Complete Customer Support

Complete Solutions
Dionex is committed to providing total customer support through after-sales service, on-site training, system qualification services, and a wide range of products to designed to meet your laboratory requirements.

Customer Service
With over 30 years experience in ion chromatography, Dionex understands what is necessary to install and maintain your IC systems for optimal performance and maximum up-time. We do more than install your system; we ensure it will provide solutions to your analytical problems.

On-Site Training
Training courses are available for all applications and levels of operator expertise. During installation, the service representative will provide an introduction and overview of system operation. Dionex also offers extended training through regional training courses or on-site courses, intended for operators new to ion chromatography. These courses are designed for technicians and provide information on system configuration, instrument operation, software operation, routine maintenance, and troubleshooting.

Total Commitment to Customer Satisfaction
Dionex has built its reputation on problem solving and customer satisfaction. The ICS-1100, ICS-1600, and ICS-2100 products continue that tradition. Our Customer Service and Technical Support Departments can provide:

- System Qualification IQ/OQ/PQ
- Custom Service Agreements
- Complete Instrument and Applications Support

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Dionex products are designed, developed, and manufactured under an ISO 9001 Quality System.

LPN 1514-07 5M 07/10
Printed in U.S.A.

RFIC™

Ion Chromatography

ICS-1100, ICS-1600, and ICS-2100 Systems

RFIC ER

RFIC EG

RFIC ESP

DIONEX

Passion. Power. Productivity.

Dedicated System

ICS-1100 Series

Standard Features
- Dual-Piston Pump
- Thermostated Digital Conductivity Cell
- Electrolytic Suppression
- LED Status Front Panel
- Chromeleon® SE Control Software
- Eluent Regeneration Controller

Options
- Eluent Regeneration (RFIC-ER™)
- Column Heater
- In-Line Vacuum Degas
- Full Chromeleon Chromatography Data System software
- Sample Preparation Valve, PEEK™, High Pressure, 2-Position, 6- or 10-Port

ICS-1600 Series

Standard Features
- Touchpad Front Panel Control
- Dual-Piston Pump
- Thermostated Digital Conductivity Cell
- Electrolytic Suppression
- Column Heater
- Chromeleon Chromatography Data System software
- Eluent Regeneration Control

Options
- Eluent Regeneration (RFIC-ER)
- In-Line Vacuum Degas
- Sample Preparation Valve, PEEK, High Pressure, 2-Position, 6- or 10-Port

Configurations

ICS-2100 Series

Standard Features

- Touchpad Front Panel Control
- RFIC-EG™ System
  - Eluent Generation
  - Electrolytic Gradients
  - Electrolytic Suppression
  - CR-TC Trap Column
- Dual-Piston Pump
- Thermostated Digital Conductivity Cell
- Column Heater
- Chromeleon Chromatography Data System software

As an RFIC-EG system, just add water to produce these eluents:

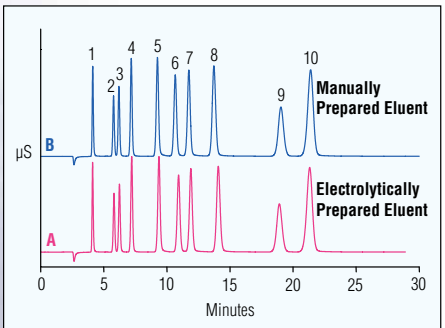
- K^+, Na^+, or Li^+ hydroxide
- CO_3^-
- CO_3^-/HCO_3^-
- MSA

Options

- In-Line Vacuum Degas
- Eluent Regeneration (RFIC-ER)
- Sample Preparation Valve, PEEK, High Pressure, 2-Position, 6- or 10-Port
- Electrolytic Sample Preparation (RFIC-ESP™)
- Electrolytic Water Purifier

Integrated Ion Chromat

Dionex's high-performance integrated Reagent-Free™ ion chromatography (RFIC™) systems, the ICS-1100, ICS-1600, and ICS-2100, provide the ultimate in productivity for low cost per analysis while maintaining high-sensitivity results. The systems combine the power of on-line sample preparation with all the capabilities of modern IC systems, including eluent generation (EG), eluent regeneration (ER), and electrolytic sample preparation (ESP). All three RFIC systems feature a dual-piston pump and optional eluent degasser, a conductivity detector with heated cell, and a chromatography compartment for columns, suppressors, and automated sample preparation. The ICS-2100 is the first totally integrated RFIC system with Electrolytic Sample Preparation (RFIC-ESP system) for automated on-line sample preparation combined with eluent generation. The ICS-1100 and ICS-1600 are the first integrated RFIC systems with built-in ER control (RFIC-ER systems), allowing continuous operation for up to four weeks.The ICS series is compatible with all Dionex suppressor technologies and all Dionex 2 mm to 5 mm columns.



