Continuously Regenerated Trap Column

(CR-CTC III, CR-TC, CR-TC 500, CR-TC 600, CR-TC Capillary)

079684 Revision 06 • December 2021

thermo scientific

For Research Use Only. Not for use in diagnostic procedures.

Product Manual

for

Continuously Regenerated Trap Column (CR-TC III, CR-TC 500, CR-TC 600, CR-TC Capillary)

CR-ATC, P/N 060477
CR-CTC III, P/N 104-60001
CR-ATC 500, P/N 075550
CR-CTC 500, P/N 075551
CR-ATC 600, P/N 088662
CR-CTC 600, P/N 088663
CR-ATC (Capillary), P/N 072078
CR-CTC (Capillary), P/N 072079

Revision History:

Revision 01, November 2012, Original Publication.

Revision 02, April 2019, Added references to CR-TC 600 product.

Revision 03, November 2019, Removed all references to the EG40 and the EG40 ship kits.

Revision 04, July 2020, Revised the steps listed in Section 3.1.

Revision 05, December 2021, Added reference to CR-CTC III.

Revision 06, February 2022, corrected the CR-CTC III P/N

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

Thermo Scientific™ Dionex™ Continuously Regenerated Trap Column (CR-TC) is a high-pressure electrolytically regenerated trap column designed for use with Eluent Generator Devices. The CR-TC can operate long-term without the need for frequent chemical regeneration. The device, when plumbed after the Eluent Generator, removes anionic or cationic contaminants in the eluent or water continuously and provides low drift during gradient operations. The CR-TC is available in formats for anion or cation applications using analytical or capillary scales, as shown below.

CR-ATC Continuously Regenerated Anion Trap Column, P/N 060477
CR-CTC III Continuously Regenerated Cation Trap Column, P/N 104-60001
CR-ATC 500 Continuously Regenerated Anion Trap Column 500, P/N 075550
CR-CTC 500 Continuously Regenerated Cation Trap Column 500, P/N 075551
CR-ATC 600 Continuously Regenerated Anion Trap Column 500, P/N 088662
CR-CTC 600 Continuously Regenerated Cation Trap Column 500, P/N 088663
CR-ATC (Capillary) Continuously Regenerated Anion Trap Column (Capillary), P/N 072078
CR-CTC (Capillary) Continuously Regenerated Cation Trap Column, (Capillary) P/N 072079

The Thermo Scientific Dionex CR-TC 600 and CR-CTC III can be used at pressures up to 5,000 psi and is only compatible with high pressure IC systems equipped with Consumables Monitoring such as the Thermo Scientific Dionex ICS-6000 and the Thermo Scientific Dionex Integrion.

The Thermo Scientific Dionex CR-TC 500 can also be used at pressures up to 5,000 psi and is compatible with high pressure IC systems **not** equipped with Consumables Monitoring such as the Thermo Scientific Dionex ICS-5000$^+$ or Thermo Scientific Dionex ICS-2100.

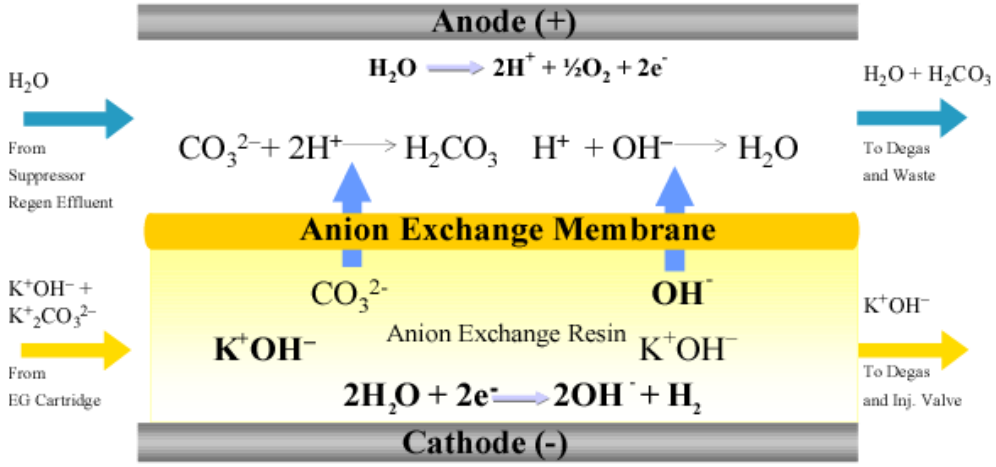
The Thermo Scientific Dionex CR-TC is to be used at pressures up to 3,000 psi and is compatible with legacy IC systems.

A single format CR-TC, CR-TC 500 or CR-TC 600 is used for analytical (1 – 5 mm i.d.) columns. The CR-TC (Capillary) is recommended for capillary (0.25 – 0.5 mm i.d.) columns.

