

Systems

ICS-3000 Ion Chromatography System



The ICS-3000 Ion Chromatography System provides an impressive combination of increased productivity, expanded capabilities, and improved performance. Innovations in all modules provide up to an order of magnitude improvement in performance—the foundation of the system. Modular versatility, functional integration, and superior performance culminate in the most advanced ion chromatography system on the market.

- Modular design allows versatility in configuring a wide variety of applications
- Performance improvements up to an order of magnitude in flow rate accuracy, eluent generator electronics stability, and conductivity cell temperature control increase retention time reproducibility, baseline stability, and sensitivity
- New hydroxide and carbonate Reagent-Free™ Ion Chromatography (RFIC™) consumables offer the greatest flexibility of any RFIC system
- Dual-system capability (within the same footprint) maximizes throughput
- Integrated DC Detector/Chromatography module with precisely controlled temperature zones maintains baseline stability and increases application flexibility
- AM Automation Manager simplifies and automates complex applications including sample preparation, preconcentration, matrix elimination and postcolumn reagent addition
- New innovative ED Electrochemical Detector capabilities improve and expand applications: multiwaveforms in a single run; post-run 3-D data processing; new cell design
- Innovative touchscreen TabletStation, mounted on a movable arm, unifies and simplifies system control and operation



Modular Design

The modular ICS-3000 meets a wide and ever-increasing range of application needs. From an entry-level IC for routine, dedicated analysis to a high-throughput, dual RFIC system, the ICS-3000 is truly designed for versatility and productivity. The system can be upgraded to a dual system configuration—without taking up more valuable laboratory bench space.

Performance Enhancements

Significant performance enhancements make the ICS-3000 the most reproducible, stable, and sensitive ion chromatography system available today. Significant improvement in flow rate accuracy, eluent generator electronics stability, and conductivity cell temperature control increase baseline stability and enhance sensitivity. Each module offers new innovations for increased performance and help your lab become more productive.

Unique System Control

Instead of individual module front panels, the ICS-3000 gives you one centralized control panel. A new touchscreen TabletStation with Chromeleon® Xpress provides a centralized panel so that all module control parameters, status, calibration, and diagnostics are easily and readily available. A convenient home screen shows overall system status while individual module tabs provide quick access to individual module functions and detailed status and diagnostics. The movable arm allows the user to move the TabletStation to the best position for use and viewing of status and chromatograms.

Modular Capabilities and Performance

DP Dual and SP Single Pump

The DP Dual Pump and SP Single Pump are each available in multiple configurations based on application requirements. Both formats can be configured for gradient or isocratic eluent delivery. A SP pump-based system can be field-upgraded to a DP pump, depending on your needs. Pump assemblies slide out for easy access and serviceability. The pumps feature a variable-speed, serial-piston design to deliver consistent flow rates and quiet detector baselines. Compared to previous systems, the pump has a tenfold improvement in flow rate accuracy and precision. The pumps are designed to support flow rates from 0.001 to 10 mL/min.

EG Eluent Generator

The EG Eluent Generator module provides the latest advances for RFIC systems in a dual-system format. Improved electronics provide an extremely stable baseline and precise gradient generation. You can generate high-purity eluents on-line, and run gradient separations as easily as isocratic. RFIC systems combine “Just Add Water” eluent generation, eluent purification, and electrolytic suppression technologies. RFIC systems eliminate variability and potential contamination compared to systems with manually prepared eluents, and provide superior performance, higher sensitivity, improved resolution, and excellent reproducibility. 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 analysis. RFIC systems are only available from Dionex.

DC Detector/Chromatography

The DC Detector/Chromatography module houses and organizes chromatography components such as valves and columns, 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 DC offers up to five separate temperatures that can be maintained simultaneously (separation section, detection section, two conductivity detector cells, and postcolumn reaction coils). This extremely flexible and precise temperature control increases stability and enhances sensitivity. Further increasing stability is a tenfold improvement in conductivity detector temperature control and a fivefold improvement in column temperature control.

CD Conductivity and ED Electrochemical Detectors

The CD and ED detectors install inside the DC compartment, minimizing tubing lengths and providing optimum thermal stability. The detectors are easy to install snap-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 new cell design with an improved reference electrode. The cell is also more rugged due to an improved handle design that provides uniform torque on the working electrode. Multiple waveforms optimize detection conditions for individual analytes and signal measurements can be collected as a complete three-dimensional data set for post-run analysis and characterization of different compound classes.

Optical Detectors

The ICS-3000 can be configured with any variety of optical detectors available from Dionex. Unlike the CD and ED, the optical detectors are configured as separate modules outside the DC.

AM Automation Manager

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

AS Autosampler

The new AS Autosampler can be configured for simultaneous or sequential sample delivery. Configured for simultaneous delivery, sample is 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).

