Thermo Scientific

Dionex ACRS-ICE 500 Suppressor

Product Manual

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Thermo SCIENTIFIC

Product Manual

for

Dionex Anion Chemically Regenerated Suppressor for ICE 500

(Dionex ACRS-ICE 500 (9 mm), P/N 084715)
(Dionex ACRS-ICE 500 (4 mm), P/N 084714)

For Research Use Only. Not for Use in Diagnostic Procedures.

Revision History:

Revision 11, October, 2014, Rebranded for Thermo Scientific.

Revision 12, March, 2014, Updated backpressure caution statement on page 22 (quick start guide).

Safety and Special Notices

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:

 **SAFETY**	***Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.***
 **WARNING**	***Indicates a potentially hazardous situation which, if not avoided, could result in damage to equipment.***
 **CAUTION**	***Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. Also used to identify a situation or practice that may seriously damage the instrument, but will not cause injury.***
 **NOTE**	***Indicates information of general interest.***
IMPORTANT	***Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.***
Tip	***Highlights helpful information that can make a task easier.***

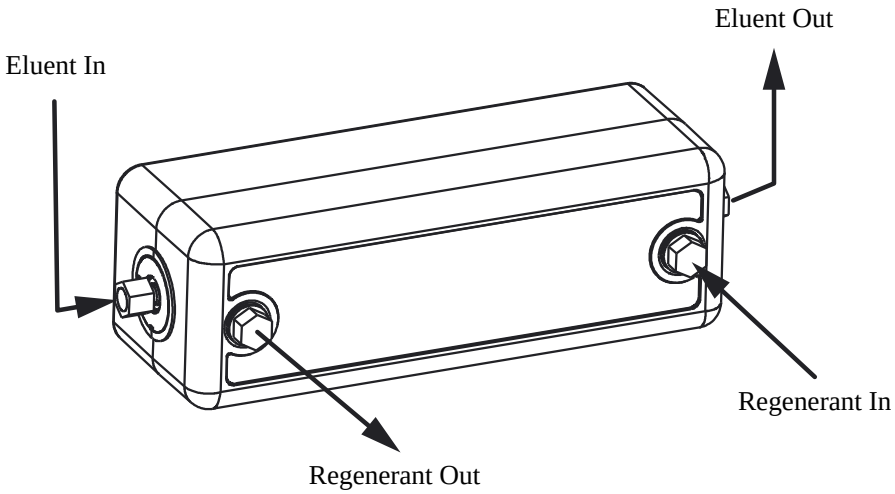
Contents

1. Introduction

The Thermo Scientific™ Dionex™ Anion Chemically Regenerated Suppressor for ICE (Dionex ACRS-ICE 500) replaces the Thermo Scientific Dionex AMMS-ICE 300 suppressor product line. The Dionex ACRS-ICE 500 is designed with exterior hardware changes that allow the suppressor to be more pressure tolerant than previous generation suppressor devices. The suppressor flow pathway has been redesigned to optimize band dispersion, and improve the flow and sealing properties. The Dionex ACRS-ICE 500 continues to use the same cleaned ion exchange components (screens and membranes) as the Dionex AMMS-ICE 300 suppressor device; however the Dionex ACRS-ICE 500 eluent channel uses an ion exchange resin bed as opposed to a gasketed screen.

The Dionex ACRS-ICE 500 is available in both 9 mm and 4 mm formats for use with 9 or 4 mm Thermo Scientific Dionex IonPac columns respectively.

Figure 1 Dionex Anion Chemically Regenerated Suppressor for ICE (Dionex ACRS-ICE 500)



The Dionex ACRS-ICE 500 permits continuous operation while adding a minimum of dead volume to the analytical system. As with any suppressor, the primary function of the Dionex ACRS-ICE 500 suppressor is the reduction of background conductivity combined with an increase in the analyte signal. Background conductivity is the sum of the specific conductances of the eluent anion and regenerant cation.

The ICE suppression mode is based on a mechanism which is a reversal of what is traditionally seen in the suppression of acidic eluents. In the ICE system the eluent is an acid, while the analytes are anionic. The Dionex ACRS-ICE 500 removes the hydronium ion present in the eluent and any other counterions of the analytes, from the eluent stream and replaces them with tetrabutylammonium ion (TBA^+). Since the hydronium ion is the main source of conductance, this greatly reduces the background conductivity of the system. In addition, this mechanism forces the ionization of the weak acid analytes, greatly increasing sensitivity.

