Thermo Scientific Dionex ICS-1100 Ion Chromatography System

The preconfigured Thermo Scientific™ Dionex™ ICS-1100 and ICS-1600 are the first integrated Reagent-Free™ IC systems with Eluent Regeneration (RFIC™-ER systems). The Dionex ICS-1000 system is designed to perform isocratic ion chromatography (IC) separations using conductivity detection and standard bore (4 mm) and microbore (2 mm) columns. Multiple available valving configurations support many modes of automated sample preparation. When configured as an RFIC-ER system, the Dionex ICS-1100 allows continuous operation for up to four weeks using a single eluent preparation. Thermo Scientific™ Dionex™ Chromeleon™ Chromatography Data System provides full control and digital data collection from a PC using USB high-speed communication protocol. Available options include column heating, in-line vacuum degassing, and RFIC-ER installation kit.

Versatility

- Performs isocratic IC separations using conductivity detection.
- Integrated, preconfigured, factory plumbed, and tested for immediate productivity.
- Streamlined design with small footprint occupies minimal bench space.
- Dual-piston pump design reduces pulsations, allowing high-sensitivity detection and excellent flow-rate accuracy and precision.
- Flexible flow rate supports 2, 3, 4, and 5 mm column formats.
- RFIC-ER system technology provides up to 28 days of chromatography results using only a single eluent preparation.
- Automated sample preparation capabilities enable techniques such as on-line filtration, concentration, and matrix elimination.

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Simple and Precise Control

- Built-in control for Thermo Scientific™ Dionex™ SRS™ Self-Regenerating Suppressor and Atlas electrolytic suppressors. Electrolytic suppression with an AutoSuppression™ device eliminates the need to hand-prepare acid or base regenerants. Suppression reduces background conductivity and provides high signal-to-noise ratios.
- Full control and digital data collection available with Windows®-based Chromeleon SE Chromatography Workstation software using USB high-speed communication protocol.
- Chromeleon eWorkflows preload all instrument parameters for fast and easy operation and data analysis.
- Application templates preload all instrument parameters for fast and easy operation.
- Chromeleon software control includes an electronic logbook for monitoring of nearly unlimited user-selectable operational parameters.

High Performance

- Eluent regeneration provides extremely stable baselines, day to day, for up to 28 days of continuous operation. Calibration curves remain valid over the entire period.
- For improved reproducibility, the thermostated high-performance conductivity detector permits measurements that are unaffected by temperature variation.
- Advanced single-range digital output with 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.
- Optional 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, nonmetallic PEEK™ components throughout the system ensure compatibility with corrosive eluents and provide metal-contamination-free chromatography.

Eluent Regeneration

- When configured as a Reagent-Free IC system with Eluent Regeneration (RFIC-ER system), the Dionex ICS-1100 allows the use of a single preparation of eluent for up to four weeks.
- The RFIC-ER system uses the Dionex SRS 300 self-regenerating suppressor to simultaneously regenerate returning eluent as it suppresses eluent before detection.
- Trap and catalytic columns purify returning eluent, assuring consistent, high quality eluent for separations.
- Because it is a closed loop, the always on, always ready RFIC-ER system remains equilibrated and calibrated between eluent changes; up to four weeks.
- Less frequent eluent preparation reduces unintentional variations in concentration, increasing reliability and reproducibility.
- RFIC-ER systems are designed for high throughput analyses of anions or cations in low- to moderate-concentration matrices without sample preparation, or in high-concentration matrices after

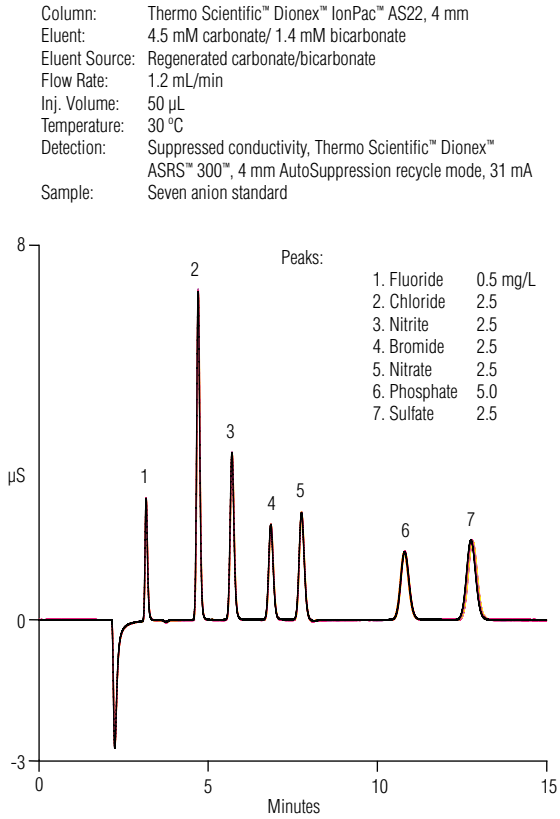

Figure 1. Overlay of chromatograms from a representative week of the seven anion calibration check standard runs on an RFIC-ER system using a single 4 L preparation of eluent. The peak retention times demonstrate high reproducibility.