Configured for sequential delivery, valves are configured to divert the sample stream to the appropriate injection valve for loading. The new AS also provides sample preparation options and variable sample size loading for preconcentration on various trap columns.

Module Features

DP Dual and SP Single Pump

The Dionex DP and SP Pumps are each available in isocratic or 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 Dual Pump module

DP and SP Features

- Variable-speed, serial dual-piston design delivers consistent flow rates and quiet detector baselines
- Pump flow components are chemically inert, made with high-quality PEEK heads and fittings, inert polymer seals, and sapphire pistons
- Quaternary proportioning and a low-volume mixer deliver reproducible eluent mixtures
- Linear, concave, and/or convex gradients are possible
- Vacuum degas provides sealed, in-line degassing for flow reproducibility and protection of eluent from contamination and degradation
- Automated integral piston seal wash prolongs seal lifetime by preventing eluent crystallization on the seal surfaces
- The 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 Chromeleon allow additional responses to status or alarm conditions
- Front panel indicates the status of power, pump flow, priming, connectivity (Chromeleon Control), and alarms

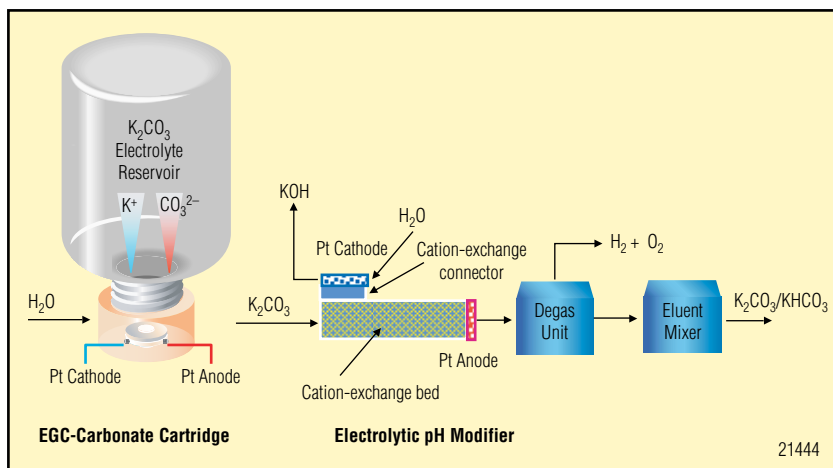
Benefits of Dual Pump Configurations

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

- Configure the system for dual applications, either running simultaneously or independently:
 - Anion and cation separations
 - Two different anion or two different cation separations

DP AND SP PUMP SPECIFICATIONS

<i>Available Configurations</i>	SP Isocratic SP Gradient DP Isocratic/Gradient DP Gradient/Gradient
<i>Applicability</i>	Gradient and Isocratic separations with 1–9-mm columns
<i>Construction</i>	Chemically inert, metal-free PEEK pump heads and flow path, compatible with aqueous eluents of pH 0–14 and reversed-phase eluents.
<i>Type</i>	Serial dual-piston, constant stroke
<i>Control Modes</i>	Remote by Chromeleon software through USB; Stand-alone through standard Chromeleon Xpress control
<i>Pressure Limit Alarms</i>	Programmable upper and lower limits
<i>Flow Rate Range</i>	0.001–10 mL/min
<i>Flow Rate Accuracy</i>	±0.1% at 1 mL/min
<i>Flow Precision</i>	±0.1% at 1 mL/min
<i>Pressure Range</i>	50–5000 psi
<i>Pressure Ripple</i>	1% (typical)
<i>Gradient Proportioning Accuracy</i>	±0.5% at 2 mL/min
<i>Gradient Proportioning Precision</i>	±0.5% at 2 mL/min
<i>Number of Solvents</i>	Isocratic: one solvent Gradient: four solvents
<i>Gradient Mixer Delay Volume</i>	2-mm GM4 < 290 µL 3–9-mm GM3 < 500 µL
<i>Vacuum Degassing</i>	SP Isocratic: one channel, (optional) SP Gradient: four channels, built-in DP Isocratic/Gradient, built-in DP Gradient/Gradient, built-in
<i>Wetted Parts</i>	PEEK, sapphire, ruby, ceramics, UHMW polyethylene, PCTFE, PTFE
<i>Leak Detection</i>	Optical sensor, (no calibration required)
<i>Computer Connection</i>	Through USB device connector; with USB hub (three) connectors
<i>I/O Interfaces Inputs/Outputs</i>	Four programmable relays; motorized switching-valve port; analog output for system pressure Three digital inputs for Start, Stop, and Hold
<i>Power Requirements</i>	90–120 V, 200–240 V; 47–63 Hz
<i>Operating Temperature Range</i>	4–40 °C (40–104 °F)
<i>Operating Humidity Range</i>	5–95% relative, noncondensing
<i>Dimensions (h × w × d)</i>	41 × 22 × 56 cm (16 × 8.5 × 21.6 in.)
<i>Weight</i>	SP: 20.4 kg (45 lb); DP: 24.1 kg (53 lb)



EG Eluent Generator module

Electrolytic generation of $K_2CO_3/KHCO_3$ eluents using an EGC II K_2CO_3 cartridge and an EPM Electrolytic pH Modifier.