1.1 Function of CR-ATC, CR-ATC 500, CR-ATC 600 and CR-ATC (Capillary) Trap Column

The CR-ATC, CR-ATC 500, CR-ATC 600 and CR-ATC (Capillary) consist of an anion exchange bed with a cathode at the eluent outlet as illustrated in Figure 1. An anion exchange membrane interface separates the anode from the eluent pathway. Anionic impurities from the hydroxide eluent are retained by the anion exchange bed and are driven through the anion exchange membrane towards the anode. The hydroxide generated at the cathode continuously regenerates the anion exchange bed while the hydronium ions generated at the anode combine with the removed anionic impurities to form acids. The hydroxide eluent solution coming out of the CR-ATC device is thus free of anionic impurities.

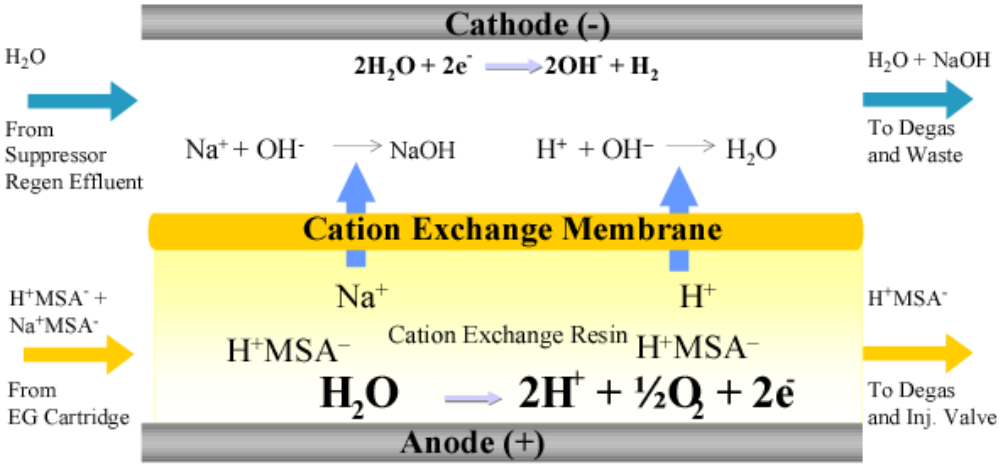
Figure 1 Operational Schematic for Continuously Regenerated Anion Trap Column



1.2 Function of CR-CTC III, CR-CTC 600, CR-CTC 500 and CR-CTC (Capillary) Trap Column

The CR-CTC III, CR-CTC 500, CR-CTC 600 and CR-CTC (Capillary) consist of a cation exchange bed with an anode at the eluent outlet as illustrated in Figure 2. A cation exchange membrane interface separates the cathode from the eluent pathway. Cationic impurities from the acidic eluent are retained by the cation exchange bed and are driven through the cation exchange membrane towards the cathode. The hydronium ions generated at the anode continuously regenerate the cation exchange bed while the hydroxide ions generated at the cathode combine with the removed cationic impurities to form bases. The acid eluent solution coming out of the CR-CTC device is thus free of cationic impurities.

Figure 2 Operational Schematic for Continuously Regenerated Cation Trap Column



WARNING

Do not use the P/N 072079 (CR-CTC, Capillary) for sample preparation applications.

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.

2. Equipment Requirements and Settings

2.1 Power Connections

A dedicated power controller is used to power the CR-TC unit. All Thermo Fisher Dionex EG modules are shipped with built-in CRTC control. The current to the CR-TC is provided when the CR-TC power is turned on. No TTL or relay control is needed. For operational instructions, refer to the EG module Operator's Manual.

2.2 System Compatibility

2.2.1 Analytical (1 – 5 mm i.d. column) systems

The CR-TC 600 and CR-CTC III are compatible with the high-pressure ion chromatography systems equipped with the Consumables Monitoring capability such as the Thermo Scientific™ Dionex™ Integrion™ HPIC™ System & the ICS-6000 Systems only.

The CR-TC 500 is compatible with High-Pressure Ion Chromatography (HPIC) systems capable of delivering up to 5,000 psi, but **not** equipped with the Consumables Monitoring capability such as the Thermo Scientific Dionex ICS-5000^{+} or Thermo Scientific Dionex ICS-2100.

The CR-TC is compatible with legacy ion chromatography systems capable of delivering up to 3,000 psi.

WARNING

Do not use the CR-ATC (P/N 060477) in High Pressure Ion Chromatography (HPIC) systems such as the ICS-5000^{+}, only the CR-CTC III (P/N 104-60001), CR-ATC 500/600 and CR-CTC 500/600 are designed for high backpressure (> 3,000 psi) operation.

2.2.2 Capillary (0.25 – 0.5 mm i.d. column) systems

The CR-TC (Capillary) is compatible with all capillary RFIC-EG systems.

