



Ion chromatography

Thermo Scientific Dionex eluent suppressors for ion chromatography

The suppressor advantage

We currently offer three types of suppressors for continuous suppression of the eluent in a broad range of IC applications. Suppressor choice depends on the eluent used, whether organic solvents are used, analyte and matrix concentration, and the type of chromatography being practiced:

- The Thermo Scientific™ Dionex™ NGES Next Generation Electrolytic Suppressor is a new generation suppressor designed to address the growing demands of the ion chromatography (IC) market. It is housed in new hardware and offers excellent performance, especially when used with 4 µm-based IC columns. The suppressor is suitable for virtually all analytical scale IC applications, both for anions and cations, and is available in 2 mm and 4 mm formats.
- The Thermo Scientific™ Dionex™ CRS™ 500 Chemically Regenerated Suppressor is used for chemically regenerated suppression of IC eluents requiring high capacity, solvents, and/or very low noise. The Dionex CRS 500 suppressor is available in the standard bore (4 mm) and microbore (2 mm) formats of operation.
- The Thermo Scientific™ Dionex™ ACRS-ICE 500 Anion Chemically Regenerated Suppressor is used for chemically regenerated suppression in ion-exclusion and is available in both the standard bore (9 mm) and microbore (4 mm) formats of operation.

Innovations in suppressor design

A significant advancement was the application of water electrolysis to generate regenerant ions within the suppressor, eliminating the need for external regenerant chemicals. This led to the development of the Thermo Scientific™ Dionex™ SRS™ Self-Regenerated Suppressor, followed by the Thermo Scientific™ Dionex™ ERS™ 500 Electrolytically Regenerated Suppressor and the Thermo Scientific™ Dionex™ DRS 600 Dynamically Regenerated Suppressor. All electrolytically regenerated processes are now superseded by a new modern designed Dionex NGES next-generation electrolytic suppressor.

Continuous improvements in suppressor performance have been made to meet the analytical needs of the IC market, including:

- High suppression capacity
 - Suppressor material: High-capacity ion exchange resins or membranes that can handle large quantities of eluent ions
 - Regeneration efficiency: The ability of the suppressor to be regenerated quickly and effectively to maintain its suppression capacity over multiple cycles
- Robustness and backpressure resilience
 - The dual membrane technology increases the pressure resilience and allows higher pressure fluctuations post detector like adding a valve or additional MS detector
- Low peak dispersion
 - Maintaining narrow and well-defined peak shapes for precise identification and quantification of the individual components
- Mass spectrometry (MS) compatibility
 - Electrolytic suppression eliminates the non-volatile ions, decreasing the salt deposits in the MS source and improving long term detector stability

Next-generation suppressor

The trend toward smaller particle packed IC columns has resulted in increased column efficiency. The development of 4 µm ion-exchange particles has allowed for faster separations with optimal resolution. This advancement places greater demands on the suppressor to maintain peak efficiencies generated by the new column technology. The Dionex NGES suppressor was developed alongside the 4 µm column technology, helping to ensure high efficiency separations.

Columns packed with 4 µm diameter particles provide up to 30–40% improvement in peak efficiency compared to older columns with 7 µm particles.

Design characteristics

The physical structure of the Dionex NGES suppressor is shown in Figure 1.

The key to this suppressor's performance is its ingenious simplicity.

The suppressor flow chamber is uniformly packed with the required ion-exchange resin; cation-exchange resin for anion analysis and anion-exchange resin for cation analysis.

The benefits of the new Dionex NGES suppressor are:

- Full electrolytic regeneration without reagents, allowing easier recoveries after operation without current
- Maintained peak efficiency and performance, providing accurate results with exceptional peak resolution
- Improved backpressure resilience for compatibility with a wide range of post suppressor devices and detectors