- Use the second pump for:
 - Sample preconcentration or matrix elimination
 - Postcolumn reagent delivery for postcolumn reaction (PCR) applications
 - External water and chemical regenerant delivery
 - A backup pump for the primary application
- Consumables cleanup or start-up preparation; preventing primary system downtime for reconfiguration

EG Eluent Generator Module

The EG Eluent Generator module provides the most recent advances for RFIC systems in a dual system format. The EG continues Dionex's technology leadership, allowing the user to generate high-purity eluents on-line and run gradient separations as easily as isocratic applications. Reagent-Free IC is the powerful combination of Dionex "Just Add Water" electrolytic eluent generation, purification, and suppression technologies. The EG can be configured for a single system or for dual system support.

EG Features

- Eluents are generated from deionized water using an EG cartridge and then polished of contaminants using one of the Continuously Regenerating Trap Columns (CR-TCs)

- Now you can enjoy the RFIC system carbonate-based eluent generation using a carbonate cartridge and EPM Electrolytic pH Modifier
- In addition to KOH for anion separations, NaOH and LiOH cartridges are available for specialized applications

EG ELUENT GENERATOR SPECIFICATIONS	
EGC Concentration Range: 0.1–100 mM	Operating Temperature Range: 4–40 °C
Eluent Types: KOH, LiOH, NaOH CO_3/HCO_3 CO_3 methanesulfonic acid (MSA)	Operating Humidity Range: 5–95% relative, noncondensing
Concentration Increments: 0.01 mM	Dimensions (h × w × d): 41 × 22 × 56 cm (16 × 8.5 × 21.6 in.)
Cartridge Capacity: Two independent	Weight: 18 kg (40 lb)
CR-TC Capacity: Two independent	Power Requirements: 90–265 V ac, 47–63 Hz
Flow Rate Range: 0.1–3.0 mL/min	EluGen® Cartridge Dimensions (h x w x d): 23 x 7 x 10 cm (9 x 2.75 x 4 in.)
Max. Operating Pressure: 3000 psi, 21 mPa	Weight: 1.6 kg (3.5 lb)
Max. Solvent Concentration: anions—25% methanol; cations—no solvent	CR-TC Trap Column Dimensions (h x w x d): 3.8 x 3.8 x 5.8 cm (1.5 x 1.5 x 2.3 in.)
Leak Detection: Optical sensor (no calibration required)	Weight: 60 g (0.13 lb)

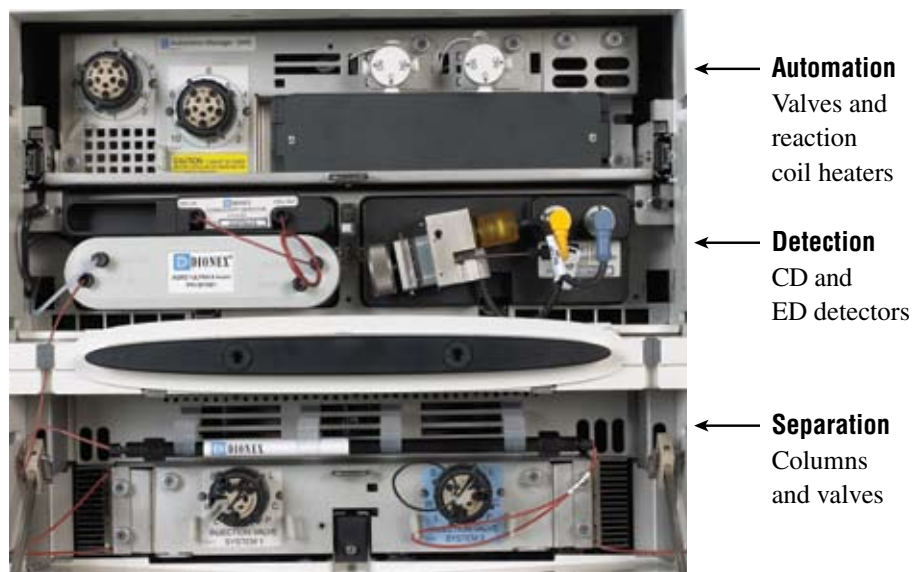
- The EG delivers eluent concentrations from 0 to 100 mM
- Control, status, and diagnostics are provided with Chromeleon software
- Improved EG electronics provide smoother eluent delivery with minimal noise for improved peak detection in both gradient and isocratic modes
- A slide-out tray provides easy access to the EG cartridges and CR-TCs for maintenance
- Using on-line eluent generation actually extends the lifetime of pump pistons and seals because the pumps only deliver water
- Front panel displays the status of module power, CR-TC power, and leak functions

Benefits of RFIC 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 contains injection valves, guard, and analytical columns, and is under independent temperature control. The conductivity and electrochemical detectors are configured above the separation columns. An Automation Manager option can be configured in the upper compartment to support switching valves and other hardware required for advanced applications.