WARNING

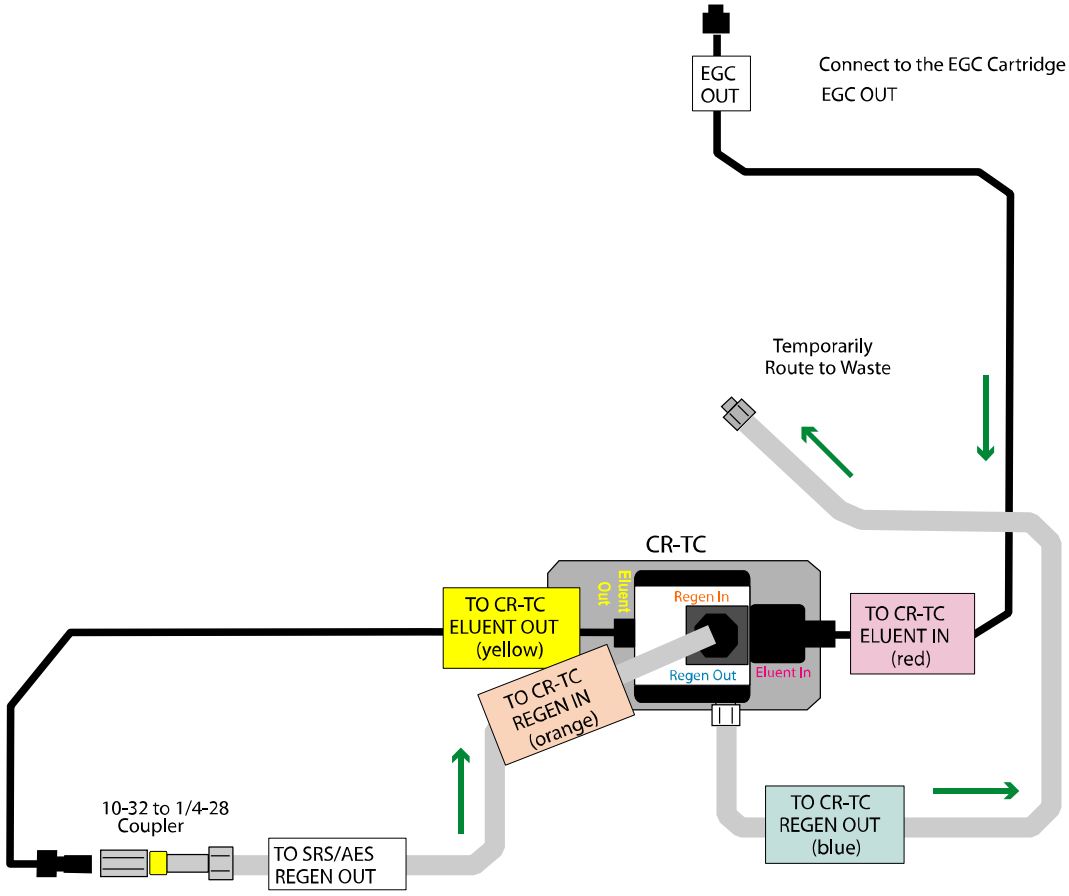
Do not use the CR-ATC 600, CR-ATC 500, CR-ATC, CR-CTC III, CR-CTC 600, or CR-CTC 500, in Capillary IC systems.
Do not use the CR-ATC (Capillary) or CR-CTC (Capillary) in Analytical IC systems.

3. Installation

The CR-TC should be hydrated prior to operation, at first installation, or after long-term storage. This process ensures that the ion exchange materials inside the CR-TC are fully hydrated and ready for operation.

