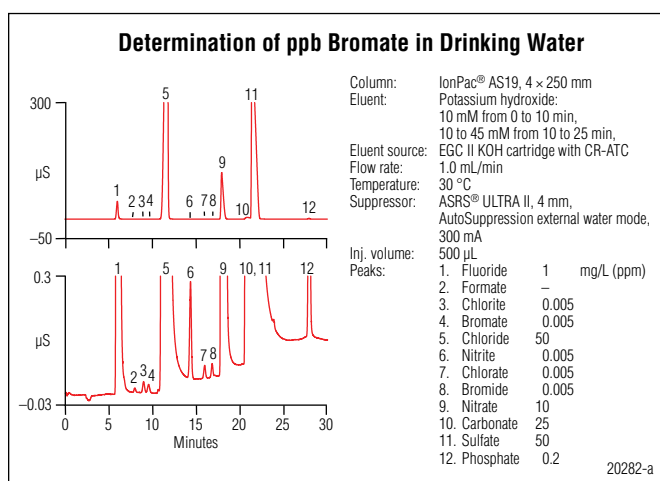
The AS19 is designed for the analysis of oxyhalides and common inorganic anions including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, groundwater, wastewater, and other diverse sample matrices. The AS19 allows analysis of most drinking water without the use of sample pretreatment or pre-concentration. The AS19 column is ideally used with an RFIC system for automatic eluent generation.

The key application for the AS19 is the determination of trace bromate in drinking water matrices using a potassium hydroxide gradient with suppressed conductivity detection. The selectivity of the AS19 ensures that bromate, a toxic byproduct of ozone disinfection, can be quantified at low- $\mu\text{g/L}$  concentrations using suppressed conductivity detection even in the presence of very high concentrations of chloride, sulfate, and carbonate.

**Note:** Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS19 column for eluent suppression.

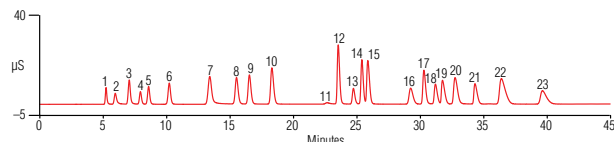


*Determination of oxyhalides and common inorganic anions using the AS19 column.*



*Determination of trace concentration of bromate in a simulated drinking water sample using the AS19 column with a large-loop injection.*

# Determination of Inorganic Anions, Oxyhalides, Organic Acids, and Oxyanions on an IonPac® AS19 Column Using a Potassium Hydroxide Gradient Delivered by an EG50 Eluent Generator



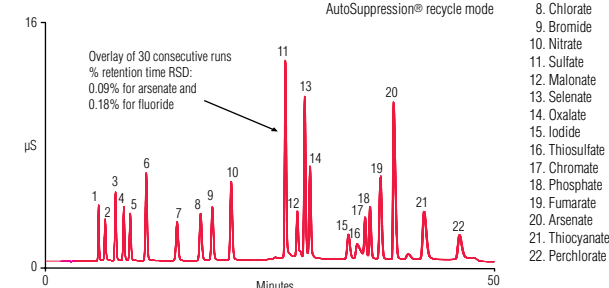
Column: IonPac AG19, AS19, 4 mm  
 Eluent: Potassium hydroxide: 10 mM from 0 to 10 min, 10–58 mM from 10 to 40 min  
 Eluent source: EGC II KOH with CR-ATC  
 Flow rate: 1.0 mL/min  
 Temperature: 30 °C  
 Suppressor: ASRS® ULTRA II, 4 mm, AutoSuppression recycle mode, 300 mA  
 Inj. volume: 25 µL

20284

*Determination of inorganic anions, oxyhalides, organic acids and oxyanions on an IonPac AS19 column using a hydroxide gradient delivered by an Eluent Generator*

## Separation of 22 Anions on an IonPac AS19 Capillary Column

Column: IonPac AS19 capillary column (0.4 mm x 250 mm)  
 Eluent: 10 mM KOH (0 to 10 min), 10 to 52 mM KOH (10 to 42 min), 52 to 70 mM (42 to 45 min), 10 mM (45 to 50 min)  
 Eluent Source: EGC-KOH capillary cartridge  
 Temperature: 30 °C  
 Flow Rate: 10 µL/min  
 Inj. Volume: 1.0 µL  
 Suppressor: Suppressed conductivity Anion Capillary Electrolytic Suppressor (ACES™) AutoSuppression® recycle mode



27083

*Separation of 22 anions on an IonPac AS19 capillary column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac AS19 Anion-Exchange Column Data Sheet

### Application Notes

AN 93: Determination of Trace Anions in Concentrated Bases Using AutoNeutralization Pretreatment/Ion Chromatography

AN 167: Determination of Trace Concentrations of Oxyhalides and Bromide in Municipal and Bottled Waters Using a Hydroxide-Selective Column with a Reagent-Free Ion Chromatography System

AN 168: Determination of Trace Concentrations of Disinfection By-Product Anions and Bromide in Drinking Water Using Reagent-Free™ Ion Chromatography Followed by Postcolumn Addition of o-Dianisidine for Trace Bromate Analysis

AN 171: Determination of Disinfection By-Product Anions and Bromide in Drinking Water Using a Reagent-Free Ion Chromatography System Followed by Postcolumn Addition of an Acidified On-Line Generated Reagent for Trace Bromate Analysis

AN 184: Determination of Trace Concentrations of Chlorite, Bromate, and Chlorate in Bottled Natural Mineral Waters

AN 187: Determination of Sub-µg/L Bromate in Municipal and Natural Mineral Waters Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

### Application Updates

AU 154: Determination of Bromate in Drinking and Mineral Water by Isocratic Ion Chromatography with a Hydroxide Eluent

AU 159: Determination of Volcanic Gases as Anions in Caustic Solutions Using AutoNeutralization, Automated Dilutions, and a Reagent-Free Ion Chromatography System

## Ordering Information

### Analytical Columns

IonPac AS19 Analytical Column (4 x 250 mm) ..... 062885  
 IonPac AS19 Analytical Column (2 x 250 mm) ..... 062886

### Guard Columns

IonPac AG19 Guard Column (4 x 50 mm)..... 062887  
 IonPac AG19 Guard Column (2 x 50 mm)..... 062888

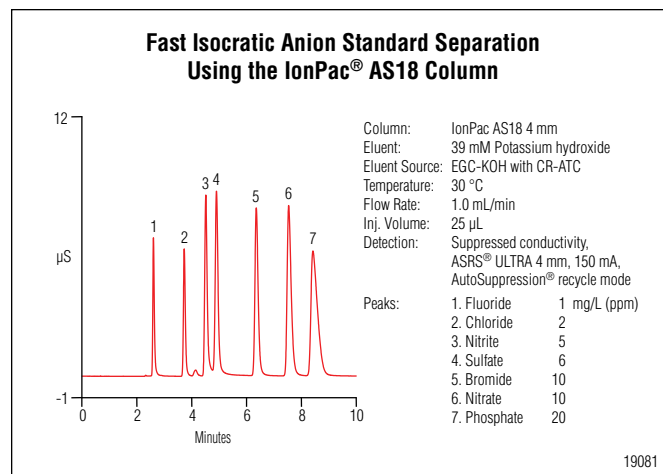
## IonPac AS18

*For determination of inorganic anions and low-molecular-weight organic acids*

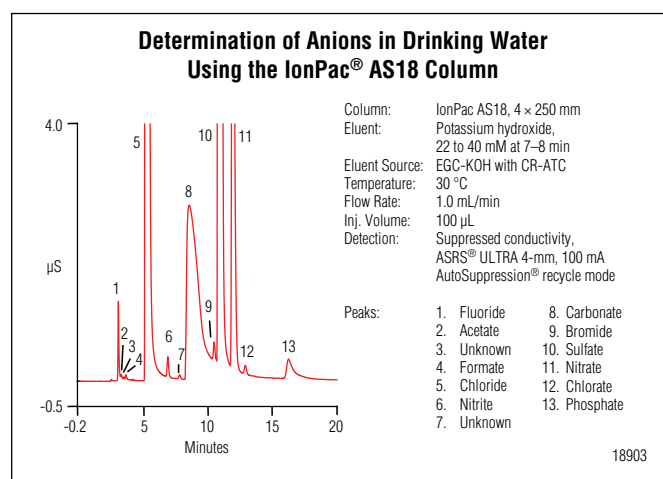
The IonPac AS18 column is the hydroxide-selective column of choice for compliance monitoring of inorganic anions in drinking water and wastewater samples in accordance with US EPA Methods 300.0 (A) and 300.1. The new IonPacAS18-Fast Capillary column offers the same selectivity as the AS18 analytical scale column, and offers reduced eluent consumption, thereby lowering operating costs. With a reduced length of 150 mm, this column separates common inorganic anions in significantly less time.

- Fast separation of the common inorganic anions in 4 minutes using the AS18-Fast capillary column
- Recommended hydroxide-selective column for inorganic anions in diverse sample matrices
- Fast isocratic separation of common inorganic anions in 9 minutes
- Inorganic anion and low-molecular weight organic acids in complex sample matrices
- Superior retention and quantification of fluoride, acetate, and formate
- Meets performance requirements specified in US EPA Method 300.0 (A)

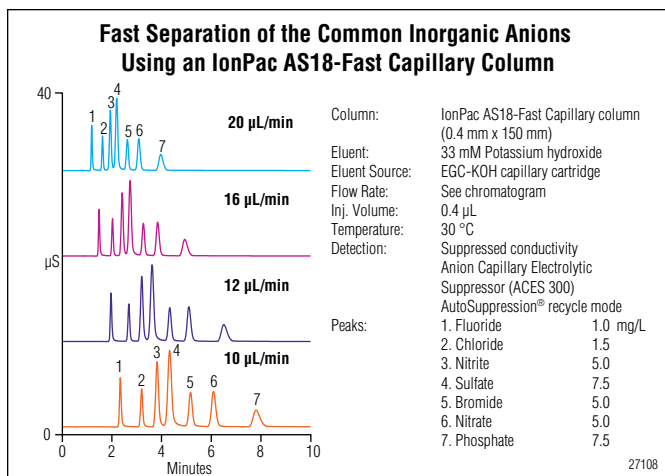
The AS18 can determine inorganic anions and low-molecular-weight organic acids in a variety of sample matrices. This column has excellent retention of fluoride from the water dip. It is approved for compliance monitoring of inorganic anions in drinking water and wastewater samples in accordance with US EPA Methods 300.0 and 300.1.



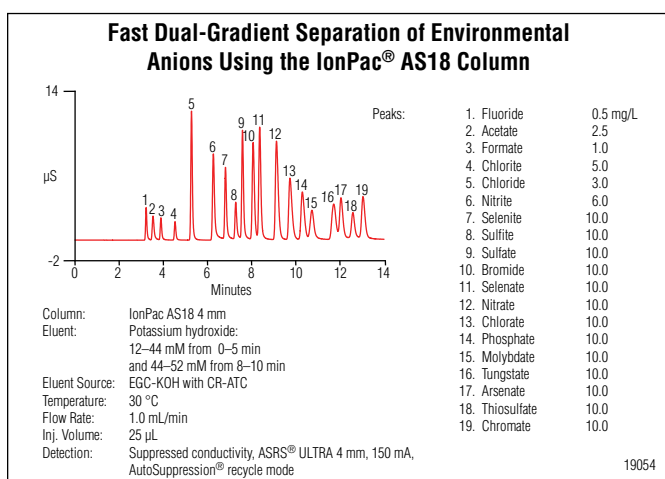
*Fast isocratic separation of the common inorganic anions on an IonPac AS18.*



*Determination of inorganic anions in a drinking water sample on an IonPac AS18 column using a potassium hydroxide gradient delivered by an Eluent Generator.*



Fast separation of the common inorganic anions using an IonPac AS18-Fast capillary column.



Fast dual-gradient separation of environmental anions using the IonPac AS18 column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac AS18 Anion-Exchange Columns Data Sheet

### Application Notes

AN 154: Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column

AN 156: Determination of Anions in Toothpaste by Ion Chromatography

AN 165: Determination of Benzoate in Liquid Food Products by Reagent-Free™ Ion Chromatography

### Application Updates

AU 146: Determination of Anions in Acid Rain by Ion Chromatography

## Ordering Information

### Analytical Columns

IonPac AS18 4 mm Analytical Column (4 x 250 mm)	060549
IonPac AS18 2 mm Analytical Column (2 x 250 mm)	060553
IonPac AS18-Fast Capillary Column (0.4 x 150 mm)	072062

### Guard Columns

IonPac AG18 4 mm Guard Column (4 x 50 mm)	060551
IonPac AG18 2 mm Guard Column (2 x 50 mm)	060555
IonPac AG18-Fast Capillary Guard Column (0.4 x 35 mm)	072063

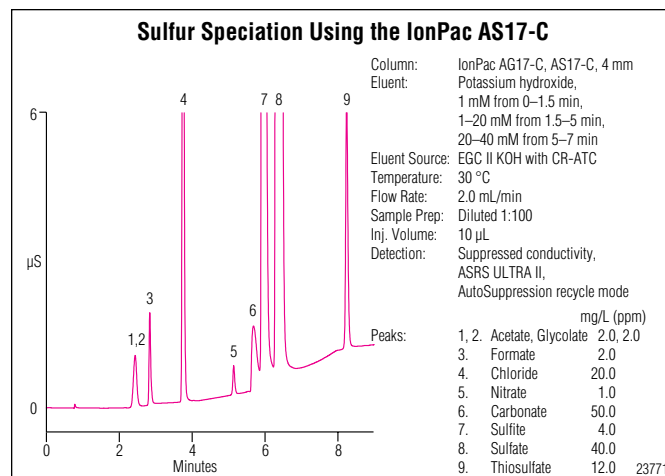
## IonPac AS17-C

*For fast gradient separation of inorganic anions in high-purity water matrices*

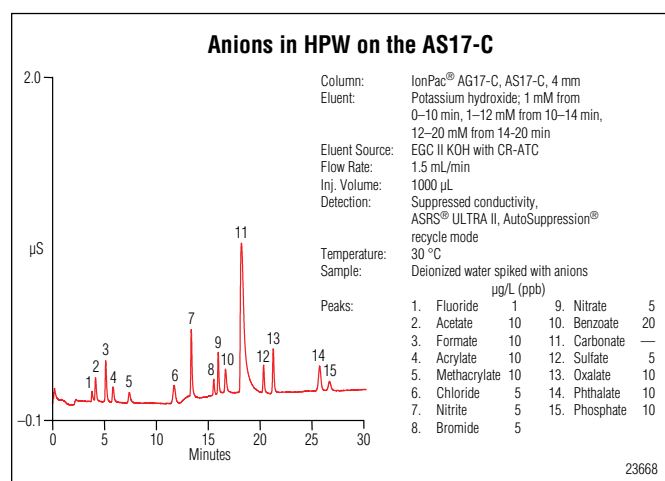
The IonPac AS17-C column is a low-capacity column for fast, gradient separation of inorganic anions. Its key application is the determination of common inorganic anions in high-purity water matrices. The AS17-C provides low sulfate blanks and fast equilibration time. It is recommended for use with RFIC systems using the Eluent Generator for automatic eluent generation. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS17-C column.

- Recommended replacement for all AS17 anion applications
- Optimized for common inorganic anions in simple sample matrices
- Fast gradient separation of inorganic anions in high-purity water matrices
- Fast, gradient separation of sulfur species including sulfite, sulfate, and thiosulfate
- Compatible with RFIC systems and the Eluent Generator for automatic eluent generation

**Note:** The IonPac AS18 column is the recommended hydroxide-selective column for determination of common anions in diverse sample matrices.



*Determination of sulfur species in a simulated industrial wastewater sample using an IonPac AS17-C Column*



*Determination of anions and organic acids in high-purity water using a large loop injection with potassium hydroxide gradient on a 4 mm IonPac AS17-C column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS17-C Anion Exchange Column Data Sheet

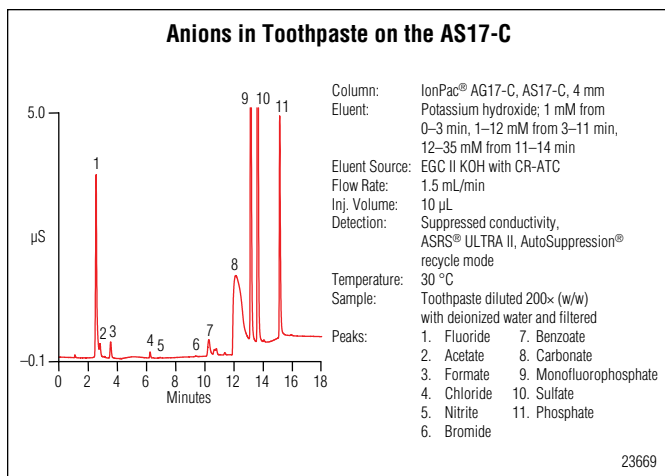
## Ordering Information

### Analytical Columns

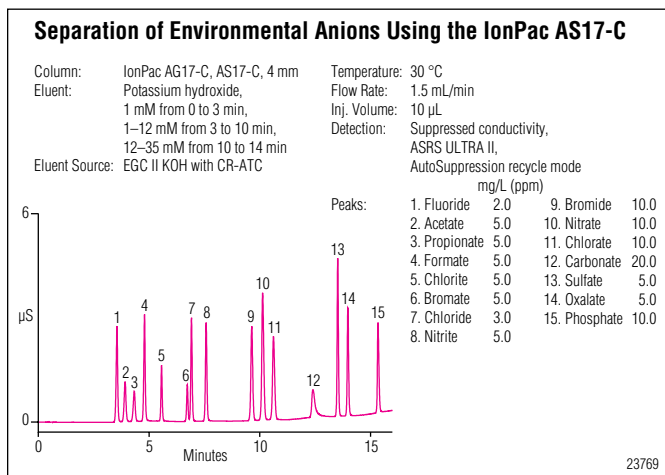
IonPac AS17-C Analytical Column (4 × 250 mm)	066294
IonPac AS17-C Analytical Column (2 × 250 mm)	066296

### Guard Columns

IonPac AG17-C Guard Column (4 × 50 mm)	066295
IonPac AG17-C Guard Column (2 × 50 mm)	066297



*Determination of anionic additives in toothpaste on an IonPac AS17-C column using a potassium hydroxide gradient delivered by an Eluent Generator.*



*Anion separation including oxyhalides on an IonPac AS17-C column using a potassium hydroxide gradient delivered by an Eluent Generator.*

## IonPac AS16

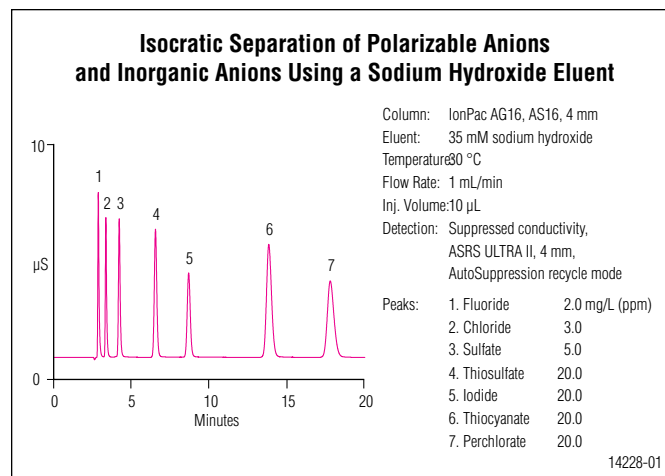
*High-capacity column optimized for determination of polarizable anions*

The IonPac AS16 column is ideally suited for trace perchlorate in drinking water in accordance with US EPA Methods 314.0 and 314.1 (Primary Method). The AS16 column simplifies the determination of polarizable anions, including thiosulfate, iodide, thiocyanate, and perchlorate using an isocratic hydroxide eluent.

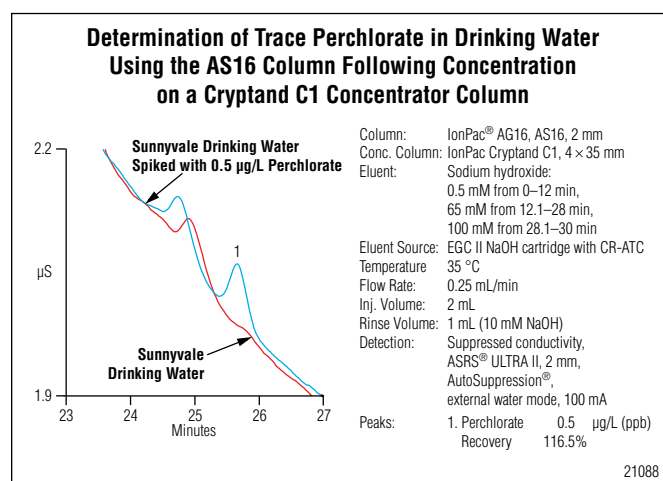
- Separate hydrophobic anions (iodide, thiocyanate, and thiosulfate) in less than 20 min
- Can be used for trace perchlorate in drinking water matrices
- Ideal for polyvalent anions, including polyphosphates and polycarboxylates
- Ultralow hydrophobicity allows fast analysis of polarizable anions

The AS16 is a high-capacity, hydroxide-selective column for the determination of polarizable anions in a variety of sample matrices. Trace concentrations of perchlorate in drinking water, surface water, and groundwater matrices can easily be determined using a large-loop injection.

**Note:** Also see the IonPac AS20, with complementary selectivity for confirmation of perchlorate identification when using EPA Method 314.1



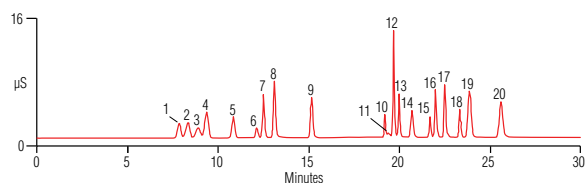
*Isocratic separation of polarizable anions and inorganic anions using a sodium hydroxide eluent on the 4 mm IonPac AS16 column.*



*Determination of trace perchlorate in drinking water using the AS16 column.*



### Gradient Separation of Polarizable Anions and Inorganic Anions Using the IonPac® AS16 and EG50 Eluent Generator



Column:	IonPac AG16, AS16, 4 mm	Peaks:	1. Fluoride	2.0	11. Carbonate	20.0
Eluent:	Potassium hydroxide, 1.5 mM from 0 to 7 min to 10 mM at 13 min		2. Acetate	10.0	12. Sulfate	10.0
Eluent Source:	EGC-KOH		3. Propionate	10.0	13. Selenate	10.0
Temperature:	30 °C		4. Formate	10.0	14. Iodide	20.0
Flow Rate:	1.5 mL/min		5. Chlorite	10.0	15. Thiosulfate	20.0
Inj. Volume:	10 µL		6. Bromate	10.0	16. Chromate	20.0
Detection:	Suppressed conductivity, ASRS® ULTRA, 4 mm, AutoSuppression® recycle mode		7. Chloride	5.0	17. Phosphate	20.0
			8. Nitrite	10.0	18. Arsenate	20.0
			9. Nitrate	10.0	19. Thiocyanate	20.0
			10. Selenite	10.0	20. Perchlorate	20.0

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## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS16 Anion-Exchange Column Data Sheet

### Application Notes

AN 134: Determination of Low Concentrations of Perchlorate in Drinking and Ground Waters Using Ion Chromatography

AN 138: Determination of Thiosulfate in Refinery and Other Wastewaters

AN 144: Determination of Perchlorate in High Ionic Strength Fertilizer Extracts By Ion Chromatography

AN 151: Determination of Perchlorate in Environmental Waters by Ion Chromatography Coupled with Electrospray Mass Spectrometry (IC-MS)

AN 176: Determining Sub-ppb Perchlorate in Drinking Water Using Preconcentration/Matrix Elimination IC with Suppressed Conductivity Detection by U.S. EPA Method 314.1

AN 178: Improved Determination of Trace Concentrations of Perchlorate in Drinking Water Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

### Application Updates

AU 145: Determination of Perchlorate in Drinking Water by Ion Chromatography

AU 148: Determination of Perchlorate in Drinking Water Using Reagent-Free™ Ion Chromatography

## Ordering Information

### Analytical Columns

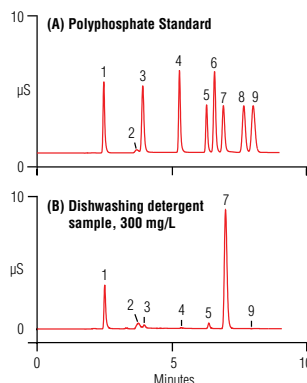
IonPac AS16 Analytical Column (4 × 250 mm)	055376
IonPac AS16 Analytical Column (2 × 250 mm)	055378

### Guard Columns

IonPac AG16 Guard Column (4 × 50 mm)	055377
IonPac AG16 Guard Column (2 × 50 mm)	055379

Determination of polarizable anions and inorganic anions using a potassium hydroxide gradient delivered with an EG using the 4 mm IonPac AS16 column.

### Separation of Polyphosphates in Detergent Using the IonPac® AS16 Column



Column:	IonPac AG16, AS16, 4 mm	
Eluent:	25 mM potassium hydroxide for 1.7 min to 65 mM in 2.5 min	
Eluent Source:	EG40	
Temperature:	30 °C	
Flow Rate:	1.5 mL/min	
Inj. Volume:	10 µL	
Detection:	Suppressed Conductivity, ASRS® ULTRA, 4 mm, AutoSuppression® recycle mode	

Peaks:	1. Chloride	3 mg/L (ppm)
	2. Carbonate	-
	3. Sulfate	5
	4. Phosphate	10
	5. Pyrophosphate	10
	6. Trimetaphosphate	10
	7. Tripolyphosphate	10
	8. Tetrametaphosphate	10
	9. Tetrapolyphosphate	10

14238

Separation of polyphosphates on the 4 mm IonPac AS16 column using a potassium hydroxide gradient delivered with an Eluent Generator.

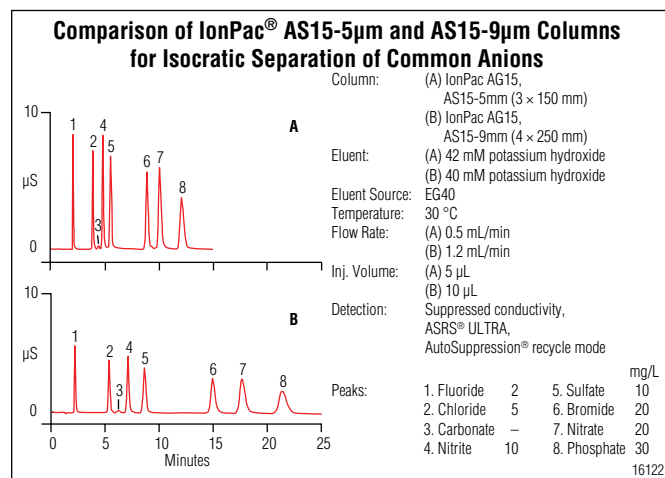
## IonPac AS15

*For trace-level concentrations of inorganic anions and low-molecular weight organic acids*

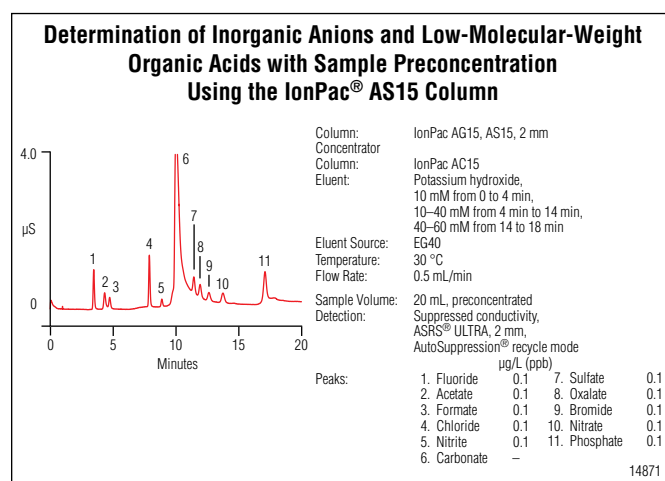
The IonPac AS15 column was designed specifically for analysis of trace anions in high-purity water matrices, for the semiconductor and power generation industries. Its high capacity and selectivity enable the determination of trace-level concentrations of inorganic anions and low-molecular-weight organic acids in high-purity water matrices.

- AS15-5  $\mu\text{m}$  (3  $\times$  150 mm) column for high efficiency, fast analysis (15 min)
- AS15-9  $\mu\text{m}$  (2  $\times$  250 and 4  $\times$  250 mm) columns for higher-capacity applications
- Column selectivity optimized for 30 °C operating temperature
- Superior resolution of early-eluting anions (fluoride, glycolate, acetate, and formate)

This column is ideal for use with large-loop injections. Use the AC15 concentration column for ultratrace (ppt) analyses. Use with the Eluent Generator for simplified eluent preparation. Use the Anion Self-Regenerating Suppressor (ASRS 300) with this column.

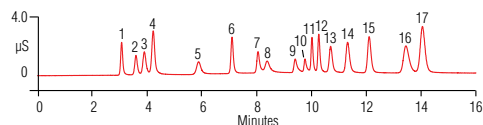


*Comparison of the AS15-5 $\mu\text{m}$  (3  $\times$  150 mm) and AS15-9 $\mu\text{m}$  (4  $\times$  250 mm) for the separation of inorganic anions.*



*Determination of inorganic anions and low-molecular-weight organic acids with sample preconcentration using the IonPac AS15 column.*

### Separation of Weakly Retained Organic Acids Using the IonPac® AS15-5µm (3 × 150 mm) Column



Column:	IonPac AG15, AS15-5mm (3 × 150 mm)	Peaks:	1. Fluoride	1	10. Sulfite	2
Eluent:	10 mM Potassium hydroxide for 4 min to 60 mM at 9 min		2. Glycolate	5	11. Sulfate	2
Eluent Source:	EG40		3. Acetate	5	12. Oxalate	3
Temperature:	30 °C		4. Formate	5	13. Bromide	5
Flow Rate:	0.7 mL/min		5. Propionate	5	14. Nitrate	5
Inj. Volume:	5 µL		6. Chloride	2	15. Phosphate	10
Detection:	Suppressed conductivity, ASRS® ULTRA, 2 mm, AutoSuppression® recycle mode		7. Nitrite	2	16. Chlorate	10
			8. Butyrate	5	17. Thiosulfate	10
			9. Carbonate	30		

16393

## Ordering Information

### Analytical Columns

IonPac AS15 Analytical Column (4 × 250 mm) .....	053940
IonPac AS15 Analytical Column (2 × 250 mm) .....	053941
IonPac AS15-5 µm Analytical Column (3 × 150 mm) .....	057594

### Guard Columns

IonPac AG15 Guard Column (4 × 50 mm) .....	053942
IonPac AG15 Guard Column (2 × 50 mm) .....	053943
IonPac AG15-5 µm Guard Column (3 × 30 mm) .....	057597

*Separation of weakly-retained organic acids using a potassium hydroxide gradient on the IonPac AS15-5 µm (3 × 150 mm) column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac AS15 Anion-Exchange Column Data Sheet

### Application Notes

AN 137: Determination of Trace Anions in High-Nitrate Matrices by Ion Chromatography

AN 171: Determination of Disinfection By-Product Anions and Bromide in Drinking Water Using a Reagent-Free Ion Chromatography System Followed by Postcolumn Addition of an Acidified On-Line Generated Reagent for Trace Bromate Analysis

AN 173: Direct Determination of Cyanide in Drinking Water by Ion Chromatography with Pulsed Amperometric Detection (PAD)

AN 179: Carbohydrate and Amino Acid Analysis Using 3-D Amperometry

### Application Updates

AU 142: Improved Determination of Trace Anions in High Purity Waters by High-Volume Direct Injection with the EG40

AU 143: Determination of Chloride in Acid Copper Plating Bath

### Technical Notes

TN 48: Determination of Trace Anions in High-Purity Water by High-Volume Direct Injection with the EG40

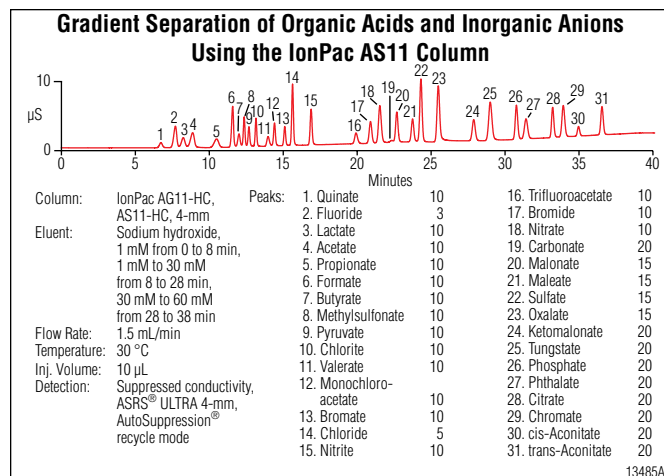
## IonPac AS11-HC

*For resolving a large number of inorganic anions and organic acid anions in complex matrices*

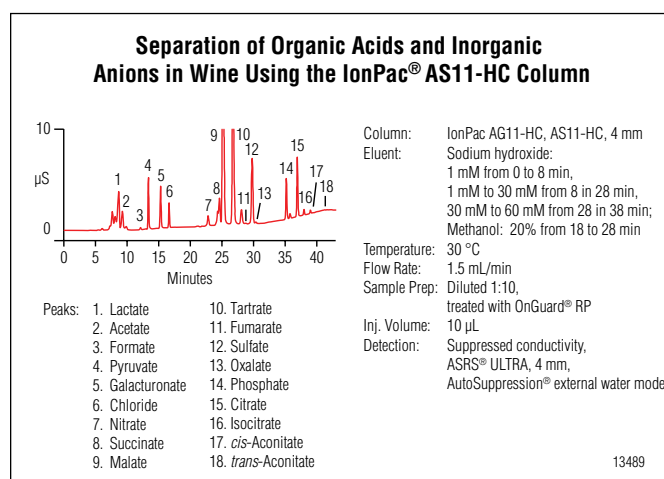
Complex sample matrices such as chemical wastewater effluents and fermentation broth solutions contain a variety of inorganic anions and organic acids. The IonPac AS11-HC was specifically designed to resolve a large number of inorganic anions and organic acid anions in a single run using a hydroxide gradient.

- Use for organic acids and anions in complex sample matrices or uncharacterized samples.
- Recommended for monovalent and divalent organic acids.
- Use the AS11 for fast analysis of organic acids and anions in well-characterized samples.
- Use the ICE-AS1 or ICE-AS6 columns for organic acids in high-ionic-strength samples.
- High capacity translates into longer retention times, but with higher resolution.

The high-capacity AS11-HC column allows the injection of more concentrated samples without overloading or peak broadening, and provides improved separation over the AS11 column for monovalent carboxylic acids, including quinate, lactate, acetate, propionate, formate, and butyrate.



*Determination of organic acids and inorganic anions using the IonPac AS11-HC column.*



*Separation of organic acids and inorganic anions in wine using the IonPac AS11-HC column.*

## Technical Notes

TN 44: The Determination of Trace Anions in Concentrated Phosphoric Acid

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

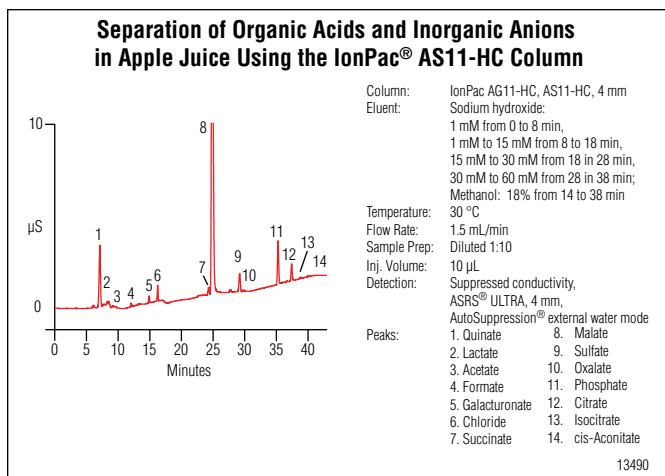
## Ordering Information

## Analytical Columns

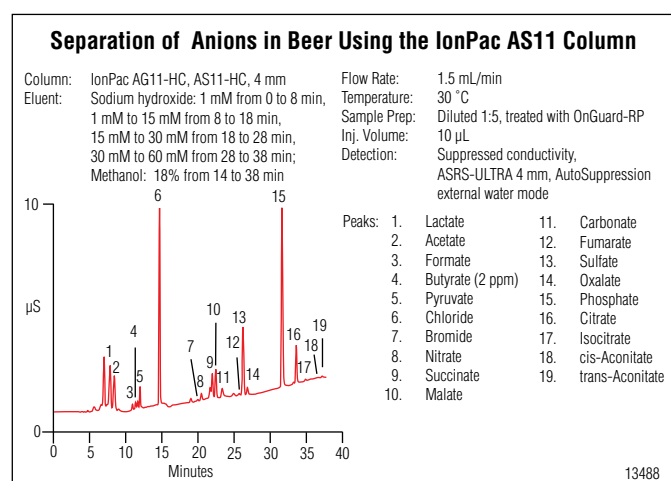
IonPac AS11-HC Analytical Column (4 × 250 mm)..... 052960  
 IonPac AS11-HC Analytical Column (2 × 250 mm)..... 052961

## Guard Columns

IonPac AG11-HC Guard Column (4 × 50 mm)..... 052962  
 IonPac AG11-HC Guard Column (2 × 50 mm)..... 052963



Separation of organic acids and inorganic anions in apple juice using the IonPac AS11-HC column.



IonPac AS11-HC column used for the analysis of beer spiked with 2 mg/L (ppm) butyrate.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## Product Data Sheets

IonPac AS11 and AS11-HC Anion-Exchange Columns Data Sheet

## Application Notes

AN 123: The Determination of Inorganic Anions and Organic Acids in Fermentation Broths

AN 143: Determination of Organic Acids in Fruit Juices

## IonPac AS11

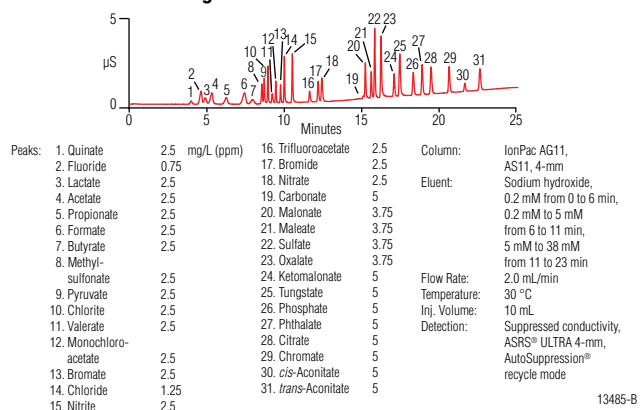
*For fast profiling of inorganic anions and organic acid anions*

The AS11 is a relatively low-capacity column designed for fast, gradient screening of inorganic anions and organic acid anions in simple sample matrices.

- Fast analysis of organic acids and inorganic anions in well-characterized samples
- Ideal for highly charged anions, including polyphosphates and polycarboxylates
- For organic acids and inorganic anions in complex sample matrices
- Low capacity translates into fast analysis times and high throughput

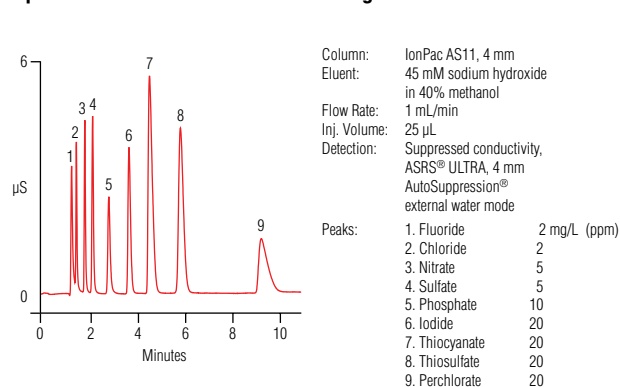
The AS11 is designed for fast profiling of inorganic anions and organic acid anions in foods, beverages, chemical process solutions, wastewater, brines, and power plant waters. The AS11 column can resolve a large number of inorganic anions and organic acids in approximately 15 minutes.

### Determination of Organic Acids and Inorganic Anions Using the IonPac® AS11 Column

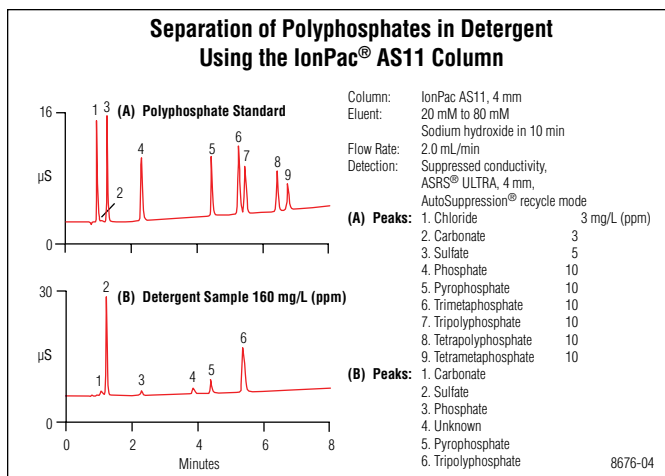


*Determination of organic acids and inorganic anions using the IonPac AS11 column.*

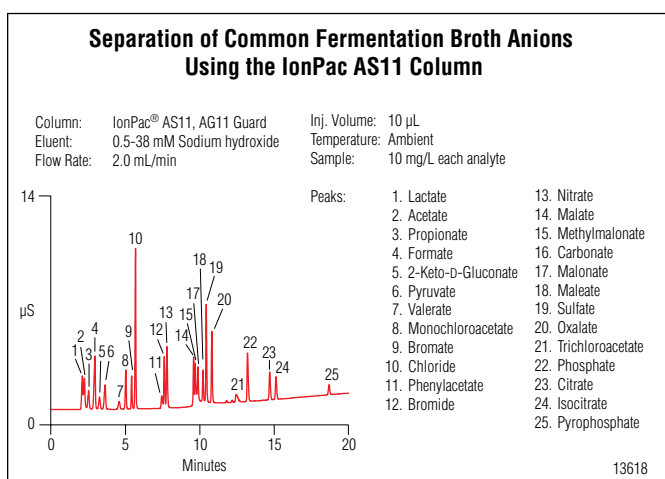
### Separation of Polarizable Anions Using the IonPac® AS11 Column



*Separation of polarizable anions using the IonPac AS11 column.*



Separation of polarizable anions in detergent using the IonPac AS11 column.



Yeast fermentation broth culture (10-fold dilution) analyzed using the IonPac AS11.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS11 and AS11-HC Anion-Exchange Columns Data Sheet

### Application Notes

AN 37: The Determination of Iodide in Milk Products

AN 71: Determination of Polyphosphates Using Ion Chromatography with Suppressed Conductivity Detection

AN 93: Determination of Trace Anions in Concentrated Bases Using AutoNeutralization Pretreatment/Ion Chromatography

AN 104: Analysis of Personal Care Products by Ion Chromatography

AN 107: Ions In Physiological Fluids

AN 112: Determination of Nitrate and Nitrite in Meat Using High-Performance Anion-Exchange Chromatography

AN 113: Determination of Trace Anions in High Purity Waters by High Volume/Direct Injection Ion Chromatography

AN 114: Determination of Trace Anions in High-Purity Waters Using Direct Injection and Two-Step Isocratic Ion Chromatography

AN 116: Quantification of Anions in Pharmaceuticals

AN 121: Analysis of Low Concentrations of Perchlorate in Drinking Water and Ground Water by Ion Chromatography

AN 123: The Determination of Inorganic Anions and Organic Acids in Fermentation Broths

AN 161: Determination of Metal Cyanide Complexes by Ion Chromatography with On-Line Sample Preconcentration and UV Absorbance Detection

AN 164: Assay for Citrate and Phosphate in Pharmaceutical Formulations

### Application Updates

AU 122: The Determination of Iodide in Brine

AU 140: The Determination of Iodide in Urine

AU 147: Direct Determination of Metal Cyanides by Ion Chromatography with UV Absorbance Detection

AU 149: Determination of Metal Cyanide Complexes in Solid Wastes by Anion-Exchange Chromatography with UV Absorbance Detection

### Technical Notes

TN 48: Determination of Trace Anions in High-Purity Water by High-Volume Direct Injection with the EG40

## Ordering Information

### Analytical Columns

IonPac AS11 Analytical Column (4 × 250 mm)	044076
IonPac AS11 Analytical Column (2 × 250 mm)	044077

### Guard Columns

IonPac AG11 Guard Column (4 × 50 mm)	044078
IonPac AG11 Guard Column (2 × 50 mm)	044079



## IonPac AS10

*For isocratic and gradient separation of inorganic anions and organic acids*

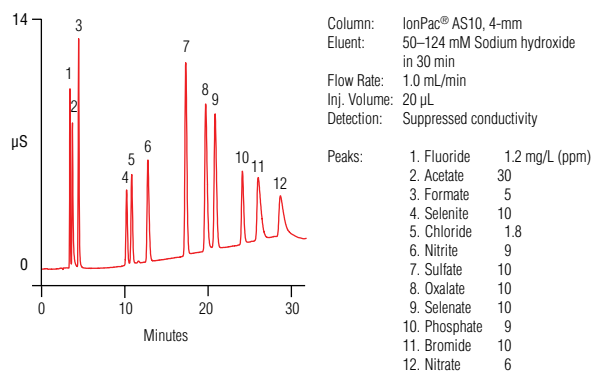
The IonPac AS10 is a high-capacity hydroxide-selective, anion-exchange column designed for isocratic and gradient separation of inorganic anions and organic acids. The column provides excellent resolution of weakly retained low-molecular-weight aliphatic acids. The high capacity of the AS10 permits the analysis of trace-level analytes in high-ionic-strength matrices.

- Use the AS10 column for analysis of inorganic anions in high nitrate samples

The column provides excellent resolution of weakly retained low-molecular-weight aliphatic acids. The selectivity and high capacity of the AS10 permits the analysis of trace-level analytes in high-ionic-strength matrices. The AS10 resin strongly retains nitrate, which makes this column well suited for the analysis of trace anions in nitric acid and nitrate salts.

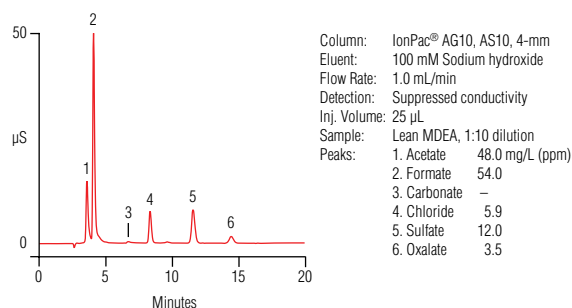
Use with the Eluent Generator for simplified eluent preparation for applications using less than 100 mN hydroxide. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS10 column.

### Gradient Separation of Organic Acids and Inorganic Anions



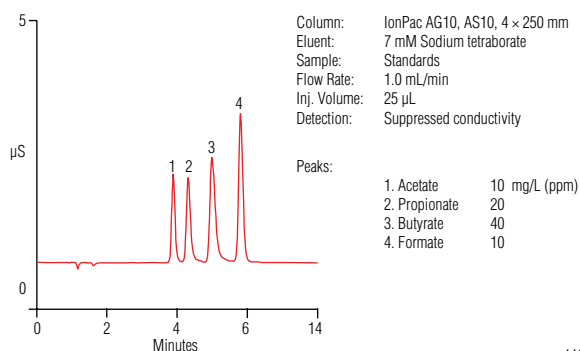
*Separation of common organic and inorganic anions on the IonPac AS10 using a hydroxide gradient.*

### Analysis of Methyl-diethanolamine for Corrosive Anions



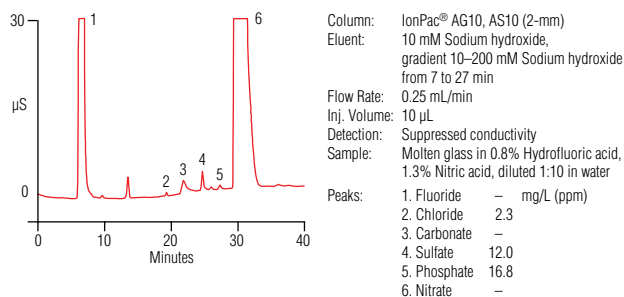
*Analysis of methyl-diethanolamine for corrosive anions using the IonPac AS10 column.*

### Determination of Aliphatic Organic Acids in Amine Matrix on the IonPac® AS10



Determination of aliphatic organic acids in amine matrix on the IonPac AS10.

### Anions from Molten Glass



Anions in molten glass using the IonPac AS10 column.

## Ordering Information

### Analytical Columns

IonPac AS10 Analytical Column (4 × 250 mm)	043118
IonPac AS10 Analytical Column (2 × 250 mm)	043123

### Guard Columns

IonPac AG10 Guard Column (4 × 50 mm)	043119
IonPac AG10 Guard Column (2 × 50 mm)	043124

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS10 Anion-Exchange Column and the IonPac AC10 Concentrator Column Data Sheet

### Application Notes

AN 78: Determination of Trace Anions in Concentrated Hydrofluoric Acid

AN 85: Determination of Trace Anions in Organic Solvents

### Technical Notes

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid



## Carbonate Eluent Anion-Exchange Packed Columns

*Anion-exchange columns optimized for use with carbonate/bicarbonate eluent*

Dionex carbonate eluent columns provide well-characterized isocratic separations, including regulated methods for drinking and wastewater. Carbonate eluent columns are available in a wide range of capacities and are compatible with RFIC-EG and RFIC-ER systems.



**IonPac AS23:** High-capacity, carbonate eluent anion-exchange column for the analysis of oxyhalides and the common inorganic anions.

**IonPac AS22-Fast:** The IonPac AS22-Fast is the product of more than 20 years of column development, and is a key complement to our award-winning Reagent-Free IC system.

**IonPac AS22:** High capacity and resolution, carbonate eluent anion-exchange column recommended for the fast, isocratic separation of inorganic anions.

**IonPac AS14:** Moderate-capacity, carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions.

**IonPac AS14A:** High-capacity, carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions.

**IonPac AS12A:** Carbonate eluent anion-exchange column designed for the fast separation of inorganic anions offering excellent retention of fluoride

**IonPac AS9-HC:** High-capacity carbonate eluent anion-exchange column for the analysis of inorganic anions and oxyhalides.

**IonPac AS9-SC:** Carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions and oxyhalides.

**IonPac AS4A-SC:** Carbonate eluent anion exchange column for the fast, isocratic separation of inorganic anions in drinking water and wastewater.

## IonPac AS23

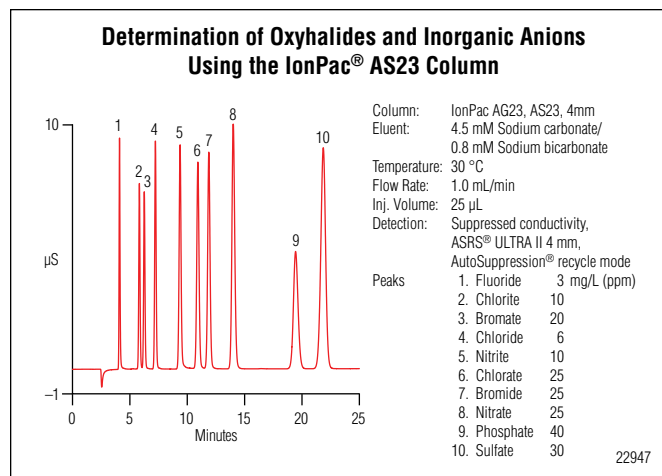
*Precise, isocratic analysis of trace oxyhalides and the common inorganic anions*

The AS23 carbonate eluent anion-exchange column is specifically designed for trace bromate in drinking water. Its high capacity and selectivity enables determination of bromate in drinking water at the low  $\mu\text{g/L}$  level. The AS23 meets the performance requirements of US EPA Methods 300.0 and 300.1.

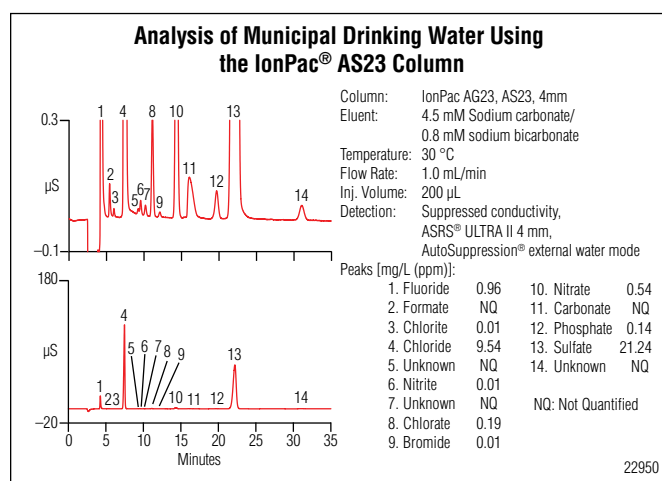
- Optimized for isocratic carbonate/bicarbonate eluent
- Recommended column for trace bromate in drinking water matrices
- Meets performance requirements specified in US EPA Methods 300.0 and 300.1
- Ideal alternative for AS9-HC oxyhalide and inorganic anion applications
- Simple, accurate eluent preparation with the AS23 Eluent Concentrate
- Optimized for a 30 °C operating temperature to ensure reproducible retention times
- Compatible with organic solvents to enhance analyte solubility

The AS23 is designed for the analysis of oxyhalides and the common inorganic anions including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, ground water, wastewater, and other diverse sample matrices.

The AS23 is the newest carbonate eluent column recommended for the analysis of oxyhalides including bromate. It can be used in combination with the Eluent Generator and the Electrolytic pH Modifier (EPM) which automatically produces potassium carbonate/bicarbonate eluents from water. The AS23 is an ideal alternative, using carbonate-bicarbonate eluents, for AS9-HC applications.



*Determination of oxyhalides and inorganic anions using an IonPac AS23 column.*



*Determination of oxyhalides and inorganic anions in a municipal drinking water sample using an IonPac AS23 column.*

## Ordering Information

### Analytical Columns

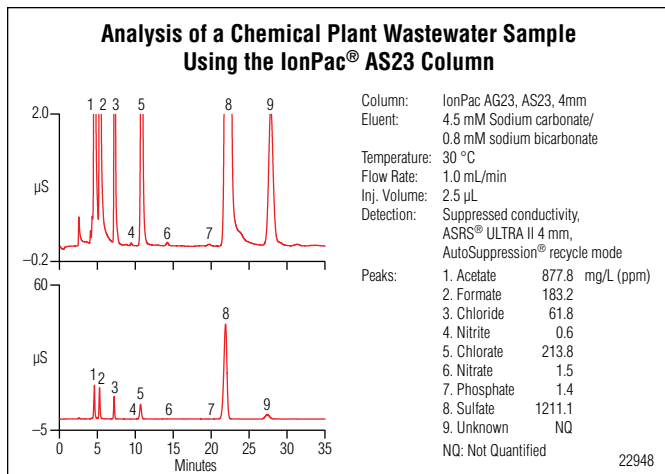
IonPac AS23 Analytical Column (2 × 250 mm) ..... 064145

IonPac AS23 Analytical Column (4 × 250 mm) ..... 064149

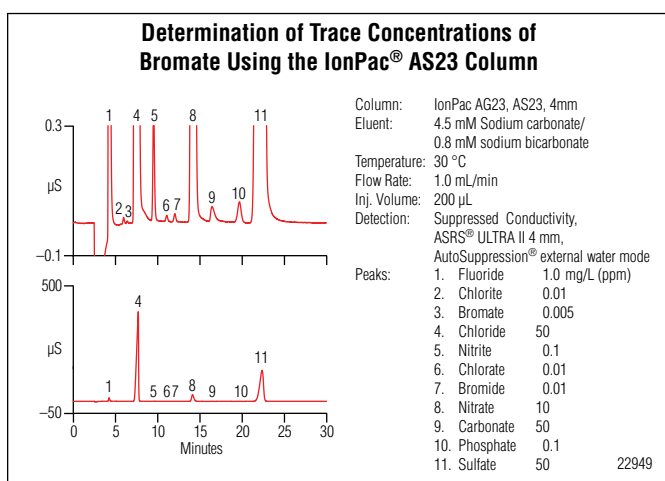
### Guard Columns

IonPac AG23 Guard Column (2 × 50 mm) ..... 064143

IonPac AG23 Guard Column (4 × 50 mm) ..... 064147



*Separation of inorganic anions, oxyhalides, and organic acids in a chemical wastewater sample using an IonPac AS23 column.*



*Determination of trace concentrations of bromate using the IonPac AS23 column with a large-loop injection.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac AS23 Datasheet

### Application Notes

AN 184: Determination of Trace Concentrations of Chlorite, Bromate, and Chlorate in Bottled Natural Mineral Waters

## IonPac AS22-Fast

*Designed for compliance to US EPA Method 300.0 (A) and 300.1 in the monitoring of inorganic anions*

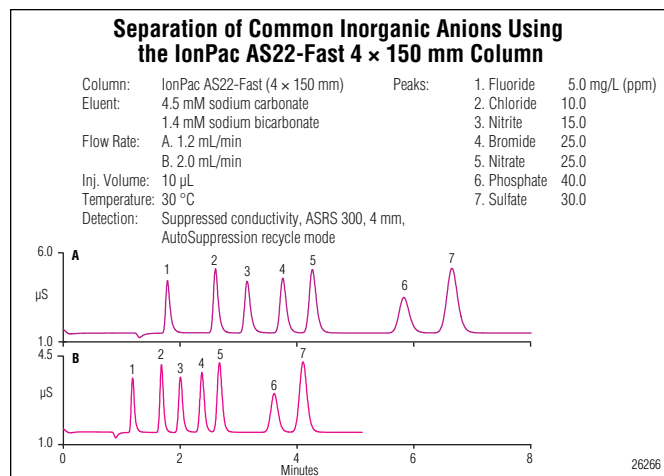
Designed specifically for compliance monitoring of inorganic anions in accordance with US EPA Method 300.0 (A) and 300.1, the IonPac AS22-Fast represents the culmination of more than 20 years of column development, and is a key complement to our award-winning Reagent-Free IC system.

- Super-Fast isocratic separation of the common inorganic anions in under 5 minutes
- Carbonate peak well-resolved from the common inorganic anions
- Same selectivity as AS22 column
- Meets performance requirements specified in US EPA Method 300.0 (A)
- Fast alternative for AS4A-SC, AS12A, AS14, AS14A, and AS22 inorganic anion applications
- Simple, accurate eluent preparation with the AS22 Eluent Concentrate
- Optimized for a 30 °C operating temperature to ensure reproducible retention times

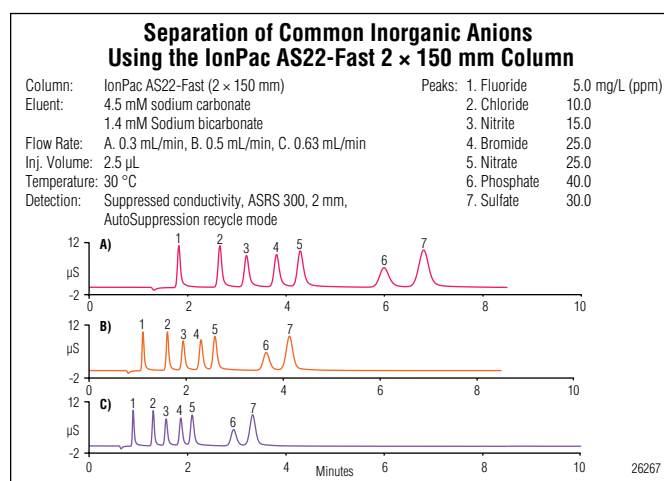
The IonPac AS22-Fast is designed for the fast determination of inorganic anions and low molecular weight organic acids including fluoride, acetate, formate, chloride, nitrite, bromide, nitrate, phosphate, and sulfate. The IonPac AS22-Fast can be used with isocratic carbonate/bicarbonate eluents and suppressed conductivity detection. Common inorganic anions can easily be separated in a variety of sample matrices including drinking water, wastewater, process streams, and scrubber solutions.

The IonPac AS22-Fast can be used in combination with the Eluent Generator and the Electrolytic pH Modifier (EPM) which automatically produce potassium carbonate/bicarbonate eluents from water. The IonPac AS22-Fast column is the newest carbonate eluent column recommended for super fast analysis of inorganic anions and is a faster alternative, using carbonate-bicarbonate eluents, for AS4A-SC, AS12A, AS14, AS14A, and AS22 inorganic anion applications.