DC Detector/Chromatography module

DC Features

- Three distinct sections keep plumbing organized while minimizing connection lengths, reducing delay volumes, and improving peak efficiencies
- Two options for overall thermal control offer application and budgetary flexibility
 - Dual temperature zone configuration controls the injection valve and column compartment separately from the upper compartments
 - A single temperature zone configuration controls the temperature of both compartments at one set temperature
- With either configuration, the CD cells feature temperature control independent of the other sections
- In the dual temperature zone configuration, up to five separate temperatures can be maintained simultaneously (separation section, detection section, two detector cells, and reaction coil) providing maximum application flexibility
- Independent compartment doors allow independent access to the separation or detector section without disturbing the other thermal section (with dual temperature zone configuration)
- Automatic detection of valves, CD/ED cells, and suppressor devices by software
- Manual loading of sample is possible
- Column compartment can be configured with two independent injection valves
- Column/Injection Valve panel slides forward for easy access
- 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

DC DETECTOR/CHROMATOGRAPHY MODULE SPECIFICATIONS

DC Models:

Single Temperature Model

Dual Temperature Model

Single Temperature Model:

(Upper and Lower sections are thermally combined)

Temperature Range:

15–40 °C in 0.1 °C increments

Temperature Performance:

Accuracy: ± 0.5 °C

Stability: ± 0.2 °C

Precision: ± 0.2 °C

Heat-up / Cool-down Time:

Less than 30 min from 20 °C to 40 °C, or 40 °C to 20 °C

Dual Temperature Model:

(Upper and Lower sections are independently thermally controlled)

Upper Section Temperature Range:

15–40 °C in 0.1 °C increments

Lower Section Temperature Range:

10–70 °C in 0.1 °C increments

Temperature Performance:

Accuracy: ± 0.5 °C

Stability: ± 0.2 °C

Precision: ± 0.2 °C

Heat-up/Cool-down Time:

Less than 30 min from 20 °C to 50 °C, or 50 °C to 20 °C

Lower Column Section:

(applies to both DC models)

High-Pressure Valve Types:

(any two)

Six-port/two-position Rheodyne PEEK injection valves

10-port/two-position Rheodyne PEEK switching valves

Column Capacity:

Two column sets 1–9 mm

Maximum Column length:

250 mm

Precolumn heat exchangers:

Capacity to house two, low-delay volume

General Specifications

Control:

Chromleon/Chromleon Xpress

Computer Connection:

USB, with integrated USB Hub with two type A USB ports

Leak Detection:

Optical leak sensor, no calibrations required

Output Voltages:

Two, switched AC controllers through Chromleon/Chromleon Xpress (90–265 V ac, 47–63 Hz compatible)

Power Requirements:

90–265 V ac, 47–63 Hz

Operating Temperature Range:

4–40 °C (40–104 °F)

Operating Humidity Range:

5–95% relative, noncondensing

Dimensions (w x h x d):

44.5 × 42 × 57.2 cm (17.5 × 16.5 × 22.5 in.)

Weight:

38 kg (84 lb)

Detector Analog Outputs:

(Optional) Any two detectors—conductivity or electrochemical

TTL and Relay inputs and outputs: (Optional)

Two controlled relay closure—output

Four controlled TTL—output

Six programmable TTL—inputs

AM Automation Manger—Optional

High Pressure Valve Types: (any two)

Six-port/two-position Rheodyne PEEK injection valves

10-port/two-position Rheodyne PEEK switching valves

Low Pressure Valve Types: (any two)

Two-port shut-off valve, auto-detected and controlled

Three-port switching valves, auto-detected and controlled

RCH Reaction Coil Heater:

Houses two postcolumn reactors

Temperature Performance:

Range: 5 °C above upper DC temperature section to 80 °C in 1.0 °C increments

Accuracy: ± 1.0 °C

Stability: ± 0.2 °C

Precision: ± 0.2 °C

Expand Your Capabilities with Dual Detection Configurations

- Easily install the CD and ED detectors as plug-in devices and have a dual system in a single system footprint
 - Run anion/cation analyses simultaneously from one injection
 - Run confirmatory separations in parallel to verify components
 - Inject different sample loop sizes; eliminate reanalysis of samples at different dilutions
- Implement innovative detection schemes by pairing conductivity and electrochemical detection techniques in series on the same system
 - Determine classic anions with conductivity along with sensitive and selective ED detection of electroactive species such as iodide, sulfide, cyanide, and phenols
 - Analyze cations and electroactive amines, organic acids, and carbohydrates from a single separation

AM Automation Manager

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 RCH Reaction Coil Heater, and a variety of reaction coils.

