


 Ion chromatography

Dionex ICS-6000 HPIC system



Modular high-pressure ion chromatography system

Benefits

The Dionex ICS-6000 HPIC system offers:

- High-pressure operation for fast analyses and high resolution
- Reagent-free operation for reproducibility and ease of use
- Modular system for adaptability/upgradability

The Thermo Scientific™ Dionex™ ICS-6000 HPIC™ System is a high-pressure ion chromatography system that provides an impressive combination of increased productivity, expanded capabilities, and improved performance. Modular versatility, functional integration, superior performance and the capability to operate continuously at up to 5,000 psi culminate in the most advanced ion chromatography system.

The system offers:

- Microbore (1–3 mm column i.d.) and standard bore (3–7 mm column i.d.) flow rates
- Operation at pressures up to 6,000 psi, allowing for faster analysis with higher flow rates and better separations with higher resolution columns
- Hydroxide, carbonate, and methanesulfonic acid (MSA) eluents for Thermo Scientific™ Dionex™ Reagent-Free Ion Chromatography Systems with eluent generation (RFIC-EG) offer high purity and unparalleled control and reproducibility for isocratic and gradient elutions
- Excellent flow rate accuracy, eluent generator electronics stability, and detector cell temperature control deliver high retention time reproducibility, baseline stability, and sensitivity
- Modular design allows versatility in configuring the system for a wide variety of applications

- Integrated Thermo Scientific™ Dionex™ ICS-6000 DC Detector/Chromatography module with precisely controlled temperature zones maintains baseline stability and increases application flexibility
- Thermo Scientific™ Dionex™ ICS-6000 AM Automation Manager simplifies and automates complex applications, including sample preparation, preconcentration, matrix elimination, and postcolumn reagent addition
- Electrochemical detector with optimized cell, including long-lasting, calibration-free Palladium Hydrogen (PdH) reference electrode
- Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) unifies and simplifies system control, operation, data collection, and reporting

Modular capabilities and performance

The modular Dionex ICS-6000 HPIC system meets a wide and ever-increasing range of application needs. From the basic system configuration for routine, dedicated analysis to the high-throughput, dual RFIC system, the Dionex ICS-6000 HPIC system is truly designed for versatility and productivity. This system can be upgraded to a dual system configuration (supporting standard and microbore formats)—without taking up more valuable bench space.

Performance

The Dionex ICS-6000 HPIC system is designed for the highest performance, making it the most reproducible, stable, and sensitive ion chromatography system available. State-of-the-art flow rate accuracy, eluent generator electronics, and detector robustness increase baseline stability and improve sensitivity.

Chromeleon CDS control

The Chromeleon CDS provides a panel so that all module control parameters, status, calibration, and diagnostics are easily available. A convenient home screen shows overall system status while individual module tabs provide quick access to module functions and to detailed status and diagnostics. Wizards take the uncertainty out of setting up customized analyses. System wellness features alert you to potential system issues before they become problems.

DP dual and SP single pump

The Thermo Scientific™ Dionex™ ICS-6000 DP Dual Pump and SP Single Pump are each available in multiple configurations to suit application requirements. Analytical formats can be configured for gradient or isocratic eluent delivery. Any SP pump can be field-upgraded to a DP pump. Pump assemblies slide out for easy access and serviceability. The pumps feature a variable-speed, serial-piston design that delivers consistent flow rates and quiet detector baselines. The pumps support flow rates from 0.001 to 10.000 mL/min.

Fast IC

All Dionex ICS-6000 HPIC systems support Fast IC. By increasing the pressure tolerance of the pump to 6,000 psi (5,000 psi with continuous operation) and increasing linear flow rates, the Dionex ICS-6000 HPIC system can achieve substantially shorter run times. Shorter run times (<5 min) provide higher throughput and higher productivity.

Better separations

HPIC systems provide the ability to run at up to 5,000 psi with eluent generation. Better separations can now be achieved using new 4 µm particle-size columns.

EG Eluent Generator module

The Thermo Scientific™ Dionex™ ICS-6000 EG Eluent Generator module provides the benefits of an RFIC-EG system in both a single and a dual system format. Robust electronics provide an extremely stable baseline and precise gradient generation. You can generate high-purity eluents on demand, and run gradient separations as easily as isocratic separations. RFIC-EG systems combine “Just Add Water” eluent generation, eluent purification, and electrolytic suppression technologies. RFIC-EG systems provide superior performance, higher sensitivity, and excellent reproducibility while eliminating variability and potential contamination of systems using manually prepared eluents. The EG can be configured for a single system or for dual-system support, along with an expanded set of eluent chemistry options for carbonate and hydroxide applications for anion and MSA for cation determinations, respectively. This also provides dual eluent generation (dual EG), capable of operating with both hydroxide and MSA for simple to complex carbohydrates.