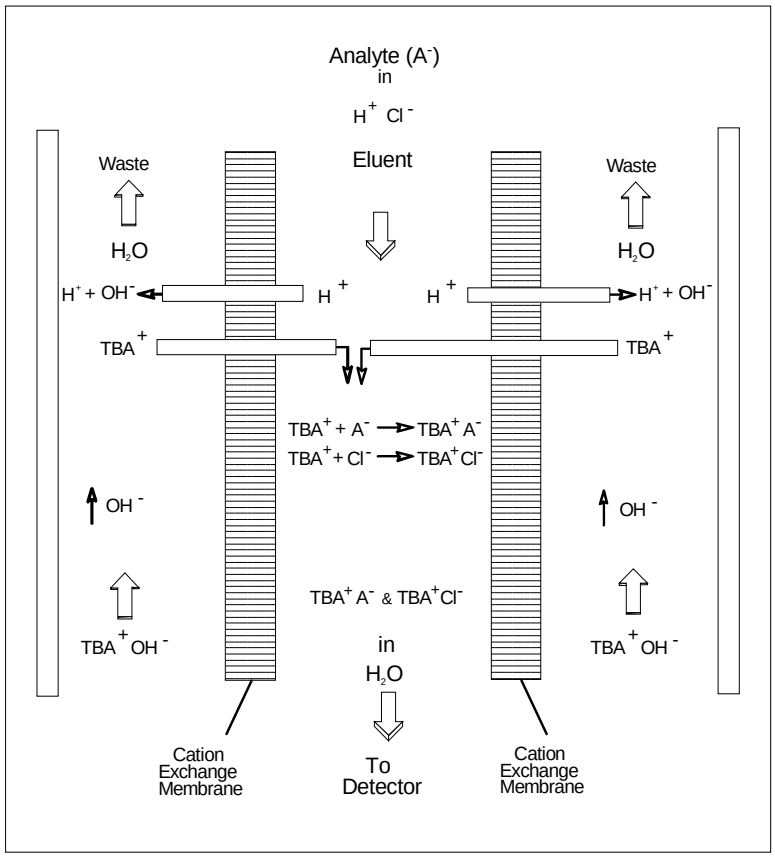
The Dionex ACRS-ICE 500 is also useful for applications in which weak acids, such as fatty acids, are separated by ion suppression. This mode uses a weak acid eluent that can easily be suppressed with the Dionex ACRS-ICE 500 suppressor.

Tetrabutylammonium hydroxide (TBAOH) is the recommended regenerant for use with the Dionex ACRS-ICE 500. Since TBA^+ cannot be produced electrolytically, a chemical regenerant is necessary to provide the TBA^+ for this process (see Figure 2, “Chemical Suppression with the Dionex ACRS-ICE 500”).

NOTE

For assistance, contact Technical Support for Dionex Products. In the U.S., call 1-800-346-6390. Outside the U.S., call the nearest Thermo Fisher Scientific office.

Figure 2 Chemical Suppression with the Dionex ACRS-ICE 500



Chemical Suppression with the Dionex ACRS-ICE 500 lowers the conductivity of the eluent by removing a highly conductive eluent cation (H^+) and replacing it with a less conductive cation (TBA^+). This process is carried out across the cation exchange membranes. Hydronium ions in the eluent cross the membranes and combine with the hydroxide ions in the regenerant to form water. At the same time, tetrabutylammonium ions cross the membranes into the eluent stream replacing the hydronium ions.

1.1 Shipment and Storage

1.1.1 Shipment

CAUTION

The Dionex ACRS-ICE 500 should not be subjected to temperatures above 50°C for extended periods of time during shipment, storage or operation, or for short durations above 80°C.

1.1.2 Storage

CAUTION

Ensure the suppressor is stored in a temperature controlled environment away from direct exposure to sunlight or other sources of heat. Do not store the suppressor in an environment where temperatures in excess of 50°C may be experienced, such as a parked car.

2. Installation

2.1 System Requirements

The Dionex Anion Chemically Regenerated Suppressor for ICE (Dionex ACRS-ICE 500) is designed to be run on any Thermo Scientific Dionex Ion Chromatograph (IC) equipped with a Dionex IonPac ICE column set and suppressed conductivity detection.

The Dionex ACRS-ICE 500 is installed in the column compartment of the chromatography module immediately after the analytical column and before the conductivity detector cell.

The Thermo Scientific Dionex Chemically Regenerated Suppressor Installation Kit (P/N 038018) contains all of the components needed to install and operate the suppressor with pressurized regenerant reservoirs. The kit includes the Thermo Scientific Dionex Chemically Regenerated Suppressor Installation Parts Kit (P/N 039055), a 25 psi pressure regulator (P/N 038201), and a four liter regenerant reservoir (P/N 039164).