Column: IonPac® AS23
Eluent: 4.5 mM Na_2CO_3 / 0.8 mM $NaHCO_3$
Flow Rate: 1.0 mL/min
Detection: Suppressed conductivity
Inj. Volume: 25 µL

Peaks:					
1. Fluoride	3.0 mg/L	6. Chlorate	25.0 mg/L
2. Chlorite	10.0	7. Bromide	25.0
3. Bromate	20.0	8. Nitrate	25.0
4. Chloride	6.0	9. Phosphate	40.0
5. Nitrite	15.0	10. Sulfate	30.0

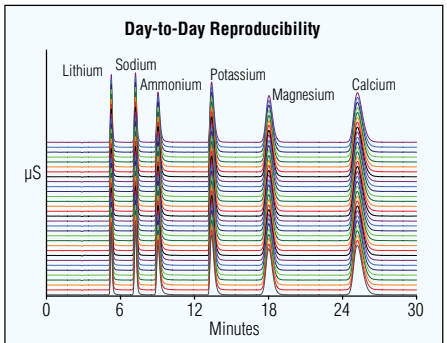
22955

Identical separation of anions and oxyhalides using manually or electrolytically prepared eluent.

Powerful RFIC Solutions

The ICS-1100 RFIC-ER system integrates an advanced set of features into a single instrument, including RFIC-ER control and plumbing for simple setup of eluent regeneration. A dual-piston pumping system with active feedback control provides extremely low pressure-ripple baselines, enabling the low flow rates required for microbore columns. Advanced detector cell design and precision temperature control provide drift-free baselines for precise integration and quantification at very low analyte concentrations. Valve options facilitate a variety of automated sample handling and preparation techniques.

The ICS-1600 RFIC-ER system has the same features as the ICS-1100—including the powerful sample preparation capabilities—with the addition of an LCD touch-panel display and integrated column heater.

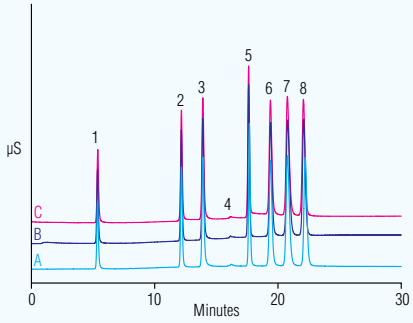


Component	Retention Time RSD
1. Lithium:	0.029%
2. Sodium:	0.024%
3. Ammonium:	0.024%
4. Postassium:	0.019%
5. Magnesium:	0.040%
6. Calcium:	0.031%

26709

RFIC-EG systems provide excellent reproducibility. Outstanding column temperature control and pump performance are demonstrated in this example showing an IonPac CS16 column and replicates of cation standards.

The ICS-2100 is the first system with integrated eluent generation (EG) and electrolytic sample preparation (ESP) capabilities. The RFIC-EG/ESP system combines the sensitivity and precision of eluent generation with a variety of automated sample preparation techniques. An auxiliary power supply is available to drive electrolytic devices, such as a water purifier for ultratrace-level anion and cation analyses.



Column: IonPac AG15, AS15 4 mm
Eluent: 8 mM KOH from 0–6 min, 8-55 mM from 6–18 min
Eluent Source: RFIC-EG system
Flow Rate: 1.6 mL/min
Inj. Volume: 25 µL
Temperature: 30 °C
Detection: Suppressed conductivity

Peaks:	
1. Fluoride	2 mg/L
2. Chloride	5
3. Nitrite	10
4. Carbonate	-
5. Sulfate	10
6. Bromide	20
7. Nitrate	20
8. Phosphate	30

Component	System A Retention Time (%RSD)	System B Retention Time (%RSD)	System C Retention Time (%RSD)
Fluoride	5.367 (0.062)	5.361 (0.031)	5.384 (0.017)
Chloride	12.166 (0.026)	12.163 (0.022)	12.165 (0.020)
Nitrite	13.908 (0.022)	13.906 (0.019)	13.904 (0.021)
Sulfate	17.685 (0.027)	17.623 (0.025)	17.618 (0.021)
Bromide	19.382 (0.031)	19.404 (0.018)	19.385 (0.018)
Nitrate	20.759 (0.036)	20.783 (0.014)	20.760 (0.017)
Phosphate	22.219 (0.049)	22.089 (0.043)	22.066 (0.018)

(%RSD) n = 20

19133

RFIC-EG systems produce consistent results. The table shows excellent reproducibility when transferring applications from system to system, and laboratory to laboratory.

ographs

The ICS-2100 System

Front Panel 1
The LCD touchpad front panel on the ICS-1600 and ICS-2100 systems provides clear identification of key operating parameters, permitting precise control and monitoring at the instrument.