DC Detector/Chromatography module

The DC Detector/Chromatography module houses and organizes chromatography components, such as valves, as well as conductivity and electrochemical detectors and cells. The module keeps plumbing organized and minimizes connection lengths to reduce delay volumes and improve peak efficiencies. The DC is separated into three sections for automation, detection, and separation. The automation section can be configured to house the AM Automation Manager. The DC offers up to five separate temperature zones that can be maintained simultaneously (separation section, detection section, two conductivity detectors, and post-column reaction coils). This flexible and precise temperature control improves stability and enhances sensitivity. Improvements in temperature control of the conductivity detector and columns further improves sensitivity.

RFIC-ESP (analytical only)

The Dionex ICS-6000 HPIC system provides automation for many sample preparation techniques with multiple valving configurations and support for electrolytic sample preparation (ESP) devices.

Conductivity Detector (CD) and Electrochemical Detector (ED)

The CD and ED detectors are installed inside the DC compartment, minimizing tubing lengths and providing optimum thermal stability. The detectors are easy-to-install, plug-in devices, and can be configured in series for dual detection or as separate detectors for a dual system—all in the same enclosure.

The ED features a cell design with an improved reference electrode and minimized dead volume for lower band-broadening and lower noise. This new PdH reference electrode has improved lifetimes and better robustness. Multiple waveforms optimize detection conditions for individual analytes.

Optical detectors

The Dionex ICS-6000 HPIC system can be configured with any of our optical detectors, such as the Thermo Scientific™ Dionex™ ICS-Series VWD Variable Wavelength Detector, which covers the range of wavelengths from visible to ultraviolet. The Dionex ICS-Series VWD variable wavelength detector can be configured to monitor single or multiple wavelengths—up to four simultaneously.

AM Automation Manager

The AM Automation Manager option can be configured in the upper compartment of the DC module. The AM options include two-high pressure rotary valves and two low-pressure solenoid valves for automated sample preparation, preconcentration, matrix elimination, and postcolumn (AutoPrep and RFIC-ESP) reagent addition. Components are recognized, configured, and controlled through the Chromeleon CDS, providing complete automation for even the most complex applications.

Dionex AS-AP autosampler

The Thermo Scientific™ Dionex™ AS-AP Autosampler can be configured for simultaneous or sequential sample delivery. In simultaneous delivery mode, samples are delivered through a splitter to two injection valves for dual full-loop injections. With this configuration, you can perform two separate analyses on one sample (e.g., anions and cations). For sequential delivery, valves are configured to divert the sample stream to the appropriate injection valve for loading.

The Dionex AS-AP autosampler also provides AutoDilution, sample preparation, and variable sample size loading for preconcentration on various trap concentrator columns. The Dionex ICS-6000 HPIC system can also be configured with other Thermo Scientific™ Dionex™ IC autosamplers.

Module features DP dual pump and SP single pump

The Dionex DP and SP pumps are each available in isocratic or proportioning gradient configurations. The pumps support standard bore and microbore applications. Gradient configurations provide low-pressure mixing of up to four mobile phases per pump at precisely controlled proportions and flow rates.

DP and SP features

- Variable-speed, serial dual-piston design delivers consistent flow rates and quiet detector baselines
- Pressure ripple <1.0% at analytical flow rates
- Pump flow components are chemically inert, made with high-quality PEEK heads and fittings, inert polymer seals, and sapphire pistons
- Automated integrated piston seal wash prolongs seal lifetime by preventing eluent crystallization on the seal surfaces
- Pump assemblies slide out for easy access and serviceability
- User-selectable pressure limits automatically stop pump flow in the event of leaks, flow restrictions, or depleted eluent reservoirs

- User-configurable alarm features in the Chromeleon CDS allow additional responses to status or alarm conditions
- Front panel indicates the status of power, pump flow, priming, connectivity (Chromeleon CDS control), and alarms
- Quaternary proportioning and a low-volume mixer deliver reproducible eluent mixtures
- Linear, concave, and/or convex gradients are possible
- Vacuum degas provides sealed, inline degassing for flow reproducibility

Benefits of dual pump configurations

Dual configurations provide independent pumping capabilities in the same module and space-saving footprint. Configure a DP-based system according to one of the following scenarios:

- Two-dimensional hybrid systems
- Configure the system for dual applications, either running simultaneously or independently:
 - Anions and cation separations
 - Anions and carbohydrates
 - Two different anion or two different cation separations
- Use the second pump for:
 - Two-dimensional IC (IC x IC)
 - Sample preconcentration or matrix elimination
 - Post column reagent delivery for postcolumn reaction (PCR applications)
 - External water and chemical regenerant delivery
 - A backup pump for the primary application
 - Cleanup or startup preparation of consumables, preventing primary system downtime when reconfiguring

EG Eluent Generator module

The EG Eluent Generator module provides the benefits of an RFIC-EG system in a dual system format. The EG allows you to generate high-purity eluents in line and run gradient separations as easily as isocratic applications. The Thermo Scientific™ Dionex™ Reagent-Free IC (RFIC™) technology is the powerful combination of “Just Add Water” electrolytic technologies, eluent generation, purification, and suppression. The EG can be configured for a single system or for dual system support.