During the course of installing and using the Dionex ACRS-ICE 500, it may be necessary to assemble new liquid line fittings. Assembly procedures for various liquid line fittings used with the Dionex ACRS-ICE 500 can be found in the document, “Thermo Scientific Dionex Liquid Line Fittings” (P/N 031432) found on the Dionex Reference Library CD-ROM.

2.2 Eluent Line Connections

A. Install the Dionex ACRS-ICE 500 in the first slot inside the Chromatography Module.

B. Use a short piece of PEEK 0.010" i.d. tubing with a PEEK 10-32 ferrule/bolt fitting on the end of the tubing that will connect to the ELUENT IN port of the Dionex ACRS-ICE 500 (see Figure 1). On the other end of this eluent tubing, place another PEEK 10-32 ferrule bolt fitting. Connect this end to the outlet end of the analytical column. Refer to “Thermo Scientific Dionex Liquid Line Fittings” for instructions on the assembly of these fittings. To avoid adding dead volume to the system, make the length of all eluent lines as short as practically possible.

C. Use a short piece of PEEK 0.010" i.d. tubing with a PEEK 10-32 ferrule/bolt fitting on the end of the tubing that will connect to the ELUENT OUT port of the Dionex ACRS-ICE 500 (see Figure 1). On the other end of this eluent tubing, place another PEEK 10-32 ferrule bolt fitting. Connect this end to the inlet end of the conductivity cell. Refer to “Dionex Liquid Line Fittings” for instructions on the assembly of these fittings. To avoid adding dead volume to the system, make the length of all eluent lines as short as practically possible.

D. Be sure to install the correct number of back pressure coils in the waste line depending on your application requirements (See Table 1, “Coils for Dionex ACRS-ICE 500 Back Pressure Requirements”).

2.3 Back Pressure Coils for the Dionex ACRS-ICE 500

All detector cells require enough back pressure to prevent eluent in the cell from degassing due to abrupt volume changes between the small inner diameter of the connecting tube and the relatively larger volume of the cell. Degassing creates bubbles in the cell and disrupts detector responsiveness. Back pressure coils help to prevent gases coming out of solution and forming bubbles in the detector cell.

Back pressure coil components are located in the detector ShipKit's Back Pressure Coils Kit, P/N 045825. For 9 mm systems, locate assembly P/N 045877. Alternatively, lengths and diameters of tubing necessary for proper back pressure are given in Table 1, "Coils for Dionex ACRS-ICE 500 Back Pressure Requirements."

2.3.1 Assembly

A. Slip PEEK liquid line bolts and ferrules onto the ends of the tubing. Refer to Table 1, "Coils for Dionex ACRS-ICE 500 Back Pressure Requirements," and determine the correct number of coils required for your application based on the eluent flow rate.

B. After assembly of the coils, place the completed coils and couplers between the conductivity cell and the waste container.

Table 1 Coils for Dionex ACRS-ICE 500 Back Pressure Requirements

Dionex ACRS-ICE 500 Type	Flow Rate	i.d. of Tubing	Length of Each Coil	Number of Coils
4 mm	0.25 – 0.75 mL/min	0.005" (Red)	12 in.	1
9 mm	0.75 – 1.5 mL/min	0.010" (Black)	30 in.	2
9 mm	1.5 – 3.0 mL/min	0.010" (Black)	30 in.	1

CAUTION

The correct amount of back pressure for optimum operation is 40–50 psi. Back pressure over 450 psi after the Dionex ACRS-ICE 500 can cause irreversible damage!

2.4 Regenerant Line Connections to and from the Regenerant Reservoir

NOTE

Refer to the pressurizable plastic reservoir manual (Document No. 032677) for complete installation instructions.

A. Install the Dionex ACRS-ICE 500 in the slot inside the chromatography module. Use a coupler (P/N 039056) to connect one end of the 30" tubing assembly (P/N 035727) that comes in the Installation Kit to the regenerant reservoir. Push a slip-on filter (P/N 038260) on the end of the line that goes inside the reservoir. Connect the other end of this tubing to the REGEN IN port of the Dionex ACRS-ICE 500 (see Figure 1).

B. Using a coupler (P/N 034056) and a 1/8" o.d. piece of tubing that comes in the Installation Kit, connect one end of this line to the REGEN OUT port of the Dionex ACRS-ICE 500 (see Figure 1). Direct the other end of the line to waste.

C. Install a restrictor to the regenerant flow by connecting a piece of 0.012" i.d. tubing to the end of the waste line that is approximately 12" long (see Figure 3).

D. Install the regulator (P/N 038201) on the helium or nitrogen supply line. The regenerant flow rate is regulated by two factors: the pressure applied to the regenerant reservoir and the length of the 0.012" i.d. tubing connected to the waste line.