Eluent Generator 2
Eluent concentrations can be changed with the click of a mouse. Atmospheric carbonate contamination is virtually eliminated because the eluent is not exposed to air as it is with manually prepared eluents. Eluent generation also eliminates the potential variability of manually prepared eluents and improves day-to-day, operator-to-operator repeatability.

Injector 13
Highly precise, electrically activated PEEK Rheodyne valve provides reliability and consistency from injection to injection.

Pump 12
Dual-piston pump design provides low drift and pulsation-free eluent delivery for stable baselines and low detection limits. The PEEK polymeric flow path eliminates metal contamination and corrosion.

Conductivity Cell 3
Low-volume, high-performance thermostated cell provides high sensitivity and permits stable operation even in variable temperature environments. Digital control offers a wide dynamic range with autoranging which allows both major and minor components to be detected in a single run.

Auxiliary Power Supply 11
The auxiliary power supply supports electrolytic devices, such as a water purifier for trace analysis or CR-TC for sample preparation.

Automated Sample Prep 10
Optional 6-port or 10-port valve provides a wide range of sample injection and preparation options, including matrix elimination, on-line filtration, and concentration.

Suppressor 4
All Dionex suppressor technologies are supported ensuring that all application requirements are met. Electrolytic suppression eliminates the need to prepare acidic or basic regenerants, provides lower noise and improved sensitivity, and requires less maintenance.

Vacuum Degas (Optional) 9
Provides in-line vacuum degassing of eluents, ensuring reproducibility and protection of eluents from contamination and decomposition. Control of the degas operation can be automated to trigger degassing as required.

Column Heater 5
Temperature control promotes column stability and reproducibility in many applications. A low-dispersion heat exchanger provides eluent preheating prior to the column to maintain the column temperature set point. The transparent cover allows viewing of the column connections without temperature disruption. The column heater is standard on the ICS-1600 and ICS-2100 systems, and optional on the ICS-1100 system.

Eluent Valve 8
Electronically controlled valve provides positive shutoff of eluent flow prior to the pump for easy servicing.

USB Communication 7
Plug-n-Play USB communication permits fast connectivity and reliability. Instantaneous recognition with auto-configuration provides simplicity when configuring systems.

Leak Detector and Drip Tray 6
Provide fast response and shutdown for system leaks.

A Powerful Combination of

Integrated, upgradable modules for all your application needs

Electrolytic Suppression

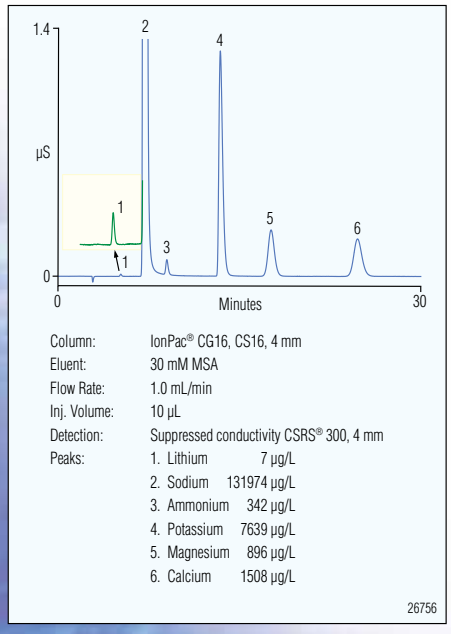
The ICS-1100, ICS-1600, and ICS-2100 systems support all types of Dionex suppressor technologies, including MMS™, SRS®, and AES® suppressors.