DP Dual Pump module

EG features

- Eluents are generated from deionized water using an EG cartridge and then polished of contaminants using one of the Thermo Scientific™ Dionex™ CR-TC Continuously Regenerated Trap Columns
- The RFIC carbonate-based eluent generation system, using a carbonate cartridge and Thermo Scientific™ Dionex™ EPM 500 Electrolytic pH Modifier, is available in analytical format (3,000 psi max pressure)
- In addition to KOH for anion separations, NaOH and LiOH cartridges are available for specialized applications (3,000 psi max pressure)
- Eluent concentrations are delivered from 0.1–100 mM for a Thermo Scientific™ Dionex™ EGC 500 Eluent Generator Cartridge and from 0.1–200 mM for Thermo Scientific™ Dionex™ EGC 400 Eluent Generator Cartridges for dual EG
- Control, status, and diagnostics are provided with the Chromeleon CDS
- A slide-out tray provides easy access to the EG cartridges, EG degassers, and Dionex CR-TC continuously regenerated trap columns for maintenance
- Using on-line eluent generation extends the lifetime of pump pistons and seals because the pumps only deliver water

Benefits of an RFIC-EG system

- Minimizes baseline drift
- Improves retention time stability and resolution
- Provides excellent run-to-run reproducibility
- Supports both gradient and isocratic applications
- Minimizes labor and operating costs

DC Detector/Chromatography module

The DC Detector/Chromatography module houses and organizes chromatography components such as valves and columns.

The DC module contains three sections: (1) separation, (2) detection, and (3) automation. The lower separation compartment holds injection valves, analytical guard, and analytical separation columns with independent temperature control. The conductivity and electrochemical detectors are housed above the separation columns. The AM Automation Manager option can be configured in the upper compartment to support switching valves and other hardware required for advanced applications.

DC features

- Three distinct sections keep plumbing organized while minimizing connection lengths, reducing delay volumes, and improving peak efficiencies
- Dual temperature zone configuration controls the injection valve and column compartment separately from the upper compartments
- Up to five separate temperatures can be maintained simultaneously (separation section, detection section, two detectors, or reaction coil), providing maximum application flexibility
- Independent compartment doors allow independent access to the separation or detector section without disturbing the other thermal section
- Automatic detection of valves, CD/ED cells, and suppressor devices by software
- Manual loading of sample is possible



EG Eluent Generator module



Dionex EGC 500 eluent generator cartridge

- Column compartment can be configured with two independent injection valves (analytical only)
- Column/injection valve panel slides forward for easy access (lower section)
- Optional analog output board provides analog detection signals to data recorders
- Optional analog board also includes eight user-assignable TTL inputs that are provided for basic valve and detector operation
- Front panel displays the status of module power, injection valve position, and alarms

Expand your capabilities with dual detection configurations

- Easy-to-install CD and ED detectors are plug-in devices, giving you a dual system with a single system footprint
 - Run anion/cation determinations simultaneously on each sample
 - Run confirmatory separations in parallel to verify analytes
 - Eliminate reanalysis of samples at different dilutions with different sample loop sizes
- Implement innovative detection schemes by pairing conductivity and electrochemical detection techniques in series on the same system
 - Determine standard ions with conductivity along with sensitive and selective ED detection of electroactive species, such as iodide, sulfide, cyanide, amines, amino acids, carbohydrates, and phenols

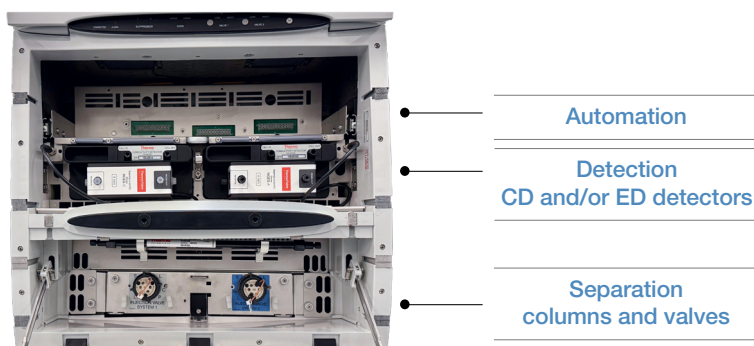
AM Automation Manager (optional)

Simplify complex applications with the AM Automation Manager option. This option, which fits in the upper section of the DC module, organizes and controls high-pressure rotary valves, low-pressure solenoid valves, the Thermo Scientific™ Dionex™ RCH Reaction Coil Heater, and a variety of reaction coils.