**Note:** Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS22-Fast column for eluent suppression.



*Determination of oxyhalides and inorganic anions using an IonPac AS23 column.*

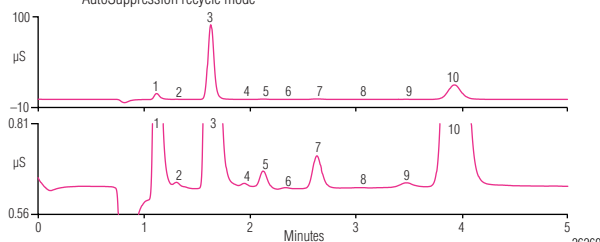


*Determination of oxyhalides and inorganic anions in a municipal drinking water sample using an IonPac AS23 column.*



### Analysis of a Municipal Drinking Water Sample Using the IonPac AS22-Fast 4 × 150 mm Column

Column: IonPac AS22-Fast (4 × 150 mm)      Peaks: 1. Fluoride      6. Bromide  
 Eluent: 4.5 mM sodium carbonate      2. Formate      7. Nitrate  
 1.4 mM sodium bicarbonate      3. Chloride      8. Carbonate  
 Flow Rate: 2.0 mL/min      4. Nitrite      9. Phosphate  
 Inj. Volume: 100 µL      5. Chlorate      10. Sulfate  
 Temperature: 30 °C  
 Detection: Suppressed conductivity, ASRS 300, 4 mm,  
 AutoSuppression recycle mode



*Separation of inorganic anions, oxyhalides, and organic acids in a chemical wastewater sample using an IonPac AS23 column.*

## Ordering Information

### Analytical Columns

IonPac AS22-Fast Analytical Column (4 × 150 mm)..... 072782

IonPac AS22-Fast Analytical Column (2 × 150 mm)..... 072783

### Guard Columns

IonPac AG22-Fast Guard Column (2 × 30 mm)..... 072785

IonPac AG22-Fast Guard Column (4 × 30 mm)..... 072784

### Anion Eluent Concentrates

AS22 Eluent Concentrate (100 x), 250 mL..... 063965

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac AS22 Datasheet

## IonPac AS22

### Fast analysis of common inorganic anions

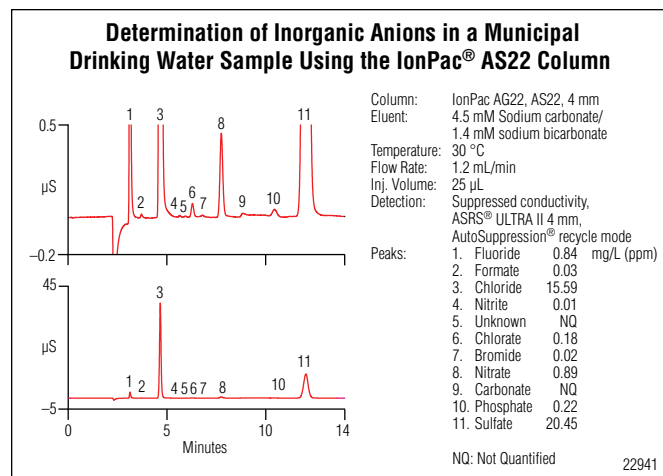
Designed specifically for compliance monitoring of inorganic anions in accordance with US EPA Method 300.0 (A) and 300.1, the IonPac AS22 represents the culmination of more than 20 years of column development, and is a key complement to our award-winning Reagent-Free IC system.

- Fast isocratic separation of the common inorganic anions in 8 minutes
- Isocratic separation of inorganic anions in complex sample matrices in 12 minutes
- Carbonate peak well-resolved from the common inorganic anions
- Meets performance requirements specified in US EPA Method 300.0 (A)
- Ideal alternative for AS4A-SC, AS12A, AS14, and AS14A inorganic anion applications
- Simple, accurate eluent preparation with the AS22 Eluent Concentrate
- Optimized for a 30 °C operating temperature to ensure reproducible retention times

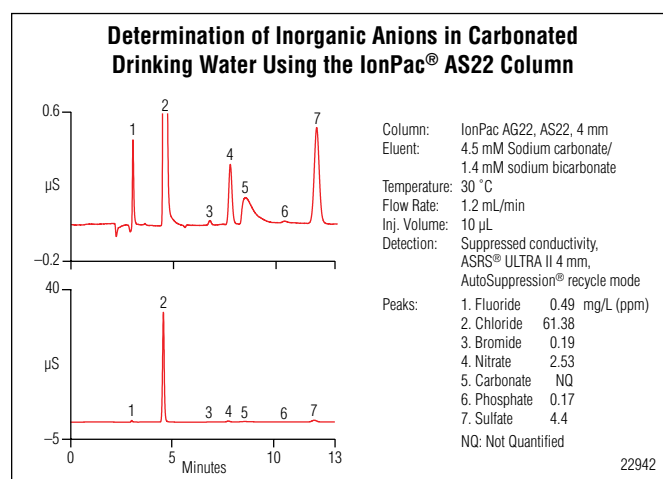
The AS22 is designed for the determination of inorganic anions and low molecular weight organic acids including fluoride, acetate, formate, chloride, nitrite, bromide, nitrate, phosphate, and sulfate. The AS22 can be used with isocratic carbonate/bicarbonate eluents and suppressed conductivity detection. Common inorganic anions can easily be separated in a variety of sample matrices including drinking water, wastewater, process streams, and scrubber solutions.

The AS22 can be used in combination with the Eluent Generator and the Electrolytic pH Modifier (EPM) which automatically produce potassium carbonate/bicarbonate eluents from water. The AS22 column is the newest carbonate eluent column recommended for fast analysis of inorganic anions and is an ideal alternative, using carbonate-bicarbonate eluents, for AS4A-SC, AS12A, AS14, and AS14A inorganic anion applications.

**Note:** Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS22 column for eluent suppression.

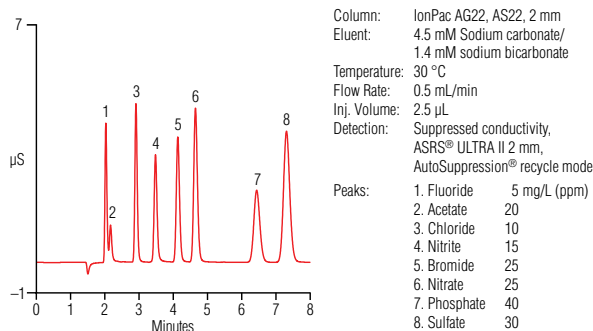


Common inorganic anions in a municipal drinking water sample can be separated in approximately 12 minutes.



The unique selectivity of the AS22 column positions carbonate well away from the common inorganic anions.

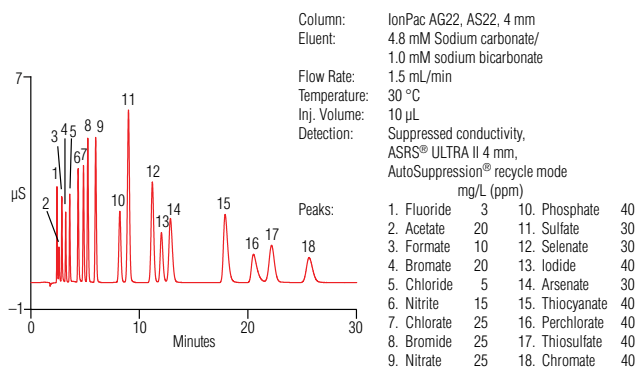
### The IonPac® AS22 Permits Fast Anion Analysis



22943

The IonPac AS22 resin packing supports fast anion analysis.

### Separation of Environmental Anions Using the IonPac® AS22 Column



22944

Separation of 18 environmental anions is completed in under 30 minutes using the IonPac AS22 column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

[Product Data Sheets](#)

[IonPac AS22 Datasheet](#)

[Application Updates](#)

AU 161: Determination of Sulfate and Chloride in Ethanol Using Ion Chromatography

## Ordering Information

### Analytical Columns

IonPac AS22 Analytical Column (2 × 250 mm)	064137
IonPac AS22 Analytical Column (4 × 250 mm)	064141

### Guard Columns

IonPac AG22 Guard Column (2 × 50 mm)	064135
IonPac AG22 Guard Column (4 × 50 mm)	064139

## IonPac AS14

*For the analysis of fluoride and other inorganic anions*

The IonPac AS14 is designed for fast analysis of the common inorganic anions in diverse sample matrices.

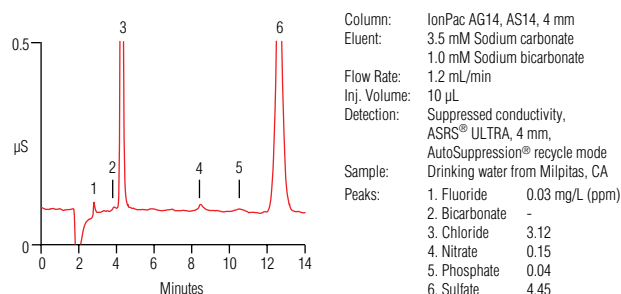
- Common inorganic anions are resolved in 13 minutes using an isocratic carbonate/bicarbonate eluent.
- Sodium tetraborate gradient optimizes difficult separations.
- The AS14 column meets or exceeds US EPA Method 300.0 (A) performance requirements.

The AS14 supports the separation of inorganic anions, including fluoride, chloride, nitrite, bromide, nitrate, phosphate, and sulfate using a carbonate/bicarbonate eluent coupled with suppressed conductivity detection. With the AS14, inorganic anions can be determined easily in drinking water, wastewater, foods and beverages, scrubber solutions, and other diverse sample matrices.

For simplified operation, use the AS14 Eluent Concentrate and the Combined Seven Anion Standard. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS14 column for low-noise operation.

**Note:** See also the IonPac AS22 and AS22-Fast, the latest columns recommended for fast analysis of inorganic anions.

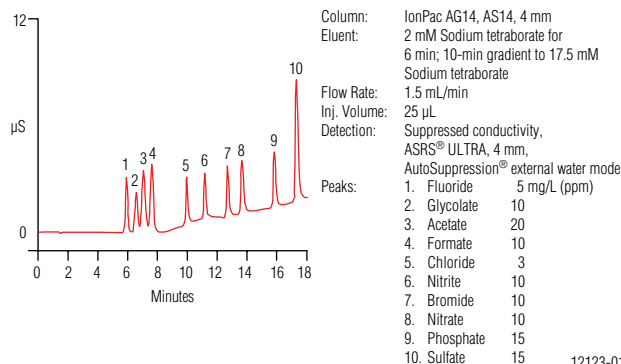
### Analysis of Municipal Drinking Water Using the IonPac® AS14



12125

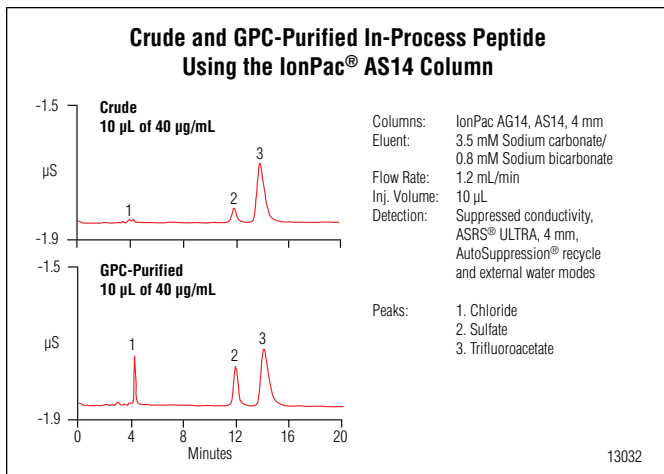
*The IonPac AS14 column is ideal for interference-free determination of inorganic anions, including fluoride, in drinking water.*

### Sodium Tetraborate Gradient Separation of Anions Using the IonPac® AS14 Column

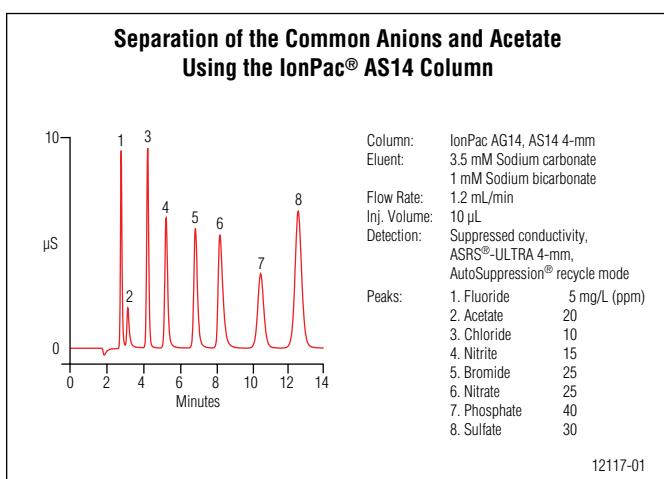


12123-01

*Separation of weakly retained anions using a sodium tetraborate gradient elution.*



Determination of anionic counterions present in a gel permeation purified peptide.



Isocratic separation of inorganic anions on an IonPac AS14 column in less than 13 minutes.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS14 Anion-Exchange Column Data Sheet

### Application Notes

AN 115: Determination of Trifluoroacetic Acid (TFA) in Peptides

AN 116: Quantification of Anions in Pharmaceuticals

AN 133: Determination of Inorganic Anions in Drinking Water by Ion Chromatography

AN 135: Determination of Inorganic Anions in Wastewater by Ion Chromatography

AN 166: Application of Eluent Generation for Trace Anion Analysis of Borated Waters

AN 2: Determination of Nitrate and Sulfate Collected on Air Filters

AN 2: Determination of Nitrate and Sulfate Collected on Air Filters

### Technical Notes

TN 47: Achieving Low Baseline Noise for Anion Determination by Suppressed Conductivity Using Carbonate Eluents

## Ordering Information

### Analytical Columns

IonPac AS14 Analytical Column (4 × 250 mm) .....	046124
IonPac AS14 Analytical Column (2 × 250 mm) .....	046129

### Guard Columns

IonPac AG14 Guard Column (4 × 50 mm) .....	046134
IonPac AG14 Guard Column (2 × 50 mm) .....	046138

## IonPac AS14A

*Fast analysis of the common inorganic anions in diverse sample matrices*

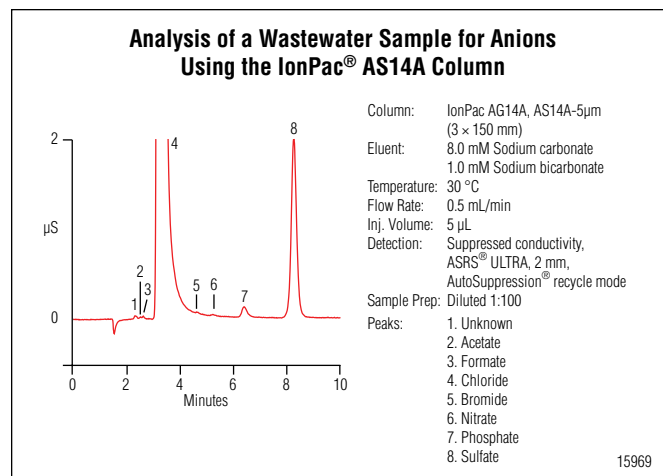
The IonPac AS14A anion-exchange column is a carbonate-based column for fast analysis of the common inorganic anions in diverse sample matrices. The AS14A meets the performance requirements specified in US EPA Method 300.0 (A).

- High-efficiency and fast analysis (8 minutes)
- High-capacity applications (13 minute run time)
- Improved peak shape, efficiency, and pH stability
- Meets or exceeds US EPA Method 300.0 (A) performance requirements
- Simplified operation with AS14A Eluent Concentrate and Combined Seven Anion Standard

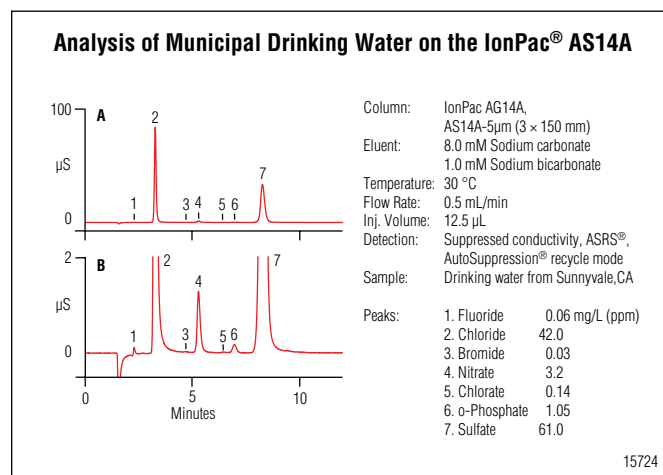
The AS14A is designed for the separation of inorganic anions, including fluoride, chloride, nitrite, bromide, nitrate, phosphate, and sulfate, using a carbonate/bicarbonate eluent coupled with suppressed conductivity detection. The inorganic anions can easily be determined in drinking water, wastewater, foods and beverages, scrubber solutions, and other diverse sample matrices.

For simplified operation use the AS14A with AS14A Eluent Concentrate and the Combined Seven Anion Standard. Use the ASRS 300 suppressor with the AS14A column for low-noise operation.

**Note:** See also the IonPac AS22 and AS22-Fast, the newest carbonate eluent columns recommended for fast analysis of inorganic anions.

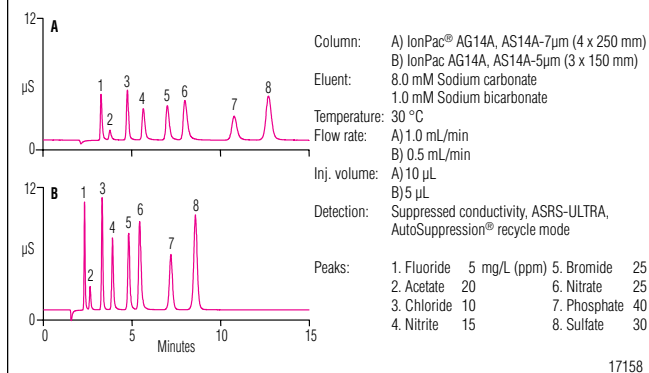


*Determination of inorganic anions in a wastewater sample from a chemical manufacturer using an IonPac AS14A-5µm (3 × 150 mm) column.*



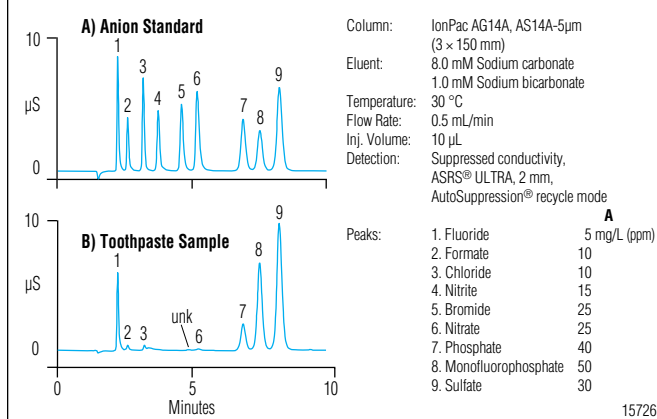
*Determination of inorganic anions in municipal drinking water using the IonPac AS14A-5µm (3 × 150 mm) column.*

### Comparison of the IonPac AS14A 3-mm and 4-mm Columns for the Separation of the Inorganic Anions



Comparison of the separation of inorganic anions using 3 mm and 4 mm IonPac AS14A columns.

### Analysis of Toothpaste Using the IonPac® AS14A



Determination of anionic additives in toothpaste using an IonPac AS14A-5μm (3 x 150 mm) column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS14A Anion-Exchange Column Data Sheet

### Application Notes

AN 140: Fast Analysis of Anions in Drinking Water by Ion Chromatography

## Ordering Information

### Analytical Columns

IonPac AS14A-7μm Analytical Column (4 x 250 mm)..... 056904  
IonPac AS14A-5μm Analytical Column (3 x 150 mm)..... 056901

### Guard Columns

IonPac AG14A-7μm Guard Column (4 x 50 mm) ..... 056897  
IonPac AG14A-5μm Guard Column (3 x 30 mm) ..... 056899



## IonPac AS12A

*Fast separation of inorganic anions, with excellent retention of fluoride*

The IonPac AS12A anion-exchange column provides fast analysis of common inorganic anions and oxyhalides, such as chlorite and bromate, in environmental waters. This column is also useful for trace chloride and sulfate in high-carbonate matrices.

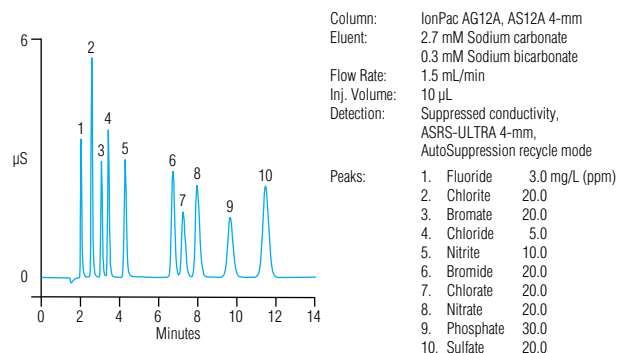
- Provides fast analysis of inorganic anions and oxyhalides at similar concentrations
- Resolves trace chloride and sulfate high-carbonate samples

The AS12A is a moderate-capacity, carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions and oxyhalides, including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, wastewater, groundwater, and other diverse sample matrices.

The common inorganic anions and oxyhalides can be determined in less than 12 min using an isocratic carbonate/bicarbonate eluent coupled with suppressed conductivity detection. It resolves chloride from high concentrations of carbonate. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS12A column.

**Note:** For trace bromate in ozonated drinking water, use the high-capacity IonPac AS23, recommended for determination of oxyhalides and inorganic anions.

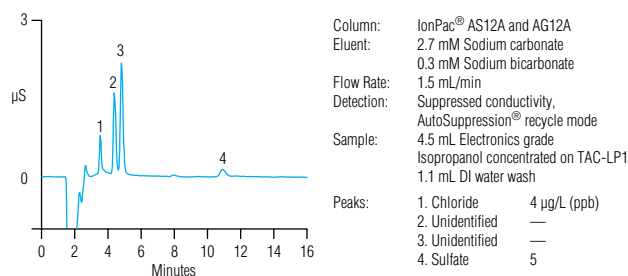
### Separation of Oxyhalides Using the IonPac® AS12A Column



10191

*Isocratic separation of inorganic anions and oxyhalides using the IonPac AS12A column.*

### Determination of Anions in High Purity Solvent



10198

*Isocratic separation of anions in high-purity solvents using the IonPac AS12A column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS12A Anion-Exchange Column Data Sheet

## Ordering Information

### Analytical Columns

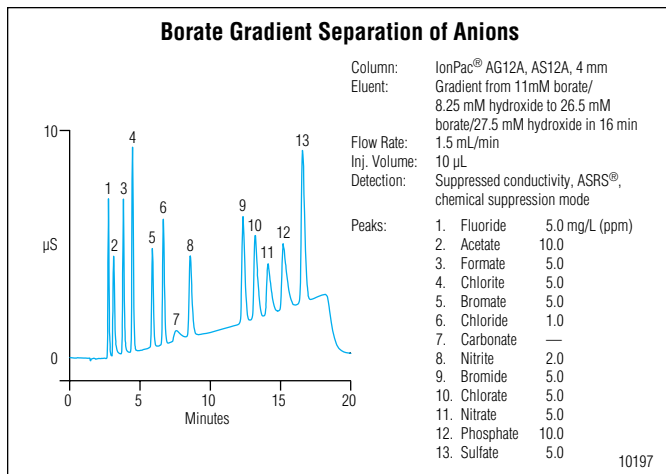
IonPac AS12A Analytical Column (4 × 200 mm) ..... 046034

IonPac AS12A Analytical Column (2 × 200 mm) ..... 046055

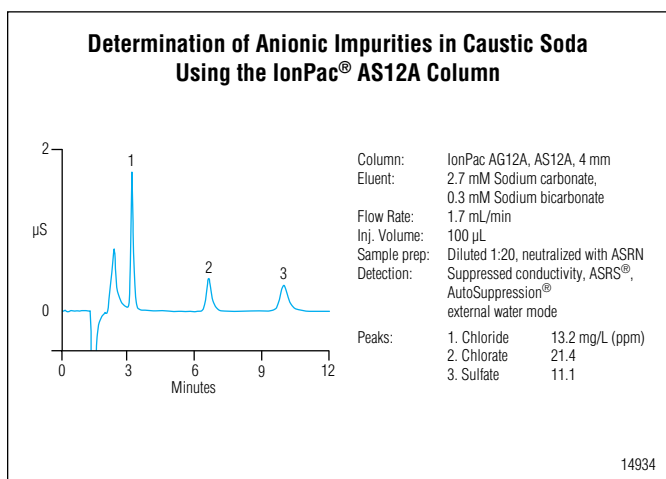
### Guard Columns

IonPac AG12A Guard Column (4 × 50 mm) ..... 046035

IonPac AG12A Guard Column (2 × 50 mm) ..... 046056



*Borate gradient separation of anions using the IonPac AS12A column.*



*Determination of anionic impurities in caustic soda using the IonPac AS12A column.*

## IonPac AS9-HC

*High-capacity column for the analysis of inorganic anions and oxyhalides including bromate.*

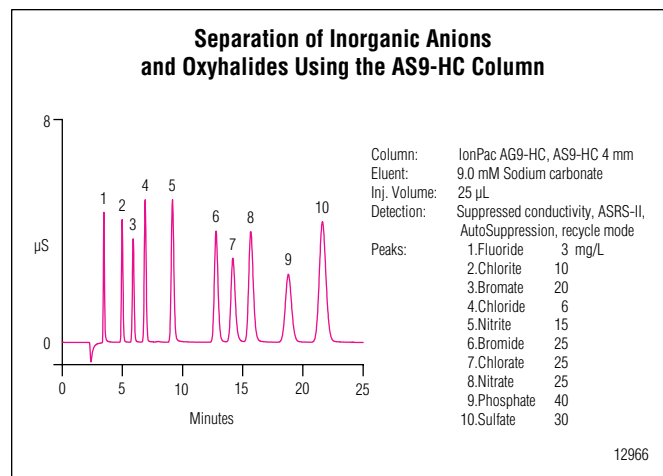
Specifically designed for trace bromate in drinking water, the AS9-HC is the specified column for U.S EPA Methods 300.1 and 317.0.

- For the analysis of oxyhalides and inorganic anions in complex sample matrices
- Simple, isocratic method for trace bromate (5 µg/L) in ozonated drinking water matrices
- Ideal for difficult applications, such as trace nitrite in complex sample matrices
- Improved separation of bromate/chloride, chloride/nitrite, chlorate/nitrate analyte pairs

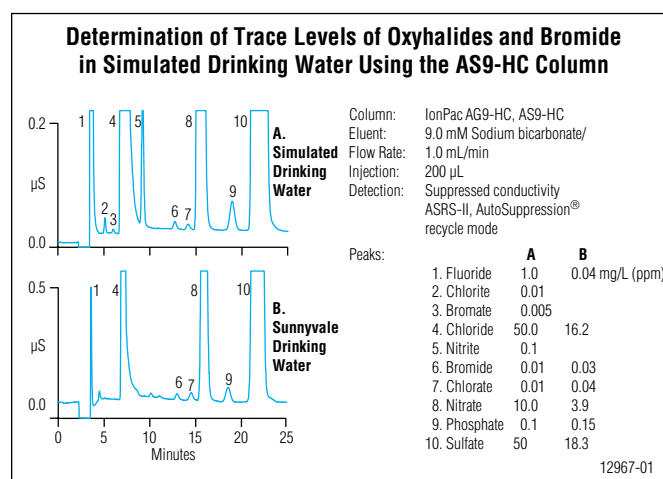
The AS9-HC is a high-capacity carbonate eluent anion-exchange column with selectivity similar to the AS9-SC column. The AS9-HC also supports the analysis of oxyhalides and inorganic anions, including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate. The AS9-HC is specified in validated methods such as US EPA Method 300.1 and 317.0 and meets or exceeds the performance requirements of these methods.

This column separates trace bromate in drinking water matrices using an isocratic carbonate eluent and a large-loop injection. The AS9-HC also offers good retention of fluoride out of the water dip. The column's high capacity (190 µeq for 4 × 250 mm) increases retention time to approximately 22 min. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS9-HC column.

**Note:** The AS23 is the newest carbonate eluent column recommended for the analysis of oxyhalides including bromate.



*Separation of inorganic anions and oxyhalides using the AS9-HC column.*



*Determination of trace bromate in drinking water using the AS9-HC column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS9-SC and AS9-HC Anion-Exchange Columns  
Data Sheet

### Application Notes

AN 135: Determination of Inorganic Anions in Wastewater by Ion Chromatography

AN 136: Determination of Inorganic Oxyhalide Disinfection Byproduct Anions and Bromide in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis

AN 149: Determination of Chlorite, Bromate, Bromide, and Chlorate in Drinking Water by Ion Chromatography with an On-Line-Generated Postcolumn Reagent for Sub- $\mu\text{g/L}$  Bromate Analysis

AN 81: Ion Chromatographic Determination of Oxyhalides and Bromide at Trace Level Concentrations in Drinking Water Using Direct Injection

AN 85: Determination of Trace Anions in Organic Solvents

### Technical Notes

TN 45: Determination of Trace Anions in Concentrated Hydrofluoric Acid

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

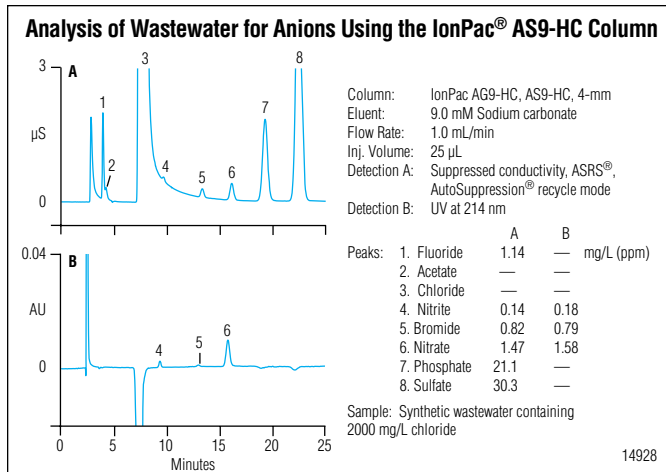
## Ordering Information

### Analytical Columns

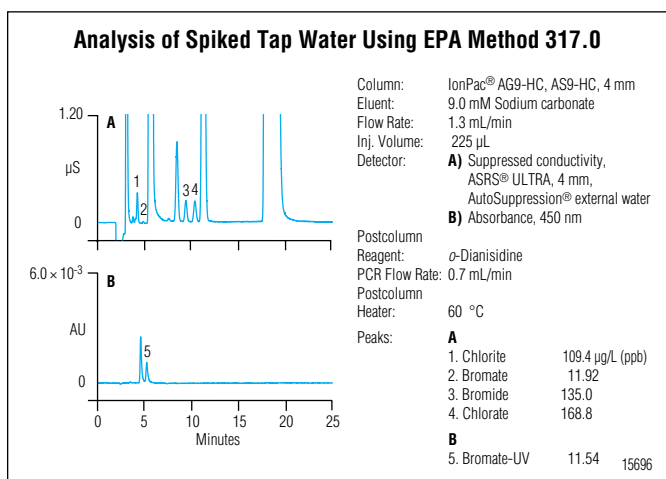
IonPac AS9-HC Analytical Column (4 × 250 mm).....	051786
IonPac AS9-HC Analytical Column (2 × 250 mm).....	052244

### Guard Columns

IonPac AG9-HC Guard Column (4 × 50 mm).....	051791
IonPac AG9-HC Guard Column (2 × 50 mm).....	052248



Analysis of wastewater for anions using the IonPac AS9-HC column.



Analysis of spiked tap water using EPA Method 317.0.

## IonPac AS9-SC

*For the fast isocratic separation of inorganic anions and oxyhalides*

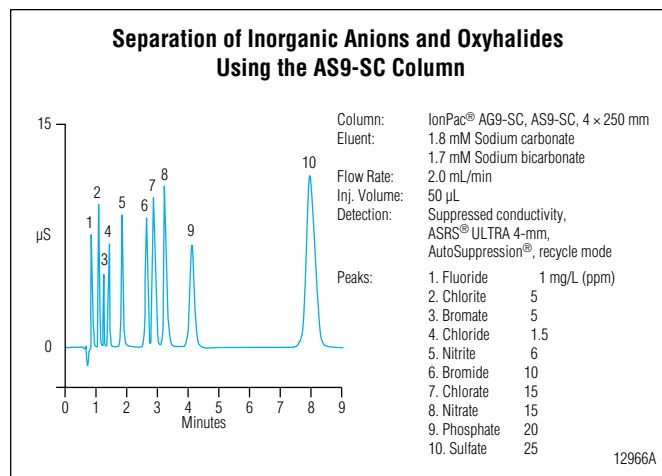
The AS9-SC is designed for the isocratic separation of oxyhalides and inorganic anions, including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, wastewater, groundwater, and other diverse sample matrices.

- For fast analysis of oxyhalides and inorganic anions at similar concentrations
- Ideal for simple sample matrices

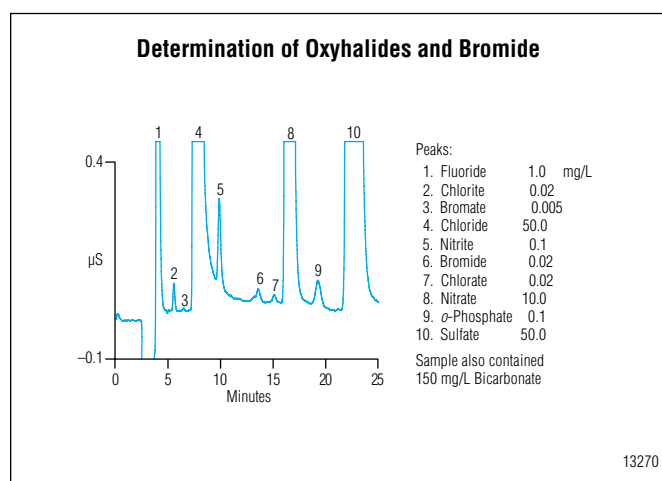
Common inorganic anions and oxyhalides can be determined in less than 10 minutes using an isocratic carbonate/bicarbonate eluent coupled with suppressed conductivity detection.

The AS9-SC column is specified in US EPA Method 300.0 (B), and meets or exceeds the performance requirements of this method. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS9-SC column.

**Note:** See also the AS23, the recommended column for the analysis of oxyhalides, including bromate.



*Separation of inorganic inions and oxyhaldies using the AS9-SC column.*



*Determination of oxyhalides and bromide in simulated drinking water.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS9-SC and AS9-HC Anion-Exchange Columns  
Data Sheet

### Application Notes

AN 101: Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography

AN 51: Method for Determination of Anions in Sodium Hydroxide

### Application Updates

AU 131: Determination of Nitrite and Nitrate in Drinking Water Using Chemically Suppressed Ion Chromatography

AU 132: Determination of Nitrite and Nitrate in Drinking Water Using Ion Chromatography with Direct UV Detection

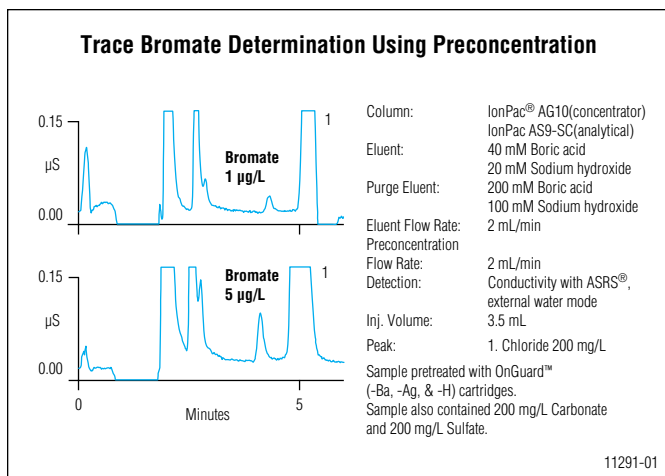
## Ordering Information

### Analytical Columns

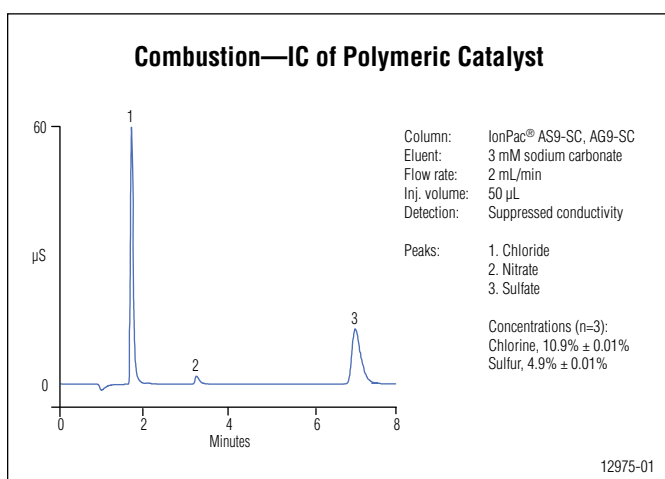
IonPac AS9-SC Analytical Column (4 × 250 mm) ..... 043185

### Guard Columns

IonPac AG9-SC Guard Column (4 × 50 mm)..... 043186



Trace bromate determination using preconcentration.



Determination of chloride and sulfate in a polymeric catalyst using the AS9-SC column.

## IonPac AS4A-SC

*For the fast isocratic separation of inorganic anions in drinking water and wastewater*

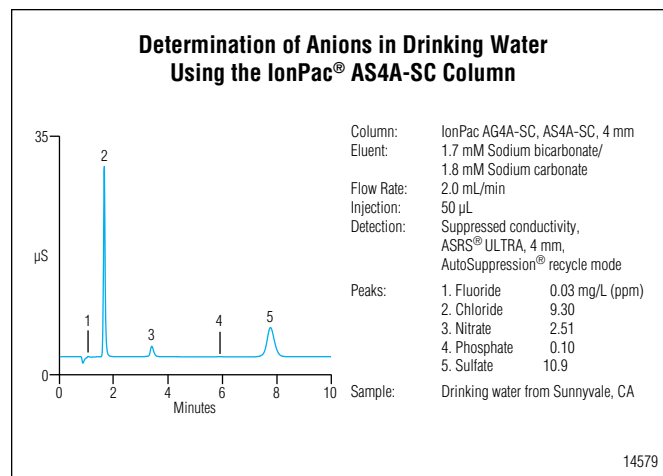
The IonPac AS4A-SC 2 mm and 4 mm anion-exchange columns are designed for the fast analysis of inorganic anions in environmental waters. The AS4A-SC was introduced in 1984 and has been the preferred column for inorganic anion analysis for many years. It is the specified column in US EPA Method 300.0 (A).

- Resolves inorganic anions in 8 min using an isocratic carbonate/bicarbonate eluent.
- Sodium tetraborate gradient optimizes difficult separations.
- Meets or exceeds US EPA Method 300.0 (A) performance requirements.
- Provides excellent performance for fast analysis of inorganic anions.

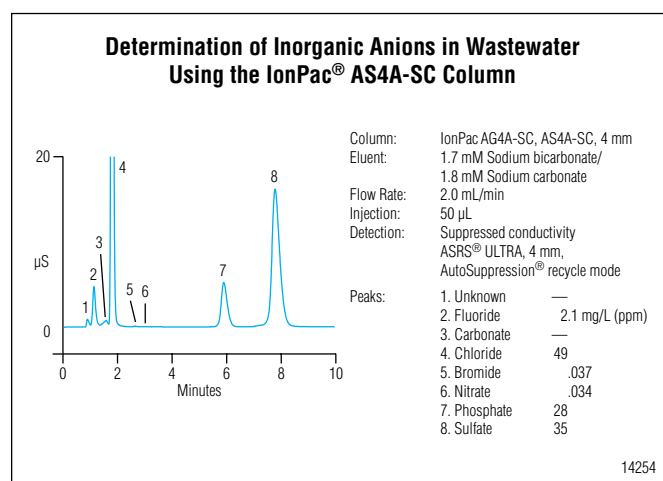
The IonPac AS4A-SC (solvent-compatible) is a low-capacity carbonate eluent anion-exchange column for the fast, isocratic separation of inorganic anions such as nitrate or sulfate, using a carbonate/bicarbonate eluent coupled with suppressed conductivity detection. Inorganic anions are easily determined in any liquid, including water, foods, and other diverse sample matrices.

Separation of the common inorganic anions can be achieved in less than 10 min using an isocratic carbonate/bicarbonate eluent. For simplified operation, use the AS4A-SC Eluent Concentrate and the Combined Seven Anion Standard. The Anion Self-Regenerating Suppressor (ASRS 300) is recommended for use with the AS4A-SC column.

**Note:** The AS22 is the newest carbonate eluent column recommended for fast analysis of inorganic anions.



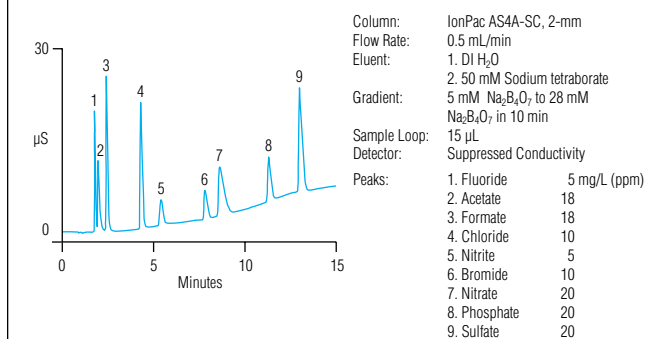
*Determination of inorganic anions in a drinking water sample using an IonPac AS4A-SC column.*



*Determination of inorganic anions in a wastewater sample using an IonPac AS4A-SC column.*



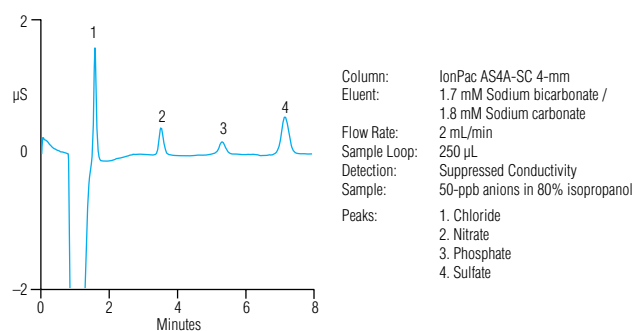
### Tetraborate Gradient Separation of Anions Using the IonPac® AS4A-SC Column



8236

Tetraborate gradient separation of anions using the IonPac AS4A-SC 2 mm column.

### Trace Anions in Solvents Using the IonPac® AS4A Column



8238

Direct injection of anions in a solvent extract using the IonPac AS4A-SC column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS4A-SC Anion-Exchange Column Data Sheet

### Application Notes

AN 133: Determination of Inorganic Anions in Drinking Water by Ion Chromatography

AN 135: Determination of Inorganic Anions in Wastewater by Ion Chromatography

AN 31: Determination of Anions in Acid Rain by Ion Chromatography

AN 36: Determination of Oxalate in Urine by Ion Chromatography

## Ordering Information

### Analytical Columns

IonPac AS4A-SC Analytical Column (2 × 250 mm)..... 043125  
 IonPac AS4A-SC Analytical Column (4 × 250 mm)..... 043174

### Guard Columns

IonPac AG4A-SC Guard Column (4 × 50 mm)..... 043175  
 IonPac AG4A-SC Guard Column (2 × 50 mm)..... 043126



## Specialty Anion-Exchange Packed Columns

### *Anion-exchange columns for special applications*

These anion-exchange columns support special applications, such as non-suppressible eluents, in combination with a variety of detection modes, including amperometric and UV-VIS detection.



*IonPac AS7:* High-capacity, high-efficiency, hydrophobic anion-exchange column designed for the separation of a wide range of polyvalent anions.

*IonPac AS5:* Low-capacity, hydroxide-selective anion-exchange column for separating higher-valence anions

## IonPac AS7

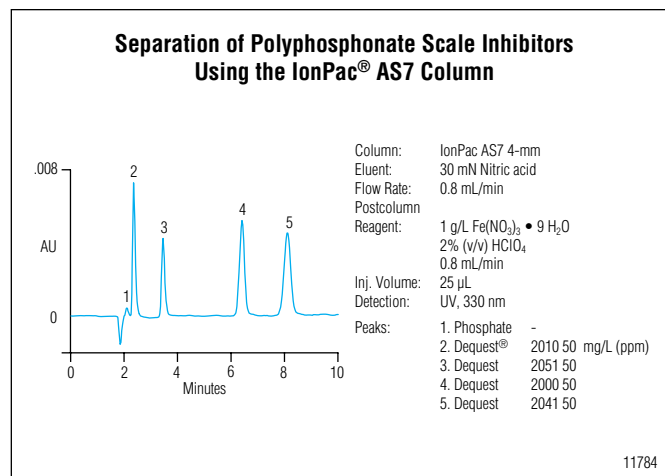
*For the separation of a wide range of polyvalent anions*

The IonPac AS7 separates a wide variety of polyvalent anions, including polyphosphates, polyphosphonates, and other polyvalent complexing agents such as EDTA and NTA using acidic elution (eliminating metal interferences) with postcolumn derivatization and UV-Vis detection.

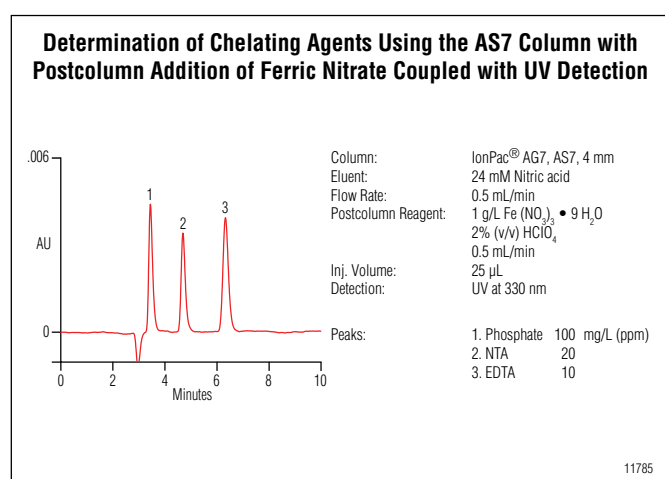
- For polyvalent anions and chelating agents in complex sample matrices
- Determines cyanide and sulfide using amperometric detection
- Useful for hexavalent chromium in environmental matrices

The AS7 column has a unique polymer packing that provides superior performance for separating ionic and polar compounds. The patented packing offers high-speed, high-efficiency, and high-loading capacity at moderate backpressures.

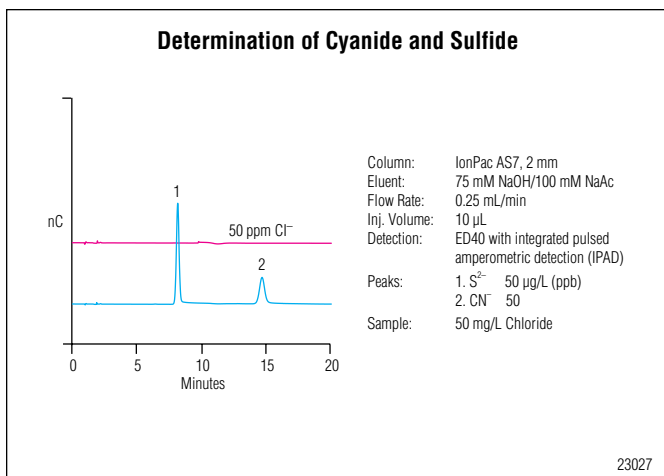
**Note:** The newer IonPac AS16 or AS20 column is recommended for polyphosphates.



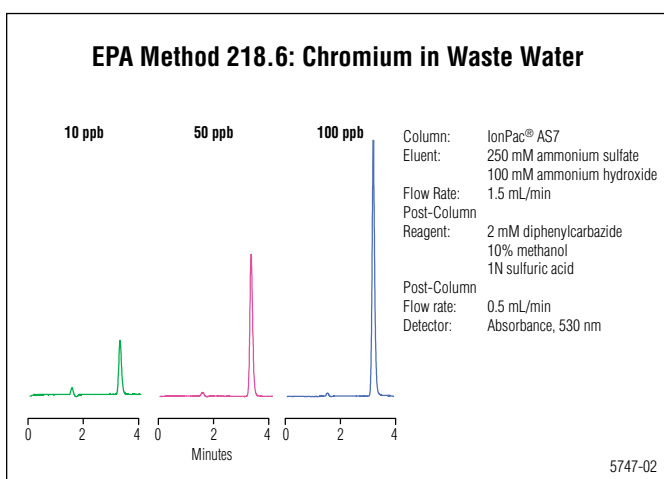
*Determination of polyphosphonate scale inhibitors using the IonPac AS7 4 mm column.*



*Chelating agents by UV detection with postcolumn ferric nitrate.*



Determination of cyanide and sulfide using the IonPac AS7 2 mm column with amperometric detection and a disposable silver electrode.



Determination of hexavalent chromium using the IonPac AS7 column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS7 Anion Exchange Column Data Sheet

### Application Notes

AN 80: Determination of Dissolved Hexavalent Chromium in Drinking Water, Groundwater and Industrial Waste Water Effluents by Ion Chromatography

### Application Updates

AU 107: Determination of Cyanide in Strongly Alkaline Solutions

AU 144: Determination of Hexavalent Chromium in Drinking Water Using Ion Chromatography

### Technical Notes

TN 26: Determination of Cr(VI) in Water, Waste Water, and Solid Waste Extracts

## Ordering Information

### Analytical Columns

IonPac AS7 Analytical Column (4 × 250 mm) .....	035393
IonPac AS7 Analytical Column (2 × 250 mm) .....	063097

### Guard Columns

IonPac AG7 Guard Column (4 × 50 mm) .....	035394
IonPac AG7 Guard Column (2 × 50 mm) .....	063099

## IonPac AS5

*For separating higher-valence anions*

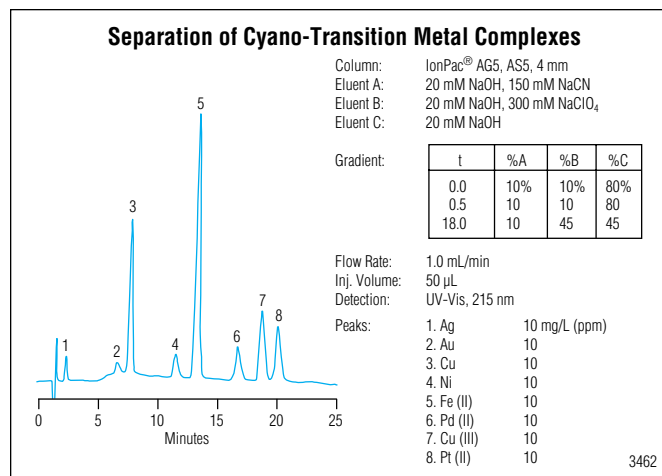
The IonPac AS5 separates higher-valence anions, including polyphosphates, oxyanions, EDTA complexes, metal cyanide complexes, and hydrophobic anions such as iodide, thiosulfate, and thiocyanate.

- For metal-EDTA complexes
- For cyano-transition metal complexes
- For hydrophobic anions, including iodide, thiocyanate, and thiosulfate
- AS16 or AS20 columns are recommended for hydrophobic anions and highly charged anions

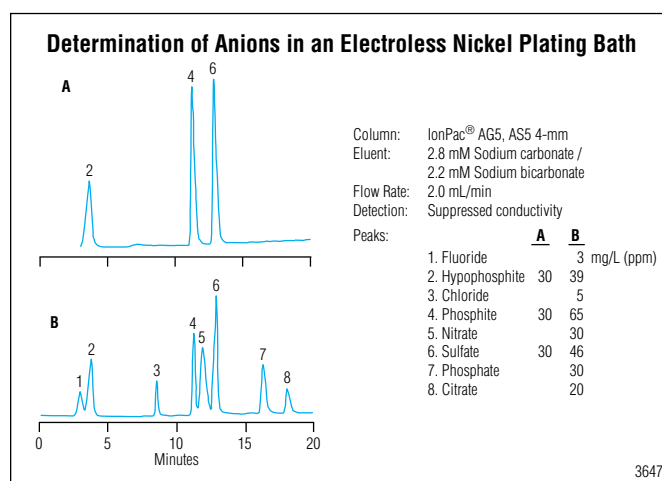
The AS5's compatibility with weak eluents simplifies the determination of strongly-retained species, since these eluents are compatible with a suppressor. Furthermore, the rapid elution of strongly-retained species greatly improves peak shapes, lowers minimum detection limits, and increases sample throughput potential.

The selectivity of the AS5 makes it possible to rapidly elute strongly-retained species such as iodide and thiocyanate in brines without interference from the large chloride peak typical of such samples.

**Note:** IonPac AS16 or AS20 columns are recommended for hydrophobic anions and highly-charged anions.

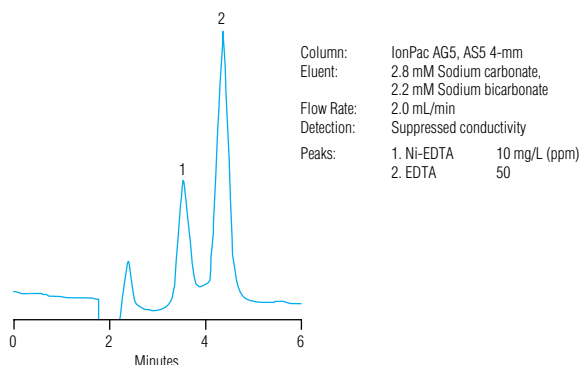


Separation of cyano-transition metal complexes.



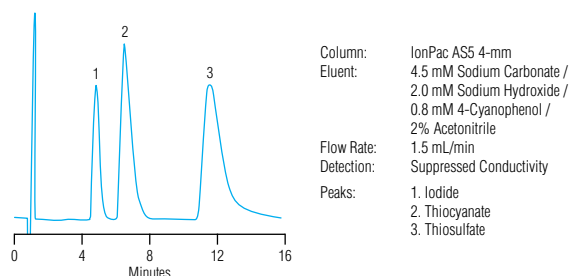
Determination of anions in an electroless nickel plating bath.

### Separation of EDTA from Nickel-EDTA Complexes Using the IonPac® AS5 Column



Separation of EDTA from nickel-EDTA complexes using the IonPac AS5 column.

### Isocratic Separation of Strongly Retained Anions Using the IonPac® AS5 Column



Isocratic separation of strongly-retained anions using the IonPac AS5 column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac AS5 Data Sheet

### Application Notes

AN 51: Method for Determination of Anions in Sodium Hydroxide

AN 55: Determination of Metal Cyanides

## Ordering Information

### Analytical Columns

IonPac AS5 Analytical Column (4 × 250 mm) ..... 035395

### Guard Columns

IonPac AG5 Guard Column (4 × 50 mm) ..... 035396





## Cation-Exchange Packed Columns

*A complete family of columns for separation of inorganic cations, ammonium, and amines*

Dionex cation-exchange columns provide high-resolution separations of inorganic cations, ammonium, and amines. They provide an excellent approach to separations of alkali metals, alkaline earth metals, alkylamines, alkanolamines and biogenic amines. The carboxylate-functionalized cation-exchange columns are available in a wide range of capacities and hydrophobicities. They are hydronium-selective and are compatible with RFIC-EG and RFIC-ER systems.



**IonPac CS18:** Low-capacity carboxylate-functionalized cation-exchange column for the separation of polar amines such as ethanolamines.

**IonPac CS17:** Low-capacity carboxylate-functionalized cation-exchange column for gradient profiling and amine determination.

**IonPac CS16:** High-capacity carboxylate-functionalized cation-exchange column for disparate concentration ratios of adjacent cations such as sodium and ammonium.

**IonPac CS15:** Medium-capacity carboxylate-functionalized cation-exchange column with unique selectivity for disparate concentration ratios of sodium and ammonium.

**IonPac CS14:** Medium low-capacity carboxylate-functionalized cation exchange column for aliphatic and aromatic amines and polyamines.

**IonPac CS12A:** Medium-capacity carboxylate-functionalized column for fast, isocratic separation of inorganic cations.

**IonPac CS11:** Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and diaminopropionic acid eluents.

**IonPac CS10:** Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and diaminopropionic acid eluents.

## IonPac CS18

*Low-capacity cation-exchange column for the separation of polar amines*

The IonPac CS18 carboxylate-functionalized cation-exchange column is tailored for the separation of polar amines including alkanolamines and methylamines, and moderately hydrophobic and polyvalent amines including biogenic amines and alkyl diamines, using simple aqueous eluents and elevated temperature. The CS18 is ideally used with RFIC systems for automatic methanesulfonic acid eluent generation.

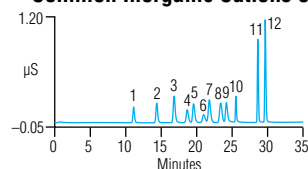
- For amines including alkanolamines and methylamines in diverse sample matrices
- For moderately-hydrophobic amines incl. biogenic amines, alkyl diamines, and polyvalent amines
- Optimized for simple acidic gradient separations with minimal baseline shift
- Ideal Reagent-Free electrolytic suppression with the Cation Self-Regenerating Suppressor CSRS 300
- Compatible with moderate amounts of organic solvents, excluding alcohols
- Requires only a modest acid concentration to elute polyvalent cations

The IonPac CS18 cation-exchange column supports isocratic and gradient separations of polar amines, moderately hydrophobic amines, and polyvalent cations using suppressed conductivity detection. The CS18 column with nonsuppressed conductivity detection is recommended when extended calibration linearity for ammonium or weak bases is required. The CS18 can be used for many of the nonsuppressed applications supported by the IonPac SCS-1 column but with much greater column stability.

The IonPac CS18 is targeted for analysis of power plant waters treated with ammonium, morpholine, or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; personal care products; and food samples.

**Note:** Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS18 column.

### Gradient Separation of Alkanolamines, Methylamines, and the Common Inorganic Cations on the IonPac® CS18 Column



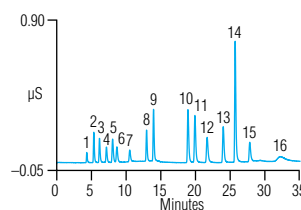
Peaks:	1.	Lithium	0.1 mg/L (ppm)
	2.	Sodium	0.4
	3.	Ammonium	0.5
	4.	Ethanolamine	1.0
	5.	Methylamine	1.0
	6.	Diethanolamine	2.0
	7.	Potassium	1.0
	8.	Dimethylamine	0.8
	9.	Triethanolamine	9.0
	10.	Trimethylamine	3.0
	11.	Magnesium	0.5
	12.	Calcium	1.0

Column: IonPac CS18, 2 mm  
 Eluent: 0.5 mM MSA, gradient to 1 mM at 20 min, gradient to 6 mM at 22.4 min, gradient to 8 mM at 28 min, back to 0.5 mM at 28.1 min  
 Eluent Source: EGC II MSA  
 Flow Rate: 0.3 mL/min  
 Temperature: 35 °C  
 Inj. Volume: 5 µL  
 Detection: Suppressed conductivity, CSRS® ULTRA II 2 mm, AutoSuppression® recycle mode

20289

*The CS18 column can separate small, hydrophilic amines, including alkanolamines and methylamines, in a single run using a modest acidic gradient.*

### Biogenic Amines, Methylamines, and the Common Six Cations on the IonPac® CS18 Column

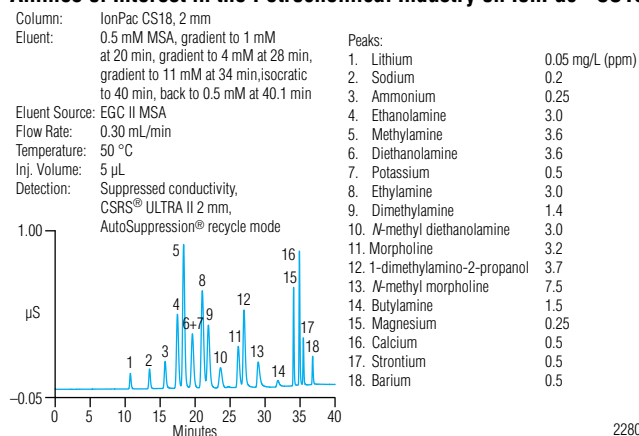


Peaks (mg/L (ppm)):	
1. Lithium	0.02
2. Sodium	0.08
3. Ammonium	0.10
4. Methylamine	0.25
5. Potassium	0.20
6. Dimethylamine	0.20
7. Trimethylamine	0.75
8. Magnesium	0.1
9. Calcium	0.2
10. Putrescine	1.1
11. Cadaverine	1.1
12. Histamine	1.6
13. Agmatine	1.4
14. Spermidine	4.0
15. Spermine	0.4
16. Phenethylamine	1.5

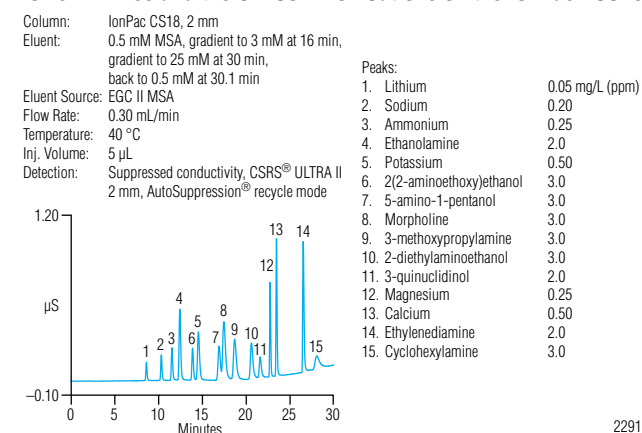
Column: IonPac CS18, 2 mm  
 Eluent: 3 mM MSA, isocratic to 5 min, gradient to 18 mM at 20 min, gradient to 45 mM at 25 min, isocratic to 35 min, back to 3 mM at 35.1 min  
 Eluent Source: EGC II MSA  
 Flow Rate: 0.25 mL/min  
 Temperature: 40 °C  
 Inj. Volume: 5 µL  
 Detection: Suppressed conductivity, CSRS® ULTRA II 2 mm, AutoSuppression® recycle mode

22798

*The IonPac CS18 column can easily separate biogenic amines, methylamines, and Group I and II cations using an aqueous eluent without organic solvent.*

**Amines of Interest in the Petrochemical Industry on IonPac® CS18**

*Separation of a variety of amines and the extended Group I and II inorganic cations that are monitored in the petrochemical industry.*

**Power Amines and the Six Common Cations on the IonPac® CS18**

*Separation of a variety of amines used in the power industry with the IonPac CS18 column.*

**Related Literature**

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

*Product Data Sheets*

IonPac CS18 Datasheet

*Application Notes*

AN 182: Determination of Biogenic Amines in Alcoholic Beverages by Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric Detections

AN 183: Determination of Biogenic Amines in Fermented and Non-Fermented Foods Using Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric Detection

*Application Updates*

AU 162: Determination of Biogenic Amines in Fruit, Vegetables, and Chocolate Using Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric

**Ordering Information****Analytical Columns**

IonPac CS18 Analytical Column (2 × 250 mm) ..... 062878

**Guard Columns**

IonPac CG18 Guard Column (2 × 50 mm) ..... 062880

## IonPac CS17

*Low-capacity cation-exchange column for gradient profiling and amine determination*

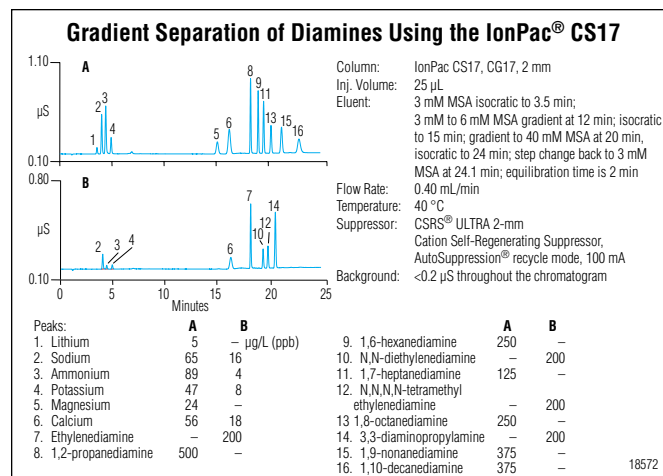
The IonPac CS17 carboxylate-functionalized cation-exchange column is tailored for gradient separation of polyvalent and moderately hydrophobic amines, including biogenic amines and diamines, using simple aqueous eluents and elevated temperature (40 °C). The CS17 is an excellent column for use with Reagent-Free IC systems using Eluent Generation, which require only a deionized water source to produce methanesulfonic acid eluent.

