Thermo Scientific Dionex ICS-2100 Ion Chromatography System

The Thermo Scientific™ Dionex™ ICS-2100 system is the first Reagent-Free™ ion chromatography system with electrolytic sample preparation (RFIC-ESP system) and eluent generation (RFIC-EG system) capabilities. Designed to perform all types of electrolytically generated isocratic and gradient IC separations using conductivity detection, it fully supports microbore 2mm columns as well as standard bore 4 mm columns. The ICS-2100 RFIC-ESP system now provides automation for many automated sample preparation techniques with multiple valving configurations and support for electrolytic sample preparation devices. The ICS-2100 system provides high performance with unequalled ease-of-use when coupled with an AutoSuppression™ device, such as the Thermo Scientific Dionex SRS 300 suppressor. The Thermo Scientific™ Dionex™ Chromeleon™ Chromatography Data System provides full control and digital data collection from a PC using simple USB connectivity.

Versatility

- This integrated system performs all types of IC separations using conductivity detection.
- RFIC-EG system technology converts deionized water into high-purity eluents on-line.
- RFIC-ESP system accessories enable control of electrolytic sample preparation devices such as water purifiers and sample conditioners.
- Sample preparation capabilities extend the range of the instrument into areas, such as on-line filtration, matrix elimination, neutralization, and ultratrace analysis.
- The dual-piston pump design reduces pulsations, allowing high-sensitivity detection and excellent flow-rate accuracy and precision.
- Wide flow rate range supports 2, 3, 4, and 5 mm column formats.
- The streamlined design with its small footprint occupies minimal bench space.
- An LCD touch-pad front panel provides clear identification of key operating parameters permitting at-instrument control and monitoring

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Reagent-Free IC Systems

- Electrolytic eluent generation and suppression and regenerant minimize time, labor, operating costs, and eluent preparation errors.
- The eluent generator delivers sodium, potassium, and lithium hydroxide as well as carbonate/bicarbonate eluents for anion separations. Methanesulfonic acid eluents for cation separations are also provided.
- Eluent generation provides the utmost in reliable, reproducible eluent concentrations from a supply of deionized water. Gradient elution becomes routine. EG-produced hydroxide eluents offer the lowest conductivity backgrounds possible.

Automated Sample Preparation

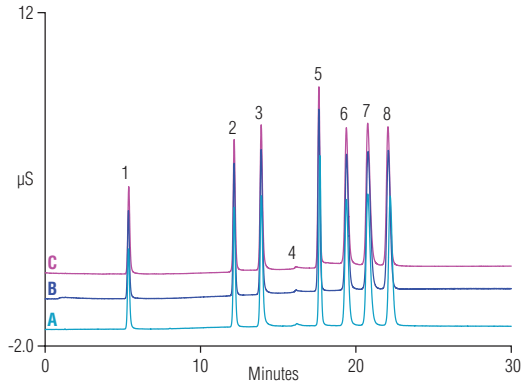
- Optional valving supports matrix elimination, sample concentration, and on-line filtration.
- Auxiliary power port supports electrolytic sample preparation devices.

Simple and Precise Control

- Control for the Dionex SRS and Thermo Scientific™ Dionex™ Atlas™ electrolytic suppressors is built in. These AutoSuppression devices eliminate the need to manually prepare regenerants solutions.Electrolytic suppression reduces background conductivity and provides high signal-to-noise ratios.
- Full control and digital data collection are available with the Windows® based Chromeleon Chromatography Data System software using a USB high-speed communication protocol.
- Chromeleon eWorkflows preload all instrument parameters for fast and easy operation and data analysis.
- Chromeleon software includes an electronic logbook of nearly unlimited user-selectable operational parameters.

High Performance

- For improved reproducibility, the actively heated high-performance conductivity detection cell permits measurements that are unaffected by temperature variation.
- Advanced single-range digital output provides an operating range to 15,000 µS full scale with autoranging to provide accurate detection of major and minor constituents in a single run. Single range analog signal output is also standard.
- Column heater provides day-to-day consistency, ensuring reproducibility and stability. Preheating of the eluent prior to the column maintains the column temperature set by the user. A transparent cover allows viewing of the column without temperature disruption.
- Optional built-in vacuum degas provides in-line degassing of eluents, ensuring reproducibility and protection of eluents from contamination and decomposition. Control of the degas operation can be automated to sense when degassing is required.
- Inert, metal-free PEEK™ component throughout the system ensure compatibility and metal contamination-free chromatography.