3.1 Hydrating the CR-TC Trap Column

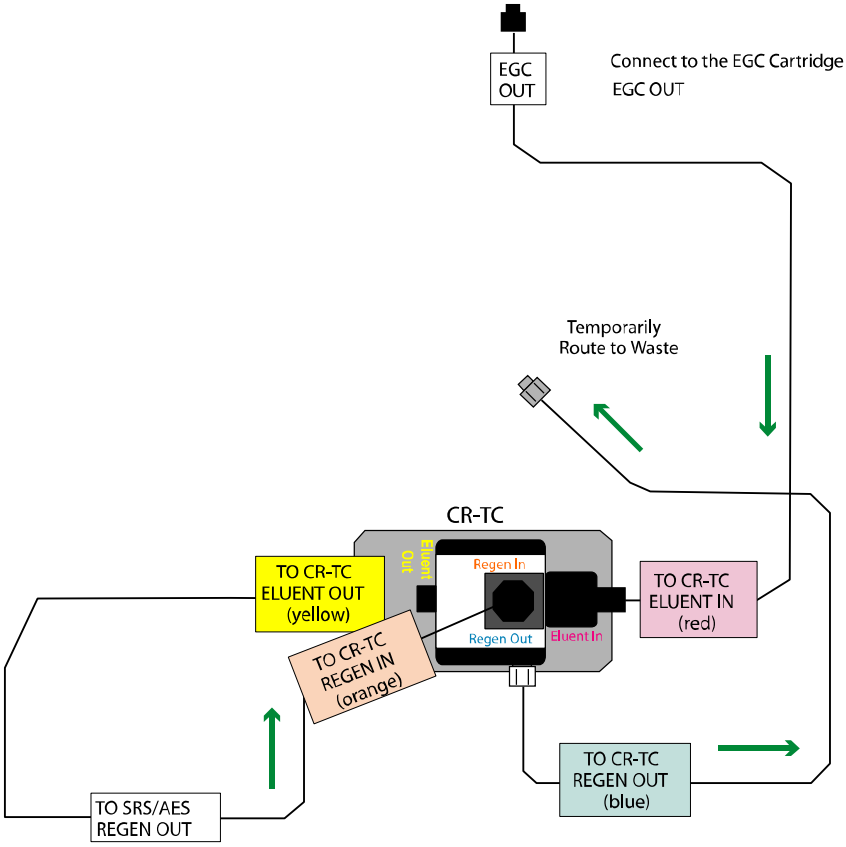
Figure 3 Plumbing Diagram for Hydration of CR-TC 500 or CR-TC 600 Trap Column



NOTE

Please note that the CR-TC is a consumable and should be replaced every year.

Figure 4 Plumbing Diagram for Hydration of CR-TC (Capillary) Trap Column



A. Remove the plugs on the Dionex CR-TC ports. **Note**: **Do not loosen or remove the fittings with the electrical connections (fittings with wires attached).**

B. Turn off the pump, Dionex EGC, and the suppressor.

C. If present, disconnect the old CR-TC installed between the Eluent Generator and the Degas Assembly

D. Identify the tubing with the red label on one end and a white label on the other end (supplied with the EG module).

E. Connect the end with the white label to the Eluent Out port of the Dionex EGC. For conditioning of the EGC cartridge, please refer to the corresponding EGC manual.

F. Connect the end with the red label to the Eluent In port of the Dionex CR-TC.

G. Connect the tubing with the orange label to the Regen In port of the Dionex CR-TC.

H. Connect the tubing with the blue label to the blue Regen Out port of the Dionex CR-TC.

I. Connect the tubing with the yellow label to the yellow Eluent Out port of the Dionex CR-TC

J. Temporarily disconnect the **ELUENT OUT** line of the Degas Assembly at the end labeled **TO INJ VALVE IN-P** and connect this end to a 10-32 coupler.

K. For all other modules except capillary systems, follow the hydration steps in step M.

L. For capillary systems, connect the end of the tubing labeled **TO DEGAS REGEN OUT** to the 10-32 coupler.

M. Hydrating a Dionex CR-TC, CR-TC 500, or CR-TC 600:

a. Connect a PEEK backpressure restrictor tubing (Item # 053765) with 2,000 psi backpressure at 1.0 mL/min to the 10-32 coupler.
b. Connect the outlet of the PEEK backpressure restrictor tubing (Item # 053765) to the REGEN IN port of the CR-TC
c. Connect the REGEN OUT port of the CR-TC to a waste container.
d. Connect the electrical cable of the CR-TC to the CR-TC power supply of the EG module
e. Set the pump flow to 0.5 mL/min.
f. Turn on the pump to hydrate the CR-TC for 5 minutes.
g. Turn the pump off.
h. Set the pump flow rate to 1.0 mL/min.
i. Turn the pump on
j. Set the EG concentration to 50 mM KOH (for CR-ATC) or 50 mM MSA (for CR-CTC)
k. Turn on the CR-TC.
l. Condition the CR-TC for 30 minutes using the 50 mM eluent.
m. Turn off the powers to EGC and CR-TC.
n. Pump the eluent at the application flow rate and concentration through both EGC and CR-TC for 5 minutes.
o. After 5 mins, turn the pump off, disconnect the backpressure restrictor line from the eluent out of the CR-TC and connect the CR-TC eluent out port to degasser inlet line to resume the operation.