- Configure up to two each, six- or 10-port high-pressure rotary valves for automated sample preparation, preconcentration, matrix elimination, or flow-diversion applications

- Configure up to two each, low-pressure two port shut-off or three port switching valve for selection of reagents for postcolumn reagent addition, rinse solutions, or regenerants
- Install the optional RCH for heated reactions, or simply mount non-heated reaction coils to support ambient reagent addition
- Installed components are automatically recognized through Chromeleon
- All valves and positions are recognized with Chromeleon
- Preconcentrate samples during a run to increase throughput

CD Conductivity and ED Electrochemical Detectors

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

CD Features

- Microprocessor-controlled digital signal processing detects high and low concentrations of analytes in the same run



CD Detector cell with suppressor

- Supports all IC and RFIC system applications with maximum range up to 15,000 μS
- Control through Chromeleon software or locally through TTL inputs
- Mount 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
- Heats CD cell independently from other chromatography components
- Innovative built-in electronics allow for easy calibration and diagnostics



AM Automation Manager

CD CONDUCTIVITY DETECTOR SPECIFICATIONS

Electronics Type:

Microprocessor-controlled digital signal processing

Detection types:

Single- and dual-conductivity detection

Cell Drive:

8 kHz square wave

Linearity:

1% at 1000 μ S

Resolution:

0.10 nS

Full-Scale Output Range:

Digital: 0–15,000 μ S

Analog: 0–15,000 μ S

Signal Sampling Rate:

Maximum of 100 Hz

Electronic Noise, Dry:

S/N ratio = 200,000:1

(Example: 1000 μ S:5 nS)

Electronic Noise, Wet:

At 23 μ S, noise <0.2 nS

At 1 μ S, noise <0.1 nS

Filter:

Rise times from 0 to 10 s

Temperature Compensation:

Factory default at 1.7%,
programmable from 0.0–3.0 %

Analog Signal Output Voltage:

User-selectable full-scale recorder output of 10, 100, or 1000 mV

Analog Signal Output Frequency:

Output rate of 100 Hz

Control Modes:

Local or remote using relay closures, TTL, by Chromeleon through the DC module

Chromeleon software or by tablet PC with Chromeleon Xpress

Autoranging:

Autoranging digital conductivity signal monitoring with Chromeleon software

Conductivity Flow Cell Electrodes:

Passivated 316 stainless steel micro electrodes

Cell Body:

Chemically inert polymeric material

Cell Volume:

<1.0 μ L

Maximum Operating Pressure:

500 psi

Cell Temperature Range:

5 °C above the upper DC enclosure temperature; up to 60 °C max.

Cell Temperature Stability:

<0.001 °C

Precell Heat Exchanger:

PEEK or other inert material
Low dispersion

Dimensions (h x w x d):

6.9 x 16.7 x 9.9 cm (2.7 x 6.5 x 3.9 in.)

Weight:

400 g (1.6 lb)



ED Electrochemical Detector and cell

ED Features

- New one-piece reference electrode provides consistency and reliability
- New 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 amperometry detection modes
- New detection capabilities include use of multiple waveforms and multiple integration times to optimize detection conditions for individual analytes
- Three-dimensional display of the raw integrated amperometry data set similar to PDA data display, with cross-hairs on an isoamperometric plot used to select “slices” of the plot along the applied voltage axis (to render a chromatogram) and along the time axis (to render a voltammogram)
- Three-dimensional wireframe rendering, printing, color selection, display of apex, and other spectra on peaks in chromatograms are echoed in the integrated amperometry implementation
- The integrated amperometry mode provides complete freedom to change the waveform profile’s number of segments, duration of each segment, and voltage applied at each segment

ED ELECTROCHEMICAL DETECTOR SPECIFICATIONS

Electronics Type:

Microprocessor-controlled digital signal processing

Detection Types:

Single- and dual-electrochemical detection

Noise: Amperometry Electronics

DC amperometry: <1 pA at lowest range

Integrated amperometry: 10 pC

Potential Range:

–2.00 V to 2.00 V in 0.001 V increments

Signal Range: Digital and Analog

DC amperometry: 5 pA to 74 μ A

Integrated amperometry: 50 pC to 200 μ C

Electronic Noise:

IPAD <5 pC

DC amperometry <1 pA

Filter:

0–10 s response time

Control Mode:

Local or remote using relay closures, TTL, or by Chromeleon through the DC module

Cell Body:

Titanium body, titanium inlet tubing, compatible with 0.5-mm i.d. columns (flow rate 3–10 μ L/min) and 4-mm i.d. columns (2 mL/min); pressure rating 120 psi when fully assembled

Working Electrode (interchangeable):

Gold, glassy carbon, platinum, silver

Disposable Working Electrode:

Gold, silver

Counter Electrode:

Titanium

Reference Electrode:

pH-Ag/AgCl combination

Autoranging:

Autoranging digital amperometry signal with Chromeleon software

Analog Signal Output Voltage:

User-selectable full-scale recorder output of 10, 100, or 1000 mV

Analog Signal Output Frequency:

Output rate of 100 Hz

Wetted Materials:

PEEK, titanium, Kel-F[®], polyetherimide, EPR, glass, high-density polyethylene (HDPE), ULTEM, working electrode materials

Cell Volume at Working Electrode:

<0.5 μ L

Maximum Operating Pressure:

0.7 MPa (100 psi)

Dimensions (h x w x d):

6.9 x 16.7 x 9.9 cm (2.7 x 6.5 x 3.9 in.)

Weight:

400 g (1.6 lb)

- Control through Chromeleon software 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 integrated to minimize noise, maximize electrical isolation and shielding, and maximize thermal stability
- Innovative, built-in electronics for easy calibrations and diagnostics
- Can be used in dual-detection configurations (detectors in series or systems in parallel)

Optical Detectors

The ICS-3000 can be configured with any of several optical detectors available from Dionex.

PDA-100 Photodiode Array Detector

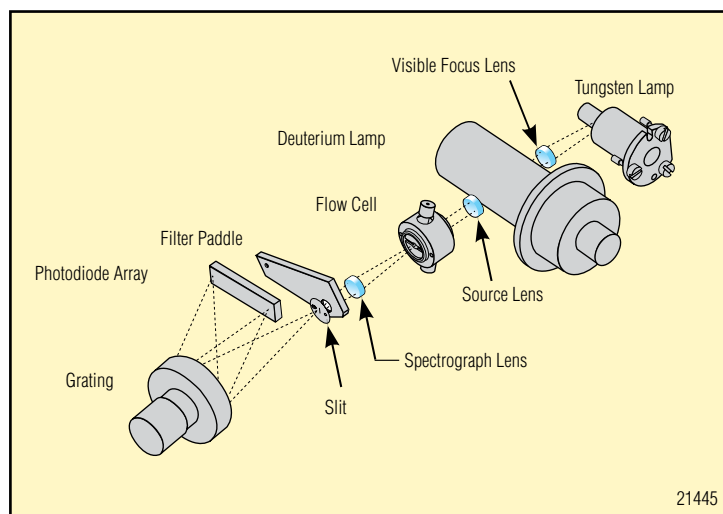
The PDA-100 is a high-resolution, 1024-element photodiode array detector with low noise and drift. Two light sources, a deuterium lamp and a tungsten lamp, provide a broad spectral range. The PDA-100 is operated using Chromeleon software with a 3-D data processing option.

Get the benefits of performance and versatility of the PDA-100 Photodiode Array detector through the following unique features:

- Photodiode array (1024-element) provides optimum wavelength resolution
- Broad wavelength range from 190 to 800 nm
- Low noise and high light intensity over the full spectral range via deuterium and tungsten lamps
- Full control and data collection through Chromeleon software with 3-D option
- LAN-based digital data collection for simple installation
- Four analog outputs support alternate data collection
- Built-in holmium oxide filter for easy verification of wavelength accuracy



PDA-100 Photodiode Array detector



PDA-100 optical schematic

- Low baseline drift for excellent reliability and reproducibility
- Front access to prealigned cells and lamps for easy maintenance
- Four front-panel LEDs that clearly indicate detector status

PDA-100 PHOTODIODE ARRAY DETECTOR SPECIFICATIONS

Performance

Noise:

±10 µAU at 254 nm (flowing water, 2-s rise time)

±15 µAU at 520 nm (flowing water, 2-s rise time)

Drift:

<500 µAU/h

Wavelength Accuracy:

±1 nm, self-calibration with deuterium lines
verification with built-in holmium oxide filter

Linearity:

Deuterium lamp, >2 AU

Tungsten lamp, >2 AU

Optics

Photodiode Array:

1024 element

Pixel Resolution:

0.7 nm

Lamps:

Tungsten and deuterium

Photodiode Array:

1024

Pixel Resolution:

0.7 nm

Optical Resolution:

1.0 nm

Wavelength Range:

190–800 nm

Electronics

Analog Outputs:

Four, 0–3 AU, selectable,
1000 mV range

Analog Outputs:

Four, 0–3 AU, 1000 mV range

Flow Cell

Cell:

PEEK, fused silica

Cell Path Length:

10 mm

Cell Volume:

<13 µL

Pressure:

<300 psi

Flow Cell Materials:

PEEK, fused silica, SST

Path Length:

10 mm

Cell Volume:

13 µL

Flow Cell Pressure Limit:

<2 MPa (300 psi) PEEK

<3 MPa (500 psi) SST

Physical Specifications

Power Requirements:

90–265 V ac, 47–63 Hz

Operating Temperature Range:

4–40 °C (40–104 °F)

Operating Humidity Range:

5–95% relative, noncondensing

Dimensions (h × w × d):

17.2 × 33.6 × 49.5 cm

(6.7 × 13.1 × 19.3 in.)