The SRS and AES suppressors use electrolytic suppression, which frees the operator from manual regenerant preparation. The suppressor automatically produces the regenerant required for the application and provides continuous regeneration. The advantages of electrolytic suppression include:

- Enhanced day-to-day consistency with low noise and drift
- Reduced background conductivity and lower detection limits
- Fast startup times
- Superior sensitivity for analysis of cations or anions

Conductivity Detection

The ICS-1100, ICS-1600, and ICS-2100 systems are designed and optimized for all types of IC separations and applications using conductivity detection. The temperature-controlled high-performance conductivity cell permits measurements that are unaffected by temperature variations. Digital control offers a wide dynamic range for detecting analytes with large or disparate concentration variations within the same sample.



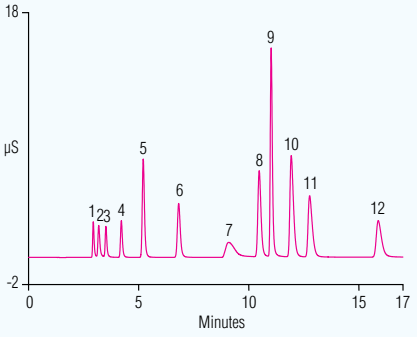
Column:	IonPac® CG16, CS16, 4 mm
Eluent:	30 mM MSA
Flow Rate:	1.0 mL/min
Inj. Volume:	10 µL
Detection:	Suppressed conductivity CSRS® 300, 4 mm
Peaks:	1. Lithium 7 µg/L
	2. Sodium 131974 µg/L
	3. Ammonium 342 µg/L
	4. Potassium 7639 µg/L
	5. Magnesium 896 µg/L
	6. Calcium 1508 µg/L

26756

RFIC-EG systems provide excellent reproducibility. This example shows 50 runs ovelaid on the IonPac CS12A column separating a six-cation standard.

Eluent Generation

Eluent generation, integrated into the ICS-2100 system, eliminates the need for manual eluent preparation. The system requires only a source of DI water; isocratic or gradient eluent concentrations are programmed with the click of a mouse for unprecedented simplicity and error-free operation. Electrolytic eluent generation provides precise eluent concentration delivery, run-to-run, instrument-to-instrument, and lab-to-lab.



Column:	IonPac AS18, 4 mm
Eluent:	22 to 40 mM KOH: 7–8 min
Eluent Source:	RFIC-EG system
Flow Rate:	1 mL/min
Inj. Volume:	25 µL
Temperature:	30 °C
Detection:	Suppressed conductivity
Sample:	Anion standard

Peaks:	1. Fluoride	0.5 mg/L
	2. Acetate	2.5
	3. Formate	1.0
	4. Chlorite	5
	5. Chloride	3
	6. Nitrite	5
	7. Carbonate	20
	8. Bromide	10
	9. Sulfate	10
	10. Nitrate	10
	11. Chlorate	10
	12. Phosphate	10

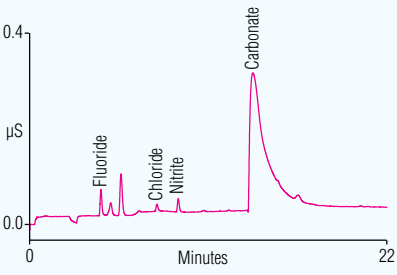
19136

The ICS-2100 system and the IonPac AS18 column provide excellent separation and increased sensitivity in this anion application. RFIC-EG systems meet the requirements of U.S. EPA methods 300.0 and 300.1.

The RFIC-EG system consists of an eluent generator, a continuously regenerated trap column, and an electrolytic suppressor. Electrolytically generated hydroxide eluents provide very low background conductivity, resulting in the lowest detection limits available for ion chromatography.

Eluent Regeneration

The ICS-1100 and ICS-1600 systems are the first fully integrated RFIC-ER systems. Eluent regeneration (ER) technology is designed for systems dedicated to routine analyses of anions or cations in low-to-moderate concentration matrices. This technology uses electrolytic suppression and patented catalytic and purification columns to regenerate eluent for reuse. A single preparation of eluent can be regenerated for up to four weeks, increasing reproducibility while reducing eluent preparation time and waste disposal. Because the system operates continuously, it does not require re-equilibration or recalibration between eluent preparation. Always on and always ready, the RFIC-ER system can be used for isocratic separations with carbonate, carbonate/bicarbonate, or methanesulfonic acid eluents.