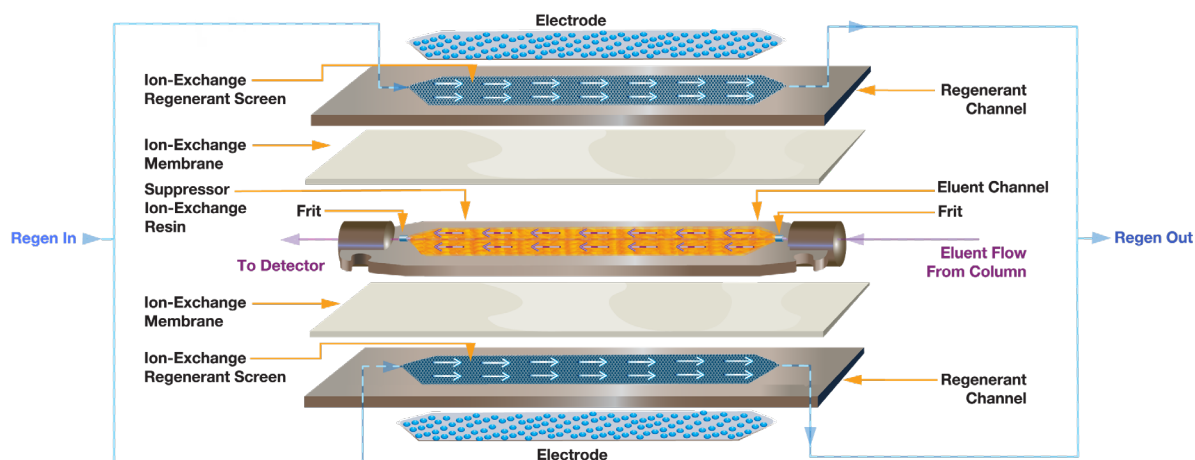


Figure 1. Schematic of the Dionex NGES suppressor series

Suppressor specifications

Physical specifications

	Dionex NGES	Dionex NGES	Dionex CRS 500	Dionex CRS 500	Dionex ACRS-ICE 500	Dionex ACRS-ICE 500
	2 mm	4 mm	2 mm	4 mm	4 mm	2 mm
Dimensions	10.7 × 4.5 × 4.7 cm (4.2 × 1.8 × 1.8 in.)	10.7 × 4.5 × 4.7 cm (4.2 × 1.8 × 1.8 in.)	14.0 × 4.5 × 4.8 cm (5.5 × 1.8 × 1.9 in.)	14.0 × 4.5 × 4.8 cm (5.5 × 1.8 × 1.9 in.)	10.3 × 3.1 × 10.3 cm (5.5 × 1.8 × 1.9 in.)	10.3 × 3.1 × 10.3 cm (5.5 × 1.8 × 1.9 in.)
Weight	470 g (1.04 lb)	460 g (1.01 lb)	370 g (0.82 lb)	370 g (0.82 lb)	150 g (0.3 lb)	150 g (0.3 lb)
Void volume	<15 µL	<50 µL	<15 µL	<50 µL	<15 µL	<15 µL
Supported modes of operation	Recycle, EWM ^{1,2}	Recycle, EWM ^{1,2}	ERM, DCR ^{3,4}	ERM, DCR ^{3,4}	ERM, DCR ^{3,4}	ERM, DCR ^{3,4}
Regeneration principle	Electrolytic	Electrolytic	Chemical	Chemical	Chemical	Chemical
Maximum backpressure	500 psi	500 psi	60 psi	60 psi	40 psi	40 psi
Maximum flow rate	0.75 mL/min	3 mL/min	0.75 mL/min	3 mL/min	0.75 mL/min	0.75 mL/min
Maximum regenerant flow rate	2 mL/min	5 mL/min	5 mL/min	10 mL/min	5 mL/min	5 mL/min
Temperature range	15–50 °C	15–50 °C	15–40 °C	15–40 °C	15–40 °C	15–40 °C
Operational requirements	All Thermo Scientific Dionex systems	All Thermo Scientific Dionex systems	All Thermo Scientific Dionex systems	All Thermo Scientific Dionex systems	All Thermo Scientific Dionex systems	All Thermo Scientific Dionex systems