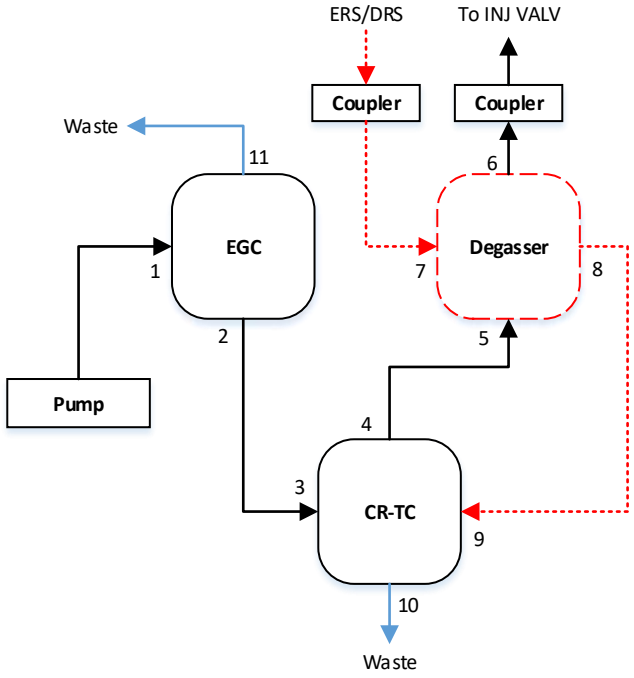
N. Hydrating a Dionex CR-TC (Capillary):
   a. Set the pump flow rate to 0.1 mL/min and flush the Dionex CR-TC for 3 minutes.
   b. Change the pump flow rate to 0.03 mL/min.
   c. Set the EGC concentration to 50 mM and turn on the Dionex EGC and Dionex CR-TC power for 30 minutes.
   d. Turn off the Dionex EGC and Dionex CR-TC power.

O. After the above hydration step, disconnect the coupler and complete the CR-TC installation by following the diagrams in Section 3.2.

3.2 System Flow Diagram of Eluent Generator with CR-TC

3.2.1 System flow diagram of eluent generator with CR-TC 600 or CR-TC 500 or CR-TC

Figure 5 System Flow Diagram of Eluent Generator with CR-TC 600 or CR-TC 500 or CR-TC



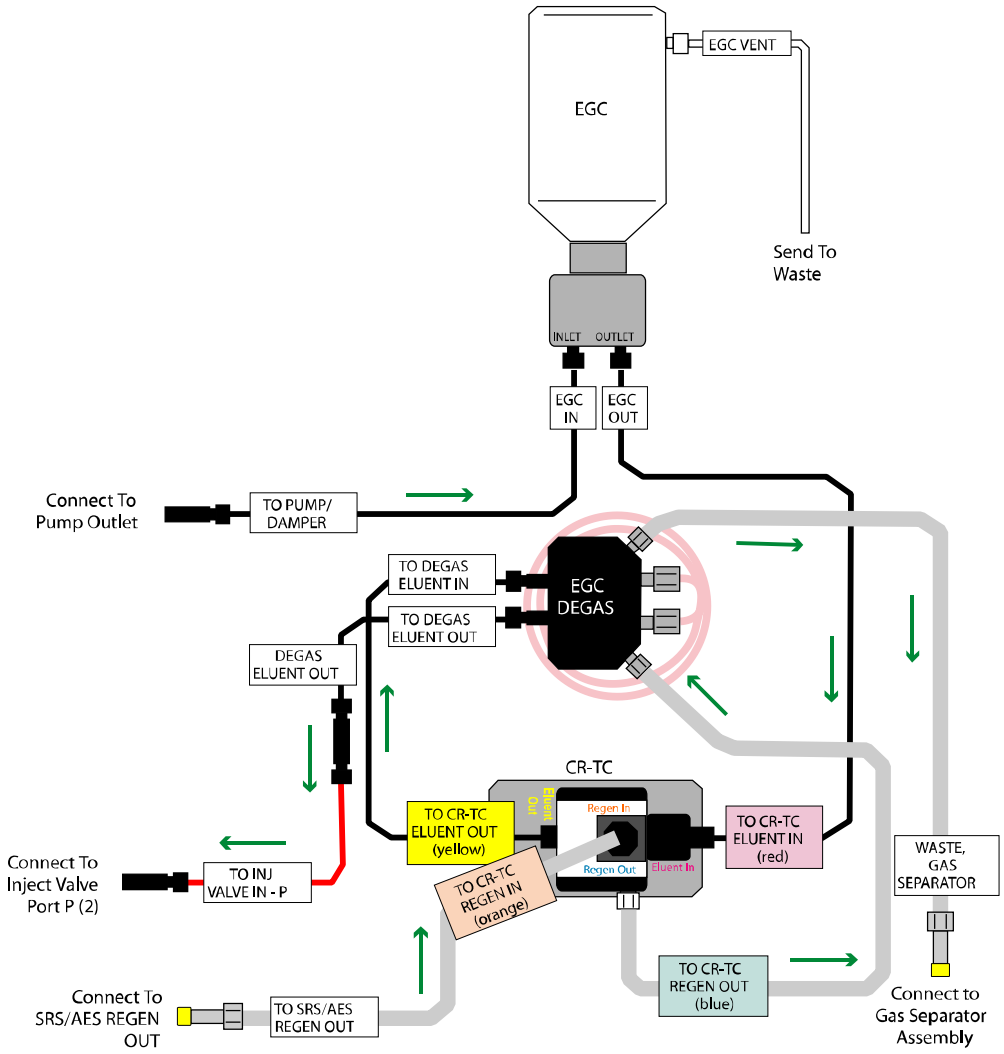
KEY

1. EGC Eluent Inlet
2. EGC Eluent Outlet
3. CR-TC Eluent In
4. CR-TC Eluent Out
5. Degasser Eluent In
6. Degasser Eluent Out
7. Degasser Regen In
8. Degasser Regen Out
9. CR-TC Regen In
10. CR-TC Regen Out
11. EGC Vent

NOTE: For CR-TC, bypass the Degasser and connect to the CR-TC Regen-IN directly from ERS/DRS.