- Configure up to two 6- or 10-port high-pressure rotary valves for automated sample preparation, preconcentration, matrix elimination, or flow-diversion applications
- Configure up to two low-pressure 2- or 3-port switching valves for selection of reagents for postcolumn reagent addition, rinse solutions, or regenerants
- Install the optional RCH reaction coil heater for heated reactions, or simply mount non-heated reaction coils to support ambient reagent addition
- Installed components are automatically recognized through the Chromeleon CDS
- All valves and positions are recognized with the Chromeleon CDS
- Preconcentrate samples during a run to increase throughput and sensitivity

CD Conductivity Detector and ED Electrochemical Detector

The CD and ED detectors are installed inside the DC compartment as plug-in devices. They can be configured in series for dual detection, or as separate detectors for a dual system.



DC Detector/Chromatography module



CD Conductivity Detector

CD features

- Microprocessor-controlled digital signal processing detects high and low concentrations of analytes in the same run
- Supports all IC and RFIC system applications with maximum range up to 15,000 μS
- Control through the Chromeleon CDS or locally through TTL inputs
- Mounts inside the DC compartment in either of two locations
- No tools are required
- Minimizes noise and maximizes thermal stability
- Electronics are integrated between cell and detector for greater stability
- Analytical CD cell heats independently from other chromatography components
- Innovative, built-in electronics allow for easy calibration and diagnostics
- Analytical CD Detector is optimized for highest signal-to-noise—up to flow rates of 10 mL/min

ED features

- PdH reference electrode available
- One-piece reference electrode provides consistency and reliability
- Handle design provides consistent torque to cell electrode for consistent installation and mounting of working electrode
- Uses microprocessor-controlled digital signal processing
- Supports DC amperometry, pulsed amperometry, or integrated pulsed amperometry detection modes
- Ability to utilize either pH-Ag/AgCl, Ag/AgCl, or PdH reference electrode
- Detection capabilities include use of multiple waveforms and multiple integration times (post-run data processing only) to optimize detection conditions for individual analytes
- The integrated pulsed amperometry mode provides complete freedom to change the waveform profile's number of segments, duration of each segment, and voltage applied at each segment
- Control through the Chromeleon CDS or locally through TTL inputs
- Mounts within the DC compartment in either of two locations
- No tools are required for installation
- Cell and detector electronics are integrated to minimize noise, maximize electrical isolation and shielding, and maximize thermal stability
- Innovative, built-in electronics for easy calibration and diagnostics
- Can be used in dual-detection configuration (detectors in series or systems in parallel)

Optical detectors

The Dionex ICS-6000 HPIC system can be configured with any of several optical IC detectors.

VWD absorbance detector

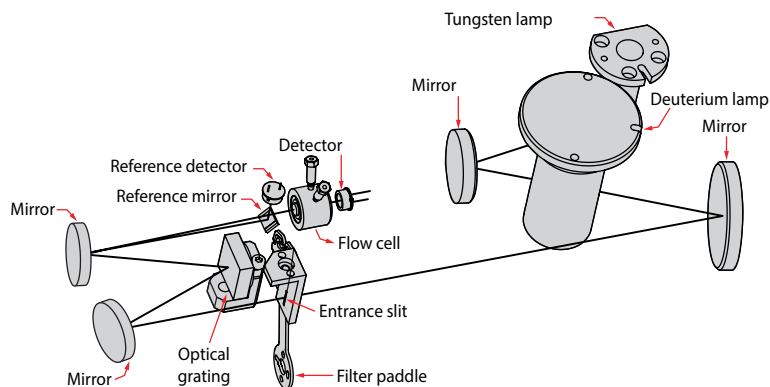
Experience the performance and versatility of the VWD through the following features:

- Deuterium and tungsten lamps provide high sensitivity over the entire wavelength range of 190–900 nm
- PEEK flow cells for standard bore (11 μ L volume) or microbore (2.5 μ L volume) flow rates
- Compact design for optimal plumbing of liquid flow path and minimal use of bench space



Dionex ICS-Series VWD variable wavelength detector

- Built-in holmium oxide filter for automated wavelength verification
- High signal-to-noise ratio for maximum sensitivity
- Data collection rate up to 100 Hz allows detection of even the sharpest peaks
- Low baseline drift for reliable results
- Excellent resolution that yields high linearity
- Integrated flow cell heat exchanger for thermal stability
- Lamp lifetime monitor to prevent downtime
- Front access to prealigned lamps and flow cell to simplify detector maintenance



