

ICS-1100 AR Acid Rain Ion Chromatography System



The preconfigured ICS-1100 AR is a dedicated ion chromatography (IC) system for acid rain monitoring programs in China. This Reagent-Free™ IC system with Eluent Regeneration (RFIC-ER™ system) is designed to meet everyday requirements for acid rain analysis for up to a month of continuous operation with a single eluent preparation. Real-time results can be obtained every 15 minutes for either anions or cations. Operators do not have to know chemistry or complex instrumentation—simply collect samples, inject them, and review results.

Eluent regeneration technology allows you to perform isocratic IC separations using conductivity detection and standard bore (4 mm) columns. Chromeleon® software provides full control and digital data collection from a PC using USB high-speed communication protocol.

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 supports 4 mm only).
- 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

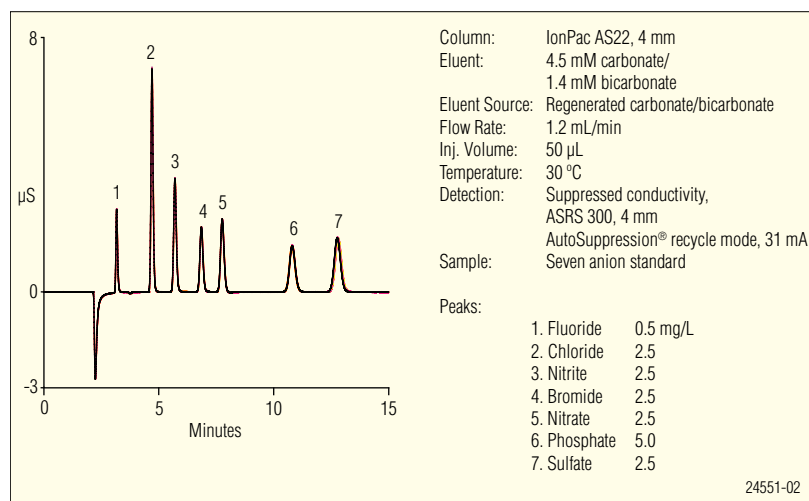
- Built-in control for SRS electrolytic suppressors. Electrolytic suppression with an AutoSuppression device eliminates the need to hand-prepare acid or base regenerants. Suppression reduces background conductivity and provides high signal-to-noise ratios.
- Full control and digital data collection available 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

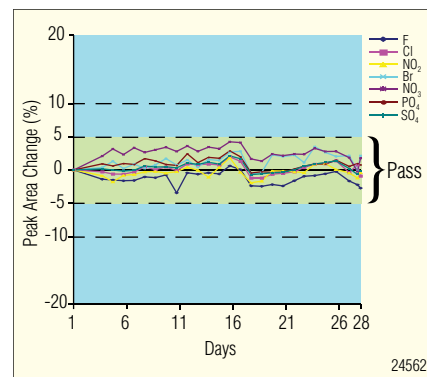
- For improved reproducibility, the thermostated high-performance conductivity detector permits measurements that are unaffected by temperature variation.
- Advanced single-range digital output with operating range to 15,000 μS full scale, with autoranging to provide accurate detection of major and minor 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

- The ICS-1100 AR Reagent-Free IC system with Eluent Regeneration (RFIC-ER system) allows the use of a single eluent preparation for up to four weeks. Calibration curves remain valid over the entire period.
- The RFIC-ER system uses the SRS 300 electrolytic 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 (< 600 ppm total dissolved solids) without sample preparation, or in high-concentration matrices after matrix elimination.



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



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 requilibration or recalibration.

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.

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

ICS-1100 AR 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. (RFIC-ER system supports 4 mm i.d. only); 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)

2-position, 6- or 10-port high-pressure Rheodyne valve, fully inert PEEK construction, electrically activated

Eluent Regeneration

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

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™ 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:

SRS:

4 mm, 0–300 mA in 1 mA increments
2 mm, 0–100 mA in 1 mA increments
AES®: 0–150 mA in 1 mA increments
CMD: 0–500 mA in 1 mA increments
SRN: 0–500 mA in 1 mA increments

Salt Converter:

Available in 2 and 4 mm versions

AMMS-ICE:

Available in 2 and 4 mm versions

Carbonic Acid Removal for Anions:

ASRS® 300 with CRD 200 for hydroxide eluents
ASRS 300 with CRD 300 for carbonate eluents

Non-Suppressed Chromatography:

Yes, supported

Suppressor Wear Parts:

None; peristaltic pump and inline filters not required

Suppression Capacity:

Anion SRS 300 (4 mm): 200 µeq/min
Cation SRS 300 (4 mm): 110 µeq/min
Anion SRS 300 (2 mm): 50 µeq/min
Cation SRS 300 (2 mm): 37.5 µeq/min
Anion MMS™ 300 (4 mm): 150 µeq/min
Cation MMS 300 (4 mm): 150 µeq/min
Anion MMS 300 (2 mm): 37.5 µeq/min
Cation MMS 300 (2 mm): 37.5 µeq/min
Anion AES: 25 µeq/min
Cation AES: 25 µeq/min

Void Volumes:

SRS 300 (4 mm): <50 µL
SRS 300 (2 mm): <15 µL
MMS 300 (4 mm): <50 µL
MMS 300 (2 mm): <15 µL
AMMS-ICE 300 (4 mm): <50 µL
AMMS-ICE 300 (2 mm): <15 µL
Anion AES: <35 µL
Cation AES: <35 µL

ICS-1100 AR IC SYSTEM SPECIFICATIONS (CONT'D)

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 μ S
Analog signal range 0–15000 μ S

Electronic Noise:

\pm 0.1 nS when background conductivity is 0–150 μ S/cm
 \pm 2 nS when background conductivity is 151–3200 μ S

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 μ L

Heat Exchanger:

Inert, tortuous path for low axial dispersion

Maximum Cell Operating Pressure:

10 MPa (1500 psi)

Autosampler

Automation Using Autosampler:

Dionex AS-DV, AS, AS-HV, or third-party autosamplers

Sequential/Simultaneous Injection

Yes, depending on autosampler capabilities

Automated Dilution:

Yes, available with AS Autosampler

Dilution Factor, AS Autosampler:

1:1 to 1:1000

Dilution Time, AS Autosampler:

15 seconds with sample overlap

Inline Sample Degassing:

Yes, optional with 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

This system is available only in China. Order through your local Dionex office or distributor. Refer to the following part numbers.

ICS-1100 AR Acid Rain Ion Chromatography System

An ICS-1100 AR bundled package includes: an ICS-1100 AR system with isocratic dual-piston pump, injection valve, heated conductivity cell, USB cable, Chromeleon SE, and USB dongle. Chromeleon SE comes with one SE timebase controlling one ICS-1100 AR system. The ICS-1100 AR is supplied without a front control panel, and must be controlled through Chromeleon software. Consumables must be ordered separately.

ICS-1100 AR Acid Rain Ion Chromatography System with072769
Chromeleon SE and Anion Startup Kit

ICS-1100 AR Acid Rain Ion Chromatography System with072770
Chromeleon SE and Cation Startup Kit

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LPN 2364 PDF 09/09
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