3.2.2 System flow diagram of RFC-30 with CR-TC

Figure 6 Flow Diagram of RFC-30 with CR-TC



NOTE

It is recommended that the CR-TC be installed after the EGC cartridge.

3.3 The CR-TC Trap Column

The CR-TC is installed between the EGC cartridge and the Degas Module as shown in Figures 5 through 7. Ensure that the Eluent Generator is properly installed on the system. If the Eluent Generator is not installed, follow the Eluent Generator installation instructions listed in the EG Module's Product Manual.

The CR-TC has color-coded labels to direct you in the installation of the CR-TC in the Eluent Generator modules. Match the colored tubing labels with the colored port labels on the CR-TC. All fittings should be finger tight plus 1/4 turn.

NOTE

The Dionex CR-TC should be hydrated after first installation before operation, or after long-term storage. The process ensures the Dionex CR-TC resin and membranes are fully hydrated and ready for operation.

The Dionex CR-ATC 600 and Dionex CR-ATC 500 are not compatible with a Dionex EGC 500 K_2CO_3 or Dual EGC applications.

A. Turn off the pump, Dionex EGC, and the suppressor.

B. Verify that the tubing with the Red label **(TO CR-TC ELUENT IN)** is connected to the **Eluent In** port of the CRTC. Verify that the other end of this tubing with the White label **(EGC OUT)** is connected to the **OUTLET** port of the EGC Cartridge.

C. Verify that the tubing with the Yellow label **(TO CR-TC ELUENT OUT**) is connected to the CR-TC **Eluent Out** port.

D. Verify that the tubing with the Orange label **(TO CR-TC REGEN-IN)** is connected to the CR-TC **Regen In** port. Connect the other end of this tubing with the White label **(TO SRS/AES, REGEN OUT)** to the SRS or AES **REGEN OUT** port.

E. Verify that the tubing with the Blue label **(TO CR-TC REGEN-OUT)** is connected to the CR-TC **Regen Out** port.

F. Verify that the line **TO WASTE** is connected to a Gas Separator Waste Tube and then is diverted to waste.

G. A restrictor tubing may be inserted before the injection valve to adjust the total system pressure.

4. Operation

4.1 Operational Precautions

The recommended maximum operating pressure for the CR-TC 600, CR-TC 500, & CR-CTC III is 5,000 psi (34.5 MPa). The recommended maximum operating pressure for CR-TC is 3,000 psi. This pressure limit protects the degas tubing assembly in the Eluent Generator from mechanical failure. For the CR-TC (Capillary) the maximum operating pressure is 5000 psi (34.5 MPa).

NOTE

Do not operate the CR-ATC 600, CR-ATC 500, CR-ATC in conjunction with the EGC KOH cartridge with solvents other than methanol (maximum 25% methanol) for anion separations.

Solvents should not be used with the EGC MSA cartridge, CR-CTC III, CR-CTC 600, CR-CTC 500 Trap Column or CR-CTC (Capillary) Trap Column.

To prevent the buildup of hydrogen and oxygen gases, install the CR-TC/Eluent Generator module in a well-ventilated site.

4.2 Background and Drifts

A system functioning correctly with equilibrated consumables (pump/Eluent Generator/CR-TC/column/suppressor), the expected background for most Eluent Generator applications (up to 50 mM KOH) is < 2 µS/cm. For higher eluent strengths, the background may be slightly higher. Note the background may be higher at start-up with new consumables (EGC cartridge, suppressor, columns).

The expected baseline drift values using the EGC KOH cartridge and CR-ATC are shown below:

AS11 standard gradient (0.5 - 38.3 mM KOH)	< 100 nS/cm per run
AS15 standard gradient (1- 50 mM KOH)	< 200 nS/cm per run

The expected baseline drift values using the EGC MSA cartridge and CR-CTC are shown below:

CS12A standard gradient (11 - 57 mM MSA)	< 100 nS/cm per run
CS17 standard gradient (1 - 50 mM MSA)	< 50 nS/cm per run

4.3 Carbohydrate Applications

The Eluent Generator with CR-ATC 600, CR-ATC 500 & CR-ATC installed may be used for carbohydrate applications. See the EG Module manual for installation requirements for carbohydrate applications.