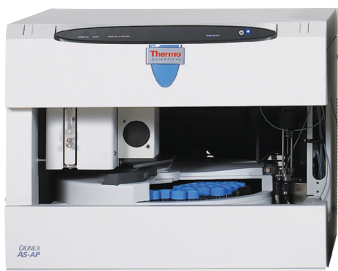
Dionex ICS Series VWD optical schematic

- Identification chips integrated into lamps and flow cells (automatically logged to audit trail)
- Multiple wavelength monitoring—up to four different wavelengths simultaneously

Autosamplers

Dionex AS-AP autosampler

The Dionex AS-AP autosampler delivers precision, reliability, ruggedness, and ease of use. Options include tray temperature control and sequential injections.



Dionex AS-AP autosampler

Configure the autosampler for simultaneous injection and perform concurrent injection of a sample or standard onto two systems running unique or similar applications. Improve efficiency by controlling dual Dionex ICS-6000 HPIC systems with one autosampler through sequential injections. This setup allows different applications to be run, or doubles the throughput of one application. With simultaneous and sequential injection, you can increase sample throughput and eliminate errors associated with multiple operators and sampling locations.

Features include automated dilutions and re-injections with AutoDilution. Reagent prime, reagent flush, and concentrate capabilities offer additional flexibility that ranges from matrix elimination to concentration applications. Sequences can also be run in overlap with the previous sample to minimize overall cycle time.

- Free up your schedule and lab time with automated sample handling for your IC
 - Simultaneous injection
 - Sequential injection
 - Preconcentration
 - Matrix elimination
 - Automated dilutions and re-injections with AutoDilution
 - Fraction collection and re-injection
- Eliminate complex laboratory procedures with automated standard preparation

Key Dionex AS-AP autosampler features provide speed, performance, and versatility

- Capable of simultaneous injection
- Excellent reproducibility with RSDs less than 0.3% for full loop injections
- 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
- High sample capacity, 81 × 10 mL vials to 3 × 384 well plates
- Well plate capabilities
- Sample preparation function to automate sample and standard preparations, saving time and labor
- Optional valves, one or two 6- or 10-port valves for sequential injections, sample preparation, or sample injection
- Chemistry-switching option to provide fully automated switching between two independent applications on the same IC system
- Sample tray temperature control option for thermally sensitive sample that offers precise, reliable control over a temperature range of 4–60 °C



Dionex ICS-6000 HPIC system control

The powerful Chromeleon CDS integrates system control and data handling, providing a convenient command center. Run with direct control, or set up a sequence of samples and methods for your system to run automatically overnight. It's easy and convenient.

For data analysis, the Chromeleon CDS gives you all the power and versatility of the world's most complete chromatography data system.

- **Prepare**
Set up and start running your routine analyses in seconds
- **Develop**
Customize your methods for advanced analysis
- **Control**
Take complete control of your chromatography instruments
- **Acquire**
Get accurate results for peaks of all sizes with autoranging digital data acquisition
- **Diagnose**
Maintain high confidence in your results with system wellness
- **Interpret**
Process your data quickly and accurately for dependable results
- **Organize**
Find the data you need quickly and easily with powerful queries
- **Report**
Produce the reports you need with an easy-to-use spreadsheet
- **Comply**
Satisfy requirements of GLP, GMP, and 21 CFR Part 11

EO Eluent Organizer

The EO Eluent Organizer holds eluent containers in a liner for spill and leak containment. The EO holds and organizes eluent tubing and air lines. The EO is designed for placement on top of or adjacent to Dionex ICS-6000 system modules.



EO features

- The flexible design of the EO Eluent Organizer accommodates:
 - Four 1 or 2 L plastic containers
 - Two 4 L plastic containers
- Up to two EO Eluent Organizers on top of the DC or TC module
- Translucent liner contains spills and allows view of liquid levels
- Materials are corrosion-proof polypropylene and epoxy resin
- Pressure regulator option available

Eluent containers

Features

- Available in 1, 2, and 4 L sizes constructed from polypropylene
- Non-twist stopper with separate retaining ring prevents tubing from tangling
- Graduations marked on containers in 100 mL increments
- Includes polyethylene end-line filters with 5 μ m pores