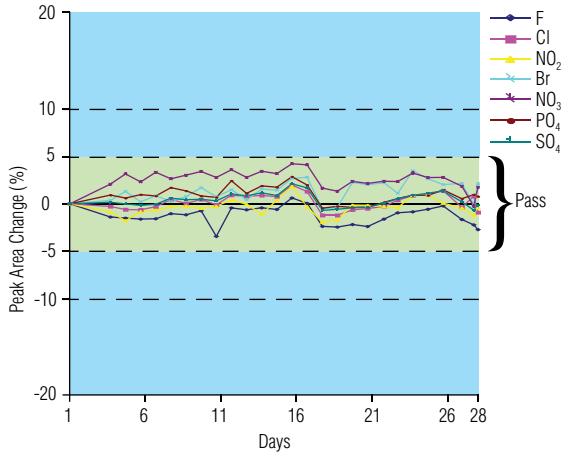

Figure 2. Graph of peak area changes for a seven-anion calibration check standard run daily for 28 days on an RFIC-ER system using a single 4 L preparation of eluent. The system passed for the entire four weeks without reequilibration or recalibration.

matrix elimination.

Convenience

- RFIC-ER system technology reduces eluent preparation to once every 28 days.
- Versatile eluent organizer tray accommodates 1, 2, or 4 liter eluent bottles.
- Electrically actuated six-port Rheodyne PEEK injection valve for precise sampling.
- Ergonomically placed injection port for easy manual sampling.
- Eluent valve provides positive shut- off of eluent flow prior to the pump for easy servicing.
- Easy-access door to chromatography components.
- Leak detection and management allow fast response to system leaks.
- TTL controls for external pump, injection valve, range selection, and signal offset for stand-alone operation.

Automated Sample Preparation

- Optional 6- or 10-port valves support automated sample preparation.
- The 6-port valve supports techniques such as matrix elimination, sample concentration, and on-line filtration.
- The 10-port valve supports Auto-Dilution using a small loop and large loop to reinject out-of-range samples
- 6- or 10-port valves can be used for matrix diversion prior to MS detection.

Key Features

- Eluent regeneration functionality built in
- Dual-piston pump
- Electrolytic suppression
- Digital conductivity detection
- USB connectivity, plug-n-play
- Optical leak detector
- Electronic logbook and trending
- Optional 6- or 10-port valve for automated sample preparation