5. Troubleshooting

5.1 Unstable System Pressure

Unstable system pressure can cause high baseline drift and noise.

A. Ensure that the pump is properly primed.

B. Disconnect the tubing's to ensure that there are no trapped bubbles and reconnect the tubing's.

C. Check the system pressure. If the total system pressure is < 2000 psi, add sufficient backpressure, preferably using 0.003" ID tubing between the degas assembly and the injection valve and ensure that the total system pressure is between 2000 – 5000 psi for high pressure system or 2,000 – 3,000 psi for older non high-pressure ion chromatography (HPIC) systems.

5.2 High Noise

A. Ensure that the system pressure is stable. If the system pressure is unstable refer to previous Section 5.1.

B. For analytical systems, if the total system pressure is < 2000 psi, add sufficient backpressure, preferably using 0.003" ID tubing between the degas assembly and the injection valve and ensure that the total system pressure is between 2000 – 5000 psi (2,000 – 3,000 psi in conjunction with older non high-pressure ion chromatography (HPIC) systems such as the ICS-2100, ICS-5000 and earlier).

5.3 High Background and Drift

A. Check if the CR-TC unit is powered.

B. If the CR-TC was operated without any power and with eluent flowing, the capacity of the device is depleted. Under these conditions follow the cleanup procedure outlined in Section 6.

C. Check the backpressure to the CES, SRS or AES suppressor and ensure that it is approximately 40 psi.

D. Check the system backpressure.

1. If the total system pressure has decreased to a lower value after installing the CR-TC, bypass the CR-TC eluent channel by coupling the **TO CR-TC ELUENT IN** (red) line to **TO CR-TC ELUENT OUT** (yellow) line and check the backpressure.
2. If the system pressure is higher (without the CR-TC) than before (with the CR-TC), this suggests that the CR-TC has an internal leak. Verify the pressure drop by reconnecting the CR-TC eluent channel. If the pressure is lower, the CR-TC must be replaced.

5.4 Leakage

A. Always operate analytical RFIC-EG systems with the system backpressure between 2000 – 5000 psi (2,000 – 3,000 psi in conjunction with older non high-pressure ion chromatography (HPIC) systems such as the ICS-2100, ICS-5000 and earlier). Lower the backpressure if the system pressure exceeds the recommended maximum backpressure. Check the pressure restrictor after the Degas module. Capillary RFIC-EG systems should be operated between 1000-5000 psi.

B. If leakage is observed at the **Regen In** and **Eluent Out** fittings where the electrodes are located, do not tighten the fittings. Replace the CR-TC unit.

C. If the tubing pops from a fitting during high pressure operation, the tubing may be deformed. The fitting should be removed. For analytical systems, cut new tubing using the tubing cutting tool (P/N 049584) and remake the fitting. Do not cut tubing on capillary systems; replace tubing with factory pre-cut tubing. All fittings should be finger tight plus 1/4 turn.

5.5 Lower System Pressure

A. If the total system pressure is changed to a lower value after the CR-TC was installed. Bypass the CR-TC eluent channel by coupling the **TO CR-TC ELUENT IN** (red) line to **TO CR-TC ELUENT OUT** (yellow) line and check the backpressure.

B. If the system pressure is lower (without the CR-TC) than before (with the CR-TC) examine individual components of the system (including pump and consumables) and ensure that they are working correctly.

C. If the system pressure is higher (without the CR-TC) than before (with the CR-TC), this suggests that the CR-TC has an internal leak. Verify the pressure drop by reconnecting the CR-TC eluent channel. If the total system pressure is lower, replace the CR-TC unit.

5.6 High Pressure CR-TC (Eluent Channel)

If the CR-TC develops a pressure > 100 psi in the eluent channel, the column inlet bed support of the CR-TC may need to be replaced. To change the inlet bed support assembly, refer to the following instructions, using one of the two spare inlet bed support assemblies included in the Ship Kit. Be sure to filter DI water used for eluents before use to eliminate the DI water as a source of particulates.

A. Disconnect the CR-TC column from the system.

B. Using two open end wrenches, carefully unscrew the inlet (top) column fitting.

C. Turn the end fitting over and tap it against a benchtop or other hard, flat surface to remove the bed support and seal assembly. If the bed support must be pried out of the end fitting, use a sharp pointed object such as a pair of tweezers, but be careful that you **DO NOT SCRATCH THE WALLS OF THE END FITTING.** Discard the old bed support assembly.

D. Place a new bed support assembly into the end fitting. Make sure that the end of the column tube is clean and free of any particulate matter so that it will properly seal against the bed support assembly. Use the end of the column to carefully start the bed support assembly into the end fitting.