Dionex ICS-6000 SP single pump and DP dual pump specifications

Pump	
Type	Dual-piston (in series), microprocessor controlled, constant stroke, variable speed, patented Isokinetic Eluent Precompression
Construction	Chemically inert, metal-free PEEK pump heads and flow path; compatible with aqueous eluents from pH 0–14 and reversed-phase solvents
Pressure range	Analytical: 0–41 MPa (0–6,000 psi)
Flow rate range	Analytical: 0.000–10.000 mL/min with settable flow increments at 0.001 mL/min, without changing pump heads
Flow rate precision	<0.1%
Flow rate accuracy	<0.1%
Pressure ripple	<1% at 1.0 mL/min/typical, <0.2% (with damper) at 10 μ L/min, <1.0% (without damper) typical
Pressure	None required
Vacuum degasser	Integrated, optional 1 channel for isocratic pump or 4 channel for quaternary pump
Piston seal wash	Standard, automatic operation
Gradient formation	Quaternary low pressure (analytical only) or electrolytic eluent generation at high pressure
RFIC-EG gradients	Analytical: 0.1–100 mM (200 mM with Dual EGC)
Gradient profiles	Any combination of an unlimited number of linear, convex, and concave positive and negative gradient profiles
Gradient proportioning accuracy and precision	\pm 0.5 at 2 mL/min
Gradient mixing	Passive mixers for 2 mm and 4 mm i.d. columns, optional
Eluent generation	Optional eluent generation (RFIC-EG)
Eluent on/off valve	Electrically actuated, standard
Leak sensor	Optical, standard
System software	
Software	Chromeleon CDS
Physical specifications	
Power requirements	90–265 V.ac, 47–63 Hz
Dimensions (H x W x D)	41 x 23 x 56 cm (16 x 8.75 x 21.5 in.)
Weight	SP: 20.4 kg (45 lb)—DP: 24.1 (55 lb)
Flow path	All polymeric (PEEK), anion, or cation configuration

Dionex ICS-6000 EG Eluent Generator module specifications

Minimum and maximum eluent concentration	Analytical: 0.1–100 mM (200 mM with Dual EGC)
Flow rates	Analytical: 0.1–3,000 mL/min
Eluent types	Analytical: KOH, LiOH, NaOH; Carbonate; Carbonate/Bicarbonate; MSA
Maximum operating pressure	Analytical: Dionex EGC III: 21 MPa (3,000 psi); Dionex EGC 400: 35 MPa (5,000 psi); Dionex EGC 500: 35 MPa (5,000 psi)
Maximum solvent concentration	Cations: None Anions: 25% methanol (KOH, NaOH and LiOH cartridges); None (Carbonate cartridge and EPM)
Gradient profiles	Standard: any combination of an unlimited number of linear, convex, and concave positive and negative gradient profiles
Number of cartridges supported	Two with dual cartridge support RFIC eluent degasser Eluent degasser housed in the EG Eluent Generator module
System software	
Software	Chromeleon CDS
Physical specifications	
Power requirements	90–265 V ac, 47–63 Hz
Dimensions (H x W x D)	41 x 23 x 56 cm (16 x 8.75 x 21.5 in.)
Weight	25 kg (40 lb) without optional items
Flow path	All polymeric (PEEK), anion, or cation configuration
Eluents	Please refer to the Thermo Scientific™ Dionex™ EGCs product specifications sheet for the latest information on available EGCs and their respective eluents and concentration ranges.
Flow rates.	1.00–2.00 mL/min
Continuous operation with 4 L of eluent	Up to 28 days or 2,000 samples, typically
Always on, always ready capable	Standard feature
Remains fully calibrated for extended periods of time (≤28 days):	Standard feature, results are traceable to a single calibration
System wellness	Consumables usage monitoring for predictive maintenance
Maximum operating pressure	35 MPa (5,000 psi)
Operating temperature range	4–40 °C