Column:	IonPac AS18 4 mm, AG18 4 mm
Concentrator:	UTAC-LP1
Eluent:	KOH gradient
	18 mM to 50 mM from 0 to 10 min
	50 mM 10 to 18 min
	18 mM at 18.1 min, hold to end, 24 min
Eluent Source:	EluGen II KOH cartridge on EGC-1
Flow Rate:	1.0 mL/min
Temperature:	30 °C
Detection:	Suppressed conductivity
Suppressor: Electrolytic	ASRS® 300, 4 mm; operated at 99 mA
Water Purifier:	20 mA from ICS-2100 auxiliary power supply
Peaks:	1. Fluoride 24 ng/L (ppt)
	2. Chloride 32
	3. Nitrite 42

26212

The RFIC-ESP system is especially well-suited fo trace-level analysis.

Chemistry and Software

Automated Sample Preparation

The sample preparation capabilities available with the ICS-1100, -1600, and -2100 systems provide a wide variety of automated labor-saving techniques, described below:

Electrolytic Sample Preparation

The auxiliary power supply on the ICS-2100 system allows control of electrolytic sample preparation devices, such as Self-Regenerating® Neutralizers for matrix removal from acidic or basic samples. An optional electrolytic water purifier can be added to polish for ultratrace-level determinations.

Intelligent Large Loop/Small Loop Sample Injection

Automatically reinject different volumes of sample when a specified analyte concentration is out of range. Two injection loops with a large volume differential makes reanalysis of disparate sample concentrations easy.

Dual On-Line Filtration

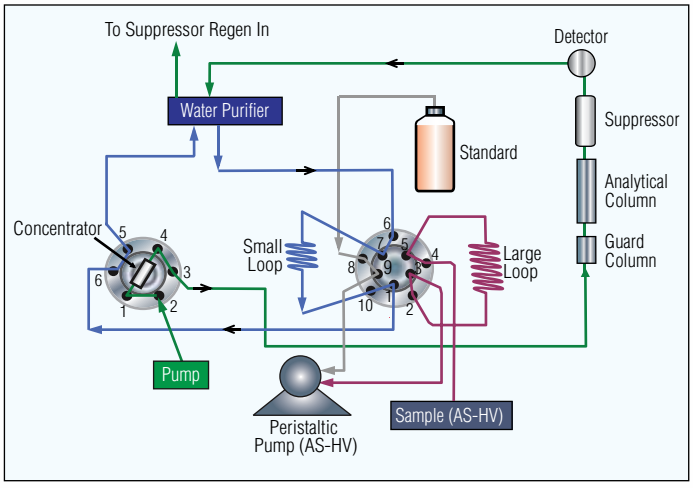
Off-line sample filtration is costly in terms of labor and consumables, and on-line sample filtration techniques are prone to sample contamination or carryover problems. Backflushing eliminates these issues, providing more accurate results.

On-Line Matrix Elimination

Organic materials easily can foul and damage analytical columns. Trap columns can remove these materials, but trap column lifetime is limited. Automated column wash or backflush significantly extends organic trap column lifetime, prevents carryover, and eliminates sample contamination. Matrix elimination can be combined with on-line filtration for improved protection of the analytical column.

Sample Preconcentration

Automated on-line sample preconcentration makes trace analysis easy, improving chromatography by narrowing analyte bands. Optional sample preparation valves facilitate automated sample preconcentration. The optional electrolytic water purifier reduces analyte background noise and eliminates the need for an external pump for loading the concentrator column.



In RFIC-ESP systems, the optional water polisher also serves as a sample preparation pump, facilitating preconcentration or matrix elimination applications.

Chromatography Management Solutions

Chromeleon Chromatography Data System Software

Chromeleon software provides the most powerful control and data processing software available for ion chromatography. Chromeleon features make system control and setup fast and easy. Overall system and method consistency is accomplished with minimal effort with easy-to-follow screens and setup wizards.

Wellness Trending

The built-in Electronic Log Book monitors and plots the trend of the condition of your system over time to ensure high performance and accurate diagnosis of potential service issues.

eWorkflows

Using eWorkflows™, you simply select an instrument, and specify the number of samples, and the starting vial position in the autosampler. The eWorkflow automatically generates the injection list, loads the correct instrument conditions, and applies the correct processing parameters. Chromatograms are immediately processed and results are instantly calculated.

Application Templates

Select the column type and the Chromeleon software sets the eluent conditions and flow rate, guaranteeing system consistency and application conditions proven to meet your laboratory requirements.

Calibration Wizard

Enter the component and concentration levels through a wizard-based program. This gives the operator guidance and confirmation for fast and easy method development and quantfication.

These are just a few of the exciting features available in Chromeleon. To discover more ways this powerful data system software can benefit your laboratory, contact your local Dionex Sales Representative or visit www.dionex.com.