- For polyvalent and moderately hydrophobic amines including diamines and biogenic amines
- Optimized for simple acidic gradient applications with minimal baseline shift
- Ideal alternative for IonPac CS14 amine applications
- Improved peak shape without adding organic solvent to the eluents
- Compatible with organic solvents

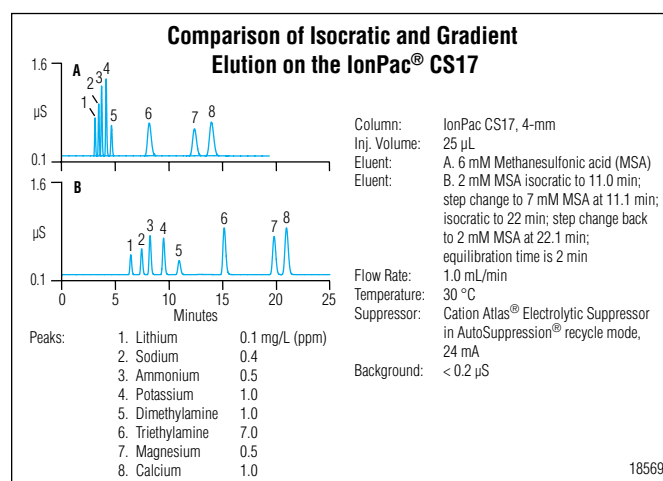
The CS17 column is recommended for polar amines including alkanolamines and methylamines. It can also be used for moderately hydrophobic amines, including biogenic amines, alkyldiamines, and polyamines. Sample matrices include environmental waters, power plant waters treated with ammonium, morpholine or ethanolamine, chemical additives, chemical process solutions, scrubber solutions, plating baths, and industrial solvents. The CS17 is also used extensively in the food industry.

The CS17 column offers improved peak shapes and efficiencies for IonPac CS14 amine applications. Solvent compatibility permits solvent use for elution of more hydrophobic amines and easy column cleanup after the analysis of complex sample matrices. Use the CS17 with Eluent Generation for simplified methanesulfonic acid eluent preparation.

**Note:** Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS17 column.



*The IonPac CS17 column demonstrates excellent selectivity for diamines.*

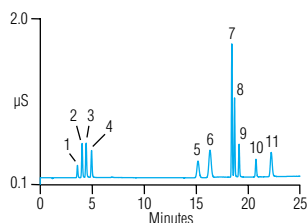


*Gradient elution improves resolution of cations and amines without causing a baseline shift.*

**Determination of Biogenic Amines Using the IonPac® CS17**

Column: IonPac CS17, CG17, 2-mm  
 Inj. Volume: 25 µL  
 Eluent: 3 mM MSA isocratic to 3.5 min;  
 3 mM to 6 mM MSA gradient at 12 min;  
 isocratic to 15 min; gradient to 40 mM  
 MSA at 20 min, isocratic to 24 min;  
 step change back to 3 mM MSA  
 at 24.1 min; equilibration time is 2 min  
 Flow Rate: 0.40 mL/min

Temperature: 40 °C  
 Suppressor: CSRS® ULTRA 2-mm  
 Cation Self-Regenerating Suppressor,  
 AutoSuppression® recycle mode,  
 100 mA  
 Background: < 0.2 µS throughout the chromatogram  
 Peaks:



18570

**Ordering Information****Analytical Columns**

IonPac CS17 Analytical Column (4 × 250 mm)	060557
IonPac CS17 Analytical Column (2 × 250 mm)	060561
IonPac CS17 Analytical Column (2 × 250 mm)	060561

**Guard Columns**

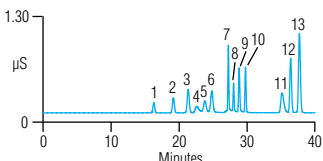
IonPac CG17 Guard Column (4 × 50 mm)	060560
IonPac CG17 Guard Column (2 × 50 mm)	060563
IonPac CG17 Guard Column (2 × 50 mm)	060563

*The IonPac CS17 column can easily separate biogenic amines and Group I and II cations using an aqueous eluent without added organic solvent.*

**Determination of Power Plant Amine Additives Using the IonPac® CS17 Column**

Column: IonPac CG17, CS17, 2-mm  
 Inj. Volume: 25 µL  
 Eluent: 0.5 mM to 0.7 mM MSA gradient at 25 min;  
 step change to 4 mM MSA at 25.1 min;  
 isocratic to 27 min; step change to  
 6.5 mM MSA at 27.1 min; isocratic to 37 min;  
 step change back to 0.5 mM MSA at 37.1 min;  
 equilibration time is 2 min  
 Flow Rate: 0.35 mL/min  
 Temperature: 30 °C  
 Suppressor: Cation Atlas® Electrolytic Suppressor  
 AutoSuppression® Recycle Mode, 8 mA

Peaks:



18575

*The moderate capacity, hydrophilic IonPac CS17 column solves the difficult resolution problem of separating hydrazine from ammonium and ethanolamine.*

**Related Literature**

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

*Product Data Sheets*

IonPac CS17 Cation-Exchange Column

*Application Updates*

AU 155: Determination of Cations and Amines in Hydrogen Peroxide by Ion Chromatography Using a RFIC (Reagent-Free) System

AU 160: Determination of N,N-Dimethyl-o-Toluidine and N,N-Diethyl-o-Toluidine in Ethylene Gas Samples

## IonPac CS16

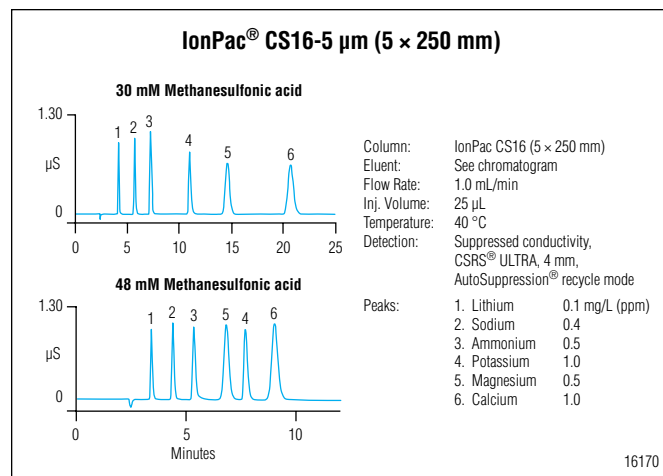
*High-capacity carboxylate-functionalized column for disparate sodium and ammonium concentrations*

The IonPac CS16 is the column of choice for disparate concentration ratios of adjacent eluting cations such as sodium and ammonium in diverse sample matrices. The high-capacity, high-resolution CS16 column can be used for short-chained amines, including alkylamines and alkanolamines, in diverse sample matrices.

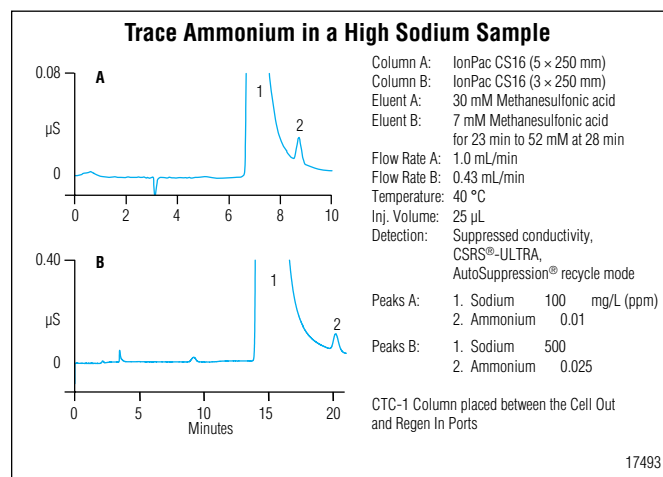
- For disparate concentration ratios of close-eluting cations such as ammonium and sodium in complex matrices
- Ideal for trace-level ammonium in high concentrations of sodium
- Ideal for trace-level sodium in high concentrations of ammonium or amines
- Best carboxylate-functionalized column to tolerate samples with low pH
- Isocratic acid eluent and elevated temperature (40 °C) required for sodium:ammonium ratios to 1:10,000
- Gradient MSA eluent and elevated temperature required for sodium:ammonium ratios up to 1:20,000
- Useful for short-chained amines, including alkylamines and alkanolamines
- Compatible with organic solvents excluding alcohols

Using an isocratic acid eluent and elevated temperature (40 °C) coupled with suppressed conductivity, ratios up to 10,000:1 of sodium and ammonium can be resolved in less than 20 min. Sample matrices include environmental waters; power plant waters treated with ammonium, morpholine or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; and industrial solvents. The CS16 is designed for use in most IonPac CS15 applications.

The CS16 column has the highest capacity among Dionex carboxylate-based cation columns, resulting in improved loadability and resolution. Use the CS16 with the Eluent Generator for simplified, consistent methanesulfonic acid eluent preparation. Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS16 column.



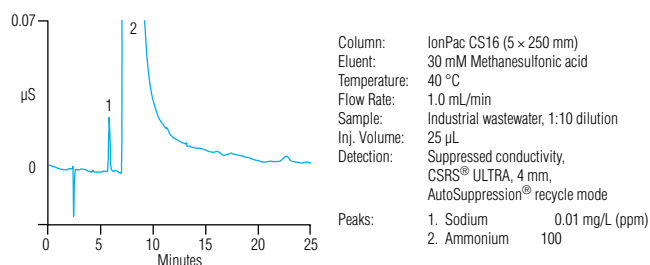
*Isocratic separation of common inorganic cations and ammonium. Note that magnesium elutes before potassium at the higher eluent concentration.*



*Isocratic versus gradient determination of trace level ammonium in a high sodium sample.*



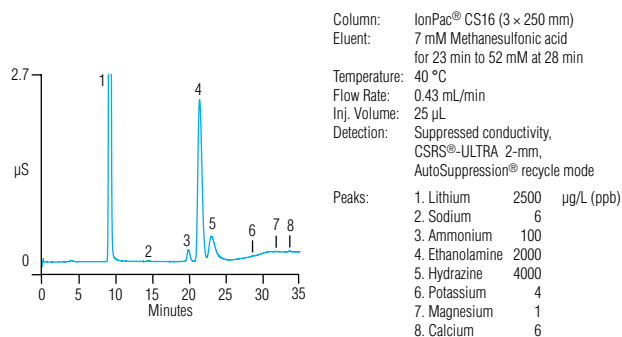
### Determination of Trace-Level Sodium in a High Ammonium Sample Using the IonPac® CS16 Column



16391

Isocratic determination of a 1:10,000 sodium to ammonium concentration ratio.

### Trace Sodium in a High Amine Sample



CTC-1 Column placed between the Cell Out and Regen In Ports

17494

Determination of trace level sodium in a high amine sample.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac CS16 Cation-Exchange Column Data Sheet

### Application Notes

AN 94: Determination of Trace Cations in Concentrated Acids Using AutoNeutralization Pretreatment/Ion Chromatography

AN 141: Determination of Inorganic Cations and Ammonium in Environmental Waters by Ion Chromatography Using the IonPac CS16 Column

AN 152: Determination of Sodium at the Parts-Per-Trillion Level in the Presence of High Concentrations of Ethanolamine in Power Plant Waters

AN 157: Comparison of suppressed to nonsuppressed conductivity detection for the determination of common inorganic cations

## Ordering Information

### Analytical Columns

IonPac CS16 Analytical Column (5 × 250 mm)	057573
IonPac CS16 Analytical Column (3 × 250 mm)	059596

### Guard Columns

IonPac CG16 Guard Column (5 × 50 mm)	057574
IonPac CG16 Guard Column (3 × 50 mm)	059595

## IonPac CS15

*Medium-capacity cation-exchange column for disparate concentration ratios of sodium and ammonium*

The IonPac CS15 is a medium-capacity carboxylate-function-alized cation-exchange column with crown ether moiety for the determination of disparate concentration ratios of sodium and ammonium in diverse sample matrices.

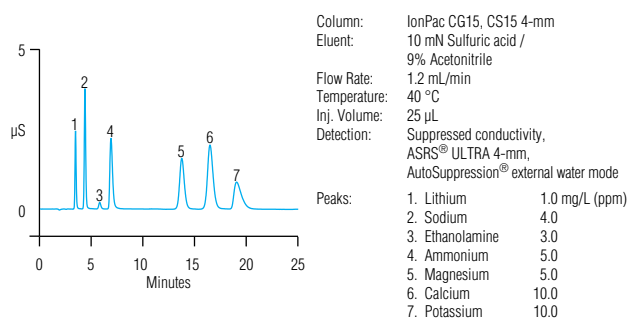
- Solvent and elevated temperature required for more efficient ammonium and potassium peaks
- Use the CS16 column for separating disparate concentrations of sodium and ammonium without an organic solvent
- Useful for determination of trace ethanolamine in high-ammonium or high-potassium concentrations
- Useful for separating alkanolamines and other small amines
- The crown ether moiety gives it unique selectivity, and may offer an advantage for certain types of matrices
- Compatible with organic solvent

The IonPac CS15 has unique selectivity, and is the only carboxylic acid based cation column from Dionex in which ethanolamines elute before ammonium. Thus, for samples with high ammonium to low ethanolamine ratios, the CS15 is the column of choice. Using an isocratic acid or solvent eluent and elevated temperature (40 °C), coupled with suppressed conductivity detection, ratios of up to 8000:1 of sodium and ammonium can also be determined.

Sample matrices include environmental waters; power plant waters treated with ammonium, morpholine or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; industrial solvents; and soil matrices. The CS15 is also particularly useful for matrices with high potassium concentrations. Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS15 column.

**Note:** See the IonPac CS16 for improved performance without using solvent.

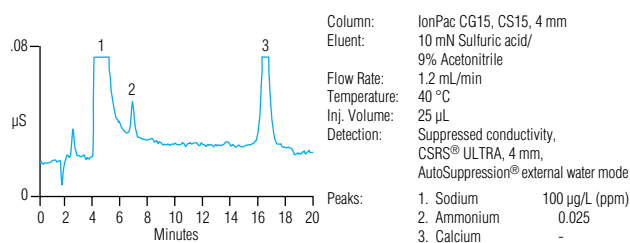
### Isocratic Separation of Ethanolamine Using the IonPac® CS15 Column



12829

*The unique selectivity of the IonPac CS15 column causes ethanolamine to elute before ammonium, and potassium to elute after the divalent magnesium and calcium cations.*

### Isocratic Determination of Ammonium in the Presence of High Sodium (1:4000 ratio) with the IonPac® CS15 Column



12826

*Isocratic determination of trace-level ammonium in environmental wastewater containing a high sodium concentration.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac CS15 Cation-Exchange Column Data Sheet

## Ordering Information

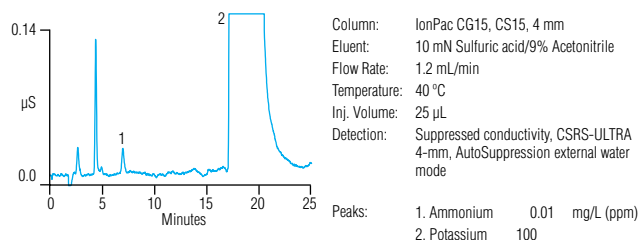
### Analytical Columns

IonPac CS15 Analytical Column (4 × 250 mm)	051795
IonPac CS15 Analytical Column (2 × 250 mm)	052252

### Guard Columns

IonPac CG15 Guard Column (4 × 50 mm)	052200
IonPac CG15 Guard Column (2 × 50 mm)	052256

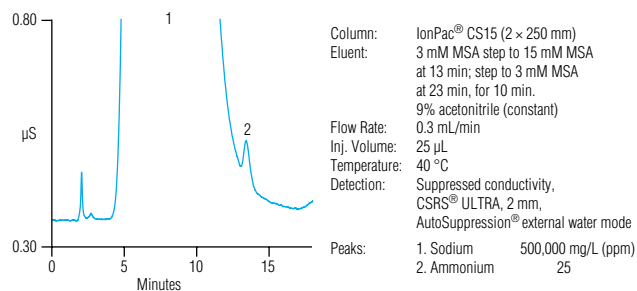
### Trace Ammonium in a Potassium Chloride Soil Extract



12958

Determination of trace-level ammonium in a potassium chloride soil extract.

### Step—Change Elution of 20,000:1 Ratio of Sodium to Ammonium



17097

Step change elution of 20,000:1 ratio of sodium to ammonium.

## IonPac CS14

*Medium low-capacity column for aliphatic and aromatic amines and polyamines*

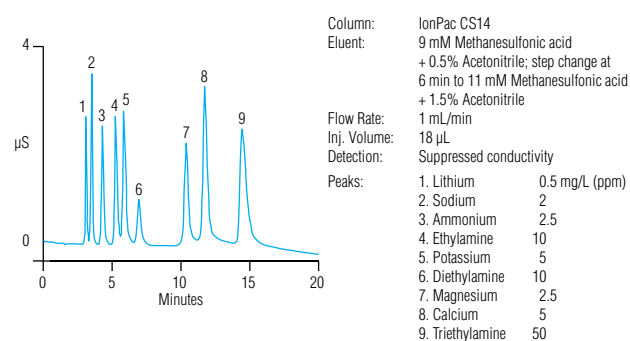
The IonPac CS14 is a medium low-capacity carboxylate-functionalized cation-exchange column for the determination of aliphatic, aromatic, and polyvalent amines. Sample matrices include environmental waters; power plant waters treated with ammonium, morpholine or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; industrial solvents; and wastewater.

- For amine separations, including aliphatic amines, aromatic amines, and polyamines
- For hydrophobic and polyvalent amines
- For polar amines including alkanolamines and alkylamines
- For moderately hydrophobic amines
- Compatible with organic solvents

The CS14 column can be used with isocratic or gradient methanesulfonic acid or sulfuric acid eluents to resolve a variety of amines from the Group I and II cations. Solvent and elevated temperature may be required for efficient elution of hydrophobic amines. Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS14 column.

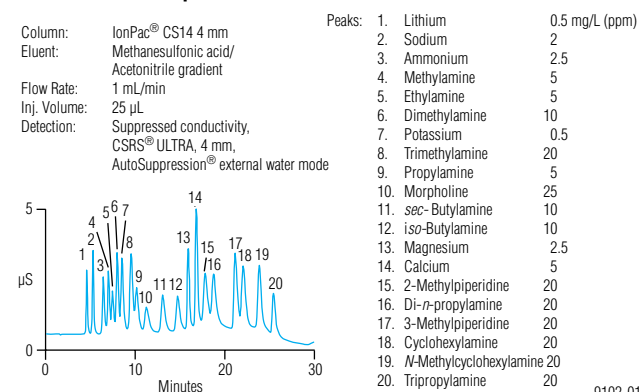
The CS18 and CS17 are recommended replacement columns for most CS14 applications. The CS17 is recommended replacement column for hydrophobic and polyvalent amines, including biogenic amines and diamines. The CS18 is recommended for polar amines, including alkanolamines and methylamines; and moderately hydrophobic and polyvalent amines, including biogenic amines and alkyldiamines.

### Step Change Separation of Ethyl, Diethyl, and Triethylamine Plus the Group I & II Cations Using the IonPac® CS14 Column



*Acetonitrile can be used to optimize the resolution of ethylamines from Group I and Group II cations.*

### Gradient Elution of Alkylamines and the Group I and II Cations on IonPac CS14



*The unique selectivity of the IonPac CS14 allows a large number of aliphatic amines and Group I and Group II cations to be resolved.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Data Sheets*

IonPac CS14 Cation Exchange Column Data Sheet

### *Application Notes*

AN 86: Determination of Trace Cations in Power Plant Waters Containing Morpholine

AN 148: Determination of Bethanechol by Ion Chromatography

## Ordering Information

### Analytical Columns

IonPac CS14 Analytical Column (2 × 250 mm) .....	044121
IonPac CS14 Analytical Column (4 × 250 mm) .....	044123

### Guard Columns

IonPac CG14 Guard Column (2 × 50 mm) .....	044122
IonPac CG14 Guard Column (4 × 50 mm) .....	044124

## IonPac CS12A

*Medium capacity column for fast, isocratic separation of cations using MSA or sulfuric acid*

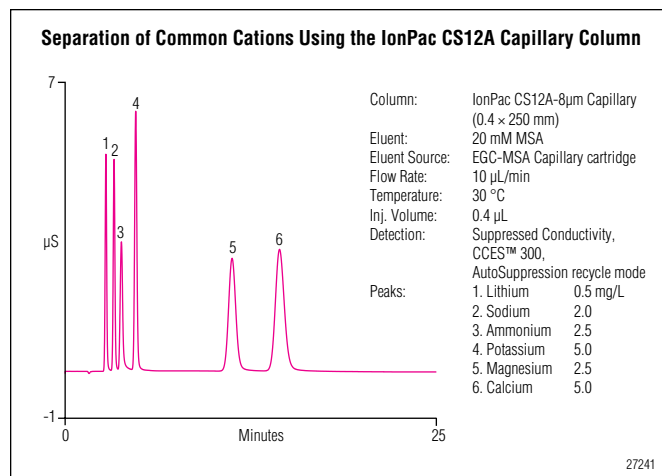
The IonPac CS12A is a medium-capacity, carboxylate-functionalized cation-exchange column recommended for fast, isocratic separation of lithium, sodium, ammonium, potassium, magnesium, and calcium using methanesulfonic or sulfuric acid eluents in diverse sample matrices. The new CS12A-8 $\mu$ m and CS12A-5 $\mu$ m Capillary Columns offer the same selectivity as their analytical-scale counterparts, but offer the advantage of reduced eluent consumption, thereby lowering operating costs.

- Robust, reliable column for group I and II cations plus ammonium
- Recommended for manganese and morpholine
- Recommended for inorganic cations in complex matrices
- Simplified Reagent-Free IC operation provided by the EG or eluent regeneration
- Compatible with organic solvents (excluding alcohols), high temperatures, and high acid concentrations
- Analysis time for common six cations as short as 3 min (CS12A-5 $\mu$ m) to 15 min (CS12A-8 $\mu$ m)
- CS12A-MS IC-MS screening column for fast elution and low flow rates required for IC-MS
- For disparate concentration ratios of adjacent-eluting cations, the high-capacity IonPac CS16 is recommended

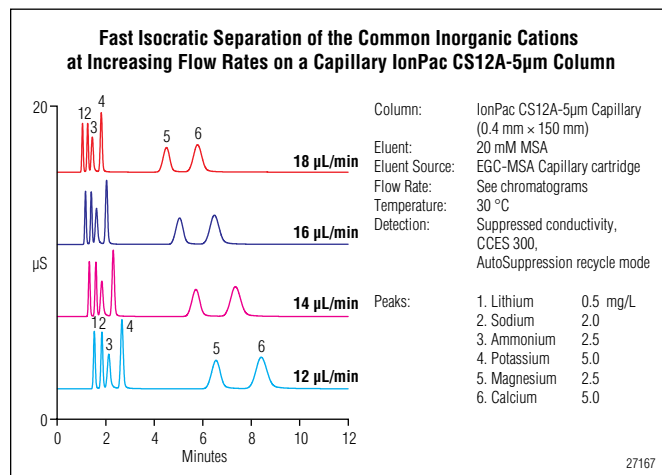
The medium-capacity IonPac CS12A cation-exchange column supports fast, isocratic separation with suppressed conductivity detection. Sample matrices include environmental and drinking waters; soil extracts; acid digests; power plant waters treated with ammonium or morpholine; chemical additives; chemical process solutions; scrubber solutions; plating baths; and industrial solvents.

Use the CS12A-5 $\mu$ m column for high efficiency and fast analysis (3 min). The smaller-diameter resin technology and reduced column length provide faster analysis time, reduced eluent consumption, and increased sensitivity. The CS12A column is the recommended replacement for all CS12 applications. Use the CS12A with the Eluent Generator for simplified methanesulfonic acid eluent preparation.

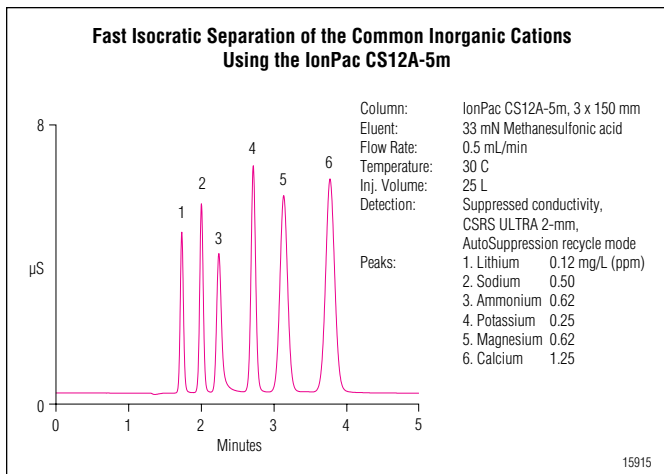
**Note:** Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS12A column.



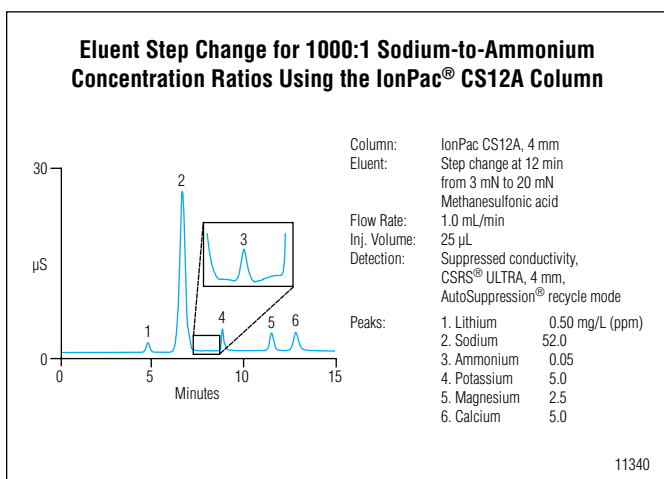
*The IonPac CS12A-8mm capillary column for the separation of the common cations. The capillary format uses 100-fold less water and produces only one hundredth of waste.*



*Fast isocratic separation on the common inorganic cations at increasing flow rates on the the IonPac CS12A-5 $\mu$ m capillary column.*



Fast isocratic separation of the common inorganic cations.



Trace-level quantification of ammonium in brine (1000:1 ratio) using the IonPac CS12A coupled with cation AutoSuppression.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac CS12A Cation-Exchange Column Data Sheet

### Application Notes

AN 106: Ion Chromatography in the Pharmaceutical Industry

AN 107: Ions In Physiological Fluids

AN 120: Determination of Calcium and Magnesium in Brine

AN 124: Determination of Choline in Dry Milk and Infant Formula

## Application Updates

AU 137: Determination of Trace Lithium in Industrial Process Waters

AU 158: Determination of Manganese in Brine

## Ordering Information

### Analytical Columns

IonPac CS12A-5 µm Analytical Column (3 x 150 mm).....	057185
IonPac CS12A Analytical Column (4 x 250 mm).....	046073
IonPac CS12A Analytical Column (2 x 250 mm).....	046075
IonPac CS12A-8µm Capillary Column (0.4 x 250 mm).....	072066
IonPac CS12A-5µm Capillary Column (0.4 x 150 mm).....	072068
IonPac CS12A-MS Analytical Column (2 x 100 mm) .....	059960

### Guard Columns

IonPac CG12A-5 µm Guard Column (3 x 30 mm).....	057184
IonPac CG12A Guard Column (2 x 50 mm) .....	046076
IonPac CG12A Guard Column (4 x 50 mm) .....	046074
IonPac CG12A-8µm Capillary Guard Column (0.4 x 50 mm) .....	072067
IonPac CG12A-5µm Capillary Guard Column (0.4 x 50 mm) .....	072069



## IonPac CS11

*Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and DAP.*

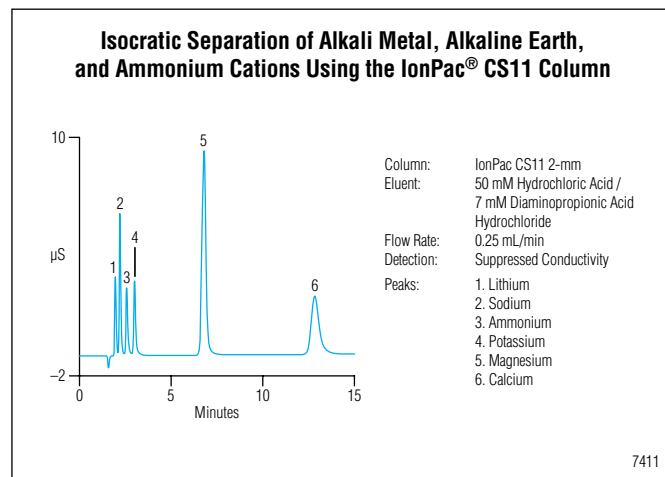
The IonPac CS11 is designed for the isocratic separation of inorganic cations using hydrochloric acid with diaminopropionic (DAP) acid eluents.

- The CS11 can be used for analysis of common inorganic cations and aliphatic, cyclic, and aromatic amines.
- Compatible with organic solvents
- The CS12A improves performance for fast analysis of inorganic cations and ammonium.
- The CS17 column is recommended for hydrophobic and polyvalent amines.
- The CS18 column is recommended for polar amines including alkanolamines and methylamines.
- The CS18 is also recommended for moderately hydrophobic amines and polyvalent amines.

The CS11 is useful in determining common inorganic cations and aliphatic and aromatic amines in diverse sample matrices, including environmental and drinking waters, power plant waters treated with ammonium, soil extracts, acid digests, chemical additives, chemical process solutions, scrubber solutions, plating baths, and industrial solvents.

The CS11 has selectivity similar to the CS10 column, with improved sensitivity and lower eluent consumption due to its smaller 2 mm i.d. format.

**Note:** Use the Cation MicroMembrane Suppressor (CMMS 300) with the CS11 column. Electrolytic suppression is not recommended with HCl and DAP eluents.



Common inorganic cations can be separated using the IonPac CS11 with a HCl/DAP acid eluent.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Application Updates

AU 138: Determination of Ethanolamines in Industrial Waters by Cation-Exchange Chromatography

## Ordering Information

### Analytical Columns

IonPac CS11 Analytical Column (2 × 250 mm) ..... 043127

### Guard Columns

IonPac CG11 Guard Column (2 × 50 mm) ..... 043128

## IonPac CS10

*Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and DAP.*

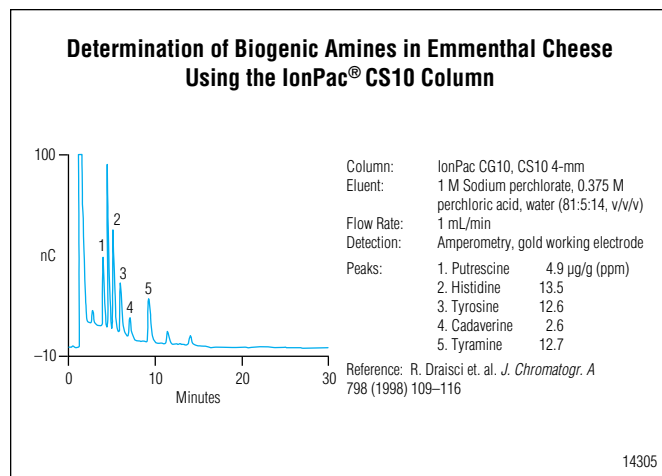
The IonPac CS10 is a sulfonate-functionalized cation-exchange column for the isocratic separation of inorganic cations using hydrochloric acid with diaminopropionic (DAP) acid eluents. The CS12A is the recommended column for the fast analysis of inorganic cations; the CS17, for hydrophobic and polyvalent amines; and the CS18, for polar amines. The CS18 is also recommended for moderately hydrophobic and polyvalent amines.

- The CS10 can be used for analysis of the common inorganic cations and aliphatic, cyclic, and aromatic amines.
- Compatible with organic solvents.
- The CS12A provides improved performance for fast analysis of inorganic cations and ammonium.
- The CS17 column is recommended for hydrophobic and polyvalent amines.
- The CS18 column is recommended for polar amines including alkanolamines and methylamines.
- The CS18 is also recommended for moderately hydrophobic amines and polyvalent amines.

The IonPac CS10 is designed for the isocratic separation of lithium, sodium, ammonium, potassium, magnesium, and calcium using hydrochloric acid with diaminopropionic acid eluents with suppressed conductivity detection. Sample matrices for the CS10 include environmental waters; power plant waters treated with ammonium, morpholine, or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; and industrial solvents.

The CS11 has selectivity similar to the CS10 column, with improved sensitivity due to its smaller 2 mm i.d. format.

**Note:** Use the Cation MicroMembrane Suppressor (CMMS 300) with the CS10 column. Electrolytic suppression is not recommended with HCl and DAP eluents.



*Biogenic amines can be separated rapidly using the IonPac CS10 column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac CS10 Cation Exchange Column Data Sheet

## Ordering Information

### Analytical Columns

IonPac CS10 Analytical Column (4 × 250 mm) ..... 043015

### Guard Columns

IonPac CG10 Guard Column (4 × 50 mm) ..... 043016



## Transition Metal Packed Columns

*For determination of metals in diverse sample matrices.*

Cation-exchange chromatography is ideal for determination of transition and lanthanide metals in a variety of sample matrices. Because most transition and lanthanide metals are incompatible with suppressed conductivity detection, postcolumn reagent absorbance detection is typically used. Dionex transition metal columns are optimized for this mode of operation.



*IonPac CS5A: High-resolution, ion-exchange column for determination of transition and lanthanide metals in diverse sample matrices.*

## IonPac CS5A

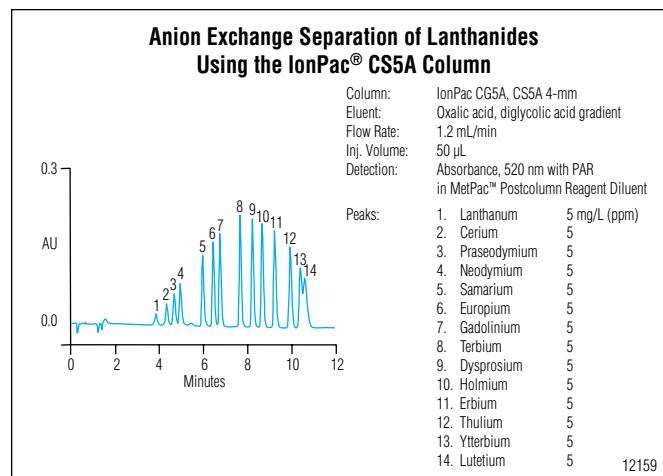
*High-resolution, ion-exchange column for transition and lanthanide metals in diverse sample matrices*

The IonPac CS5A is a high-resolution, ion-exchange column designed for determination of transition and lanthanide metals in a variety of sample matrices. The CS5A column, in combination with postcolumn derivitization and visible detection at 530 nm, provides a sensitive and selective method for transition metal analysis.

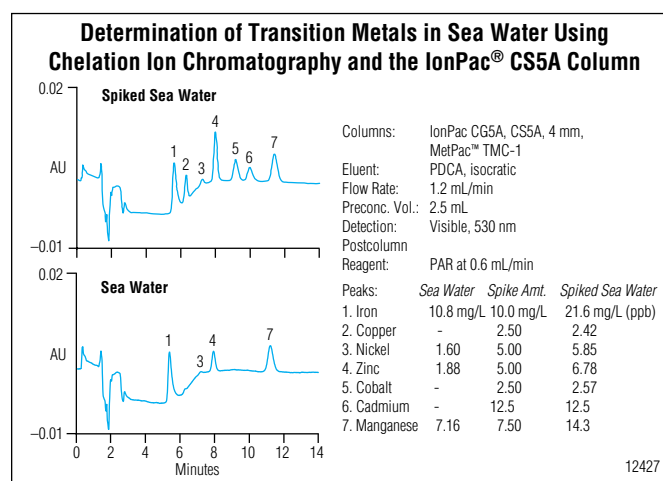
- Recommended for the separation of transition and lanthanide metals
- Also useful for aluminum analysis

The CS5A column provides simultaneous determination of common transition metals in less than 11 min using a unique bifunctional resin. The transition metals are detected following complexation with 4-(2-pyridylazo) resorcinol (PAR). The PAR derivative is detected at 520–530 nm. This method is both sensitive and selective for transition metals.

The CS5A provides improved selectivity and higher efficiencies than its predecessor, the CS5 column. Use the MetPac PDCA and Oxalic Acid Eluent Concentrates and PAR Postcolumn Reagent Diluent for simplified operation.

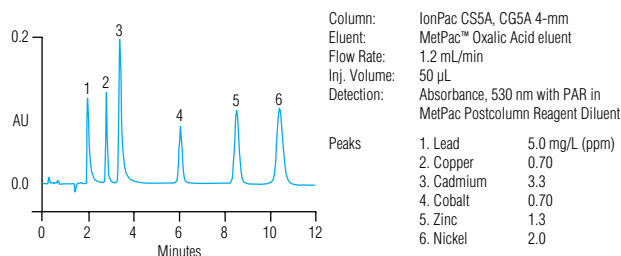


*Separation of lanthanide metals using oxalic acid/diglycolic acid as the complexing agent.*



*Determination of transition metals in seawater.*

### Separation of Transition Metals Using Oxalic Acid with the IonPac® CS5A

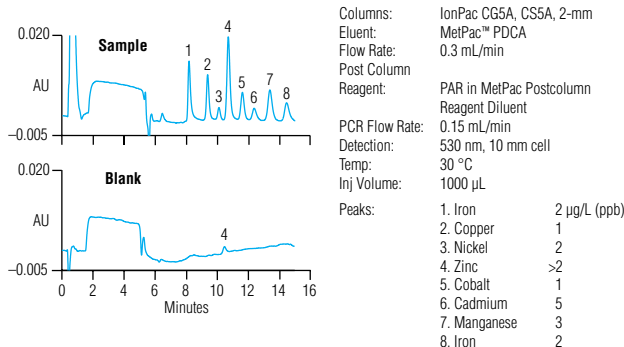


Column: IonPac CS5A, CG5A 4-mm  
 Eluent: MetPac™ Oxalic Acid eluent  
 Flow Rate: 1.2 mL/min  
 Inj. Volume: 50 µL  
 Detection: Absorbance, 530 nm with PAR in MetPac Postcolumn Reagent Diluent

11871

Separation of transition metals by a mixed-mode mechanism using oxalate as a complexing agent.

### Large Sample Loop Injection of µg/L Levels of Transition Metals Using the IonPac® CS5A Column



Columns: IonPac CG5A, CS5A, 2-mm  
 Eluent: MetPac™ PDCA  
 Flow Rate: 0.3 mL/min  
 Post Column Reagent: PAR in MetPac Postcolumn Reagent Diluent  
 PCR Flow Rate: 0.15 mL/min  
 Detection: 530 nm, 10 mm cell  
 Temp: 30 °C  
 Inj Volume: 1000 µL

13775

Large sample loop injection of µg/L levels of transition metals on a 2 mm system with PC10 pneumatic postcolumn delivery.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac CS5A Column and MetPac Reagents Data Sheet

### Application Notes

AN 131: Determination of Transition Metals at PPT Levels in High-Purity Water and SC2 (D-clean) Baths

AN 108: Determination of Transition Metals in Serum and Whole Blood by Ion Chromatography

### Technical Notes

TN 10: Determination of Transition Metals by Ion Chromatography

## Ordering Information

### Analytical Columns

IonPac CS5A Analytical Column (4 × 250 mm).....	046100
IonPac CS5A Analytical Column (2 × 250 mm).....	052576

### Guard Columns

IonPac CG5A Guard Column (4 × 50 mm).....	046104
IonPac CG5A Guard Column (2 × 50 mm).....	052836





# Ion-Exclusion Packed Columns

## *Ion-exclusion for organic acid separations*

In ion-exclusion separations, Donnan exclusion causes strong acids to elute in the void volume of the column. Weak acids that are protonated in the acidic eluent are not subject to Donnan exclusion and penetrate into the pores of the resin. Separation is accomplished by differences in pKa, size, and hydrophobicity.



*IonPac ICE-AS1:* Ion-exclusion column for fast analysis of aliphatic organic acids and alcohols in complex samples.

*IonPac ICE-AS6:* Ion-exclusion column for aliphatic organic acids, including hydroxy-substituted organic acids, and alcohols in complex samples

*IonPac ICE-Borate:* Ion-exclusion column ideal for monitoring trace levels of borate in high-purity water.

## IonPac ICE-AS1

*Ion-exclusion column for fast analysis of aliphatic organic acids and alcohols in complex samples*

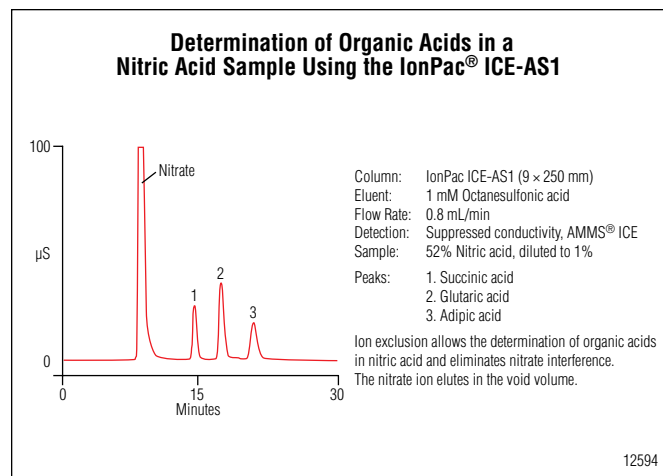
The IonPac ICE-AS1 ion-exclusion column supports fast analysis of aliphatic organic acids and alcohols in complex or high-ionic-strength samples, including foods and beverages, biological samples, fermentation processes, industrial process liquors, and wastewaters.

- Fast separation of organic acids
- Ideal for electroactive ions such as cyanide and sulfite
- Useful for organic acids and alcohols in complex sample matrices

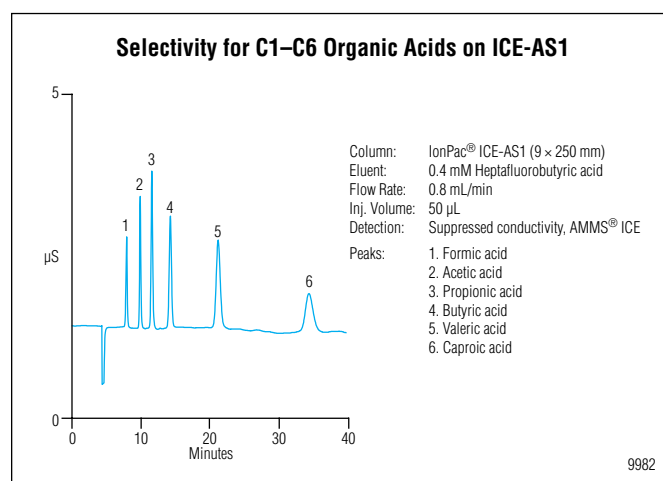
The IonPac AS11 is recommended for fast analysis of organic acids and inorganic anions in well-characterized samples. Use the high-capacity AS11-HC for organic acids and inorganic anions in complex sample matrices.

With the IonPac ICE-AS1 column, weakly ionized acids are separated by pKa differences, size, and hydrophobicity. Strong acid anions such as chloride, oxalate, and sulfate elute in the void and do not interfere with quantification of the organic acids. The ICE-AS1 column can be used with any typical strong acid eluent and a wide variety of detectors, including conductivity, amperometry, photometry, and refractive index, to determine aliphatic organic acids.

**Note:** Use the Anion MicroMembrane Ion-Exclusion Suppressor (AMMS ICE 300) with the ICE-AS1 column.

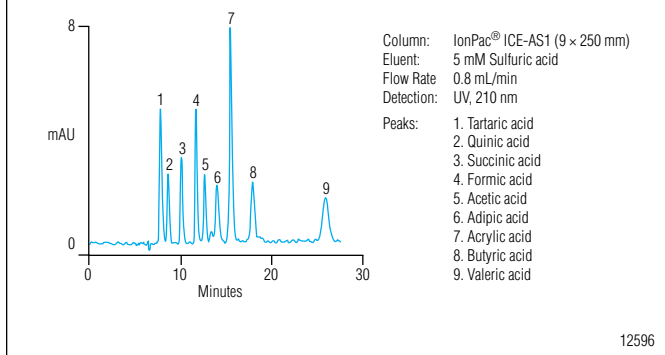


*Determination of organic acids in a nitric acid sample using the IonPac ICE-AS1.*



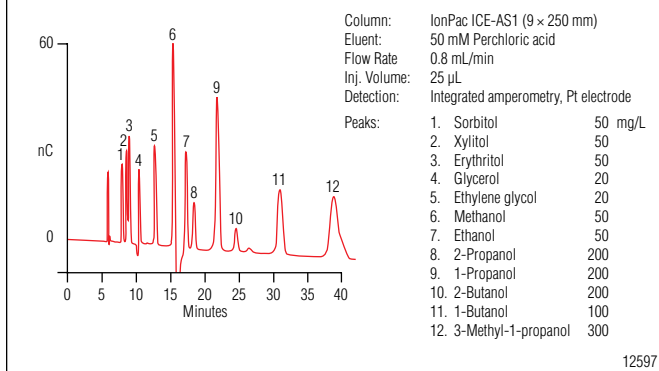
*Selectivity of ICE-AS1 for C1–C6 organic acids.*

### Determination of Weakly Ionized Organic Acids Using UV Detection



Determination of organic acids using the IonPac ICE-AS1 column.

### Determination of Alcohols



Determination of alcohols using the IonPac ICE-AS1 with pulsed amperometric detection.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac ICE-AS1 Ion-Exclusion Column Data Sheet

### Application Notes

AN 21: Organic Acids in Wine

AN 54: Determination of Sulfite in Food and Beverages by Ion Exclusion Chromatography with Pulsed Amperometric Detection

AN 116: Quantification of Anions in Pharmaceuticals

AN 117: Quantification of Carbohydrates and Glycols in Pharmaceuticals

AN 188: Determination of Glycols and Alcohols in Fermentation Broths Using Ion-Exclusion Chromatography and Pulsed Amperometric Detection

## Ordering Information

### IonPac ICE-AS1

IonPac ICE-AS1 Analytical Column (9 x 250 mm) .....	043197
IonPac ICE-AS1 Analytical Column (4 x 250 mm) .....	064198
IonPac ICE-AS1 Guard Column (4 x 50 mm) .....	067842

## IonPac ICE-AS6

*Ion-exclusion column for aliphatic organic acids and alcohols in complex samples*

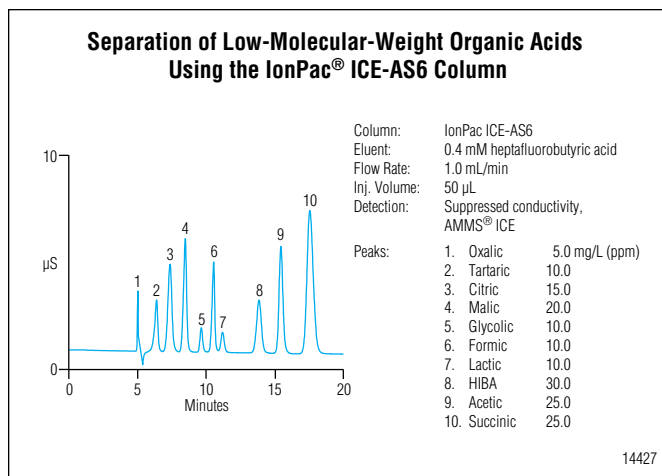
The IonPac ICE-AS6 ion-exclusion column is designed for the fast analysis of aliphatic organic acids (including hydroxy-substituted organic acids) and alcohols in complex or high-ion-strength samples, including foods and beverages, biological samples, fermentation processes, industrial process liquors, and wastewaters. The ICE-AS6 column is ideally suited for most applications performed on the ICE-AS1 column.

- Use the ICE-AS6 column for organic acids in complex sample matrices.
- Use the ICE-AS1 column for the fast separation of organic acids.

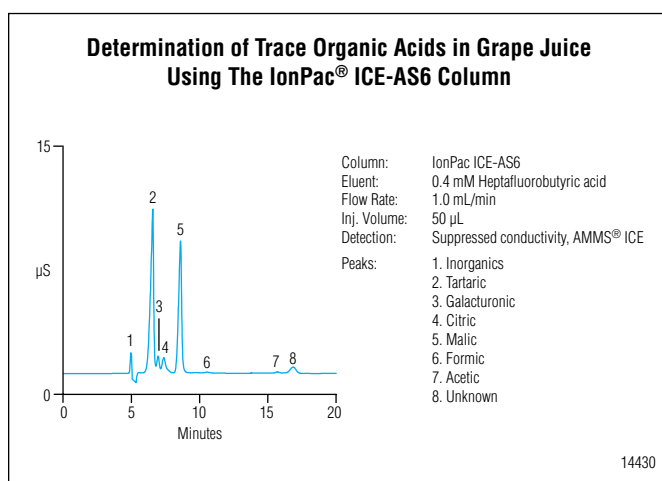
The ICE-AS6 column provides improved peak efficiencies and selectivity for carboxylic acids and alcohols. The weakly ionized acids are separated by pKa differences, size, and hydrophobicity. Strong acid anions such as chloride, oxalate, and sulfate elute in the void and do not interfere with the quantification of the organic acids.

The ICE-AS6 column can be used with any typical strong acid eluent and a wide range of detectors, including conductivity, amperometry, photometry, and refractive index to determine aliphatic organic acids. Use the AS11 for fast analysis of organic acids and inorganic anions in well-characterized samples. Use the high-capacity AS11-HC column for organic acids and inorganic anions in complex sample matrices or uncharacterized samples.

**Note:** Use the Anion MicroMembrane Ion-Exclusion Suppressor (AMMS ICE 300) with the ICE-AS6 column.

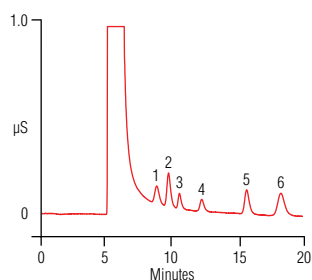


*Separation of low-molecular-weight organic acids using the IonPac ICE-AS6 column.*



*Determination of trace organic acids in grape juice using suppressed conductivity detection.*

### Determination of Organic Acids in Sulfuric Acid Using the IonPac® ICE-AS6 Column

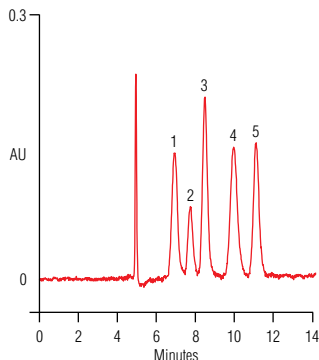


Column: IonPac ICE-AS6  
 Eluent: 1.0 mM Heptafluorobutyric acid  
 Flow Rate: 1.0 mL/min  
 Detection: Suppressed conductivity,  
 AMMS® ICE  
 Sample: 0.25% Sulfuric acid, 50 mL  
 Peaks:  
 1. Citric  
 2. Malic  
 3. Glycolic  
 4. Lactic  
 5. Acetic  
 6. Succinic

14428-01

*Ion exclusion allows the determination of organic acids in sulfuric acid and eliminates sulfate interference.*

### Determination of Strongly Ionized Organic Acids Using the IonPac ICE-AS6 Column



Column: IonPac ICE-AS6  
 Eluent: 0.01 M Sulfuric acid  
 Flow Rate: 1.0 mL/min  
 Detection: UV, 210 nm  
 Peaks:  
 1. Glucuronic  
 2. Galacturonic  
 3. Tartaric  
 4. Citric  
 5. Malonic

14431

*Determination of strongly ionized organic acids using UV detection.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac ICE-AS6 Ion-Exclusion Column Data Sheet

### Application Notes

AN 46: Ion Chromatography: A Versatile Technique for the Analysis of Beer

AN 104: Analysis of Personal Care Products by Ion Chromatography

AN 106: Ion Chromatography in the Pharmaceutical Industry

### Technical Notes

TN 44: The Determination of Trace Anions in Concentrated Phosphoric Acid

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

## Ordering Information

### IonPac ICE-AS6

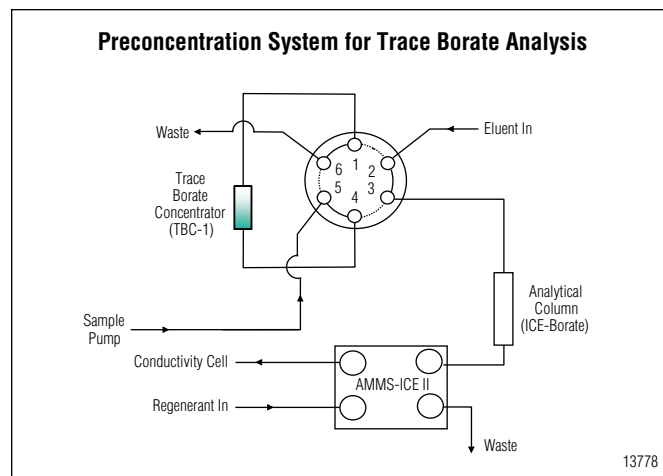
IonPac ICE-AS6 Analytical Column (9 × 250 mm) ..... 046023

## IonPac ICE-Borate

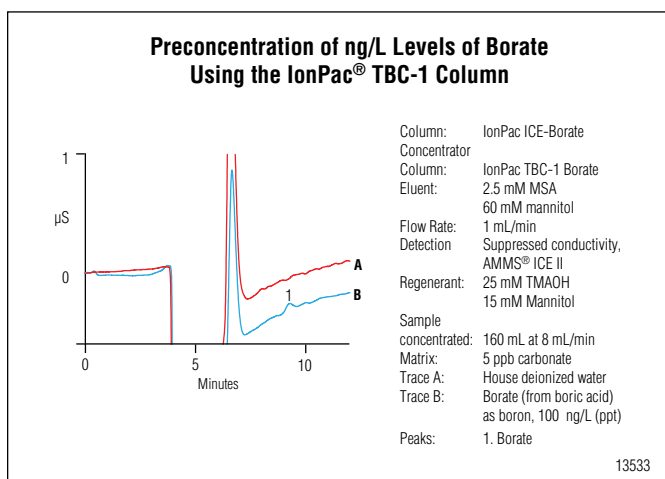
*Ion-exclusion column ideal for monitoring trace levels of borate in high-purity water*

The IonPac ICE-Borate ion-exclusion column is designed for monitoring trace levels of borate in high-purity water.

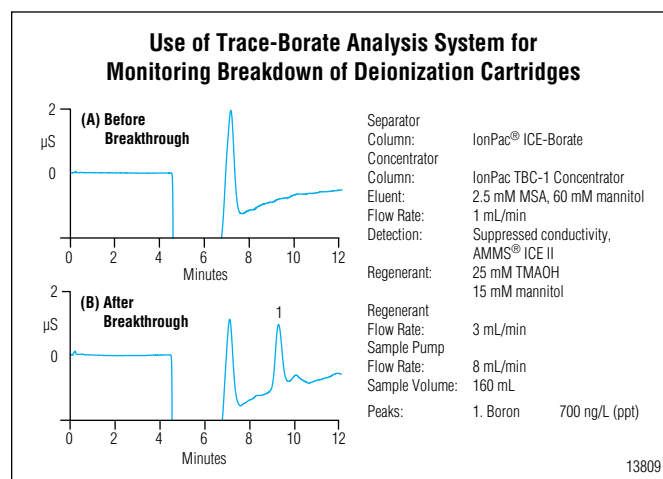
Used with the TBC-1 Borate Concentrator column and conductivity detection, the ICE-Borate ion-exclusion column supports the determination of borate at ng/L (ppt) concentrations. Borate is separated and detected as the mannitol complex. Use the Anion MicroMembrane Ion-Exclusion Suppressor (AMMS-ICE 300) with the ICE-Borate column.



IC preconcentration system for trace-level borate determination.



Determination of ng/L concentrations of borate using sample preconcentration.



IC preconcentration system for trace-level borate determination.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

IonPac TBC-1 Borate Concentrator Column and IonPac ICE-Borate Column Data Sheet

## Ordering Information

### IonPac ICE-Borate

IonPac ICE-Borate Analytical Column (9 × 250 mm) ..... 053945

## Specialty IC Columns

*Ideally suited for ion-pair and ion-suppression reversed-phase chromatography*

The NS1 Column is ideal for Mobile Phase Ion Chromatography (MPIC), which combines ion-pair chromatography with suppressed conductivity detection. This combination can be used to determine high molecular weight ionic analytes that are difficult to separate using ion-exchange chromatography

- Ideally suited for ion-pair and ion-suppression of hydrophobic ionizable compounds
- Can also be used for reversed-phase separations
- Polymeric nature permits the use of acids, bases, and solvents in the eluent
- Stable over a wide pH range of 0–14

Suppressed conductivity detection improves the detection limits for acids or bases by reducing the eluent conductance and maximizing analyte conductance. Alternatively, the NS1 can easily be coupled with UV detection for aromatic molecules.



*IonPac NS1:* Polymeric based, reversed-phase column ideal for ion-pair or ion-suppression separations of hydrophobic, ionizable compounds.



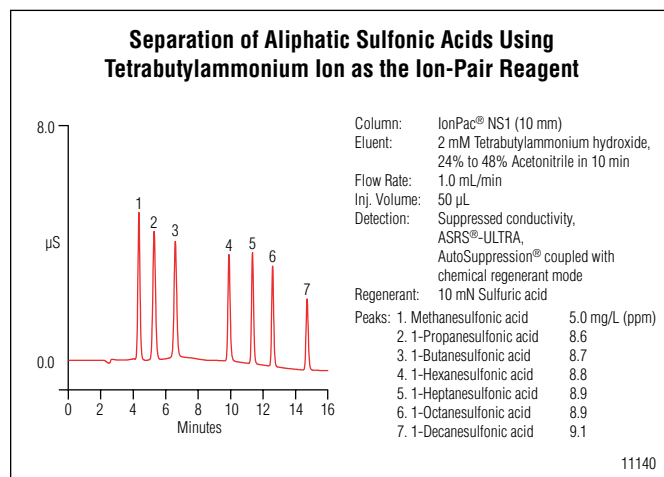
## IonPac NS1

*Polymeric reversed-phase column for ion-pair or ion suppression chromatography*

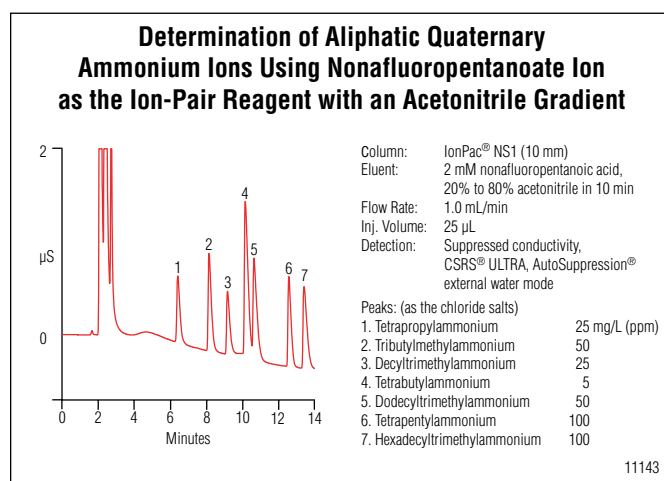
The IonPac NS1 column 10  $\mu\text{m}$  and NS-1 5  $\mu\text{m}$  are packed with a neutral, macroporous high surface area ethylvinylbenzene polymere crosslinked with 55% divinylbenzene. This resin makes the NS-1 column resistant to solvents, acids, and bases, and permits the use of eluents from pH 0-14

- Ideal for separation of large molecules that carry localized charges such as surfactants
- Compatible with acids, bases, and solvents
- Can also be used for traditional polymeric reversed-phase applications
- Use ion-pair chromatography for difficult separations

The IonPac NS1 column is the column of choice for routine ion-pair chromatography or ion-suppression separations using the AMMS-ICS suppressor. The NS-1 column is also used for mobile-phase ion chromatography (MPIC), a technique especially suited for large molecules with local charges (e.g. surfactants) as well as other ions that are not amenable to separation by ion exchange chromatography



*Separation of aliphatic sulfonic acids using tetrabutylammonium ion as the ion-pair reagent.*



*Determination of aliphatic quaternary ammonium ions using nonafluoropentanoate ion as the ion-pair reagent with an acetonitrile gradient.*

## Key Applications

The IonPac NS1 column can be used for the separation of high MW aliphatic carboxylic acids, alkyl and aromatic sulfates and sulfonates, quaternary ammonium ions, water-soluble vitamins, sulfur oxides, metal cyanide complexes, phenols, and alkanolamines.