Product	**(P/N)**
Bed Support Assembly	042955
End Fitting	052809

CAUTION

If the column tube end is not clean when inserted into the end fitting, particulate matter may obstruct a proper seal between the end of the column tube and the bed support assembly. If this is the case, additional tightening may not seal the column but instead damage the column tube or the end fitting.

E. Screw the end fitting back onto the column. Tighten it finger tight, then an additional 1/4 turn (25 in x lb). Tighten an additional 1/4 turn further only if leaks are observed. If a leak still is observed, remove the end fitting and re-clean the sealing surfaces.

F. Reconnect the column to the system and resume operation.

CAUTION

Do NOT replace the CR-TC outlet bed support in the CR-TC Eluent Out port.

5.7 High Pressure CR-TC (Regen Channel)

If the CR-TC develops a pressure > 20 psi in the Regen channel due to particulate matter, then

A. Fill a 5 mL syringe with DI water and push 5 mL of DI water into the CR-TC **Regen Out** port. If liquid flows out of the **Regen In** port, then the particle has been dislodged.
B. Reverse the flow by pushing 5 mL of DI water from the **Regen In** port to the **Regen Out** port.
C. If liquid does not flow out of the Regen ports in step A or B, the CR-TC Trap Column must be replaced.

5.8 Blockage Between Suppressor and CR-TC

If no gas stream is observed out of the SRS/AES suppressor when the CR-TC is installed and powered,

A. Check for leaks.
B. The CR-TC Regen flow may be blocked, troubleshoot following the steps in Section 5.7.
C. Check whether the EG Degas Assembly has developed high pressure in the **REGEN IN** (**SRS WASTE IN**) or **WASTE OUT** channel.
D. Check if the SRS/AES has developed high pressure in the regenerant channel. Refer to appropriate suppressor Product Manual.

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.

6. Clean-Up

6.1 CR-ATC 600, CR-ATC 500, CR-ATC, and CR-ATC (Capillary) Cleanup

The CR-ATC 600, CR-ATC 500, CR-ATC and CR-ATC (Capillary) for normal day-to-day operation do not require a cleanup. However, if the CR-ATC is exposed accidentally to high levels of anionic contaminants or is converted from the OH^- form to other anionic forms such as carbonate then the device may require a cleanup using 2.0 M NaOH.

A. Disconnect all the lines to the CR-ATC.
B. Connect a line from the **Eluent In** port to the **Regen In** port on the CR-ATC. Direct the **Regen Out** port to waste.
C. Prepare a fresh solution of 2.0 M NaOH from a 50% w/w NaOH solution (available from Fisher Scientific Catalogue No. SS254) with at least the following purity specifications: iron < 5 ppm, Chloride < 0.005%; and sodium carbonate $\leq$ 0.1%.
D. Use the Trap Column / Suppressor Clean-up Kit (P/N 059659) to deliver 100 mL of 2.0 M NaOH solution through the **Eluent Out** port of the CR-ATC column, or 10 mL to a CR-ATC capillary column. Do not use the analytical pump to deliver this solution as it may be difficult to remove the residual NaOH from the pump heads.
E. Rinse the CR-ATC unit with 10 mL (1.0 mL for CR-ATC Capillary) DI water before plumbing it back into the system.

6.2 CR-CTC 600, CR-CTC 500, CR-CTC III and CR-CTC (Capillary) Cleanup

The CR-CTC 600, CR-CTC 500, CR-TC III and CR-CTC (Capillary) for normal day-to-day operation do not require a cleanup. However, if the CR-CTC is exposed accidentally to high levels of cationic contaminants or is converted from the hydronium ion form to other cationic forms such as ammonium, then the device requires a cleanup using 1.0 M methanesulfonic acid (MSA).

A. Disconnect all the lines to the CR-CTC.
B. Connect a line from the **Eluent In** port to the **Regen In** port on the CR-CTC. Direct the **Regen Out** port to waste.
C. Prepare a fresh solution of 1.0 M MSA from a concentrated MSA solution.
D. Use the Trap Column / Suppressor Clean-up Kit (P/N 059659) to deliver 100 mL of 1.0 M MSA solution through the **Eluent Out** port of the CR-CTC column or 10 mL to a CR-CTC capillary column. Do not use the analytical pump to deliver this solution as it may be difficult to remove the residual MSA from the pump heads.
E. Rinse the CR-CTC unit with 10 mL (1.0 mL for CR-CTC Capillary) of DI water before plumbing it back into the system.

NOTE

Please note that the CR-TC is a consumable and should be replaced every year.

Appendix – Specifications

Dimensions:	(H x W x L) 5.1 cm x 5.5 cm x 8.4 cm (2.0 in x 2.15 in x 3.3 in)
Weight:	50 g (0.13 lb.)
Current Output:	< 125 mA
Void Volume:	< 100 µL (Analytical)
	< 2 µL (Capillary)
Maximum Backpressure:	5,000 psi (eluent channel)
	100 psi (regen channel)