Dionex ICS-6000 DC Detector/Chromatography Compartment specifications

Standard DC model	Upper zone temp range: 18–40 °C (minimum temperature: ambient–15 °C); (maximum temperature: ambient +20 °C) Lower zone temp. range: 10–70 °C (minimum temperature: ambient–15 °C) (maximum temperature: ambient 50 °C) Temperature accuracy: ±0.15 °C Temperature stability: <0.05 °C Temperature precision: ±0.2 °C
Lower zone	Injection valves: Up to two high-pressure valves, either 6- or 10-port, 2-position Low pressure valves: Up to 2 inert, 2- or 3-way Reaction coil heater (RCH): Holds two reaction coils RCH temperature range: 5 °C above upper zone, 80 °C maximum AutoPrep kit: Dual loop for sample preconcentration All valves and heater upgradable and field installable
Automation manager (Optional)	Injection valves: Up to two high-pressure valves, either 6- or 10-port Low pressure valves: Up to 2 inert, 2- or 3-way Reaction coil heater (RCH): Holds two reaction coils RCH temperature range: 5 °C above upper zone, 80 °C maximum AutoPrep kit: Dual loop for sample preconcentration All valves and heater upgradable and field installable
Flow path	Plumbing configurations for 4 mm, 2 mm, 1 mm, fully inert, PEEK
Detectors	Any combination of two conductivity or electrochemical detectors, upgradeable and field installable. Dual detectors can be operated simultaneously or independently. Optional remote operation up to 3 m from instrument.
Analog signal output	Two analog output channels, two 24 V relays, 2 TTL Out and 8 TTL In lines, upgradable and field installable, optional
Leak detection	Optical leak sensor, standard
Application control automation	Standard, all DC modules come equipped with two switched AC controllers built-in to automate external devices and the ability to control up to six low pressure 2- or 3-way valves for fluidic automation
Suppressors and control	
Non-suppressed chromatography	Yes, supported
Supported suppression modes	<ul style="list-style-type: none"> • Chemical suppression • Electrolytic suppression
Available suppressor types	2 mm and 4 mm anion and cation
Note: Please refer to the Thermo Scientific™ Dionex™ eluent suppressors product specifications sheet for the latest information on available suppressors and detailed specifications.	
Suppressor regeneration	<ul style="list-style-type: none"> • Chemical suppressor: Internal or external regenerant pump • Electrolytic suppressor: Recycled or external water
Suppressor wear parts	<ul style="list-style-type: none"> • Chemical suppression: Regenerant pump tubing • Electrolytic suppression: No user-replaceable parts
Electrolytic salt converter	Thermo Scientific™ Dionex™ SC-CERS 500 available in 2- and 4-mm versions
Carbonic acid removal for anions	<ul style="list-style-type: none"> • Thermo Scientific™ Dionex™ CRD 200 Carbonate Removal Device for use with hydroxide eluents • Thermo Scientific™ Dionex™ CRD 300 Carbonate Removal Device for use with carbonate eluents
System software	
Software	Chromeleon CDS
Physical specifications	
Power requirements	90–265 V ac, 47–63 Hz; (auto-sensing power supply; no manual voltage or frequency adjustment required)
Dimensions (H × W × D)	Standard model 44.5 × 42 × 57.5 cm (17.5 × 16.0 × 22.6 in.)
Weight	Standard model 38 kg (84 lb)
Flow path	All polymeric (PEEK), anion, or cation configuration

Thermo Scientific™ Dionex™ ICS-6000 CD Conductivity Detector specifications

Electronics type	Microprocessor controlled digital signal processing
Cell drive	8 kHz square wave
Linearity	$R^2 \geq 0.999\%$
Resolution	0.00238 nS/cm
Flow path	Plumbing configurations for 4 mm, 2 mm columns, fully inert, PEEK
Output range	Digital signal range: 0–18,000 $\mu\text{S/cm}$ Analog signal range: 0–18,000 $\mu\text{S/cm}$
Noise, wet	<0.2 nS at 23 $\mu\text{S/cm}$ background <0.1 nS at 1 $\mu\text{S/cm}$ background
Filter	Rise times 0 to 10 s, programmable
Sample rate	1 to 100 Hz, user settable or automatic
Cell temperature	5 °C above DC upper zone temperature to 60 °C maximum. User settable, working range is identical to settable range.
Cell temperature stability	<0.001 °C
Cell temperature compensation	Default 1.7% per °C; programmable from 0–3% per °C
Flow cell maximum pressure	10 MPa (1,500 psi)
Flow cell volume	Analytical: 0.7 μL
Cell electrodes	Passivated 316 stainless steel. Compatible with MSA.
Cell body	Chemically inert polymeric material
Heat exchanger	Inert, tortuous-path for low axial dispersion
System software	
Software	Chromeleon CDS
Physical specifications	
Dimensions (H × W × D)	6.9 × 16.7 × 9.9 cm (2.7 × 6.5 × 3.9 in.)
Weight	400 g (1.6 lb)

Thermo Scientific™ Dionex™ ICS-6000 ED Electrochemical Detector specifications

Electronics type	Microprocessor controlled digital signal processing
Electronic noise (wet noise)	IPAD (Au electrode) <30 pC at 10 mM KOH, DC Amperometry (GC) <5 pA at catecholamine eluent
Potential range	-2.0 to 2.0 V in 0.001 V increments
Signal range (digital and analog)	Integrated amperometry: 0.0008 pC to 200 µC DC amperometry: 0.00008 pA to 74 µA
Filter	0–10 s response time, user settable
Control mode	Local or remote control using relay closures or TTL, or control using Chromeleon CDS via DC module
Cell body	Titanium body with narrow-bore PEEK inlet tubing, titanium inlet tubing for analytical format. Compatible with 0.2–0.6 mm i.d. columns (PEEK inlet), 2–7 mm i.d. columns (Ti inlet)
Working electrodes	Conventional: gold, glassy carbon, platinum, and silver Disposable: gold, platinum, carbon, and silver
Reference electrode	pH-Ag/AgCl combination, one-piece design PdH, one-piece design
Autoranging	Yes
Analog output	User selectable full scale of 10, 100, or 1,000 mV
Cell volume at working electrode	<0.2 µL
Maximum cell operating pressure	0.7 MPa (100 psi)
System software	
Software	Chromeleon CDS
Physical specifications	
Dimensions (H × W × D)	6.9 × 16.7 × 9.9 cm (2.7 × 6.5 × 3.9 in.)
Weight	400 g (1.6 lb)