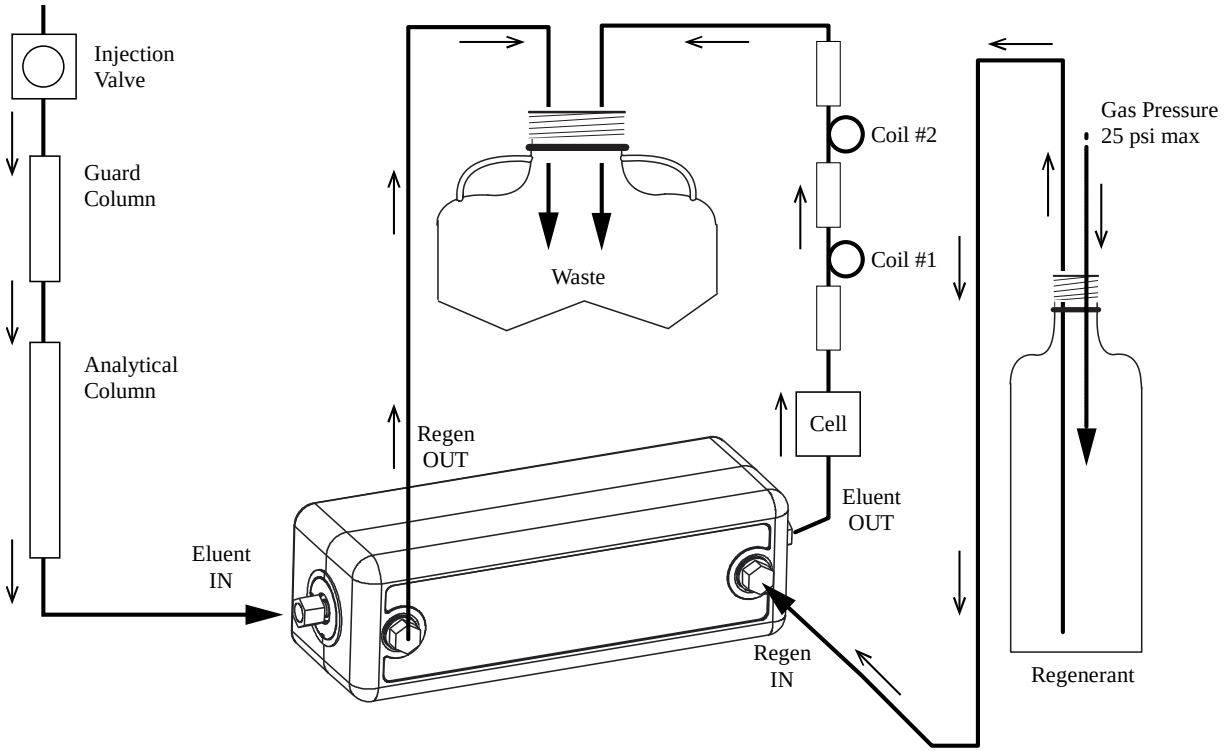
E. Prepare the regenerant. Fill the regenerant reservoir. Make sure that the O-ring is inside the cap of the reservoir before screwing the cap onto the reservoir. Screw the cap onto the reservoir tightly and place the reservoir near the chromatography module. Refer to Section 3.2.

F. Adjust the reservoir pressure (0–25 psi) to deliver a regenerant flow rate of 2–3 mL/min.

NOTE

A safety relief valve on the reservoir regulator prevents pressure greater than 25 psi from being applied to the regenerant reservoir.

Figure 3 Configuration of the Pressurized Regenerant Reservoir with the Dionex ACRS-ICE 500



3. Operation

This section provides instructions for the start up and operation of the Dionex Anion Chemically Regenerated Suppressor for ICE (Dionex ACRS-ICE 500).

3.1 Chemical Purity Requirements

Obtaining precise and accurate results requires eluents that are free of ionic impurities. Chemicals and deionized water used to prepare eluents must be of the purities described below. Low trace impurities and low particulate levels in eluents and regenerants also help protect your Dionex ACRS-ICE 500 and system components from contamination. Thermo Fisher Scientific cannot guarantee proper Dionex ACRS-ICE 500 performance when the quality of the chemicals and water used to prepare eluents has been compromised.

3.1.1 Inorganic Chemicals

Reagent Grade inorganic chemicals should always be used to prepare ionic eluents. Whenever possible, inorganic chemicals that meet or surpass the latest American Chemical Society standard for purity (universally accepted standard for reagents) should be used. These inorganic chemicals will detail the purity by having an actual lot analysis on each label.