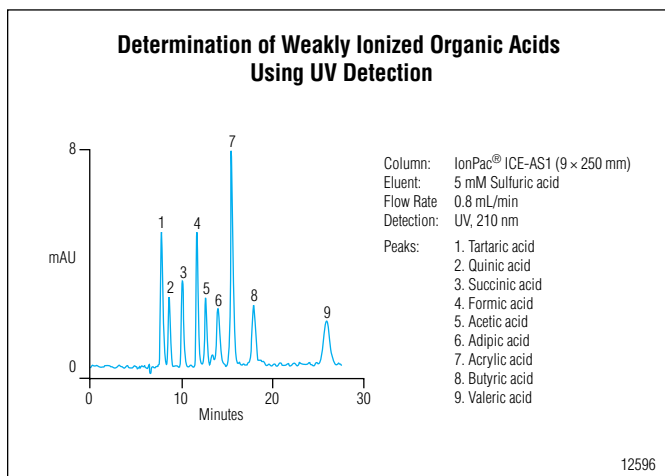
## Ordering Information

### Analytical Columns

IonPac NS1-10 µm Analytical Column (4 x 250 mm).....	035321
IonPac NS1-5 µm Analytical Column (4 x 150 mm).....	039568
IonPac NS1 10 µm Analytical Column (2 x 250 mm).....	SP4354

### Guard Columns

IonPac NG1-10 µm Guard Column (4 x 35 mm).....	039567
IonPac NG1-10 µm Guard Column (2 x 50 mm).....	SP4356



*Determination of aliphatic carboxylic acids.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### Product Data Sheets

IonPac NS1 Reversed Phase Polymeric Column Data Sheet

### Application Notes

AN 139: Determination of Additives and Byproducts in an Acid Copper Plating Bath by Liquid Chromatography

AN 145: Determination of the Suppressor Additive in Acid Copper Plating Bath

AN 45: Fatty Acid Analysis

### Technical Notes

TN 12: Methods Development Using Ion-Pair Chromatography with Suppressed Conductivity Detection



## IC Trap Columns

### *Columns to purify eluent or polish samples*

Trap columns are short columns installed in the system to prevent unwanted analytes from interfering with the separation of your analytes of interest. IonPac trap columns contain high-capacity, low-efficiency, ion-exchange resin. The columns strip trace contaminants from the eluent and prevent them from reaching the guard and analytical columns. Polisher columns are specialized columns that remove unwanted counterions from the sample, and are installed between the sampler and injector.



*Anion Trap Columns:* Anion trap columns prevent anionic contaminants from causing spurious peaks

*Cation Trap Columns:* Cation trap columns prevent cationic contaminants from causing spurious peaks

*Cation Polisher:* For removal of metallic contaminants and other cations such as calcium and magnesium from the sample stream during anion analysis.

*MFC-1 Metal-Free:* Designed to remove transition metals from high-pH eluents.

## Anion Trap Columns

IonPac Anion Trap Columns contain high-capacity, anion-exchange resin in the hydroxide form. The anion trap column is installed in the eluent line prior to the injection valve to prevent eluent contaminants from causing spurious peaks during gradient chromatography.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### Product Data Sheets

Concentrator and Trap Columns Data Sheet

### ATC-3 Anion Trap Column

The IonPac ATC-3 Anion Trap Column contains a high-capacity, low-efficiency, anion-exchange resin used to remove trace anion contamination from eluents.

#### Ordering Information

##### Accessories

Trap Column/Suppressor Cleanup Kit.....	059659
ATC-3 4 mm Anion Trap Column (9 × 24 mm).....	059660
ATC-3 2 mm Anion Trap Column (4 × 35 mm).....	059661

### ATC-HC Anion Trap Column

The IonPac ATC-HC Anion Trap Column is a high-capacity, anion-exchange trap column designed for use with hydroxide eluents.

For RFIC, EGC-KOH applications, use the CR-ATC.

#### Ordering Information

##### Accessories

ATC-HC Anion Trap Column (9 × 75 mm).....	059604
Trap Column/Suppressor Cleanup Kit.....	059659

### ATC-HC Borate Form Anion Trap Column

The ATC-HC Borate Form Anion Trap Column is a high capacity anion-exchange trap column designed for use with borate eluents.

The ATC-HC Borate Form is placed between the pump outlet and the inlet of the EGC-KOH cartridge to strip anionic contaminants from the deionized water and prevent them from reaching the guard and analytical columns.

#### Ordering Information

##### Accessories

Trap Column/Suppressor Cleanup Kit.....	059659
ATC-HC Anion Trap Column - Borate Form (9 × 75 mm).....	064755

## Cation Trap Columns

IonPac Cation Trap Columns contain high-capacity, cation-exchange resin in the hydronium form. The cation trap column is installed in the eluent line prior to the injection valve to prevent eluent contaminants from causing spurious peaks during gradient chromatography.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Concentrator and Trap Columns Data Sheet

### CTC Cation Trap

The IonPac CTC Cation Trap Column contains high-capacity, low-efficiency, cation-exchange resin in the hydronium ion form, to remove trace cation contaminants from eluents. The trap is installed in the eluent line prior to the injection valve to prevent spurious peaks and reduce baseline shifts during gradient chromatography. For RFIC-EGC MSA applications, use the CR-CTC.

### Ordering Information

#### Accessories

IonPac CTC-1 Cation Trap Column .....	040192
IonPac CTC Cation Trap Column 2 mm .....	043132

## Cation Polisher

IonPac CP1 Na<sup>+</sup> Form and CP2 H<sup>+</sup> Form Cation Polishers are designed for removal of metallic contaminants and other cations such as calcium and magnesium from the sample stream during anion analysis. They prevent high levels of metals or cations in samples from collecting on columns or suppressors, which can cause performance issues such as poor peak shapes or anion recoveries.

- Helps extend column and suppressor lifetimes
- Suited to phosphate analysis with metallic contaminants
- CP1 Na<sup>+</sup> form: specifically designed for autosampler operation
- CP2 H<sup>+</sup> form: recommended for large-volume sample preconcentration applications using an external pump

Dionex Cation Polisher Columns can aid removal of matrix cations during anion analysis with sample preconcentration. Matrix cations can elute species of interest from the concentrator column leading to poor peak shapes and recovery. Removing the matrix cations using the Cation Polisher Column enables improved chromatographic performance.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Concentrator and Trap Columns Data Sheet

### Cation Polisher Na<sup>+</sup> for Anion Analysis

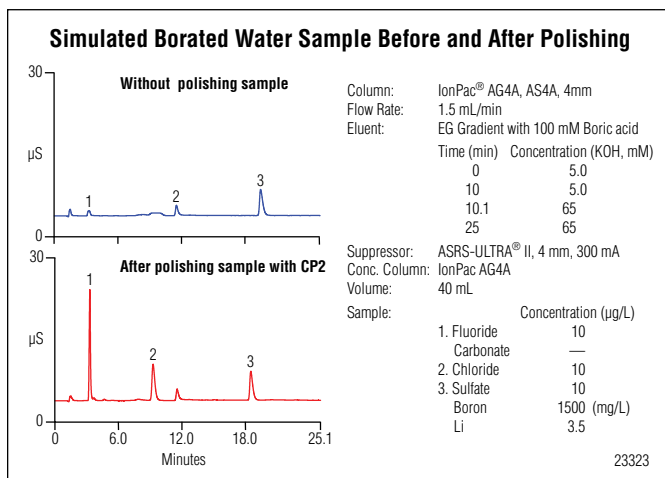
The CP1 Na<sup>+</sup> Form (6 × 16 mm) column is a cation exchange column in the sodium form, packed in a low pressure format. It is specifically designed for autosampler operation. The void volume of this column is approximately 250 µL.

### Ordering Information

#### Cation Polisher Na<sup>+</sup>

IonPac CP1 Na <sup>+</sup> Form Cation Polisher Column (6 × 16 mm) .....	064930
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## Cation Polisher H<sup>+</sup> for Anion Analysis



The CP2 H<sup>+</sup> Form (9 × 24 mm) column is a higher-capacity version in the hydronium form, with a void volume of approximately 825 µL. The CP2 is recommended for large-volume sample preconcentration applications using an external pump. The Cation Polisher Columns can be regenerated off-line approximately every 2-3 months (depending on the level of contamination and usage).

### Ordering Information

#### Cation Polisher H<sup>+</sup>

IonPac CP2 H<sup>+</sup> Form Cation Polisher Column (9 × 24 mm) ..... 064931

## MFC-1 Metal-Free

The IonPac MFC-1 metal-free column contains a special chelating resin that strips trace transition metal contaminants from high-pH eluents.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### Product Data Sheets

Concentrator and Trap Columns Data Sheet

## MFC-1 Metal Free Column

The IonPac MFC-1 metal-free column is installed in the eluent line prior to the injection valve to clear trace transition metal contaminants from high-pH eluents.

### Ordering Information

#### Accessories

MFC-1 Metal-Free Column (3 × 27 mm) ..... 037017

## IC Concentrator Columns

*Columns to capture and concentrate sample ions from large injection volumes*

IonPac concentrator columns are designed primarily for high purity water analysis. A concentrator column retains ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits. Concentrator columns typically have internal volumes of hundreds of microliters, but can concentrate the ions from tens of milliliters, increasing sensitivity by 2–5 orders of magnitude compared to standard sample loops.



*Anion Concentrator Columns:* Retains anions from a measured volume of sample matrix, concentrating the analyte species.

*Cation Concentrator Columns:* Retains cations from a measured volume of aqueous sample matrix, concentrating the analyte species.

*Transition Metal:* High-capacity, cation-concentrator column for coupling the MetPac CC-1 chelating column to the IonPac CS5A analytical column.



## Anion Concentrator Columns

IonPac anion concentrator columns are designed primarily for high-purity water analysis. The concentrator retains ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits by 2–5 orders of magnitude.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

#### Product Data Sheets

Concentrator and Trap Columns Data Sheet

### UTAC-LP2

The IonPac UTAC-LP2 is an anion-exchange concentrator column with low void volume. Designed primarily for high-purity water analysis, this ultraclean (low sulfate) concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits.

- Low void volume (approximately 145  $\mu\text{L}$ )
- Low-backpressure
- Compatible with the AS-DV Autosampler, and Loading Pumps
- Ultraclean (low sulfate)
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

Improved backpressure resilience eliminates the need for a pulse damper on the loading pump, and improved matrix resilience allows direct injection of samples containing polyacrylic acid additives.

### Key Specifications

*Dimensions:* 4 × 35 mm

*Void Volume:* approximately 145  $\mu\text{L}$

*Capacity:* 25.0  $\mu\text{eq/col}$

*Backpressure:* <60 psi at 2.0 mL/min

### Ordering Information

#### UTAC-LP2

UTAC-LP2 Ultra Trace Anion Concentrator- Low Pressure (4 × 35 mm)..... 072779

### UTAC-ULP2

The IonPac UTAC-ULP2 Ultratrace Anion Concentrator Column is an anion-exchange concentrator column with low void volume. Designed primarily for high-purity water analysis, this ultraclean (low sulfate) concentrator column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits.

- Low void volume of approximately 145  $\mu\text{L}$
- Ultra-Low backpressure column
- Compatible with the AS, AS-HV and AS-DV Autosamplers, and Loading Pumps
- Ultraclean (low sulfate) concentrator column
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

Improved backpressure resilience eliminates the need for a pulse dampener on the loading pump, and improved matrix resilience allows direct injection of samples containing polyacrylic acid additives.

### Key Specifications

*Dimensions:* 5 × 23 mm

*Capacity:* 25  $\mu\text{eq/col}$

*Void Volume:* approximately 145  $\mu\text{L}$

*Backpressure:* <30 psi at 2.0 mL/min

### Ordering Information

#### UTAC-ULP2

UTAC-ULP2 Ultra Trace Anion Concentrator-  
Ultralow Pressure (5 × 23mm)..... 072780

### UTAC-XLP2

The IonPac UTAC-XLP2 Ultra Trace Anion Concentrator Column is a general purpose anion-exchange concentrator column. The UTAC-XLP2 can be used with a single-piston loading pump (AXP) syringe pump, or autosampler (AS, AS-HV, or AS-DV).

- Low void volume approximately 145  $\mu\text{L}$
- Extremely low-backpressure column
- Compatible with AS, AS-HV and AS-DV Autosamplers and Loading Pumps
- Ultraclean (low sulfate) concentrator column
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

Improved backpressure resilience eliminates the need for a pulse damper on the loading pump, and improved matrix resilience allows direct injection of samples containing polyacrylic acid additives.

## Key Specifications

**Dimensions:** 6 × 16 mm

**Capacity:** 25 µeq/col

**Void Volume:** approximately 145 µL

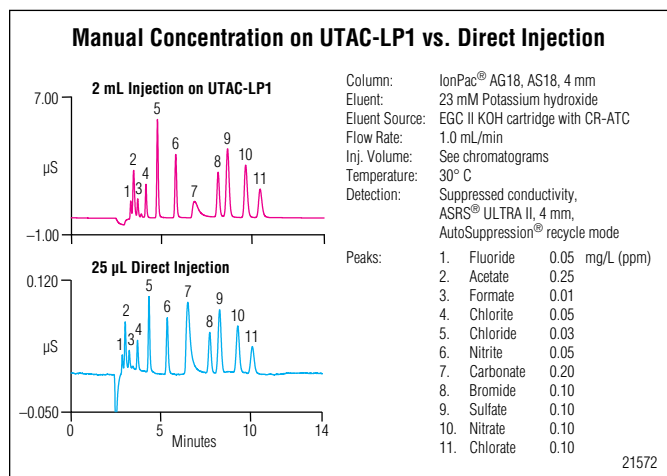
**Backpressure:** <15 psi at 2.0 mL/min

## Ordering Information

### UTAC-XLP2

UTAC-XLP2 Ultra Trace Anion Concentrator- Extremely Low Pressure (6 x 16mm) ..... 072781

### UTAC-LP1



The UTAC-LP1 Ultra Trace Anion Concentrator Column is a pellicular anion-exchange concentrator with low void volume. The ultraclean (low sulfate) UTAC-LP1 is a general purpose concentrator column for use with syringe or autosampler loading.

- Low-backpressure column
- Compatible with the AS-DV Autosampler
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

## Key Specifications

**Format:** 4 × 35 mm

**Capacity:** 25.0 µeq/column

**Void Volume:** approximately 145 µL

**Backpressure:** <60 psi at 2.0 mL/min.

## Ordering Information

### UTAC-LP1

UTAC-LP1 Ultra Trace Anion Concentrator Low Pressure (4 x 35 mm)..... 063079

### UTAC-ULP1

The UTAC-ULP1 Ultra Trace Anion Concentrator Column is a pellicular anion-exchange concentrator column with low void volume of approximately 145 µL.

- Ultraclean (low sulfate) concentrator column
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

The UTAC-ULP1 is a general purpose concentrator for use with syringe or autosampler loading. This ultralow backpressure concentrator can be used with the AS-DV, AS-HV, or AS Autosamplers, and with single piston sample delivery pumps including the AXP. It is compatible with carbonate/bicarbonate, borate, and hydroxide eluents.

## Key Specifications

**Format:** 5 × 23 mm

**Capacity:** 25.0 µeq/column

**Void Volume:** approximately 145 µL

**Backpressure:** <30 psi at 2.0 mL/min.

## Ordering Information

### UTAC-ULP1

UTAC-ULP1 Ultra Trace Anion Concentrator Ultralow Pressure (5 x 23 mm) ..... 063475

## UTAC-XLP1

The UTAC-XLP1 Ultra Trace Anion Concentrator Column is a pellicular anion-exchange concentrator column with low void volume (approximately 145  $\mu\text{L}$ ).

- Ultraclean (low sulfate) concentrator column
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

The UTAC-XLP1 is a general purpose concentrator for use with syringe or autosampler loading. This low-backpressure column can be used with the AS-DV, AS-HV, or AS Autosamplers, and with single piston sample delivery pumps including the AXP.

**Note:** Not solvent compatible.

### Key Specifications

**Format:** 6  $\times$  16 mm

**Capacity:** 25.0  $\mu\text{eq}$ /column

**Void Volume:** approximately 145  $\mu\text{L}$ .

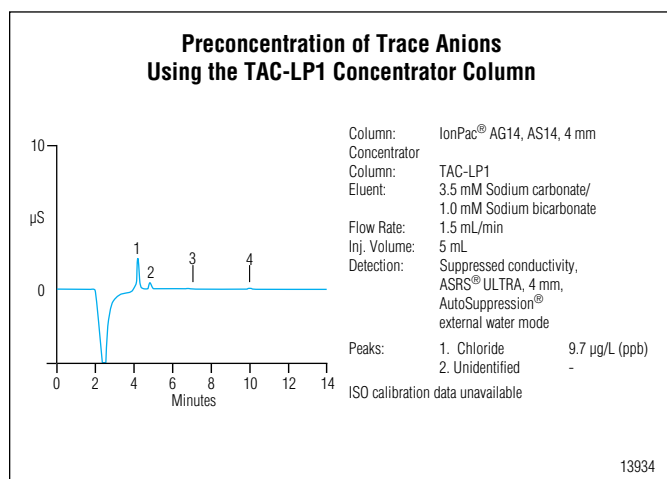
**Backpressure:** <10 psi at 2.0 mL/min.

### Ordering Information

#### UTAC-XLP1

UTAC-XLP1 Ultra Trace Anion Concentrator Extremely Low Pressure (6  $\times$  16 mm) ..... 063459

## TAC-LP1



The IonPac TAC-LP1 Trace Anion Concentrator Column is a pellicular anion-exchange concentrator.

- Supports carbonate/bicarbonate, borate, and hydroxide eluents

The TAC-LP1 is a general purpose, low-pressure concentrator for use with syringe or autosampler loading with void volume of approximately 145  $\mu\text{L}$ . The TAC-LP1 is also designed for use as the concentrator column in the SP10 AutoNeutralization module for anions.

### Key Specifications

**Format:** 4  $\times$  35 mm

**Capacity:** 25  $\mu\text{eq}$ /column

**Void Volume:** approximately 145  $\mu\text{L}$

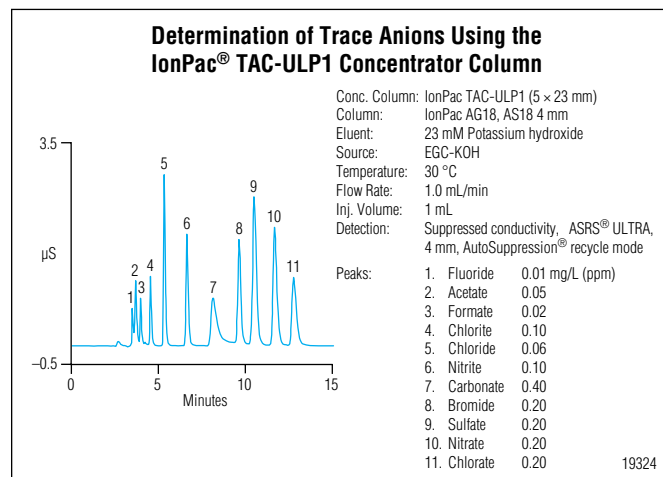
**Backpressure:** <60 psi at 2.0 mL/min

### Ordering Information

#### TAC-LP1

IonPac TAC-LP1 Low Pressure Anion Concentrator ..... 046026

## TAC-ULP1



The IonPac TAC-ULP1 Trace Anion Concentrator Column is a pellicular anion-exchange concentrator with moderately low void volume. It is an ultralow pressure concentrator for use with syringe or autosampler loading (AS-DV and AS-HV Autosamplers). It can be used with single-piston sample delivery pumps (e.g., AXP). Compatible with carbonate, borate, or hydroxide eluents.

### Key Specifications

**Format:** 5  $\times$  23 mm

**Capacity:** 25.0  $\mu\text{eq}$ /column

**Void Volume:** approximately 145  $\mu\text{L}$

**Backpressure:** <30 psi at 2.0 mL/min

## Ordering Information

## TAC-ULP1

TAC-ULP1 Ultralow Pressure Trace Anion Concentrator (5 x 23 mm) ..... 061400

## TAC-2

The IonPac TAC-2 Trace Anion Concentrator Column is a pellicular anion-exchange concentrator column with moderately low void volume (~50  $\mu$ L).

- Can be used with carbonate/bicarbonate and borate eluents

**Note:** Not solvent compatible.

## Key Specifications

**Format:** 4 x 50 and 2 x 50 mm

**Capacity:** 9  $\mu$ eq/column (4mm); 2.2  $\mu$ eq/column (2 mm)

**Void volume:** 150  $\mu$ L (4 mm); 53  $\mu$ L (2 mm)

**Backpressure:** <140 psi at 1.0 mL/min; <160 psi at 0.42 mL/min

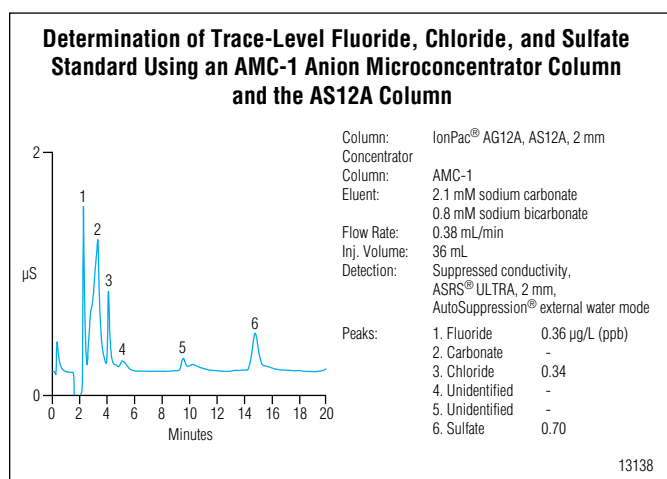
## Ordering Information

## TAC-2

IonPac TAC-2 Trace Anion Concentrator..... 043101

IonPac TAC-2 Trace Anion Concentrator, Pkg. of 4..... 043102

## AMC-1



The AMC-1 is a very low void volume microconcentrator column designed for the concentration of inorganic anions and low-molecular-weight organic anions from ultrapure water. A unique, solvent-compatible resin technology ensures a low sulfate background and ruggedness during the concentration step.

The AMC-1 can be loaded with either a loop or sample loading pump. The low void volume (approximately 15  $\mu$ L) ensures accurate determination of early-eluting anions such as fluoride, glycolate, acetate, and formate. The AMC-1 can be used with carbonate/bicarbonate or borate eluents.

## Key Specifications

**Format:** 2 x 15 mm

**Capacity:** 3 mequiv/column

**Void volume:** 15  $\mu$ L

**Backpressure:** 60–110 psi at 0.5 mL/min

## Ordering Information

## AMC-1

IonPac AMC-1 Anion Micro Concentrator (2 x 15 mm)..... 051760

## AC10

The IonPac AC10 is an anion-exchange concentrator column designed for use with the IonPac AS10 column.

## Key Specifications

**Format:** 4 x 50 and 2 x 50 mm

**Capacity:** 4.0  $\mu$ eq/column (4 mm); 0.8  $\mu$ eq/column (2 mm)

**Void Volume:** 207  $\mu$ L (4 mm); 52  $\mu$ L (2 mm)

**Backpressure:** <300 psi at 1.0 mL/min (4 mm); <300 psi at 0.25 mL/min (2 mm)

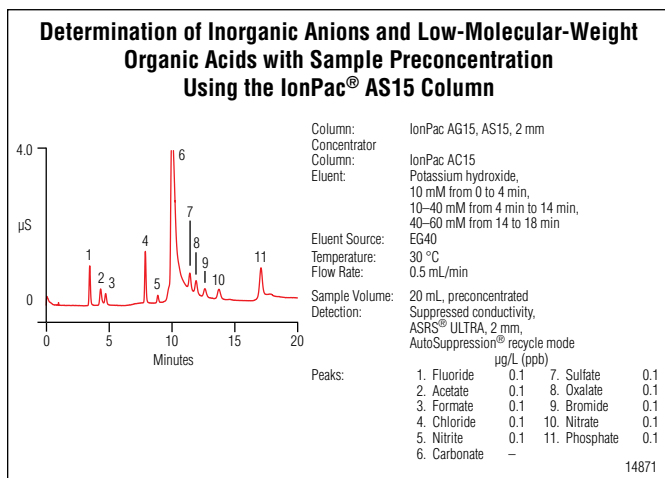
## Ordering Information

## AC10

IonPac AC10 Concentrator Column (4 x 50 mm) ..... 043133

IonPac AC10 Concentrator Column (2 x 50 mm) ..... 043134

## AC15



The IonPac AC15 is an anion-exchange concentrator column designed for use with the IonPac AS15 column. Use the AC15 2 × 50 mm format for 2 and 3 mm applications.

## Key Specifications

**Format:** 4 × 50 and 2 × 50 mm

**Capacity:** 9 µeq/column (4mm); 2.2 µeq/column (2 mm)

**Void volume:** 150 µL (4 mm); 53 µL (2 mm)

**Backpressure:** <140 psi at 1.0 mL/min; <160 psi at 0.42 mL/min

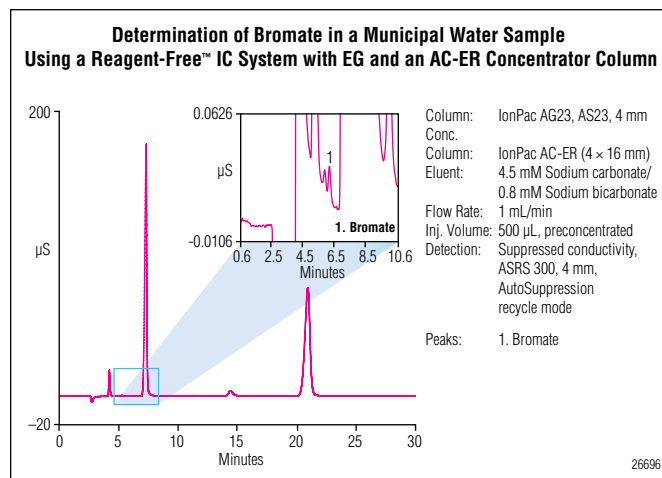
## Ordering Information

## AC15

IonPac AC15 Concentrator Column (4 × 50 mm) ..... 055694

IonPac AC15 Concentrator Column (2 × 50 mm) ..... 055695

## AC-ER



The AC-ER Anion Concentrator Column is a general-purpose, low dead volume, extremely low pressure anion concentrator column with similar features to the UTAC 2, but with reduced dead volume and capacity. The AC-ER is housed in a 4 × 16 mm column body for low dead volume, maximizing the number of injections that can be made on a RFIC-ER system between eluent exchanges.

- Extremely low backpressure
- Very low dead volume
- AC-ER column has a capacity of 12.0 µeq/column and a void volume of approximately 70 µL
- 266 injections can be performed before the eluent needs to be replaced regardless of the sample load
- Compatible with AS, AS-HV and AS-DV Autosamplers
- Ultraclean (low sulfate)
- Supports carbonate/bicarbonate eluents

With an AC-ER column installed in an RFIC-ER system, each injection only adds 75 µL of sample matrix into the eluent regardless of the sample volume (70 µL + 5 µL for connecting tubing). By using a matrix elimination step with the AC-ER in place, solvents can be directly injected onto the AC-ER then flushed off before injection into the RFIC-ER system.

## Key Specifications

**Dimensions:** 4 × 16 mm

**Mobile Phase Compatibility:** Carbonate/Bicarbonate eluents;  
0–100% HPLC solvents

**Substrate Characteristics:** Bead Diameter: 20  $\mu\text{m}$ ;  
Crosslinking (%DVB): 55%; Functional Group: Alkanol  
quaternary ammonium

**Capacity:** 12  $\mu\text{eq/col}$

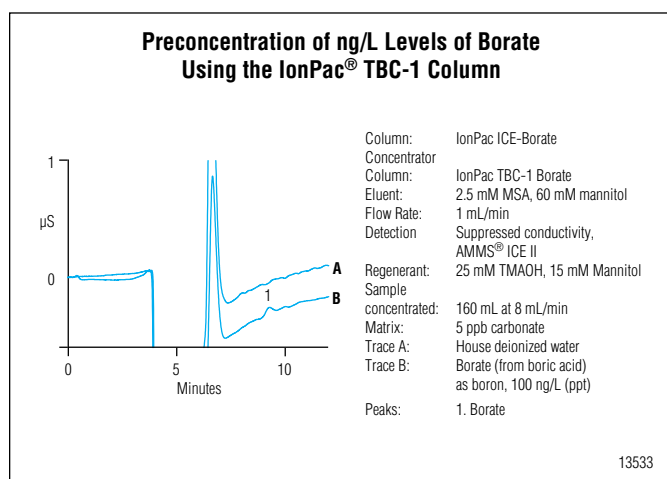
**Void Volume:** 70  $\mu\text{L}$

## Ordering Information

### AC-ER

AC-ER Anion Concentrator for RFIC-ER ..... 072778

## Cryptand C1



The IonPac Cryptand C1 Concentrator Column is recommended for the analysis of trace perchlorate in drinking water. This adjustable-capacity column contains a macroporous, 17.5- $\mu\text{m}$  resin grafted with the macrocyclic 2,2,2 cryptand compound. The column's functional capacity depends on eluent concentration and the type of cation bound within the cryptand molecule.

- Approximately 30  $\mu\text{eq/col}$  of cryptand capacity available for use
- Capacity adjustable from fixed amount to zero by via eluent concentration or cation type

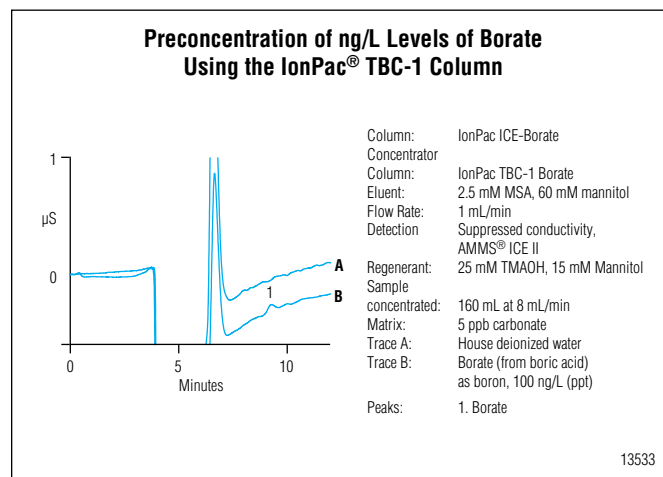
The adjustable capacity makes the Cryptand C1 a powerful tool for determining trace perchlorate in drinking water and high-ionic-strength water. Methods using the C1 can quantify 140 ng/L of perchlorate in a background of total dissolved solids with concentrations as high as 3000 mg/L. The Cryptand C1 is specified for sample preconcentration in US EPA Method 314.1.

## Ordering Information

### Cryptand C1

IonPac Cryptand C1 Concentrator Column (4 x 35 mm) ..... 062893  
IonPac TBC-1 Trace Borate Concentrator ..... 053944

## IonPac TBC-1



The IonPac TBC-1 Trace Borate Concentrator Column is optimized for trace analysis of borate. The TBC-1 has a low void volume and is packed with a unique resin surface grafted with highly selective polyol groups. The TBC-1 is coupled to a specially designed ICE-Borate column for the determination of borate at ng/L (ppt) concentrations.

Mannitol eluent quantitatively elutes borate from the TBC-1 concentrator column.

## Ordering Information

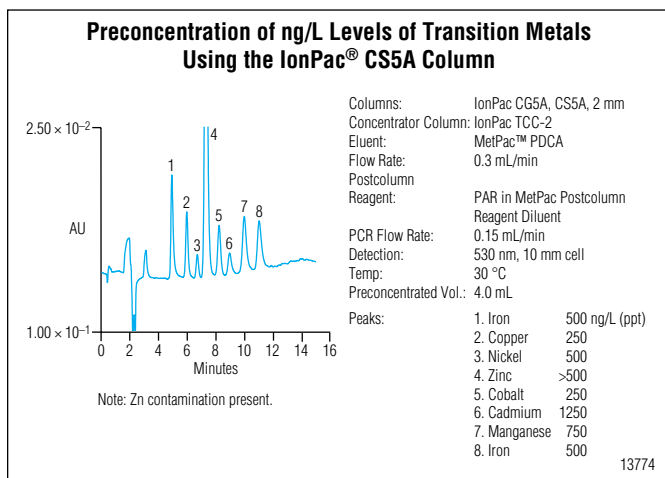
### TBC-1

IonPac TBC-1 Trace Borate Concentrator ..... 053944

## Cation Concentrator Columns

IonPac cation concentrator columns are designed primarily for high-purity water analysis. The concentrator strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits by 2–5 orders of magnitude.

### TCC-2



The IonPac TCC-2 Trace Cation Concentrator Column is a pellicular cation-exchange concentrator with moderately low void volume (approximately 50  $\mu$ L).

The TCC-2 is a surface-sulfonated, cation-exchange concentrator column that is ideal for use with sulfonated columns such as the CS3, CS10, and CS11. It can also be used as a concentrator column for transition metals. The TCC-2 can be used with hydrochloric acid or diaminopropionic acid eluent.

### Key Specifications

Format: 3  $\times$  35 mm

Capacity: 10  $\mu$ eq/column

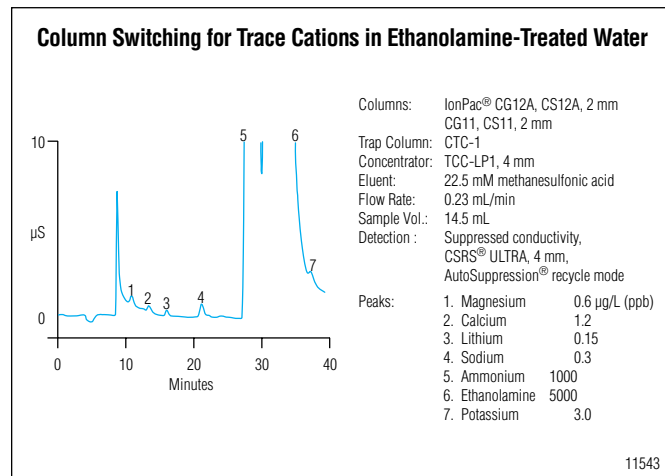
Void volume: 50  $\mu$ L

### Ordering Information

#### Accessories

IonPac TCC-2 Trace Cation Concentrator..... 043103  
 IonPac TCC-2 Trace Cation Concentrator, Pkg of 4..... 043104

### TCC-LP1



The IonPac TCC-LP1 Trace Cation Concentrator Column is a pellicular cation-exchange concentrator with moderately low void volume (approximately 145  $\mu$ L).

The TCC-LP1 is a general purpose, very low-pressure concentrator for use with syringe or autosampler loading. It is also designed for use as the concentrator column in the SP10 AutoNeutralization module for cations. The TCC-LP1 can be used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

**Note:** The TCC-LP1 is recommended for use with carboxylated columns such as the CS12, CS12A, CS14, CS15, CS16, CS17, and CS18.

### Key Specifications

Format: 4  $\times$  35 mm

Capacity: 260  $\mu$ eq/column

Void volume: 145  $\mu$ L

Backpressure: 70 psi at 1.0 mL/min

### Ordering Information

#### Accessories

IonPac TCC-LP1 Low Pressure Cation Concentrator ..... 046027



## TCC-ULP1

The IonPac TCC-ULP1 Trace Cation Concentrator Column is a pellicular cation-exchange concentrator column with moderately low void volume (approximately 145  $\mu$ L). It is designed primarily for high purity water analysis. The column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species, thereby lowering detection limits.

The TCC-ULP1 Ultralow Pressure Trace Cation Concentrator Column is a general purpose, ultralow-pressure concentrator for use with syringe or autosampler loading (AS-DV, AS-HV, or AS autosamplers) and with single-piston sample delivery pump including the AXP. The TCC-ULP1 can be used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

**Note:** The TCC-ULP1 is recommended for use with carboxylated columns such as the IonPac CS12, CS12A, CS14, CS15, CS16, CS17, and CS18 columns.

### Key Specifications

*Format:* 5 × 23 mm

*Capacity:* 260  $\mu$ eq/column

*Void Volume:* approximately 145  $\mu$ L

*Backpressure:* 45 psi at 1.0 ml/min

### Ordering Information

#### Accessories

TCC-ULP1 Ultralow Pressure Trace Cation Concentrator (5 x 23 mm) ..... 063783

## TCC-XLP1

The IonPac TCC-XLP1 Extremely-Low Pressure Trace Cation Concentrator Column is a pellicular cation-exchange concentrator with moderately low void volume.

The IonPac TCC-XLP1 is compatible with a syringe or autosampler (AS-DV, AS-HV or AS Autosamplers) and with single-piston sample delivery pump including the AXP. It is recommended for use with carboxylated columns such as the IonPac CS12, CS12A, CS14, CS15, CS16, CS17, and CS18. The column is used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

### Key Specifications

*Format:* 6 × 16 mm

*Capacity:* 260  $\mu$ eq/column

*Void volume:* approximately 145  $\mu$ L

*Backpressure:* 30 psi at 1.0 mL/min

### Ordering Information

#### Accessories

TCC-XLP1 Extremely Low Pressure Trace Cation Concentrator (6 x 16 mm) ..... 063889



## Transition Metal Concentrator Columns

Dionex provides a trace metal concentrator for use in chelation ion chromatography.

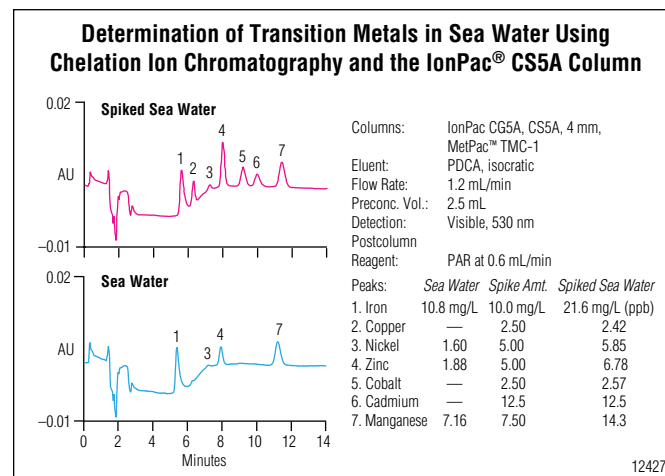
### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

*Product Data Sheets*

Concentrator and Trap Columns Data Sheet

### TMC-1



The IonPac TMC-1 Trace Metal Concentrator is a high-capacity cation concentration column used for coupling the MetPac CC-1 to the IonPac CS5 and CS5A analytical columns when performing chelation IC.

### Key Specifications

*Format:* 3 × 25 mm

*Capacity:* 6.3 µeq/column

### Ordering Information

#### TMC-1

IonPac TMC-1 Trace Metal Concentrator (3 × 25 mm)..... 049000

## ***Protein and Peptide Columns***

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# Protein and Peptide Columns

## *HPLC analysis of proteins and peptides*

The Bio column line offers a complete selection of ion-exchange and reversed-phase columns for the analysis and purification of proteins and peptides. Stationary phases include polymer bead and monolith ion-exchange phases, and polymer and silica-based reversed-phase. Dionex also supports SEC, IMAC and HIC applications with specialty columns.

- ProPac ion exchange for protein, glycoprotein analysis and monoclonal antibody analysis.
- Acclaim PepMap reversed-phase columns for peptide analysis
- ProSwift and PepSwift monoliths for fast high-resolution separation and purification of proteins and peptides
- Specialty columns for SEC, IMAC, and HIC separations

ProPac ion-exchange columns separate protein variants and monoclonal antibodies, resolving isoforms that differ by as little as one charged residue. Applications include analysis of monoclonal antibodies, blood and dairy proteins. Acclaim silica-based columns provide both traditional and capillary formats for peptide mapping and high-efficiency protein separations.



**MABPac SEC-1:** MABPac SEC-1 is a size exclusion chromatography (SEC) column for monoclonal antibodies (Mab) aggregate and fragment analysis.

**MABPac SCX-10:** Strong cation-exchange nonporous column for the exceptionally high-resolution separation and analysis of monoclonal antibody variants

**ProPac SCX and WCX:** Nonporous, strong and weak cation-exchange columns for the separation of proteins and their variants.

**ProPac SAX and WAX:** Strong and weak anion exchangers with quaternary ammonium and tertiary amine functional groups, respectively, attached to a nonporous core.

**ProPac PA1:** Strong anion-exchange column for the analysis of hydrophilic anionic proteins and peptides with pI values from 3 to 11; offers base stability.

**ProPac HIC:** Silica-based high-resolution, high-capacity HPLC column for the separation of proteins by hydrophobic interaction chromatography.

**ProPac IMAC:** High-resolution HPLC column for gradient separations in Immobilized Metal Affinity Chromatography mode.

**ProSwift ConA:** The ProSwift ConA-1S affinity monolith column is for fast, highly efficient enrichment and purification of Con A binding glycans and glycoconjugates.

**ProSwift RP:** Unique, reversed-phase monolith columns for high-speed, high-resolution separations of proteins and other biomolecules.

**ProSwift IEX:** Unique, high-capacity monolith columns for high-resolution, fast separations of proteins and other biomolecules.

**Acclaim 300 C18:** Reversed-phase column for the separation of peptides, proteins, and other biological macromolecules.

**Acclaim PepMap:** Silica-based reversed-phase columns for superior protein and peptide separations. **PepSwift:** Monolithic columns for fast analysis of peptides and proteins using nano and capillary LC coupled to MS.

## MABPac SEC-1

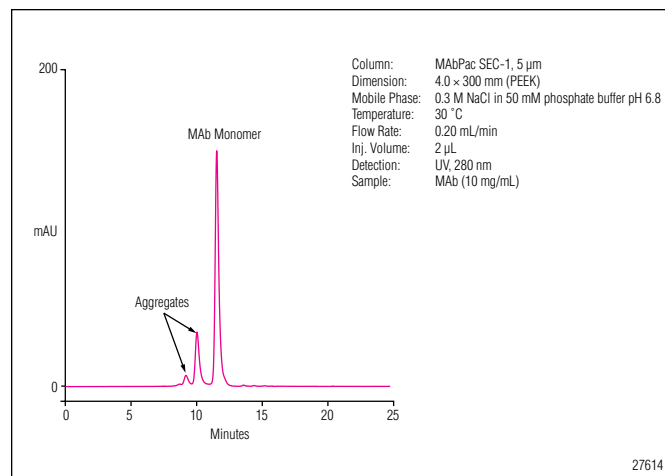
*Size exclusion chromatography column for monoclonal antibodies aggregate and fragment analysis.*

MABPac SEC-1 is a size exclusion chromatography (SEC) column specifically designed for separation and characterization of monoclonal antibodies (MAb) and their aggregates, as well as the analysis of Fab and Fc fragments resulting from proteolysis. The stationary phase is designed for different eluent conditions containing both high and low concentration of salt mobile phases, as well as operate in mass spectrometry friendly volatile eluents.

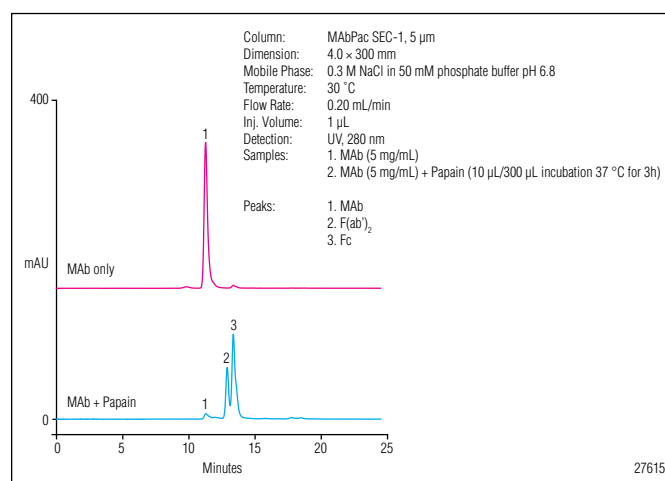
- Hydrophilic bonded layer for minimal undesired interactions between the biomolecules and the stationary phase
- Nonmetallic and Biocompatible PEEK housing eliminates metal contamination from the column hardware
- Stable surface bonding leads to low column bleed and compatibility with MS, ELSD and Corona CAD detection
- Reproducible and rugged
- Superior performance for the analysis of monoclonal antibodies, even using low-salt concentrations

The MABPac SEC-1 is based on high-purity, spherical, porous (300 Å), 5 µm silica particles that are covalently modified with a proprietary diol hydrophilic layer. Combined with the use of the nonmetallic, biocompatible, PEEK housing, it is ideal for separating monoclonal antibodies, by providing excellent peak shapes and efficiencies under both high- and low salt conditions. The stability of the bonded layer makes this column fully compatible with MS, Corona CAD or ELSD detection.

SEC provides a method for separating dimers, trimers and aggregates that are not easily distinguished by other chromatographic means. On the MABPac SEC-1 column, very large analytes (> 1000 kDa) are excluded by the pores thus eluting in the void, whereas smaller molecules (<1000 kDa) pass through the pores and elute according to their size. MAb fragments are also well resolved from the parent MAb peak and distinguished from each other.



*Size exclusion chromatography column for monoclonal antibodies and aggregates*

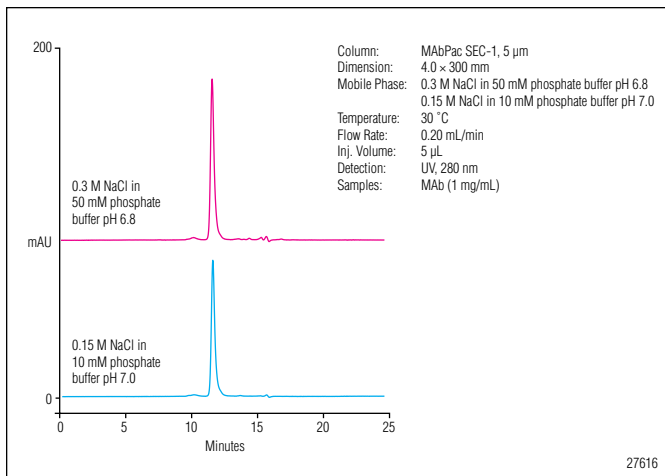


*Monoclonal Antibody (MAb) fragment analysis*

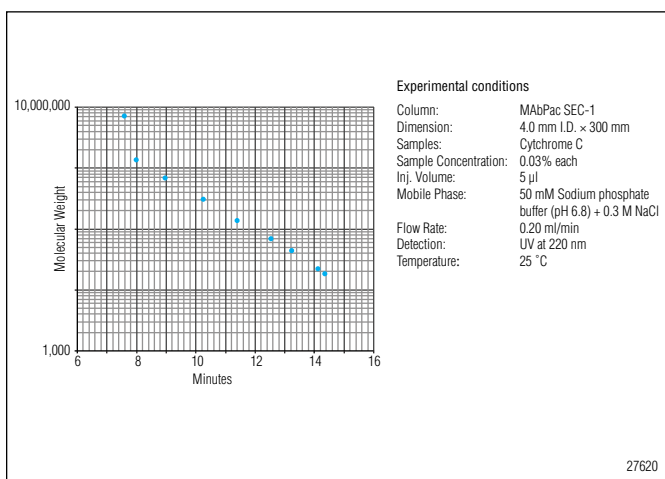
## Applications

The MABPac SEC-1 column separates MAbs and their aggregates. MAbs produced from cell cultures may contain significant amounts of dimers, trimers and other aggregates. The formation of aggregates may originate from elevated temperature, shear strain, surface adsorption, high protein concentration or other unknown reasons. Aggregates present in drug products can cause severe immunogenic and anaphylactic reactions, and therefore be characterized and monitored to ensure efficacy and safety.

The MABPac SEC-1 column can be used to monitor the MAb fragmentation process upon proteolysis. Papain is a nonspecific sulfhydryl protease that hydrolyzes specific peptide bonds. Papain treatment of MAb generates Fab and Fc fragments. Under cysteine-free conditions, F(ab')<sub>2</sub> (100kDa) and 2 Fc fragments (each 25 kDa) are formed and are well resolved from the parent MAb peak (see chromatogram).



Mab Analysis in high-salt and low-salt conditions



Calibration curve

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

The MABPac SEC-1 Column for Monoclonal Antibody (MAb) Analysis

## Ordering Information

### Analytical Columns

MABPac SEC-1, 5  $\mu$ m, 300  $\text{\AA}$ , Analytical column PEEK (4.0  $\times$  300 mm) ..... 074696

### Guard Columns

MABPac SEC-1, 5  $\mu$ m, 300  $\text{\AA}$ , Guard column PEEK (4.0  $\times$  50 mm)..... 074697

## MABPac SCX-10

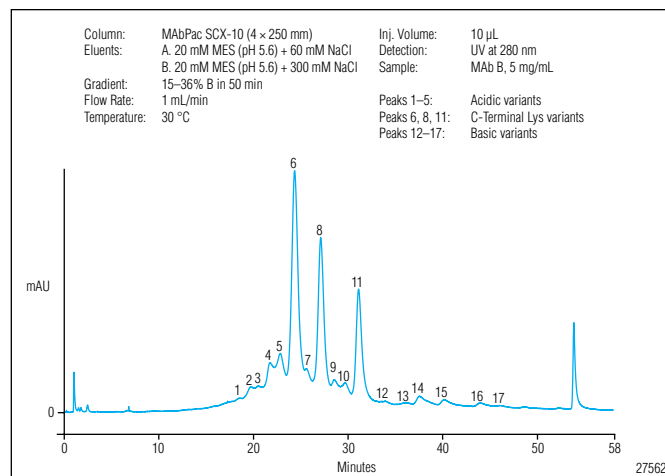
*For the exceptionally high-resolution separation and analysis of monoclonal antibody variants*

The MABPac SCX-10 column is a strong cation-exchange column designed specifically for the high-resolution, high-efficiency analysis of monoclonal antibodies and associated variants. The unique nonporous pellicular resin provides exceptionally high resolving power, permitting the separation of monoclonal antibody variants that differ by as little as one charged residue. Hydrophobic interactions with the resin are essentially eliminated for very efficient peaks.

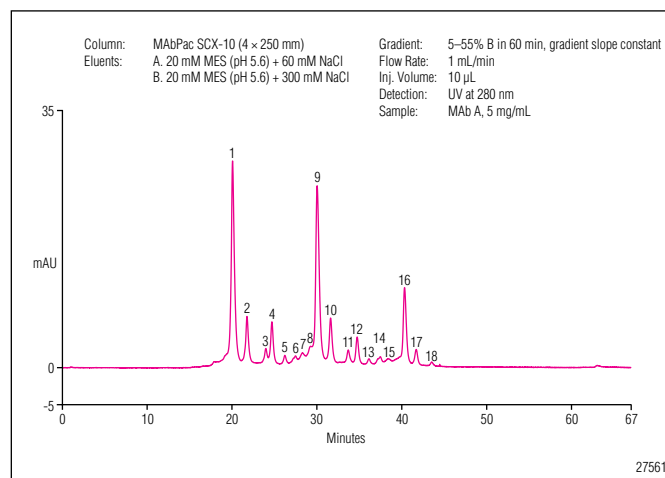
- Exceptionally high resolution for monoclonal antibody variants
- High efficiency
- Ideal for characterization and quality control assessment of monoclonal antibodies.
- Unmatched column to column and lot to lot reproducibility
- Hydrophobic interactions essentially eliminated
- Ideal for stability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

The MABPac SCX-10 resin technology is the basis for the superior performance of monoclonal antibody variant analysis. The nonporous core particle provides high rates of mass transfer which results in high efficiency separations. A hydrophilic layer surrounds the polymeric beads, eliminating hydrophobic interactions between proteins and the resin while contributing to high efficiency peaks. A grafted cation exchange surface provides pH selectivity control resulting in high resolution separations.

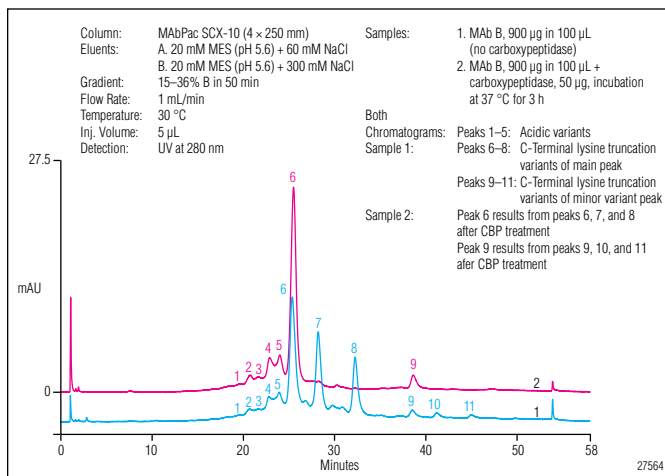
MABPac SCX-10 columns address the regulatory requirements for biopharmaceutical characterization, and are manufactured and tested under the strictest specifications. The consistent manufacturing processes ensures column to column and lot to lot reproducibility for methods development and data analysis.



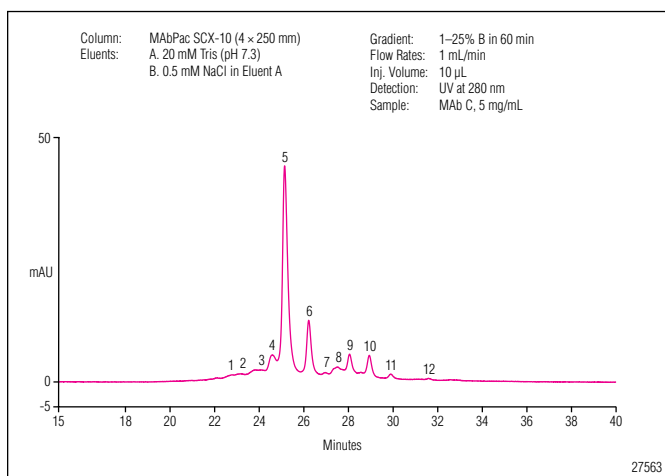
*Analysis of monoclonal antibody variants using the MABPac SCX-10 column.*



*The MABPac SCX-10 column provides high resolution separations of monoclonal antibody variants.*



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



*Another example of the high resolution and peak efficiencies of monoclonal antibody acidic and basic variants on the MAbPac SCX-10 column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## Product Data Sheets

MAbPac SCX-10 Column for Monoclonal Antibody Variant Analysis

## Ordering Information

### Analytical Column

MAbPac SCX-10 Analytical Column (4 x 250 mm)..... 074625



## ProPac SCX and WCX

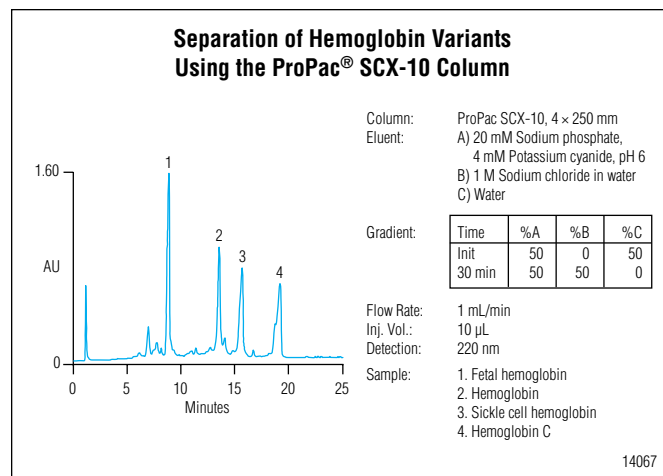
*Strong and weak cation-exchange columns for the high-resolution separation of proteins and MABs*

ProPac SCX-10 and WCX-10 strong and weak cation-exchange columns are based on a nonporous core particle providing exceptionally high resolution and efficiency for separations of protein variants. ProPac SCX-10 and WCX-10 columns can resolve isoforms that differ by a single charged residue. A hydrophilic layer prevents unwanted secondary interactions, and a grafted cation-exchange surface provides pH-based selectivity control and fast mass transfer for high-efficiency separation and moderate capacity.

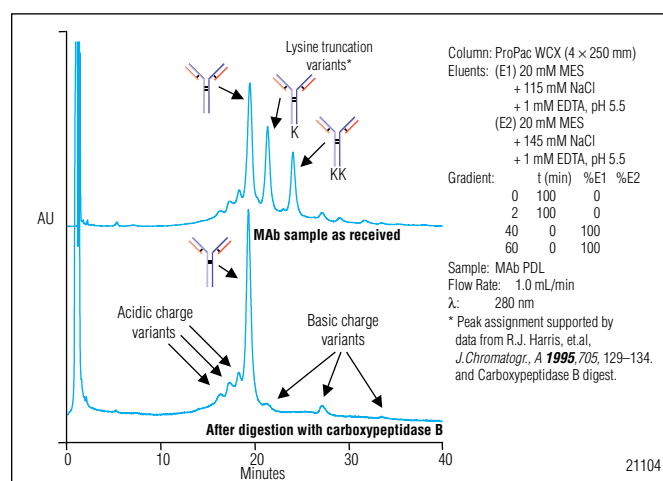
- Characterization and quality control assessment of monoclonal antibodies and other proteins
- Unequalled resolution
- High-efficiency separations with excellent sample recovery
- Unmatched column-to-column and lot-to-lot reproducibility
- Useful for characterization of related protein variants (e.g., deamidation and MAb lysine truncation variants)
- Highly-efficient peaks with excellent sample recovery
- Available in different dimensions and formats for flexibility in method development

The ProPac SCX-10 is a strong cation exchange column with sulfonate functional groups. The ProPac WCX-10 is a weak cation exchanger with a carboxylate functional group. Both are based on 10  $\mu$ m nonporous, polymeric beads and coated with a proprietary hydrophilic layer.

All ProPac columns are manufactured and tested under the strictest specifications, resulting in unmatched column-to-column and lot-to-lot reproducibility. Dionex also offers ProPac columns as a lot select package: either three columns from one lot or three columns from three different lots, to assist quality control scientists in method validation.



*Separation of hemoglobin variants.*



*MAb separation on ProPac WCS column: characterization of lysine truncation variants.*

## Product Data Sheets

## ProPac Ion-Exchange Columns for Protein Analysis

## Application Notes

AN 125: Monitoring Protein Deamidation by Cation-Exchange Chromatography

AN 126: Determination of Hemoglobin Variants by Cation-Exchange Chromatography

AN 127: Analysis of Monoclonal Antibody Heterogeneity by Cation-Exchange Chromatography: Separation of C-Terminal Lysine Variants

AN 128: Monitoring Stability of Monoclonal Antibodies by Cation-Exchange Chromatography

AN 129: Separation of Tryptophan and Methionine Oxidized Peptides from Their Unoxidized Forms

AN 177: Separation of an Intact Monoclonal Antibody and Fractionation of Monoclonal Antibody Papain Digest Fragments Using Immobilized Metal Affinity Chromatography (IMAC)

## Ordering Information

## SCX Analytical Columns

ProPac SCX-10 Analytical Column (4 x 250 mm).....	054995
ProPac SCX-10 Analytical Column (2 x 250 mm).....	063456
ProPac SCX-10 Semipreparative Column (9 x 250 mm).....	063700
ProPac SCX-10 Semipreparative Column (22 x 250 mm).....	SP5522
ProPac SCX-10 Lot Select Column Set (4 x 250 mm) (1 Lot of Resin) .....	SP5727
ProPac SCX-10 Lot Select Column Set (4 x 250 mm) (3 Lots of Resin).....	SP5728

## SCX Guard Columns

ProPac SCX-10G Guard Column (4 x 50 mm).....	054996
ProPac SCX-10G Guard Column (2 x 50 mm).....	063462

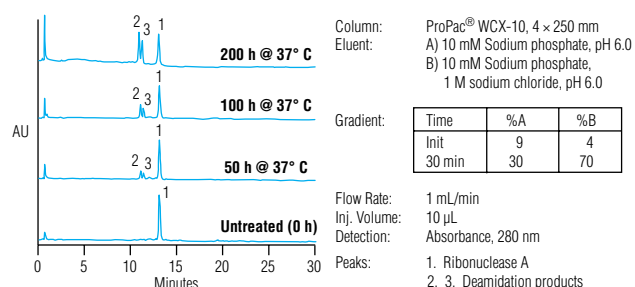
## WCX Analytical Columns

ProPac WCX-10 Analytical Column (2 x 250 mm) .....	063472
ProPac WCX-10 Analytical Column (4 x 100 mm) .....	SP5829
ProPac WCX-10 Analytical Column (4 x 250 mm) .....	054993
ProPac WCX-10 Lot Select 3 Column Set (4 x 250 mm) (1 Lot of Resin)....	SP5512
ProPac WCX-10 Lot Select 3 Column Set (4 x 250 mm) (3 Lots of Resin)..	SP5513
ProPac WCX-10 Semipreparative Column (9 x 250 mm) .....	063474
ProPac WCX-10 Semipreparative Column (22 x 250 mm) .....	SP5482

## WCX Guard Columns

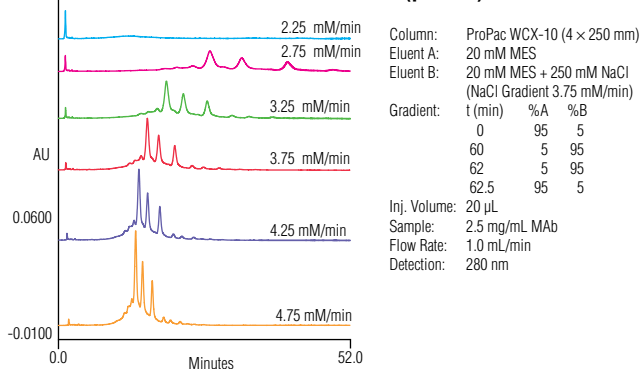
ProPac WCX-10G Guard Column (2 x 50 mm) .....	063480
ProPac WCX-10G Guard Column (4 x 50 mm) .....	054994

## Separation of Ribonuclease A and Its Two Deamidation Products



14065

Separation of ribonuclease A and its two deamidation products during the course of forced deamidation.