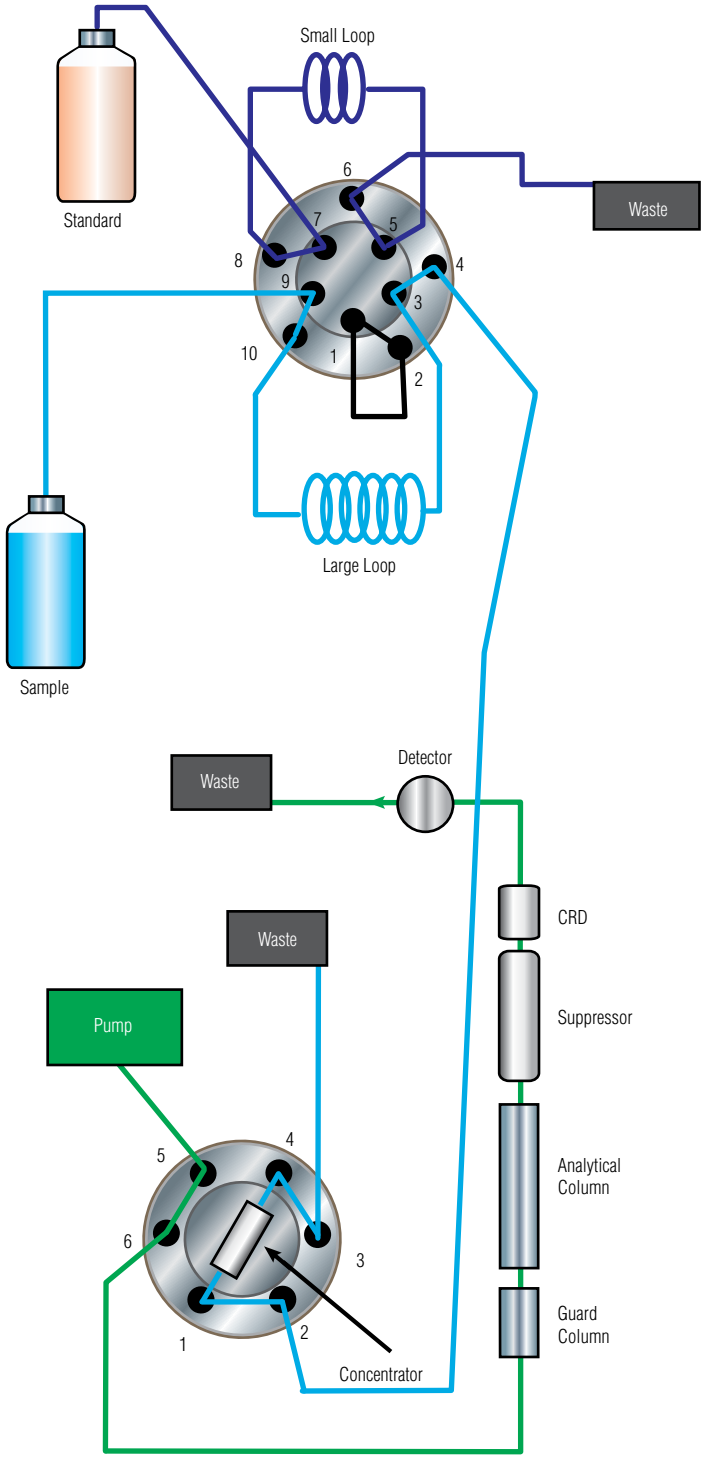

Figure 3. Optional 6- or 10-port valves support automated, on-line sample preparation techniques, such as sample concentration and matrix elimination, or AutoDilution using large and small injection loops with a 10-port valve, shown above.

DIONEX ICS-1100 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:	Yes, 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 activated
Columns Supported:	2, 3, 4, and 5 mm i.d.; maximum length 250 mm analytical column with 50 mm guard column
Column Heater (Optional)	
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
Auxiliary Valve (Optional)	
Available Valves	2-position, 6- or 10-port high-pressure Rheodyne valve, fully inert PEEK construction, electrically activated
Eluent Generation	
Optiona	Thermo Scientic™ Dionex™ RFC-30™
Eluent Regeneration	
Eluent Regeneration Support:	Yes, with optional RFIC-ER 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, typically
Always On, Always Ready Capable:	Yes, standard feature
Remains Fully Calibrated for Extended Periods (<28 days):	Yes, 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-1100 IC SYSTEM SPECIFICATIONS (CONT'D)

Suppressors and Control	
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; both membrane and MonoDisk™ suppressionbed 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 ControlRange:	Dionex SRS: 4 mm, 0–300 mA in 1 mA increments 2 mm, 0–100 mA in 1 mA increments Dionex™ AES Atlas Electrolytic Suppressor: 0–150 mA in 1 mA increments Thermo Scientific™ Dionex™ CMD™ Carbohydrate Membrane Desalter: 0–500 mA in 1 mA increments Thermo Scientific™ Dionex™ SRN™ Self-Regenerating Neutralizer: 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:	ASRS 300 with Thermo Scientific™ Dionex™ CRD 200 Carbonate Removal Device for hydroxide eluents Dionex ASRS 300 with Dionex CRD 300 for carbonate eluents
Non-Suppressed Chromatography:	Yes, 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 Anion MicroMembrane Suppressor (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 Cation Self-Regenerating Suppressor (4 mm): 110 µeq/min Dionex CSRS 300 (2 mm): 37.5 µeq/min Thermo Scientific™ Dionex™ CMMS™ 300 Cation MicroMembrane Suppressor (4 mm): 150 µeq/min Dionex CMMS 300 (2 mm): 37.5 µeq/min Thermo Scientific™ Dionex™ Cation Atlas Electrolytic Suppressor: 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
Resolution:	0.00238 nS/cm
Full-Scale Output Ranges:	Digital signal range 0–15000 µS Analog signal range 0–15000 µS
Electronic Noise:	±0.1 nS when background conductivity is 0–150 µS/cm ±2 nS when background conductivity is 151–3200 µS
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-1100 IC SYSTEM SPECIFICATIONS (CONT'D)

Autosampler

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

System Software

Chromeleon Chromatography Management Software, supports Windows XP or Vista:

- Automated Procedure Wizards
- 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 array, mass spectrometer, 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 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

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

Dionex ICS-1100 Ion Chromatography System with Software and PC	Part Number
Dionex ICS-1100 Ion Chromatography System with Chromeleon SE and Windows XP Workstation, without Degas:	069648
Dionex ICS-1100 Ion Chromatography System with Chromeleon SE,Windows XP Workstation, and Degas:	069649
Dionex ICS-1100 Ion Chromatography System with Chromeleon SE, without Windows XP Workstation, or Degas:	069650
DionexICS-1100 Ion Chromatography System with Chromeleon SE and Degas, without Windows XP Workstation:	069651
Optional Column Heater:	069564
RFIC-ER Anion Startup Kit. Includes anion installation kit and anion consumables:	069570
RFIC-ER Cation Startup Kit. Includes cation installation kit and cation consumables:	069569

A Dionex ICS-1100/Chromeleon SE/Windows Workstation bundled package includes: a Dionex ICS-1100 with isocratic dual-piston pump, injection valve, heated conductivity cell, USB cable, Chromeleon SE , computer (with Windows XP), and USB dongle. Chromeleon SE comes with one SE timebase controlling one Dionex ICS-1100 system. The Dionex ICS-1100 is supplied without a front control panel, and must be controlled through Chromeleon software. Consumables must be ordered separately.

www.thermoscientific.com/dionex

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

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