3.1.2 Solvents

Since solvents used with the Dionex ACRS-ICE 500 are added to ionic eluents to modify the ion exchange process or improve sample solubility, the solvents used must be free of ionic impurities. However, since most manufacturers of solvents do not test for ionic impurities, it is important that the highest grade of solvents available be used. Currently, several manufacturers are making ultrahigh purity solvents that are compatible for HPLC and spectrophotometric applications. These ultrahigh purity solvents will usually ensure that your chromatography is not affected by ionic impurities in the solvent. At Thermo Fisher Scientific, we have obtained consistent results using High Purity Solvents manufactured by Burdick and Jackson and Optima® Solvents by Thermo Fisher Scientific.

3.1.3 Deionized Water

The deionized water used to prepare eluents should be degassed Type I Reagent Grade Water with a specific resistance of 18.2 megohm-cm. The deionized water should be free of ionized impurities, organics, microorganisms and particulate matter larger than 0.2 µm. It is good practice to filter eluents through a 0.2 µm filter whenever possible. Bottled HPLC-Grade Water should not be used since most bottled water contains an unacceptable level of ionic impurities. Finally, thoroughly degas all deionized water prior to preparing any eluents or regenerants.

3.1.4 Regenerant

For ease of regenerant preparation and guaranteed purity, use Thermo Scientific Dionex Cation Regenerant Solution, 0.1 N tetrabutylammonium hydroxide (TBAOH), P/N 039602. Tetrabutylammonium hydroxide (TBAOH) is the recommended regenerant for use with the Dionex ACRS-ICE 500.

3.2 Start Up

The Dionex ACRS-ICE 500 is installed in the chromatography module right after the analytical column and before the conductivity cell. On the ICS-1100, ICS-1600 and ICS-2100 instruments, the Dionex ACRS-ICE 500 mounts on the tabs on the component panel. Orient the Dionex ACRS-ICE 500 with the Eluent In port at the top. On the ICS-5000$^+$ instrument, the Dionex ACRS-ICE 500 mounts on the tabs on the conductivity detector inside the DC. Orient the Dionex ACRS-ICE 500 with the Eluent In port at the left. Align the slots on the back of the Dionex ACRS-ICE 500 with the tabs on the instrument. Press in, and then down or to the right, to lock the Dionex ACRS-ICE 500 in place. Lift up and pull out to remove the Dionex ACRS-ICE 500. Make sure the Dionex ACRS-ICE 500 is plumbed properly. Refer to Section 2, "Installation," for complete installation instructions.

CAUTION

The membranes and screens in the Dionex ACRS-ICE 500 must be completely hydrated to maintain liquid seals and chromatographic performance. To accomplish this, keep the regenerant chambers filled with regenerant solution. This will ensure that the membranes and screens remain properly hydrated.

CAUTION

The correct amount of back pressure for optimum operation is 40–50 psi. Be sure to install the correct number of back pressure coils depending on your flow rate. Back pressures over 450 psi after the Dionex ACRS-ICE 500 can cause irreversible damage!

A. Connect the eluent line from the ELUENT IN port of the Dionex ACRS-ICE 500 to the analytical column and the eluent line from the ELUENT OUT port of the Dionex ACRS-ICE 500 to the conductivity detector cell.

B. Connect the regenerant line from the REGEN IN port of the Dionex ACRS-ICE 500 to the regenerant reservoir and the waste line from the REGEN OUT port of the Dionex ACRS-ICE 500 to the waste container.

C. Turn on the column eluent flow. Adjust the reservoir pressure to establish the regenerant flow through the Dionex ACRS-ICE 500.

D. Pump approximately 5 mL of eluent through the ELUENT IN port and 5 mL of regenerant through the REGEN IN port of the Dionex ACRS-ICE 500 respectively.

E. Let the suppressor sit for at least 20 minutes to ensure that the membranes and screens are fully hydrated.

F. Restart operation. Allow the system to equilibrate before beginning analysis.

3.3 Determining Eluent and Regenerant Concentrations

A. Unlike packed bed suppressor columns, which entail periodic shutdowns for regeneration, the Dionex ACRS-ICE 500 has the ability to provide continuous suppression.

B. The operation of the Dionex ACRS-ICE 500 requires a constant flow of the regenerant over the membrane, in a direction that is countercurrent to the flow of the eluent. A standard regenerant flow rate of 2–3 mL/min is recommended. This flow rate is adequate for most applications. For applications that require stronger than typical eluent strengths, the regenerant flow rate may be increased up to a maximum of 5 mL/min.

C. The Dionex ACRS-ICE 500 is compatible with acetonitrile, methanol, ethanol, and isopropanol. The maximum solvent level is 90%. For more information about solvent compatibility, call the Thermo Scientific Dionex Technical Services Hotline.