MAb Separation on ProPac WCX  
Effect of Salt Gradients (pH 5.5)

23748

MAb separation on ProPac WCX column: effect of salt gradients at pH 5.5.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

## ProPac SAX and WAX

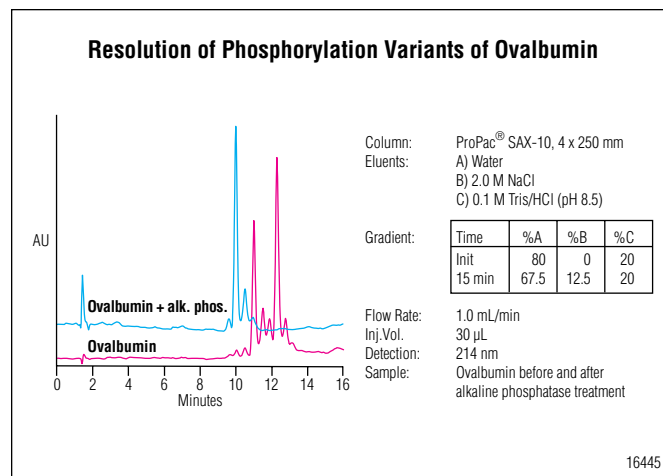
*High-resolution, strong and weak anion-exchange columns for the separation of proteins*

The ProPac SAX-10 and WAX-10 strong and weak cation-exchange columns are based on a nonporous core particle providing unequalled high resolution and efficiency in the separations of protein variants. These columns can resolve protein isoforms that differ by as little as one charged residue. A hydrophilic layer prevents unwanted secondary interactions and a grafted anion-exchange surface provides pH control, selectivity, and fast mass transfer for high- efficiency separation, as well as moderate capacity.

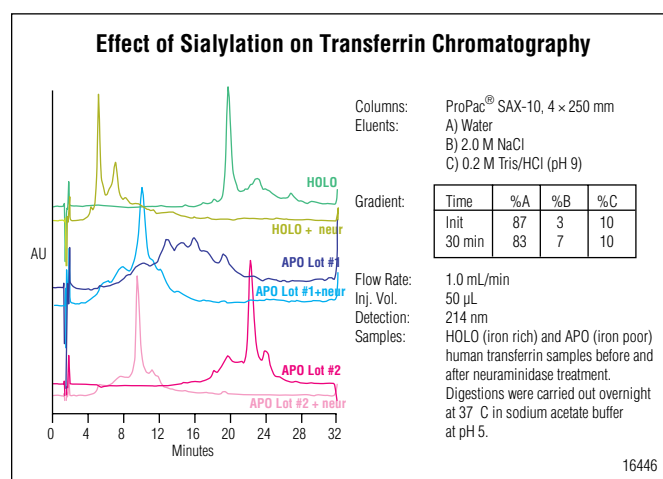
- Unequalled resolution
- High-efficiency peaks with excellent recovery
- Higher capacity than other columns based on nonporous particles
- Useful for characterization and quality control assessment of closely-related protein variants
- Supports separation of proteins that differ by as little as one amino acid residue
- Neutral hydrophilic coat that eliminates protein-resin hydrophobic interactions
- Superior lot-to-lot and column-to-column reproducibility

The ProPac SAX-10 is a strong anion-exchange column with quaternary amine functional group. The ProPac WAX-10 column is a weak anion exchanger with a tertiary amine functional group. Both are based on 10  $\mu\text{m}$  nonporous, polymeric beads and coated with a proprietary hydrophilic layer. Differences in selectivity between the WAX-10 and SAX-10 provide flexibility in maximizing resolution of closely related species.

All ProPac columns are manufactured and tested under the strictest specifications, resulting in unmatched column-to-column and lot-to-lot reproducibility. Dionex also offers these columns as a lot-select package: three columns from one lot or three columns from three different lots, to assist quality control scientists in method validation.



*Resolution of phosphorylation variants of ovalbumin.*



*Effect of sialylation on transferrin chromatography.*

## Ordering Information

### SAX Analytical Columns

ProPac SAX-10 Analytical Column (2 × 250 mm)	063448
ProPac SAX-10 Analytical Column (4 × 250 mm)	054997
ProPac SAX-10 Lot Select Column Set (4 × 250 mm) (1 Lot of Resin)	SP5729
ProPac SAX-10 Lot Select Column Set (4 × 250 mm) (3 Lots of Resin)	SP5730
ProPac SAX-10 Semipreparative Column (9 × 250 mm)	063703
ProPac SAX-10 Semipreparative Column (22 × 250 mm)	SP5594

### WAX Analytical Columns

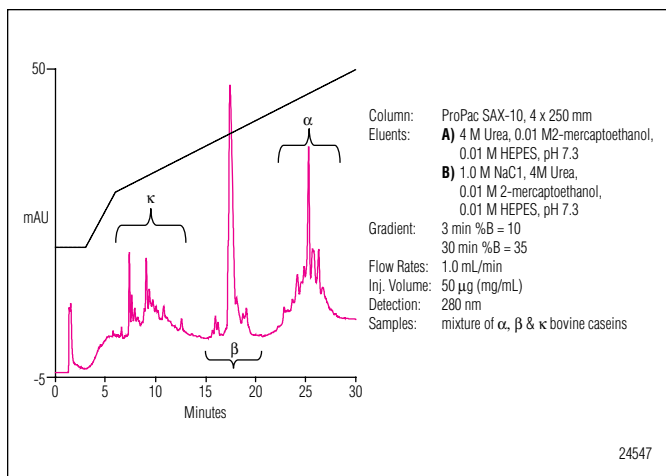
ProPac WAX-10 Analytical Column (2 × 250 mm)	063464
ProPac WAX-10 Analytical Column (4 × 250 mm)	054999
ProPac WAX-10 Lot Select Column Set (4 × 250 mm) (1 Lot of Resin)	SP5731
ProPac WAX-10 Lot Select Column Set (4 × 250 mm) (3 Lots of Resin)	SP5732
ProPac WAX-10 Semipreparative Column (9 × 250 mm)	063707
ProPac WAX-10 Semipreparative Column (22 × 250 mm)	SP5598

### WAX Guard Columns

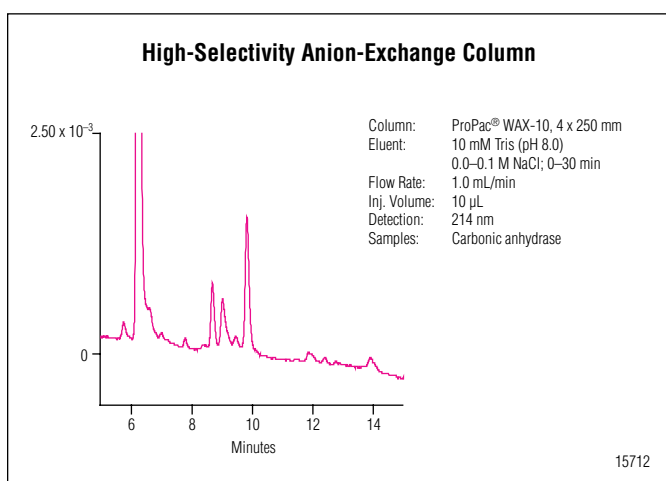
ProPac WAX-10G Guard Column (2 × 50 mm)	063470
ProPac WAX-10G Guard Column (4 × 50 mm)	055150

### SAX Guard Columns

ProPac SAX-10G Guard Column (2 × 50 mm)	063454
ProPac SAX-10G Guard Column (4 × 50 mm)	054998



Profiling dairy milk caseins.



The ProPac WAX shows high selectivity for proteins in this separation of carbonic anhydrase.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

ProPac Ion-Exchange Columns for Protein Analysis

### Application Notes

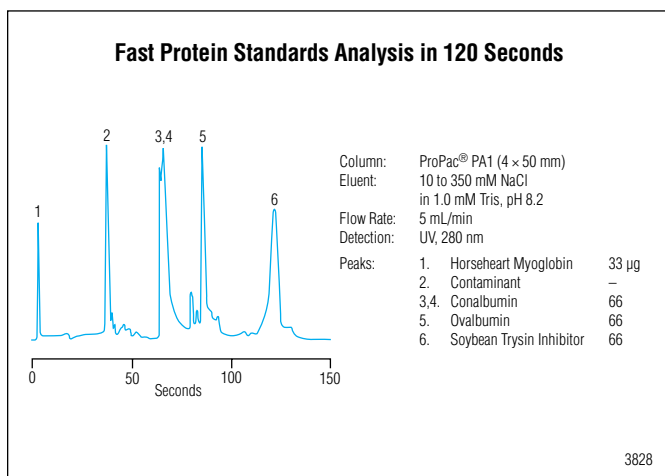
AN 214: Separation of Protein Phosphoisoforms Using Strong Anion-Exchange Chromatography

## ProPac PA1

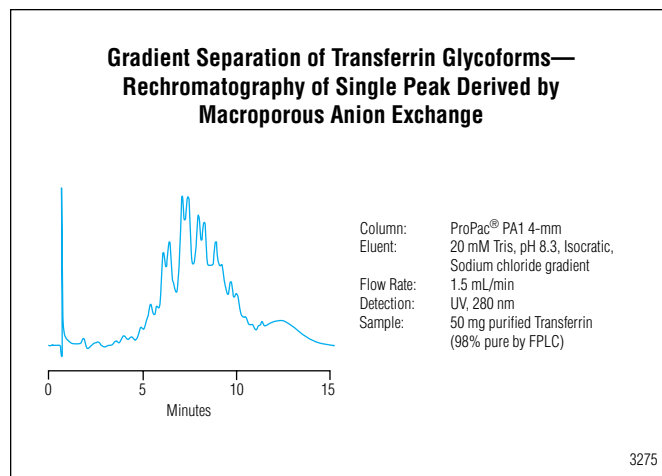
### For hydrophilic anionic protein separations

The ProPac PA1 column supports the analysis and purification of hydrophilic anionic proteins and peptides. Proteins and peptides that are highly cationic (e.g., those with very high isoelectric points) may be resolved on this column, but some may exhibit substantial binding to the column.

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



Gradient separation of protein standards.



Gradient separation of transferrin glycoforms.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

ProPac Ion-Exchange Columns for Protein Analysis

## Ordering Information

### Analytical Columns

ProPac PA1 Analytical Column (4 × 250 mm) ..... 039658  
 ProPac PA1 Semipreparative Column (9 × 250 mm)..... 040137

### Guard Columns

ProPac PA1 High Speed Column (4 × 50 mm)..... 039657

## ProPac HIC

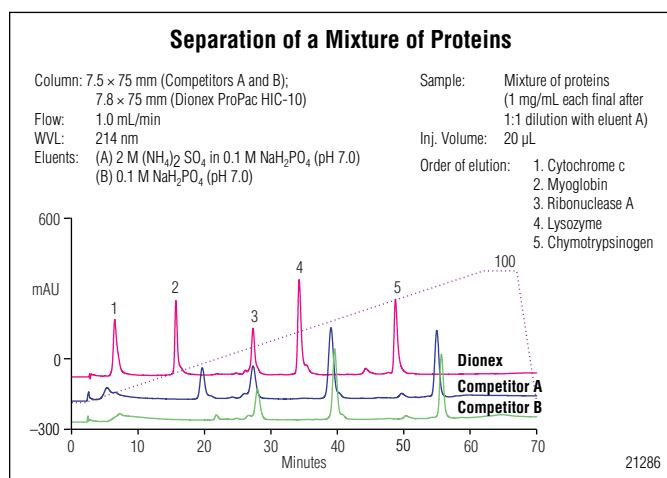
### Hydrophobic Interaction Chromatography columns for the separation of proteins and peptides

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

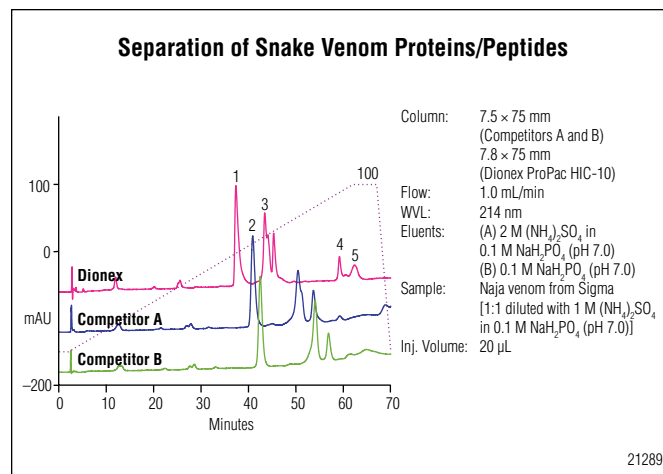
- High-resolution HPLC separation of proteins, protein variants and peptides
- Proteins are separated under non-denaturing conditions
- High protein loading capacity for protein purification applications
- Wide range of applications
- Based on 5  $\mu\text{m}$  ultrahigh purity spherical silica gel particles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

Hydrophobic interaction chromatography separates biomolecules in a decreasing salt gradient, based on differences in surface hydrophobicity. The HIC separation mechanism is complementary to those of ion-exchange and gel filtration chromatography. This method preserves the biological activity of proteins. The HIC separating mechanism is complementary to those ion-exchange and gel filtration chromatography.

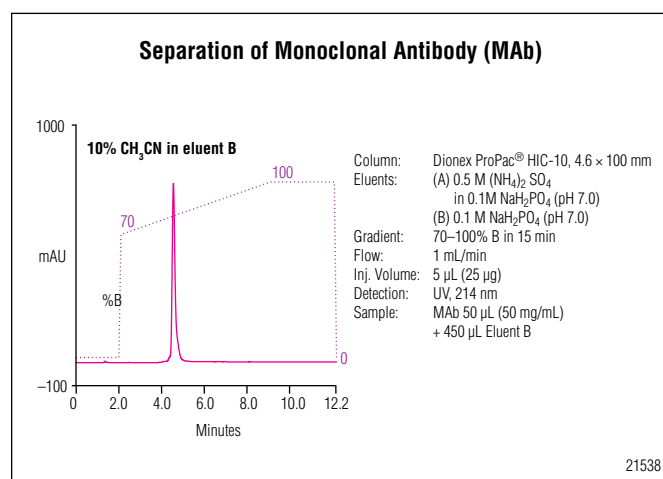
The ProPac HIC column is based on 5  $\mu\text{m}$  ultrahigh-purity spherical silica gel particles with 300 Å pores. This column provides excellent separation of proteins and variants. Examples include separation of monoclonal antibodies and their variants, bovine serum proteins, snake venom proteins, enzymes, human skeletal muscle protein (HSMP), pancreatin, thrombin, and peptide applications including tryptic digests of proteins.



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



Comparison of the separation of snake venom proteins/peptides using the ProPac HIC-10 and two competitor columns.



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

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

ProPac HIC-10 Column Solutions for Protein Analysis

### Application Notes

AN 211: Hydrophobic Interaction Chromatography for Separation of Tryptophan and Methionine Oxidized Peptides from Their Native Forms

## Ordering Information

### Analytical Columns

ProPac HIC-10 Column (2.1 $\times$ 100 mm)	063653
ProPac HIC-10 Column (4.6 $\times$ 100 mm)	063655
ProPac HIC-10 Column (7.8 $\times$ 75 mm)	063665

## ProPac IMAC

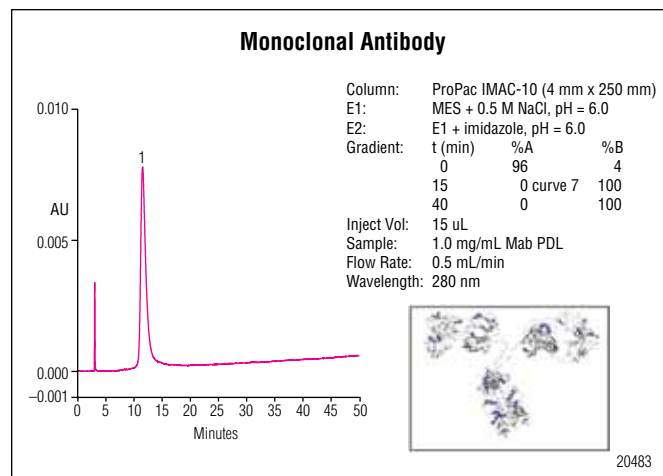
### IMAC column for analytical and semipreparative applications

The ProPac IMAC-10 is a high-resolution analytical and semi-preparative column for separation of proteins and peptides by immobilized metal affinity chromatography. It is packed with 10  $\mu\text{m}$ , nonporous, polymeric beads coated with a hydrophilic layer, then grafted with poly(IDA) chains. The poly(IDA) grafts are converted to metal-containing nanoparticles when the column is charged with metal. These nanoparticles act as IMAC interaction sites for individual proteins and provide the ProPac IMAC-10 with its high resolving power.

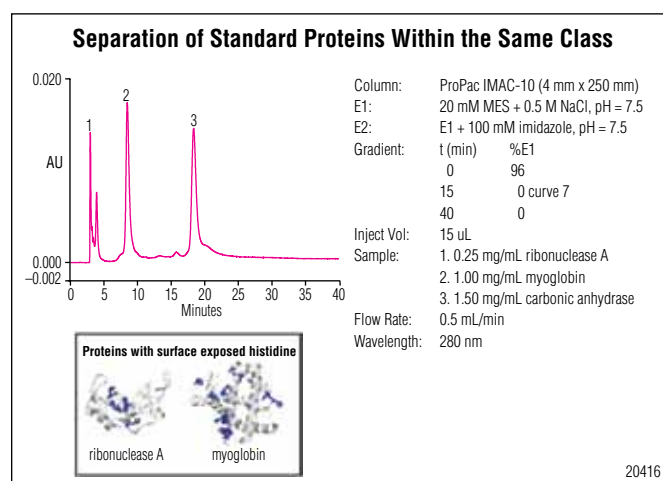
- State-of-the-art technology for reusable columns with metal tailored specificity
- Resolve target proteins using a single column in a high-resolution gradient run
- Retention control by imidazole concentration or pH gradient
- High-purity separations of metal-binding proteins
- High loading capacity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

The ProPac IMAC-10 is shipped free from any metal and ready to be charged with the metal of your choice. It can be operated between pH 2–12, and is compatible with most reagents commonly used in protein purifications (such as denaturants, non-ionic detergents, reducing agents). It can be used under native or denaturing HPLC conditions..

The ProPac IMAC-10 is an analytical HPLC column. Its design maximizes the number of sterically accessible ligands for binding to proteins, thereby ensuring that the proteins remain tightly bound during separation.

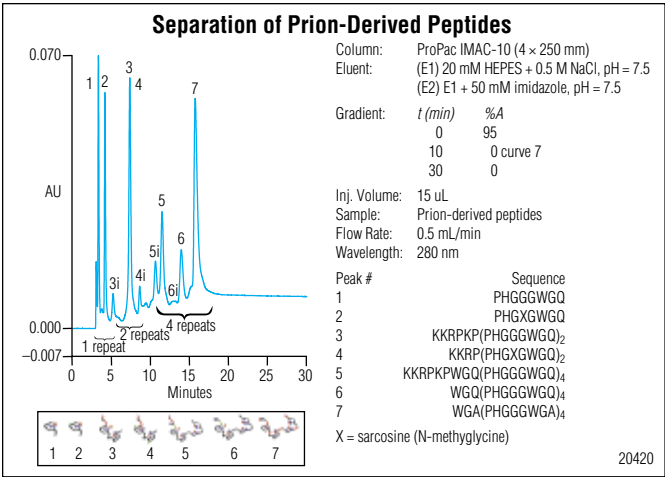


Separation of monoclonal antibodies using the ProPac IMAC.



Separation of standard proteins with surface-exposed histidines.





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

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

Product Data Sheets

ProPac IMAC-10 Column Solutions for Protein and Peptide Analysis

Application Notes

AN 177: Separation of an Intact Monoclonal Antibody and Fractionation of Monoclonal Antibody Papain Digest Fragments Using Immobilized Metal Affinity Chromatography (IMAC)

Ordering Information

Accessories

IMAC Loading Column (4 x 50 mm)	063667
IMAC Loading Column (9 x 50 mm)	063710
IMAC Loading Column (9 x 250 mm)	063718

Analytical Columns

ProPac IMAC-10 Column (1 x 50 mm)	063617
ProPac IMAC-10 Column (2 x 50 mm)	063272
ProPac IMAC-10 Column (4 x 50 mm)	063276
ProPac IMAC-10 Column (9 x 50 mm)	063615
ProPac IMAC-10 Column (2 x 250 mm)	063274
ProPac IMAC-10 Column (4 x 250 mm)	063278
ProPac IMAC-10 Column (9 x 250 mm)	063280
ProPac IMAC-10 Column (22 x 250 mm)	063282



## ProSwift ConA-1S

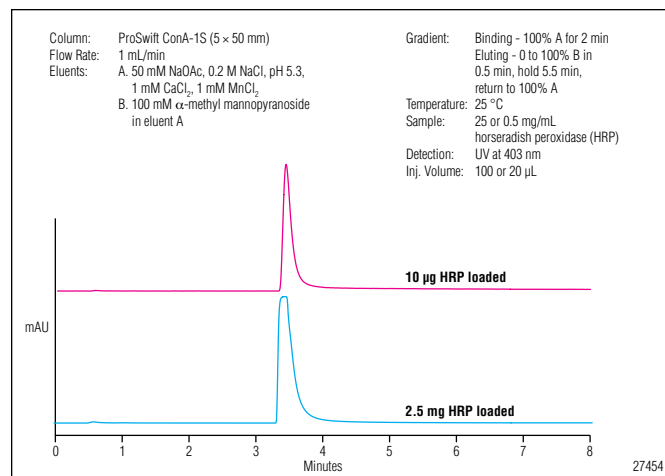
*For the highly efficient enrichment and purification of Con A binding Glycans and Glycoconjugates*

The ProSwift ConA-1S affinity monolith column is unsurpassed for fast, highly efficient enrichment and purification of Concanavalin A (Con A) binding glycans, glycopeptides, and glycoproteins. The high capacity and ligand density of the Con A affinity column facilitates the highly efficient enrichment of samples. The high peak efficiency of the column produces sharp peaks resulting in low elution volumes. The HPLC column is reusable, and over a hundred enrichments and purifications are possible.

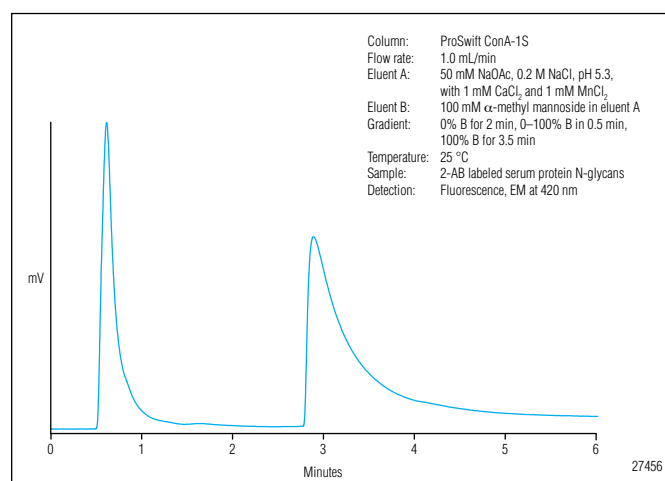
- Highly efficient enrichment and purification
- Highly purified glycan and glycoconjugate products
- High capacity and ligand density
- High sample recovery
- Low elution volumes
- Fast separations
- HPLC compatible
- Reusable for over one hundred purifications

The ProSwift ConA-1S column is a polymeric monolith functionalized with the lectin Con A. The monolith is a cylindrical rod containing uninterrupted interconnected flow through pores and smooth surfaces. The monolith morphology provides high ligand density and fast mass transfer. The high ligand density gives the column its high capacity and facilitates highly efficient enrichment. The fast mass transfer enables high peak efficiency resulting in highly enriched products in low elution volumes.

The ProSwift ConA-1S column, designed for and used in HPLC systems, provides many advantages compared to standard manual methods. These include faster separations, better enrichment and sample recovery, efficient washing capabilities, high peak efficiency and small elution volumes. Other advantages of the ProSwift ConA-1S column used with HPLC systems include automation, reusability, high-throughput capability and more accurate analysis with on-line monitoring.



*Horseradish peroxidase (HRP) injected at high (2 mg) and low (10 µg) loading on the ProSwift ConA-1S column*



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

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

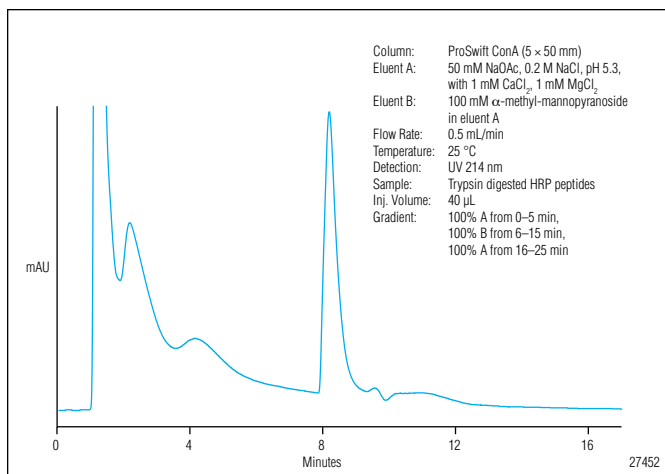
### Product Data Sheets

ProSwift ConA-1S Affinity Column for the Enrichment of Glycans and Glycoconjugates

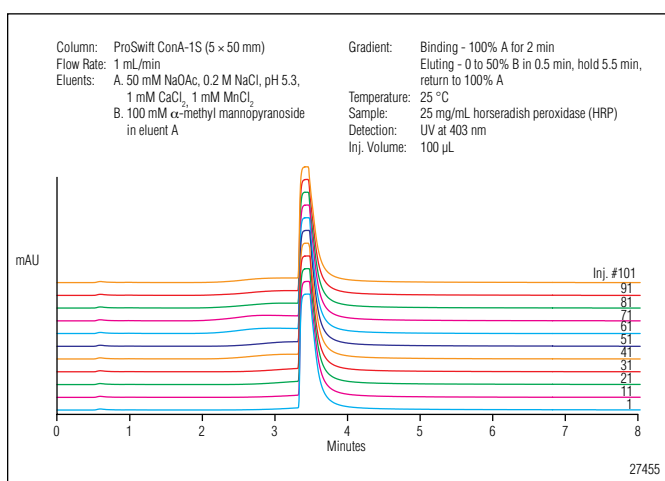
## Ordering Information

### Analytical Columns

ProSwift ConA-1S Affinity Column (5 x 50 mm)..... 074148



Glycopeptide enrichment using the ProSwift ConA-1S column.



High reusability by maintaining good capacity after 100 injections on the ProSwift ConA-1S column.

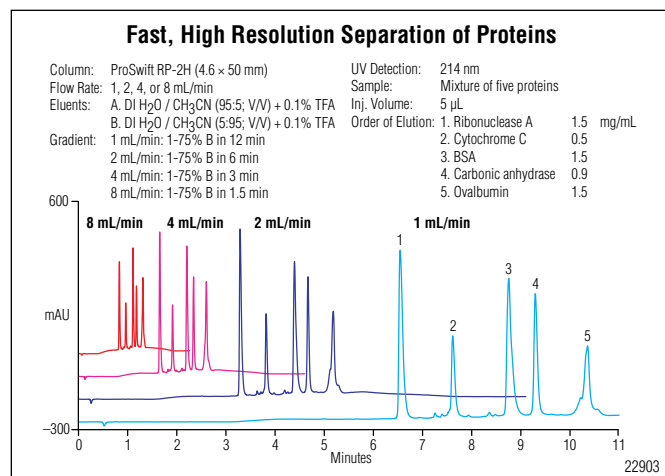
## ProSwift RP

*Monolith reversed-phase columns for high-resolution protein separations at high flow rates*

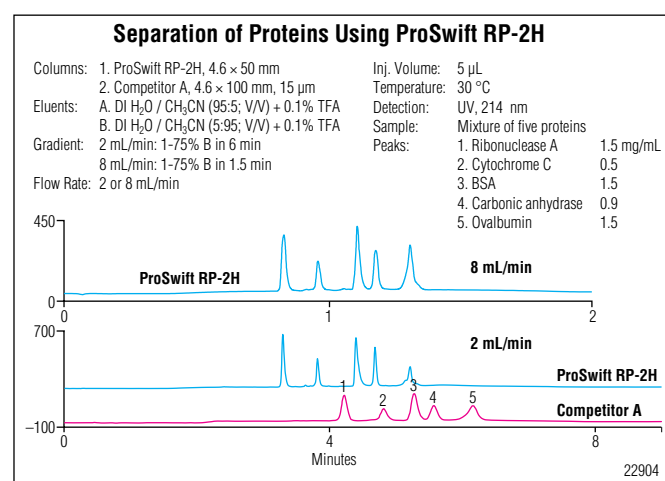
ProSwift reversed-phase monolith columns uniquely provide the advantages of high resolution at exceptionally high flow rates for protein separations. They deliver the outstanding resolving power of nonporous analytical media combined with faster separations than any bead based columns available. ProSwift polymer monolith columns achieve provide long column lifetime, exhibit reproducibility even after hundreds of runs, and have broad pH stability, providing high stringent wash capability.

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

ProSwift polymer monolith media are uniquely suited for the separation of proteins. Each monolith is a single cylindrical polymer rod containing an uninterrupted, interconnected network of flow-through channels of a specific pore size. These large channels and the monolith's nonporous surfaces result in fast mass transfer for high-resolution and fast protein separations. The channels also produce low backpressure, allowing the use of higher linear velocities with minimal loss of resolution.



*Separation of proteins at a variety of flow rates.*



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

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

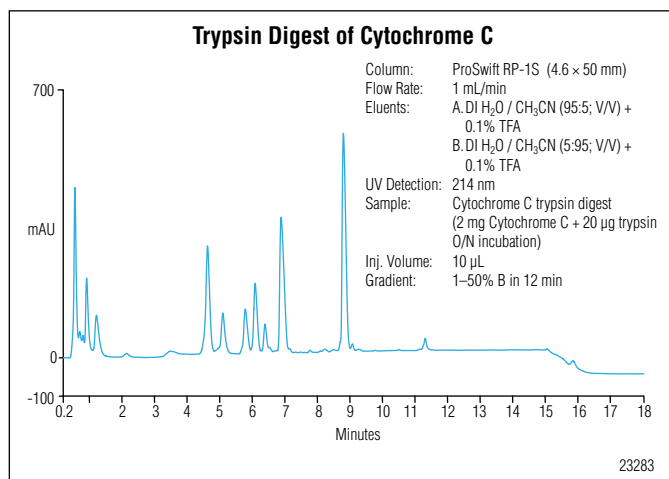
### Product Data Sheets

ProSwift and PepSwift Monolith Columns for Biomolecule Analysis

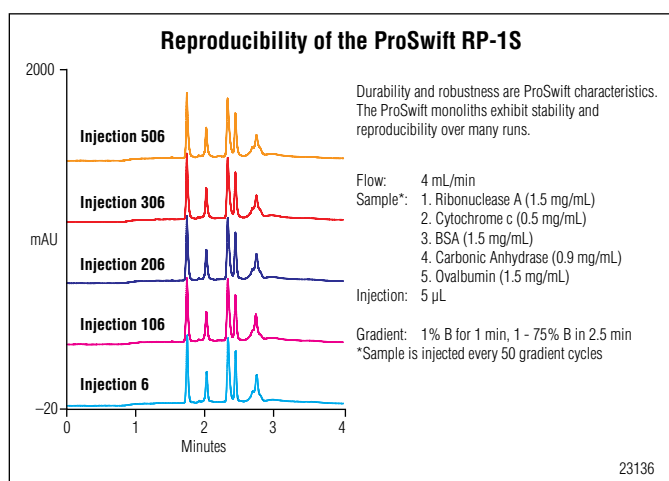
## Ordering Information

### Analytical Columns

ProSwift RP-2H Monolith Column (4.6 × 50 mm)	064296
ProSwift RP-1S Monolith Column (4.6 × 50 mm)	064297
ProSwift RP-3U Monolith Column (4.6 × 50 mm)	064298
ProSwift RP-4H Monolith Column (1.0 × 250 mm)	066640
ProSwift RP-4H Monolith Column (1.0 × 50 mm)	069477
ProSwift RP-10R Monolith Column (1.0 × 50 mm)	164397



Separation of cytochrome c digest on ProSwift RP-1S.



Reproducibility and ruggedness of the ProSwift RP-1S ensure long column lifetime.

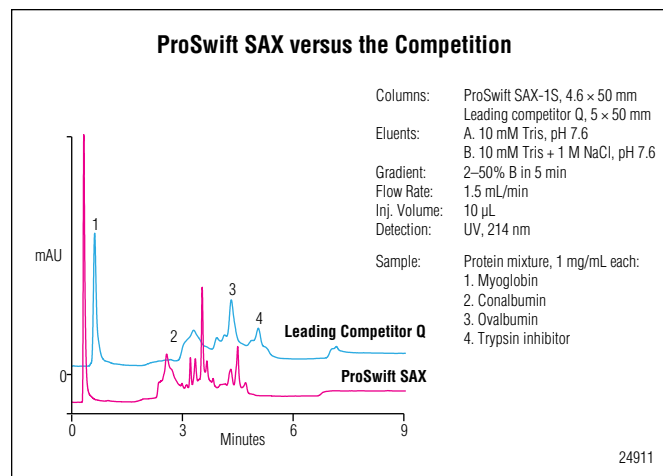
## ProSwift IEX

*Monolith IEX columns for superior high-resolution analytical and preparative protein separations*

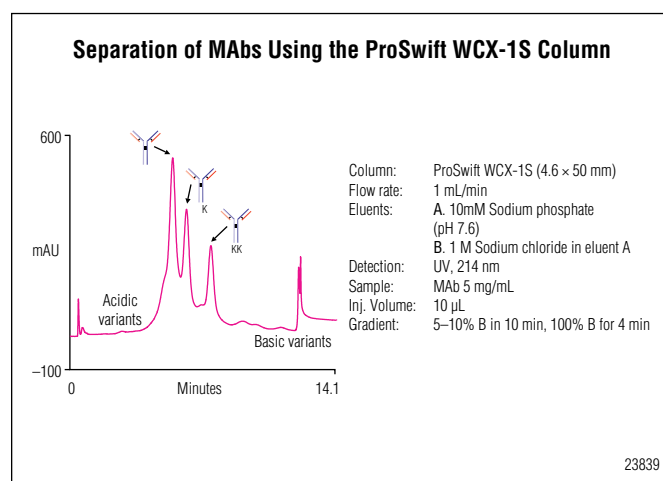
ProSwift IEX monoliths are the column of choice when high resolution and capacity are required for protein separations. They deliver higher resolution than porous bead-based columns while providing high capacity. ProSwift IEX monoliths provide the outstanding resolving power of nonporous analytical media combined with fast separation performance. ProSwift polymer monolith columns achieve long column lifetime and exhibit reproducibility even after hundreds of runs.

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

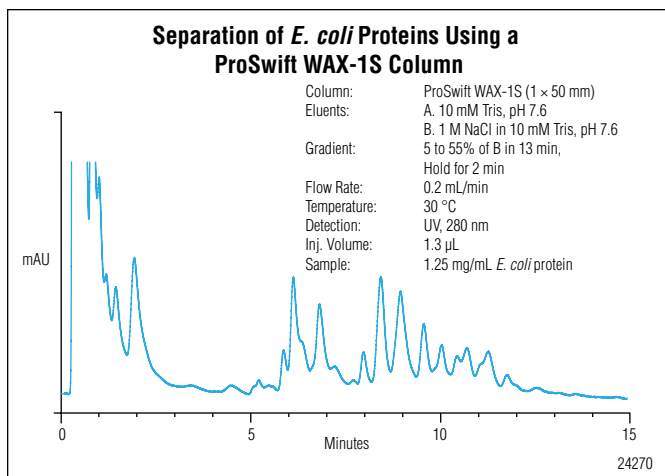
ProSwift polymer monolith media are uniquely suited for the separation of proteins. Each monolith is a single cylindrical, sponge-like polymer rod containing an uninterrupted, interconnected network of flow-through channels of a specific pore size. These large channels and the monolith's nonporous surfaces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



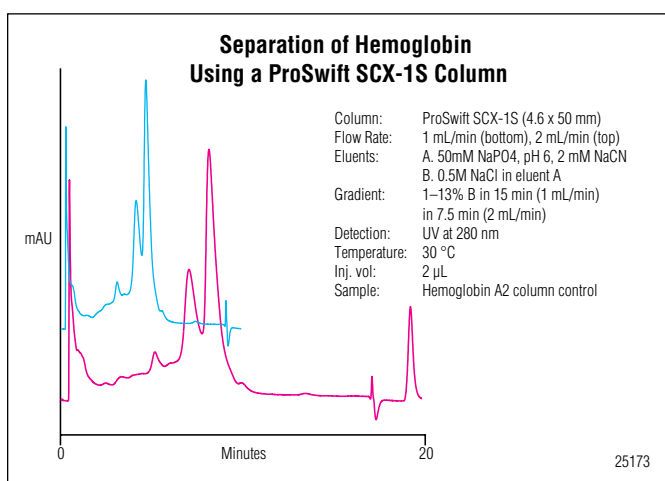
*Comparison of the separation of a protein mixture on the ProSwift SAX-1S and a leading competitor's column.*



*Separation of monoclonal antibody variants.*



Protein separation on the ProSwift WAX-1S column.



Separation of hemoglobin at different flow rates using a ProSwift SCX column.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

ProSwift Ion-Exchange Monolith Columns for Biomolecule Analysis Data Sheet

### Technical Notes

TN 79: Two-Dimensional LC Protein Separation on Monolithic Columns in a Fully Automated Workflow

## Ordering Information

### Analytical Columns

ProSwift SAX-1S Monolith Column (4.6 × 50 mm) .....	064293
ProSwift SCX-1S Monolith Column (4.6 × 50 mm).....	066765
ProSwift SAX-1S Monolith Column (1.0 × 50 mm) .....	068459
ProSwift WAX-1S Monolith Column (4.6 × 50 mm).....	064294
ProSwift WCX-1S Monolith Column (4.6 × 50 mm).....	064295
ProSwift WAX-1S Monolith Column (1.0 × 50 mm).....	066642
ProSwift WCX-1S Monolith Column (1.0 × 50 mm).....	066643
ProSwift SCX-1S Monolith Column (1.0 × 50 mm).....	071977

## Acclaim 300 C18

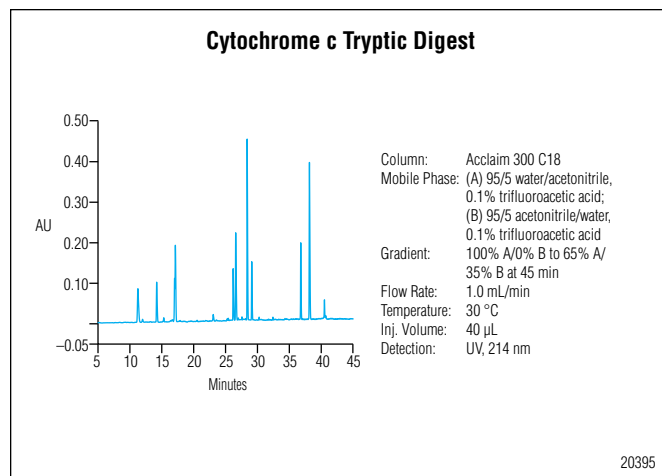
### High-resolution separation of proteins and peptides

The Acclaim 300 features 3  $\mu\text{m}$  silica particles for rapid analysis of complex protein digests. Because of the Acclaim 300 column's stable bonding, only insignificant bleeding occurs, making these columns compatible with LC/MS applications.

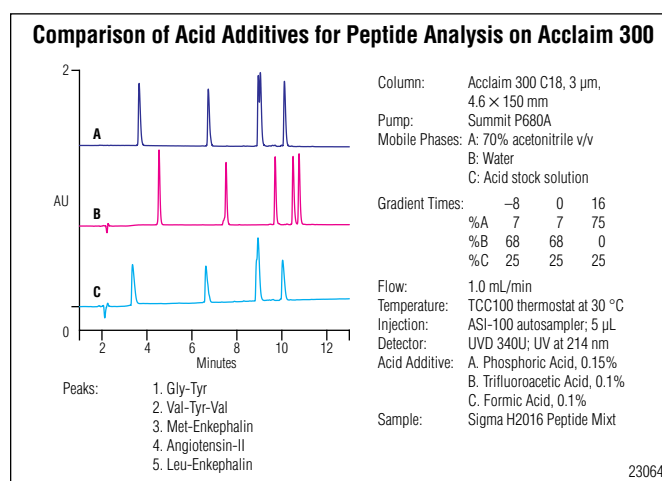
- Designed for high-resolution peptide mapping and protein separations
- High-efficiency 3  $\mu\text{m}$  spherical silica substrate
- High-performance bonding chemistry on 300 Å pore silica
- Application tested for suitability in peptide mapping
- Reproducible for dependable results
- LC/MS compatible

Manufacture of these columns starts with ultrapure silica that contains minimal concentrations of metal contaminants, minimizing the tailing effects of residual, exposed silanol groups. Exhaustive bonding and endcapping techniques result in stable bonding and columns that exhibit predictable reversed-phase separations with minimal secondary interactions.

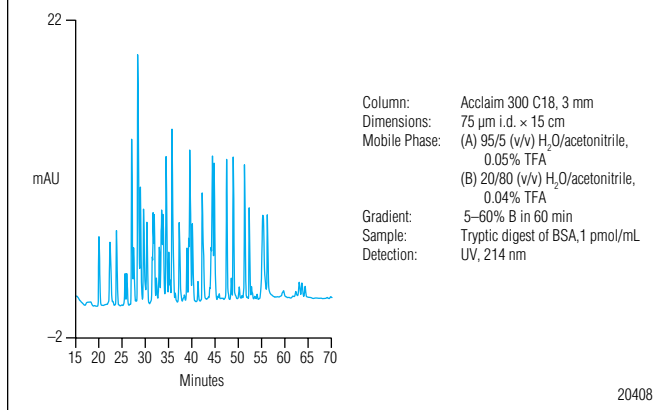
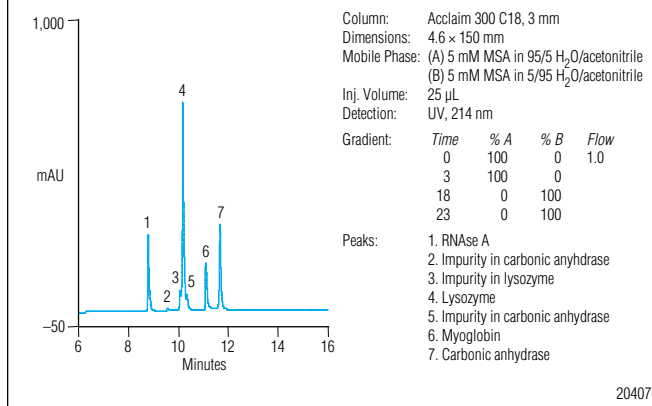
The use of a 3  $\mu\text{m}$  silica particle reduces limits for diffusion of the analytes into the stationary phase, resulting in fast, high-resolution separations. Compared to 5  $\mu\text{m}$  column packings, the smaller particles support increased flow rates and shallower gradients on shorter columns, for faster separations. Dionex tests each bonded silica lot for peptide selectivity to ensure reproducible performance.



*Cytochrome c tryptic digest.*



*Comparison of acid additives for peptide analysis.*

**Capillary LC for Peptide Mapping Using Acclaim® 300 C18***Capillary LC for peptide mapping.***Protein Mixture by Reversed-Phase HPLC on Acclaim® 300 C18***Protein mixture separated using reversed-phase HPLC.***Related Literature**

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

*Product Data Sheets*

Acclaim 300 HPLC Columns Data Sheet

*Application Notes*

AN 205: Determination of Cefepime and Cefepime-Related Substances Using HPLC and UV Detection

*Application Updates*

AU 156: Evaluation of Acclaim HPLC Columns Using the National Institute of Standards Standard Reference Material 870

*Technical Notes*

TN 705: Automated Enrichment and Determination of Phosphopeptides Using Immobilized Metal Affinity and Reversed-Phase Chromatography with Column Switching

**Ordering Information**

The standard particle size is nominally 3 µm. Analytical columns are available in 2.1, 3.0, and 4.6 mm diameters; standard lengths are 50 and 150 mm. Capillary formats are available in 75 and 300 µm, 1.0 mm, and custom diameters, and in 50, 150, or 250 mm lengths. Guard columns in both 2.0 and 4.3 mm sizes are recommended to protect analytical columns.

**Analytical Columns**

Acclaim 300, C18, 3 µm Analytical (2.1 × 50 mm).....	060263
Acclaim 300, C18, 3 µm Analytical (2.1 × 150 mm) .....	060264
Acclaim 300, C18, 3 µm Analytical (3 × 150 mm).....	063684
Acclaim 300, C18, 3 µm Analytical (4.6 × 50 mm).....	060265
Acclaim 300, C18, 3 µm Analytical (4.6 × 150 mm) .....	060266

**Guard Columns**

Acclaim 300,C18, 3µm, Guard Cartridges, (2.1 × 10 mm), 2 ea; (requires holder 069580) .....	069690
Acclaim 300 Guard Cartridges (4.3 × 10 mm), 2 ea; (requires holder 059456) .....	060393

**Hardware**

Acclaim SST Guard Cartridge Holder V-1 .....	059456
Guard to Analytical Column Coupler .....	059457
Guard Kit (Holder and Coupler) .....	059526

**Micro and Nano Columns**

Acclaim 300, C18, 3 µm, 300 Å, 75 µm i.d. × 5 cm.....	162223
Acclaim 300, C18, 3 µm, 300 Å, 75 µm i.d. × 15 cm .....	162224
Acclaim 300, C18, 3 µm, 300 Å, 300 µm i.d. × 5 cm .....	162221
Acclaim 300, C18, 3 µm, 300 Å, 300 µm i.d. × 15 cm .....	162222
Acclaim 120, C18, 3 µm, 120 Å, 1.0 mm i.d. × 5 cm .....	162219
Acclaim 300, C18, 3 µm, 300 Å, 1.0 mm i.d. × 15 cm .....	162220

*These columns are designed for optimal performance using Dionex UltiMate 3000 and ICS-3000 chromatography instruments.*



## Acclaim PepMap

The members of the Acclaim PepMap family are designed to separate peptides and proteins efficiently. These silica-based stationary phases have virtually zero silanophilic activity, resulting in minimal peak tailing. The Acclaim PepMap columns can be operated TFA-free, making them ideal for LC-MS based biomolecular analysis.

- Zero silanophilic interactions
- Peptide separations: C18 and C8 100 Å with 3 µm or 5 µm particles
- Protein separations: C18 and C4 300 Å with 5 µm particles
- TFA-Free LC/MS, for enhanced MS sensitivity
- Outstanding separation efficiency
- Superior resolution and recovery

Acclaim PepMap Trap and Nano-Trap columns are available for preconcentration of diluted samples, large-volume injections, or various column-switching techniques. Allowing substantially shorter loading times results in reduced overall analysis time. Desalting or SDS removal prior to MS analysis, phosphopeptide enrichment, and MDLC (2-D, 3-D) are other applications.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Application Notes

AN 521: Automated 2-D LC Coupled to ESI-MS/MS for the Analysis of Complex Peptide Samples

AN 524: Parallel Nano and Capillary LC for High-Throughput MS Proteomics

AN 527: Comprehensive 2-D Nano LC/MS for Human Tissue Proteomics

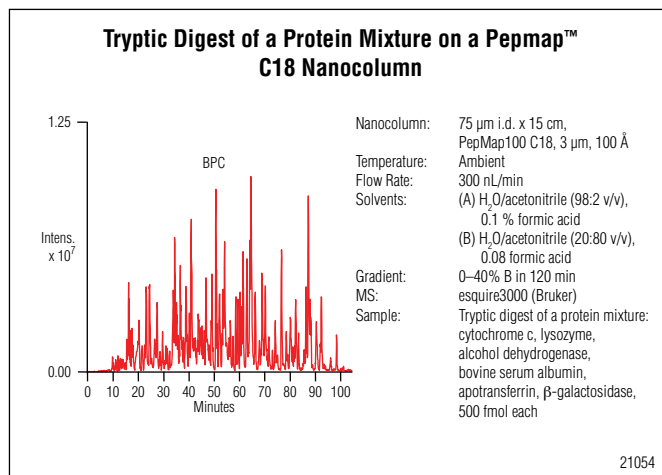
AN 531: Phosphopeptide Enrichment using a TiO<sub>2</sub> Nano Precolumn

### Technical Notes

TN 60: UltiMate 3000: Direct Sample Injection onto a 75 µm i.d. PepMap100 (C18) Column

TN 61: UltiMate 300: Preconcentration on a 75 µm i.d. × 15 cm PepMap100 (C18) Nanocolumn

## Acclaim PepMap100 C18



The Acclaim PepMap100 C18 column sets the benchmark in peptide separation. PepMap100 C18 is available in 3 or 5 µm particle sizes, with 100 Å pore sizes, and in nano, capillary, and micro formats.

## Ordering Information

### Nano LC Columns

75 µm i.d. × 5 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	160316
75 µm i.d. × 15 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	160321
75 µm i.d. × 25 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	164261
75 µm i.d. × 5 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160318
75 µm i.d. × 15 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160323
75 µm i.d. × 25 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160326

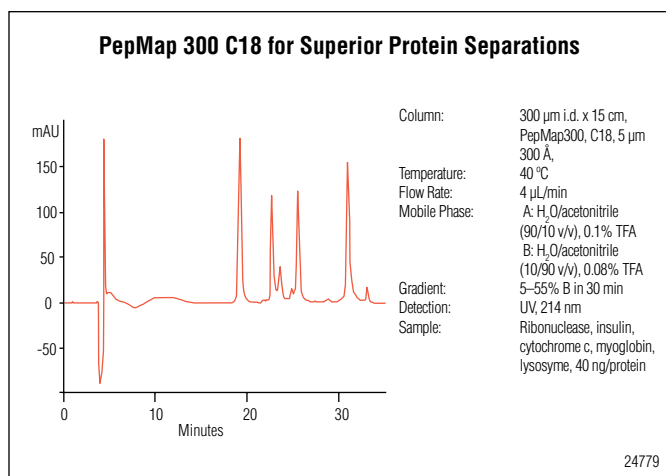
### Capillary LC Columns

300 µm i.d. × 5 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	160290
300 µm i.d. × 15 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	160295
300 µm i.d. × 5 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160292
300 µm i.d. × 15 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160297
300 µm i.d. × 25 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160300

### Micro LC Columns

1.0 mm i.d. × 5 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	160277
1.0 mm i.d. × 15 cm, Acclaim PepMap100 C18, 3 µm, 100 Å	160282
1.0 mm i.d. × 5 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160279
1.0 mm i.d. × 15 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160284
1.0 mm i.d. × 25 cm, Acclaim PepMap100 C18, 5 µm, 100 Å	160287

## Acclaim PepMap300 C18



The Acclaim PepMap300 C18 column is used for the separation of larger peptides and proteins. It is available in 5  $\mu$ m particle sizes, with 300 Å pore sizes, and in nano, capillary, and micro formats.

### Ordering Information

#### Nano LC Columns

75 $\mu$ m $\times$ 5 cm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å wide pore .....	163577
75 $\mu$ m $\times$ 15 cm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å wide pore .....	163574

#### Capillary LC Columns

300 $\mu$ m $\times$ 5 cm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å wide pore .....	163580
300 $\mu$ m $\times$ 15 cm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å wide pore .....	163581

#### Micro LC Columns

1.0 mm $\times$ 5 cm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å wide pore .....	163584
1.0 mm $\times$ 15 cm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å wide pore .....	163585

## Acclaim PepMap100 C8

Acclaim PepMap100 C8 is an excellent alternative for the Acclaim PepMap100 C18, when separating very hydrophobic peptides (e.g., non-tryptic peptides). It is available with 3 or 5  $\mu$ m particles, with 100 Å pore sizes, and in capillary and micro formats.

### Ordering Information

#### Nano LC Columns

75 $\mu$ m i.d. $\times$ 5 cm, Acclaim PepMap100 C8, 3 $\mu$ m, 100 Å .....	161184
75 $\mu$ m i.d. $\times$ 15 cm, Acclaim PepMap100 C8, 3 $\mu$ m, 100 Å .....	161185
75 $\mu$ m i.d. $\times$ 5 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161555
75 $\mu$ m i.d. $\times$ 15 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161553
75 $\mu$ m i.d. $\times$ 25 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161186

#### Capillary LC Columns

300 $\mu$ m i.d. $\times$ 5 cm, Acclaim PepMap100 C8, 3 $\mu$ m, 100 Å .....	161181
300 $\mu$ m i.d. $\times$ 15 cm, Acclaim PepMap100 C8, 3 $\mu$ m, 100 Å .....	161182
300 $\mu$ m i.d. $\times$ 5 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161547
300 $\mu$ m i.d. $\times$ 15 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161545
300 $\mu$ m i.d. $\times$ 25 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161183

#### Micro LC Columns

1.0 mm i.d. $\times$ 5 cm, Acclaim PepMap100 C8, 3 $\mu$ m, 100 Å .....	160240
1.0 mm i.d. $\times$ 15 cm, Acclaim PepMap100 C8, 3 $\mu$ m, 100 Å .....	161179
1.0 mm i.d. $\times$ 5 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161539
1.0 mm i.d. $\times$ 15 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161537
1.0 mm i.d. $\times$ 25 cm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161180

## Acclaim PepMap300 C4

Acclaim PepMap300 C4 is used for the separation of hydrophobic peptides and proteins, providing higher recoveries. It is available in 5  $\mu$ m particle size, with 100 Å pore size, and in nano, capillary, and micro formats.

### Ordering Information

#### Capillary LC Columns

180 $\mu$ m i.d. $\times$ 5 cm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163947
180 $\mu$ m i.d. $\times$ 15 cm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163948
300 $\mu$ m $\times$ 5 cm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163582
300 $\mu$ m $\times$ 15 cm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163583

#### Micro LC Columns

1.0 mm $\times$ 5 cm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163586
1.0 mm $\times$ 15 cm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163587

## Acclaim PepMap $\mu$ -Precolumns

Acclaim PepMap  $\mu$ -Precolumns are very short microcolumns—available in 5 and 15 mm lengths—consisting of a cartridge holder and a set of disposable cartridges.  $\mu$ -Precolumns are used for sample pre-concentration, sample cleanup, or in various column-switching techniques.

### Ordering Information

$\mu$ -Precolumns	
$\mu$ -Precolumn holder, 5 mm, with universal fitting .....	160431
$\mu$ -Precolumn holder, 15 mm, with universal fitting .....	160432
300 $\mu$ m i.d. $\times$ 5 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	160454
300 $\mu$ m $\times$ 5 mm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163589
300 $\mu$ m i.d. $\times$ 5 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	161194
300 $\mu$ m $\times$ 5 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163591
500 $\mu$ m i.d. $\times$ 5 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	160446
500 $\mu$ m i.d. $\times$ 15 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	160450
500 $\mu$ m i.d. $\times$ 15 mm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163946
500 $\mu$ m i.d. $\times$ 5 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	161192
500 $\mu$ m i.d. $\times$ 15 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	161193
500 $\mu$ m i.d. $\times$ 5 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163943
500 $\mu$ m i.d. $\times$ 15 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163945
1.0 mm i.d. $\times$ 5 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	160434
1.0 mm i.d. $\times$ 15 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	160438
1.0 mm $\times$ 5 mm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163592
1.0 mm $\times$ 15 mm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163593
1.0 mm i.d. $\times$ 5 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	161189
1.0 mm i.d. $\times$ 15 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å (set of 5 cartridges).....	161190
1.0 mm $\times$ 5 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163594
1.0 mm $\times$ 15 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å (set of 5 cartridges).....	163595

## Acclaim PepMap $\mu$ -Guard Columns

Acclaim PepMap  $\mu$ -Guard columns are short microcolumns that can be coupled directly to the front of the capillary or micro LC column to avoid column contamination.

### Ordering Information

$\mu$ -Guard Columns	
300 $\mu$ m i.d. $\times$ 1 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å .....	160428
300 $\mu$ m i.d. $\times$ 1 mm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å .....	163938
300 $\mu$ m i.d. $\times$ 1 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161188
300 $\mu$ m i.d. $\times$ 1 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163937
800 $\mu$ m i.d. $\times$ 2 mm, Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å .....	160424
800 $\mu$ m i.d. $\times$ 2 mm, Acclaim PepMap300 C18, 5 $\mu$ m, 300 Å .....	163942
800 $\mu$ m i.d. $\times$ 2 mm, Acclaim PepMap100 C8, 5 $\mu$ m, 100 Å .....	161187
800 $\mu$ m i.d. $\times$ 2 mm, Acclaim PepMap300 C4, 5 $\mu$ m, 300 Å .....	163941

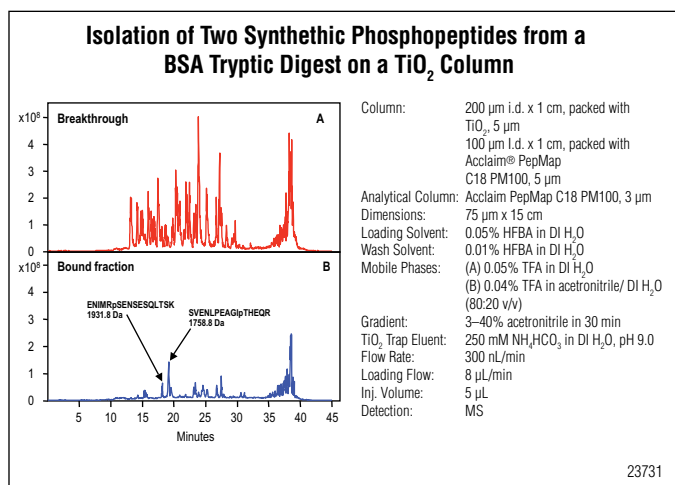
## Acclaim PepMap100 C18 Nano-Trap Columns

The Acclaim PepMap100 Nano-Trap columns are available in 100  $\mu$ m and 200  $\mu$ m i.d. fused silica, and are packed with 5  $\mu$ m particle size and 300 Å pore size.

### Ordering Information

Nano-Trap Columns	
Nano Trap Column, 100 $\mu$ m i.d. $\times$ 1 cm, packed with Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 2).....	164197
Nano Trap Column, 100 $\mu$ m i.d. $\times$ 2 cm, packed with Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 2).....	164199
Nano Trap Column, 200 $\mu$ m i.d. $\times$ 1 cm, packed with Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 2).....	164212
Nano Trap Column, 200 $\mu$ m i.d. $\times$ 2 cm, packed with Acclaim PepMap100 C18, 5 $\mu$ m, 100 Å (set of 2).....	164213

## Titanium-Dioxide Nano-Trap Columns



Titanium-Dioxide Nano-Trap columns support the enrichment of phosphopeptides. They are available in 100  $\mu\text{m}$  and 200  $\mu\text{m}$  i.d. format, and are packed with 5  $\mu\text{m}$  particle size. In addition, a combination of Titanium-Dioxide and Acclaim PepMap100 C18 is also available.

**Note:** For more information see Application Note 531: Phosphopeptide Enrichment Using a TiO<sub>2</sub> Nano Precolumn

## Ordering Information

### Nano-Trap Columns

Nano Trap Column, 100 $\mu\text{m}$ i.d. x 1 cm, TiO <sub>2</sub> , 5 $\mu\text{m}$ (set of 2) .....	164205
Nano Trap Column, 100 $\mu\text{m}$ i.d. x 2 cm, TiO <sub>2</sub> , 5 $\mu\text{m}$ (set of 2) .....	164214
Nano Trap Column, 200 $\mu\text{m}$ i.d. x 1 cm, TiO <sub>2</sub> , 5 $\mu\text{m}$ (set of 2) .....	164215
Nano Trap Column, 200 $\mu\text{m}$ i.d. x 2 cm, TiO <sub>2</sub> , 5 $\mu\text{m}$ (set of 2) .....	164206
Nano Trap Column, 100 $\mu\text{m}$ i.d. x 2 cm, packed with 1 cm TiO <sub>2</sub> , 5 $\mu\text{m}$ and 1 cm Acclaim PepMap100 C18, 5 $\mu\text{m}$ , 100 Å (set of 2) .....	164216
Nano Trap Column, 200 $\mu\text{m}$ i.d. x 2 cm, packed with 1 cm TiO <sub>2</sub> , 5 $\mu\text{m}$ and 1 cm Acclaim PepMap100 C18, 5 $\mu\text{m}$ , 100 Å (set of 2) .....	164217

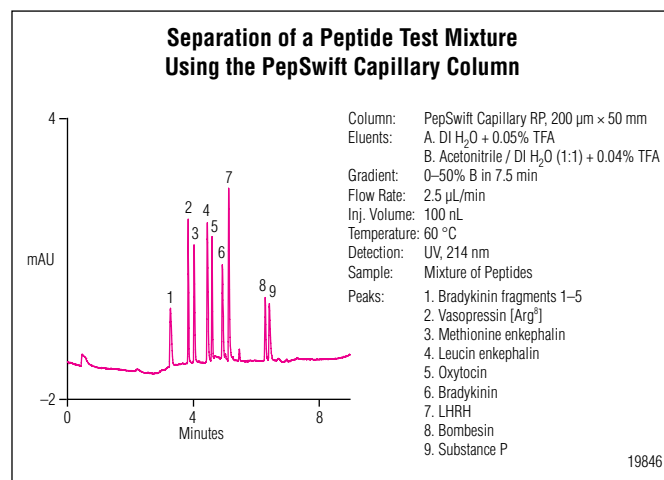
## PepSwift

*Monolithic columns for fast, high-resolution protein and peptide analysis*

PepSwift monolithic columns are specially designed for fast separation and identification of proteins and peptides using nano and capillary LC coupled to MS. Pepswift columns are based on a polystyrene divinylbenzene copolymer bed. The bed structure of the column offers a high-quality alternative to traditional microparticulate sorbents, providing important advantages for high-sensitivity proteomics applications.