Chemical specifications

		Dionex NGES	Dionex NGES	Dionex CRS 500	Dionex CRS 500	Dionex ACRS-ICE 500	Dionex ACRS-ICE 500
		2 mm	4 mm	2 mm	4 mm	4 mm	9 mm
Suppressor capacity [mN] x [mL/min]	Anion	50 µeq/min	200 µeq/min	75 µeq/min	150 µeq/min	75 µeq/min	150 µeq/min
	Cation	35 µeq/min	100 µeq/min	37.5 µeq/min	75 µeq/min	NA	NA
Eluent compatibility	Anion	Hydroxide, carbonate/bicarbonate eluents and borate eluents. Up to 40% methanol with 150 mM NaOH @ 0.25 mL/min ^(5,6)	Hydroxide, carbonate/bicarbonate eluents and borate eluents. Up to 40% methanol with 150 mM NaOH @ 0.25 mL/min ^(5,6)	Carbonate/bicarbonate, borate and hydroxide eluents containing solvents	Carbonate/bicarbonate, borate and hydroxide eluents containing solvents	Any Dionex IonPac ICE column set with suppressed conductivity detection	Any Dionex IonPac ICE column set with suppressed conductivity detection
	Cation	MSA and sulfuric acid eluents. Up to 40% acetonitrile with 100 mM MSA @ flow rate of 0.25 mL/min ^(5,6)	MSA and sulfuric acid eluents. Up to 40% acetonitrile with 100 mM MSA @ flow rate of 0.25 mL/min ^(5,6)	MSA and sulfuric acid eluents and eluents containing solvents, chloride, or nitrate	MSA and sulfuric acid eluents and eluents containing solvents, chloride, or nitrate	Use eluents containing only hydronium ion as the cation	Use eluents containing only hydronium ion as the cation
Solvent compatibility	Anion	100% methanol (exposure without irreversible effects) ⁷	100% methanol (exposure without irreversible effects) ⁷	100% methanol (exposure without irreversible effects) ⁷	100% methanol (exposure without irreversible effects) ⁷	90% methanol (exposure without irreversible effects) ⁷	90% methanol (exposure without irreversible effects) ⁷
	Cation	100% acetonitrile (exposure without irreversible effects) ⁷	100% acetonitrile (exposure without irreversible effects) ⁷	100% acetonitrile (exposure without irreversible effects) ⁷	100% acetonitrile (exposure without irreversible effects) ⁷	NA	NA
Column compatibility	Anion	Columns: all anion-exchange columns	Columns: all anion-exchange columns	Columns: all anion-exchange columns	Columns: all anion-exchange columns	Any Dionex IonPac ICE column set with suppressed conductivity detection	Any Dionex IonPac ICE column set with suppressed conductivity detection
	Cation	All cation-exchange columns except Thermo Scientific™ Dionex™ IonPac™ SCS 1	All cation-exchange columns except Dionex IonPac SCS 1	All cation-exchange columns except Dionex IonPac SCS 1	All cation-exchange columns except Dionex IonPac SCS 1	NA	NA
Maximum current [mA]	Anion	150 mA	500 mA	NA	NA	NA	NA
	Cation	110 mA	300 mA	NA	NA	NA	NA

¹ EWM (External water mode): The Auto Suppression external water mode is used for any application requiring organic solvents in the eluent or sample, or for applications using borate as the eluent ion.

² Recycle mode: The Auto Suppression recycle mode uses the suppressed conductivity cell effluent as the source of water for the regenerant.

³ ERM (External chemical regeneration mode) uses a regenerant solution which can be applied by either the using a pressurized bottle or a peristaltic pump.

⁴ DCR (Displacement Chemical Regeneration) mode uses the effluent from the conductivity cell to drive the regenerant into the regenerant chamber of the suppressor using a closed bottle configuration.

⁵ For high concentrated solvent applications it's recommended to use the CRS500.

⁶ For eluents containing chloride, nitrate use the Dionex CCRS 500 suppressor.

⁷ Solvent compatibility was tested after exposure to the organic solvents, applying an aqueous eluent.

Suppressor ordering information

Suppressor	Chemistry	Size	Regeneration principle	Product No.
NGES-A-2 mm Next Generation Electrolytic Suppressor	Anion	2 mm	Electrolytic	060003
NGES-A-4 mm Next Generation Electrolytic Suppressor	Anion	4 mm	Electrolytic	060001
NGES-C-2 mm Next Generation Electrolytic Suppressor	Cation	2 mm	Electrolytic	060004
NGES-C-4 mm Next Generation Electrolytic Suppressor	Cation	4 mm	Electrolytic	060002
ACRS 500-2 mm Chemically Regenerated Suppressor	Anion	2 mm	Chemical	085091
ACRS 500-4 mm Chemically Regenerated Suppressor	Anion	4 mm	Chemical	085090
CCRS 500-2 mm Chemically Regenerated Suppressor	Cation	2 mm	Chemical	085093
CCRS 500-4 mm Chemically Regenerated Suppressor	Cation	4 mm	Chemical	085092
ACRS-ICE 500-4 mm Chemically Regenerated Suppressor	Ion exclusion	4 mm	Chemical	084714
ACRS-ICE 500-9 mm Chemically Regenerated Suppressor	Ion exclusion	9 mm	Chemical	084715