Column:	Thermo Scientific™ Dionex™ IonPac™ AG15, AS15, 4 mm
Eluent:	8 mM KOH from 0–6 min, 8-55 mM from 6–18 min
Flow Rate:	1.6 mL/min
Inj. Volume:	25 µL
Temperature:	30 °C
Detection:	Thermo Scientific™ Dionex™ ASRS™ ULTRA (4 mm) AutoSuppression recycle mode Power Setting – 220 mA

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

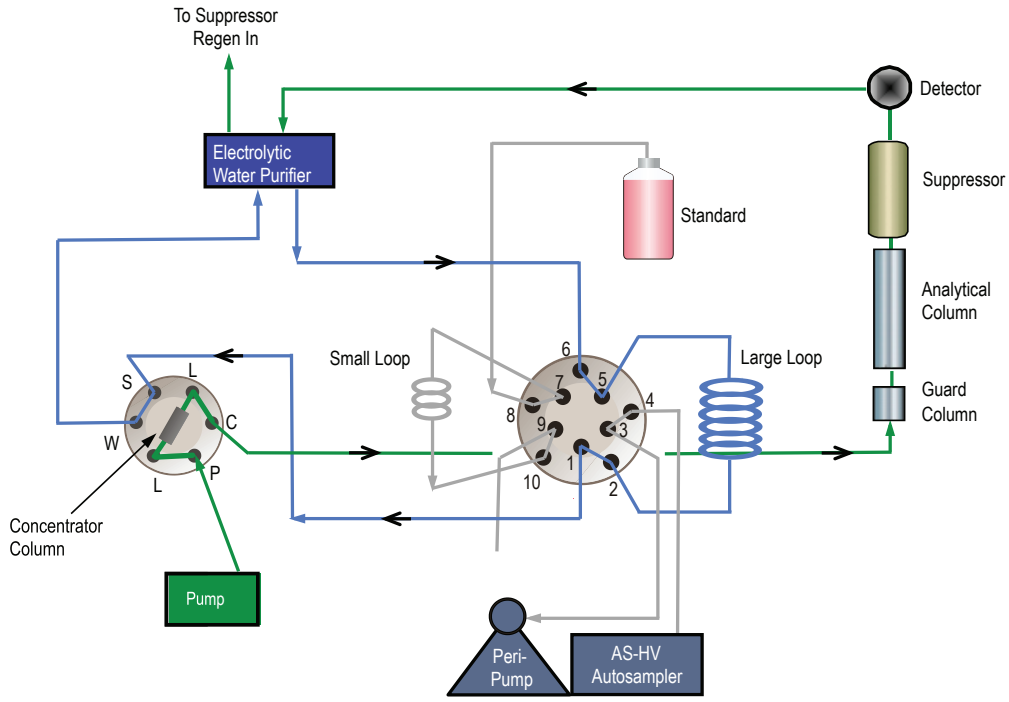
Reagent-Free IC systems produce consistent lab-to-lab eluent concentrations for highly reproducible retention times and peak areas. Results are the same day to day, system to system, and lab to lab.

Convenient

- Versatile eluent organizer tray. Accommodates 1, 2, or 4 L eluent bottles.
- Electrically actuated six-port Rheodyne PEEK injection valve.
- Ergonomically placed injection port for easy manual sampling.
- Eluent valve for positive shut-off of eluent flow prior to the pump for easy servicing.
- Easy-access door to chromatography components.
- Leak detection and management for fast response to system leaks.
- TTL controls for external pump, injection valve, range selection, and signal offset for stand-alone operation.

Key Features

- Automated eluent generation
- LCD front panel control
- Dual-piston pump
- Column heater
- Electrolytic suppression
- Digital conductivity detection
- Vacuum degas (option)
- Optional 6- or 10-port valve
- Optional RFIC-ESP water purifier
- USB connectivity, plug-n-play
- Electronic logbook and trending through virtual channels



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

All components are easily accessed through the front chromatography panel.