Dionex ICS-Series VWD variable wavelength detector specifications

Optical system wavelength UV-Vis	Dual beam forward optics design (monochromator) single or multiple (4-channel) detector options
Light source	Deuterium lamp for UV range; tungsten lamp for visible range
Wavelength range	190 to 900 nm in 1 nm increments
Electronics	
Analog output ranges (optional)	0.001–3.0 AU
Rise time	0.00–4.55 s
Full-scale recorder output	1 V or 10 V
Data collection rate up to 100 Hz digital output	Full dynamic autoranging digital absorbance signal output to the Chromeleon CDS
Control modes	Software remote control through the Chromeleon CDS
Flow cells	
Cell	PEEK
Cell path length	10 mm (Standard), 7 mm (Micro)
Cell volume	11 μ L (Standard) 2.5 μ L (Micro)
Heat exchanger volume	8.8 μ L
Maximum flow cell operating pressure	725 psi (5 MPa)
Performance	
Wavelength accuracy	± 1 nm
Linearity	>2 AU
Bandwidth	6 nm at 254 nm
Noise	Typically - $< \pm 2.5 \times \mu$ AU at 254 nm
Drift	<0.1 m μ AU/h at 254 nm
Physical specifications	
Power requirements	85–265 V ac, 47–63 Hz
Operating temperature range	10–35 $^{\circ}$ C (50–95 $^{\circ}$ F)
Operating humidity range	5–80% relative, noncondensing
Dimensions (H \times W \times D)	15.2 \times 44.4 \times 50.3 cm (6.0 \times 17.5 \times 19.8 in.)
Weight	15.4 kg (34 lb)

Dionex AS-AP autosampler specifications

Sample capacity	10 mL vials: 81 1.5 mL vials: 120 0.3 mL vials: 120 Well plates: 288 (3 × 96 standard or deep well) Well plates: 1152 (3 × 384 standard well)
Minimum sample volume	10 µL can be sampled from a 300 µL microvial; 20 µL can be sampled from a 500 µL microvial
Maximum injection volume	7,500 µL
Variable volume range	1–100 µL in 0.1 µL increments; 100–7,500 µL in 1 µL increments
Injection cycle time (including sample prep such as dilution)	15 s with sample overlap function; 30 s for a 5 µL full loop without sample overlap
Injection modes	Full loop; partial loop; limited sample
Sampling technique	Pull mode; push mode
Injection precision	Fixed loop: <0.3% RSD at 20 µL; partial loop: <0.5% RSD at 20 µL
Dilution	1:1 to 1:1,000
Auto Dilution	With post-run functionality and Chromeleon Auto Dilution license
Dilution precision	<1.0% RSD for a 1:10 dilution
Carryover	<0.01% with 500 µL flush volume
Sample tray thermostating	4 °C to 60 °C, optional
Dual instrument support	Sequential (asynchronous) and simultaneous modes, field upgradeable, optional
Sample degassing	CRD 200/300, upgradeable, user installable
Injection valves	One or two 2-position, 6- or 10-port
Diverter valve	One 2-position, 6- or 10-port
Sample preparation	Dilution, addition of internal standards, concentration/matrix elimination, derivatization, etc.
Inline sample filtration	Dual filter, backflush, optional
System software	
Software	Chromeleon CDS
Physical specifications	
Dimensions (H × W × D)	44.5 × 35.9 × 51.6 cm (17.5 × 14.1 × 20.3 in.)
Weight	<25.2 kg (<55.5 lb) <26.8 kg (<59.0 lb) with sample temperature control
Power	90–265 V ac, 47–63 Hz
Flow path	All polymeric (PEEK), anion or cation configurations

Validation services

Thermo Fisher Scientific offers a full range of validation services and kits for the Dionex ICS-6000 product line. Validation procedures include Installation Qualification (IQ) and Operational Qualification (OQ) for the Dionex ICS-6000 system modules.

All validation kits include detailed procedures for performing the validation. Also included are calibration tools, data worksheets, methods, and validation certificates.

Ordering information

Part numbers for Dionex ICS-6000 systems and modules are available from your local Thermo Fisher Scientific office or distributor. Please consult your representative for the system configuration and modules best suited to your analytical needs.

 Learn more at thermofisher.com/ics6000

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