NOTE

Do not use THF solvent in the eluent.

D. 5 mM tetrabutylammonium hydroxide (TBAOH) is the recommended regenerant for use with the Dionex ACRS-ICE 500. Tetramethylammonium hydroxide or potassium hydroxide may be used as alternate regenerants, but cause higher background conductivity and therefore compromise total system performance. For ease of preparation and guaranteed purity, use Dionex Cation Regenerant Solution (P/N 039602).

E. For the best signal to noise ratio and overall performance, Dionex recommends that the Cation Regenerant Solution (P/N 039602) be pressurized with nitrogen or helium. Do not use air.

NOTE

Use nitrogen or helium to pressurize the Regenerant Reservoir.

3.4 Dionex ACRS-ICE 500 Storage

The Dionex ACRS-ICE 500 is shipped with an acidic eluent and TBAOH regenerant as the storage solution. The suppressor's storage solution should be the eluent acid (Heptafluorobutyric acid or HCl) at the same concentration used in the application without solvent. If the suppressor will not be used for more than one week, prepare it for storage. The screens and membranes in the Dionex ACRS-ICE 500 must be completely hydrated to maintain liquid seal and chromatographic performance.

3.4.1 Routine Use Storage (1 to 5 days)

A. Plug all Dionex ACRS-ICE 500 fitting ports.

B. To resume operation, connect the suppressor to the system. Allow the system to equilibrate before starting analysis.

NOTE

If the eluent last used contained organic solvents, flush the Dionex ACRS-ICE 500 with deionized water for 10 minutes through eluent and regen chambers before plugging the fitting ports.

3.4.2 Short Term Storage (1 to 3 Weeks)

A. Pump 10 mL of 0.2–2 mM Heptafluorobutyric acid or HCl eluent (without solvent) at 1.0 mL/min through the eluent chamber.

B. Fill the regen chambers with TBAOH regenerant.

C. Plug all Dionex ACRS-ICE 500 fitting ports.

D. To resume operation, connect the suppressor to the system. Allow the system to equilibrate before starting analysis.

3.4.3 Long Term Storage (More than 3 Weeks)

A. Pump 10 mL of 0.2–2 mM Heptafluorobutyric acid or HCl eluent (without solvent) at 1.0 mL/min through the eluent chamber.

B. Fill the regen chambers with TBAOH regenerant.

C. Plug all Dionex ACRS-ICE 500 fitting ports.

D. On starting, perform the procedure outlined in Section 3.2, “Start Up.”

4. Troubleshooting Guide

The purpose of the Troubleshooting Guide is to help you solve operating problems that may arise while using the Dionex Anion Chemically Regenerated Suppressor for ICE (Dionex ACRS-ICE 500). For more information on problems that originate with the Ion Chromatograph or the specific anion exchange column set in use, refer to the Troubleshooting Guide in the appropriate Installation Manual. If you cannot solve the problem on your own, contact the nearest Thermo Scientific Dionex Regional Office (see, "Thermo Scientific Dionex Worldwide Offices").

4.1 High Background Conductivity

A. Check that the regenerant is flowing from the waste line at the proper flow rate.

1. If there is no flow from the waste line, disconnect the 0.012" i.d. tubing connected to the waste line.

   If the regenerant lines and the suppressor are filled with regenerant and there are no restrictions in the regenerant line, the regenerant should flow freely from the 1/8" o.d. waste line.

   If there is no flow, make sure the reservoir cap is tight and that there are no audible air leaks. Also make sure that the regenerant reservoir is pressurized. If it is pressurized, trace the regenerant lines backward from the reservoir to find and remove any blockage.

2. If there is flow from the waste line, but it is less than the desired flow rate, increase the flow rate by shortening the 0.012" i.d. waste line tubing or by increasing the reservoir pressure. If the flow rate is correct, go on to the next step.

3. If the regenerant is flowing at the desired rate, either the selected regenerant flow rate is too slow or the regenerant is too dilute to suppress the eluent concentration at the set eluent flow rate. Increase the regenerant flow rate or increase the regenerant concentration. Most applications require 10 mM TBAOH regenerant or less.

B. Check for eluent flow out of the suppressor ELUENT OUT port.

1. If there is no flow out of the Dionex ACRS-ICE 500 ELUENT OUT port, make sure that eluent is entering the suppressor at the ELUENT IN port. If there is no flow at this point, trace the eluent flow path backward through the system to find and remove the blockage.

2. If there is flow into the Dionex ACRS-ICE 500, but not out, and there are no visible leaks from the side seam of the suppressor, a break in the membrane is probably allowing eluent to leak into the regenerant. If this is the case, then the Dionex ACRS-ICE 500 must be replaced.