Weight: 15.9 kg (35 lb)



AD25 UV-Vis detector

AD25 Absorbance Detector

Get the benefits of performance and versatility of the AD25 through the following features:

- Deuterium and tungsten lamps that provide operation over the entire wavelength range of 190–800 nm
- Compact design for optimal plumbing of liquid flow path and minimal use of bench space
- Built-in holmium oxide filter for automated wavelength verification
- High signal-to-noise ratio for maximum sensitivity
- 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
- Available with 10-mm PEEK and SST flow cells for compatibility with a wide range of IC and HPLC applications

AD25 ABSORBANCE DETECTOR SPECIFICATIONS

AD25 Optics

Optical System:

Forward, dual-beam monochromator with a concave holographic grating and reflective beamsplitter

Light Source:

Deuterium lamp (30 W) for UV range and tungsten lamp (10 W) for visible range

Wavelength Range:

190–800 nm in 1-nm increments

AD25 Electronics

Analog Output Ranges:

0.001–3.0 AU

Rise Time:

0.1–10 s

Full-Scale Recorder Output:

1 V

Digital Output:

Full dynamic autoranging digital absorbance signal output to Chromeleon 6 software

Control Modes:

Local through relay closures or TTL. Software remote control through Chromeleon 6.

AD25 Flow Cell

Cell:

PEEK, fused silica

Cell Path Length:

10 mm

Heat Exchanger Volume:

14.5 μ L

Cell Volume:

10 μ L PEEK

Maximum Flow Cell Operating Pressure:

2 MPa (300 psi)

AD25 Performance

Wavelength Accuracy:

\pm 1 nm

Bandwidth:

<5 nm

Linearity:

>2 AU

Noise:

\pm 10.0 μ AU peak-to-peak (254 nm, 2-s rise time, flowing water)

Drift:

<100 μ AU/h

AD25 Physical Specifications

Power Requirements:

90–265 V ac, 47–63 Hz

Operating Temperature Range:

4–40 $^{\circ}$ C (40–104 $^{\circ}$ F); cold-room (4 $^{\circ}$ C) compatible as long as system power remains on

Operating Humidity Range:

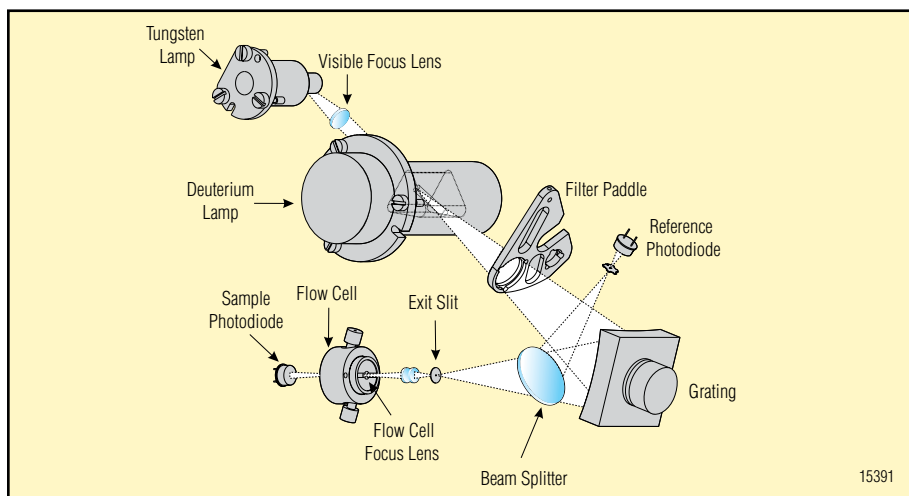
5–95% relative, noncondensing

Dimensions (h \times w \times d):

17 \times 22.5 \times 42 cm
(6.6 \times 8.8 \times 16.4 in.)

Weight:

10.9 kg (24 lb)



AD25 optical schematic

Autosamplers

AS Autosampler

The new AS Autosampler delivers high precision, reliability, ruggedness, and ease of use. It offers a wide range of options to fit your needs, including sample preparation, temperature control, and chemistry switching. The AS works with the entire ICS product line.