DIONEX ICS-2100 IC SYSTEM SPECIFICATIONS

Analytical Pump and Fluidics	
Type	Serial dual-reciprocating pistons, microprocessor-controlled constant stroke, variable speed
Construction	Chemically inert, metal-free PEEK pump heads and flow paths compatible with aqueous eluents of pH 0–14 and reversed-phase solvents
Pump Operating Pressure	0–35 MPa (0–5000 psi)
Flow Rate Range	0.00–5.00 mL/min without changing pump heads
Flow Precision	<0.1%, typically
Flow Accuracy	<0.1%, typically
Pressure Ripple	<1% at 13.8 MPa (2000 psi) and 1.0 mL/min
Eluent On-Off Valve	Standard
Piston Seal Wash	Dual-pump head, wash can be continuous when connected to rinse solution supply
Pressure Alarm Limits	Upper limit 0–35 MPa or 0–5000 psi in one unit (MPa or psi) increments; lower limit can be set up to one unit lower than upper limit
Vacuum Degas	Optional, automatic control
Eluent Bottles	Polypropylene, up to 4 L volume
Eluent Bottle Pressure	Not required
Injection Valve	6-port, 2-position Rheodyne valve, electrically actuated
Columns Supported	2, 3, 4, and 5 mm i.d., maximum length 250 mm analytical column with 50 mm guard column
Column Heater (Standard)	
Operating Temperature Range	30 to 60 °C (86 to 140 °F); minimum 5 °C above ambient; settable range is equal to working range
Temperature Accuracy	±0.5 °C at sensor, at 40 °C
Eluent Generation (Standard)	
Eluent Types	KOH, LiOH, NaOH, K_2CO_3, K_2CO_3/$KHCO_3$, MSA
Gradient Profiles	Combination of unlimited number of linear, convex and concave positive and negative gradient profiles
Concentration Increments	0.01 mM
Concentration Range	0.1–100 mM (depending on eluent used)
Flow Rate	0.1–3.0 mL/min
Maximum Operating Pressure	21 MPa (3000 psi)
Maximum Solvent Concentration	Anions: 25% methanol Cations: no solvents
Auxiliary Power Supply (Standard)	
Current	Constant, 0–200 mA at up to 35 V
Alarms	Overvoltage and overcurrent alarms; linked to pump flow to protect devices from power on at zero flow
Auxiliary Valve (Optional)	
Available Valves	6- or 10- port, 2-position high-pressure Rheodyne valves, fully inert PEEK construction, electrically activated
Eluent Regeneration (Optional)	
Eluent Regeneration Support	With optional kit
Eluents	Carbonate and carbonate/bicarbonate up to 20 mM MSA up to 34 mM
Flow Rates	0.01–2.00 mL/min
Continuous Operation (4 L of Eluent)	Up to 28 days or 2000 samples
Always On, Always Ready Capable	Standard feature
Remains Fully Calibrated for Extended Periods (<28 days)	Standard feature. results are traceable to a single calibration
System Wellness	Consumables usage monitoring for predictive maintenance
Maximum Operating Pressure	21 MPa (3000 psi)
Operating Temperature Range	4–40 °C

DIONEX ICS-2100 IC SYSTEM SPECIFICATIONS (CONT'D)

Autosampler	
Chemical Suppression	2 mm and 4 mm anion and cation, membrane suppression bed types
Displacement Chemical Regeneration	2 mm and 4 mm anion and cation, membrane suppression bed types
Electrolytic Suppression—Self-Regenerating	2 mm and 4 mm anion and cation, membrane and MonoDisk™ suppression bed types available
Electrolytic Suppression—Self-Regenerating with External Water Mode:	2 mm and 4 mm anion and cation. Both membrane and MonoDisk suppression bed types available
Current Control Range	Dionex SRS: 4 mm, 0–300 mA in 1 mA increments 2 mm, 0–100 mA in 1 mA increments Thermo Scientific™ Dionex™ AES™: 0–150 mA in 1 mA increments Thermo Scientific™ Dionex™ CMD™: 0–500 mA in 1 mA increments Thermo Scientific™ Dionex™ SRN™: 0–500 mA in 1 mA increments
Salt Converter	Available in 2 and 4 mm versions
Thermo Scientific Dionex AMMS-ICE	Available in 2 and 4 mm versions
Carbonic Acid Removal for Anions	Dionex ASRS 300 with Thermo Scientific Dionex CRD 200 for hydroxide eluents Dionex ASRS 300 with Dionex CRD 300 for carbonate eluents
Non-Suppressed Chromatography	Supported
Suppressor Wear Parts	None; peristaltic pump and inline filters not required
Suppression Capacity	Anions: Dionex ASRS 300 (4 mm): 200 µeq/min Dionex ASRS 300 (2 mm): 50 µeq/min Thermo Scientific™ Dionex™ AMMS™ 300 (4 mm): 150 µeq/min Dionex AMMS 300 (2 mm): 37.5 µeq/min Dionex AAES: 25 µeq/min
	Cations: Thermo Scientific™ Dionex™ CSRS™ 300 (4 mm): 110 µeq/min Dionex CSRS 300 (2 mm): 37.5 µeq/min Thermo Scientific™ Dionex™ CMMS™ 300 (4 mm): 150 µeq/min Dionex CMMS 300 (2 mm): 37.5 µeq/min Thermo Scientific Dionex CAES: 25 µeq/min
Void Volumes	Dionex SRS 300 (4 mm): <50 µL Dionex SRS 300 (2 mm): <15 µL Dionex MMS 300 (4 mm): <50 µL Dionex MMS 300 (2 mm): <15 µL Dionex AMMS-ICE 300 (4 mm): <50 µL Dionex AMMS-ICE 300 (2 mm): <15 µL Dionex AAES: <35 µL Dionex CAES: <35 µL