- Polymeric monolithic stationary phases
- High-speed protein/peptide separations (<10 min)
- High separation efficiency (>200,000 plates/m)
- High column-to-column reproducibility
- High sensitivity in LC/MS
- Superior lifetime
- Available in 100  $\mu\text{m}$ , 200  $\mu\text{m}$  and 500  $\mu\text{m}$  i.d.

PepSwift Precolumns can be used for preconcentration and desalting of samples consisting of peptides and proteins without negative impact on the chromatographic performance or recovery of the compounds. Various ion-pairing agents can be used in the loading solvent and/or mobile phases to change the selectivity of the separation or improve the trapping efficiency.



Separation of a peptide test mixture.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Application Notes

AN 522: Monolithic Capillary Columns in LC-MS Proteomics

AN 523: Fast Protein and Peptide Separations Using Monolithic Nanocolumns and Capillary Columns

AN 525: LC-MALDI MS Using Monolithic Capillary Columns

AN 526: PS-DVB Monolithic Columns Applied in an Off-Line 2-D LC/ESI-MS Bottom-Up Study for the Identification of Platelet Proteins

AN 528: Parallel LC with Capillary PS-DVB Monolithic Columns for High-Throughput Proteomics

AN 529: Capillary PS-DVB Monolithic Column of 500- $\mu$ m i.d. for Peptide and Protein Separations in Top-Down Proteomics Studies

AN 530: Proteome Analysis Involving Off-Line 2-D LC of Intact Proteins, Proteolytic Digestion, and Capillary RP-LC-MS/MS Analysis Using Monolithic PS-DVB Columns

## Ordering Information

### Analytical Columns

Monolithic Nano Column, 100 $\mu$ m i.d. $\times$ 5 cm (PS-DVB).....	162348
Monolithic Capillary Column, 200 $\mu$ m i.d. $\times$ 5 cm (PS-DVB) .....	161409
Monolithic Capillary Column, 500 $\mu$ m i.d. $\times$ 5 cm (PS-DVB) .....	164087

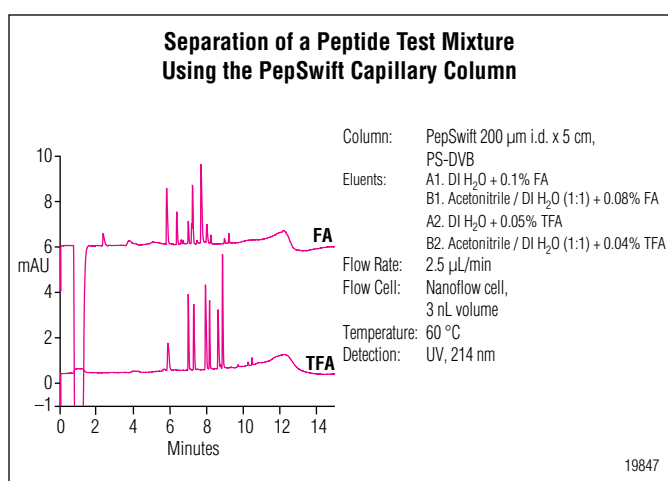
### Micro and Nano Precolumns

Monolithic Trap Column, 200 $\mu$ m i.d. $\times$ 5 mm (PS-DVB) set of 2 .....	163972
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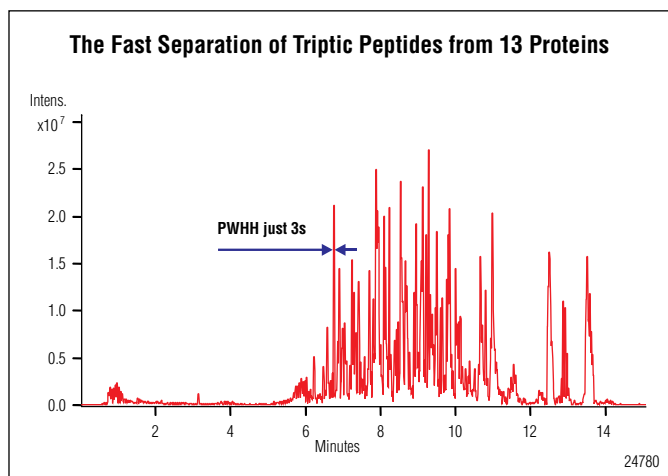
**Peak Width at Half Height (PWHH) for Peptides Separated on a Monolithic Columns**

Peptide Number	Retention Time Minutes	PWHH Seconds
1. Bradykinin fragment 1–5	3.3	3.5
2. Vasopressin [Arg <sup>8</sup> ]	3.8	1.6
3. Methionine enkephalin	4.0	1.9
4. Leucine enkephalin	4.4	2.3
5. Oxytocin	4.6	1.6
6. Bradykinin	4.9	2.5
7. LHRH	5.1	1.9
8. Bombesin	5.1	1.9
9. Substance P	6.4	2.6

Peak Width at Half Height (PWHH) for peptide separation.



Comparison of the influence of FA and TFA on separation of a peptide mixture.



Fast separation of tryptic peptides from 13 proteins. Peak capacities of up to 150 peaks in less than 15 minutes are routinely observed.

# Nucleic Acid Columns

## *HPLC analysis of nucleic acids*

The DNAPac PA100 and PA200 are anion-exchange polymer-based columns which set the standard for oligonucleotide purity analysis, fast screening, and purification. The DNAPac columns provide the highest resolution of oligonucleotides including full-length from n-1, n+1, and other failure sequences, and support screening of synthetic oligonucleotides for production yield and failure sequences. The DNAPac PA200 column offers improved efficiency and enhanced stability under alkaline conditions.

- High resolution separation of oligonucleotides and nucleic acids
- Capable of n, n-1 resolution for oligonucleotides
- Compatible with solvent, high pH, and high temperatures
- Provides easy scale-up

The DNASwift semipreparative column is a strong anion-exchange monolith column that provides exceptionally high purity and yields of oligonucleotides. This column combines DNAPac and monolith technology to provide exceptionally high resolution and capacity for oligonucleotide purification, making it the ideal column for therapeutic and diagnostic research.



*DNAPac PA100:* Anion-exchange column for n, n-1 resolution of single-stranded oligonucleotides.

*DNAPac PA200:* Polymer-based, anion-exchange column for oligonucleotide purity check, screening, and purification.

*DNASwift:* The DNASwift SAX-1S is a unique, porous, polymer-based strong anion-exchange monolith column designed for oligonucleotide purification.



## DNAPac PA100

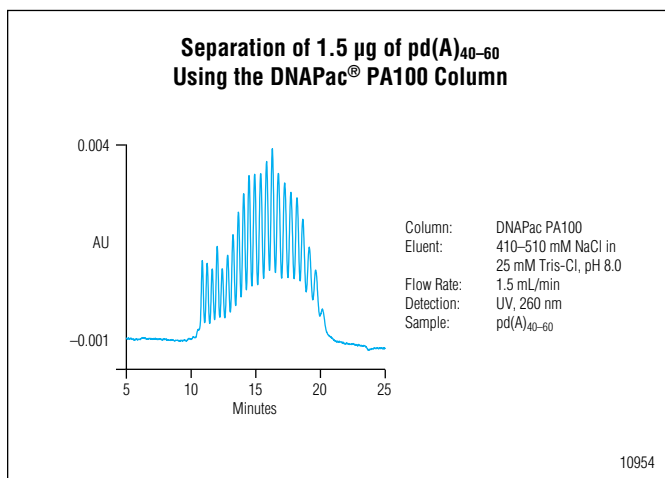
### *For n, n-1 resolution of single-stranded oligonucleotides*

The DNAPac PA100 is a high-resolution anion-exchange column that provides single-base resolution. It is stable under denaturing conditions, rugged, reliable, and can be readily scaled up. The DNAPac PA100 is a 13  $\mu\text{m}$  pellicular, nonporous polymeric resin with bound quaternary amine-functionalized MicroBeads. The rapid mass-transport characteristics of this resin result in very high-resolution oligonucleotide separations.

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

The MicroBead resin used in DNAPac columns provides high-resolution separations to ensure maximum peak purity, and makes linear scale-up of your separation easy. For more complex separations, the polymeric properties of the DNAPac PA100 column allows great flexibility to select ideal conditions, including high pH, high temperature, or chaotropic agents.

Synthetic oligonucleotides can be screened for production yield and failure sequences using the DNAPac PA100. Unit-base resolution of synthetic oligonucleotides to 60 bases and beyond has been demonstrated. The DNAPac PA100 can even be operated under denaturing conditions. Either high temperature (up to 90 °C) or high-pH eluents (up to pH 12.5) can be used to eliminate hydrogen bonding, allowing resolution of problem sequences such as self-complementary sequences or poly-G stretches.



Separation of oligonucleotides using the DNAPac PA100 column.

## Separates RNA/Double-Stranded DNA

The DNAPac PA100 is ideally suited for the purification and analysis of synthetic RNA. Failure sequences are easily separated from the full-length product. Double-stranded DNA, such as plasmids, or restriction fragments are also separated.

Analytical separations on the 4 mm diameter column can be scaled directly to larger diameter columns so preparative methods can be conveniently developed using small samples. The loading capacity of the DNAPac PA100 (4  $\times$  250 mm) column is from 1 to 100  $\mu\text{g}$ . Scaling the flow rate and sample size up for the 9  $\times$  250 mm and 22  $\times$  250 mm column yields essentially identical chromatography.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Data Sheets*

DNAPac PA100 Data Sheet

### *Application Notes*

AN 100: High-Resolution Analysis and Purification of Oligonucleotides with the DNAPac PA100 Column

## Ordering Information

### Analytical Columns

DNAPac PA100 Analytical Column (4 $\times$ 250 mm).....	043010
DNAPac PA100 Semipreparative Column (9 $\times$ 250 mm).....	043011
DNAPac PA100 Semipreparative Column (22 $\times$ 250 mm).....	SP2091
FAST Cartridge, DNAPac PA100 (2 $\times$ 10 mm), Pkg./150 .....	SP4008
FAST Cartridge, DNAPac PA100 (2 $\times$ 10 mm), Pkg./600 .....	SP3229

### Guard Columns

DNAPac PA100 Guard Column (2 $\times$ 50 mm).....	SP4016
DNAPac PA100 Guard Column (4 $\times$ 50 mm).....	043018

## DNAPac PA200

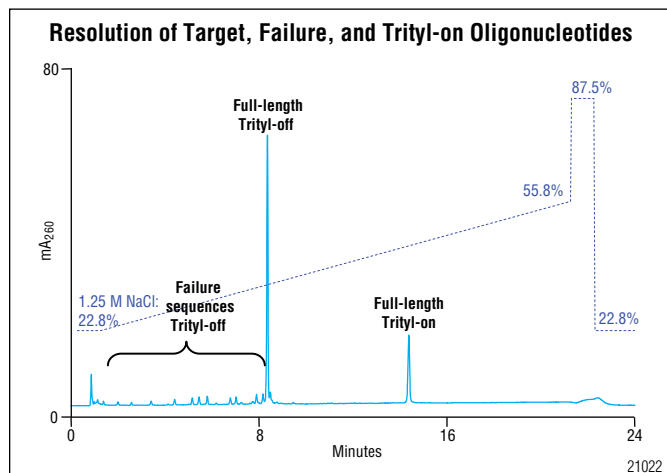
### Ultrahigh-resolution separations of oligonucleotides

The DNAPac PA200 is a strong anion-exchange column developed to provide unsurpassed high-resolution analysis and purification of synthetic oligonucleotides. DNAPac PA200 can resolve full length from n-1, n+1, and other failure sequences not possible with other columns. Retention times and selectivity can be controlled by the choice of salt, pH, and solvent. Therefore, the separation can be tailored to the requirements of many different oligonucleotide analysis challenges.

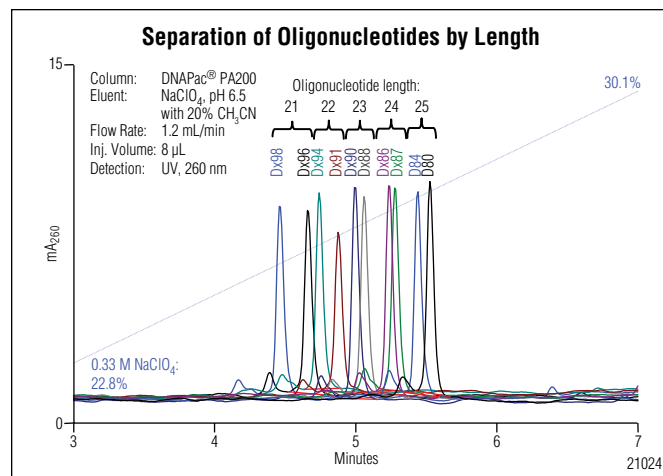
- Achieve n, n-1 resolution for oligonucleotides
- Resolve oligonucleotides with secondary structures
- Assay phosphorothioate purity
- Selectivity control with eluent pH, salt, and solvent
- Resolve RNA with aberrant (2 in.–5 in.) links from normal SS-RNA

The DNAPac PA200 is packed with a pellicular anion-exchange resin composed of an 8- $\mu$ m-diameter nonporous polymeric substrate, to which is bound quaternary amine-functionalized MicroBeads. The rapid mass transport characteristics of this resin result in high-resolution oligonucleotide separations. The DNAPac PA200 column can be operated under denaturing conditions, such as high temperature (up to 85 °C), or high-pH eluents (up to pH 12.5), or by the inclusion of chaotropic agents (such as urea).

The DNAPac PA200 offers the highest quality phase stability over a broad pH range, delivers exceptional resolution and supports high-throughput separations. DNAPac PA200 columns support resolution of normal-length oligonucleotides (8- to 30-mer), extended-length oligonucleotides (30- to 70-mer), linear double-stranded DNA, and supercoiled versus nicked/linear DNA.



Resolution of oligonucleotides.



Separation of oligonucleotides by length.

Analytical separations on the 4 mm diameter column can be scaled directly to larger diameter columns so preparative methods can be conveniently developed using small samples. Scaling the flow rate and sample size up for the 9  $\times$  250 mm and 22  $\times$  250 mm column yields essentially identical chromatography.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

DNAPac PA200 Column Data Sheet

## Ordering Information

### Analytical Columns

DNAPac PA200 Analytical (2 $\times$ 250 mm)	063425
DNAPac PA200 Analytical Column (4 $\times$ 250 mm)	063000
DNAPac PA200 Analytical (9 $\times$ 250 mm)	063421
DNAPac PA200 Semipreparative (22 $\times$ 250 mm)	SP6734

### Guard Columns

DNAPac PA200 Guard (2 $\times$ 50 mm)	063423
DNAPac PA200 Guard Column (4 $\times$ 50 mm)	062998
DNAPac PA200 Guard (9 $\times$ 50 mm)	063419
DNAPac PA200 Guard (22 $\times$ 50 mm)	SP6731



## DNASwift

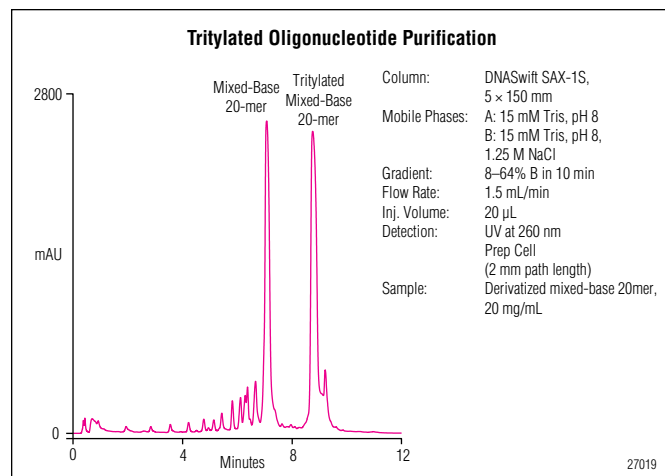
*A semipreparative column providing exceptionally high purity and yield for oligonucleotides*

The DNASwift SAX-1S is a strong anion-exchange monolith column that provides exceptionally high purity and yield of oligonucleotides. This semipreparative column incorporates the high resolution and selectivity of the DNAPac column, providing unsurpassed purity and yields. The DNASwift SAX-1S column is ideal for therapeutic and diagnostic research, which have high purity and yield requirements.

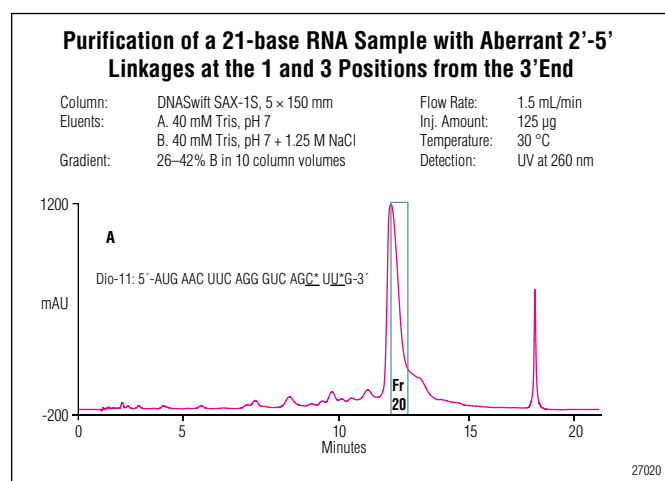
- Highest resolution for oligonucleotide purification available, providing high purity and yields
- Exceptionally high capacity
- Refined selectivity, as with the DNAPac column, for high resolution
- Compatible with high pH mobile phases, solvents, and high temperatures
- Ideal for therapeutic and diagnostic research
- Purify difficult oligonucleotide products

The DNASwift SAX-1S is a unique porous polymer monolith column designed for oligonucleotide purification. The column incorporates a pressure- and chemically-stable substrate coated with functionalized latex nanobeads. These nanobeads, with strong anion-exchange functional groups optimized for oligonucleotide separations, are similar to those of the industry-leading DNAPac columns. Similarly, the nanobeads contribute to the DNASwift's exceptional high resolution and selectivity control.

The monolith is a polymeric cylinder with interconnected flow-through channels which provides fast mass transfer that contributes to the exceptionally high resolution of the DNASwift column. The porous monolith also offers low backpressure, allowing increased flow rates with minimal loss of resolution. The combination of functionalized latex nanobeads and monolith technology results in the DNASwift column having very high capacity, exceptionally high resolution, and refined selectivity control.



*Purification of tritylated oligonucleotide using the DNASwift SAX-1S column.*



*Effect of pH on oligonucleotide retention and selectivity using the DNASwift SAX-1S column.*

Analytical separations on the 4 mm diameter column can be scaled directly to larger diameter columns so preparative methods can be conveniently developed using small samples. Scaling the flow rate and sample size up for the 9 × 250 mm and 22 × 250 mm column yields essentially identical chromatography.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

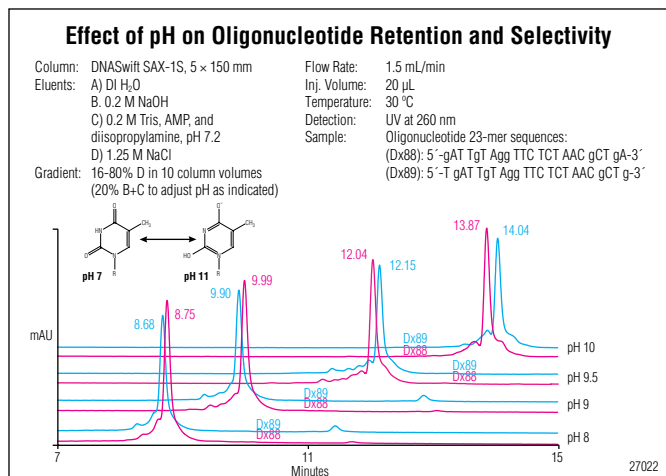
### Product Data Sheets

DNASwift Monolith Column for Oligonucleotide Purification Data Sheet

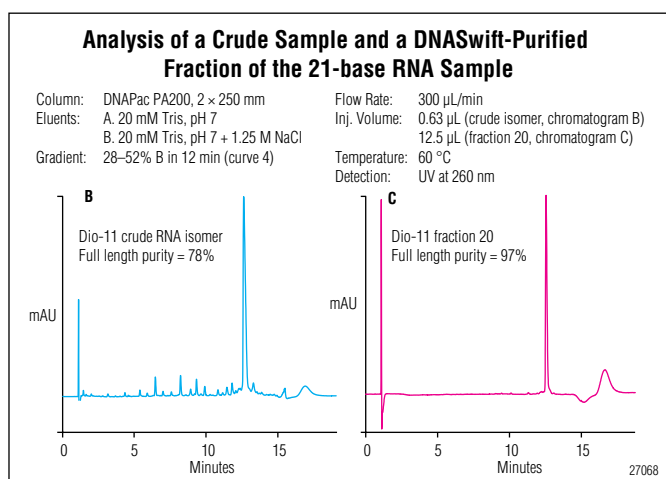
## Ordering Information

### DNASwift

DNASwift SAX-1S Monolith Column (5 x 150 mm).....066766



Effect of pH on oligonucleotide retention and selectivity.



Analysis of crude sample and DNASwift-purified RNA sample.



# Amino Acid Columns

## *HPLC analysis of amino acids*

The AminoPac PA10 column provides solutions for the two primary approaches of amino acid analysis: (1) anion-exchange separation by *AAA-Direct* in which amino acids are detected directly, without the need for derivatization, or (2) anion-exchange separation with postcolumn derivatization. The AminoPac PA10 is the recommended column for both *AAA-Direct* system and postcolumn derivatization.

- Separate free amino acids without derivatization
- Separate free amino acids with derivatization
- Compatible with solvent, high pH, and high temperatures
- Provides easy scale-up

AminoPac columns are used for high-resolution separations of free amino acids as well as for separation and detection of a wide range of sugars, phosphorylated amino acids, and common oxidation products of sulfur-containing amino acids.



*AminoPac PA10*: Hydrophobic, polymeric column stable from pH 0–14, recommended for use with the Dionex *AAA-Direct* system.

## AminoPac PA10

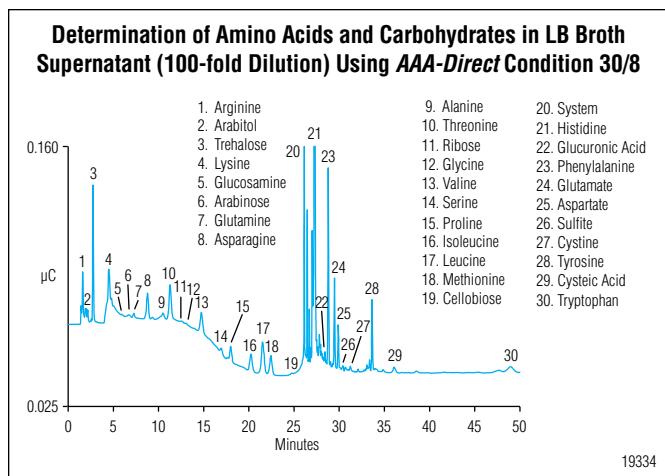
*For high-resolution separations of free amino acids by AAA-Direct*

The AminoPac PA10 column is packed with a hydrophobic, polymeric, pellicular, anion-exchange resin that is stable over the range of pH 0–14. The unique pH stability allows the use of eluents that are conducive to anodic oxidation of amino acids at gold electrodes. This column is recommended for use with the AAA-Direct Amino Acid Analyzer, allowing direct detection of primary and secondary amino acids by IPAD, with no need for pre- or postcolumn derivatization.

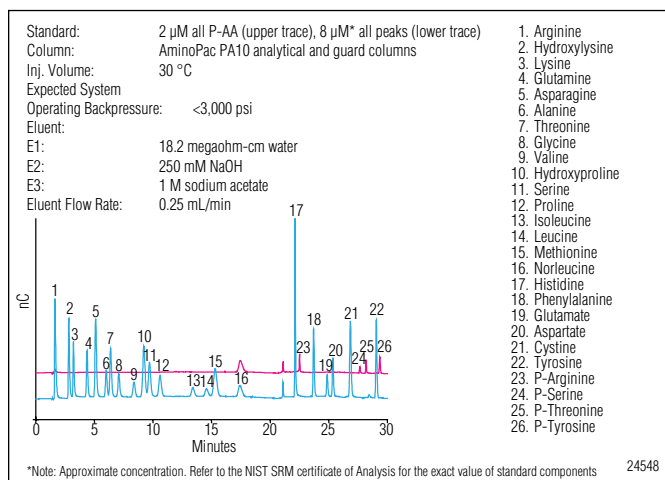
- Derivatization not required
- Carbohydrates and amino acids separated and detected simultaneously
- Mid-femtomole to low-picomole detection limits
- Compatible with all commonly used hydrolysis procedures
- Can be configured for on-line analysis
- Separates free amino acids with derivatization

AAA-Direct is a technique that eliminates the need for any form of derivatization, and is therefore compatible with on-line monitoring of cell cultures and fermentation broths.

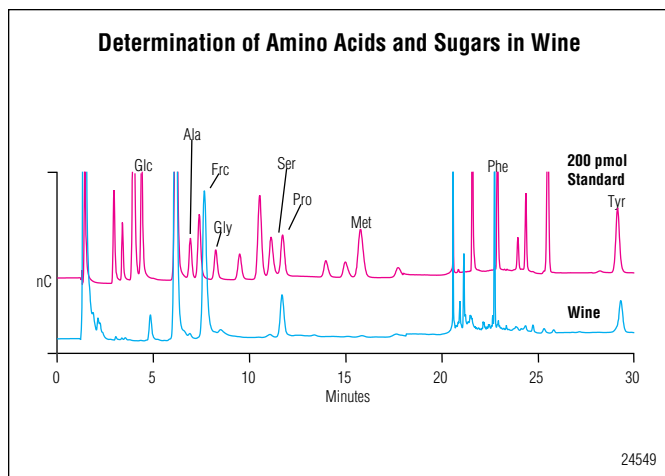
The AminoPac PA10 column is optimized for separations of free amino acids by AAA-Direct. Vitamins, amino sugars, and carbohydrates can be detected simultaneously with amino acids. Additional capabilities include separation of a wide range of sugars, phosphorylated amino acids, and common oxidation products of sulfur-containing amino acids, such as cysteic acid, methionine sulfone, and methionine sulfoxide.



*Determination of amino acids and carbohydrates in LB broth supernatant.*



*Analysis of phospho-amino acids.*



Analysis of amino acids and sugars in red wine.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Application Notes

AN 130: Identification of a Hydroxylysine-Containing Peptide Using *AAA-Direct*

AN 142: Determination of Tryptophan Using *AAA-Direct*

AN 150: Determination of Amino Acids in Cell Cultures and Fermentation Broths

AN 179: Carbohydrate and Amino Acid Analysis Using 3-D Amperometry

### Application Updates

AU 152: An Improved Gradient Method for the *AAA-Direct* Separation of Amino Acids and Carbohydrates in Complex Sample Matrices

### Technical Notes

TN 50: Determination of the Amino Acid Content of Peptides by *AAA-Direct*

TN 55: Screening of Sample Matrices and Individual Matrix Ingredients for Suitability in *AAA-Direct*

## Ordering Information

### AminoPac PA10 - Analytical Columns

AminoPac PA10 Analytical Column (2 × 250 mm).....	055406
AminoPac PA10 (22 × 250 mm).....	SP5488
AminoPac PA10 (9 × 250 mm).....	SP5490
AminoPac PA10 Analytical Column (4 × 250 mm).....	SP5678

### Guard Columns

AminoPac PA10 Guard Column (2 × 250 mm).....	055407
AminoPac PA10 Guard Column (4 × 50 mm).....	SP5680

### Accessories

<i>AAA-Direct</i> Installation Kit.....	059539
Carbohydrate Removal Accessory Kit for ICS-3000 SP, including the CRA column, an external pump and the required plumbing .....	070510
Carbohydrate Removal Accessory Kit for the ICS-3000 DP, including CRA column and all plumbing.....	064418
Carbohydrate Removal Cartridge (CRC) (2 × 15 mm).....	068598



# Carbohydrate Columns

## *HPLC analysis of carbohydrates*

The CarboPac family of columns provide high resolution separations of saccharides. Combined with pulsed amperometric detection (PAD), these columns provide high sensitivity without the need for derivatization. CarboPac columns support simple, reliable techniques to separate sugars.

- Sugar alcohols
- Mono- and disaccharides
- Poly- and oligosaccharides

The CarboPac family of columns offers a selection of columns, each optimized for a different class of compounds. The CarboPac MA1 column provides high resolution of reduced sugars. The CarboPac PA10 and PA20 columns provide high-resolution separation of mono- and disaccharides. The CarboPac PA100 and PA200 columns provide high resolution of oligonucleotides for analysis and mapping.



*CarboPac MA1:* High-capacity, sensitive, rugged and reliable strong anion-exchange column for separations of reduced sugars, without the need for derivatization.

*CarboPac PA1:* Durable column for carbohydrate separations. Use for analysis of monosaccharides, disaccharides, and for linear polysaccharide profiling.

*CarboPac PA10:* Anion-exchange column designed for isocratic separations of mono- and disaccharides with pulsed amperometric detection.

*CarboPac PA20:* Fast mono- and disaccharide column. The six common glycoprotein monosaccharides can be baseline resolved in less than 10 min.

*CarboPac PA100:* Strong anion-exchange column for separation of oligosaccharides based on size, charge, branching, and linkage.

*CarboPac PA200:* Recommended for high resolution separations of neutral and charged oligosaccharides. The column is used with pulsed amperometric detection.



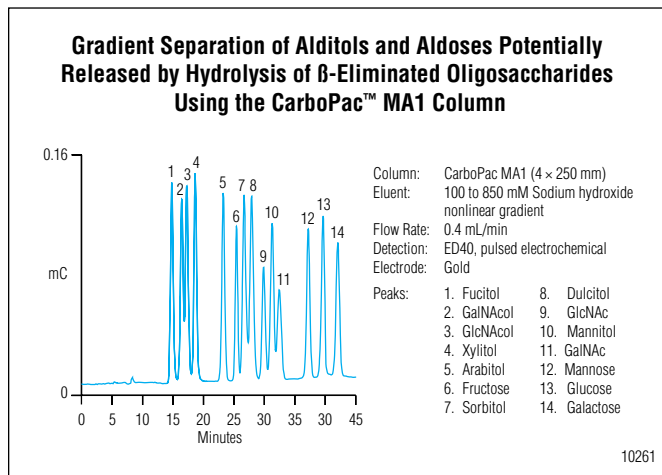
## CarboPac MA1

*CarboPac MA1 column for carbohydrate, alditol, and aldose analysis*

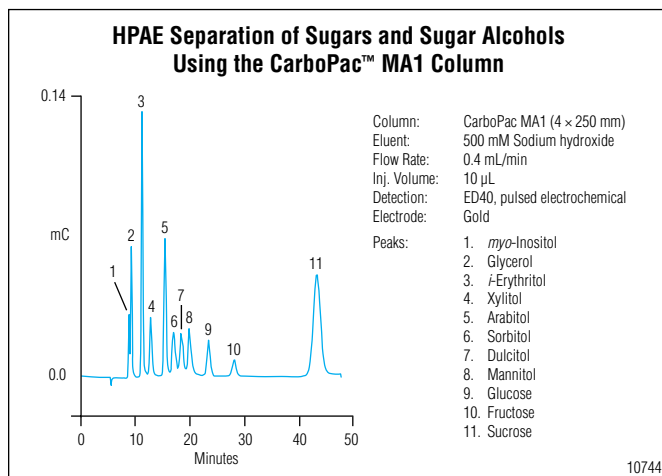
The CarboPac MA1 column is a high-capacity, strong anion-exchange column that delivers sensitive, rugged, and reliable separations of reduced sugars without derivatization. The MA1 column consists of a macroporous resin fully functionalized with a tertiary amine.

- Recommended for the separation of reduced mono- and disaccharides
- No derivatization needed
- Separations using a simple hydroxide eluent
- Alditols and aldoses separated from one another in a single run

Designed for reduced mono- and disaccharide alditol analyses, the CarboPac MA1 is also well suited for analysis of exoglycosidase-released neutral monosaccharides. Monosaccharides are moved away from the column void, enabling immediate evaluation of contaminating exoglycosidase activities. The MA1 can provide baseline resolution of fucose, *N*-acetyl-(D)-glucosamine, *N*-acetyl-galactosamine, mannose, glucose, and galactose, as well as neutral oligosaccharides in the same separation.



*Gradient separation of alditols and aldoses potentially released by hydrolysis of beta eliminated oligosaccharides. Arabinol serves as an internal standard.*



*HPLC separation of sugars and sugar alcohols without derivatization.*

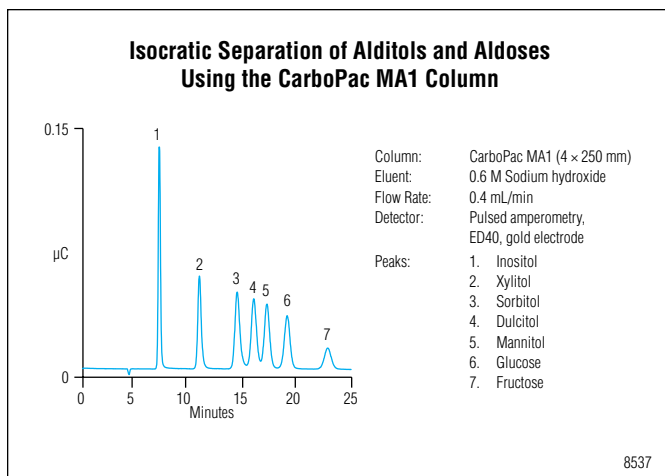
## Ordering Information

### Analytical Columns

CarboPac MA1 Analytical Column (4 × 250 mm) ..... 044066

### Guard Columns

CarboPac MA1 Guard Column (4 × 50 mm) ..... 044067



*Isocratic separation of a representative set of alditols and aldoses ensures lot-to-lot reproducibility in the manufacturing of the CarboPac MA1 column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

CarboPac MA1 Column for Carbohydrate Alditol and Aldose Analysis Data Sheet

### Application Notes

AN 87: Determination of Sugar Alcohols in Confections and Fruit Juices by HPAE-PAD

AN 117: Quantification of Carbohydrates and Glycols in Pharmaceuticals

AN 122: The Determination of Carbohydrates, Alcohols, and Glycols in Fermentation Broths

### Technical Notes

TN 20: Analysis of Carbohydrates by High Performance Anion Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD)

TN 21: Optimal Settings for Pulsed Amperometric Detection of Carbohydrates Using the Dionex ED40 Electrochemical Detector

## CarboPac PA1

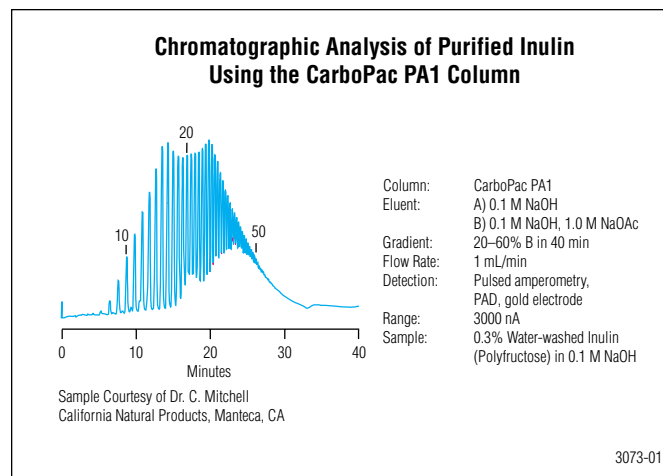
*For the separation of monosaccharides, disaccharides, and linear polysaccharides*

The CarboPac PA1 is an anion-exchange column for the separation of mono-, disaccharides, and specific oligosaccharides using an isocratic eluent. Sialic acid analysis has also been demonstrated on this column.

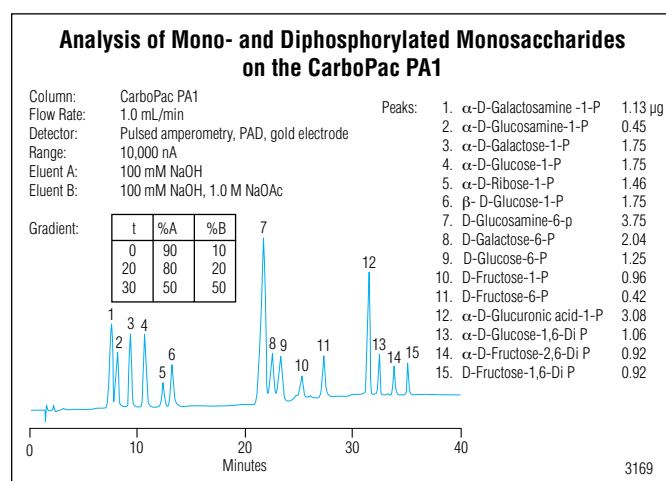
- General-purpose column for isocratic determination of monosaccharides and disaccharides
- Detection by pulsed amperometric detection; no derivatization needed
- Approved for use in a variety of official methods for the analysis of foods
- High resolution of linear polysaccharides

The unique MicroBead pellicular structure of the CarboPac PA1 resin gives it stability from pH 0–14 at all concentrations of buffer salts. The pellicular resin structure allows excellent mass transfer resulting in fast gradient reequilibration.

The CarboPac PA1 column is used with pulsed amperometric detection; no derivatization is required. Sensitivity on the CarboPac PA1 column is not as high as with the CarboPac PA20 or PA10 columns for monosaccharide analysis. Thus, the CarboPac PA1 is well suited for the analysis of foods for nutritional labeling. The CarboPac PA1 column has been approved for use in a number of official methods.



*Chromatographic analysis of purified inulin.*



*Analysis of mono- and diphosphorylated monosaccharides on the CarboPac PA1 column.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

CarboPac PA1 and PA10 Columns for Mono- and Disaccharide Analysis Data Sheet

### Application Notes

AN 61: Determination of Tobramycin and Impurities Using HPAE-PAD

AN 66: Determination of Neomycin B and Impurities Using HPAE-PAD

AN 67: Determination of Plant-Derived Neutral Oligo- and Polysaccharides

AN 82: Analysis of Fruit Juice Adulterated with Medium Invert Sugar from Beets

AN 92: Determination of Sugars in Molasses by High Performance Anion Exchange with Pulsed Amperometric Detection

AN 122: The Determination of Carbohydrates, Alcohols, and Glycols in Fermentation Broths

AN 147: Determination of Polydextrose in Foods by AOAC Method 2000.11

AN 155: Determination of Trans-Galactooligosaccharides in Foods by AOAC Method 2001.02

AN 181: Determination of Streptomycin and Impurities Using HPAE-PAD

AN 186: Analysis of Paromomycin by HPAE-IPAD

AN 225: Rapid Method for the Estimation of Total Free Monosaccharide Content of Corn Stover Hydrolysate Using HPAE-PAD

### Application Updates

AU 150: Determination of Plant-Derived Neutral Oligo- and Polysaccharides Using the CarboPac PA200

AU 167: Determination of Tobramycin in Crude and In-Process Production Samples During Manufacturing Using HPAE-IPAD

### Technical Notes

TN 20: Analysis of Carbohydrates by High Performance Anion Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD)

TN 30: Monosaccharide and Oligosaccharide Analysis of Glycoproteins Electrotransferred onto Polyvinylidene Fluoride (PVDF) Membranes

TN 36: Analysis of Exoglycosidase Digestions of N-Linked Oligosaccharides Using HPAE-PAD

## Ordering Information

### Analytical Columns

CarboPac PA1 Analytical Column (2 × 250 mm).....	057178
CarboPac PA1 Analytical Column (4 × 250 mm).....	035391
CarboPac PA1 Semipreparative Column (9 × 250 mm) .....	039686
CarboPac PA1 Semipreparative Column (22 × 250 mm).....	SP2866

### Guard Columns

CarboPac PA1 Guard Column (2 × 50 mm).....	057179
CarboPac PA1 Guard Column (4 × 50 mm).....	043096
CarboPac PA1 Guard (9 × 50 mm).....	063501

## CarboPac PA10

*For sensitive, high-resolution analysis of mono- and disaccharides*

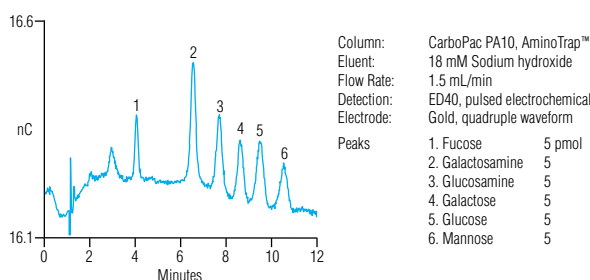
The CarboPac PA10 is a anion-exchange column designed specifically for high-resolution separations and high sensitivity detection of mono- and disaccharides without the need for derivatization. High resolution and high sensitivity detection is accomplished using a simple isocratic eluent and pulsed amperometric detection (PAD) with no derivatization required.

- For the quantification of acidic, neutral, and aminomonosaccharides
- Simple, isocratic separations
- Superior selectivity for common monosaccharides compared to the CarboPac PA1
- No derivatization required
- Gradient compatible

The CarboPac PA10 column is ideal for the analysis of mono- and disaccharides in foods, drugs, and plants. Fucose is well resolved from the system void and from protein hydrolysate interferences. The CarboPac PA10 column allows oxygen to elute after mannose, eliminating interference with monosaccharides. This column also separates sialic acids with the addition of sodium acetate to the eluent.

The CarboPac PA10 column consists of 10- $\mu$ m-diameter nonporous beads covered with a fine latex of functionalized MicroBead resin. This pellicular resin structure permits excellent mass transfer, resulting in high-resolution chromatography and rapid reequilibration. The performance of each column is verified with a Dionex MonoStandard.

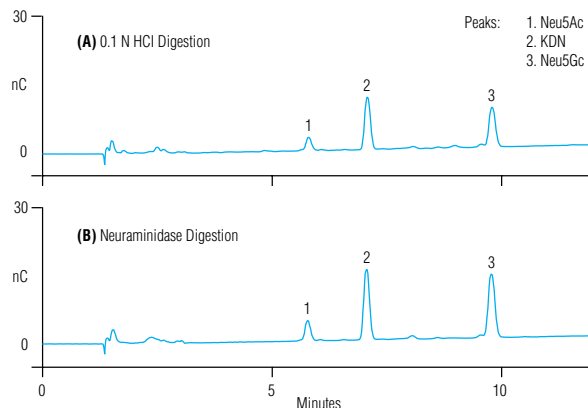
### High-Sensitivity Analysis Using the CarboPac® PA10



13549

*High-sensitivity analysis using the CarboPac PA10 column.*

### Sialic Acid Analysis of Bovine Transferrin



13097

*Sialic acid analysis of bovine transferrin on the CarboPac PA10 column.*

## Ordering Information

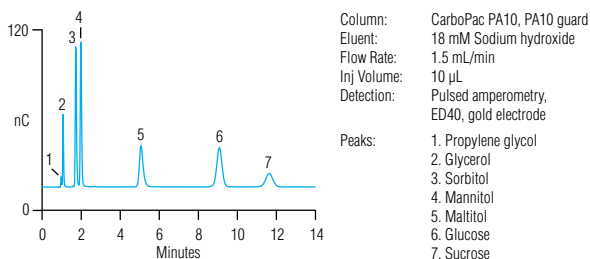
### Analytical Columns

CarboPac PA10 Analytical Column (2 × 250 mm).....	057180
CarboPac PA10 Analytical Column (4 × 250 mm).....	046110
CarboPac PA10 Semipreparative (9 × 250 mm).....	SP4216

### Guard Columns

CarboPac PA10 Guard Column (2 × 50 mm).....	057181
AminoTrap Column (2 × 50 mm).....	SP5578
<i>(Use as a guard column with the CarboPac PA10 when analyzing samples containing amino acids.)</i>	
CarboPac PA10 Guard Column (4 × 50 mm).....	046115
Amino Trap Column (4 × 50 mm).....	046122
<i>(Use as a guard column with the CarboPac PA10 when analyzing samples containing amino acids.)</i>	
Borate Trap Column.....	047078
<i>(Use as an eluent trap column with the CarboPac PA10 for removal of borate contamination from the eluent.)</i>	
Amino Trap Column (3 × 30 mm).....	060146
<i>(Use as a guard column with the CarboPac PA10 when analyzing samples containing amino acids.)</i>	

### Determination of Glycols, Sugar Alcohols, and Carbohydrates Using the CarboPac PA10 Column



13155

The CarboPac PA10 column resolves mixtures of glycols, sugar alcohols, and carbohydrates in a pharmaceutical formulation.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

CarboPac PA1 and PA10 Columns for Mono- and Disaccharide Analysis Data Sheet

### Application Notes

AN 117: Quantification of Carbohydrates and Glycols in Pharmaceuticals

### Application Updates

AU 141: Improved Long-Term Stability of N-Acetylneuraminic Acid and N-Glycolylneuraminic Acid Peak Area Responses Using Waveform A, a Quadruple Potential Waveform

### Technical Notes

TN 20: Analysis of Carbohydrates by High Performance Anion Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD)

TN 40: Glycoprotein Monosaccharide Analysis Using High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD)

TN 41: Analysis of Sialic Acids Using High-Performance Anion-Exchange Chromatography

TN 71: Eluent Preparation for High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection

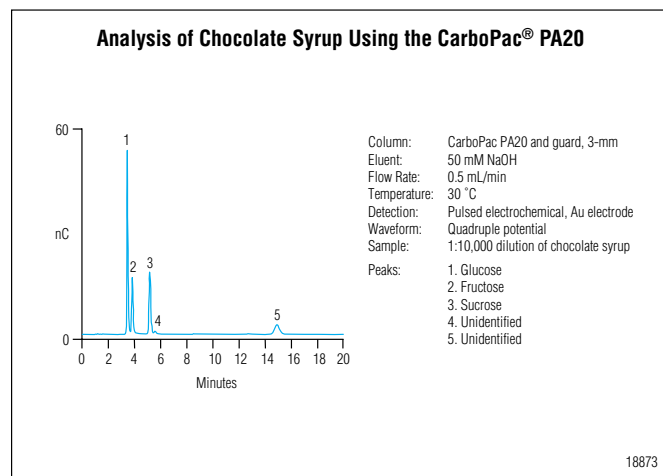
## CarboPac PA20

*Highest resolution analysis of sensitive mono- and disaccharides*

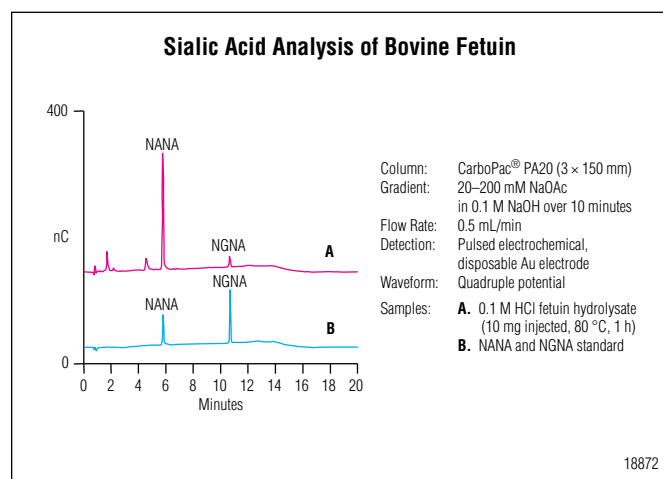
The CarboPac PA20 is a strong anion-exchange column that provides the highest-resolution separations of mono- and disaccharides with no need for derivatization. This column provides baseline resolution between the six monosaccharides commonly found in mammalian glycoproteins over a wide range of eluent concentrations. The CarboPac PA20 column provides superior selectivity over the CarboPac PA1 or PA10 columns, making it an attractive choice for separating difficult peak pairs.

- The column of choice for high resolution and high-sensitivity monosaccharide and disaccharide analyses
- Highly efficient separations with good resolution between neighboring peaks
- Fast analysis—<10 min
- Optimized resolution of glucosamine/galactose and glucose/mannose peak pairs
- Lower eluent consumption
- Does not require derivatization

The CarboPac PA20 consists of 6.5- $\mu$ m-diameter nonporous beads covered with a fine latex of functionalized MicroBead resin. This pellicular resin structure permits excellent mass transfer, resulting in high-resolution chromatography and rapid reequilibration. The performance of each column is verified with a Dionex MonoStandard.



*Analysis of chocolate syrup using the CarboPac PA20 column.*



*Sialic acid analysis of bovine fetuin.*

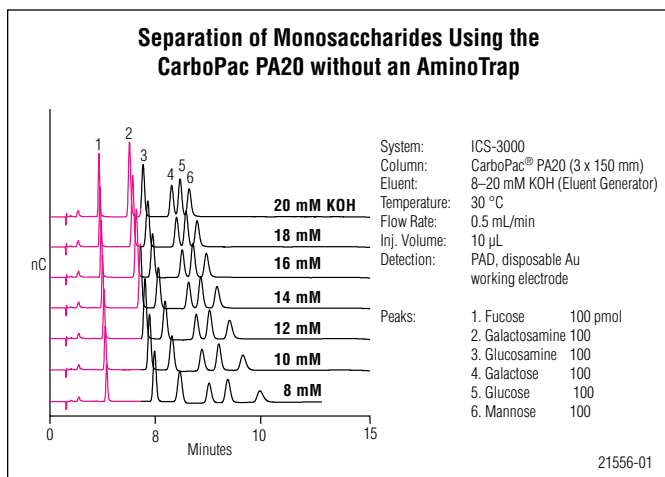
## Ordering Information

### Analytical Columns

CarboPac PA20 Analytical Column (3 × 150 mm)..... 060142

### Guard Columns

CarboPac PA20 Guard Column (3 × 30 mm)..... 060144



*Effect of hydroxide concentration on elution times.*

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

CarboPac PA20 Column Data Sheet

### Application Notes

AN 159: Determination of Sucralose Using HPAE-PAD

AN 197: Determination of Glucosamine in Dietary Supplements Using HPAE-PAD

AN 202: High Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD) Analysis of Mannose-6-Phosphate

AN 233: Determination of Galactosamine Containing Organic Impurities in Heparin by HPAE-PAD Using the CarboPac PA20 Column

### Application Updates

AU 164: Determination of Glucosamine in Chondroitin Sulfate-Containing Dietary Supplements Using HPAE-PAD

AU 151: Determination of Sucralose in Reduced- Carbohydrate Colas using High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection

### Technical Notes

TN 40: Glycoprotein Monosaccharide Analysis Using High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD)



## CarboPac PA100

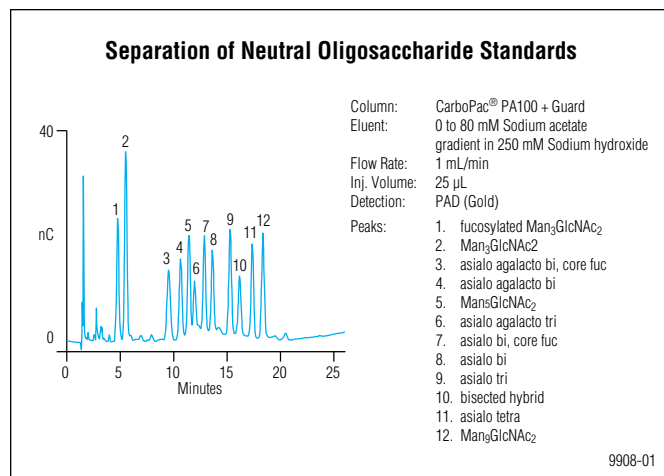
### High resolution and low-picomolar oligosaccharide analysis

The CarboPac PA 100 column is a high-resolution, strong anion-exchange column for enhanced chromatography of oligosaccharides. With no time-consuming derivatization, you can separate complex mixtures of neutral and charged oligosaccharides based on size, charge, degree of branching, anomericity, and linkage isomerism.

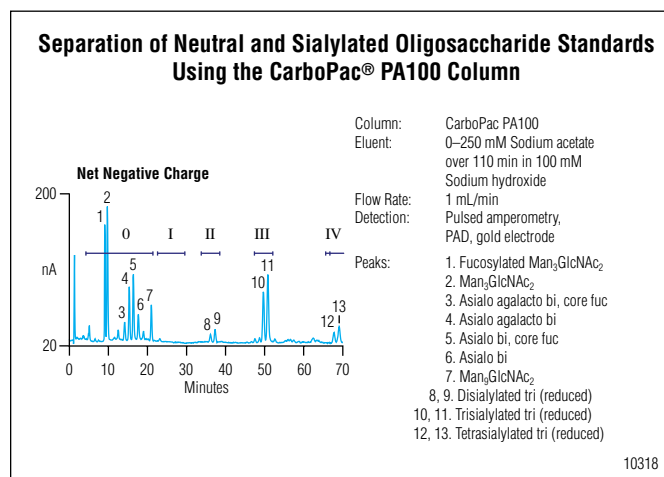
- Separation of closely related oligosaccharides—even isomers—at picomole levels
- Separation of neutral and charged oligosaccharides in the same run
- No sample derivatization required for detection

Oligosaccharides released from therapeutic glycoproteins can differ in size, charge, branching, and linkage. Oligosaccharides with these features can be resolved using the CarboPac PA100. It provides the flexibility to separate oligosaccharides into broad classes depending upon the degree of sialylation, while maintaining the resolution needed for routine analysis based on linkage isomerism. Coupled with pulsed amperometric detection, the PA100 supports detection at low-picomole levels.

The Carbohydrate Membrane Desalter can be used on-line prior to fraction collection.



Separation of neutral oligosaccharide standards. Twelve commonly occurring N-linked neutral oligosaccharides are easily resolved within 20 minutes.



Separation of neutral and sialylated oligosaccharide standards.



## Analytical Columns

## Guard Columns

CarboPac PA100 Guard Column (2 x 50 mm) .....	057183
CarboPac PA100 Guard Column (4 x 50 mm) .....	043054

## 355

## CarboPac PA200

### Highest resolution separations of oligosaccharides

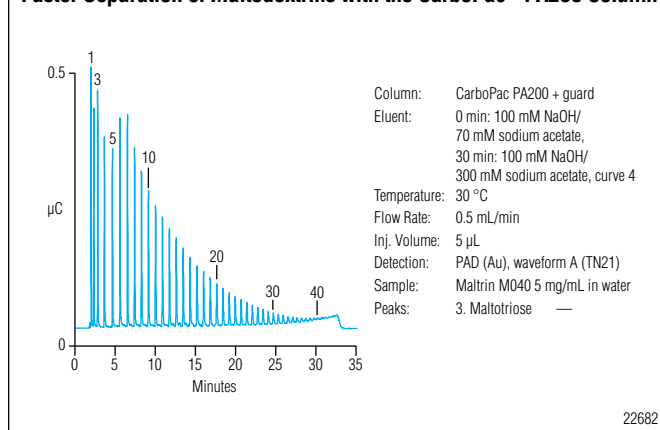
The CarboPac PA 200 column is a high-efficiency, strong anion-exchange column that provides the highest resolution available for oligosaccharide analysis and mapping. With no time-consuming derivatization, you can separate complex mixtures of neutral and charged oligosaccharides based on size, charge, degree of branching, anomericity, and linkage isomerism. The CarboPac PA 200 column also provides the separation of closely related oligosaccharides—even isomers—at picomole levels.

- Sensitive, direct detection with no derivatization, using pulsed amperometric detection
- Very high-efficiency separations
- Separations based on size, charge, degree of branching, and linkage isomerism
- Low flow rate saves on eluent consumption
- Does not require derivatization

A variety of HPLC approaches are proposed for characterizing oligosaccharides, but many prove inadequate for separating complex mixtures and are limited by a lack of specificity and high limits of detection. Dionex has developed an improved HPLC technique for carbohydrate analysis based on anion-exchange chromatography coupled with pulsed amperometric detection. This technique provides high-resolution separations with sensitive and specific detection, without derivatization.

Oligosaccharides released from therapeutic glycoproteins can differ in size, charge, branching, and linkage. Oligosaccharides with these features can be resolved using the CarboPac PA200. It provides the flexibility to separate oligosaccharides into broad classes depending upon the degree of sialylation, while maintaining the resolution needed for routine analysis based on linkage isomerism. Coupled with pulsed amperometric detection, the PA200 supports detection at low-picomole levels.

### Faster Separation of Maltodextrins with the CarboPac® PA200 Column



Separation of maltodextrins with the CarboPacPA200 column.

CarboPac PA200 columns are packed with a hydrophobic, polymeric, pellicular anion-exchange resin stable over the range of pH 0–14. The unique pH-stability of the packing material allows the use of eluent compositions that are conducive to anodic oxidation of carbohydrates at gold electrodes.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### Product Data Sheets

CarboPac PA200 Column Solutions for Oligosaccharide Analysis Data Sheet

### Application Notes

AN 215: Separation of Asparagine-Linked (N-Linked) Oligosaccharides from Human Polyclonal IgG Using the CarboPac PA200 Column

### Application Updates

AU 150: Determination of Plant-Derived Neutral Oligo- and Polysaccharides Using the CarboPac PA200

## Ordering Information

### Guard Columns

CarboPac PA200 Guard Column (3 × 50 mm) ..... 062895

### Analytical Columns

CarboPac PA200 Analytical Column (3 × 250 mm)..... 062896

# Chromatography Accessories

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# Chemical Suppressors

*Improving sensitivity by reducing eluent conductivity and enhancing analyte response*

Suppression works two ways to achieve the absolute best sensitivity and corresponding lowest detection limits for inorganic analyses; it increases analyte signal while simultaneously decreasing background signal and noise. Dionex was the first company to commercialize chemical suppression in 1975, and has continued to expand the capabilities of suppression technology by inventing electrolytic suppression in 1992. Today we offer a full line of choices tailored to meet the needs of our customers.

- SRS 300 Self-Regenerating Suppressor
- CES 300 Capillary Electrolytic Suppressor
- AES Atlas Electrolytic Suppressor
- MMS 300 MicroMembrane Suppressor, AMMS-ICE 300 MicroMembrane Suppressor for Ion Exclusion Chromatography
- SC-CSRS 300 Salt Converter Cation Self-Regenerating Suppressor
- CMD 300 Carbohydrate Membrane Desalter

Electrolytic suppression based on Reagent-Free Ion Chromatography (RFIC) with AutoSuppression is available only from Dionex.



**SRS 300 Self-Regenerating Suppressor:** The latest electrolytic suppressor. This suppressor is a true workhorse, serving virtually all IC applications.

**MMS 300 Micromembrane Suppressor:** High-capacity, solvent-compatible, chemically-regenerated suppressor.

**CES 300 Capillary Electrolytic Suppressor:** CES 300 Capillary Electrolytic Suppressors are optimized for eluent flow rates typically seen in capillary systems.

**AES Atlas Electrolytic Suppressor:** Continuous electrolytically regenerated suppressor based on Dionex MonoDisc and AutoSuppression products.

**AMMS-ICE 300 MicroMembrane Suppressor:** Ideally suited to ion-exclusion chromatography of organic acids and alcohols in complex or high-ionic-strength samples.

**SC-CSRS 300 Salt Converter Cation Self-Regenerating Suppressor:** Suppressor optimized to convert analytes to their fully dissociated methanesulfonic acid species.

**CMD 300 Carbohydrate Membrane Desalter:** Designed to remove eluent salts from high-pH eluents.

## SRS 300 Self-Regenerating Suppressor

*High-capacity electrolytically-regenerated suppressor for use with IC eluents*

The SRS 300 serves virtually all ion chromatography applications for both anions and cations. For anions, the preferred eluent is hydroxide. With RFIC systems, the sample is determined using conductivity detection in the lowest possible background of high-purity water. AutoSuppression means ease of use; you don't need to make regenerant because the suppressor is constantly regenerated by the continuous electrolysis of water. The SRS 300 offers:

- Low background noise levels
- Fast startup equilibration times
- Trace anion and cation determinations
- Compatible with mass spectrometry detection
- Compatible with all Dionex ICS and DX chromatography modules\*
- A three-fold increase in backpressure tolerance compared to previous generations

The SRS 300 delivers low backgrounds and low noise levels for the full range of Dionex ion-exchange IonPac columns and eluents, even under high concentration gradient conditions.

When combined with the revolutionary Eluent Generator, it delivers truly automated, minimal-maintenance Reagent Free Ion Chromatography (RFIC).

**Note:** \*Chemical suppression mode only with the ICS-90 and ICS-900 systems. Older systems may require the RFC-10 or RFC-30 controller.



### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Eluent Suppressors for Ion Chromatography Data Sheet

### Ordering Information

The SRS 300 is compatible with Dionex IC systems equipped with a suppressor power supply. The new SRS 300 products directly replace the SRS ULTRA II. Simply install the new SRS 300 into your current Dionex IC system.

#### Accessories

Anion Self-Regenerating Suppressor ASRS 300 (4 mm) .....	064554
Anion Self-Regenerating Suppressor ASRS 300 (2 mm) .....	064555
Cation Self-Regenerating Suppressor CSRS 300 (4 mm) .....	064556
Cation Self-Regenerating Suppressor CSRS 300 (2 mm) .....	064557



## MMS 300 MicroMembrane Suppressor

*High-capacity, solvent-compatible, chemically-regenerated suppressor*

The MMS 300 is a chemically-regenerated suppressor and therefore has very low noise and quick startup time. With the new Displacement Chemical Regeneration (DCR) Kit, this classic suppressor provides easier operation. MMS Suppressor advantages include:

- High-capacity and solvent-compatible design capable of handling samples with complex matrices
- Very low signal-to-noise and excellent baseline stability
- Low method detection limits
- Fast startup and equilibration
- Easy to use, maintenance-free operation with the DCR kit

The MMS 300 has high capacity and can be used with all Dionex ion-exchange columns. For lowest noise and longest life, the MMS is recommended for anion and cation separations using eluents containing HPLC solvents. The MMS 300 suppressor is available in both 2- and 4 mm formats; 3 mm columns should be used with 2 mm suppressors.

The MMS produces the lowest noise because it uses nonelectrolytic chemical regeneration. Low noise levels translate into lower method detection limits.



### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Eluent Suppressors for Ion Chromatography Data Sheet

### Ordering Information

Accessories	
Anion MicroMembrane Suppressor AMMS 300 (4 mm).....	064558
Anion MicroMembrane Suppressor AMMS 300 (2 mm).....	064559
Cation MicroMembrane Suppressor CMMS 300 (4 mm).....	064560
Cation MicroMembrane Suppressor CMMS 300 (2 mm).....	064561



## CES 300 Capillary Electrolytic Suppressor

*Optimized for eluent flow rates typically seen in capillary systems*

CES 300 Capillary Electrolytic Suppressors are optimized for eluent flow rates typically seen in capillary systems (0.005–0.030 mL/min). The ACES 300, used for anion analysis, converts highly conductive hydroxide-based eluents into pure water, reducing the baseline conductivity. The ACES 300 also converts the analytes into a more conductive hydronium (acid) form, simultaneously suppressing the eluent, increasing sensitivity under conductivity detection.

- High-capacity and solvent-compatible design capable of handling samples with complex matrices
- Very low signal-to-noise and excellent baseline stability
- Low method detection limits
- Fast startup and equilibration
- Easy to use, maintenance-free operation with the DCR kit

The CCES 300, used for cation analysis, converts highly conductive methanesulfonic acid (MSA) eluents into pure water simultaneously converting analytes to a more conductive hydroxide form, increasing sensitivity.

The CES suppressor uses a three-chamber design to minimize dead volume while maximizing suppression capacity and reducing noise. The eluent chamber comprises an ion-exchange capillary membrane that facilitates the efficient exchange of the eluent counterions for regenerant ions.



*Anion Capillary Electrolytic Suppressor (ACES 300).*

The unique design of the CES 300 simplifies software and hardware control options. The ICS-5000 includes software and hardware to control the CES 300 suppressor. Chromeleon 6.8 or 7.x is required.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Eluent Suppressors for Ion Chromatography Data Sheet

### Ordering Information

#### Accessories

ACES 300 Anion Capillary Electrolytic Suppressor .....	072052
CCES 300 Cation Capillary Electrolytic Suppressor .....	072053

## Atlas Electrolytic Suppressor

*Low noise electrolytically regenerated suppressor for use with IC eluents*

The Atlas Electrolytic Suppressor (AES) is a continuous electrolytically-regenerated suppressor based on the MonoDisc and AutoSuppression products developed by Dionex. The unique design of the Atlas enables very fast startup times and an extremely-low noise level, particularly for carbonate eluents. The benefits of the Atlas include:

- High performance and very low noise for carbonate eluents
- Low background conductivity, and excellent baseline stability
- Easy to use maintenance-free operation
- Fast startup and equilibration
- Will suppress eluents up to 25 µeq/min

The MonoDisc suppression bed of the AES is composed of ion-exchange monolith and flow distribution disks. This configuration facilitates efficient exchange of the eluent counterions for regenerant ions, resulting in eluent suppression and analyte response enhancement.



### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Eluent Suppressors for Ion Chromatography Data Sheet

### Ordering Information

The Atlas suppressor is fully compatible with the ICS-5000, ICS-2100, ICS-1600, and ICS-1100 chromatography systems. It is not compatible with the ICS-90 or ICS-900. When ordering an Atlas suppressor for older systems, the DX-600, BioLC, or DX-320 systems must be configured with an ED50A, CD25A, or IC25A detector. The RFC-30 or RFC-10 Suppressor Controller must be ordered to use the Atlas with the earlier versions of detectors.

#### Accessories

Anion Atlas Electrolytic Suppressor .....	056116
Cation Atlas Electrolytic Suppressor .....	056118

### AMMS-ICE 300 MicroMembrane Suppressor

*Chemically-regenerated suppressor optimized for ion-exclusion chromatography*

The Anion-ICE MicroMembrane Suppressor AMMS-ICE 300 is designed for the analysis of organic acids and alcohols in complex or high-ionic strength samples, including food and beverage products, biological samples, fermentation processes, industrial process liquors, and treated wastewaters. This suppressor is ideally suited to ion-exclusion chromatography of organic acids and alcohols in complex or high-ionic strength samples. It provides the following advantages:

- High-capacity and solvent-compatible design
- Optimized for organic acid and alcohol analysis in complex or high-ionic-strength samples
- Low detection limits as a result of high signal-to-noise ratio and excellent baseline stability
- Fast startup and equilibration

The AMMS-ICE 300 suppressor is used in chemical suppression mode with a tetrabutylammonium hydroxide (TBAOH) regenerant. Standard ion suppression converts analytes into their acid or base forms. The AMMS-300 suppressor increases analyte conductivity by forming the TBA salt of the weak acid analyte, which is more conductive than the partially ionized acid form of the analyte.

The AMMS-ICE 300 removes the hydronium ion and any counterions of the analytes from the eluent stream and replaces them with tetrabutylammonium ion. This removal greatly reduces background conductivity. In addition, this mechanism forces the ionization of weak acid analytes, increasing sensitivity.



### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### *Product Data Sheets*

Eluent Suppressors for Ion Chromatography Data Sheet

### Ordering Information

#### Accessories

Anion-ICE MicroMembrane Suppressor AMMS-ICE 300 (4 mm) ..... 067527

## SC-CSRS Salt Converter

*Converts analytes to their fully-dissociated methanesulfonic acid species*

With the SC-CSRS 300, nonlinear response of ammonia and certain amines can be overcome by converting the weak base analyte to a fully ionized form, thus extending the linear response. The SC-CSRS 300 suppressor is designed to make this conversion and provide linearity across as much as three orders of magnitude.

- Increased linearity for ammonium and amines
- Increased sensitivity for ammonium and amines
- Low background and noise
- Conversion to and detection as fully dissociated methanesulfonic acid

The SC-CSRS should be used in industries where regulated methods require a linear response. A linear response increases accuracy at higher concentrations, and so requires fewer calibration check standards over the calibration curve. Reduced calibration requirements increase sample throughput for industries with high sample workloads such as the power generation industry.

Method detection limits for Group I and II cations, ammonium, and amines using the SC-CSRS are equivalent to or better than those achieved using the CSRS 300.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Data Sheets*

Salt Converter-Cation Self-Regenerating Suppressor 300

## Ordering Information

### Accessories

SC-CSRS 300 Salt Converter-Cation Self-Regenerating Suppressor (4 mm).....	067530
SC-CSRS 300 Salt Converter-Cation Self-Regenerating Suppressor (2 mm).....	067529

## CMD 300 Carbohydrate Membrane Desalter

*On-line device for users of HPAE-PAD to collect and further analyze carbohydrate samples*

High-pH HPAE-PAD has become the method of choice for oligosaccharide purification because it permits very high resolution of neutral and charged oligosaccharide isomers. Subsequent characterization of purified oligosaccharides often requires removal of eluent salts. Manual desalting methods are available; the CMD 300 provides an easier, automated method.

- Reduces the pH of the effluent from pH ~13 to between pH 2–6
- Supports lyophilization of collected fractions without dialysis
- Provides minimal dispersion of the sample exiting the detector cell
- Low dispersion for accurate fraction collection
- >99% sodium ions removed from eluents that contain up to 0.35 M sodium ions

The CMD 300 exchanges sodium ions in the eluent for hydronium ions. This process converts sodium hydroxide and sodium acetate eluents to water and acetic acid, lowering sample pH after samples leave the detector cell. Because acetic acid is volatile, fractions can then be lyophilized without dialysis, leaving the purified carbohydrate sample ready for further manipulation.

The CMD 300 reliably desalts up to 0.35 M Na at an eluent flow of 1.0 mL/min. Oligosaccharides eluting in up to 0.35 M Na, collected after on-line desalting and evaporated in a centrifugal vacuum evaporator, exhibit residual [Na<sup>+</sup>] below 200  $\mu$ M after resuspension to original volume in deionized water. This represents a desalting efficiency of >99.9%.

## Ordering Information

### Accessories

CMD 300, 4 mm.....	067528
CMD-1 Startup Package.....	059091

# Chromatography Accessories

*Column hardware, RFIC accessories, standards, reagents, and cartridges*



**RFIC-Eluent Generation:** Eluent generator cartridges for the electrolytic production of high-purity eluents for isocratic and gradient runs.

**RFIC-Eluent Regeneration:** Allows nonstop operation of a carbonate or methanesulfonic-acid eluent applications for up to four weeks at a time.

**AMMS-ICE 300 MicroMembrane Suppressor:** Continuously Regenerated Trap Columns (CR-TC) for Reagent-Free Ion Chromatography (RFIC-EG).

**CRD Carbonate Removal Device:** The CRD causes carbon dioxide to diffuse through the walls of a permeable membrane, removing it prior to detection or injection.

**InGuard Cartridges:** For removal of matrix interferences including anions, cations transition metals, or hydrophobic substances.

**OnGuard II Cartridges:** Remove matrix interferences such as phenolics, metals, cations, anions, or hydrophobic substances, for better performance in many IC applications.

**Standards, Reagents, and Eluent Concentrates:** A complete line of standards, reagents, and eluent concentrates for ion chromatography applications.

**ICS-900 Consumables Packages:** Bundled kits with matched columns, suppressor, and application-specific supplies recommended for the ICS-900 and similar systems.

**ICS-5000 and ICS-2100 Consumables Bundles:** These kits are appropriate for RFIC-EG systems, such as the ICS-5000, and ICS-2100.

**LCi Solutions Kits:** Preconfigured capillary kits and comprehensive quick installation guides for fast and convenient implementation of UltiMate 3000 LCi Solutions.

**Viper Fingertight Fittings:** The Viper fingertight fitting system provides ease of use and dead-volume free plumbing of every conventional HPLC and modern UHPLC system.

**nanoViper Fingertight Fittings:** nanoViper is the new, finger-tight connection system for nano LC connections which eliminates the assembly of PEEK sleeve connections.

## RFIC-Eluent Generation

### *Eluent Generation—a major component of Reagent-Free IC*

Eluent generation prevents baseline shift, increases sensitivity, improves resolution, and ensures consistent peak integration. Dionex offers a range of EGC cartridges for the production of hydroxide, carbonate and methanesulfonic acid eluents. Eluent generation eliminates the need to handle acids and bases traditionally required for the preparation of IC eluents, and allows chromatographers to run a full range of gradient and isocratic separations more effectively than hand-made eluents.

- Automatic production of high-purity eluents for isocratic and gradient runs on ICS-5000 and ICS-2100 systems
- Outstanding run-to-run reproducibility week after week
- Elimination of acid and base handling
- Longer lasting pumps because they encounter only deionized water
- Available for analytical scale as well as capillary scale systems

EGC III cartridges support a concentration range of 0.1–100 mM (0.1–80 mM EGC-LiOH) at 1.0 mL/min. EGC Capillary Cartridges support a concentration range of 0.1–200 mM at 0.010 mL/min. KOH, NaOH and LiOH cartridges support a maximum of 25% methanol. The potassium carbonate and MSA cartridges are not solvent-compatible.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### *Product Brochures*

Reagent-Free Ion Chromatography

### *Product Data Sheets*

Reagent-Free Ion Chromatography Systems with Eluent Generation for IC Without Manually Prepared Eluents

## Ordering Information

Accessories	
EGC III KOH (replaces 058900).....	074532
EGC III NaOH (replaces 058908).....	074533
EGC III LiOH (replaces 058904).....	074534
EGC III K <sub>2</sub> CO <sub>3</sub> (replaces 058904).....	074536
EPM III (replaces 063175).....	080135
EGC III MSA (replaces 058902).....	074535
EGC-KOH (Capillary).....	072076
EGC-MSA (Capillary).....	072077

## RFIC-Eluent Regeneration

*Allows nonstop operation of an IC system for up to four weeks at a time*

RFIC-ER is a low-cost alternative to RFIC-EG systems. Rather than generate eluent electrolytically using deionized water, RFIC-ER uses the electrolytic suppressor to regenerate the starting eluent. Eluent is prepared in the normal manner. After use and regeneration, the eluent is passed through a series of eluent purifier columns to produce pure eluent. The purified eluent is returned to the eluent bottle. One batch of original eluent can provide up to four weeks of non-stop operation.

- Always on, Always Ready capability for ICS-1100, 1600, 2100, and 5000 systems
- System remains fully equilibrated and calibrated for long periods of time
- Simple plumbing and easy-to-understand schematic diagram
- Low cost of ownership
- Ideal for the analysis of common anions and cations in drinking, surface and ground water samples
- Operator errors are significantly reduced or eliminated

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com)

### *Product Brochures*

Reagent-Free Ion Chromatography

### *Product Data Sheets*

Reagent-Free Ion Chromatography Systems with Eluent Regeneration Data Sheet

## Ordering Information

Startup kits include the tubing, controllers, and software needed to upgrade an ICS-1100, 1600, 2100, or 5000 to an RFIC-ER system. The startup kit also includes one complete set of consumables.

### RFIC-ER

RFIC-ER Anion Startup Kit.....	067797
<i>Includes one Anion Consumables Kit</i>	
RFIC-ER Cation Startup Kit.....	067798
<i>Includes one Cation Consumables Kit</i>	
Eluent Regeneration Startup Kit, Anion, for ICS-1100 and ICS-1600 .....	069570
Eluent Regeneration Startup Kit, Cation, for ICS-1100 and ICS-1600 .....	069569
AC-ER Anion Concentrator for RFIC-ER .....	072778

### Accessories

RFIC-ER Anion Consumables Kit.....	067791
RFIC-ER Cation Consumables Kit.....	067792



## CR-TC Continuously Regenerated Trap Columns

### *Reduce baseline drift by removing contaminants*

Designed for eluent generators in RFIC systems, CR-TCs remove all anionic or cationic contaminants in the eluent continuously and provide very low baseline drift during gradient operations. The CR-TC offers:

- Contaminant-free deionized source water and eluent
- Time savings—no need to perform the regeneration off-line
- Very low baseline drift for improved integration and increased sensitivity
- Increased productivity; quality data soon after startup
- Sample pretreatment with the CR-CTC II
- Compatibility with Capillary RFIC-EG systems
- Removal of ammonium contaminants from source water

Plumb the CR-TC after the EG Cartridge (EGC) to remove eluent contaminants continuously and achieve very low baseline drift during gradient operations.

## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Data Sheets*

Concentrator and Trap Columns Data Sheet

## Ordering Information

The CR-TC column is compatible with all Dionex Eluent Generators including the RFC-30, ICS-2100 and ICS-5000 EG. EG40 customers must first order the CR-TC Add-on Kit (P/N 060476). A single format is used with 2, 3, 4, and 5 mm i.d. separator column applications, while a second format is available for capillary column applications.

### CR-TC

CR-ATC Continuously Regenerated Anion Trap Column .....	060477
CR-CTC II Continuously Regenerated Cation Trap Column .....	066262
CR-ATC Continuously Regenerated Anion Trap Column (Capillary) (For use with Capillary Anions Columns) .....	072078
CR-CTC Continuously Regenerated Cation Trap Column (Capillary) (For use with Capillary Cation Columns) .....	072079

## CRD Carbonate Removal Device

### *Reduces carbonate for improved sensitivity*

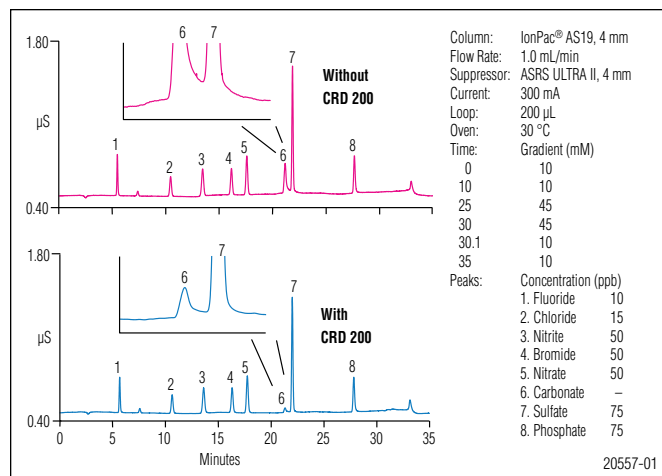
The Carbonate Removal Device (CRD 200) removes carbon dioxide from the suppressed eluent stream by diffusion through the walls of a gas permeable membrane. The result is a reduction in the response from carbonate. It therefore removes the carbonate peak in hydroxide eluent RFIC-EG systems or reduces the background to near hydroxide-like levels in carbonate eluent systems. Plumbed after the suppressor, the carbon dioxide transfer is aided by a countercurrent flow of basic solution.

- The CRD 200 is optimized for the removal of the carbonate in hydroxide eluent systems.
- Minimizing carbonate using the CRD 200 can improve quantification.
- The increased membrane length of the CRD 300 is optimized for carbonate eluent systems.
- Reducing the baseline with a CRD 300 results in higher sensitivity.
- Elimination of the carbonic acid matrix with a CRD 300 increases the linearity range.

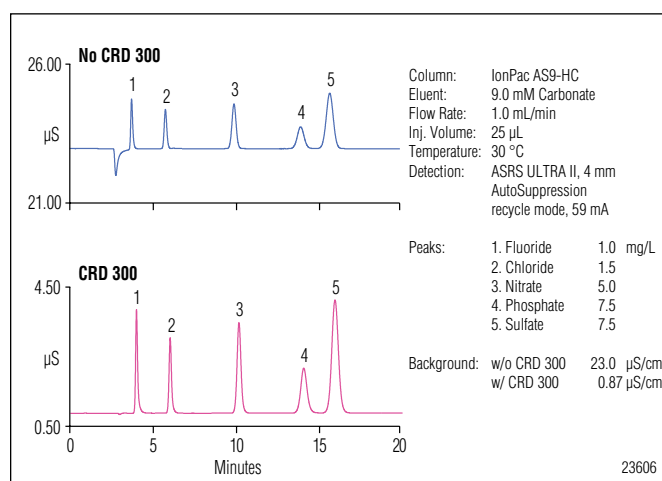
By simply being exposed to carbon dioxide in the air, samples can become contaminated with carbonate. In some samples, depending on the column and separation conditions, the presence of high levels of carbonate originating from dissolved carbon dioxide interferes with the accurate determination of analytes of interest, such as sulfate and nitrite.

The CRD 200 requires no reagents or software control, and can be installed easily in any Dionex IC system equipped with an eluent generator, CR-ATC, and ASRS 300 or ACES 300 suppressor. The CRD 200 is a low-dispersion device specifically for use with hydroxide-based and borate-based chemistries using Dionex columns. The CRD 200 is available in three formats: The CRD 200 (4 mm) supports carbonate removal from standard bore systems, the CRD 200 (2 mm) supports carbonate removal from microbore systems, and the CRD 200 (Capillary) supports carbonate removal from capillary-scale systems at flow rates of 5–30  $\mu\text{L}/\text{min}$ .

**Note:** The CRD 300 is not recommended for use with the ASRS ULTRA II suppressor.



*A significant amount of carbonate is removed using the CRD.*



*Background noise is significantly reduced using the CRD 300.*

The CRD 300 is easily installed in any Dionex IC system equipped with an ASRS 300 suppressor. It requires either a constant flow of basic solution from a peristaltic pump or evacuation by a vacuum pump. It is a low-dispersion device designed for use with carbonate-based chemistries using Dionex columns. The CRD 300 is available in two formats. The CRD 300 (4 mm) supports carbonate removal from standard bore systems, while the CRD 300 (2 mm) supports carbonate removal from microbore systems.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

Product Data Sheets

Carbonate Removal Device 200 (CRD 200) for RFIC Systems

Carbonate Removal Device 300 (CRD 300) for Carbonate Eluents

Ordering Information

CRD 200	
Carbonate Removal Device CRD 200 (4 mm) .....	062983
Carbonate Removal Device CRD 200 (2 mm) .....	062986
Carbonate Removal Device CRD 200 (Capillary) .....	072054
CRD 300	
Carbonate Removal Device CRD 300 (4 mm) .....	064637
Carbonate Removal Device CRD 300 (2 mm) .....	064638
CRD 300 (4 mm) with Peristaltic Pump .....	064905
CRD 300 (2 mm) with Peristaltic Pump .....	064906
Santoprene Tubing for Peristaltic Pump .....	068518
Peristaltic Pump / CRD 300 Ship Kit .....	064911
<i>For configuring two CRD 300s with one peristaltic pump</i>	
CRD 300 (4 mm) with VP Vacuum Pump .....	068475
CRD 300 (2 mm) with VP Vacuum Pump .....	068474

## InGuard Cartridges



The InGuard line of sample pretreatment cartridges is designed to remove matrix interferences such as anions, cations, transition metals, or hydrophobic substances encountered in many ion chromatography (IC) applications. The InGuard cartridge is installed inline between the autosampler and the IC injection valve facilitating immediate, automated sample pretreatment.

- Eliminates manual sample pretreatment steps
- Facilitates better separations
- Increases lifetimes of analytical columns
- Solves major matrix problems
- Achieves reproducible ppm-level determinations in concentrated matrices
- Convenient and easy to use

The InGuard cartridge is optimized for the best performance in matrix removal applications and can be used singly or in series. Designed to eliminate leaks and channeling, the cartridges use standard 10–32 fittings for easy installation into an IC system. The unique sample distribution frit maximizes complete resin bed usage.

**Note:** Depending on the chemistry and samples treated, some cartridges can be regenerated.

### Related Literature

For detailed product specifications and applications, see the following, available under Literature on [www.dionex.com](http://www.dionex.com).

#### Product Datasheets

InGuard In-Line Sample Pretreatment Cartridges Data Sheet

## InGuard Ag Cartridge

The InGuard Ag cartridge removes chloride, bromide, and iodide from concentrated sample matrices such as brines. The InGuard Ag resin is a styrene-based sulfonic acid resin in the silver form, the same material used in OnGuard II Ag cartridges. For the removal of any residual silver ions, an InGuard H or InGuard Na cartridge should be placed after the InGuard Ag cartridge.

**Note:** The InGuard H or InGuard Na cartridge should be placed after the InGuard Ag cartridge to remove any residual silver ions.

### Key Specifications

**Functionality:** Cation-exchange, silver form

**Capacity:** 5–5.5 meq

**Solvents:** 0–100% HPLC

**pH:** 0–14

**Mode:** Removal of halides by precipitation

### Ordering Information

#### Accessories

InGuard Ag, pkg. of 4..... 074038

## InGuard H Cartridge

The InGuard H cartridge is ideal for the removal of high levels of alkaline earth metals and transition metals from sample matrices. It is also used for the neutralization of highly alkaline samples such as sodium hydroxide or sodium carbonate. Carbonate can be reduced to very low levels following this pH reduction by passing the sample through a CRD 200.

The InGuard H cartridge contains styrene-based, sulfonic acid resin in the hydronium form, the same as that used in OnGuard II H cartridges. This resin is designed to have very high selectivity for polyvalent cations, such as calcium and transition metals.

### Key Specifications

**Functionality:** Cation-exchange, hydronium form

**Capacity:** 5–5.5 meq

**Solvents:** 0–100% HPLC

**pH:** 0–14

**Mode:** Removal of alkaline earth and transition metals; pH adjustment of basic samples

## Ordering Information

## Accessories

InGuard H, pkg. of 4..... 074037

## InGuard Na

The InGuard Na cartridge is used for the removal of high levels of alkaline earths and transition metals from sample matrices without acidifying the sample, ensuring good recovery of acid-labile analytes such as nitrite. The InGuard Na cartridge contains styrene-based, sulfonic acid in the sodium form, designed to have high selectivity for multivalent cations.

## Key Specifications

*Functionality:* Cation-exchange, sodium form

*Capacity:* 5–5.5 meq

*Solvents:* 0–100% HPLC

*pH:* 0–14

*Mode:* Removal of alkaline earth and transition metals

## Ordering Information

## Accessories

InGuard Na, pkg. of 4 ..... 074036

## InGuard HRP Cartridge

The InGuard HRP cartridge can be used to remove organic matrix material over a wide range of hydrophobicity, including fats from whole milk. The InGuard HRP cartridge contains a hydrophilic reversed-phase resin based on divinylbenzene. The material is water-wettable, thus 100% aqueous samples can be pretreated without disruption of the column bed.

## Key Specifications

*Functionality:* Hydrophilic divinylbenzene

*Capacity:* 2 g

*Solvents:* 0–100% HPLC

*pH:* 0–14

*Mode:* Adsorption,  $\pi$ - $\pi$  bonding. Removal of hydrophobic species, azo-, and cyano-containing species

## Ordering Information

## Accessories

InGuard HRP, pkg. of 4..... 074034

## InGuard Na/HRP

The InGuard Na/HRP cartridge is designed to provide general purpose cleanup of samples, such as foods, for anion analysis. This cartridge contains a blend of sulfonated resin in the sodium form and HRP resin to provide the dual functionality of removing both organic contaminants and cations, including metals, from a sample.

## Key Specifications

*Functionality:* Dual Functionality

*Capacity:* 50% Na/50% HRP

*Solvents:* 0–100% HPLC

*pH:* 0–14

*Mode:* Ion-exchange (Na) and adsorption remove  $\text{Ca}^{2+}$  ( $\text{Na}^{+}$ ) and lipids (HRP) from dairy

## Ordering Information

## Accessories

InGuard Na/HRP, pkg. of 4..... 074035

## OnGuard II Cartridges

OnGuard II Cartridges remove matrix interferences such as phenolics compounds, metals, cations, anions, or hydrophobic substances encountered in many ion chromatography applications. Cartridges are available in 1 cc and 2.5 cc high-capacity formats.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### Product Data Sheets

OnGuard II Sample Pretreatment Cartridges and Workstation

#### Application Notes

AN 101: Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography

AN 136: Determination of Inorganic Oxyhalide Disinfection Byproduct Anions and Bromide in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis

AN 37: The Determination of Iodide in Milk Products

#### Application Updates

AU 140: The Determination of Iodide in Urine

## OnGuard II A

The OnGuard II A is used in the removal of anionic contaminants from sample matrices and for the neutralization of highly acidic samples. These cartridges contain styrene-based, anion-exchange resin in the bicarbonate form.

### Key Specifications

*Functionality:* anion-exchange, bicarbonate form

*Capacity ( $\mu\text{eq}/\text{cartridge}$ ):* 0.7 (1 cc cartridge); 1.75 (2.5-cc cartridge)

*Solvents:* 0–100% HPLC

*pH stability:* 0–14

*Mode:* removal of anions; pH adjustments of acidic samples

### Ordering Information

#### Accessories

OnGuard II A Cartridges, 1 cc, pkg. of 48 .....	057091
OnGuard II A Cartridges, 2.5 cc, pkg. of 48 .....	057092

## OnGuard II Ag

The OnGuard II Ag contains a silver-form, high-capacity, sulfonated, cation-exchange resin similar to the OnGuard II H packing. These cartridges remove chloride, bromide, and iodide from sample matrices. An OnGuard II H cartridge should be used after the OnGuard II Ag cartridge to remove dissolved  $\text{Ag}^+$ .

### Key Specifications

*Functionality:* cation-exchange, silver form

*Capacity ( $\mu\text{eq}/\text{cartridge}$ ):* 2.0–2.2 (1 cc); 5.0–5.5 (2.5 cc)

*Solvents:* 0–100% HPLC

*pH Stability:* 0–14

*Mode:* removal of chloride, bromide, iodide by precipitation

### Ordering Information

#### Accessories

OnGuard II Ag Cartridges, 1 cc, Pkg. of 48 .....	057089
OnGuard II Ag Cartridges, 2.5 cc, Pkg. of 48 .....	057090

## OnGuard II Ag/H

The OnGuard II Ag/H is a layered cartridge that contains both OnGuard II Ag and OnGuard II H resins.

- Easily removes chloride, bromide, and iodide from concentrated matrices such as brines
- Traps soluble silver and other cations
- Removes high levels of alkaline earth and transition metals
- Neutralizes caustic samples
- Removes carbonate

This two-layer cartridge replaces two cartridges in series, and provides greater silver capacity.

### Ordering Information

#### Accessories

OnGuard II Ag-H Cartridge, 2.5 cc, Pkg. of 48 ..... 057410

## OnGuard II Ba

The OnGuard II Ba resin is a styrene-based, sulfonic acid resin in the barium form, designed for the removal of high concentrations of sulfate from sample matrices. For reproducible, quantitative determinations in low-ionic strength samples, activate these cartridges by adding sodium chloride or other sodium salt.

Samples treated with NaCl should be passed through an OnGuard II Ag cartridge to remove the added chloride, followed by the OnGuard II H cartridge or MetPac™ CC-1 chelating column to remove residual silver counterions.

### Key Specifications

*Functionality:* cation-exchange, barium form

*Capacity (μeq/cartridge):* 2.0–2.2 (1 cc); 5.0–5.5 (2.5 cc)

*Solvents:* 0–100% HPLC

*pH Stability:* 0–14

*Mode:* removal of sulfate by precipitation

### Ordering Information

#### Accessories

OnGuard II Ba Cartridges, 1 cc, pkg. of 48 ..... 057093

OnGuard II Ba Cartridges, 2.5 cc, pkg. of 48 ..... 057094

## OnGuard II Ba/Ag/H

The OnGuard II Ba/Ag/H is a layered cartridge containing OnGuard II Ba, Ag, and H styrene-based, sulfonic acid resins.

- The Ba resin removes high concentrations of sulfate from sample matrices.
- The Ag form easily removes chloride, bromide, and iodide from concentrated matrices.
- The H form is highly selective for polyvalent cations such as calcium and transition metals.

This cartridge is ideal for the removal of high levels of alkaline earth and transition metals from sample matrices, neutralization of caustic samples, and removal of carbonate. This three-layer cartridge can be used in place of three single cartridges in series and has the added advantage of higher silver capacity.

### Ordering Information

#### Accessories

OnGuard II Ba/Ag/H Cartridges, 2.5 cc, pkg of 48 ..... 063955

## OnGuard II H

The OnGuard II H removes high levels of alkaline earth and transition metals from sample matrices and neutralizes highly alkaline samples such as sodium hydroxide or sodium carbonate. Carbonate can then be removed by sparging the sample.

These cartridges contain 16% crosslinked, styrene-based, sulfonic acid resin in the hydrogen form. This resin is designed to have very high selectivity for multivalent cations such as calcium and transition metals.

### Key Specifications

*Functionality:* cation-exchange hydronium form

*Capacity (μeq/cartridge):* 2.0–2.2 (1 cc); 5.0–5.5 (2.5 cc)

*Solvents:* 0–100% HPLC

*pH Stability:* 0–14

*Mode:* removal of alkaline earth and transition metals; pH adjustment of basic samples

### Ordering Information

#### Accessories

OnGuard II H Cartridges, 1 cc, pkg. of 48 ..... 057085

OnGuard II H Cartridges, 2.5 cc, pkg. of 48 ..... 057086

## OnGuard II M

The OnGuard II M is used for the removal of transition metals and for matrix elimination of alkali and alkaline earth metals. These cartridges contain an iminodiacetate resin in the ammonium form, ready to use with no lengthy preparation required.

### Key Specifications

*Functionality:* iminodiacetate, ammonium form

*Capacity ( $\mu\text{eq/cartridge}$ ):* 0.4 (1 cc); 1.0 (2.5 cc)

*Solvents:* 0–100% HPLC

*pH Stability:* 0–14 (resin shrinks in acid form)

*Mode:* concentration of transition metals by chelation (2.5 cc format); removal of transition metals (1 cc format)

### Ordering Information

#### Accessories

OnGuard II M Cartridges, 1 cc, pkg. of 48 ..... 057137  
OnGuard II M Cartridges, 2.5 cc, pkg. of 48 ..... 057095

## OnGuard II Na

The OnGuard II Na removes high levels of alkaline earth and transition metals from sample matrices without acidifying the sample. This ensures good recovery of acid-labile analytes such as nitrite. These cartridges contain 16% crosslinked, styrene-based, sulfonic acid resin in the sodium form.

This resin has very high selectivity for multivalent cations such as calcium, magnesium and transition metals.

### Key Specifications

*Functionality:* cation-exchange, sodium form

*Capacity ( $\mu\text{eq/cartridge}$ ):* 2.0–2.2 (1 cc); 5.0–5.5 (2.5 cc)

*Solvents:* 0–100% HPLC

*pH Stability:* 0–14

*Mode:* removal of alkaline earth and transition metals without acidifying the sample

### Ordering Information

#### Accessories

OnGuard II Na Cartridges, 1 cc, pkg. of 48 ..... 062948  
OnGuard II Na Cartridges, 2.5 cc, pkg. of 48 ..... 062962

## OnGuard II P

The OnGuard II P is recommended for removing the phenolic fraction of humic acids, tannic acids, lignins, anthocyanins, and azodyes from samples prior to analysis by anion or cation exchange.

These cartridges contain polyvinylpyrrolidone (PVP) polymer with very high selectivity for phenolics, azo-containing compounds, aromatic carboxylic acids, aromatic aldehydes, and iodine as the triiodide complex.

### Key Specifications

*Functionality:* polyvinylpyrrolidone

*Capacity ( $\mu\text{eq/cartridge}$ ):* 6.0 (1 cc); 2.5 cc format not available

*Solvents:* 0–100% HPLC

*pH Stability:* 1–10

*Mode:* removal of phenols, azo dyes, humic acids by complexation

### Ordering Information

#### Accessories

OnGuard II P Cartridges, 1 cc, pkg. of 48 ..... 057087

## OnGuard II RP

The OnGuard II RP cartridge is recommended for removing hydrophobic substances such as aromatic dyes, some aromatic carboxylic acids, hydrocarbons, and surfactants from sample matrices. These cartridges contain a macroporous divinylbenzene resin that has a very high selectivity for hydrophobic substances, especially unsaturated or aromatic organic substances.

Contains 0.3 g resin/1 cc cartridge, 0.75 g resin 2.5 cc cartridge.

### Key Specifications

*Functionality:* polydivinylbenzene

*Capacity ( $\mu\text{eq/cartridge}$ ):* 0.3 g resin (1 cc); 0.75 g resin (2.5-cc)

*Solvents:* 0–100% HPLC

*pH Stability:* 0–14

*Mode:* removal of surfactants, high-molecular weight carboxylic acids, aromatic dyes by adsorption



Ordering Information

Accessories	
OnGuard II RP Cartridges, 1 cc, Pkg. of 48.....	057083
OnGuard II RP Cartridges, 2.5 cc, Pkg. of 48.....	057084

OnGuard Accessories

The OnGuard Sample Prep Station enables simultaneous pretreatment of multiple samples with OnGuard sample pretreatment cartridges. When used with Dionex 0.5 mL PolyVials and a vacuum source, the OnGuard Sample Prep Station supports semi-automatic pretreatment of up to 12 samples. Samples may also be treated manually using standard Luer tip syringes.

The OnGuard Sample Prep Station has individual stopcock valves on each sample tube to allow control of individual flow rates. The station will also hold six 10 mL volumetric flasks.

Ordering Information

Accessories	
OnGuard Sample Prep Workstation.....	039599
OnGuard Needle, 18 Gauge, 1.25/Luer .....	039996
OnGuard Valve, Stopcock Luer.....	040896

## Standards, Reagents, and Eluent Concentrates

To simplify your workflow, Dionex has developed all the reagents and standards you need, including anion and cation standards, eluent concentrates, and AutoRegen concentrates. Dionex offers high-purity chemicals and standards for transition metal analysis, including ultrapure chelation chromatography reagents for trace and ultratrace transition and lanthanide metal analysis.

### Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

#### Product Data Sheets

IC Standards and Reagents Data Sheet

### Ion Standard Concentrates

The IonPac ready-to-use ion standards are designed for routine anion or cation determinations.

#### Ordering Information

##### Ion Standard Concentrates

5-Anion Standard, 100 mL .....	037157
<i>Contains: F, 20 mg/L; Cl, 30 mg/L; NO<sub>2</sub>, 100 mg/L; PO<sub>4</sub>, 150 mg/L; SO<sub>4</sub>, 150 mg/L</i>	
7-Anion Standard, 50 mL .....	056933
<i>Contains: F, 20 mg/L; Cl, 30 mg/L; NO<sub>2</sub>, 100 mg/L; Br, 100 mg/L; NO<sub>3</sub>, 100 mg/L; PO<sub>4</sub>, 150 mg/L; SO<sub>4</sub>, 150 mg/L</i>	
7-Anion Standard II, 100 mL .....	057590
<i>Contains: F, 20 mg/L; Cl, 30 mg/L; NO<sub>2</sub>, 100 mg/L; Br, 100 mg/L; NO<sub>3</sub>, 100 mg/L; PO<sub>4</sub>, 150 mg/L; SO<sub>4</sub>, 150 mg/L</i>	
Fluoride Standard (1000 mg/L), 100 mL .....	037158
Chloride Standard (1000 mg/L), 100 mL .....	037159
Sulfate Standard (1000 mg/L), 100 mL .....	037160
6-Cation Standard-I, 50 mL .....	040187
<i>Contains: Li, 50 mg/L; Na, 200 mg/L; NH<sub>4</sub>, 400 mg/L; K, 200 mg/L; Mg, 200 mg/L; Ca, 1000 mg/L</i>	
6-Cation Standard-II, 50 mL .....	046070
<i>Contains: Li, 50 mg/L; Na, 200 mg/L; NH<sub>4</sub>, 250 mg/L; K, 500 mg/L; Mg, 250 mg/L; Ca, 500 mg/L</i>	

### MS Standard Concentrates

For the quantification of perchlorate at low parts-per-trillion levels using mass spectrometric detection. Contains stable-labeled perchlorate (1 mg/L).

#### Ordering Information

##### MS Standard Concentrates

Kit of Standards for OQ/PQ Measurements (FM104284) .....	061496
Calibrant for MSQ ELMO and PLUS .....	062917
Mass Calibration Solution Mixture MSQ Std Only (FM104285) .....	060758
Perchlorate O-18 Internal Standard, 1 mg/L, 10 mL .....	062923

### Haloacetic Acid Internal Standards

Ready-to-use internal standards for haloacetic acid analysis using electrospray-mass spectrometric detection. Stable-labeled internal standards prepared in MTBE (methyl-t-butyl ether), 1 mL ampule plus empty vial

#### Ordering Information

##### Haloacetic Acid Internal Standards

Monochloroacetic Acid -2-13C Internal Standard, 1000 mg/L in MtBE, 1 mL .....	069406
Monobromoacetic Acid -1-13C Internal Standard, 1000 mg/L in MtBE, 1 mL .....	069407
Dichloroacetic Acid -2-13C Internal Standard, 1000 mg/L in MtBE, 1 mL .....	069408
Trichloroacetic Acid -2-13C Internal Standard, 1000 mg/L in MtBE, 1 mL .....	069409
Calibrant for MSQ ELMO and Plus, 250 mL (60111-01001) .....	062917

### OQ/PQ Standards

#### Ordering Information

##### OQ/PQ Standards

Custom Caffeine Standards Kit, 10 mL Ampoules .....	060253
Custom Nitrate Standards Kit, 10 mL Ampoules .....	060254
Threonine Standards Kit, Set of Six Standards, 1 mL each .....	063542

## Anion Eluent Concentrates

### Ordering Information

Anion Eluent Concentrates	
AS23 Eluent Concentrate (100x), 250 mL	064161
AS22 Eluent Concentrate (100x), 250 mL	063965
AS14A Eluent Concentrate (100x), 250 mL	056937
AS14A Eluent Concentrate (20x), 100 mL	057560
AS14A Eluent Concentrate (20x), 100 mL, Pkg. of 4	057557
AS14 Eluent Concentrate (100x), 250 mL	053560
AS4A Eluent Concentrate (100x), 500 mL	039513
AS4 Eluent Concentrate (100x), 500 mL	037161
Carbonate Concentrate, 0.5M, 500 mL	037162
Bicarbonate Concentrate, 0.5 M, 500 mL	037163

## Cation Eluent Concentrates and Reagents

### Ordering Information

Cation Eluent Concentrates and Reagents	
Methanesulfonic Acid, 500 mL	033478
<i>For IonPac CS12, CS12A, CS14, CS15, CS17, and CS18 cation-exchange column eluents.</i>	
CS12A Eluent Concentrate (20x), 100 mL	057562
CS12A Eluent Concentrate (20x), 100 mL, Pkg. of 4	057558
DAP-HCl (DL-2,3-Diaminopropionic Acid-HCl), 5 g	039670
<i>For IonPac CS3, CS10, and CS11 cation-exchange column eluents</i>	

## Displacement Chemical Regenerant Reagents

### Ordering Information

Displacement Chemical Regeneration Reagents	
Anion Regenerant Concentrate (2.0 N H <sub>2</sub> SO <sub>4</sub> ), 75 mL	057559
Anion Regenerant Concentrate (2.0 N H <sub>2</sub> SO <sub>4</sub> ), 75 mL, Pkg. of 4	057555
Cation Regenerant Solution (2.06 M TBAOH), 100 mL	057561
Cation Regenerant Solution (2.06 M TBAOH), 100 mL, Pkg. of 4	057556

## MMS Regenerant Concentrates

### Ordering Information

MMS Regenerant Concentrates	
Anion Regenerant Concentrate (10x), 50 mL	039601
Anion Regenerant Concentrate (20x), 200 mL	039203
Anion Regenerant Concentrate (20x), 200 mL, Pkg. of 4	037164
Cation Regenerant Solution, 500 mL	039602

## Ion Pairing Reagents

Highly purified ion-pairing reagents are used in mobile phase ion chromatography (MPIC), combining reversed-phase ion-pair chromatography with chemical suppression.

### Ordering Information

Ion Pairing Reagents	
Tetrabutylammonium Hydroxide (TBAOH), 500 mL	035360
Tetrapropylammonium Hydroxide (TPAOH), 500 mL	035363
Hexanesulfonic Acid (HSA), 500 mL	035361
Octanesulfonic Acid (OSA), 500 mL	035362

## Transition Metal Analysis Reagents

The MetPac PDCA Eluent Concentrate uses pyridine-2,6-dicarboxylic acid for the separation of iron (II) and iron (III), copper, nickel, zinc, cobalt, cadmium, and manganese on the IonPac CS5A column. The MetPac Oxalic Acid Eluent Concentrate uses oxalic acid for the separation of lead, copper, cadmium, cobalt, zinc, and nickel on the IonPac CS5A column.

The MetPac PAR Postcolumn Reagent Diluent is a ready-to-use diluent for 4-(2-pyridylazo) resorcinol for postcolumn derivatization of transition metals separated using the IonPac CS5A column.

### Ordering Information

Transition Metal Analysis Reagents	
MetPac Oxalic Acid Eluent Concentrate (10x), 500 mL	046091
MetPac PDCA Eluent Concentrate (5x), 1000 mL	046088
PDCA (Pyridine-2,6-dicarboxylic Acid), 20 g	039671
MetPac PAR Post Column Diluent, 1000 mL	046094
<i>Ready-to-use diluent for 4-(2-Pyridylazo) Resorcinol</i>	
PAR (4-(2-Pyridylazo) Resorcinol Monosodium Salt), 5 g	039672
<i>Required for transition metal and lanthanide postcolumn derivitization using the IonPac CS5 or CS5A columns</i>	

## Chelation Chromatography Reagents

Chelation IC reagents are designed specifically for use with the Dionex Chelation Concentration System coupled with IC, or ICAP for the determination of transition and lanthanide metals at trace and ultratrace levels. A Certificate of Analysis is provided with each product.

### Ordering Information

#### Chelation Chromatography Reagents

2.0 M Nitric Acid, 1 L .....	033442
2.0 M Nitric Acid, 1 L, Pkg. of 6 .....	033443
2.0 M Ammonium Acetate, 1 L .....	033440
2.0 M Ammonium Acetate, 1 L, Pkg. of 6 .....	033441
0.1 M Ammonium Nitrate, 1 L .....	033444
0.1 M Ammonium Nitrate, 1 L, Pkg. of 6 .....	033445

## Carbohydrate Standards

Dionex Carbohydrate Standards are ready-made standards for performance verification. These standards are for qualitative use only, and should be used to verify the performance of your BioLC system or CarboPac carbohydrate column. Simply reconstitute the vial contents and inject.

The Dionex MonoStandard Mix of Six carbohydrate standard is prepared from reference-grade monosaccharides. Each vial of Dionex MonoStandard Mix of Six contains 100 nmol of fucose, galactosamine hydrochloride, glucosamine hydrochloride, galactose, glucose, and mannose. Prior to use, dilute the contents of the vial to yield a solution containing 0.1 mM (100 pmol/ $\mu$ L) of each monosaccharide.

The sialylated fetuin N-linked alditol standard is purified from bovine fetuin. Each vial contains 25 nmol oligosaccharides. Prior to use, reconstitute the contents of the vial in a known volume of water (e.g., 250 mL) depending upon your application.

### Ordering Information

#### Carbohydrate Standards

MonoStandard, Mixture of Six, 100 nmol Each .....	043162
Oligo Standard, Sialylated N-Linked Alditols, 25 nmol .....	043064

## AAA-Direct Reagents

Dionex AAA-Direct grade sodium acetate is preweighed; just add water to produce the correct concentration.

- Prequalified sodium acetate for AAA-Direct that is guaranteed not to contaminate your AAA-Direct system
- Preweighed sodium acetate for ease of use
- 2-pack of sodium acetate sufficient for one month of continuous operation

The quality of sodium acetate used for AAA-Direct is crucial. When AAA-Direct was first introduced, Dionex recommended that customers purchase certain high grades of sodium acetate from particular vendors. However, different lots of these recommended high grades were found to contain contaminants that adversely affected the performance of AAA-Direct. In response, Dionex has introduced its own prequalified AAA-Direct grade sodium acetate, which has been tested and is guaranteed not to contaminate your system. Dionex recommends that AAA-Direct users purchase only the prequalified Dionex sodium acetate to guarantee trouble-free use of their system.

### Ordering Information

#### AAA-Direct Reagents

Sodium Acetate Salt (Pre-Weighed Reagent), Pkg. of 2 .....	059326
Histidine Standard, AAA-Direct System Installation .....	059540

## ICS-900 Consumables Packages

These bundled packages include: analytical and guard columns, appropriate MMS II suppressor, application-specific DCR bottle, eluent, and regenerant concentrates. These kits are appropriate for the ICS-900, ICS-90, ICS-90A, and previous Displacement Chemical Regeneration systems.

### AS4A 4 mm Bundled Package

This package includes:

- IonPac AS4A-SC 4 mm, P/N 043174
- IonPac AG4A-SC 4 mm, P/N 043175
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- AS4A-SC Eluent Concentrate, P/N 039513

#### Ordering Information

##### ICS-900 - AS4A 4 mm - Bundled Package

ICS-900, AS4A 4 mm, Consumables Bundled Package ..... 060133

### AS9-HC 4 mm Bundled Package

This package includes:

- IonPac AS9-HC 4 mm, P/N 051786
- IonPac AG9-HC 4 mm, P/N 051791
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-90 DCR Anion Regenerant 2 L Bottle, P/N 057712
- Sodium Carbonate Concentrate (0.5 M), 500 mL, P/N 037162
- Sodium Bicarbonate Concentrate (0.5 M), 500 mL, P/N 037163

#### Ordering Information

##### ICS-900 - AS9-HC 4 mm - Bundled Package

ICS-900, AS9-HC 4 mm, Consumables Bundled Package..... 060134

## AS12A 4 mm Bundled Package

This package includes:

- IonPac AS12A 4 mm, P/N 046034
- IonPac AG12A 4 mm, P/N 046035
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- Sodium Carbonate Concentrate (0.5 Molar), 500 mL, P/N 037162
- Sodium Bicarbonate Concentrate (0.5 Molar), 500 mL, P/N 037163

#### Ordering Information

##### ICS-900 - AS12A 4 mm - Bundled Package

ICS-900, AS12A 4 mm, Consumables Bundled Package ..... 060135

### AS14 4 mm Bundled Package

This package includes:

- IonPac AS14 4 mm, P/N 046124
- IonPac AG14 4 mm, P/N 046134
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- AS14 Eluent Concentrate, P/N 053560

#### Ordering Information

##### ICS-900 - AS14 4 mm - Bundled Package

ICS-900, AS14 4 mm, Consumables Bundled Package..... 060136

**AS14A 4 mm Bundled Package**

This package includes:

- IonPac AS14A 4 mm, P/N 056904
- IonPac AG14A 4 mm, P/N 056897
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- AS14A Eluent Concentrate, P/N 056937

**Ordering Information****ICS-900 - AS14A 4 mm Bundled Package**

ICS-900, AS14A 4 mm, Consumables Bundled Package ..... 060137

**AS14A 3 mm Bundled Package**

This package includes:

- IonPac AS14A 3 mm, P/N 056901
- IonPac AG14A 3 mm, P/N 056899
- AMMS III 2 mm, P/N 056751
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- AS14A Eluent Concentrate, P/N 056937

**Ordering Information****ICS-900 - AS14A 3 mm - Bundled Package**

ICS-900, AS14A 3 mm, Consumables Bundled Package ..... 060138

**AS22 4 mm Bundled Package**

This package includes:

- IonPac AS22 4 mm, P/N 064141
- IonPac AG22 4 mm, P/N 064139
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- AS22 Eluent Concentrate, P/N 067078

**Ordering Information****ICS-900 - AS22 4 mm - Bundled Package**

ICS-900, AS22 4 mm, Consumable Bundled Package ..... 067078

**AS23 4 mm Bundled Package**

This package includes:

- IonPac AS23 4 mm, P/N 064149
- IonPac AG23 4 mm, P/N 064147
- AMMS III 4 mm, P/N 056750
- AMMS III Regenerant Concentrate, 4 pack, P/N 057555
- ICS-900 DCR Anion Regenerant 2 L Bottle, P/N 057712
- AS23 Eluent Concentrate, P/N 064161

**Ordering Information****ICS-900 - AS23 4 mm - Bundled Package**

ICS-900, AS23 4 mm, Consumable Bundled Package ..... 067079

**CS12A 4 mm Bundled Package**

This package includes:

- IonPac CS12A 4 mm, P/N 046073
- IonPac CG12A 4 mm, P/N 046074
- CMMS III 4 mm, P/N 056752
- CMMS III Regenerant Concentrate, 4 pack, P/N 057556
- ICS-900 DCR Cation Regenerant 2 L Bottle, P/N 057713
- CS12A Eluent Concentrate, P/N 057562

**Ordering Information****ICS-900 - CS12A 4 mm - Bundled Package**

ICS-900, CS12A 4 mm, Consumables Bundled Package ..... 060132

**CS12A 3 mm Bundled Package**

This package includes:

- IonPac CS12A 3 mm, P/N 057185
- IonPac CG12A 3 mm, P/N 057184
- CMMS III 2 mm, P/N 056753
- CMMS III Regenerant Concentrate, 4 pack, P/N 057556
- ICS-900 DCR Cation Regenerant 2 L Bottle, P/N 057713
- CS12A Eluent Concentrate, P/N 057562

**Ordering Information****ICS-900 - CS12A 3 mm - Bundled Package**

ICS-900, CS12A 3 mm, Consumables Bundled Package ..... 060131

**CS16 5 mm Bundled Package**

This package includes:

- IonPac CS16 5 mm, P/N 057573
- IonPac CG16 5 mm, P/N 057574
- CMMS III 4 mm, P/N 056752
- CMMS III Regenerant Concentrate, 4 pack, P/N 057556
- ICS-900 DCR Cation Regenerant 2 L Bottle, P/N 057713
- Methanesulfonic Acid, 500 mL, P/N 033478

**Ordering Information****ICS-900 - CS16 5 mm - Bundled Package**

ICS-900, CS16 5 mm, Consumables Bundled Package ..... 060129

**CS16 3 mm Bundled Package**

This package includes:

- IonPac CS16 3 mm, P/N 059596
- IonPac CG16 3 mm, P/N 059595
- CMMS III 2 mm, P/N 056753
- CMMS III Regenerant Concentrate, 4 pack, P/N 057556
- ICS-900 DCR Cation Regenerant 2 L Bottle, P/N 057713
- Methanesulfonic Acid, 500 mL, P/N 033478

**Ordering Information****ICS-900 - CS16 3 mm - Bundled Package**

ICS-900, CS16 3 mm, Consumables Bundled Package ..... 060130

## LC Solutions Kits

LC Solutions Kits comprise all items needed to plumb an UltiMate 3000 System with Viper or nanoViper capillaries for LC solutions. All analytical kits are available for SD and RS systems.

- Parallel analysis
- Tandem analysis
- 2-D LC analysis
- On-line SPE analysis
- Inverse gradient for uniform response with nebulizer-based detectors
- Automated method scouting
- Proteomics preconcentration, parallel LC, and MDLC

With the use of Viper, the revolutionary new fingertight fitting system, installation is as easy and fast as never before. The Viper system improves chromatographic results and allows connection of LC modules, valves, and columns quickly and efficiently without tools.

## General LC Solutions Kits

### Ordering Information

#### Automated Application Switching Kits

Viper Application Switching Solution Kit, RS system.....	6040.2805
Viper Application Switching Solution Kit, SD system .....	6040.2806

#### Automated Method Scouting Kits

Viper Method Scouting Solution Kit, RS systems.....	6040.2807
Viper Method Scouting Solution Kit, SD systems.....	6040.2808
Extension Kit for Viper Method Scouting Capillary Kit .....	6040.0100

#### On-Line SPE Kits

Viper On-line SPE Solution Kit, RS system.....	6040.2801
Viper On-line SPE Solution Kit, SD system.....	6040.2802

#### Parallel LC Kits

Viper Parallel Analyses Solution Kit, RS system.....	6040.2809
Viper Parallel Analyses Solution Kit, SD system .....	6040.2810

#### Tandem LC Kits

Viper Tandem Analyses Solution Kit, RS system.....	6040.2803
Viper Tandem Analyses Solution Kit, SD system.....	6040.2804
Viper Inverse Analyses Solution Kit, SD systems .....	6040.2819
Viper Inverse Analyses Solution Kit, RS systems .....	6040.2820



### LC Solutions Kits for Proteomics

#### Ordering Information

##### Direct Injection Kits

UltiMate 3000 RSLCnano Direct Injection nano LC kit .....	6720.0300
UltiMate 3000 RSLCnano Direct Injection Capillary LC kit .....	6720.0305

##### Preconcentration Kits

UltiMate 3000 RSLCnano Preconcentration nano LC kit .....	6720.0310
UltiMate 3000 RSLCnano Preconcentration Capillary LC kit .....	6720.0315
UltiMate 3000 RSLCnano Preconcentration Monolithic LC kit .....	6720.0320

##### 2-D Salt Plug Application Kits

UltiMate 3000 RSLC nano 2-D Salt Plug kit .....	6720.0325
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##### Automated Off-Line 2D-LC Kits

UltiMate 3000 RSLCnano Automated off-line SCXxRP Peptides kit .....	6720.0330
UltiMate 3000 RSLCnano Automated off-line RPxRP Peptides kit .....	6720.0340

##### Tandem nano LC Kits

UltiMate 3000 RSLCnano Tandem nano LC Kit .....	6720.0335
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## ICS-5000 and ICS-2100 RFIC-EG Consumables Bundles

These bundled packages include:

- Eluent Generator Cartridge
- Continuously Regenerated Trap Column
- Suppressor (SRS 300 or CES 300)
- CRD 200 (anion bundles only)

These kits are appropriate for RFIC-EG systems, such as the ICS-5000 and ICS-2100. Capillary (0.4 mm) bundles are only appropriate for the ICS-5000 with capillary pump and IC Cube option. Separator and Guard Columns must be ordered separately.

### Anion RFIC-EG Consumables Bundle (4 mm)

This package includes:

- EGC III KOH
- CR-ATC
- ASRS 300 (4 mm)
- CRD 200 (4 mm)

#### Ordering Information

##### Anion RFIC-EG Consumables Bundle (4 mm)

Anion RFIC-EG Consumables Bundle (4 mm)..... 072255

### Anion RFIC-EG Consumables Bundle (2 mm)

This package includes:

- EGC III KOH
- CR-ATC
- ASRS 300 (2 mm)
- CRD 200 (2 mm)

#### Ordering Information

##### Anion RFIC-EG Consumables Bundle (2 mm)

Anion RFIC-EG Consumables Bundle (2 mm)..... 072256

### Anion RFIC-EG Consumables Bundle (0.4 mm)

This package includes:

- EGC-KOH (Capillary)
- CR-ATC (Capillary)
- ACES 300
- CRD 200 (Capillary)

**Note:** This bundle is only appropriate for the ICS-5000 with capillary pump and IC Cube option.

#### Ordering Information

##### Anion RFIC-EG Consumables Bundle (0.4 mm)

Anion RFIC-EG Bundle (0.4 mm)..... 072257

### Cation RFIC-EG Consumables Bundle (4 mm)

This package includes:

- EGC III MSA
- CR-CTC II
- CSRS 300 (4 mm)

#### Ordering Information

##### Cation RFIC-EG Consumables Bundle (4 mm)

Cation RFIC-EG Consumables Bundle (4 mm)..... 072258

### Cation RFIC-EG Consumables Bundle (2 mm)

This package includes:

- EGC III MSA
- CR-CTC II
- CSRS 300 (2 mm)

#### Ordering Information

##### Cation RFIC-EG Consumables Bundle (2 mm)

Cation RFIC-EG Consumables Bundle (2 mm)..... 072259

### **Cation RFIC-EG Consumables Bundle (0.4 mm)**

This package includes:

- EGC-MSA (Capillary)
- CR-CTC (Capillary)
- CCES 300

***Note:** This bundle is only appropriate for the ICS-5000 with capillary pump and IC Cube option.*

### **Ordering Information**

#### **Cation RFIC-EG Consumables Bundle (0.4 mm)**

Cation RFIC-EG Consumables Bundle (0.4 mm) ..... 072260

## Viper Fingertight Fittings

*Provides ease of use and dead-volume free plumbing of every conventional HPLC and UHPLC system*

The Viper fingertight fitting system provides ease of use and dead-volume free plumbing of every conventional HPLC and modern UHPLC system. Together with flexible stainless steel capillaries, it opens a new dimension in liquid chromatography. The Viper system improves chromatographic results, independent of various different connection geometries and system backpressures. Connecting LC modules, valves, and columns quickly and easily without tools is simple with the Viper system.

- Provides zero-dead volume fingertight connections
- Supports operating pressures up to 1200 bar (17,400 psi)
- Available in different lengths: 65 mm and from 150 to 950 mm in 100 mm steps
- Available in different inner diameters: 0.13 mm (0.005") or 0.18 mm (0.007")
- Easy to use due to stainless steel capillaries (1/32" o.d.) and fingertight design
- Works with virtually any valve and column from any manufacturer
- Fits narrow connections such as 10-port valves and enables mixed use with different designs

Extracolumn volumes in HPLC have the most detrimental effects on the separational performance of an LC system and must be minimized. Conventional fittings tightened by hand or using tools have considerable drawbacks which can compromise efficiency. The Viper fitting system design overcomes these drawbacks, working without ferrules to reduce the dead volume of any fluidic connection to zero. The Viper system unifies robust performance, ease of use, acceptable lifetime, and universal compatibility with virtually all different valves and columns for HPLC system users..



## Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on [www.dionex.com](http://www.dionex.com).

### *Product Data Sheets*

Viper Capillaries and Fingertight Fittings Data Sheet

### *Technical Notes*

TN 80: Reduce Eluent Consumption by Optimizing UltiMate 3000 Quaternary Analytical Systems for Small Column Volumes

## Ordering Information

Viper is included in shipments of the UltiMate 3000 RSLC System, but must be ordered separately for UltiMate 3000 Standard Systems. For more information on Viper Solution kits, see the LC Solutions section under Chromatography Accessories.