WARNING

Do not disassemble the Dionex ACRS-ICE 500**.**

3. If there is flow from the ELUENT OUT port but no eluent suppression, the membrane may have been contaminated. Try to restore system performance by cleaning the membrane (see Section 5, “Cleanup”).

C. Remake the regenerant to be sure that the concentration is correct and that the solution has been freshly prepared. Be sure that chemicals of the required purity were used to make the regenerant (see Section 3.1). If the regenerant concentration is too high or too old, it can cause high background conductivity. Dionex recommends the use of Dionex Cation Regenerant Concentrate (P/N 039602) for the best performance.

D. Remake the eluent to be sure that the concentration is correct. Be sure that chemicals of the required purity were used to make the eluent (see Section 3.1). If the eluent concentration is too high, the Dionex ACRS-ICE 500 will not be able to suppress it, resulting in high background conductivity.

E. If the background conductivity remains high, and you cannot solve the problem on your own, contact the Dionex Regional Office nearest you (see, “Dionex Worldwide Offices”).

4.2 Drifting Baseline

A. Increase the regenerant flow rate by decreasing the length of the 0.012" i.d. restrictor line on the regenerant waste line or by increasing the pressure on the reservoir.

B. Remake the regenerant to be sure that the concentration is correct and that the solution has been freshly prepared. Be sure that chemicals of the required purity were used to make the regenerant (see Section 3.1). If the regenerant has absorbed carbon dioxide from the air, it can cause a drifting baseline.

4.3 Decreased Sensitivity

A. Check for leaks throughout the system. If a fitting is leaking, tighten it carefully until the leak stops.

B. Ensure that the injection valve is operating correctly. Refer to the valve manuals that accompany the chromatography module for troubleshooting assistance. Be sure to check the slider port faces for damage.

C. Check the regenerant flow rate. If the flow rate has decreased from the selected setting, reset it to the initial conditions.

D. If sensitivity remains low, clean the suppressor (see Section 5).

E. If cleaning the membrane does not restore sensitivity, the Dionex ACRS-ICE 500 may need to be replaced.

F. If you cannot solve the problem on your own, contact the Thermo Scientific Dionex Regional Office nearest you (see, “Thermo Scientific Dionex Worldwide Offices”).

4.4 System Back Pressure Increases Over Time

A. If the increased back pressure does not affect system performance, no maintenance is necessary.

B. The most common cause of increasing system back pressure is a contaminated frit in the analytical or guard column inlet end fitting. Before doing anything else, check the inlet frits on these columns and replace them if necessary. The complete instructions for replacing column bed support assemblies are in Document No. 032285. Recheck the system back pressure. If it remains high, go on to the next step.

C. Bypass the Dionex ACRS-ICE 500 by coupling the ELUENT IN and ELUENT OUT eluent lines. If the back pressure decreases by less than 150 psi with the Dionex ACRS-ICE 500 out of line, a blockage at another point in the system is causing the high pressure. Find and eliminate the blockage.

D. If the back pressure decreases by more than 150 psi with the Dionex ACRS-ICE 500 out of line, the high pressure is caused by a blockage in the Dionex ACRS-ICE 500. Reverse the direction of flow of both the eluent and the regenerant through the Dionex ACRS-ICE 500. Do not connect the line between the cell and the Dionex ACRS-ICE 500. If this inverted operation decreases the back pressure, reconnect the Dionex ACRS-ICE 500 to the cell and use it in this position.

E. If reversing the flow through the Dionex ACRS-ICE 500 does not decrease the pressure, clean the membrane (see Section 5).

F. If cleaning the membrane does not reduce the pressure, the Dionex ACRS-ICE 500 must be replaced.

G. If you cannot solve the problem on your own, contact the Thermo Scientific Dionex Regional Office nearest you (see, “Thermo Scientific Dionex Worldwide Offices”).

4.5 Liquid Leaks

A. If there is leakage around the ports of the Dionex ACRS-ICE 500, carefully tighten the fittings in the ELUENT and REGEN IN and OUT ports (see Figure 1). If tightening the fittings does not stop the leak, replace the ferrule and bolt.

B. If there is leakage from the cover of the Dionex ACRS-ICE 500, check the system back pressure.

1. If the back pressure is less than 100 psi with only the Dionex ACRS-ICE 500 in-line, the Dionex ACRS-ICE 500 is defective and must be replaced. Do not disassemble the Dionex ACRS-ICE 500 and attempt to repair it yourself.
2. If the back pressure is greater than 100 psi, the leaks are caused by excessive back pressure downstream from the Dionex ACRS-ICE 500. Find and eliminate the source of the pressure.