Conductivity Detector Electronics and Flow Cell	
Type	Microprocessor-controlled digital signal processor
Cell Drive	8 kHz square wave
Linearity	1% up to 1 mS/cm
Resolution	0.00238 nS/cm
Full-Scale Output Ranges	Digital signal range 0–15000 µS/cm Analog signal range 0–15000 µS/cm
Electronic Noise	±0.1 nS when background conductivity is 0–150 µS/cm ±2 nS when background conductivity is 151–3200 µS/cm
Filter:	Rise times from 0 to 10 s, user selectable
Temperature Compensation	Fixed at 1.7% per 1 °C at cell temperature
Temperature Range	Ambient +7 °C, 30 to 55 °C
Cell Electrodes:	Passivated 316 stainless steel; compatible with MSA
Cell Body:	Chemically inert polymeric material
Cell Volume:	<1 µL
Heat Exchanger	Inert, tortuous path for low axial dispersion
Maximum Cell Operating Pressure	10 MPa (1500 psi)

DIONEX ICS-2100 IC SYSTEM SPECIFICATIONS (CONT'D)

Suppressors and Control

Automation Using Autosampler	Thermo Scientific Dionex AS-AP, AS-DV, AS-HV, or third-party autosamplers
Sequential/Simultaneous Injection	Depending on autosampler capabilities
Automated Dilution	Available with AS-AP autosampler
Dilution Factor, AS Autosampler	1:1 to 1:1000
Dilution Time, AS Autosampler	15 seconds with sample overlap
Inline Sample Degassing	Optional with CRD 300/200
Inline Filtration	Yes, AS-DV autosamplers or inline filter
High Automation Flexibility	Conditionals using Chromeleon and Autodilution License

System Software

Chromeleon Chromatography Data System software, supported on Windows 7, Vista, or XP

- System Wellness and Predictive Performance
- Data trending plots (numerical device parameters)
- Virtual Column Simulator (evaluation mode standard, isocratic and gradient optional)
- Application templates
- Multivendor automation support of 3rd party instruments (fully controls over 300 instruments from more than 30 manufacturers, including GC, HPLC, and MS) 3-D software for photodiode arrays, mass spectrometers, and electrochemical detectors (optional)
- Customizable system control panels
- System status Virtual Channels
- Power failure protection
- Sequential injection
- System trigger commands and conditionals
- Daily audit trail
- Sample audit trail
- Multiple network control and network failure protection (optional)
- System calibration storage (factory, present, and previous; completely user selectable)
- Customized reporting (unlimited report workbooks)
- Automated system qualification (detailed, comprehensive qualification reports)

Physical Specifications

Power Requirements	100–240 V ac, 50-60 Hz autoranging
Operating Temperature	4–40 °C (40–104 °F); cold-room compatible (4 °C) as long as system power remains on
Operating Humidity Range	5–95% relative, noncondensing
Control Modes	Full control through front panel and Chromeleon software; alternative control through TTL or relay closures; two relay outputs, two TTL outputs, four programmable inputs
USB Communication Protocol	One USB input; one built-in two-output USB hub
Leak Detection	Built-in, optical sensor
Dimensions (h × w × d)	56.1 cm × 22.4 cm × 53.3 cm (22.1 in × 8.8 in × 21 in)
Weight	24.5 kg (54 lb)

Ordering Information

In the U.S., call (800) 346-6390 or contact the Thermo Fisher Scientific Regional Office nearest you. Outside the U.S., order through your local Thermo Fisher Scientific office or distributor. Refer to the following part numbers:

Dionex ICS-2100 Ion Chromatography System with Software and PC	Part Number
Dionex ICS-2100 Ion Chromatography System Without Degas, with Chromeleon software and Windows 7 PC Workstation	069656
Dionex ICS-2100 Ion Chromatography System with Degas, with Chromeleon software and Windows 7 PC Workstation	069657
Dionex ICS-2100 Ion Chromatography System Without Degas, with Chromeleon software	069659
Dionex ICS-2100 Ion Chromatography System with Degas, with Chromeleon software	069658
Dionex ICS-2100 Ion Chromatography System with Degas; No Chromeleon Software and No PC	069576
Dionex ICS-2100 Ion Chromatography System Without Degas; No Chromeleon Software and No PC	069573
AutoDilution License	069725

ICS-2100 instruments include: integrated isocratic dual-piston pump, eluent generator with full EG gradient capability, injection valve, column heater, heated conductivity cell, LCD touch-pad front panel, auxiliary power supply and USB cable. Support for optional auxiliary high pressure valve and optional eluent degassing are included. Windows 7 Workstation includes Chromeleon software, PC (with Windows 7), 23 inch flat screen monitor and USB dongle. Comes with two Class 1 Timebases controlling one Dionex IC system. Consumables must be ordered separately.

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

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