**Individual Viper Capillaries, RS/Micro**

Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 65 mm, SST.....	6040.2307
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 150 mm, SST.....	6040.2315
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 250 mm, SST.....	6040.2325
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 350 mm, SST.....	6040.2335
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 450 mm, SST.....	6040.2345
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 550 mm, SST.....	6040.2305
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 650 mm, SST.....	6040.2310
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 750 mm, SST.....	6040.2320
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 850 mm, SST.....	6040.2330
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.13 mm/0.005", Length 950 mm, SST.....	6040.2340

**Individual Viper Capillaries, SD/Analytical**

Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 65 mm, SST.....	6040.2357
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 150 mm, SST.....	6040.2360
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 250 mm, SST.....	6040.2385
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 350 mm, SST.....	6040.2375
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 450 mm, SST.....	6040.2365
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 550 mm, SST.....	6040.2355
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 650 mm, SST.....	6040.2395
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 750 mm, SST.....	6040.2370
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 850 mm, SST.....	6040.2380
Viper UHPLC Fingertight Fitting incl. Capillary for 10-32 Fitting, i.d. 0.18 mm/0.007", Length 950 mm, SST.....	6040.2390

**Viper Capillary Kits**

Viper Capillary Kit for UltiMate 3000 RSLC Systems, SST.....	6040.2301
Viper Capillary Kit for UltiMate 3000 SD Systems, SST.....	6040.2302
Viper On-line SPE Solution kit, RS System.....	6040.2801
Viper Tandem Analyses Solution kit, RS Systems.....	6040.2803
Viper Parallel Analyses Solution kit, RS Systems.....	6040.2809
Viper Application Switching Solution kit, RS Systems.....	6040.2805
Viper Method Scouting Solution kit, RS Systems.....	6040.2807
Viper On-line SPE Analyses Solution kit, SD Systems.....	6040.2802
Viper Tandem Analyses Solution kit SD Systems.....	6040.2804
Viper Parallel Analyses Solution kit, SD Systems.....	6040.2810
Viper Application Switching Solution kit, SD Systems.....	6040.2806
Viper Automated Method Scouting Solution kit, SD Systems.....	6040.2808
Viper Inverse Gradient Solution kit, RS Systems.....	6040.2820
Viper Automated Method Scouting Capillary kit, SD Systems.....	6040.2808
Viper Inverse Gradient Solution kit, SD Systems.....	6040.2819

**Viper Accessoriess**

Viper Union.....	6040.2304
Viper Plug.....	6040.2303

nanoViper Fingertight Fittings

nano LC Made Easy

The nanoViper Fingertight Fitting System is the easiest connection system for nano LC applications. It comes preassembled and therefore overcomes the difficulties associated with assembling PEEK sleeve connections. The nanoViper fitting is capable of withstanding pressures up to 1034 bar, and is compatible with third-party valves and unions.

- Zero-dead-volume UHPLC fingertight nano LC connections
- Allows for a complete tool free set up of your nano LC application
- Nano LC column exchange in seconds
- Supports pressures up to 1034 bar (15,000 psi)
- Compatible with third party 1/16" connection material
- Available in lengths up to 750 mm and different inner diameters (20 µm, 50 µm, or 70 µm)
- Standard on RSLCnano Accessories and Acclaim PepMAP RSLC nano columns
- Removable knurl for easy 10-port valve connection

The preassembled nanoViper fittings allow fast, easy and reliable connections of capillaries, loops and columns. Eliminating the use of a loose nut, ferrule and PEEK sleeve prevents dead volumes and damage by overtightening. Retention time shifts and peak distortions due to improperly connected tubing and handled conventional fitting systems belong to the past.



Ordering Information

nanoViper connections are standard on RSLCnano accessories and Acclaim PepMap RSLC nano columns. See the Acclaim PepMap product page for ordering information.

Accessories	
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 20 µm, Length 350 mm.....	6041.5240
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 20 µm, Length 550 mm .....	6041.5260
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 20 µm, Length 650 mm .....	6041.5275
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 20 µm, Length 750 mm .....	6041.5280
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 50 µm, Length 350 mm .....	6041.5540
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 50 µm, Length 550 mm .....	6041.5560
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 50 µm, Length 650 mm .....	6041.5575
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 50 µm, Length 750 mm .....	6041.5880
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 75 µm, Length 250 mm .....	6041.5730
nanoViper UHPLC Fingertight Fitting incl. Fused Silica Capillary with PEEK Sheath for 10-32 Fitting, i.d. 75 µm, Length 350 mm .....	6041.5735



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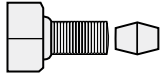


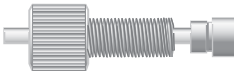
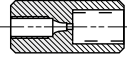
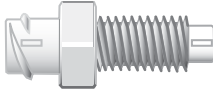
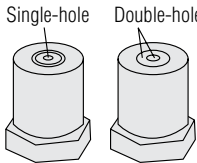
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# Dionex Quick Guide: Accessory List for Ion Chromatography

Part	Description	Part Number		Common Uses
<b>Bolt</b>	Double cone ferrule bolt, 10-32, 5/16 in. hex head	043275		High-pressure connections to 1/16 in. tubing (columns, suppressors, etc.).
<b>Ferrule</b>	Double cone ferrule, 10-32	043276		
	Double cone ferrule, 10-32; Pack of 10	043225		
<b>Plug</b>	10-32	042772		Plug columns, eluent connections on CR-TC, suppressors, and so on.
<b>Plug</b>	1/4-28	037628		Plug regen side of suppressors, CR-TC, and so on.
<b>Cap</b>	1/4-28	045597		Cap 1/8 in. tubing for eluent supply and regen lines.
<b>Bolt</b>	1/4-28 for 1/8 in. tubing, Flangeless, Natural PEEK™	052267		Connect eluent supply and waste lines.
<b>Bolt</b>	1/4-28 for 1/8 in. tubing, Flangeless, Natural PEEK, short length	057934		Regen IN tubing connection on CR-TC.
<b>Ferrule</b>	1/8 in., Flangeless (yellow, reverse type, for 2 bolts above)	048949		
<b>Bolt</b>	1/4-28 for flat fitting, 1/16 in. tubing	052230		Connect 1/16 in. tubing to regen circuit of CR-TC, suppressor (use Green PEEK tubing only).
<b>Ferrule</b>	Flat type reverse, 1/16 in. (for bolt above)	052231		
<b>Union</b>	1/4-28 to 1/4-28, 0.06 in. through hole (female threaded for male connectors)	039056		Connect 1/8 in. tubing pieces together.
<b>Union</b>	1/4-28 to 10-32 (female threaded for male connectors)	042806		Join 1/8 in. and 1/16 in. tubing together.
<b>Union</b>	10-32 to 10-32 (female threaded for male connectors)	042627		Join 1/16 in. and 1/16 in. tubing together.
<b>Syringe Adapter</b>	Female Luer to male thread 1/4-28	024305		Connect syringe to 1/8 in. tubing (with 1/4-28 to 1/4-28 union and male fittings, not included).
<b>Syringe Adapter</b>	Female Luer to male thread 10-32	046888		
<b>Check Valve</b>	ICS-900, -1000, -1100, -1500, -1600, -2000, -2100, -3000		<div>Single-hole</div> <div>Double-hole</div> 	
<b>Inlet</b>	Cartridge only	045994		
	Cartridge and Housing	045722		
<b>Outlet</b>	Cartridge only	045994		
	Cartridge and Housing	045721		
<b>Injection Valve Rebuild Kit</b>	ICS-900, -1000, -1100, -1500, -1600, -2000, -2100, -3000	057896		Rebuild 6-port injection valve on instruments listed.
<b>Pump Seal</b>	ICS-900, -1000, -1100, -1500, -1600, -2000, -2100	055870		Replace pump seal on instruments listed.
<b>Backup Pump Seal</b>	ICS-900, -1000, -1100, -1500, -1600, -2000, -2100	063382		Replace seal wash seal on instruments listed.
<b>Pump Seal</b>	ICS-3000	064946		Replace pump seal on ICS-3000.
<b>Piston Wash Seal</b>	ICS-3000	063382		Replace seal wash seal on ICS-3000.

## PEEK tubing, 1/16 inch O.D.

<b>Yellow</b>	0.003 in. (0.075 mm)	5 ft	052301	Backpressure coils only.
		20 ft	052300	
<b>Red</b>	0.005 in. (0.125 mm)	5 ft	052310	Microbore (2 mm column) plumbing.
		20 ft	052311	
<b>Black</b>	0.010 in. (0.25 mm)	5 ft	052306	Standard (4 mm column) plumbing.
		20 ft	052307	
<b>Orange</b>	0.020 in. (0.50 mm)	5 ft	052309	
		20 ft	052308	
<b>Green</b>	0.030 in. (0.75 mm)	5 ft	052305	Tubing for high flow rates or where very low backpressure is needed. Regen lines to suppressors etc..
		20 ft	052304	
<b>1/8 in. tubing</b>	PTFE Tubing 1/8 inch OD	5 ft	066046	Eluent supply and waste lines.

## Sample Loops

<b>10 µL</b>	PEEK Loop	036104	Backpressure coils only.
<b>25 µL</b>	PEEK Loop	036105	
<b>50 µL</b>	PEEK Loop	036106	Microbore (2 mm column) plumbing.
<b>100 µL</b>	PEEK Loop	030391	
<b>200 µL</b>	PEEK Loop	036107	Standard (4 mm column) plumbing.
<b>500 µL</b>	PEEK Loop	030393	
<b>1000 µL</b>	PEEK Loop	036108	

## Standards

<b>Five Anion</b>	100 mL	037157	<b>F</b> , 20; <b>Cl</b> <sup>-</sup> , 30; <b>NO<sub>2</sub></b> <sup>-</sup> , 100; <b>PO<sub>4</sub></b> <sup>3-</sup> , 150; <b>SO<sub>4</sub></b> <sup>2-</sup> , 150 (mg/L)
<b>Seven Anion I</b>	50 mL	056933	<b>F</b> , 20; <b>Cl</b> <sup>-</sup> , 30; <b>NO<sub>2</sub></b> <sup>-</sup> , 100; <b>Br</b> <sup>-</sup> , 100; <b>NO<sub>3</sub></b> <sup>-</sup> , 100; <b>PO<sub>4</sub></b> <sup>3-</sup> , 150; <b>SO<sub>4</sub></b> <sup>2-</sup> , 150 (mg/L)
<b>Seven Anion II</b>	100 mL	057590	<b>F</b> , 20; <b>Cl</b> <sup>-</sup> , 100; <b>NO<sub>2</sub></b> <sup>-</sup> , 100; <b>Br</b> <sup>-</sup> , 100; <b>NO<sub>3</sub></b> <sup>-</sup> , 100; <b>PO<sub>4</sub></b> <sup>3-</sup> , 200; <b>SO<sub>4</sub></b> <sup>2-</sup> , 100 (mg/L)
<b>Six Cation I</b>	50 mL	040187	<b>Li</b> <sup>+</sup> , 50; <b>Na</b> <sup>+</sup> , 200; <b>NH<sub>4</sub></b> <sup>+</sup> , 400; <b>K</b> <sup>+</sup> , 200; <b>Mg</b> <sup>2+</sup> , 200; <b>Ca</b> <sup>2+</sup> , 1000 (mg/L)
<b>Six Cation II</b>	50 mL	046070	<b>Li</b> <sup>+</sup> , 50; <b>Na</b> <sup>+</sup> , 200; <b>NH<sub>4</sub></b> <sup>+</sup> , 250; <b>K</b> <sup>+</sup> , 500; <b>Mg</b> <sup>2+</sup> , 250; <b>Ca</b> <sup>2+</sup> , 500 (mg/L)

## Ordering Information

<b>United States</b>	1-800-346-6390
<b>Asia Pacific</b>	<a href="http://www.dionex.com/en-us/address/global-region/lp5480.html">http://www.dionex.com/en-us/address/global-region/lp5480.html</a>
<b>Europe</b>	<a href="http://www.dionex.com/en-us/address/global-region/lp5479.html">http://www.dionex.com/en-us/address/global-region/lp5479.html</a>
<b>Latin/South America</b>	<a href="http://www.dionex.com/en-us/address/global-region/lp4829.html">http://www.dionex.com/en-us/address/global-region/lp4829.html</a>
<b>Middle East/Africa</b>	<a href="http://www.dionex.com/en-us/address/global-region/lp5220.html">http://www.dionex.com/en-us/address/global-region/lp5220.html</a>

# Column Selection Guide

Silica Columns			Reversed-Phase (RP)			Mixed-Mode	HILIC	Application-Specific					Example Applications						
			Acclaim 120 C18	Acclaim 120 C8	Acclaim 300 C18	Acclaim Polar Advantage (PA)	Acclaim Polar Advantage II (PA2)	Acclaim Phenyl-1	Acclaim Trinity P1	Acclaim Mixed-Mode WAX-1	Acclaim Mixed-Mode WCX-1	Acclaim Mixed-Mode HILIC-1		Acclaim HILIC-10	Acclaim Organic Acid	Acclaim Surfactant	Acclaim Explosives E1	Acclaim Explosives E2	Acclaim Carbamate
General Applications	Neutral Molecules	High hydrophobicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						Fat-soluble vitamins, PAHs, glycerides
		Intermediate hydrophobicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							Steroids, phthalates, phenolics
		Low hydrophobicity	✓			✓	✓					✓	✓						Acetaminophen, urea, polyethylene glycols
	Anionic Molecules	High hydrophobicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							NSAIDs, phospholipids
		Intermediate hydrophobicity	✓	✓	✓	✓	✓	✓	✓			✓							Asprin, alkyl acids, aromatic acids
		Low hydrophobicity				✓			✓	✓		✓	✓						Small organic acids, e.g. acetic acids
	Cationic Molecules	High hydrophobicity	✓	✓	✓	✓	✓	✓		✓	✓	✓							Antidepressants
		Intermediate hydrophobicity	✓	✓	✓	✓	✓	✓			✓	✓							Beta blockers, benzidines, alkaloids
		Low hydrophobicity	✓			✓			✓		✓	✓	✓						Antacids, pseudoephedrine, amino sugars
	Amphoteric/ Zwitterionic Molecules	High hydrophobicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							Phospholipids
		Intermediate hydrophobicity	✓	✓	✓	✓	✓	✓			✓								Amphoteric surfactants, peptides
		Low hydrophobicity				✓	✓		✓	✓	✓	✓	✓						Amino acids, aspartame, small peptides
	Mixtures of Neutral, Anionic, Cationic Molecules	Neutrals and acids	✓			✓	✓		✓	✓									Artificial sweeteners
		Neutrals and bases	✓			✓	✓		✓		✓								Cough syrup
		Acids and bases				✓			✓										Drug active ingredient with counterion
		Neutrals, acids, and bases				✓			✓										Combination pain relievers
Specific Applications	Surfactants	Anionic	✓	✓	✓	✓	✓								✓				SDS, LAS, laureth sulfates
		Cationic													✓				Quats, benzylalkonium in medicines
		Nonionic	✓	✓	✓	✓	✓					✓			✓				Triton X-100 in washing tank
		Amphoteric	✓	✓	✓	✓	✓								✓				Cocoamidopropyl betaine
		Hydrotropes													✓				Xylenesulfonates in handsoap
		Surfactant blends													✓				Noionic and anionic surfactants
	Organic Acids	Hydrophobic							✓	✓				✓					Aromatic acids, fatty acids
		Hydrophilic							✓	✓				✓					Organic acids in soft drinks, pharmaceuticals
	Environmental Contaminants	Explosives															✓	✓	U.S. EPA Method 8330, 8330B
		Carbonyl compounds																✓	U.S. EPA 1667, 555, OT-11; CA CARB 1004
		Phenols	✓			✓													Compounds regulated by U.S. EPA 604
		Chlorinated/Phenoxy acids				✓													U.S. EPA Method 555
		Triazines	✓			✓													Compounds regulated by U.S. EPA 619
		Nitrosamines				✓													Compounds regulated by U.S. EPA 8270
		Benzidines	✓			✓													U.S. EPA Method 605
		Perfluorinated acids				✓													Dionex TN73
		Microcystins	✓																ISO 20179
		Isocyanates					✓					✓							U.S. OSHA Methods 42, 47
		Carbamate insecticides																✓	U.S. EPA Method 531.2
	Vitamins	Water-soluble vitamins				✓	✓		✓										Vitamins in dietary supplements
		Fat-soluble vitamins	✓	✓	✓	✓	✓	✓		✓									Vitamin pills
	Pharmaceutical Counterions	Anions							✓	✓									Inorgaic anions and organic acids in drugs
		Cations							✓		✓								Inorgaic cations and organic bases in drugs
		Mixture of Anions and Cations							✓										Screening of pharmaceutical counterions
		API and counterions							✓										Naproxen Na <sup>+</sup> salt, metformin Cl salt, etc.

For more information, visit the Acclaim Library of related applications at [www.dionex.com](http://www.dionex.com) under Literature/Application Notes (right side of the page).

Polymer Columns		IonPac AS23	IonPac AS22	IonPac AS22-Fast	IonPac AS14/A	IonPac AS12A	IonPac AS9/HC/SC	IonPac AS4A/SC	IonSwift MAX-100	IonPac AS24	IonPac AS21	IonPac AS20	IonPac AS19	IonPac AS18	IonPac AS18-Fast	IonPac AS17-C	IonPac AS16	IonPac AS15	IonPac AS11(-HC)	IonPac AS10	IonPac AS7	IonPac AS5	IonPac Fast Anion IIIA	OmniPac PAX-100	OmniPac PAX-500
ANIONS	Inorganic Anions	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓					
	Oxyhalides	✓				✓	✓			✓			✓												
	Bromate	✓					✓			✓			✓												
	Perchlorate										✓	✓					✓								
	Organic Acids								✓							✓		✓	✓	✓					
	Phosphoric/Citric Acids																						✓		
	Poly/High-Valence Anions								✓			✓					✓		✓		✓	✓			
	Hydrophobic Anions								✓			✓					✓		✓						
	Hydrophobic/Halogenated Anions								✓			✓							✓					✓	
	Anionic Neutral Molecules									✓	✓	✓	✓												✓
CATIONS	Inorganic Cations																								
	Sodium/Ammonium																								
	Amines/Polyvalent Amines																								
	Aliphatic/Aromatic Amines																								
	Alkanol/Ethanolamines																								
	Biogenic Amines																								
	Transition/Lanthanide Metals																								
	Hydrophobic Cations																								
	Cationic Neutral Molecules																								
BIO-MOLECULES	Amino Acids																								
	Phosphorylated Amino Acids																								
	Amino Sugars																								
	Oligosaccharides																								
	Mono-/Di-Saccharides																								
	Glycoproteins																								
	Alditols/Aldoses mono/di Saccharides																								
	ds Nucleic Acids																								
	Single-Stranded Oligonucleotides																								
	Peptides																								
	Proteins																								
	Metal-binding Proteins																								
	Monoclonal antibodies																								
	Aliphatic Organic Acids																								
	Alcohols																								
	Borate																								
	Large Molecules, Anions																								
ORGANIC MOLECULES	Small Molecules																								
	Small Molecules/LC-MS																								
	Polar/Non-Polar Small Molecules																								
	Hydrophobic/Aliphatic Organic Acids																								
	Surfactant Formulations																								
	Explosives/EPA 8330																								
MODE	Anion Exchange / Carbonate	✓	✓	✓	✓	✓	✓	✓																	
	Anion Exchange / Hydroxide								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Cation Exchange																								
	Multi-Mode																							✓	✓
	Affinity																								
	Ion Exclusion																								
	Reversed Phase																								
	Anion Exchange/Other																								



# Column Specifications

## IC Anion Columns

Column	Format	Primary Eluent	Application	Particle Diameter	Substrate Crosslinking	Latex Diameter	Latex Crosslinking	Capacity (per column)	Functional Group	Hydrophobicity
IonPac AS24	2 × 250 mm	Hydroxide	Recommended column for haloacetic acids prior to MS or MS/MS detection	7 µm	55%	-	-	140 µeq	Alkanol quaternary ammonium	Ultralow
IonPac AS23	2 × 250 mm 4 × 250 mm	Carbonate	Recommended column for inorganic anions and oxyhalides. Trace bromate in drinking water.	6 µm	55%	-	-	80 µeq 320 µeq	Alkyl quaternary ammonium	Ultralow
IonPac AS22	2 × 250 mm 4 × 250 mm	Carbonate	Recommended column for fast analysis of common inorganic anions.	6.5 µm	55%	-	-	52.5 µeq 210 µeq	Alkyl quaternary ammonium	Ultralow
IonPac AS21	2 × 250 mm	Hydroxide	Recommended column for trace perchlorate prior to MS or MS/MS detection	7.0 µm	55%	-	-	45 µeq	Alkanol quaternary ammonium	Ultralow
IonPac AS20	2 × 250 mm 4 × 250 mm	Hydroxide	Recommended column for trace perchlorate prior to suppressed conductivity detection.	7.5 µm	55%	-	-	77.5 µeq 310 µeq	Alkanol quaternary ammonium	Ultralow
IonPac AS19	2 × 250 mm 4 × 250 mm	Hydroxide	Recommended column for inorganic anions and oxyhalides. Trace bromate in drinking water.	7.5 µm	55%	-	-	60 µeq 350 µeq	Alkanol quaternary ammonium	Low
IonPac AS18	2 × 250 mm 4 × 250 mm	Hydroxide	Recommended column for the analysis of common inorganic anions.	7.5 µm	55%	65 nm	8%	75 µeq 285 µeq	Alkanol quaternary ammonium	Low
IonPac AS17-C	2 × 250 mm 4 × 250 mm	Hydroxide	Trace anions in HPW matrices. Carboxylated resin, no sulfate blank. Low capacity for fast analysis of common inorganic anions using gradient elution with the Eluent Generator.	10.5 µm	55%	75 nm	6%	7.5 µeq 30 µeq	Alkanol quaternary ammonium	Low
IonPac AS16	2 × 250 mm 4 × 250 mm	Hydroxide	High capacity for hydrophobic anions including iodide, thiocyanate, thiosulfate, and perchlorate. Polyvalent anions including: polyphosphates and polycarboxylates	9 µm	55%	80 nm	1%	42.5 µeq 170 µeq	Alkanol quaternary ammonium	Ultralow
IonPac AS15	2 × 250 mm 4 × 250 mm	Hydroxide	High capacity for trace analysis of inorganic anions and low molecular weight organic acids in high purity water matrices.	9 µm	55%	-	-	56.25 µeq 225 µeq	Alkanol quaternary ammonium	Medium-High
IonPac AS15-5mm	3 × 150 mm	Hydroxide	Fast run, high capacity for trace analysis of inorganic anions and low molecular weight organic acids in high purity water matrices.	5 µm	55%	-	-	70 µeq	Alkanol quaternary ammonium	Medium-High
IonPac AS14A-5 µm	3 × 150 mm	Carbonate	Recommended column for fast analysis of common inorganic anions.	5 µm	55%	-	-	40 µeq	Alkyl quaternary ammonium	Medium
IonPac AS14A	4 × 250 mm	Carbonate	For analysis of common inorganic anions.	7 µm	55%	-	-	120 µeq	Alkyl quaternary ammonium	Medium
IonPac AS14	2 × 250 mm 4 × 250 mm	Carbonate	Moderate capacity for fast analysis of common inorganic anions.	9 µm	55%	-	-	16 µeq 65 µeq	Alkyl quaternary ammonium	Medium-High

Column	Format	Primary Eluent	Application	Particle Diameter	Substrate Crosslinking	Latex Diameter	Latex Crosslinking	Capacity (per column)	Functional Group	Hydrophobicity
IonPac AS12A	2 × 200 mm 4 × 200 mm	Carbonate	Moderate capacity for analysis of inorganic anions and oxyhalides. Trace chloride and sulfate in high carbonate matrices.	9 µm	55%	140 nm	0.20%	13 µeq 52 µeq	Alkyl quaternary ammonium	Medium
IonPac AS11-HC	2 × 250 mm 4 × 250 mm	Hydroxide	High capacity for the determination of organic acids and inorganic anions in uncharacterized samples.	9 µm	55%	70 nm	6%	72.5 µeq 290 µeq	Alkanol quaternary ammonium	Medium-Low
IonPac AS11	2 × 250 mm 4 × 250 mm	Hydroxide	Low capacity for fast profiling of organic acids and inorganic anions in well-characterized samples.	13 µm	55%	85 nm	6%	11 µeq 45 µeq	Alkanol quaternary ammonium	Very Low
IonPac AS10	2 × 250 mm 4 × 250 mm	Hydroxide	High capacity for the analysis of inorganic anions and organic acids in high nitrate samples.	8.5 µm	55%	65 nm	5%	42.5 µeq 170 µeq	Alkyl quaternary ammonium	Low
IonPac AS9-HC	2 × 250 mm 4 × 250 mm	Carbonate	High-capacity column for inorganic anions and oxyhalides. Trace bromate in drinking water.	9 µm	55%	90 nm	18%	48 µeq 190 µeq	Alkyl quaternary ammonium	Medium-Low
IonPac AS9-SC	4 × 250 mm	Carbonate	Low capacity for fast analysis of inorganic anions and oxyhalides. Specified column in US EPA Method 300.0 (B).	13 µm	55%	110 nm	20%	30-35 µeq	Alkyl quaternary ammonium	Medium-Low
IonPac AS4A-SC	2 × 250 mm 4 × 250 mm	Carbonate	Low capacity for fast analysis of common inorganic anions. Specified column in U.S. EPA Method 300.0 (A).	13 µm	55%	160 nm	0.50%	5 µeq 20 µeq	Alkanol quaternary ammonium	Medium-Low
IonPac Fast Anion IIIA	3 × 250 mm	Hydroxide	Recommended column for phosphoric and citric acids in cola soft drinks.	7.5 µm	55%	-	-	55 µeq	Alkanol quaternary ammonium	Ultralow
IonPac AS7	4 × 250 mm	Specialty Eluents	Polyvalent anions including chelating agents, polyphosphates and polyphosphonates. Cyanide, sulfide, hexavalent chromium, and arsenic speciation.	10 µm	2%	530 nm	5%	100 µeq	Alkyl quaternary ammonium	Medium-High
IonPac AS5A	4 × 150 mm	Hydroxide	Low capacity for fast profiling of organic acids and inorganic anions in well-characterized samples.	5 µm	2%	60 nm	4%	35 µeq	Alkanol quaternary ammonium	Low
IonPac AS5	4 × 250 mm	Hydroxide	Metal-EDTA complexes, metal-cyanide complexes, and oxyanions.	15 µm	2%	120 nm	1%	20 µeq	Alkanol quaternary ammonium	Low



## IC Cation Columns

Column	Format	Primary Eluent	Application	Particle Diameter	Substrate Crosslinking	Latex Diameter	Latex Crosslinking	Capacity (per column)	Functional Group	Hydrophobicity
IonPac CS18	2 × 250 mm	MSA	Recommended column for polar amines (alkanolamines and methylamines) and moderately hydrophobic and polyvalent amines (biogenic and diamines). Nonsuppressed mode when extended calibration linearity for ammonium and weak bases is required	6 µm	55%	-	-	0.29 µeq	Carboxylic acid	Medium
IonPac CS17	2 × 250 mm 4 × 250 mm	MSA	Recommended column for hydrophobic and polyvalent amines (biogenic amines and diamines)	7 µm	55%	-	-	0.363 µeq 1.45 µeq	Carboxylic acid	Very Low
IonPac CS16	3 × 250 mm 5 × 250 mm	MSA	Recommended column for disparate concentration ratios of adjacent-eluting cations such as sodium and ammonium. Can be used for alkylamines and alkanolamines.	5 µm	55%	-	-	3.0 µeq 8.4 µeq	Carboxylic acid	Medium
IonPac CS15	2 × 250 mm 4 × 250 mm	MSA	Disparate concentration ratios of ammonium and sodium. Trace ethanolamine in high-ammonium or high-potassium concentrations. Alkanolamines.	8.5 µm	55%	-	-	0.7 µeq 2.8 µeq	Carboxylic acid/ phosphonic acid/ crown ether	Medium
IonPac CS14	2 × 250 mm 4 × 250 mm	MSA	Aliphatic amines, aromatic amines, and polyamines plus mono- and divalent cations.	8.5 µm	55%	-	-	0.325 µeq 1.3 µeq	Carboxylic acid	Low
IonPac CS12A-MS	2 × 100 mm	MSA	IC-MS screening column for fast elution and low flow rates required for interfacing with IC-MS	8.5 µm	55%	-	-	0.28 µeq	Carboxylic acid/ phosphonic acid	Medium
IonPac CS12A-5 µm	3 × 150 mm	MSA	Recommended column for high efficiency and fast analysis (3 min) of mono- and divalent cations.	5 µm	55%	-	-	0.94 µeq	Carboxylic acid/ phosphonic acid	Medium
IonPac CS12A	2 × 250 mm 4 × 250 mm	MSA	Recommended column for the separation of mono- and divalent cations. Manganese morpholine, alkylamines, and aromatic amines.	8.5 µm	55%	-	-	0.7 µeq 2.8 µeq	Carboxylic acid/ phosphonic acid	Medium
IonPac CS11	2 × 250 mm	HCl + DAP	Separation of mono- and divalent cations. Ethanolamines if divalent cations are not present.	8 µm	55%	200 nm	5%	0.035 µeq	Sulfonic acid	Medium
IonPac CS10	4 × 250 mm	HCl + DAP	Separation of mono- and divalent cations.	8.5 µm	55%	200 nm	5%	0.08 µeq	Sulfonic acid	Medium
IonPac CS5A	2 × 250 mm 4 × 250 mm	Pyridine dicarboxylic acid	Recommended column for transition and lanthanide metals analysis. Aluminum analysis.	9 µm	55%	140 nm 75 nm	10% 20%	0.02 µeq/ 0.005 µeq 0.04 µeq/ 0.01 µeq	Sulfonic acid/ alkanol quaternary ammonium	-

## Ion-Exclusion Columns

Column	Format	Primary Eluent	Application	Particle Diameter	Substrate Crosslinking	Latex Diameter	Latex Crosslinking	Capacity (per column)	Functional Group	Hydrophobicity
IonPac ICE-AS1	4 × 250 mm 9 × 250 mm	Heptafluorobutyric acid	Organic acids in high ionic strength matrices. Fast separation of organic acids.	7.5 µm	8%	-	-	5.3 µeq 27 µeq	Sulfonic acid	Ultra Low
IonPac ICE-AS6	9 × 250 mm	Heptafluorobutyric acid	Organic acids in complex or high ionic strength matrices.	8 µm	8%	-	-	27 µeq	Sulfonic and carboxylic acid	Moderate
IonPac ICE-Borate	9 × 250 mm	MSA/ Mannitol	Trace concentrations of borate	7.5 µm	8%	-	-	27 µeq	Sulfonic acid	Ultra Low

## Acclaim General and Specialty Columns

Column	Bonded Phase	USP Type	Endcapped	Substrate	Particle Shape	Particle Size	Metal Impurity (ppm) Na, Fe, AL	Average Pore Diameter	Surface Area (m <sup>2</sup> /g)	Total Carbon Content
Mixed-Mode WAX	Proprietary alkyl amine	na	Proprietary	Ultrapure silica	Spherical	5 µm	<10 ppm	120 Å	300	na
Mixed-Mode HILIC	Proprietary alkyl diol	na	Proprietary			5 µm		120 Å	300	na
Mixed-Mode WCX	Proprietary alkyl carboxyl	na	Proprietary			5 µm		120 Å	300	na
Organic Acid (OA)	Proprietary	na	Yes			5 µm		120 Å	300	17%
Surfactant and Explosives E1/2	Proprietary	na	Yes			5 µm		120 Å	300	na
120 C18	C18	L1	Yes			2, 3 and 5 µm		120 Å	300	18%
120 C8	C8	L7	Yes			3 and 5 µm		120 Å	300	11%
300 C18	C18	L1	Yes			3 µm		300 Å	100	7%
Polar Advantage	Sulfamido C16	na	Yes			3 and 5 µm		120 Å	300	17%
Polar Advantage II	Amide C18	na	Yes			2, 3 and 5 µm		120 Å	300	17%
HILIC	Proprietary hydrophilic		Yes			3 µm		120 Å	300	
Phenyl-1	Proprietary alkyl phenyl		Yes			3 µm		120 Å	300	
Carbamate	Proprietary alkyl group		Yes			3 and 5 µm		120 Å	300	
Trinity			Yes					120 Å	300	

## Bio Columns

## Protein

Column	Phase	Target Applications	Base Matrix Material	Substrate Crosslinking	Capacity	Recommended Flow Rate	Solvent Compatibility	Maximum Backpressure	pH Range
MABPac SEC-1									
MABPac SCX-10									
ProPac WCX-10	Weak Cation Exchange	High resolution and high efficiency separations of proteins and glycoproteins, pI ≈3-10, MW>10,000 units	10-μm diameter nonporous substrate to which is grafted a polymer chain bearing carboxylate groups.	55%	6 mg/ mL lysozyme	0.2–2 mL/min	80% ACN, acetone. Incompatible with alcohols and MeOH	3000 psi (21 MPa)	2–12.0
ProPac SCX-10	Strong Cation Exchange	High resolution and high efficiency separations of proteins and glycoproteins, pI ≈3-10, MW>10,000 units	10 μm diameter nonporous substrate to which is grafted a polymer chain bearing sulfonate groups.	55%	3 mg/ mL lysozyme	0.2–2.0 mL/min	80% ACN, acetone, MeOH	3000 psi (21 MPa)	2–12.0
ProPac SCX-20									
ProPac WAX-10	Weak Anion Exchange	High resolution and high efficiency separations of proteins and glycoproteins, pI ≈3-10, MW>10,000 units	10 μm diameter non-porous substrate to which is grafted a polymer chain bearing tertiary amine groups.	55%	5 mg/ mL BSA/ mL	0.2–2.0 mL/min	80% ACN, acetone, MeOH,	3000 psi (21 MPa)	2–12.0
ProPac SAX-10	Strong Anion Exchange	High resolution and high efficiency separations of proteins and glycoproteins, pI ≈3-10, MW>10,000 units	10 μm diameter non-porous substrate with grafted polymer chain bearing quaternary ammonium groups.	55%	15 mg/ mL BSA	0.2–2.0 mL/min	80% ACN, acetone, MeOH	3000 psi (21 MPa)	2–12.0
ProSwift RP-1S	Reversed-Phase	Fast protein separation with high capacity using Reversed Phase	Monolith; polystyrene-divinylbenzene with phenyl functional group	Monolith Standard permeability	5.5 mg/mL Insulin	2–4 mL/min	Most common organic solvents	2800 psi (19.2 Mpa)	1–14
ProSwift RP-2H	Reversed-Phase	Fast protein separation with high capacity using Reversed Phase	Monolith; polystyrene-divinylbenzene with phenyl functional group	Monolith High permeability	1.0 mg/mL Lysozyme	1–10 mL/min	Most common organic solvents	2800 psi (19.3 Mpa)	1–14
ProSwift RP-4H									
ProSwift RP-3U	Reversed-Phase	Fast protein separation with high capacity using Reversed Phase	Monolith; polystyrene-divinylbenzene with phenyl functional group	Monolith Ultrahigh permeability	0.5 mg/mL Lysozyme	1– 16 mL/min	Most common organic solvents	2800 psi (19.3 Mpa)	1–14
ProSwift SAX-1S	Strong Anion Exchange	Fast protein separation with good resolution using Anion Exchange	Monolith; polymethacrylate with quaternary amine functional group	Monolith Standard permeability	18 mg/mL BSA	0.5–1.5 (4.6 mm), 0.05–.25 (1.0 mm)	Most common organic solvents	1000 psi (4.6 mm) 2000 psi (1.0 mm)	2–12.0

Column	Phase	Target Applications	Base Matrix Material	Substrate Crosslinking	Capacity	Recommended Flow Rate	Solvent Compatibility	Maximum Backpressure	pH Range
ProSwift SCX-1S	Strong Cation Exchange	Fast protein separation with good resolution using Cation Exchange	Monolith; polymethacrylate with sulfonic acid functional group	Monolith Standard permeability	30 mg/mL Lysozyme	0.5–1.5 mL/min (4.6 mm)	Most common organic solvents	1000 psi (4.6 mm)	2–12.0
ProSwift WAX-1S	Weak Anion Exchange	Fast protein separation with good resolution using Anion Exchange	Monolith; polymethacrylate with tertiary amine (DEAE) functional group	Monolith Standard permeability	18 mg/mL BSA	0.5–1.5 mL/min (4.6 mm), 0.05–25 (1.0 mm)	Most common organic solvents	1000 psi (4.6 mm) 2000 psi (1.0 mm)	2–12.0
ProSwift WCX-1S	Weak Cation Exchange	Fast protein separation with good resolution using Cation Exchange	Monolith; polymethacrylate with carboxylic acid (CM) functional group	Monolith Standard permeability	23 mg/mL Lysozyme	0.5–1.5 mL/min (4.6 mm), 0.05–20 (1.0 mm)	Most common organic solvents	1000 psi (4.6 mm) 2000 psi (1.0 mm)	2–12.0
ProPac IMAC-10	Immobilized Metal Affinity	High resolution separation of certain metal-binding proteins and peptides	10 µm diameter non-porous polystyrene divinylbenzene substrate with poly (IDA) grafts.	55%	>60 mg lysozyme/mL gel (4 x 250 mm)	1.0 mL/min	EtOH, urea, NaCl, non- ionic detergents, glycerol, acetic acid, guanidine HCl	3000 psi (21MPa)	2–12
ProSwift ConA-1S									
ProPac HIC-10	Reversed-Phase	Protein separation using hydrophobic interaction with salt gradient elution	Spherical 5 µm, ultrapure silica, 300 Å, surface area 100 m <sup>2</sup> /g,	n/a	340 mg lysozyme per 7.8 x 75 mm column	1.0 mL/min	2M Ammonium sulfate/ phosphate salts, organic solvent for cleanup	4,000 psi	2.5–7.5

## Carbohydrate

Column	Target Applications	Base Matrix Material	Substrate Crosslinking	Latex Crosslinking	Capacity	Recommended Eluents	Recommended Flow Rate	Solvent Compatibility	Maximum Backpressure	pH Range
CarboPac MA1	Reduced mono- and disaccharide analysis.	7.5 µm diameter macroporous substrate fully functionalized with an alkyl quaternary ammonium group	15%	No latex	1450 µeq (4 × 250 mm)	Hydroxide	0.4 mL/min	0%	2000 psi (14 MPa)	0–14
CarboPac PA1	General purpose mono-, di-, and oligosaccharide analysis	10 µm diameter nonporous substrate agglomerated with a 500 nm MicroBead quaternary ammonium functionalized latex	2%	5%	100 µeq (4 × 250 mm)	Hydroxide, acetate/hydroxide	1.0 mL/min	0–5%	4000 psi (28 MPa)	0–14
CarboPac PA10	Monosaccharide compositional analysis	10 µm diameter nonporous substrate agglomerated with a 460 nm MicroBead di-functionalized latex	55%	5%	100 µeq (4 × 250 mm)	Hydroxide, acetate/hydroxide	1.0 mL/min	0–90%	3500 psi (24.5 MPa)	0–14
CarboPac PA20	Fast mono-, and disaccharide analysis	6.5 µm diameter nonporous substrate agglomerated with a 130 nm MicroBead quaternary ammonium functionalized latex	55%	5%	65 µeq (3 × 150 mm)	Hydroxide, acetate/hydroxide	0.5 mL/min	0–100%	3000 psi (21 MPa)	0–14
CarboPac PA100	Oligosaccharide mapping and analysis	8.5 µm diameter nonporous substrate agglomerated with a 275 nm MicroBead di-functionalized latex	55%	6%	90 µeq (4 × 250 mm)	Hydroxide, acetate/hydroxide	1.0 mL/min	0–90%	4000 psi (28 MPa)	0–14
CarboPac PA200	High resolution oligosaccharide mapping and analysis	5.5 µm diameter nonporous substrate agglomerated with a 43 nm MicroBead quaternary ammonium functionalized latex	55%	6%	35 µeq (3 × 250 mm)	Hydroxide, acetate/hydroxide	0.5 mL/min	0–100%	4000 psi (28 MPa)	0–14

## DNA

Column	Target Applications	Base Matrix Material	Substrate Crosslinking	Latex Crosslinking	Capacity	Recommended Eluents	Recommended Flow Rate	Solvent Compatibility	Max. Backpressure	pH Range
DNAPac PA100	Single stranded DNA or RNA oligonucleotides, restriction fragments, glycoprotein isoforms.	13-µm diameter nonporous substrate agglomerated with a 100-nm MicroBead alkyl quaternary ammonium functionalized latex.	55%	5%	40 µeq	Chloride, acetate, bromide, perchlorate: in lithium sodium or ammonium forms	1.5 mL/min	0–100%	4000psi (28MPa)	2–12.5
DNAPac PA200	High resolution single stranded DNA or RNA oligonucleotides, restriction fragments, glycoprotein isoforms.	8-µm diameter nonporous substrate agglomerated with a 130-nm MicroBead alkyl quaternary ammonium functionalized latex.	55%	5%	40 µeq	Chloride, acetate, bromide, perchlorate: in lithium sodium or ammonium forms	1.2 mL/min	0–100%	4000psi (28MPa)	2–12.5
DNASwift										

# Dionex Literature

The following literature is available in Adobe PDF format on [www.dionex.com](http://www.dionex.com), by product category under Literature or by searching for the literature number shown below.

## General Interest

Ion Chromatography, Third Edition by Joachim Weiss (English) .....	034996
Dionex Product Selection Guide .....	2002
Dionex Corporation Brochure .....	1993
Advances in Chemical Suppression .....	1855
Reference Library DVD-ROM .....	053891
Dionex Global Services Brochure .....	2165

## Applications Booklets/CD-ROMs

Mass Spectrometry Applications Guide .....	1955
Beverage Applications Notebook .....	2447
Biofuels for a Global Market .....	2267
Biomolecule Analysis Using the ICS-5000 Ion Chromatography System .....	2585
Carbohydrate Analysis for the Food and Beverage Industry .....	1971
Chemicals for a Global Market .....	2388
Determination of Bromate in Water Using Ion Chromatography .....	1970
Environmental Analysis Using ICS-3000 .....	1783
Food Safety Applications Notebook .....	2178
Global Food Safety Brochure .....	2135
Global Pharmaceutical Solutions .....	2499
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### Superior Service

When you purchase a Dionex Support Plan, you are investing in a world-class support organization. Dionex will dedicate the required resources to ensure that long after purchase, your system performs the way you need it to.

Dionex offers varied levels of comprehensive service plans to meet the most stringent laboratory requirements for uptime and maintenance.

Service plans vary by region; contact your local office for details. See "Dionex Locations" in the Ordering Information section for local contact information.

### Validation Services

Dionex offers a full range of validation services and kits. Trained field service representatives are available to perform installation, operation, and performance qualification on your HPLC or IC system.

Performance validation kits are also available that contain all the tools, worksheets, methods, certificates, and validation tags necessary to validate individual system components.



### Automating the Validation Process

Dionex data systems, Chromeleon 6 and PeakNet 6, were designed to make all aspects of validation as easy as possible for the user. Validating the software installation is as simple as choosing a menu option and printing out the results.

To help automate the instrument validation process, OQ/PQ procedures and pass/fail criteria are built into the software. Validation "wizards" walk you through the creation of methods to validate your specific HPLC or IC configuration.

### Peak Performance Kits

Dionex Peak Performance Kits are designed to meet the preventative maintenance needs of your Dionex hardware. Each maintenance kit includes the required spare parts to perform the recommended annual maintenance on the specified module.

Dionex will perform this maintenance for you, or you can follow the included instructions and perform the maintenance yourself.

### Contact Information

For service and technical support, contact our Technical Support Department:

*e-mail:* [techsupport@dionex.com](mailto:techsupport@dionex.com)

*phone:* 1-800-DIONEX-0 (zero), within U.S. from 8:00 a.m. EST to 5:00 p.m. PST.

or fill out our Technical Support Request Form online:

[http://www1.dionex.com/forms/dnex\\_tech\\_support\\_request.html](http://www1.dionex.com/forms/dnex_tech_support_request.html)

See also "Dionex Locations" in the Ordering Information section for local contact information to inquire about local service offerings.

# Training

## *Complete solutions for your analytical needs*

Dionex's ultimate goal is to provide you with an end-to-end solution to your analytical needs. To meet this goal, we offer a complete line of services, including a training program to help you get the most out of your instrumentation and results.

Contact your local Dionex representative to find out about specific training offerings in your area. (See "Dionex Locations" in the Ordering Information section.)

Visit us on the web at:

[www1.dionex.com/en-us/training/lp2514.html](http://www1.dionex.com/en-us/training/lp2514.html)

for details about training offered in your region.

## Course Offerings

### Instrumentation

These courses provide the skills to operate your chromatography system and optimize its analytical and automation capabilities. Example courses include:

*Ion Chromatography Systems:* Instrument-specific courses in basic operation and troubleshooting, and advanced maintenance and troubleshooting

*HPLC Systems:* Instrument operation, maintenance and troubleshooting

*MSQ Detector Family*

*IC Method Development*

*Analyte-Specific Analysis*

### Software

Take advantage of the benefits you obtain when participating in a Dionex Chromatography Software training course. As you become more familiar with Dionex Chromatography Software, you will appreciate the power and capabilities this software provides. Courses include:

*Chromeleon Level 1:* An Introduction to Chromeleon

*Chromeleon Level 2:* Next Steps in Chromeleon

*Chromeleon Level 3:* Chromeleon Advanced Operator Training

*Chromeleon System Administrator Training*



## Training Options

### Specialized

Designed specifically to your application and instrumentation requirements. Assist the chromatographer in maximizing the capabilities of their system (e.g., IC, ICS, ASE, UltiMate, Summit). Example courses include:

*An Introduction to the Principles and Practices of HPLC*

*Accelerated Solvent Extraction (ASE) Training*

*Carbohydrate Determination by HPAE-PAD*

*In Search of Resolution:* A Practical Approach to Reversed-phase HPLC Method Development

*Basic Mass Spectrometry, MSQ*

*Method Development in Ion Chromatography*

### Customized Training

Do you need a training session customized to your individual needs? Perhaps you need training geared towards a specific application or need advanced training on a particular topic. Whatever your needs, contact the Dionex Training group and we will put together a course to suit your needs.

### On-Site Training

Do you have a larger group to train? Or perhaps you would like to have training on your own instruments. Whatever the reason, we can come to you and train you at your facility. Your on-site training session can include any combination of our standard courses and/or customized courses to meet individual needs.

### Web-Based Training

Interactive training sessions advance your knowledge of Chromeleon Software. These sessions use live online meeting technology with desktop sharing to answer your questions and guide you through solutions.



# Dionex Trademarks and Product Names

*All trademarks and registered trademarks belong to Dionex unless otherwise indicated.*

## A

AAA-Direct™ Amino Acid Analysis System  
AAA-Direct™ Certified  
AAA-Certified™  
ACES™ Anion Capillary Electrolytic Suppressor  
Acclaim® columns, Acclaim® PolarAdvantage (PA) column,  
Acclaim® PepMap™ column  
ACQUITY® (Waters Corporation)  
ACQUITY UltraPerformance LC® (Waters Corporation)  
ACQUITY UPLC® (Waters Corporation)  
Acrodisc® (Gelman Sciences, Inc.)  
Acurate™ Flow Splitter  
AES® Atlas Electrolytic Suppressor  
Alliance® (Waters Corporation)  
Aminex® (Bio-Rad Laboratories, Inc.)  
AminoPac® columns  
AminoTrap™ columns  
AMMS®, AMMS® ICE, AMMS® ICE II Anion MicroMembrane  
Suppressor  
Analyst® (Applied Biosystems)  
AnchorChips™ (Bruker Daltonics)  
Anion Self-Regenerating Suppressor®  
Anion Trap Columns (IonPac®)  
Anotop® (Whatman)  
apex-ultra® (Bruker Daltonics)  
API 2000™, API 3000™, API 3200™, API 4000™, API 5000™, (AB  
SCIEX)  
Applera™ (Applera Corporation)  
AQA™ Mass Spectrometer (Thermo Fisher Scientific, Inc.)  
Aqua™ column (Phenomenex, Inc.)  
ARC™ Automated Run Completion  
Aroclor™ (Monsanto Corp.)  
ASE® 150 or 350 Accelerated Solvent Extractor  
ASE® Prep CR  
ASE® Prep DE  
ASE® Solvent Controller  
ASI-100™, ASI-100P™, ASI-100PT™, or  
ASI-100T™ Automated Sample Injector  
ASPEC™ (Gilson, Inc.)  
ASRN™ Anion Self-Regenerating Neutralizer, ASRN I, ASRN II  
ASRS®, ASRS® II, ASRS® ULTRA II, or ASRS® 300 Anion  
Self-Regenerating Suppressor  
Atlantis® columns (Waters Corporation)  
Atlas® Suppressor

Auto OnGuard™ [without Auto it is OnGuard®]  
AutoASE® software  
autoflex™ (Bruker Daltonics)  
AutoNeutralization™ system  
AutoPrep  
AutoPurification® (Waters Corporation)  
AutoQ™ instrument qualification  
AutoRegen® system  
AutoSelect™  
AutoSuppression® device  
AutoTrace® 280 Solid-Phase Extraction instrument  
AXIMA-QIT™ (Shimadzu Biotech)

## B

Bacto™ YPD Broth (BD Diagnostics)  
BAKER INSTRA-ANALYZED® Acids (J. T. Baker)  
Baker Analyzed® Reagents (J. T. Baker)  
BioAnalyst™ (AB SCIEX)  
Biodialyser™ (AmiKa, Inc.)  
BioLC® (Use ® when written with a column name, but not when used  
with System)  
BioPlus™ columns  
BioSelect™ (The Separations Group)  
Biospectrometry™ (AB SCIEX)  
BorateTrap™ columns

## C

CAD® Charged Aerosol Detector  
CapLC® (Waters Corporation)  
CarboPac® MA1, PA1, PA10, PA100, PA20, PA200 columns  
Cat-A-Phase® mobile phase  
Cation Atlas® Electrolytic Suppressor  
Cation MicroMembrane Suppressor®  
Cation Self-Regenerating Suppressor®  
Cation Trap Columns (IonPac®)  
CCES™ Cation Capillary Electrolytic Suppressor  
CD Builder™ (AppletWare Inc.)  
Chemraz® (Greene, Tweed & Co.)  
Chromachem® Evaporative Light Scattering Detector  
Chrome™ browser (Google Inc.)  
Chromeleon® Chromatography Data System (patent pending);  
Chromeleon® PA; Chromeleon® Xpress [or CM Xpress or CMX]  
Chromeleon® Purification Suite™  
ChromSword® Auto (Dr. Sergey Galushko Software Entwicklung)  
Clarus® (Perkin Elmer, Inc.)

CMD™ Carbohydrate Membrane Desalter  
 CMMS® Cation MicroMembrane Suppressor  
 Cobra™ peak detection algorithm  
 Corona® Charged Aerosol Detector  
 Corona® ultra™ Charged Aerosol Detector  
 CoulArray® Coulometric Array Detector, or multi-electrode array detector  
 Coulochem® III Electrochemical Detector  
 Coulometric® detector  
 Couloscan™  
 CSRN™ Cation Self-Regenerating Neutralizer  
 CSRS®, CSRS® II, CSRS® ULTRA II, or CSRS® 300 Cation Self-Regenerating Suppressor  
 CMMS® II Cation MicroMembrane Suppressor  
 Curtain Gas™ (AB SCIEX)

## D

Data Explorer® (AB SCIEX)  
 DataDetective™ (AppletWare Inc.)  
 dBASE® (Borland International, Inc.)  
 DCMSLink™  
 Delayed Extraction® (AB SCIEX)  
 Dequest® (Monsanto Corp.)  
 Dionex®  
 DNAPac® column [replaces NucleoPac]  
 DNAPhor™ SB1.5 kB Sieving Buffer Kit  
 DNASwift™ column  
 Dowex® (Dow Chemical Company)  
 Dionium™ components or pathway  
 DuoSpray™ (AB SCIEX)  
 DX-LAN Instrument Interface

## E

eLab Notebook™ (Waters Corporation)  
 EluGen (no longer trademarked)  
 Eppendorf® (Eppendorf-Netheler-Hinz GmbH)  
 ESA®  
 ESA Plus Design®  
 esquire2000™ (Bruker Daltonics)  
 Explorer™ (AB SCIEX)

## F

FAMOS™ Fully Automated Micro Autosampler  
 Fast IC™ column  
 FastLoc™ (Thermo Fisher Scientific, Inc.)  
 Firefox® (Mozilla Foundation)  
 Flavoscan™  
 Florisil® (U.S. Silica Co.)

Foxy® (Teledyne Isco, Inc.)  
 FPLC® (GE Healthcare)  
 FractionLynx™ (Waters Corporation)  
 Freon® (E.I. du Pont de Nemours & Co.)

## G

Google® (Google Inc.)

## H

Halo® (Advanced Materials Technology, Inc.)  
 HCTultra™ (Bruker Daltonics)  
 Hydromatrix™ (Varian Associates, Inc.)  
 Hypersil® (Agilent Technologies)  
 Hypercarb™ (Thermo Fisher Scientific, Inc.)  
 HyStar™ (Bruker Daltonics)

## I

IC Cube™ module  
 ICAT® (University of Washington, Seattle, USA)  
 Inertsil® (GL Sciences, Inc.)  
 InGuard™ Automated Sample Pretreatment Cartridges (InGuard™ cartridges, for short)  
 InkJet® (Hewlett-Packard)  
 Integral™  
 Integral Migration Path™  
 Internet Explorer® (Microsoft Corporation)  
 Interrogator™ (AB SCIEX)  
 Ion Bright™ (Thermo Fisher Scientific, Inc.)  
 IonPac® columns  
 IonPhor™ Electrolyte Buffers  
 iScience™ (Applera Corporation)  
 IonSpray™ (AB SCIEX)  
 IonSwift™ MAX-100 columns  
 iTRAQ™ (Applera Corporation)  
 Irganox® (Ciba)

## J

## K

Kalrez® (E.I. du Pont de Nemours & Co.)  
 Kel-F® (3M Corporation)  
 Kynar® (Arkema, Inc.)

## L

LabPRO® (Rheodyne LLC)  
 LaChromUltra® (Hitachi)  
 LANtastic® (Artisoft, Inc.)

LaserJet® (Hewlett-Packard)

LichroCART® (Merck KGaA, Darmstadt, Germany)

LiChrospher® ADS (Merck KGaA, Darmstadt, Germany)

LINAC® (AB SCIEX)

Luna® columns (Phenomenex, Inc.)

### M

MALDI TOF/TOF™ [for instrument] (AB SCIEX)

MALDI TOF/TOF® [for ion source for mass spectrometer] (AB SCIEX)

MarkerView™ (AB SCIEX)

Mascot® (Matrix Science Ltd.)

MassChrom™ (AB SCIEX)

MassLynx™ (Waters Corp.)

Metexchange®

MetPac™ reagents

MICRO® (International Products Corp.)

Micro BCA™ (Pierce Biotechnology, Inc.)

MicroBead™ resin

MICRO DIST® (Lachat Instruments)

MicrolonSpray® (AB SCIEX)

MicroMass® (Waters Corporation)

MicroMembrane™ Suppressor

Microsoft® (Microsoft Corporation)

Millennium® (Waters Corporation)

Milli-Q® (Millipore Corporation)

MMS™ MicroMembrane™ Suppressor

MonoDisk™

Mono Q™ (GE Healthcare)

MonoStandard™

Mozilla® (Mozilla Foundation)

M Path™ (Thermo Fisher Scientific, Inc.)

MPIC® Mobile Phase IC

MSQ Plus™ Mass Spectrometer (Thermo Fisher Scientific, Inc.)

### N

Nalgene® (Nalge Nunc International)

TriVersa NanoMate® (Advion Biosciences, Inc.)

NanoSpray® (AB SCIEX)

nanoViper™ fingertight fitting system

N-EVAP® (Organomation Associates, Inc.)

NovaPak® (Waters Corp.)

### O

OligoStandards™

oMALDI™ (AB SCIEX)

OmniFLEX™ (Bruker Daltonics)

OmniPac® columns

OnGuard®, OnGuard® II Sample Prep Station [but Auto OnGuard™]

Opera® (Opera Software ASA)

Opera Software™ (Opera Software ASA)

Operational Simplicity™

OptiBeam™ (AB SCIEX)

Opti-TOF™ (AB SCIEX)

Optima™ (Thermo Fisher Scientific, Inc.)

ORBO™ (Supelco, Inc.)

Oxscan™ HPLC electrochemical array detection method

### P

PaintJet® (Hewlett-Packard)

PEEK™ (Victrex PLC)

PEEKsil™ (SGE Analytical Science)

Pentium® (Intel Corporation)

PepMap™ for Acclaim® PepMap™ columns

PepSwift™ columns

PhotoSpray® (AB SCIEX)

PicoView™ (New Objective, Inc.)

Pittcon® (The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy)

Plexiglass® (ATOFINA)

PolyVial™

Poros® (Applied Biosystems)

PowerPoint® (Microsoft)

PrepStar™ (Varian, Inc.)

Prevail™ (Alltech Associates, Inc.)

Probot™ Microfraction Collector

ProPac® columns

ProStar (Varian, Inc.)

ProteinChips® (Ciphergen)

ProSwift® columns

Purification Suite™ [use Chromeleon® Purification Suite™]

Purospher® STAR (Merck KGaA, Darmstadt, Germany)

PWA™ Purification Workflow Automation

### Q

Q TRAP® (AB SCIEX)

QSTAR® (AB SCIEX)

QuanTIS™ (AB SCIEX)

QJet™ (AB SCIEX)

### R

RDA™ (AB SCIEX)

Reacti-Block™ (Pierce Chemical Company)

Reacti-Therm™ (Pierce Chemical Company)

Reagent-Free™ systems, columns  
 RF 2000 Fluorescence Detector  
 RFIC™ [as adjective only, follow RFIC with a product (e.g., system, instruments, column, suppressor, eluent generator, etc.)]  
 RFIC-EG™ systems or Reagent-Free™ IC systems with eluent generation  
 RFIC-ER™ systems or Reagent-Free™ IC systems with eluent regeneration  
 RFIC-ESP™ systems or Reagent-Free™ IC systems with electrolytic sample preparation

## S

Santoprene® (Advanced Elastomer Systems, L.P.)  
 SC-CSRS™  
 SELDI ProteinChips® (Ciphergen)  
 SelectaPore™ columns (The Separations Group)  
 SEQUEST® (University of Washington, Seattle, USA)  
 SFM™ Sample and Fraction Manager  
 Simply Intelligent™ chromatography software  
 Simriz® Freudenberg-NOK General Partnership  
 SmartFlow®  
 SmartPeaks™ integration assistant  
 SmartRun™ system  
 SolEx™ SPE cartridges  
 SP10 AutoNeutralization™ system  
 SpectraSYSTEM® (Thermo Fisher Scientific, Inc.)  
 SpeedVac® (Thermo Fisher Scientific, Inc.)  
 Spherisorb® (Waters Corporation)  
 SRN™ Self-Regenerating Neutralizer  
 SRS® Self-Regenerating Suppressor  
 strata™ (Phenomenex)  
 Summit HPLC System (NOT registered)  
 Summit x2 Dual-Gradient System (NOT registered)  
 SUPELCO SIL™, Supelguard™ (Supelco, Inc.)  
 Hyflo Super Cel® (Manville Corp.)  
 Superose® (GE Healthcare)  
 Supor® (Pall Corporation)  
 SupraPur® (EM Industries, Inc.)  
 Switchos™ Microcolumn Switching Module  
 SymBiot® (AB SCIEX)  
 Symmetry® columns (Waters Corporation)

## T

Taper-cell® (Waters Corporation)  
 Teflon®, Tefzel® (E.I. du Pont de Nemours & Co.)  
 ThermoFlare™  
 TOF/TOF™ (AB SCIEX)

TotalChrom® (Perkin Elmer Inc.)  
 Trace GC Ultra™ (Thermo Fisher Scientific, Inc.)  
 Trinity™ for Acclaim® Trinity™ columns  
 Triton® X-100 (Rohm & Haas)  
 TSQ Quantum Access™ (Thermo Fisher Scientific, Inc.)  
 TurboIonSpray®, TurboIonTrap® (AB SCIEX)  
 TurboMatrix™ (Perkin Elmer Inc.)  
 Turbo V™ (AB SCIEX)  
 TurboVap® (Caliper Life Sciences)  
 Tween® 20 (Atlas Chemical Co.)

## U

UltiChrom™ software  
 UltiFlow™  
 UltiMate® 3000 Intelligent LC series  
 ultra™ (with Corona)  
 Ultrex® (J. T. Baker)  
 UPLC® (Waters Corporation)  
 UZ-View™ Capillary Flow Cell

## V

VALVEMATE® (Gilson, Inc.)  
 Vespel® (E.I. du Pont de Nemours & Co.)  
 VHP™ (The Separations Group, Inc.)  
 Viper™ fingertight fitting system  
 Virtual Column™ Separation Simulator  
 Vitascan™ analytical method  
 Vortex-Genie® (Scientific Industries, Inc.)  
 Voyager™, Voyager-DE™ (AB SCIEX)  
 Vydac® columns (The Separations Group, Inc.)

## W

Windows® 98, Windows® 2000, Windows® XP, Windows® Vista (Microsoft Corporation)  
 Windows NT® (Microsoft Corporation)  
 Wonderware InTouch® (Wonderware Corp.)

## X,Y,Z

Xcalibur® (Thermo Fisher Scientific, Inc.)  
 XTerra® (Waters Corporation)  
 ZIC®-HILIC and ZIC®-pHILIC columns (Merck Sequant AB)  
 Zitex® (Norton Chemplast)  
 Zorbax® (E.I. du Pont de Nemours & Co.)

# Ordering Information

*Contact your local sales office for ordering and additional information*

Order terms and conditions vary by region. Contact your local Dionex representative for more information.



## Dionex Locations

### Dionex Corporation

1228 Titan Way  
P.O. Box 3603  
Sunnyvale, CA 94088-3603  
www.dionex.com

### Competence Centers

Sunnyvale, California, U.S.A.  
Germering, Germany  
Salt Lake City, Utah, U.S.A.  
Amsterdam, The Netherlands  
Chelmsford, Massachusetts, USA

### North America

#### United States

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Fax: (847) 283 0722

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Fax: (55) 11 3213 9530

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Fax: (31) 20 685 3452  
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Fax: (32) 3 353 42 93

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Fax: (45) 36 36 90 99

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Fax: (44) 1276 691837









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



Dionex products are designed,  
developed, and manufactured  
under an ISO 9001 Quality System.

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