5. Cleanup

This section describes routine cleanup procedures for the Dionex Anion Chemically Regenerated Suppressor for ICE (Dionex ACRS-ICE 500), in the case of contamination. Consult the Troubleshooting Guide (see Section 4) to first determine that the system is operating properly. If the Dionex ACRS-ICE 500 is determined to be the source of higher than normal back pressure, higher than anticipated conductivity, decreased suppression capacity or decreased sensitivity, cleaning the membrane may restore the performance of the system. Use the following procedures to clean the membrane.

5.1 Organic Contaminants or Precipitates

A. Disconnect the analytical (and guard) column(s) from the injection valve and the Dionex ACRS-ICE 500. Refer to the specific analytical column Product Manual for column cleanup procedures.

B. Turn off the regenerant and disconnect the regenerant line from the Dionex ACRS-ICE 500 REGEN IN port.

C. Disconnect the liquid line from the Dionex ACRS-ICE 500 ELUENT OUT port to the cell at the cell and reconnect it to the REGEN IN port.

D. Connect a container of 90% acetonitrile or methanol in 100 mM HCl to the Analytical Pump. Pump this solution through the Dionex ACRS-ICE 500 at 1 – 2 mL/min (9 mm) or 0.25 – 0.50 mL/min (4 mm) for 30 minutes.

E. Flush the Dionex ACRS-ICE 500 with deionized water at 1 – 2 mL/min (9 mm) or 0.25 – 0.50 mL/min (4 mm) for 10 minutes.

F. Reinstall the analytical (and guard) column(s). Begin pumping eluent through the system at the flow rate required for your analysis and equilibrate the system.

Read This First!

6. Appendix – Quick Start Guide

6.1 Important Information

A. The Dionex ACRS-ICE 500 is installed in the column compartment of the chromatography module right after the analytical column and before the conductivity detector cell. Refer to Section 2 of the manual for complete installation instructions.
B. The operation of the Dionex ACRS-ICE 500 requires a constant flow of the regenerant over the membrane, in a direction that is countercurrent to the flow of the eluent. A standard regenerant flow rate of 2–3 mL/min is recommended for most applications.
C. The recommended regenerant for use with the Anion-ICE MicroMembrane Suppressor (Dionex ACRS-ICE 500) is 5 mM tetrabutylammonium hydroxide (TBAOH).

6.2 Safety

CAUTION

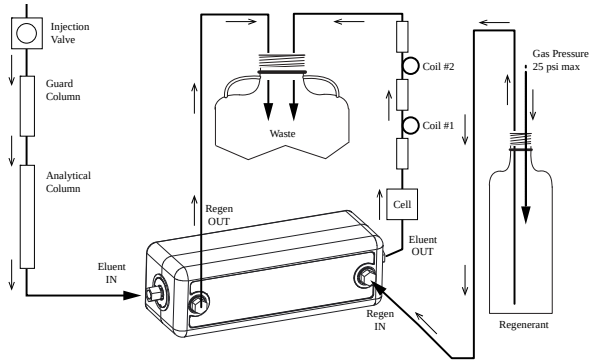
The membranes and screens in the Dionex ACRS-ICE 500 must be completely hydrated to maintain liquid seals and chromatographic performance. To accomplish this, keep the regenerant chambers filled with regenerant solution. This will ensure that the membranes and screens remain properly hydrated.

CAUTION

Back pressures over 450 psi after the Dionex ACRS-ICE 500 can cause irreversible damage! For optimum operation, the correct amount of back pressure on the suppressor and cell is 40–50 psi. Be sure to install the correct number of back pressure coils after the cell, depending on your flow rate.

6.3 Configuration

A. Connect the eluent line from the ELUENT IN port of the Dionex ACRS-ICE 500 to the analytical column.
B. Connect the eluent line from the ELUENT OUT port of the Dionex ACRS-ICE 500 to the conductivity detector cell.
C. Connect the regenerant line from the REGEN IN port of the Dionex ACRS-ICE 500 to the regenerant reservoir.
D. Connect the waste line from the REGEN OUT port of the Dionex ACRS-ICE 500 to the waste container.



6.4 Getting Started

A. Turn on the column eluent flow.
B. Adjust the reservoir pressure to establish the regenerant flow through the Dionex ACRS-ICE 500.
C. Pump approximately 5 mL of eluent through the ELUENT IN port and 5 mL of regenerant through the REGEN IN port of the Dionex ACRS-ICE 500 respectively.
D. Let the suppressor sit for at least 20 minutes to ensure that the membranes and screens are fully hydrated.
E. Allow the system to equilibrate before beginning analysis.