Suppressor accessories

Optional kits for Dionex NGES

	Product No.
Thermo Scientific™ Dionex™ Suppressor External Regenerant Installation Kit For Dionex NGES operation in the external water mode, chemical regeneration mode. Kit contains a 4 L bottle, one pressure regulator (0–30 psi/0–210 kPa), and appropriate tubing and fittings for installation of one Dionex NGES with pneumatic delivery of regenerant.	038018
Thermo Scientific™ Dionex™ SRS Gas-Assisted Regeneration Kit Required for the initial installation of the gas-assisted recycle mode or the gas-assisted external water mode. Contains one pressure regulator (0–30 psi/0–210 kPa), 1/4-28 mixing tee, one check valve, and all tubing and fittings required to install the NGES for operation in these modes.	056886
Thermo Scientific™ Dionex™ SRD-10 Suppressor Regenerant Detector The Dionex SRD-10 is a standalone device that monitors liquid flow to a suppressor's regenerant chambers and automatically disables the eluent pump if flow is disrupted.	074395

Suppressor accessories continued	
Dionex CRS 500 chemical regeneration kits for displacement	Product No.
2 L DCR Kit: Thermo Scientific™ Dionex™ MMS Installation Kit for Displacement Chemical Regeneration Includes one regenerant reservoir, cap, and all tubing and fittings to install the Dionex CRS 500 in the DCR mode.	056882
Thermo Scientific™ Dionex™ 2 L Eluent Bottle	044129
Thermo Scientific™ Dionex™ 4 L Eluent Bottle	063292
Thermo Scientific™ Dionex™ Anion Regenerant Concentrate (75 mL of 2.0 N H ₂ SO ₄)	057559
Thermo Scientific™ Dionex™ Anion Regenerant Concentrate, 4-pack (Four each of P/N 057559)	057555
Thermo Scientific™ Dionex™ Cation Regenerant Concentrate (100 mL of 2.06 M TBAOH)	057561
Thermo Scientific™ Dionex™ Cation Regenerant Concentrate, 4-pack (Four each of P/N 057561)	057556

Dionex CRS 500 chemical regenerant kits and regenerant concentrates	Product No.
Dionex Suppressor External Regenerant Installation Kit	038018
Thermo Scientific™ Dionex™ Cation Regenerant Concentrate (500 mL of 0.10 N TBAOH)	039602

Dionex CRS 500 suppressor spare parts	Product No.
Backpressure loop, 1 each, for 4 and 5 mm system	045877
Backpressure loop, 1 each, for 4 and 5 mm system	045878
Syringe 1.0 mL, disposable, for flushing the Dionex CRS 500 suppressor at startup.	016388
Syringe Adapter female Luer lock, 1/4-28 threads	024305

Dionex ACRS-ICE 500 suppressor regenerant kits and regenerant solutions	Product No.
External Regenerant Installation Kit Required for first time installation. Includes one 4 L pressurizable regenerant reservoir, one pressure regulator (0–30 psi/0–210 kPa), and all tubing and fittings required to install regenerant delivery to Dionex ACRS-ICE 500 Suppressor.	038018
Dionex ACRS-ICE 500 Cation Regenerant Solution 500 mL of 0.1 M tetrabutylammonium hydroxide (TBAOH)	039602

Suppressor accessories continued	
Dionex ACRS-ICE 500 suppressor spare parts	Product No.
Backpressure loop, 1 each for 4 mm system Required for first time installation. Includes one 4 L pressurizable regenerant reservoir, one pressure regulator (0–30 psi/0–210 kPa), and all tubing and fittings required to install regenerant delivery to Dionex ACRS-ICE 500 Suppressor.	045877
Syringe, 1.0 mL, disposable For flushing the Dionex ACRS-ICE 500 suppressor at startup	016388

Ordering

In the US, call (800) 346-6390 or contact the Thermo Fisher Scientific regional office nearest you. Outside the US, order through your local Thermo Fisher Scientific office or distributor.

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