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

New features include reagent prime, reagent flush, and concentrate. These capabilities offer additional flexibility that range from matrix elimination to concentrate. In addition, sequences can now 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
- Eliminate complex laboratory procedures with automated standard preparation



AS Autosampler

AS AUTOSAMPLER SPECIFICATIONS

Sample Capacity:

49 10 mL; 100 1.5 mL

Vial Size:

10-mL polystyrene and 1.5-mL glass septum vials, 1.5-mL polypro

Vial Temperature Control Range: (Optional)

Programmable from 4–60 °C in 1 °C increments
Cooling –20 °C from ambient
Heating +40 °C from ambient

Vial Temperature Accuracy:

±2 °C (from 4–10 °C and 41–60 °C);
±1 °C (from 11–40 °C)

Vial Temperature Differential:

<2 °C between any two vials

Temperature Stability:

±5 °C

Temperature Reproducibility:

±5 °C

Time to Temperature:

Cools tray from 24 to 4 °C in <30 min; heats tray from 24 to 60 °C in <30 min

Number of Injections per Vial:

1–99

Minimum Sample Volume:

10 µL can be sampled from a 300-µL microvial
20 µL can be sampled from 500 µL in a 10-mL vial

Variable Volume Range:

1–100 µL in 0.1-µL increments
100–8000 µL in 1-µL increments

Injection Valve: (Optional)

PEEK Rheodyne with Tefzel® rotor seal

Injection Loop Size:

25-µL standard; other sizes available

Injection Precision:

Fixed-loop <0.3% RSD at 20 µL or greater; variable <0.5% RSD at 20 µL

Dilution Precision:

<1.0% RSD for a 1:100 dilution

Dispensing Precision:

<0.2% RSD by weighing

Carryover:

<0.01% with 500-µL flush volume

Ambient Temperature Range:

10–40 °C

Humidity range:

50–90% relative humidity, noncondensing

Power Requirements:

90–265 V ac, 47–63 Hz

Operating Temperature Range:

4–40 °C (40–104 °F)

**Key AS Autosampler Features
Provide Performance and Versatility**

- Consistent operation at RSDs of less than 0.3% that provide reproducible and accurate results
- Specially designed 10-mL polystyrene sample vials with wide openings that are easy to fill, easy to handle, and permit large-volume injections
- Easy access to components for effective troubleshooting
- All-PEEK flow paths that ensure compatibility with aqueous and reversed-phase eluents and protect sensitive samples from metallic contamination
- Control through Chromeleon or module front panel
- Moving-needle design to guarantee reliable sampling from a variety of vial sizes
- Easy syringe priming
- Sample preparative option that saves time and labor by automating your sample and standard preparations
- 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 samples that offers precise, reliable control over a temperature range of 4–60 °C

ICS-3000 System Control

The ICS-3000 is controlled by a TabletStation mounted on a flexible arm. The TabletStation can be configured with a powerful user interface, Chromeleon Xpress for stand-alone control. Xpress is a complete system controller that replaces and combines module front panels into one convenient system control panel.



TabletStation with Chromeleon Xpress

The TabletStation can also be configured with full Chromeleon for complete control, data acquisition, and management mounts on the side or on top of the ICS-3000 depending on user needs.

- Chromeleon Xpress is control-only, made with a unique, easy-to-use graphical interface.
- The panel provides complete single-point control and status monitoring of all modules.
- Off-the-shelf, tablet PC—mounted on a user-adjustable arm—adjusts to different user requirements.
- Tablet options:
 - Touchpad controller
 - Laptop/touchpad controller

MINIMUM TABLET STATION SPECIFICATIONS
<i>Tablet PC:</i>
1.4 GHz Pentium® M Centrino™ processor
512 MB RAM
40 GB hard drive
CD-RW/DVD-ROM
10/100 Ethernet
802.11 b/g WiFi Ethernet
Window XP Tablet Edition
14.1 in. XGA active matrix screen

- Configuration options include:
 - TabletStation with Chromeleon Xpress
 - TabletStation with full-featured Chromeleon
 - TabletStation with wireless keyboard and mouse with full-featured Chromeleon
 - Desktop PC with full-featured Chromeleon

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 ICS-3000 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 stack on top of the DC module.
- Translucent liner contains spills and allows view of liquid levels
- Constructed of corrosion-proof polypropylene and epoxy
- Pressure regulator option is 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 custom-molded polyethylene end-line filters with 5- μ m pores

Validation Services

Dionex offers a full range of validation services and kits for the ICS-3000 product line. Validation procedures include Installation Qualification (IQ) and Operational Qualification (OQ)/ Performance Qualification (PQ) for the ICS-3000 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 ICS-3000 systems and modules are available from the nearest Dionex regional office. Please consult your Dionex representative for the system configuration and modules best suited to your needs.



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